

# ANTARCTIC

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

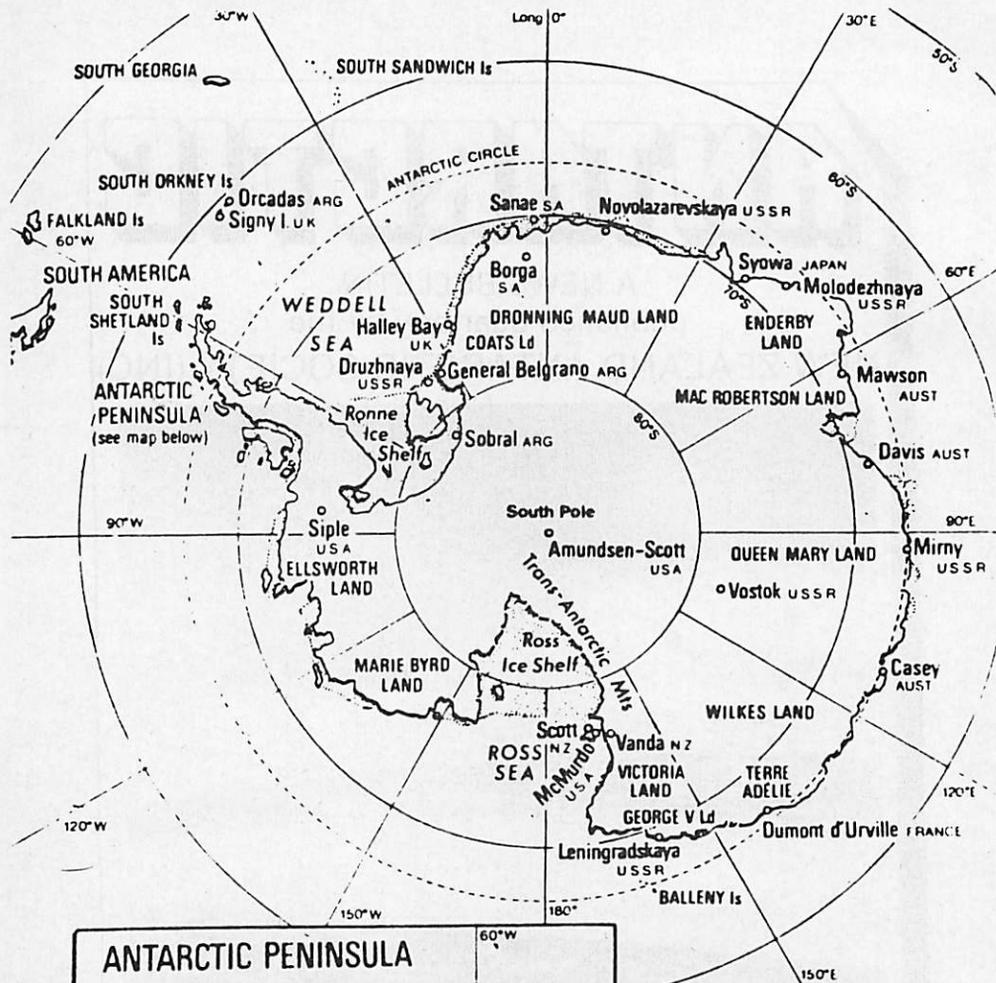


Hallett Station, on the coast of Northern Victoria Land, where New Zealand will have an ornithological research team this summer. The joint United States-New Zealand station, shown here as it was in 1963 with Mt Herschel (3335m) in the background, was built in 1957, manned all the year round until a fire in 1964, and closed as a summer station in February, 1973.

Antarctic Division photo

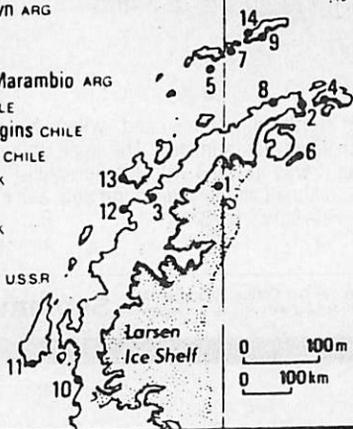
**Vol. 9, No. 11**

Registered at Post Office Headquarters,  
Wellington, New Zealand, as a magazine. **September, 1982**



## ANTARCTIC PENINSULA

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



## ANTARCTICA

0 500 1000 Miles

0 500 1000 Kilometres

### ABBREVIATIONS

ARG ARGENTINA  
AUST AUSTRALIA

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

# ANTARCTIC

(successor to 'Antarctic News Bulletin')

**Vol. 9, No. 11. 107th Issue. September, 1982**

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## **CONTENTS**

### **ARTICLES**

GRANITE HOUSE 416-417

### **POLAR ACTIVITIES**

NEW ZEALAND 378-392

UNITED STATES 393-397

JAPAN 398

WEST GERMANY 399-401

FRANCE 402-403

NORWAY 403

UNITED KINGDOM 404-406

BRAZIL 407

POLAND 414-415

CHILE 415

### **GENERAL**

MINERAL RESOURCES 408

MARINE RESOURCES 409

WHALING COMMISSION 410-411

TRANSGLOBE 412

TOURISM 413-414

OBITUARIES 419

ANTARCTIC BOOKSHELF 420

ISSN 0003-5327

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# NEW ZEALAND PLANS FOR SEASON

New Zealand's Antarctic research programme for 1982-83 includes scientific and logistic preparations for the planned 1983-87 offshore drilling project, Cenozoic Investigations in the Ross Sea (CIROS). This will be the principal research project for several seasons, and New Zealand scientists will work on it with many guest scientists from the United States, Japan, and Australia.

After more than 10 years New Zealand will have a research team at Cape Hallett, the former joint United States-New Zealand station established in 1957, and closed as a summer station in 1972. Ornithological research there will be part of New Zealand's contribution to the final season of the three-year International Survey of Antarctic Seabirds (ISAS).

Three of the principal scientific events this season will be international in nature. New Zealanders will take part in or support projects with United States, Japanese, and Australian scientists in the dry valleys, and on Mt Erebus. There are nine guest scientists from England, Scotland, Japan and Australia in the programme, and observers from the People's Republic of China and Italy.

*Publication of the September issue of "Antarctic" has been delayed because of the Editor's absence overseas. Readers will find that some reports may refer to events early in October.*

This season the New Zealand programme will call on some 200 scientists and support staff. Most of the research will be done in the McMurdo Sound and dry valley regions, but there will be ornithological and oceanographic projects along the Northern Victoria Land coast and in the Ross Sea.

There is only one remote field project in the programme. A New Zealand Geological Survey team will operate with motor toboggans in the Terra Nova Bay — Inexpressible Island region of Northern Victoria Land. It will be flown to

the Browning Pass area behind the bay by a United States Navy Hercules aircraft.

All the continuous long-term seismic, geomagnetic, ionospheric, and meteorological programmes will be maintained at Scott Base. Other research in the McMurdo Sound — dry valley area will cover fish physiology, marine biology, ornithology, oceanography, soil studies, geophysical surveys, hydrology-glaciology, and geochemistry. Scientists from four universities will undertake a number of field research projects listed elsewhere in this issue.

Men and women from the Antarctic Division, Ministry of Works and Development, Geological Survey, Geophysics Division, Oceanographic Institute, Soil Bureau, Physics and Engineering Laboratory, Meteorological Service, Institute of Nuclear Sciences, Lands and Survey Department, and National Museum, will work on a wide range of projects. Army construction teams will continue the Scott Base rebuilding programme, and Post Office riggers will check aerial installations.

CIROS, which will be co-ordinated by the Antarctic Division and Victoria

University of Wellington, is planned to obtain more knowledge of the Cenozoic history of the McMurdo Sound area which encompasses the growth of the Antarctic ice sheet and the rise of the Transantarctic Mountains. Offshore drilling from a platform on the sea ice of McMurdo Sound in the 1975-76 and 1979-80 season failed to reach Cenozoic sub-bottom sediments. CIROS will be an extension and refinement of the earlier efforts.

Dr Peter Barrett, director of the VUW Antarctic research centre, is the principal investigator for CIROS. Scientists from many organisations in New Zealand and the United States will also contribute their expert knowledge to the project. Ohio State University and the University of Northern Illinois scientists in particular have worked with New Zealand teams on earlier drilling projects.

Acute drilling is expected to be done in the 1984-85, 1985-86 and 1986-87 seasons. It is hoped to recover 280m to 550m sub-bottom cores. These will enable a study to be made of the sedimentary, climatic, and tectonic history of the region before there was ice in Antarctica, and during the early development of the ice sheet. Scientific results of the drilling will be useful in assessing the hydrocarbons in the McMurdo Sound area although that is not the aim of CIROS.

### DRILL SITES

This season and next season geological, geophysical, and glaciological studies will continue on the western side of McMurdo Sound to gain more information for determining the precise locations of the drill sites. At present the sites are expected to be 10km off Butter Point at the mouth of New Harbour, and 20km off Cape Roberts near Granite Harbour.

Logistic support preparations will be the main purpose this season. Analyses will be made of base camp sites on the piedmont near Butter Point and Cape Roberts, fuel supplies, base camp and site buildings, vehicle support needs, and power generation equipment. An MOWD drilling superintendent, Jim Gupwell, and two Geophysics Division

drillers, Richard Gallagher and David Clemence, will assess the condition of the drilling rig and equipment now stored at McMurdo Station.

An extensive drilling programme using a New Zealand drill will undertake coring of sediments in the Lower Taylor Valley. The project is one of the three international events in the programme. It is essentially a refinement of the Dry Valley Drilling Project (DVDP) completed in the mid 1970's and will concentrate on coring sediments laid down during the various epochs of Ross Sea glaciation. Investigators from the United States Geological Survey and the University of Maine, and the University of Waikato, will be supported by a New Zealand drill crew, and logistic support will be a U.S.-N.Z. concern.

### COAL STUDIES

Three coal geologists, two Australian and one New Zealand, will carry out a detailed mapping survey of coal measures found in the Beacon Supergroup Formation of Shapeless Mountain and Mt Fleming at the head of the Wright Valley. Dr John Bryan and Kerry Whitby are guest scientists from the Antarctic Coal Measures Study Group of New South Wales in this international project. Steven Edbrooke, of the Geological Survey, and Simon Carr, an Antarctic Division field assistant, complete the team.

Samples will be collected for laboratory analysis to determine the chemical composition and character of the coals. This project will continue next season, and at some stage a New Zealand drill will be used to core unoxidised coal seams.

In the third international project four New Zealanders will work on Erebus in the third and final season of the International Mt Erebus Seismic Study (IMESS). This project was conceived by Dr Philip Kyle, of the New Mexico Institute of Mining and Technology, who has worked on Erebus for several years. He is a New Zealand-born geologist. His team will include scientists from the Geological Survey, Victoria University of Wellington, University of Alaska, Japanese National Institute of Polar Research, and University of Melbourne.

A VUW seismologist, Dr Ray Dibble, will carry out seismic observations around the summits caldera. Seismometers have been set up on Abbott Peak, Hooper's Shoulder, above Terra Nova Saddle, and on nearby Mt Terror, as well as near the summit cone. Seismic signals are recorded at Scott Base for interpretation as a means of gaining an insight into the internal mechanisms of the volcano's magma chamber and associated eruptions and earthquakes.

### LAKE WATCH

Surveillance from the crater rim of the lava lake of associated eruptive activity, and petrologic examination of material erupted from the active crater will also be undertaken. Peter Otway, of the Geological Survey, who has installed and monitored a network of survey markers round the summit caldera of the volcano to detect the nature and rate of deformation during the last two seasons, will continue his studies.

This season his resurvey is expected to disclose whether there has been measurable volcanic or tectonic deformation near the the main crater, and the rate at which the ground immediately north-east of the summit but is deforming. A Geological Survey surveyor, Steve Currie will work with Peter Otway, and Lindsay Bell, one of the snowcraft and survival team, will be responsible for safety aspects.

Dr Broady, of the University of Melbourne, who was invited to join the University of Canterbury microbiology team at Cape Bird and in the dry valleys, will join the Erebus team later in the season. As a phycologist he will continue the taxonomic-botanical studies of the fungi and blue-green algae in the warm soil and fumaroles of the summit area. These were begun by University of Waikato botanists several season ago.

An attempt to complete detailed geological mapping of the Precambrian-Early Paleozoic metasedimentary and granitoid rocks will be made by the party which will work in the Terra Nova Bay — Inexpressible Island region of Northern Victoria Land from late October to the end of January. Dr David Skinner, of the Geological Survey, who will lead the party, began this work in 1962

and completed half of it by the 1969-70 season. With him will be Colin Brodie, an Antarctic Division geologist, Shaun Norman, an Antarctic Division field leader, and Chris Morris, field assistant.

Soils in areas to the north of the main McMurdo Oasis will be investigated by Dr Graeme Claridge and Iain Campbell, of the Soil Bureau. If old, highly weathered soils are found, they could be correlated with the soils of the Asgard Range and the head of the Darwin Glacier, where old soils dating back almost to the time of the onset of glaciaion in Antarctica have been found.

During January the two soil scientists will work in six areas: Robinson Peak, Willett Range; Coombs Hills — Mt Brooke; Mt Perseverance, Lower Mackay Glacier; Elkom Ridge; Battleship Promontory; Lake Balham, Victoria Valley. They will also investigate permafrost and buried soils in the Asgard Range where ridges of moraine that appear to have been deposited by a very early movement of ice up the Wright Valley. A knowledge of the stratigraphy of the moraine deposits in the area would add substantially to understanding of the early glacial history of the region.

### OIL SPILLS

For a long time the area around McMurdo Station and Scott Base has been subjected to human influence, and already shows considerable mechanical disturbance. The influence of oil spills, diesel smoke, and other chemical pollutants may not be so immediately obvious. Therefore Dr Claridge and Iain Campbell plan to sample some soils near the two bases in order to assess the effect of human occupation, particularly the build-up of non-degradable materials.

Tests of the usefulness of remote sensing, and in particular enhanced satellite imagery, as a means of predicting the distribution of weathered soils in Antarctica, will also be made by the soil scientists. This will be done in conjunction with the soil examination in the Mackay Glacier region. Predictions made before the field work, based on available imagery, will be compared with the actual situation as found.

Vanda Station in the Wright Valley will be operated for the summer only. But the living quarters will be upgraded to prepare for occupation by a winter team in 1984. This season a team of three led by Ron Garrick will continue a programme of daily meteorological observations, record solar radiation, and measure wind, temperature, and pressure variations above the valley floor.

Support for New Zealand and United States field parties operating in the dry valleys or on the edge of the Polar Plateau will be provided by Vanda. It will also support the hydrology and glaciology programme which will be carried out in the dry valleys by Trevor Chinn (glaciology) and Ralph Dickson, of the Ministry of Works and Development, assisted by Trevor Butler, an Antarctic Division field assistant.

This team will continue the monitoring programme that documents long and short term climatic variations in the dry valleys by studying the flows of the Onyx River and its tributaries, measuring the levels of nine enclosed lakes, and making mass balance and ablation measurements on selected glaciers. The glacial measurements are to determine longer term climatic variations (5-100 year term).

Measurements of lake levels at the beginning and end of summer will be continued at Lakes Vida, Vanda, House, Joyce, Bonney, Henderson, Hoare, Fryxell, and Don Juan Pond. There is an experimental recorder installed at Don Juan Pond to record winter water levels as the high saline content prevents winter freezing. Lakes Vanda, Joyce, Bonney, Hoare, and Fryxell only will be drilled to obtain accurate early season water levels.

### ICE SAMPLES

Mass balance measurements will be continued on the Heimdall Glacier, and ice samples will be taken from a traverse along the glacier surface for analysis of oxygen isotope ranges to estimate palaeo-temperature change. Comparative ablation measurements will be continued at the margins of one inland glacier (Wright Upper) and two coastal glaciers (Clark and Wright Lower).

Anomalous ice masses will be investigated on the snouts of the Lower Victoria, Lower Wright, and Jeremy Sykes Glaciers.

To determine the isostatic loading of Ross Island gravity observations and associated seismic soundings will be made along a line between Windless Bight and Minna Bluff by a team from the Geophysics Division headed by Tim Stern. Gravity observations will also be made on the island.

As part of a geophysical survey of the McMurdo Sound area gravity, magnetic, and seismic soundings will also be made on and about the Dailey Islands. This joint programme with VUWAE 27 is to assess the suitability of the Dailey Islands as a future drilling programme. Gravity observations will also be made west from the islands to Cape Chocolate and Salmon Hill.

Phytoplankton studies in McMurdo Sound will be made by two scientists from the Oceanographic Institute. Dr Derek Burns and John Hunt, assisted by two Antarctic Division field assistants, David Wills and Tony Parker, will work from late October to early November sampling the water column under the sea ice in McMurdo Sound through a series of holes up the centre of the sound.

Early in February John Hunt and another oceanographer, John Mitchell, will return to Antarctica to join a cruise by the United States Coast Guard icebreaker Glacier. They will take samples in open water areas while the Glacier is in McMurdo Sound, and also at each degree of latitude on the way back to New Zealand.

### HISTORIC HUTS

Preservation and future management of historic sites in the Ross Dependency will be the concern of a team from the National Museum and the New Zealand Antarctic Society this season. Jack Fry, a National Museum conservator, and Gavin Dougherty, of the Chemistry Division, DSIR, who is a member of the Wellington branch of the Antarctic Society, will work at the three historic huts on Ross Island.

For some years the DSIR Physics and Engineering Laboratory and the Depart-

ment of Lands and Survey have been exploring the uses of Antarctic Landsat images, refining the reproduction, and making specific enhancements. This summer Dr Ian Thomas, of PEL, will carry out radio-metric work near the Hut Point Peninsula of Ross Island, and in co-ordination with the United States receiving centre at McMurdo Sound. He will be assisted by a Scott Base laboratory technician, and the project will include measurements of the surface density of a number of different types of packed snow that can be differentiated on Landsat imagery at locations such as Arrival Heights, Crater Hill's environments, and local sea-ice regions.

Four of the nine scientists from other nations who have been invited to join the New Zealand programme this season are from the Japan Polar Research Association. Once again the team will be lead by Dr Tetsuya Torii, and will continue geochemical studies in the dry valleys to obtain more information about the origins of salts in the fresh and highly saline lakes of the area. In addition samples of glacial and Polar Plateau ice, and atmospheric particles (aerosols) will be collected to assist with the studies.

Two chemists, Dr Shyu Nakaya (Hiroasaki University) and Dr Noriyasu Madsuda (Hokkaido University) will work out of Vanda Station at Mt Fleming, the upper part of the Victoria Valley, and in the northern part of the Labyrinth area near the terminus of the Upper and Low Wright Valleys. This season Dr Torii will have a special field assistance — his son, Nobuya Torii.

### **SURVEY WORK**

As in past seasons Lands and Survey Department surveyors will provide assistance to a number of New Zealand and United States projects in the McMurdo Sound area and the dry valleys. They will be associated with the Scott Base rebuilding project, the McMurdo Ice Shelf movement survey, drilling and glaciology in the dry valleys, and Erebus Ice Tongue dynamics. A joint project with the United States Geological Survey will be continuance of the 1:500,000 mapping series of the dry valleys.

This summer a team of up to 34 New Zealand Army and Ministry of Works and Development tradesman will be engaged on another stage of Scott Base rebuilding programme, which began in the 1976-77 season, and is expected to be completed in another two years. An advance party flew south on August 24 to make an early start on the interior work of the kitchen and mess block completed last season.

Next month the rest of the team will start work on the the fourth stage of the rebuilding programme — a new command centre building which will house the Post Office, general administration offices, and telecommunications system. Also the Vanda Station sleeping quarters will be replaced by an eight-man hut divided into two rooms, and the mess block will be relined and insulated.

Courses in basic snowcraft and survival techniques will be provided for United States and New Zealand air crews, Coast Guard icebreaker crews, and American and New Zealand research and support staff. An Antarctic Division field leader and two field assistants will conduct the course. For the first time since 1973 a United States mountain instructor, David Lasorsa, will assist the three New Zealand instructors.

### **FILM TEAMS**

New Zealand and Japanese film teams will work from Scott Base this summer. Under the directorship of Koreyoshi Kurahara, a team from the Fuji Telecasting Company will shoot sequences with the Scott Base dog team for a major feature film about the abandonment of 15 dogs at Syowa in 1958, and the survival of two of them through the winter. Two members of the base winter team, Gary, Bowcock (dog handler) and Peter Nelson (mechanic) and next year's dog handler, Bill Eaton, will assist the film team.

Last season the Japanese visited Scott Base and began shooting sequences with the dogs and Gary Bowcock. This season they will continue the project, filming dogs and Emperor penguins at Cape Crozier, and the team heading across McMurdo Sound for the Blue Glacier.

A TVNZ film crew will visit Scott Base and the dry valleys for three weeks in January to make several short documentaries for the programme "Science Express," and a longer documentary about the dry valleys and

some of the New Zealanders working there. Members of the team are Dennis Harvey (director), Graham Smith (cameraman), Ian Miller (sound recorder) and Ken Hickson (science writer).

## Winter team at Scott Base

A 37-year old police inspector, Mr. J. M. Thurston, has been appointed officer-in-charge at Scott Base for the 1982-83 summer season of the New Zealand Antarctic research programme. He is a district operations inspector in Wellington, and is responsible for search and rescue, emergency, and civil defence operations.

Mr Thurston has had 19 years service with the New Zealand police. In 1967 he was in a New Zealand police unit which served with the United Nations contingent in Cyprus.

Vanda Station's leader next summer will be Mr R. S. Garrick, of Gore. He is a 44-year-old carpenter, and worked at Scott Base as an assistant maintenance officer-carpenter in the 1969-70, 1978-79, and 1979-80 summers.

Ten men will winter at Scott Base through 1983. One, Mr S. P. Johnson, worked at Scott Base during the 1980-81 summer. Five of the men are from the North Island, and five from the South Island. Their ages range from 22 to 35.

Members of the winter team are:

**A. L. Pemberton** (32), Arrowtown. Base engineer. He is a Ministry of Works mechanic with the Clutha Valley development scheme, and has served as a ship's engineer.

**D. J. Taylor** (23), Burnham, Chef. He is a New Zealand Army corporal at Burnham Military Camp near Christchurch.

**K. J. Kirkness** (34). Invercargill. Fitter-mechanic. He is a sole charge mechanic with a transport company.

**N. L. Wear** (35), Auckland. Fitter-electrician. He is an electrical contractor with 20 years' experience.

**I. M. Stevenson** (27), Christchurch. Technician. He spent four years in the Royal New Zealand Air Force, and works for an electronics firm.

**A. E. Harrall** (22), Wellington. Technician. He has spent 12 months at the sub-Antarctic weather station on Campbell Island, and works for the Civil Aviation Division, Ministry of Transport.

**D. G. Martin** (22), Wellington. Technician. He is a technician with the Broadcasting Corporation.

**R. C. Johnson** (31), Dunedin. Senior Post Office technician.

**S. P. Johnson** (23), Napier. Senior Post Office clerk. He worked at Scott Base in the 1980-81 summer.

**W. D. Eaton** (30), Auckland, Field leader-dog handler. He is a wild animal keeper at the Auckland Zoo, and is concerned with the breeding of animals, including polar bears.

## Powerhouse fire at Casey

Some delays in the rebuilding programme at Casey Station was caused by a fire which broke out in the new powerhouses on the afternoon of June 11. Station staff managed to keep the fire contained although they had to battle for two hours in high winds and freezing temperatures.

Damage was restricted to metal and foam panels which will be replaced when Casey is relieved later in the year. No-one was injured in the fire, which started during welding operations, and the power supply from the base was not affected.

## SUMMER RESEARCH PROJECTS

New Zealand scientists will work in the Terra Bay Nova region of Northern Victoria Land this summer at Cape Hallett, from an icebreaker in the Ross Sea, and on Ross Island. Others will work on Mt Erebus, in the dry valleys of Victoria Land, and in McMurdo Sound. They are all members of field parties in the Antarctic research programme for the 1982-83 season, which, including support and construction activities, will call on the services of up to 200 men and women.

Scientists from four New Zealand universities will conduct research projects, and the research programme will also draw on staff from the Antarctic Division, Ministry of Works and Development, Geological Survey, Geophysics Division, Soil Bureau, Oceanographic Institute, Physics and Engineering Laboratory, Lands and Survey Department, Meteorological Service, Post Office, New Zealand Army, and Royal New Zealand Air Force. New Zealand scientists will also work with guest scientists from Australia, Britain, Japan, and Italy.

Men and women in the programme will work at or from Scott Base, on the sea ice in McMurdo Sound, at Cape Bird, and in the Taylor and Wright Valleys. They will work with Americans and Japanese at the summit of Mt Erebus, and with Australians and Japanese and Americans in the dry valleys.

Vanda Station in the Wright Valley 130km from Scott Base will be operated again this season by a team of three men led by Mr Ron Garrick. They will provide logistic support for New Zealand, Australian, and Japanese field parties, and also meteorological information. Field stations at Lake Fryxell in the Taylor Valley and at Cape Bird will also be used by New Zealand field parties.

There are six women in the programme this season. Isobel Gabites will work with a geological party from Victoria University of Wellington. It will operate mainly at Shapeless Mountain and in the Allan Hills, and also in the Miers Valley, and at Mt Bastion and Portal Mountain.

A biologist, Jeni Bassett, will work at Cape Bird with a party led by Dr

Laurence Greenfield, of the botany department, University of Canterbury. She will assess the age of Adelie penguin colonies, and also take part in censuses of rookeries at Cape Bird and Cape Royds.



**RON GARRICK**

In McMurdo Sound another woman, Tracey Osborne, who is a University of Canterbury B.Sc. honours student, will take part in another stage of the long-term study of marine pelagic and epontic ecosystems directed by Professor G. A. Knox, of the zoology department. The party plans to work off Cape Armitage, in the centre of the sound, and at New Harbour.

Members of the summer support staff at Scott Base are Roslyn Taylor and Diane Whitehead, who will do general duties during the summer. Last summer the Post Officer has a woman clerk at the base for the second time. The third woman clerk is Ruth Lineham.

Last season women were included for the first time in the youth group which spent three weeks at Scott Base. This season Katharine Dean, an 18-year-old Ranger scout from Blenheim, is one of the three members of the group. The others are Peter Carpenter, a Venturer scout at Twizel, and Stephen Wallis, who is a sea cadet in Christchurch. Both are 18.

### SCOTT BASE

**J. M. Thurston**, Wellington, Officer-in-charge.

**G. L. Woodhead**, Paeroa. Deputy officer-in-charge. He is a 37-year-old primary school teacher.

**J. L. Miller**, Papakura. Storekeeper.

**A. W. Stone**, Auckland. Assistant maintenance officer-mechanic.

**K. R. Forbes**, Mt Cook. Assistant maintenance officer-carpenter.

**G. A. Withington**, Invercargill. Assistant maintenance officer-carpenter.

**J. C. Sandys**, Auckland. Assistant maintenance officer-carpenter.

**I. D. McKellar**, Ohakea. Meteorological observer.

**K. Westerskov**, Dunedin. Information officer.

**J. R. Stanley**, Auckland. Assistant chef.

**Roslyn Taylor**, Motueka. General duties.

**Diane Whitehead**, Waiuku. General duties.

**R. J. Silcock**, Hamilton. Post Office technician.

**A. R. Mayes**, Paekakariki. Postmaster (summer).

**Ruth Lineham**, Westport. Post Office clerk.

### VANDA STATION

**R. S. Garrick**, Gore. Leader.

**D. T. Melville**, Timaru. Assistant maintenance officer-field assistant.

**R. J. Newland**, Paraparaumu. Meteorological technician (October-December).

**W. N. Robinson**, Auckland. Meteorological technician (December-February).

University projects are outlined elsewhere. Other projects and their participants are:—

**Ministry of Works and Development.** Glaciology and hydrology in dry valleys. T. J. Chinn and R. Dickson, T. Butler (field assistant).

**Geological Survey.** Geological mapping in Terra Nova Bay region--Inexpressible Island. Dr D. N. B. Skinner (Geological Survey), C. Brodie (Antarctic Division geologist), S. Norman (field leader), C. Morris (field assistant).

**Geophysics Division.** Gravity observations and seismic soundings on Ross Island and Dailey Islands, and on line between Windless Bight and Minna Bluff. T. Stern and M. Broadbent (Geophysics Division), B. Smith (Antarctic Division field assistant).

**Soil Bureau.** Investigation of soils in Mackay Glacier region and Asgard Range, and sampling near Scott Base and McMurdo Station to assess effect of human occupation. Dr G. Claridge, I. Campbell.

**Oceanographic Institute.** Phytoplankton studies in open water and under sea ice of McMurdo Sound. Dr D. Burns, B. Hunt (O.I.), D. Wills, T. Parker (Antarctic Division field assistants).

**Physics and Engineering Laboratory.** Landsat imagery studies near Hut Point Peninsula. Dr I. Thomas.

Continuation of upper atmosphere studies at Scott Base and Arrival Heights. Magnetic measurements and servicing of instruments at Scott Base, Cape Evans, and Vanda Station. Installation of new Scott Base ionosonde,

and scanning monochromator for stratospheric trace gas measurements. C. Roper, R. O'Neil, C. Johnston.

**Lands and Survey Department.** Four surveyors will work on a variety of projects at Scott Base, on the McMurdo Ice Shelf, and in McMurdo Sound and the dry valleys. P. Tinnelly, A. Hawke, C. Fink, L. K. Cairns.

**Meteorological Service.** Observation programmes at Scott Base and Vanda Station. Measurement of atmospheric turbidity--joint project with Dr G. Shaw, University of Alaska. Scott Base, I. D. McKellar. Vanda Station, R. J. Newland, W. N. Robinson.

**Post Office.** Check of aerial installations at Scott Base, Arrival Heights, and Vanda Station.

**Antarctic Division.** Detailed study of movement of McMurdo Ice Shelf. I. McCrae (Auckland University) in conjunction with Lands and Survey team.

Annual Adelle penguin census at Cape Royds, a site of special scientific interest, by Scott Base staff in November, December, January.

Snowcraft and survival training for United States and New Zealand staff. A. Smith (field leader), L. Bell, P. Austin (field assistants).

Scott Base staff will continue at the base and Arrival Heights the University of Canterbury mechanical engineering department's project to determine the effect and degree of atmospheric corrosion on aluminium.

**Antarctic Division-Victoria University of Wellington.** Effects of stress and isolation on Scott Base winter teams (1982 and 1983). Professor A. J. W. Taylor; professor of clinical psychology.

**International projects.** These are projects on which New Zealanders will work with scientists of other nations or guest scientists in the New Zealand programme.

Beacon Supergroup coal studies. Australian and New Zealand coal geologists will map coal measures at Shapeless Mountain and Mt Fleming. S. Edbrooke (Geological Survey), Dr J. Bryan, and K. Whitby (New South

Wales), S. Carr, Ministry of Energy (Antarctic Division field assistant).

Erebus vulcanological studies. Four New Zealanders will work around the summit of Erebus with United States and Japanese scientists in the final season of the International Mt Erebus Seismic Study (IMESS). Dr R. Dibble (Victoria University), P. Otway (Geological Survey), S. Currie (Ministry of Works surveyor), L. Bell (field assistant).

Taylor Valley drilling project. Studies of magneto-stratigraphy and sedimentology of dry valleys region. Dr C. Hendy (Waikato University), Dr P. Robinson (Antarctic Division), Drs D. Elston, H. Reick (U.S. Geological Survey), Dr G. H. Denton (University of Maine), R. Parish, J. Jenkins, G. Ryan, L. Sanson (Antarctic Division drillers).

Dry valley geochemistry. Dr T. Torii will lead a Japanese Polar Research Association team of geochemists who, with New Zealand support, will continue their chemical analyses of the dry valley lake system. S. Nakaya, N. Masuda, and N. Torii.

## Spain signs treaty

Spain became the 26th nation to sign the Antarctic Treaty this year. It acceded on March 31. Last year three nations — Italy, Papua New Guinea, and Peru — signed the treaty. Now there are 12 acceding parties and 14 consultative parties, bringing the full membership to 26.

After Spain had signed the treaty a group of sailors, scientists, and journalists, announced a plan to make a seven weeks' voyage to Antarctica in a sailing vessel called *Ides of March*. The purpose of the expedition, according to newspaper reports, was to influence public opinion and the Spanish Government as the first step towards the establishment of a Spanish base in Antarctica.

## UNIVERSITY PLANS

# Cape Hallett penguins and solar energy

Solar energy experiments in one of the dry valleys of Victoria Land, studies of the Adelie penguin rookery at Cape Hallett, and drilling in the Taylor Valley to determine glacial history, are among projects to be carried out by university scientists during the New Zealand Antarctic research programme this season. Other university parties will study algae, mosses, and lichens in the dry valleys, work on the sea ice in McMurdo Sound and examine the strata of alluvial plains formed in Victoria Land millions of years ago.

Four universities — Auckland, Waikato, Victoria, and Canterbury — will contribute teams to this summer's programme. They will work with scientists from the United States, England, Scotland, Australia, and Japan. One team will study the long-term effects of oil on the biology of Antarctic soils; another will investigate floating pollutants on the surface waters of the Ross Sea.

This season University of Canterbury scientists will work on the sea ice of McMurdo Sound, in the dry valleys of Victoria Land, in Southern Ocean waters between New Zealand and McMurdo Sound, and at Capes Bird, Royds, and Crozier. Projects will include marine biology, soil studies, and ornithology.

A major part of New Zealand's contribution to the final season of the three-year International Survey of Antarctic Seabirds (ISAS) and the 10 year BIOMASS programme will be made by scientist from the University of Canterbury. Their programme has been planned by Dr Peter Harper, who is the New Zealand co-ordinator for ISAS.

As part of the programme a team led by Graham Wilson, who has spent six seasons in Antarctica, will work for six weeks at Cape Hallett, the former joint United States — New Zealand station on the Northern Victoria Land coast. Graham Wilson, Paul Ensor, Jeni Bassett, and a Christchurch doctor, Dr Jonathan Pascoe, will be put ashore by

helicopter from the United States Coast Guard icebreaker Glacier early in January and will be picked up again about the middle of February.

## PENGUIN CENSUS

During its stay at Cape Hallett the team will make a census of the Adelie penguin rookery — the last was done in 1967 — and map its extent. A census will also be made of the Antarctic skua population, and more information on the foods and feeding of Adelie penguins will be obtained to supplement New Zealand data collected from 1963 to 1965.

Visits will be made to snow petrel and Wilson's petrel colonies to estimate their size, and nest material will be searched for Antarctic fleas. Ectoparasites will be collected from penguins, skuas, and petrels as circumstances allow.

Pelagic observations will be made during the voyage to and from Cape Hallett. Information on the distribution and numbers of birds is an important continuing part of the BIOMASS programme.

Small samples of plants, soils, and guano will be collected and photographed for Dr Laurence Greenfield, of the University of Canterbury botany department, who will conduct a soil microbiology project at Cape Bird and in the dry valleys this summer. On behalf of East German scientists collections will be made that will allow the analysis and dating of sub-fossil penguin horizons at Cape Hallett.

Dr Pascoe will conduct a small biomedical programme on renal function and handling of the electrolytes sodium and potassium at extremes of temperature at sea level in 24-hour daylight. Twenty-four hour urinary protein and sodium and potassium electrolytes will be measured in the four members of the team before they leave New Zealand, on the voyage south and twice a week at Cape Hallett.

Last summer Mr Rowley Taylor and Dr Peter Wilson, of the Ecology Division, DSIR, made an aerial survey of Adelie penguin rookeries in the Ross Dependency during a routine flight by a Hercules aircraft from McMurdo Sound to Christchurch. A similar survey is planned for the season.

After a brief visit to Cape Royds Drs Peter Taylor and Richard Sadleir, of the Ecology Division, will carry out a Hercules photographic flight at 365m. They will survey penguin colonies on Ross, Beaufort, and Franklin Islands, at Cape Hallett, on the Possession Islands, and at Robertson Bay and Cape Adare. The annual Adelie penguin census at the Cape Bird rookery will be continued this summer by a member of Dr Greenfield's team, and visits will also be made to Capes Royds and Crozier.

For five weeks the team led by Dr Greenfield will work at Cape Bird and in the dry valleys. Dr Greenfield, assisted by Tas Carryer and John Burgess, will map the plants at Cape Bird and investigate the microbiology and biochemistry of the soil-plant system. A portable video system will be used to record plant distribution.

### PLANT STUDY

Two guest scientists will work with the team. They are Dr David Wynn-Williams, microbiologist from the British Antarctic Survey, who will study the physiology of micro-organisms associated with soils and plants, and a phycologist, Dr Paul Broady, of the University of Melbourne, who will study algae.

Dr Greenfield plans to continue his investigations into the re-colonisation of an experimental site in Keble Valley,

Cape Bird, by macro and micro flora and fauna. He will attempt to determine the rates of decomposition of dead plant tissue and its components, measure the amount of nutrients in melt waters, especially nitrogen and phosphorus, perform nitrogen analysis of fresh penguin and skua excrement and other materials, and carefully assess the feasibility of preparing small oil-contaminated plots to determine the long-term effects of oil on the biology of soils in Antarctica.

Later in the season the team will move to the Blue Glacier to begin microbial work on moss areas on the south-east side near Mt Kowalczyk. Endolithic algae sites will also be investigated in dry valley locations such as Farnell Valley near the Beacon Mountains, and in the Barwick Valley. These sites will provide baseline data for comparison with the international biological programme sites on the Antarctic Peninsula.

### MARINE ECOSYSTEM

Professor George Knox and his team from the zoology department will continue their long-term study of the marine pelagic and epontic ecosystems in McMurdo Sound. The marine pelagic section is a continuation of the study which began at White Island in the 1976-77 season and was continued there in the 1978-79 season, and in McMurdo Sound in the 1979-80 season. A sea ice "epontic" (at the ice-ocean interface) algal community study will continue work begin in 1979-80.

From the middle of November to the end of January Professor Knox, Ms Tracy Osborne, and Jonathan Peacey, will work at a fish hut off Cape Armitage, on the sea ice in the centre of McMurdo Sound, and at the Dailey Islands. They will be joined early in January by Dr James Rounick, of the Institute of Nuclear Sciences.

In their studies the zoologists will compare the dynamics and productivity of the pelagic ecosystems at the three sites to estimate the input of phytoplankton and detritus to the ecosystem under the ice shelf. They will also make a stable carbon isotope study of the food sources of selected invertebrates and

fishes, and extend the 1979-80 pilot study of the feeding and energetics of the pelagic fish *Pleuragamma* to elucidate its carbon budget.

Drs Andrew von Biel, and G. Fraser, and three technicians from the physics department, Ray Borrell, Wayne Smith, and Ross Ritchie, will go south in November to complete the installation and testing of the system at Scott Base and Arrival Heights designed for study of the normal and disturbed ionospheric D-region. They will be assisted by base laboratory staff.

### ICE CORING

Waikato University's 13th expedition will continue research into the microbiology of the dry valley lakes and take part in an international drilling project in the Lower Taylor Valley with scientists from the United States Geological Survey, Arizona, and the University of Maine at Orono. A third project will include sea ice and floating glacier dynamics in McMurdo Sound, and the continuation of solar energy experiments begun at Lake Fryxell in the 1980-81 season.

In the Lower Taylor Valley drilling project the New Zealanders and Americans will look closer at the magnetostratigraphy and sedimentology of the dry valley region in an attempt to increase understanding of its Cenozoic glacial and climatic history up to 65 million years ago. Four Antarctic Division drillers, Greg Ryan, Lew Sanson, Roy Parish, and James Jenkins, using a New Zealand drill, will drill up to eight 60m holes at various locations between New Harbour and Lake Bonney.

The project, which will run from November to early January, will be a refinement of cores sampled during the Dry Valley Drilling Project (DVDP) years as well as an experimental drilling session in the Lower Taylor Valley during the 1980-81 season. It will concentrate on coring sediments laid down during the various epochs of Ross Sea glaciation.

Dr Chris Hendy will lead the Waikato team. While in the Taylor Valley region he and his two students, Laurie McLeod and Richard Ede, will investigate the

pattern of salt and nutrient discharge from the Canada Glacier and from the algal flushes in Lake Fryxell.

Dr Don Elston, of the U.S. Geological Survey, will be the principal scientist for the event, and will work with a colleague, Dr Hugh Rieck. Dr George H. Denton, of the University of Maine, with four students, and a New Zealand field assistant, Howard Conway, will continue his studies of the Cenozoic glacial history of Antarctica in the Taylor Valley and other dry valleys.

A Scottish guest scientist, Dr Rodney Herbert, of the University of Dundee, will join Dr Chris Harfoot and Paul Champion (technician) in Waikato studies of the algae, mosses, and lichens, and lake micro-organisms which are reported to play a significant role in the geochemistry of the dry valley region. From late November to early January they will work from the huts at Lake Fryxell, at Cape Bird, and other dry valley lakes such as Lakes Vanda, Bonney, and Miers.

### SOLAR HEATING

Another plastic-coated "greenhouse" will be erected this season beside the Lake Fryxell. It will be used primarily as a solar heated laboratory rather than as a place to grow plants as in previous season.

An investigation will be made of the magnitude of the organisms responsible for bacterial photosynthesis and sulphate reduction in Lake Fryxell, and sampling will be extended to other dry valleys lakes. In addition the team will assess the inter-relationships between carbon, nitrogen, and sulphur metabolism in the eutrophic lakes in the Cape Bird region.

An ice dynamics programme to determine the physical nature of wave propagation through a floating ice body will be continued by Robin Holdsworth, of the Waikato physics department, assisted by Jon Davys, of the mathematics department, and two Antarctic Division field staff, David Wills and Tony Parker. Wave energy created by Starlifter and Hercules aircraft landing on the sea ice runway in McMurdo Sound will be measured by the team.

Earlier studies of the Erebus Glacier Tongue will be continued, particularly if the tongue has not calved by the time the study begins. Robin Holdsworth's brother, Dr Gerald Holdsworth, now of Environment Canada, has predicted an imminent calving of the tongue. As there is more than one calving theory and mechanism it is important to monitor the tongue regularly and measure longitudinal oscillations and ice thickness by depth soundings.

In the 1980-81 season Robin Holdsworth began solar energy experiments at Lake Fryxell. He will continue them this summer. A solar panel will be used for further irradiation measurements and a solar boiler with a fresnel lens will enable temperature and energy inputs to be monitored continuously.

### WORK ON ICE

This summer members of the 27th Victoria University of Wellington Antarctic Expedition (VUWAE 27) will work in Northern Victoria Land, on Mt Erebus, and in McMurdo Sound. They will complete a seafloor sediment sampling programme started in 1978, measure the seismicity of Erebus, and attempt to explain the structure of Shapeless Mountain in the Wright Valley.

There are three sections in the McMurdo Sound sediments programme. The first two will run from early October to the end of November, and the third will run from late January to early February. Alex Pyne, a veteran of five previous expeditions, will lead the VUW team, and with him will be an Antarctic Division field leader, Malcolm McLeod, Dr Peter Barrett, director of the VUW Antarctic research unit, two members of the unit, Tony McPherson and Ian Paintin, and Dr Ray Dibble, a VUW seismologist.

Determination of east-west seismic refraction at Butter Point and Cape Roberts will be the first objective of the programme. It will also include collaboration with the Geophysics Division in gravity, magnetic, and seismic soundings on and about the Dailey Islands, and a gravity survey at Granite Harbour — Cape Roberts.

Seismic studies at Butter Point and Cape Roberts will help decide the drill sites on the western edge of McMurdo Sound for the proposed 1983-87 Cenozoic Investigations in the Ross Sea (CIROS) for which Dr Barrett is the principal investigator. The refraction profiles will give a further idea of the geology of the top 5km across the Transantarctic Mountain Front.

### SEDIMENT SAMPLES

To complete the seafloor sediment sampling programme Alex Pyne's team will tow a heated wannigan on a heavy duty sledge by tractor across the ice. Sediment samples will be taken using a winch and a corer dropped through the wannigan's trapdoor and holes in the sea ice. The study will be limited to safe sea ice areas but essentially will be along a line from Cape Evans to Butter Point — New Harbour, and north to Cape Roberts.

In November Dr Dribble will join the international team on Erebus to carry out seismic observations around the summit caldera. Dr Barrett, Alex Pyne, and Tony McPherson, will return to Antarctica at the end of January to join the United States Coast Guard icebreaker Glacier on a cruise in the McMurdo Sound area from February 1 to 6. They will be assisted on board by Mike Hosted, an Antarctic Division field assistant/technician and Coast Guard technicians.

During this cruise the team will take photographs and recover undisturbed large diameter (20cm) cores from several deepwater localities in the McMurdo Sound area to complete a project on mechanisms and rates of sedimentation. Another objective will be to obtain good bathymetric records from areas of prospective offshore drilling near Granite Harbour, and in other parts of the sound.

On the outward leg of the Glacier's cruise five stations in Wohlscblag and Lewis Bays will be occupied to undertake the core sampling. Another five stations will be occupied near Granite Harbour on the homeward leg.

Between 1969 and 1972 VUW field geologists studies the Shapeless Mountain Beacon sandstone sequences. Shapeless Mountain at the head of the Wright Valley is quite irregular structurally in contrast to the consistent near-horizontal stratification in the Beacon Supergroup elsewhere. The mountain also has outcrops of Mawson volcanic breccia which at Allan Hills have been interpreted as volcanic mudflow deposits.

As the two features may well be related a team led by Barry Walker will endeavour to explain the structure of Shapeless Mountain and the breccia bodies found there. Another objective will be to work out a satisfactory set of paleo-hydraulic models for Triassic alluvial plain sedimentation in Victoria Land 195 to 225 million years ago.

Barry Walker began a two-year study of alluvial plain strata at nearby Mt Bastion and in Northern Victoria Land last season. Between late October and December this season he plans to continue his Ph. D. thesis by looking at the paleo-current evidence of Shapeless Mountain to create models of the formation of the ancient alluvial plains.

There are three other members of the Antarctic research unit in the team — Isobel Gabites, Dr Russell Korsch, and Bernard Napp, and also an Antarctic Division field assistant, Mike Hosted. One section will work at Portal and Bastion Mountains while the other conducts investigations in the Miers Valley, and then at Shapeless Mountain. The whole party will reunite at Shapeless Mountain and work until mid-December when a final shift to the Allan Hills will take place.

### FISH AND COLD

For several seasons Drs John MacDonald and Rufus Wells, and their team of physiologists from the University of Auckland zoology department have been studying particular aspects of the termobiology of McMurdo Sound fishes. Mechanisms involved in long-term cold adaptation may be elucidated by looking at the metabolism and neurobiology of these fish.

This season Dr Wells will study transport in fish of the *Trematomus* species and look at their response to temperature stress and oxygen deficiency. Dr MacDonald will continue his studies of synaptic nerve function in *Trematomus borchgrevinki*, and the effects of membrane voltage and anaesthetic drugs on ion channel lifetimes.

For their research Drs MacDonald, Wells, Donald Ensor (anatomy), W. Tetens (zoology) and T. Brittain (biochemistry) will catch fish through there holes in the sea ice McMurdo Sound. They will use a fish hut at three locations off Pram Point and Cape Armitage.

A study of the *Trematomus bernacchi* population at Cape Royds will also be made by the physiologists during the eight weeks they are working from Scott Base. Last season several hundred *Trematomus bernacchi* were caught at Cape Royds through cracks in the sea ice. They were measured, tagged, and released in an attempt to gauge population, size, and local short-term migration.

This summer the same stations will be resampled. Any fish recaptured will be used to estimate annual growth rates, and to validate the use of scales for ascertaining age in the species.

### OIL SPILLAGE

A second study to gauge the extent of floatant pollutants in the Ross Sea will be made by Dr Murray Gregory, of the University of Auckland geology department. The first study was done last season from the United States Coast Guard icebreaker Glacier by towing a "neuston" net and barge during the voyage from New Zealand to McMurdo Sound.

This season Dr Gregory and Dr Mark Mabin, of the geography department, will repeat the net sampling programme between December 27 and January 16. Last season several gravel beaches along parts of the Ross Dependency were also sampled in an attempt to gauge an "oil spill vulnerability index" for the region. This season beaches missed previously will be sampled as opportunity arises to

determine floatant litter and oil retention potential, and to make observations on raised beach ridges.

Dr Gregory plans to examine the geomorphic features of possible ice-scoured submerged platforms along the coastline. This is to test a hypothesis that large quantities of sediment moving along these platforms ultimately built the spits at Capes Hallett and Adare, Possession, Franklin, and Beaufort

Islands, and other sites such as Cape Bird.

When the Glacier reaches McMurdo Sound Dr Gregory will fly back to New Zealand and Dr Mabin will do further beach geomorphology around Ross Island for the last two weeks of January. He will then join the Glacier on February 6 to repeat the towing operation between McMurdo Sound and New Zealand.

## Logistic support by two air forces

Logistic support for two Antarctic research programmes will be provided by United States and New Zealand aircraft this season. The Royal Australian Air Force will not operate through Christchurch as the agreement, for its contribution to the logistic pool was for three seasons only.

Early next month United States Air Force Starlifters will begin the summer airlift of men and materials from Christchurch to McMurdo Station. They will be joined in mid-November and early December by Hercules aircraft of the RNZAF.

New Zealand's contribution to the United States-New Zealand logistic pool has been increased this year. No. 40 Squadron will make 12 flights in Operation Ice Cube, two more than last season.

In the 1979-80 season Australia aircraft contributed to the logistic pool for the first time under an agreement which provided for Australian scientist to be flown from McMurdo Station to Casey Station by United States Navy ski-equipped Hercules aircraft of VXE-6 Squadron. In return the RAAF made flights from Christchurch to McMurdo Station.

There were six RAAF Hercules flights in the season instead of four because of the Air New Zealand DC-10 crash on Mt Erebus. Six flights were made in the 1980-81 season, and four last season.

Two RNZAF helicopter crews will be attached to VXE-6 Squadron and will fly on support missions as in past seasons. The RNZAF will also have a

team flying in the squadron's Hercules aircraft throughout the summer. RNZAF and New Zealand teams will also contribute to the logistic pool. They will work in Christchurch and at Williams Field near McMurdo Station.

## First footing at both Poles

Although the statement was corrected in 1979 the latest edition of the "Guinness Book of Records" repeats the claim that an American, David S. Porter, was the first man on record to have stood on both the South and North Poles. He was at the South Pole on December 14, 1970, and at the North Pole on April 9, 1979, but he was a trifle late both times.

Since 1961 the distinction has been held by a modest American scientist, Dr Albert P. Crary. He was at the North Pole on May 3, 1952, and at the South Pole on February 12, 1961.

In 1952 Dr Crary was one of two scientists who flew to the North Pole in a Dakota aircraft which remained there long enough for scientific studies to be made. He reached the South Pole the hard way in 1960-61 summer when he led a scientific traverse party from McMurdo Station. Dr Crary and a Soviet exchange scientist, Sveneld Evteev, drove their snotac up to the Pole Station on the afternoon of February 12.



# Budget for U.S. science programme

Scientific projects and logistic support for the United States research programme in Antarctica this season will be maintained at much the same level as last season. The National Science Foundation's total budget last season was \$66 million.

Included in the cost of the programme for the fiscal year which runs from October this year to October next year is \$13.4 million for icebreaker support previously in the budget of the Department of Transportation. The National Science Foundation, which finances and co-ordinates the whole programme, is expected to allocate more than \$50 million from the total budget for support of research projects by aircraft, icebreakers, and cargo ships, maintenance of the four American inland and coastal stations, and contract services.

This season, which began officially on October 4, about 285 scientists, including more than 30 women, and representatives of 12 other countries, will do research on the continent and in southern waters. There are 84 projects in the United States Antarctic Research Programme (USARP), and they include evaluation of Antarctica's mineral and marine living resources, drilling deep into the ice at the South Pole, and searches for vertebrate fossils and meteorites. One project of wide public interest is a study of free diving seals in McMurdo Sound to gain information about how pregnant seal communicates with its foetus, and the possible relationship of this to infant cot deaths.

In their activities the scientists will be supported by Hercules aircraft and helicopters of the Navy's VXE-6 Squadron, United States Air Force Starlifters, the United States Coast Guard's icebreakers Polar Star and Glacier, the National Science Foundation's research vessel Hero, the tanker Maumee, and the cargo ship Southern Cross. Between early October and the middle of December Air Force Starlifters, Navy and Royal New Zealand Air Force Hercules aircraft, will make nearly 40 flights south

with men and materials for the United States and New Zealand research programmes.

This summer United States and Swiss scientists will take part in a project to drill 500m into the ice at the Amundsen-Scott South Pole Station to obtain a core that will reveal information about past atmospheres and the weather and climate thousands of years ago. Tiny air bubbles in the ice will be analysed to disclose the composition of the earth's atmosphere as far back as 6,200 years. Dust in the ice will provide clues to prehistoric volcanic activity.

An electro-mechanical drill will be used to penetrate the ice-cap. Last season a similar project produced a 203m core from the polar ice.

An attempt to probe indirectly the interior of the sun by studying its oscillation or natural resonances will be made at the South Pole by Dr Robin T. Stebbins, a staff astronomer at Sacramento Peak Observatory, New Mexico. His primary purpose is to measure the long period oscillations that characterise the sun's deeper interior.

Starting in November Dr Stebbins will use a specially designed 15.24 cm portable refracting telescope on a site about 457m from the Pole Station. The telescope, which he will operate for three months, has been designed to withstand temperatures as low as minus 60 deg Celsius.

A survey of the Antarctic continental margin in the Ross Sea, which is expected to provide information about the hydrocarbon potential will be made by a marine geological field team from Rice University, Houston, Texas, working from the Coast Guard icebreaker Glacier. The survey will include taking

core samples of ancient sediments, acquiring geological samples, and constructing detailed maps of the ocean bottom.

Teams from the same university have made similar surveys on the continental margin of the Dumont d'Urville Sea between 140deg E and 150deg E, in the Bellingshausen Sea and along the Antarctic Peninsula. Last season's survey was made along portion of the continental margin in the Northern Weddell Sea and Bransfield Strait.

A search for fossils of terrestrial vertebrates at the edge of the ice sheet west of a region of ice-free valleys in Southern Victoria Land will be made this summer by scientists from Texas Tech University in Lubbock and the University of Maine at Orono. They will examine layers of sedimentary and volcanic rocks deposited in Late Paleozoic and Mesozoic times — from 270 to 135 million years ago.

Vertebrate fossils have not been found

in this part of Antarctica. To find them would help scientists to understand the geological development of Antarctica, particularly the relationship between the continent and land masses that once were adjacent to it — Africa, South America, Australia, and India.

A surveillance of Mt Erebus, the world's southernmost active volcano, will be undertaken by geologists from the New Mexico Institute of Mining and Technology in co-operation with Japanese, New Zealand, and Australian scientists. Material ejected from the volcano will be collected to study changes in the chemical composition of molten rock. Erebus contains the world's only accessible lava lake.

With helicopter support from the ice-breaker Glacier the group will also make a reconnaissance of Mt Melbourne, the only other active volcano in the Ross Sea are. One purpose of the reconnaissance will be to detect changes of cooling of the 2730m volcano.

## Starlifter's medical emergency mission

A seriously injured United States Navy construction worker in the Antarctic was flown to Christchurch on the night of September 28 and taken to hospital in the early hours of the next morning. Terry W. Busler, aged 24, of Fairland, Indiana, suffered head and back injuries on September 27 when he slipped and fell while carrying a pipe on construction work at McMurdo Station.

Arrangements for Busler to be brought back to New Zealand were made by the United States naval support force at Christchurch Airport after Lieutenant James Zurbach, medical officer with the winter team, called at 2.43 p.m. on September 27 and later discussed the injured man's condition by radio with a Christchurch neurosurgeon, Mr M. R. McFarlane. Although the sea ice runway in McMurdo Sound was ready for United States Air Force Starlifter flights to start the summer airlift on October 4 no aircraft had arrived in Christchurch.

After calls to the Philippines, Hawaii, and Australia arrangements were made for a Starlifter on a routine mission to

fly from the Royal Australian Air Force base at Richmond near Sydney to Christchurch, and then to carry out the medical emergency mission. Earlier the Royal New Zealand Air Force had offered a Hercules aircraft which remained on standby. The Starlifter reached Christchurch at 2 a.m. on September 28, and after the crew had caught up on sleep, left for McMurdo Station at 2.44 p.m.

Captain W. Dudley, a pilot with Antarctic experience, who commands the Air Force detachment at Christchurch, joined the flight crew of the Starlifter which was commanded by Colonel Robert E. Dotson. Also aboard was a United States Navy technician, Michael Clark, who cared for Busler on the flight back.

On the flight south the Starlifter carried 21,500 lbs of cargo and mail for McMurdo Station. It left on the return flight at 9.22 p.m. with the injured man and 13,799 lbs of cargo.

An ambulance was waiting for Terry Busler when the aircraft arrived at 2.45 p.m. on September 29, and took him to Christchurch Hospital.

## Welcome visitors to Ross Island winter teams

Mail from home and fresh food, were more important than the approach of spring to 89 Americans and 10 New Zealanders on Ross Island last month when flights by ski-equipped Hercules aircraft from New Zealand gave them their first direct contact with the outside world for more than six months. Temperatures were between the minus 40s and 50s when the aircraft arrived, but the delivery of 3.1 tonnes of mail plus fresh fruit, vegetables, and milk, were ample compensation for the chilly prelude to spring.

Three United States Navy VXE-6 Squadron Hercules aircraft made seven flights — one more than last year — to prepare for the United States and New Zealand scientific programmes of the 1982-82 season. Bad weather and maintenance problems delayed the schedule for one day, but all the flights of the operation, known to the United States naval support force as Winfly (winter flights) were completed before the southern spring began officially on September 1. Two flights were made on August 24, three on August 25, and two on August 27.

August 24 was a fine but really cold day. Visibility was seven miles, there was no wind, and the temperature was minus 44deg Celsius at Williams Field on the Ross Ice Shelf. It was minus 52deg on August 27 when the last aircraft returned to Christchurch. An ice fog caused by heat emissions from vehicles waiting to transport cargo and passengers to McMurdo Station and Scott Base hampered the first day's operation because of the absence of wind, but there were no undue delays.

Ross Island's winter community, which received an air drop of mail and fresh food on June 22, gave the new arrivals a warm welcome. When Winfly ended the spring population had grown to more than 250 men and two women at McMurdo Station and 22 men at Scott Base.

On their seven flights south the Hercules aircraft carried 31.35 tonnes of cargo. This included 3.11 tonnes of personal and official mail, 4.75 tonnes of fresh food, and 23.49 tonnes of general

cargo. The aircraft brought back 3 tonnes of cargo, 1.3 tonnes of mail, and 12 passengers on the return flights.

Among the 192 passengers on the flights south were technicians, equipment operators, cooks, and construction workers, who will prepare for the major airlift by Hercules and United States Air Force aircraft of men and materials for the summer. The construction team will prepare the seasonal ice runway in McMurdo Sound for the flights by wheeled aircraft which begins on October 4.

Captain Brian Shoemaker, the support force commander, flew in the first aircraft to meet the McMurdo Station winter team, and to initiate preparations for the new season. Also on the aircraft, which was flown by VXE-6 Squadron's commanding officer, Commander M. Harris, were 13 New Zealanders, one scientist, and 12 men from the Ministry of Works and Development and the New Zealand Army who will make an early start on construction work at Scott Base.

Fifty-six of the American passengers on Winfly went south to prepare for the United States National Science Foundation's summer research programme. They were Dr Mortimer D. Turner, and NSF representative, Mr R. Robbins, deputy resident manager at McMurdo Station, representing ITT Antarctic Services, contractors to the NSF for support services, and 54 members of the contractors' staff. There was also one scientist, Dr T. Delaca. He will join the team which has been studying benthic shallow water foraminifera in McMurdo Sound this winter.

## Second winter mail drop to South Pole Station

A second mid-winter mail and supply drop to 16 Americans and one Soviet exchange scientist at the Amundsen-Scott South Pole Station was made on June 22 by a United States Air Force Starlifter. The aircraft, which was refuelled in the air on its flight from Christchurch, also dropped mail and supplies by parachute into the darkness of Williams Field on the Ross Ice Shelf for 100 men and two women wintering at McMurdo Station and Scott Base.

This was the fourth winter mail and supply drop in seven years, and the second to the Amundsen-Scott South Pole Station where 15 men and two women have been isolated for more than four months. To complete the mission the Starlifter flew 5694 miles from Christchurch to the Pole and back, and was in the air for 15½ hours.

A C141B "stretched" Starlifter was flown from California to Christchurch for the mission. When it took off at 5 a.m. it carried a load of more than 12 tonnes. This included mail and cargo, and two tonnes of lettuce, celery, Brussels sprouts, carrots, radishes, tomatoes, bananas, grapes, and kiwi-fruit. The load was packed in 47 containers, 40 for McMurdo Station and Scott Base, and seven for the South Pole. Most eagerly awaited by the winter teams was 5069lb of mail, 3488lb for McMurdo Station, 1220lb for the Pole, and 361lb for Scott Base.

One KC10 tanker flew south from Auckland before the Starlifter left to carry out the mid-air refuelling operation. It delivered 67,400lb of fuel to the Starlifter beyond 60deg S. The operation was completed when the two aircraft were 40 minutes flying time from Williams Field.

By 10.28 a.m. the Starlifter was over the 1200 m drop zone which was in total darkness except for identification lights on the ice. Visibility was nil, and the temperature at ground level was minus 62deg Celsius. Only one pass over the zone was needed and all the 40 containers cleared the rear cargo ramp doors in 8.5 seconds.

Battery-powered stroboscopic lights were attached to the containers to make them easier to retrieve in the darkness, but the recovery team did not bring in the last containers until just after midnight. Minor frostbite was reported by the team because the temperature on the ice was reduced by the wind chill factor.

After completing the drop the Starlifter flew on to the South Pole. Although three passes were needed over the drop zone to parachute the seven containers the operation was completed just after 12.30 p.m., using the side parachute doors.

When the Starlifter returned to Christchurch at 8.30 p.m. its crew of 24 headed by the mission commander, Lieutenant-Colonel J. Galyen, had been in the air for 15½ hours. Colonel Galyen commanded the mission last year, and took part in the 1980 mail and supply drop to the winter teams on Ross Island.

Preparations for this year's drop were made by United States and New Zealand Army teams which packed the containers and then rigged them for dispatch from the aircraft. Two six-man crews who carried out the drop over both stations were drawn from the United States Air Force, Army, and Navy, and also included four men from the New Zealand Army.

Some grapes were squashed in the drop to the South Pole Station but they were the only real casualties in the whole operation. Lieutenant-Commander W. Asmussen, U.S.N., officer-in-charge at McMurdo Station, was pleased to be able to report the safe landing on the ice of a feather-light pavlova sent to him by his wife.

## U.S. inspection of other stations

An inspection of stations in East Antarctica will be conducted by staff of the United States Arms Control and Disarmament Agency this season in accordance with the terms of the Antarctic Treaty. Five treaty inspectors will join the United States Coast Guard icebreaker Polar Star at McMurdo Station about January 17 next year and will complete their task early in March when their final inspection is made of Georg von Neumayer Station, the new West German Base in Atka Bay, Queen Maud Land.

There are 11 stations manned by other nations along the coast of East Antarctica between Victoria Land and Queen Maud Land. Four, Leningradskaya, Mirny, Molodezhnaya, and Novolazarevskaya, are Soviet stations. Australia maintains three, Casey, Davis and Mawson, and the others are Dumont d'Urville (French), Syowa (Japanese), Sanae (South African) and Georg von Neumayer (West German).

Periodic formal inspections of station installations and equipment are permit-

ted by Article VI of the Antarctic Treaty, but the complete freedom of access principle has been exercised only 10 times since 1961. The United States inspections (1964, 1967, 1971, 1975, 1977 and 1980) have each covered from three to seven stations over a wide area. In 1980 the United States inspected Antarctic Peninsula stations. Inspections by New Zealand, Australia, and the United Kingdom (1963) and Argentine (1966) have covered fewer stations and a smaller area.

Three scientific projects will be carried out by marine biologists during the voyage of the Polar Star from McMurdo Station to Palmer Station which will complete a circumnavigation of Antarctica planned to start from Palmer at the end of December. Scientists will study near the coasts of Victoria Land, Wilkes Land, Enderby Land, and Queen Maud Land, the distribution of marine birds in relation to drill, and the distribution of marine birds and mammals in the pack ice of the eastern sector. They will also make a census of seals in the pack ice.

## Vinson Massif now lower

Antarctica's highest mountain, the Vinson Massif in Ellsworth Land, is not as high as it used to be, but remains pre-eminent on the map. United States Geological Survey calculations based on field work during the Ellsworth Mountains expedition in 1979-80, and on satellite data, show the mountain's height is 4897m not 5140m.

Since 1959-60 the elevation has been published as 5140m. The height in that season was determined during a traverse from Little America by way of Byrd Station.

Other peaks in the Ellsworth range may be trimmed down to size in the future. The Geological Survey is reworking their elevations.

## U.S. research costs

Support for the United States Antarctic research programme in the 1981 financial year by the National Science Foundation cost \$67,454,493. Science projects account for \$18,001,074, programme support cost \$37,279,619, and construction and purchases amounted to \$12,173,870.

Scientific work included the following grants: Atmospheric sciences, \$2,171,911; biological sciences, \$2,266,470; earth sciences, \$1,698,204; glaciology, \$1,063,514; oceanography, \$1,265,411; information and advisory services, \$575,664. Direct science support (costs normally included in a grant for work at an institution but provided in Antarctica from programme resources) amounted to \$8,959,900.



# Japanese oil survey in Ross Sea

A Japanese survey for geological indications of oil in the Ross Sea and the Dumont d'Urville Sea will be made this season by the Japanese Metal Mining Agency's geological survey ship Hakurei Maru. This will be the final survey of a three-year programme which began in the 1980-81 season.

Scientists from the Japanese National Oil Corporation and research institutions will take part in this year's survey which will be conducted in two stages. The first will be in the Scott Basin off the coast of Adelie Land, and the second in the Ross Sea.

Reports on the surveys go to the Ministry of International Trade and Industry which has provided funds for one of its divisions, the Agency for Natural Resources and Energy to carry out the programme. The results will be published and data is expected to be made available to other countries on a reciprocal basis.

This year the Hakurei Maru is expected to leave Funabashi near Tokyo on November 29. She will be in Sydney from December 13 to 17 and will then work in the Scott Basin off Dumont d'Urville from December 25 to January next year.

Before she starts the second stage of the survey the Hakurei Maru will be in Lyttelton from January 11 to 15. She will work in the Ross Sea from January 20 to February 12. After a stay in Sydney from February 21 to 25 she is expected back in Japan on March 11.

West Germany and France have also sent marine geological expeditions to Antarctica to investigate the geological structure of the continental margin and obtain information about the hydrocarbon potential. Similar surveys have been made in the Ross and Bellingshausen Seas by geologists from Rice University, Houston, Texas, working from United States Coast Guard icebreakers.

In the 1977-78 season scientists from the West German Federal Institute for Geosciences and Natural Resources led by Professor K. Hinz made geophysical

studies in the Weddell Sea and the South Atlantic from the 978-tonne seismic ship Explora. The programme, described as an investigation of the geological structure of the continental margin, was continued during the 1979-80 season from the Explora in the Bellingshausen and Ross Seas.

Last season the French Petroleum Institute chartered the Explora for a marine geophysical survey in the Adelie Land sector and the Ross Sea. The purpose of the survey in January and February was described in one French publication as oil research.

From Hobart the Explora sailed to work in the Dumont d'Urville Sea. She continued her survey in the Ross Sea, and returned to the New Zealand port of Bluff by way of Macquarie Island on her way back to West Germany.

## Record low at Pole

A record low temperature of minus 82.7deg Celsius was measured at the Amundsen-Scott South Pole Station on June 23. It was the lowest figure since the station was established in 1957. The previous record was 80.5 deg measured in July, 1965.

On August 24, 1960, the world's lowest temperature of minus 88.27deg was recorded at the Soviet station, Vostok, in Wilkes Land near the South Geomagnetic Pole. The lowest temperature recorded at any United States Antarctic station was minus 86.16 deg C. This was measured on July 20, 1968 at Plateau Station in Queen Maud Land, which opened in 1966 and closed early in 1969.



## GANOVEK III

# Third North Victoria Land expedition

West Germany will send a third expedition to North Victoria Land this summer. Based on the results of the first expedition, Ganovex I, in the 1979-80 season, the expedition's main aim will be to continue and finish the work of Ganovex II, which was ended before it really began because of the sinking of the *Gotland II* in December last year.

Geological and geophysical studies will be made by field parties which will be supported by helicopters and an ice-strengthened ship. Australian and United States guest scientists will join the expedition which will spend more than two months in Antarctica.

Ganovex III has been planned by the Federal Institute for Geosciences and Natural Resources (BGR) and will be led again by Dr Franz Tessensohn, who was the leader of the Ganovex I and II expeditions. The expedition's chartered ship is the 1050-tonne Norwegian Arctic research and offshore survey vessel, *Polar Queen*. She was used last season to support the West German expedition to Georg von Neumayer Station, the first permanent West German station in Atka Bay, Queen Maud Land.

To support 14 geologists and geophysicists the BGR has chartered four Hughes 500 helicopters. Two will be used mainly for fuel transport from the *Polar Queen* to the inland bases, and two will support field parties in their work out of tent camps. An additional major logistic task will be the establishment of a large kerosene fuel depot at a suitable site on the Ross Sea coast for an airborne geophysical research programme planned for the 1984-85 season.

In addition to helicopter pilots and engineers there will be three New Zealand field guides. The leader is Gary Ball, who took part in Ganovex I and II, and with him are Maurice Conway, who also worked with the first two expeditions, and Andrew Brown, of the 1980-81 Scott Base snowcraft and survival team, who was with Ganovex II.

Most of the West German scientists have worked in Northern Victoria Land

with Ganovex II, and some like Dr Tessensohn and Dr George Kleinschmidt, are veterans of both Ganovex I and II. Nearly all the scientists are from BGR; four come from the Universities of Darmstadt, Wurburg, and Kiel.

Because of commitments to the United States research programme one of the guest scientists will not work with Ganovex III for the full period. He is Dr Tom Wright, of Allegheny College, who was with Ganovex I. He was preparing to leave the United States when the *Gotland II* sank. The Australian geologist is Tom Gibson, of the University of Melbourne.

Present plans are for the *Polar Queen* to leave Wellington about December 1. Field work in North Victoria Land is expected to begin on December 15 and end by the beginning of March next year. Before the ship sails members of the field parties will take part in a snowcraft and survival course in the Mt Cook area from November 20 to 30.

Ganovex III will be split up into three successive phases. They are: (a) Geological work in the hinterland of Lady Newnes Bay on the Ross Sea coast (four weeks); (b) Geological work in the centre of the area and the Lanterman Range as initially planned for Ganovex II (four weeks); (c) reconnaissance work on the Oates Coasts (two weeks) and possibly the Lazarev Mountains.



An artist's impression of the new West German research and supply ship Polarstern in an Antarctic environment. — Hapag-Lloyd photo.

### SHIP AS BASE

For the first phase the Polar Queen will serve as a base off Lady Newnes Bay. The area is often ice-free early in the season. But ice conditions when the ship arrives will determine whether work will start in the first or second research areas.

In 1979 the Ganovex I expedition established its base camp at the foot of the Little Glacier near Mt Mulach in the Posey Range. The Little Marteen Hut will be the base for the second phase. Detailed work is planned in the Lanterman Range, especially along its contact with the Bowers Group in the east.

Work along the Oates Coast will be carried out at the end of the season. It will depend to a large extent on the ice conditions. If these are favourable an attempt will be made to reach the Lazarev Mountains and to sample the Low grade rocks of the Berg Group there. This area is to the west of the Wilson Hills.

Although United States, New Zealand, and Australian scientists did extensive work in North Victoria Land last season the main target areas for

Ganovex II are in most cases not affected. This is true mainly for the Lanterman Range in the centre of the area, and for the Oates Coast in the north.

### NEW AREA

In addition last season's international investigations resulted in directing attention to a new area of interest, the southern continuation of the Bowers Structural Zone down to the Ross Sea. Therefore this area has been included in the Ganovex III programme. The Renick Glacier geophysical project of Ganovex II could not be continued because of the scientists' other commitments.

There are eight projects in the scientific programme for 1982-83. They are:

- (1) Basement studies of the Lanterman Range and its southern prolongation down to the Ross Sea coast, mapping, metamorphism, structure, petrography.
- (2) Granites. Comparison of Granite Harbour and Admiralty Intrusives with main work in the region of overlap of the two generations.

(3) Stratigraphy of Upper Precambrian and Cambrian sediments, lithology, geochemistry and sedimentology.

(4) Volcanics in Bowers Group and Robertson Bay Group, petrology, geochemistry, mapping.

(5) Geochronology. Deduction of Ross orogenic history by dating of high and low grade rocks, and granites. Attempts to date base of volcanic pile at

Ross Sea coast.

(6) Gravimetry in profiles through Bowers and Rennick grabens across Ross Sea edge.

(7) Ross Sea edge. Structural analysis, dating of volcanism, relation to glacial events.

(8) Paleomagnetism. Construction of a sampling programme for a deduction of a polar wander curve for Antarctica.

## West German landing on Scott Island

Three West German scientists and a Canadian helicopter pilot were the first visitors to Scott Island, the tiny island at the entrance to the Ross Sea almost on the 180th parallel, last season. Visits by a United States-New Zealand scientific party and tourists from the Lindblad Explorer in January were recorded in the March issue of "Antarctic."

Scott Island at 67deg 24.5min S/179deg 55.5min E, and about 506km north-east of Cape Adare, has now had at least 108 visitors since it was discovered on Christmas Day, 1902, by Lieutenant William Colbeck, commander of the Morning, relief ship for Scott's 1901-04 expedition. The West German landing on November 24, 1981, was the second by helicopter since 1961, and the third visit in 79 years.

Last year's landing was made by members of the West German scientific expedition to Northern Victoria Land — GANOVEX II — from the Gotland II only three weeks before she sank near Yule Bay off the Pennell Coast of Oates Land. Two geologists, Dr Franz Tessensohn, leader of the expedition, and Michael Schmidt-Tombe, and a mineralogist, Ulrich Vetter, landed on the island from a Hughes 500 helicopter flown by Allan Sweet, one of the expedition's Canadian helicopter pilots.

During the day they spent on the island Dr Tessensohn's party measured a section of the volcanics exposed in the cove with the rock gate, had a discussion with a single Chinstrap penguin which claimed sovereignty, and took plenty of rock samples.

All the rock samples later went down with the Gotland II except for one pebble

from the beach which later appeared out of the pocket of an anorak. This solitary pebble served the scientists for a thin section, a chemical analysis, and possibly a radioactive whole rock date.

Fourteen Americans and New Zealanders landed again on the island on January 7 in two helicopters from the United States Coast Guard icebreaker Glacier. The party included two New Zealanders omitted from the report in the March issue of "Antarctic," and the crew of the two helicopters.

On the first landing the passengers were Stephen Morrell, of the Point Reyes Bird Observatory, California, and David Harrowfield, curator of the Antarctic Centre, Canterbury Museum, who was actually the first New Zealander to set foot on the island since 1961. A second helicopter brought Dr Murray Gregory (University of Auckland), and Graham Wilson (University of Canterbury).

Then the two helicopters transported three New Zealanders and three Americans to the island. The New Zealanders were Drs R. M. Kirk and P. C. Harper (University of Canterbury), and Mark Mabin (University of Auckland). Dr G. Hunt (University of California) headed the whole party, and other Americans were R. Reichle and Ward Testa (University of Minnesota).



## French planning for air support

TERRE ADELIE

French Antarctic research in the next 10 years will be concentrated in Wilkes Land where French glaciologists have worked for several seasons. Expeditions Polaires Francaises hopes to establish a semi-permanent research station at Dome C, possibly in the 1984-85 season.

Future scientific objectives include drilling through the ice to bedrock at Dome C—a depth of 3000 to 3500 metres — in one season, and continuation of the present karabik wind studies. Several automatic weather stations have already been installed in co-operation with United States meteorologists.

Establishment of a semi-permanent station at Dome C would enable atmospheric physicists, meteorologists, and astronomers to carry out research there. Dome C is regarded as an excellent site for studying the stratosphere, and future plans include intensive studies of the sun's corona.

To support future projects on the ice-cap and along the coast the French have made preliminary studies for building an all-weather airstrip in the Pointe Geologie Archipelago where Dumont d'Urville is situated on the Ile des Petrels. The proposal is to construct first a 600m rock-fill airstrip to take Twin Otter aircraft, and then to extend it to 1100m for use by aircraft like the Transall C160 which would link Hobart and the summer season.

Use of a Transall C160 would enable a station on the Polar Plateau to be supplied, and intermediate depots to be established on the ice-cap. A ski-equipped Twin Otter could be used for geophysical observations and biological studies along the coast, meteorological recordings on the ice-cap, and ecological recording of penguins and seals.

A first instalment of 15 million francs (based on the 1980 currency rate) was granted last season to EPF by the

Ministry of Research and Technology for the purchase of a Twin Otter aircraft, and to provide for the first stage of the civil engineering work on a proposed 600m airstrip, and the necessary equipment. Last season members of TAAF32 made topographical and bathymetric studies of Ile du Gouverneur, 3km from Dumont d'Urville, and other islands in the Pointe Geologie Archipelago.

In the 1966-67 season the French Technical Service for Air Bases (STBA) studied the establishment of a 600m strip on Ile du Gouverneur for use by a Breguet 941 short takeoff and landing aircraft. This project was abandoned for lack of an aircraft. It has now been resumed in relation to conventional aircraft like the Twin Otter and the Transall C160.

When the budget for French Antarctic research, calculated on Francs 80, is considered, establishment of a 600m airstrip on Ile du Gouverneur is regarded as the least onerous and most rapidly realisable solution to the problem of air support for future programme. The project would need a minimum of earth-works (30,000 cubic metres) and could be completed by the 1984-85 season if the engineering work began this season.

Earlier this year the French aviation and space journal, "Air and Cosmos," reviewed the different projects for an airstrip in the Pointe Geologie Archipelago. The total cost of the 600m airstrip was given as 20 million. This included the cost of the Twin Otter fitted with specialised equipment (9 million), tele-

communications and navigation aids (3 million), construction of the airstrip (5 to 6 million), aircraft hangar and other buildings, and stock of fuel (3 million).

Plans for the future direction of French research, however depend on the establishment of an air link with Hobart, and the possibility of extending a 600m airstrip on *Île du Gouverneur* to 1100m. An 1100m strip on the island, which lies west-north-west of *Ile des Petrels*, would not have the same orientation, and certain cross-winds would then be dangerous for a Twin Otter.

Therefore two other projects are also being considered. One is for an 1100m strip along the lines of *Iles Cuvier*, *Lion*, *Pollux*, *Zeus*, and *Buffon*. This would call for 450,000 cubic metres of earthworks (excavation and filling channels between the islands) and would take five summer seasons.

"Air and Cosmos" says that the ideal solution which would need much more money and time, would be the construction of a 1400m strip starting on *Lion*, crossing *Ile des Petrels*, and leading to *Jean Rostand*. With such a strip C135 aircraft (military transport version of the Boeing 707) could link France and Antarctica.

With the ability to operate from semi-permanent surfaces the *Transall C160* is a twin-engine military turbo-transport now in service with the French and West German Air Forces, which has also been bought by South Africa, Turkey, and Indonesia. It can carry six tonnes of cargo or 60 passengers over distance of 1456 nautical miles, and its range can be increased to 4780nm by fitting a centre section wing tank. Using an 1100m strip it would be able to transport all the staff for TAAF expeditions each summer. Then a polar ship would carry heavy cargo and fuel to Dumont d'Urville in January each year.

So far there have been no official estimates of the cost of an 1100m airstrip and the use of a *Transall C 160*. Jean Vaugelade, director of EPF, has been quoted earlier as saying that the cost in *Francs 79* would be 35 million, half the amount needed to replace the *Thala*

*Dan*, which has been chartered for many seasons to relieve Dumont d'Urville.

Now the *Thala Dan* has been sold by her Danish owners to the Brazilian Ministry of Marine. To replace her this season EPF has been able to charter the 2125-tonne Canadian registered ice-strengthened ship *Lady Franklin*, which has been operating in the Canadian Arctic. She was built in West Germany as a roll-on cargo ship with stern doors and controllable pitch propeller, and has been in service since 1952.

Last season's expedition to *Adelie Land* emphasised the difficulties of the present ship and helicopter operations to relieve Dumont d'Urville. Melting ice prevented heavy cargo on the *Thala Dan* from being put ashore at the ice edge. As a result 350 tonnes had to be ferried ashore by helicopter.

## Norwegian plans for season

Norwegian Antarctic research activities will be limited again this season. No winter station will be manned, but during the summer two biologists will take part in two different zooplankton investigations under the United States Antarctic research programme.

Last season one scientist continued a programme of iceberg research started by the 1978-79 Norwegian Antarctic Research Expedition. The research was conducted in the Scotia Sea aboard H.M.S. *Endurance*, the Royal Navy's ice patrol ship as part of a joint programme with scientists from the Scott Polar Research Institute.

A Norwegian biologist also conducted research on South Georgia. The project was carried out in co-operation with British Antarctic Survey scientists.



## BAS NEWS

## Three men lost on trip over sea ice

British Antarctic Survey research activities will be conducted at four stations instead of five this season because of the Argentine invasion of the Falkland Islands and South Georgia in April this year. There were no winter teams on South Georgia at Grytviken, and on Bird Island, and there will be no scientific work there this summer.

Preparations are being made to resume scientific work at Bird Island in the 1982-83 season, and to send an inspection team to Grytviken preparatory to its reopening probably in the 1983-84 season. A full earth science programme will proceed this summer because of the delivery of two new Twin Otter aircraft which replace the two destroyed in a gale at Rothera in November last year. Replacement of the present Halley geophysical observatory built in 1972-73 will start this season.

Disruption of the teleprinter link between the BAS headquarters and the Antarctic stations and ships which is routed through Stanley was the major problem towards the end of last season's summer programme. The link was reopened on July 2, and although it has not been possible to transmit all the backlog of messages the four Antarctic stations are reported to have functioned normally throughout the winter.

There are 55 men at the four stations this winter. Ten are at Faraday in the Argentine Islands, 13 at Rothera, on Adelaide Island, 19 at Halley, and 13 at Signy in the South Orkneys. New winter and summer teams will sail south aboard the Royal Research Ships John Biscoe and Bransfield. The John Biscoe is due to sail from Southampton on September 1, and the Bransfield on November 3. In mid-October the new Twin Otter aircraft will be flown to Rothera to support the earth sciences programme.

A field trip from Faraday to Petermann Island in July ended tragically last month. Three men failed to report to Faraday on August 15, and all hopes of finding them was abandoned after a detailed search by Chilean Air Force

aircraft. The men were:

**John Coll**, diesel mechanic, aged 23, of Glasgow.

**Ambrose Morgan**, radio operator, aged 22, of Petersfield, Hampshire.

**Kevin Ockleton**, physicist, aged 22, of Keyingham, near Hull.

### ICE BROKEN

On July 15 the three men left Faraday (65deg S/64deg W) off the west coast of the Antarctic Peninsula, fully-equipped but intending to be away for only a few days. At this time of year the sea ice is normally very solid in this area, allowing easy access between the various groups of islands and to the mainland a few miles to the east. The party reached its destination — a field hut on Petermann Islands, 10km to the north, but violent storms on July 16 broke up the sea ice and left them stranded there.

Fortunately, the main refuge hut survived the storm, although two smaller huts had been destroyed; the men were safe and well and had sufficient food and fuel to last until October when an airdrop would have been possible. When it was clear that they would have to remain on the island for some time, radio



A section of the coast of the Antarctic Peninsula near Faraday Station in the Argentine Islands. Three members of the winter team at Faraday died last month when returning across the sea ice from a journey to Petermann Island.

BAS Photo

schedules were reduced to once a week to conserve the batteries, but a listening watch was kept at Faraday three times a day.

On Friday, August 13, after a long period of good weather, sea ice conditions had improved sufficiently for the party to decide to reconnoitre a route to the Yalour Islands, 5km north-east of Faraday. The men were requested to communicate with Faraday two days later, but nothing more was heard from them.

By that time the weather had deteriorated again and the ice once more became extremely unstable; conditions were too dangerous to allow search parties to go out either over the ice or in boats. Fog alternated with gales and drifting snow but, when visibility allowed, frequent observations were made of Petermann Island and the surrounding area from the hill above Faraday. The field party was equipped with flares which should have been easily visible.

There was no firm evidence that the party had left Petermann Island. However, it was believed that the men might have reached the Yalour Islands, or the mainland which is only two to three kilometres to the east and where there were other well-stocked depots.

As BAS has no aircraft in the Antarctic during the winter a request for help was made to the Chilean Air Force Antarctic unit. A Hercules aircraft flew from Punta Arenas with rescue equipment and paratroopers aboard, and made a detailed search of the area on August 20. Two Twin Otter aircraft joined in the search on August 21. Bad weather forced the search to be cancelled on August 22 and 23.

There was no trace of the missing men, and from the evidence available, it was thought, almost certainly, that they had gone through a patch of thin ice (this fast ice was only five to six days old) on August 14.

Faraday Station, Teniente Rudolfo Marsh Station, the Antarctic rescue unit of the Chilean Air Force, the director of BAS, Dr Richard Laws, and his staff in Cambridge all agreed that the air search should be terminated when there was no further hope. It was abandoned on August 25.

Search parties will be organised by the men at Faraday as soon as conditions allow. It is unlikely however, that any trace of the missing men will be found.

A violent storm was also experienced at the beginning of August, over Adelaide Island, 321km to the south. This held up a party from Rothera, which was visiting the old Adelaide base, 64km away to the south-west, to dismantle an automatic weather station. A number of other parties had travelled to various other parts of Adelaide Island (one established an automatic weather station in the north in May) and north-eastern Marguerite Bay.

This season the main task of the Bransfield will be to carry the materials and equipment for rebuilding Halley geophysical observatory. She will stand by during January and February to provide extra manpower for the main construction work.

Halley is situated on the moving ice of the Brunt Ice Shelf so has to withstand horizontal movement as well as the

weight of accumulating snow as it gradually becomes buried. (The present buildings, constructed in the 1972-73 summer, are now 20m below the surface and rapidly approaching the ice edge.)

The new Halley is to be constructed inside four inter-connected plywood tubes (not steel as at present), each 9m in diameter and 70m long. The tubes consist of interlocking panels with neoprene ring gaskets at intervals to give them flexibility: each junction can slide telescopically. Steel tie bars will control horizontal stretch.

Each tube will house a two-storey block of rooms and together will provide accommodation for 18 men. Wide stairways will connect the internal decks and join the access shafts leading to the surface. For the first time at a British station, an elevator is to be fitted, to facilitate handling heavy equipment, but access to the lowest level will still be maintained by means of a covered ramp leading to the tractor garage. Cold air will be drawn between the tubes and interior buildings to prevent melting and the build-up of ice.

The present station has lasted 10 years, and the previous one seven years. It is hoped that the new building will last 15 before it is crushed or approaches the ice edge and has to be abandoned.

## Carlo Mauri made ascent of Erebus

A noted Italian mountaineer, Carlo Mauri, who climbed Mt Erebus in 1968, died in hospital in May this year after a heart attack. He was 52.

Mauri, who made many notable ascents in Europe, led an expedition which climbed Gasherbrum II in the Karakoram in the 1960s. He sailed across the Atlantic from Africa to the Caribbean aboard Thor Heyerdahl's papyrus reed boat Ra II in 1970, and again with Heyerdahl in 1977-78 aboard the reed boat Tigris which was sailed by way of Oman and Pakistan to the entrance to the Red Sea.

In the 1967-68 season Mauri, a veteran of climbs in Europe, South America,

Greenland, Africa, the Himalaya, and New Guinea, went south as a photographer and journalist for the Milan newspaper, "Corriere della Sera" to report on the activities of the New Zealand Antarctic research programme. He accompanied five New Zealanders from Scott Base who checked snow accumulation markers on Erebus and reached the summit on January 9. The next day the team climbed Mt Terra Nova.

After his return to Italy Mauri wrote a book about Antarctica called "Antartide" with the collaboration of Mr R. B. Thomson, superintendent of the Antarctic Division, D.S.I.R. There is a copy of the book in the Scott Base library.

# Brazil plans expedition to Antarctica

Brazil, which acceded to the Antarctic Treaty in 1975, will send its first expedition to Antarctica, probably to the Weddell Sea, between December and February this summer. The expedition is expected to use the veteran Danish polar ship *Thala Dan* which was sold to the Brazilian Ministry of Marine in May by her owners, J. Lauritzen Lines.

Last year Brazil began negotiations to buy the Royal Navy's ice patrol ship, H.M.S. *Endurance*, one of the surplus ships put up for sale by the Ministry of Defence. But after the British-Argentine conflict in which the *Endurance* played an important part, the Ministry of Defence decided to retain her for ice patrol duties and support of the British Antarctic Survey's research programme. The *Endurance* was originally the *Anita Dan*, another J. Lauritzen ice-strengthened polar ship, and was sold to the Ministry of Defence in 1967.

Brazilian plans to take an active part in Antarctic research began in 1979 when four military officials were sent south on an exploratory and training mission aboard H.M.S. *Endurance*. In February this year there was an announcement from Rio de Janeiro that a delegation of 10 representatives from the Brazilian Institute of Antarctic Studies and the University of Vale would visit Antarctica as guests of the Chilean Government.

A programme of Antarctic science and technology published by the Brazilian Institute of Antarctic Studies, which is a private organisation, suggests that the Brazilian research projects will concentrate mainly on marine biology and geology. But mineralogical studies, both continental and marine, and hydrocarbon analyses of Antarctic geological samples, also appear in the suggested programme.

Marine projects include studies of Antarctic biota, especially plankton, which may contribute to the marine food chain and Brazilian development of oceanic fishing resources, mainly in the high

latitudes of the South Atlantic; bottom ocean current studies, especially those related to upwelling along Brazil's Atlantic coast. United States scientists who have carried out marine geological and oceanographic studies in the Weddell Sea have been invited in their private capacities to discuss Antarctic marine research with the Brazilians.

Details of the Brazilians' plans for the use of the *Thala Dan* are scanty but they have acquired a ship fitted for their purpose. Since 1958 the *Thala Dan* has been chartered almost every summer by Australian National Antarctic Research Expeditions and Expeditions Polaires Francaises to carry men and supplies to their stations. She has accommodation for 54 people, cargo space of about 1400 cubic metres, bulk fuel capacity of some 300,000 litres, and is equipped for helicopter operations.

Brazil's Antarctic interests have not been evident over the years except in 1972 when there were reports of a privately-sponsored scientific expedition which planned to work in the Antarctic Peninsula area. This project did not eventuate, and then in 1973 there were newspaper reports that the Ministry of Marine planned to buy a Norwegian ship for scientific work in Antarctica.

In 1958 Brazil announced that she reserved her rights to formulate a claim to a sector of Antarctica, and refused to recognise existing claims. Since then there have been various newspaper reports of a Brazilian claim over the Weddell Sea sector between 29deg and 53deg W (within the British and Argentine claims).

## MINERAL RESOURCES

# Protection of Antarctic environment

Protection of the environment will be an important and integral element in further discussions by representatives of the 14 consultative parties to the Antarctic Treaty to produce an agreed regime to regulate the orderly exploration and exploitation of Antarctic mineral resources. This was one of the questions agreed on by representatives who attend a special consultative meeting on Antarctic minerals in Wellington from June 14 to June 25.

After discussions in detail of the issues involved in a minerals regime the meeting agreed on a preliminary framework for an agreement on Antarctic mineral resources. Representatives agreed that a minerals regime elaborated under the umbrella of the Antarctic Treaty would serve to strengthen the treaty system.

Representatives of the consultative parties will hold informal discussions on the framework of the agreement in Wellington next January. A formal session is expected to be held in Bonn about June next year. The next stage will be to present a draft agreement for consideration and acceptance by the 12th Antarctic Treaty Consultative Meeting in Canberra later in 1983.

Fourteen nations were represented at the Wellington meeting. They were the 12 original signatories of the Antarctic Treaty — Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Soviet Union, United Kingdom, and United States — and Poland and West Germany. There were 86 delegates to the meeting, including representatives, alternative representatives, and advisers.

Mr C. D. Beeby, Assistant Secretary, New Zealand Ministry of Foreign Affairs, was the chairman of the meeting. When the discussions ended he outlined their tenor. He indicated that the representatives were fairly well united in the view that exploitation of

Antarctica's mineral resources would not happen unless environmental conditions could be satisfied.

Mr Beeby said there was still disagreement about how detailed the environmental code should be, but the treaty nations had accepted the responsibility of setting baselines for environmental protection, and it was agreed that the eventual regulations would be legally binding on all the parties. Until regulations were agreed upon the moratorium on exploration and exploitation of mineral resources would be maintained by the treaty nations.

Substantial areas of agreement among delegations were apparent during the discussions in Wellington. But there are still outstanding areas of disagreement. One is in respect of formal claims to sovereignty by seven of the consultative parties — Argentina, Australia, Chile, France, New Zealand, Norway, and the United Kingdom. The other consultative parties either do not formally recognise any claim or do not make any.

Another area of disagreement is on the question of eventual mineral exploitation should be undertaken collectively for all the treaty nations or by private companies, consortia, and public sector entities. There is reported to be a majority of countries in favour of licensing private companies but major treaty decisions are taken by consensus rather than by majority vote.

## MARINE RESOURCES

# Australian chairman for commission

Eleven of the 15 original signatories to the international Convention for the Conservation of Antarctic Marine Living Resources (CAAMLR) have now ratified the convention, and the European Economic Community has acceded to it. The convention came into force on April 17 this year after ratification by seven nations. New Zealand was the eighth to do so on March 8. Belgium, France, Norway, and Poland, still have to ratify the convention.

Delegates from the 15 nations and the EEC attended the historic first meetings of the commission and the scientific committee which will oversee the future harvesting and conservation of most species found in the Antarctic marine ecosystem. The meetings were held in Hobart from May 25 to June 11, and were also attended by observers from the Food and Agriculture Organisation, the International Whaling Commission, the Scientific Committee on Antarctic Research, the Scientific Committee on Oceanic Research, the Intergovernmental Oceanographic Commission, and the International Union for the Conservation of Nature and Natural Resources.

Australia is the present chairman of the commission. The post is held by Dr J. L. Farrands, who was chairman of the May-June meeting. He was the leader of the Australian delegation, and is a former Secretary of the Department of Science and Technology. Japan is vice-chairman.

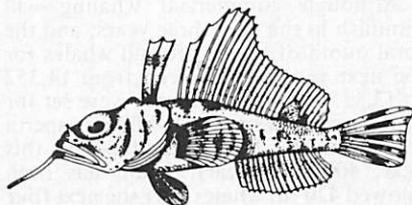
As the commission is headed by a nation, not an individual, other Australians could fill the role during the next three years of the chairmanship. At the end of Australia's term Argentina will head the commission for two years, and other CCAMLR nations will take over from her in alphabetical order for two-year periods.

Scientists from West Germany, East Germany, and New Zealand, were appointed by the scientific committee as chairman and vice-chairmen. The chairman is Dr D. Sahrhage, director of the West German Federal Institute of

Fisheries Research, and the vice-chairmen are Dr H. Ranke (East Germany) and Dr D. A. Robertson, of the New Zealand Ministry of Agriculture and Fisheries. Dr Robertson heads the deep water section of the ministry's Fisheries Research Division.

A permanent secretariat which will support the overseeing of the convention began its operations early last month. Its primary roles will be to organise the annual meetings of the commission and the scientific committee, act as a centre for research and fishing data, and as a co-ordination centre for the nations of the commission.

An Australian scientist, Dr D. Powell, was appointed executive secretary of the secretariat for an initial period of four years. He was formerly head of the operational policy branch of the Department of Science and Technology, has taken part in Antarctic policy studies, and has been a member of Australian delegates to international Antarctic meetings.



## IWC DECISION

# End to commercial whaling by 1985

Cessation of all commercial whaling was agreed to by the International Whaling Commission at its 34th annual meeting in Brighton, England, from July 19 to 24 this year. Twenty-five of the 35 member nations voted in favour of the proposal which called for a negotiated end to commercial whaling by 1985.

Seven of the whaling nations — Japan, the Soviet Union, Brazil, Norway, Iceland, South Korea, and Peru — voted against the proposal. One whaling nation, Spain, voted for the ban, and Chile abstained. Two members Jamaica and Dominica, were absent when the vote was taken.

Sponsored by the Seychelles, one of the non-whaling nations, which joined the IWC in 1979, and seconded by Australia, the proposal stipulates that catch limits for the commercial killing of whales from all stocks for the 1986 coastal and 1985-86 pelagic seasons, and thereafter, shall be zero. The provision is to be kept under review, based upon the best scientific advice, and by 1990 at the latest the IWC will undertake a comprehensive assessment of the effects of the decision on whale stocks and possible future catch limits.

After the Seychells put forward its proposal other IWC members, including Britain, the United States, and France, dropped their proposals for more immediate moratoriums. Earlier the IWC technical committee had voted 19 to 6 to phase out commercial whaling in two years. Six members abstained. The decision in the plenary session achieved the necessary 75 per cent majority of votes to ban all commercial whaling in future.

Although commercial whaling will diminish in the next three years, and the total quota of catches for all whales for the next year was reduced from 14,352 to 13,117 significant quotas were set for some stocks. Japan can kill 850 sperm whales in the North Pacific (450 this year, 400 next year), Spain has been allowed 420 fin whales over the next four years, and Peru has been given 165 Bryde's whales for the next year.

Whaling nations have 90 days from the date of the decision to register a formal objection, which under IWC rules, allows them to ignore the ban and carry on whaling. Last year the IWC banned sperm whaling in the North and South Hemispheres for the 1981-82 pelagic season and the 1982 coastal season, but the ban on the North Pacific quota of 890 whales taken by Japanese coastal whalers was provisional. Earlier this year the ban was lifted so Japan could reduce her whaling operations.

This year the IWC set a zero quota for sperm whales subject to further discussion. For the 1983 coastal season the catch limit for all sperm whales has been fixed at 400 plus 450 from the 1982 season. The built of the sperm whales are caught in the North Pacific.

Most of the minke whales are caught in the Southern Hemisphere by Japanese and Soviet pelagic factory ship expeditions operating in the Antarctic. Small quantities are also caught in the North Atlantic and off the coasts of Norway and West Greenland.

For the 1981-82 season the IWC last year increased the minke whale quota for both hemispheres from 10,867 to 12,017. Of the Southern Hemisphere quota of 7072 Japan was given a catch limit of 4800 in Antarctic waters.

This year the 1983 catch limit has been reduced by 1150 to 10,687, but the figure

is still uncertain as no decision has been reached on North-Eastern Atlantic catch limits. Norway has given an assurance that no more than 1690 minke whales will be taken from this stock — down 100 from last year.

Quotas for whale stocks of all species in the Northern and Southern Hemispheres set by the IWC show a reduction from 14,352 for the 1982 season to 13,117 for the 1983 season. Total catch limites by species for 1983 compared with the 1982 figures (in brackets) are: Sperm, 400 plus 450 for 1982 (zero subject to further decision); Bryde's, 711 (1460); minke, 10,867 (12,017), figure still uncertain; fin, 383 (561) which includes the 1982 portion of three-year block quota of 270 from Spain, Portugal, British Isles stocks from which no more than 120 can be taken in any year; gray, 179 (179); sei, 100 (100); humpback, 10 (10), aboriginal quota for Denmark; bowhead, 17 (17), aboriginal catch.

For the last five years the IWC scientific committee has recommended that subsistence whaling by Alaskan Eskimos should cease. This year the catch limit of 17, part of a three-year quota, was unchanged. Bowhead, humpback, and gray whales are protected but small catches are allowed under the aboriginal section of IWC regulations.

A summary of the whaling situation in 1981 is given in a review of developments since 1975 by S. G. Brown, of the British Natural Environment Research Council's Sea Mammal Research Unit. The review has been published in the May issue of the "Polar Research."

In the Southern Hemisphere pelagic fishery whaling in 1981 was confined to catching minke whales. Two expeditions from Japan and the Soviet Union were engaged in the Antarctic with nine catchers. Three land stations operated in Brazil, Chile, and Peru, using five catchers to take Bryde's, minke, and sperm whales.

Pelagic factoryship whaling had ceased in the North Pacific by 1981. Japanese land stations catch Bryde's and sperm whales. Small whaling operations from Japan hunt minke whales; similar operations from South Korea catch minke

whales, and a very small number of fin whales. Small catches of gray whales in Siberia waters and bowhead whales in Alaskan waters are taken under the aboriginal whaling section of the IWC regulations.

In the North Atlantic land station operations continue in Iceland and Spain catching fin, sei, and sperm whales. Norwegian small-type whaling vessels in coastal waters and on the high seas catch minke whales and some killer whales (catches of killer whales (*Orcinus orca*) by pelagic factory ships are prohibited). Minke whales are also caught in similar whaling by Iceland in coastal waters. In West Greenland waters the Greenlanders catch minke whales, and in addition a small number of fin and humpback whales under the aboriginal whaling regulations. Sperm whaling in the Azores and Madeira is not under IWC control as Portugal is not a member.

Since 1975 the membership of the IWC has risen from 15 to 35. In 1975 there were nine whaling nations and six non-whaling. This year there are 12 whaling members and 23 non-whaling. Eight more members joined the IWC last year, only one, St Vincent and the Grenadines being a whaling country. Canada withdrew before the meeting this year, and three more non-whaling countries — Kenya, Monaco, and West Germany were reported to have joined the commission.

New Zealand was represented at the IWC meeting by Mr I. L. G. Stewart, Deputy Secretary, Ministry of Foreign Affairs, in his capacity as New Zealand Whaling Commissioner, Dr Martin Cawthorn, of the Fisheries Research Division, Ministry of Agriculture and Fisheries, who is a member of the IWC scientific committee, and Mr F. Wong, New Zealand High Commission, London.



# Transglobe team reaches goal

Nearly three years after it sailed from Greenwich aboard the Benjamin Bowring the British Transglobe Expedition led by Sir Ranulph Fiennes completed the first circumnavigation of the world by sea, ice, and land, using the Greenwich meridian as a basic route. On August 30 the Benjamin Bowring docked at Greenwich. Her helmsman for the trip up the Thames was the expedition's patron, Prince Charles, who was at the wheel when the expedition left Greenwich on September 2, 1979.

In three years all but four days the expedition covered 56,000km. It crossed the Sahara, drove through African jungle to the Ivory Coast, and from Cape Town sailed to Antarctica. Three members of the ice team, Fiennes, Charles Burton, and Oliver Shepard, crossed Antarctica by way of the South Pole to Scott Base.

Lady Fiennes, who was responsible for communications, wintered in the Antarctic and Arctic with both ice teams. Oliver Shepard was unable to take part in the northern journey, and Fiennes and Burton thus became the first team in history to reach both the North and South Poles over the ice.

For the Arctic crossing Fiennes and Burton made a boat journey up the Yukon River before they started their journey through the North-West Passage last year. They wintered at Alert on the northern tip of Ellesmere Island, and on February 12 this year began their journey to the North Pole which they reached at 3.15 p.m. G.M.T. on April 11.

Then the two men began the most hazardous part of the journey across the ice of the Arctic Ocean to Spitsbergen in the Svalbard Archipelago. ("Antarctic," June, 1982). Winds, changing currents, and rising temperatures which melted the ice, prolonged the journey to rendezvous with the Benjamin Bowring at the edge of the pack ice.

To cope with ice changes Fiennes and Burton used two 5m aluminium boats fitted with skis and modelled on North American Indian canoes. They were able

to paddle the canoes through breaks in the ice at times but for 98 days of the last stage of their journey they drifted slowly south on a huge ice floe 3.5m thick.

Because the ice edge was further north than usual the Benjamin Bowring made two unsuccessful attempts to reach an area where the ice team could be picked up. She turned back first at the end of June, and on her second attempt was blocked by ice 20km south of her original northing.

Finally after pushing through 96km of ice the Benjamin Bowring reached a point 1029km south of the North Pole, and about 320km north-west of Spitsbergen. Fiennes and Burton were in radio communication but they took 11 hours to pull themselves through the ice towards the ship. They abandoned the canoes for the last desperate dash of 11km to safety.

Fiennes and Burton reached the Benjamin Bowring at 12.14 a.m. G.M.T. on August 4. They scrambled up a rope ladder to the strains of "Land of Hope and Glory" and the "Eton Boating Song" from the ship's public address system. (Fiennes was at Eton). But they had not said goodbye to the ice of the Arctic Ocean. The Benjamin Bowring was caught in it for some time.

By the middle of August the ice team was back on land — Spitsbergen which had been the final goal for nearly three years. The Benjamin Bowring made a fast passage to England, and anchored off Southend on August 24 to prepare for her triumphant return to Greenwich.

## TOURISM

## Two cruises planned to Ross Dependency

No tourists from Antarctic cruise ships called at McMurdo Station or Scott Base last season because of ice conditions in the Ross Sea. This season both the Lindblad Explorer and the World Discoverer will make cruises to the Ross Dependency. The Lindblad Explorer will sail from Ushuaia, the Argentine port of Tierra del Fuego, and the World Discoverer from Punta Arenas, the Chilean port on the same island. Both will end their Antarctic and sub-Antarctic cruise programme at Lyttelton.

Between November and January next year the Lindblad Explorer will make four voyages to Antarctica. She will take tourists to the Antarctic Peninsula area, and to South Georgia, the South Shetlands and South Orkneys, and to three islands in the South Sandwich group.

On the first cruise the ship will leave the Argentine port of Mar del Plata in mid-November for the Falkland Islands (Islas Malvinas). Calls are planned at Admiralty Bay, King George Island, in the South Shetlands where there are Chilean, Soviet, and Polish research stations, then to Paradise Bay, and Port Lockroy. After calls at Peterman Island and the United States Palmer Station on Anvers Island the ship will visit Deception Island in the South Shetlands and Hope Bay at the tip of the Antarctic Peninsula before her return to Ushuaia on December 2.

During her second cruise between December 3 and December 26 the Lindblad Explorer will visit the Falkland Islands and South Georgia. From Gryt-viken she will sail to the South Sandwich Islands and call at Zavodoski, Candlemas, and Saunders Islands in the northern part of the group. In the South Orkneys she will call at Laurie and Coronation Islands, and after cruising in the Weddell Sea and among the South Shetlands she will call at Hope Bay and return to Ushuaia on December 26.

Between December 28 and January 19 the ship will make her third cruise which will be similar to the second. Then she

will start the cruise to the Ross Dependency and New Zealand on January 20.

Her first calls will be at Admiralty Bay, King George Island, Paradise Bay, Port Lockroy, and Peter I Island in the Bellingshausen Sea. When she enters the Ross Sea she will cruise off the Ross Ice Shelf to McMurdo Sound.

In the sound off Ross Island passengers will go ashore at Cape Royds and Cape Evans to visit the historic huts. Then calls will be made at McMurdo Station and Scott Base.

After leaving McMurdo Sound the Lindblad Explorer will cruise north off Capes Hallett and Adare, and the Balleny Islands. Calls will be made at Macquarie Island, Campbell Island, and the Auckland Islands. From Stewart Island the ship will proceed to Lyttelton where she is due about February 23.

Early in December the World Discoverer will begin the first of her four cruises from Montevideo. She will sail first to the Falkland Islands, and then make calls at King George Island, Paradise Bay, Deception Island, and Port Lockroy. From Anvers Islands she will proceed to the Fildes Peninsula, and then return to Punta Arenas towards the end of the month.

On her second and third cruises the ship will follow the same pattern from Punta Arenas. These cruises will be completed about the middle of January. The cruise to the Ross Dependency will begin on January 19.

From Punta Arenas the World Discoverer will make the usual calls in the Antarctic Peninsula region, but after Anvers Island she will visit the Argentine Islands and Deception Island before sailing for the Ross Sea. Like the Lindblad Explorer she will cruise off the Ross Ice Shelf on the way to McMurdo Sound.

In McMurdo Sound passengers will go ashore at Cape Royds and Cape Evans

to visit the historic huts. If time and the weather permit calls will also be made at McMurdo Station and Scott Base.

On the way north to Macquarie Island and the Auckland Islands the World Discoverer will cruise up the Victoria Land coast past Capes Hallett and Adare, and then the Balleny Islands. She is expected to reach Lyttelton about February 19.

## POLISH REPORT

# Marine fossils found on King George Island

Highly fossiliferous marine deposits discovered in the Melville Peninsula of King George Island in the South Shetlands were studied by Polish paleontologists and sedimentologists during the fifth Antarctic expedition of the Polish Academy of Sciences in the 1980-81 season. These deposits range in age from the Middle to Upper Cretaceous periods (120m-65m years). Results of the studies are given in a paper by Drs R. Gradzinski and R. Wrona published in the February issue of the Polish Geological Review, journal of the National Geological Services.

Geological investigations on King George Island in the 1979-80 season by a team based at Arctowski Station and led by Dr A. K. Tokarski resulted in the discovery of a vast area of copper porphyry mineralisation in the Arctowski Mountains, new localities of Jurassic (180m-130m) and Tertiary (65m) plant fossils, and Pliocene (10m) marine fauna. Preliminary results of the field work are also summarised in a paper published in the Institute of Geology journal by Drs Tokarski, A. Paulo, and Z. Rubinowski.

In the Melville Peninsula area at the eastern extremity of King George Island the paleontological-sedimentological team found an exposed sequence of more than 200m of calcareous-marly and, sometimes, somewhat sandy deposits. These yielded coccoliths, diatoms, silico-flagellates, foraminifera, corals, bryozoans, polychaetes, gastropods, bivalves, scaphopods, belemnites, ostracods, crabs, asteroids, echinoids,

fishes, and displayed numerous tunnels made by crabs as well as mass occurrences of coprolites. Vagile benthos predominated in the faunal assemblage which appeared typical of a shallow shelf zone with relatively quiet sedimentation.

Another important area studied by the team was situated in the Low Head-Lion's Rump region where marine Pliocene (10m) deposits were exposed. Deposits in the lower Low Head member of the Polonez Cove Formation were very rich in fossils, especially coccoliths, diatoms, both benthic and planktonic foraminifera, bryozoans, polychaetes, brachiopods, gastropods, bivalves, scaphopods, ostracods, ophiuroids, and echinoids. Algal (? Rhodophyta) encrustations and coatings, and single stromatolite structures were also found. Numerous bivalve layers were also studied. Local allochthonous accumulations of shells of bivalves mainly representing the species *Chlamys*

anderssoni may be explained by sedimentary conditions related to heavy storms. Three lithological horizons with pholad burrows were found in the Nazurek Point area. The localities with marine fauna buried in vivo make possible paleoecological reconstructions for the Polonez Cove Formation.

Several floral localities were also revisited and explored. A large collection of well-preserved imprints of leaves, fragments of stalks and trunks and single pollen was gathered in the Dufayel, Bytadela, Fildes Peninsula — Mt Flora, Potter Cove (region of Argentina's Teniente Jubany Station) and Mt Wawel localities. The Mt Wawel locality is of special importance on account of the record of the youngest (? Upper Miocene 12m,) flora in King George Island.

In the Low Head-Lion's Rump region, Melville Peninsula and Vaureal, paleoglacial deposits were sampled for boulders of sedimentary, especially carbonate, rocks of Antarctic origin. Light-coloured varieties of limestone often yield crushed archaeocyathid cups and trilobite armature. The boulders appear completely exotic to King George Island, and preliminary analyses show that they were brought there either as morainic

material or deposited as dropstones by icebergs coming from the distant Ellsworth Mountains or Transantarctic Mountains.

Geological mapping to a scale of 1:50,000 during the investigations by Dr Tokarski's team covered an area of some 200 square kilometres round King George Bay and to the west of Admiralty Bay. Two other geological maps to scales of 1:10,000 and 1:35,000 were made of selected areas of the island for special purposes.

From the expedition's camp on an ablation moraine in the Arctowski Mountains tectonic studies were conducted, and the collection of data for a regional study of mesostructures in Tertiary (65m) rocks was completed.

New localities of Polonez Glaciation tillites (Pliocene 10m) were found, and a vast area of copper porphyry mineralisation in the Arctowski Mountains was discovered and studied. Pyrite mineralisation was studied on the Keller Peninsula (Admiralty Bay), and zeolite mineralisation was investigated in Tertiary (65m) rocks in Ezcurra Inlet. Other discoveries included new sites of Jurassic (180m-130m) and Tertiary plant fossils and Pliocene marine fauna.

## Chilean geologist finds two active Antarctic volcanoes

Two previously unknown active volcanoes, both of which show evidence of having had recent eruptions, have been discovered by a Chilean geologist on the little-explored east side of the Antarctic Peninsula. The discovery was made by Dr Oscar Gonzalez-Ferran, of the University of Chile, Santiago, in March this year while he was doing a geophysical survey of the peninsula region by helicopter as part of the Chilean Antarctic research programme.

So recent are the eruptions that one volcano was still steaming when discovered, and volcanic debris still covers a large area of the adjacent Larsen Ice Shelf. This shelf in the north-west part of the Weddell Sea extends about 563km

along the east coast of the Antarctic Peninsula.

One of the volcanoes is about 209km east of the United States Palmer Station on Anvers Island, and the other is about 257km east of the station. Both are small low cones of basalt. The exact heights have not been reported.

Dr Gonzalez-Ferran says that the presence of active volcanoes in this region shows that the Pacific crustal plate is actively subducting (moving under) the Antarctic plate. Subduction is a major cause of vulcanism and earthquake, and occurs when a large portion of the earth's crust is thrust under another crustal plate.

# THE READER WRITES

## Sidelights of Antarctic Research

Sir, — Granite House does not appear on the map of Antarctica or in any official list of historic sites in the Ross Dependency. It deserves a place somewhere although now virtually in ruins. One of the earliest examples of polar architecture, it was built 70 years ago of natural materials by an Irishman, a Norwegian, and two Australians, and named after a house in a melodrama by Jules Verne.

For more than six weeks Granite House served as the kitchen and stores hut of the base camp established at Cape Geology, Granite Harbour, by the Western Geological Party of Scott's last expedition. Like the first, the party was led by the Australian geologist Griffith Taylor. With him were another Australian geologist, Frank Debenham, Trygve Gran, the Norwegian ski expert, and an Irish petty officer, Robert Forde.

When the four men reached the southern end of Granite Harbour after sledging across the sea ice of McMurdo Sound and along the coast, they marched along the shore and came to a small, sheltered beach east of Cape Geology. Naturally the Australians called it Botany Bay. There they placed their base camp and stores depot.

To house the sheet iron blubber stove which they had dragged all the way from Cape Evans, Taylor's men needed a kitchen. Forde and Gran found a natural hollow about 3ft wide and 9ft long where the granite had weathered in long joints. All the hut needed was a roof and one wall. Three of the walls were solid granite 3ft high and 10ft thick. Forde and Gran were the chief builders, and carried huge granite blocks which were wedged level and steady to form the fourth wall.

A sledge was used as a roof tree, and Taylor and Debenham had the unpleasant task of flensing seal skins on a block of ice for the roof. The skins were sewn

to the sledge and pulled taut by heavy stones hung round the edges by string. Moss was stuffed into crevices to keep out draughts.

Griffith Taylor wrote in his diary that the hut looked quite snug with smoke from the blubber stove pouring out of the chimney. In Forde's opinion the whole structure was very like an Irish shebeen. As Gran was reading Jules Verne's exciting melodrama, "The Mysterious Island", the sample of polar architecture was named Granite House.

With nearly all the materials on the site the builders started work on November 30, 1911, and finished on December 2. But while the hut looked snug from the outside oil and soot from the blubber stove made it impossible to live in. Heavy snows all drove into the hut and formed a foot of ice on the floor. Soot spread everywhere and covered everything, oil leaking from the stove melted the ice.

All the food had to be cooked in the chilly granite kitchen and eaten in the party's tent which remained comparatively clean. But the cooks, who had laboured in the cold, had to leave the snug tent halfway through meals to stoke up the stove and get the cocoa on the boil.

A touch of domesticity was added to the camp scene when Gran and Taylor planted a vegetable garden outside Granite House. They made a mossy bed on a sunny ledge above the hut, and sowed some seeds of sea kale which Gran had brought from Cape Evans.

Seed sowing day was a Sunday, December 10, 1911, and was the warmest day with a temperature of 40deg Fahrenheit. Gran assured everyone that the kale plants would be up in a week, and ready to eat in a month. But his high hopes of fresh greens were not realised.

Almost a month later when the party was returning from one of its survey trips around the shores of Granite Harbour, Gran's sea kale was found to have sprouted in its rock garden, probably the first vegetables to be grown outside at 77deg S. January was a cold month, however, and the 12 sprouts flourished for only a week. Then they were cut down by a cold snap. Two or three of the tiny sprouts were rescued and are still preserved in Taylor's report, which is in the Australian National Library, Canberra.

When Taylor's party finally left the camp at Cape Geology for Cape Roberts on January 14, 1912, Granite House was dismantled. Geological specimens, an ice axe, pemmican, and four pairs of spare boots were packed on the roof tree sledge and left to be picked up by the Terra Nova.

A month after leaving Botany Bay Griffith Taylor's party was picked up by the Terra Nova. Late in January the next year Gran led a party from the ship to collect the geological specimens. Some items listed by Taylor earlier as etceteras were left behind.

Forty-four years later two United States geologists working at Marble Point were in Botany Bay. They found that the sealskin roof of Granite House had fallen in. Also they found the etceteras — an ice axe and two books still in perfect condition in spite of their

years of exposure.

Dr Robert L. Nichols, then head of the geology department at Tufts University, Cambridge, Massachusetts, and his assistant, William Meserve, sent the books to the United States National Science Foundation so they could be returned to the owners, Professors Taylor and Debenham. Taylor's copy of Poe's "Tales of Mystery and Imagination" was sent to him in Sydney; Debenham, then in Cambridge, England, received "The Mysterious Island". Since then both books have disappeared.

Other parties have called at Granite House since Nichols and Meserve made the first visit. Eight New Zealander arrived in October, 1962, and reported later that the sledge, ice axe, and some boots were still there. Eric Saxby, leader at Vanda Station, photographed the remains of the hut in the 1977-78 season. The granite walls and blocks still retained the shape of a hut although there was no sign of any roofing.

Tourists are unlikely to visit Granite House in the future; it is not easy of access, and does not have the attraction of the historic huts on Ross Island. But its presence and its past should be marked in some way. It has architectural, gastronomic, and horticultural claims to recognition.

Yours etc.,  
"JAMES PIGG"

## Terra Nova cook kept Neptune's razor

A large wooden cut-throat razor used by the crew of Scott's 1910-13 expedition for the traditional Crossing the Line ceremony aboard the Terra Nova disappeared mysteriously on July 15, 1910. It was believed to have been swept overboard when the sail tank in which King Neptune's "victims" had been ducked suddenly collapsed, cascading men and sea water along the upper deck.

Forty-six years later Thomas Clissold, who was cook for the shore party at Cape Evans, revealed in a letter to "Antarctic" how he acquired the razor. Clissold made his home in New Zealand after the First World War, and died in Napier in 1964.

Made for the Crossing the Line ceremony by the Terra Nova's carpenter, Frank Davies, the black and silver razor, which is 71cm long, is now with other Antarctic relics in the Canterbury Museum. It has "Terra Nova R.Y.S." on one side, and "B.A.E. 1910" and a

penguin on the other side.

Before Clissold died he left the razor to the New Zealand Antarctic Society. Later it was deposited with the National Museum, Wellington. Towards the end of last year it was passed on to the Canterbury Museum.

King Neptune's Barber, a role taken by the ship's bos'un, Alf Cheetham, used the razor to shave "the victims" after they had been well-lathered with a mixture of whitewash, soot, and grease. Then the "victims" were thrown into a huge tank made by tying up the four corners of a spare mainsail, and vigorously ducked by King Neptune's enthusiastic helpers.

In his letter Clissold said that the razor, nicknamed "Raspo", was probably the property of the expedition. He did not believe that any member of the expedition knew of its existence. It was presumed to have gone overboard after the ceremony when King Neptune and all his Court were thrown into the tank. With about 10 or 12 men milling around in it the strain was too much for the

halyards, two of which snapped like successive revolver shots, cascading men and water along the upper deck.

Clissold happened to be going forward at the time, and some of the water reached him. To his amazement the razor floated between his legs. He whipped it up, passed on down to between decks, and popped it in his locker.

When the expedition ended Clissold decided to return to New Zealand. But the First World War broke out before he had completed arrangements to sail. He went to France as a dispatch rider, and after the retreat from Mons he transferred to the Middlesex Regiment.

After being wounded at Loos Clissold transferred to the Royal Flying Corps. He was demobilised in 1919 and finally reached New Zealand in 1921.

One night in St Omer Clissold met a "victim" from the Crossing the Line ceremony who was also serving in the Royal Flying Corps. The "victim" was the Norwegian ski expert, Trygve Gran.

## Only book printed in Antarctic

Where are all the copies of "Aurora Australis", the only book to be set in type and printed in Antarctica, and what has happened to them since they were brought back to New Zealand from Cape Royds by Shackleton's 1907-09 expedition? A Canadian subscriber to "Antarctic" is seeking the answers to these questions.

Mr John Millard, of Toronto, who has been interested in Antarctic history and exploration for many years, has started a survey to determine the location and history of existing copies of "Aurora Australis". He would like readers of "Antarctic" who have information about one of the rarest books on Antarctica to get in touch with him. His

address is 18/86 Broadway Avenue, Toronto, Ontario, Canada, M4P 1T4.

One hundred copies of "Aurora Australis" are said to have been printed at Cape Royds but there is doubt about the number bound — some accounts say 30 — and whether both the shore party and the crew of the Nimrod received copies.

Four copies of "Aurora Australia" are known to be in New Zealand libraries, and at least two are privately owned. There are copies in Britain and Australia held by universities and polar institutions. Shackleton is known to have presented copies to benefactors of the expedition. For this reason Mr Millard believes that upwards of 50 bound copies may be in existence.

## OBITUARY

## Leader of first Polish expedition

Leader of the first Polish expedition to Antarctica during the International Geophysical Year (1958-59) Dr Wojciech K. E. Krzeminski, died on April 9 last year at the age of 54. He was engaged in Polish polar research for 21 years, and at the time of his death was head of the Polar Research Laboratory of the Institute of Geophysics, a member of the Polar Research Committee of the Polish Academy of Sciences, and a member of the SCAR working group for geodesy and cartography.

In the 1958-59 season Krzeminski took over from the 3rd Soviet Antarctic Expedition the Oasis station located at the edge of the Bunge Hills on the Knox Coast of Queen Mary Land. On January 21, 1959, he hoisted the Polish flag over the station now named A.B. Dobrowol-

ski, after Anton Dobrowolski, one of the first two Polish scientists to work in Antarctica.

Until the late seventies when Poland resumed Antarctic research Krzeminski worked in the Institute of Geodesy and Cartography. In 1978 he joined the Institute of Geophysics and led a new expedition to Dobrowolski, which is operated by the Polish Academy of Sciences. On the 20th anniversary of the first Polish landing in the Bunge Oasis the expedition resumed work at the station.

When he returned to Poland Krzeminski became head of the Polar Research Laboratory of the Institute of Geophysics. Before his death he was preparing to lead an Arctic expedition to the Polish Academy of Sciences station at Hornsund on Spitsbergen.

## Charles Sandell sent first polar radio messages

One of the two radio operators in Mawson's Australasian Antarctic Expedition (1911-14) who used radio for the first time in polar exploration was Charles Sandell, who died at Esperance, Western Australia, on May 9, 1980, aged 93. He was a member of the party which spent nearly two years on Macquarie Island after Mawson's expedition established the radio station on Wireless Hill.

Sandell, who was also a mechanic, was an Englishman who worked for the Commonwealth Telegraph Service in Sydney. He and the New Zealand-born radio operator, A. J. Sawyer, were able to receive Antarctic news from Mawson's main base in Adelie Land and send it to Hobart but full communication was not established until February 20, 1913.

When Mawson and his six men had to remain in Adelie Land for a second year the Macquarie Island party was asked to remain another year to maintain communication with Commonwealth

Bay. As the expedition ship Auroa was laid up during the winter of 1913 arrangements were made for the small sealer Rachel Cohen to take stores to the island party.

But the Rachel Cohen never reached the island. She ran into unusually stormy weather in July and eventually reached New Zealand badly damaged. By this time the five men were reduced to eating sea elephant meat three times a day, and had little other food left. Fortunately the New Zealand Government sent the light-house ship Tutaneikai to their aid. She brought sheep, flour, coal, and other stores on August 20, and the Rachel Cohen followed on November 18 with the remainder of the coal.

Because of illness Sawyer left the island on the Tutaneikai, and Sandell took over the radio operating. The Aurora picked up the four men at the end of November on her way south, and joined Mawson's party in Commonwealth Bay on December 12.

# ANTARCTIC BOOKSHELF



## South Pole Odyssey

Selections from the Antarctic diaries of Edward Wilson edited by Harry King. Blandford Press, 1982. 176pp. English price £3.95.

Sledging journeys undertaken during Scott's two expeditions were both numerous and worthy of note. Often they set new records of human endurance and determination which gave them an honoured place in polar history. The three most notable such journeys were the southern probe undertaken during the summer of 1902-03, the mid-winter expedition to Cape Crozier in 1911, and the history journey to the South Pole in 1911-12 which cost the lives of all the party.

One man alone took part in all three journeys — Edward Adrian Wilson. In "South Pole Odyssey" the Scott Polar Research Institute librarian, Harry King, has paid tribute to this remarkable man by bringing together extracts from the diaries he kept when he went south first in the Discovery and then in the Terra Nova.

In addition Mr King has reproduced the whole of Wilson's field diary account of the South Pole sledge journey from November 1, 1911, when 10 men and 10 ponies left Cape Evans, to February 27, 1912, the date of the last abbreviated entry written four weeks before Wilson died beside Scott and Bowers. Wilson's modest and restrained record of facts brings a different view of the tragic journey to readers familiar only with Scott's version of events.

All the world knows Scott; Wilson, his right-hand man on the last expedition, is now a shadowy figure except to polar specialists; George Seaver's books, which told more of the man, were written more than 50 years ago. Harry King's carefully chosen extracts, supplemented by explanatory notes, a "life" of Wilson, and short biographies of everyone mentioned in the extracts tell us much more about the man known to his colleagues as "Uncle Bill".

We learn that Wilson did not want to make the first southern journey in the summer of 1902-03. He saw it as an un-

warranted interruption to his beloved biological studies. His enthusiasm for the journey to Cape Crozier is clearly conveyed by the comments in his diary entries recording the most unusual of all bird-nesting expeditions. His low-key account of an almost incredible Antarctic field trip is in sharp contrast to what Apsley Cherry-Garrard wrote about "the worst journey in the world", remembered the world over by the title of his classic.

Reading Wilson's version it is sobering to reflect that today only one of the three men, Harry Bowers, would have passed a medical examination for polar duties. Wilson had suffered from tuberculosis several years earlier; Cherry-Garrard had a considerable sight disability which compelled him to wear glasses.

The final journey to the Pole and back, its hopes, its problems, and eventually the chill of defeat, are all deeply etched in Wilson's field diary entries. We learn, too, of the many sides to his complex character. There is a most moving admission that he gave his whole day's meagre biscuit ration to his pony Nobby the night before the animal had to be shot. It was a last act of kindness characteristic of the man but a foolhardy one. Wilson endured great pains of hunger as a result without complaint.

"South Pole Odyssey" is illustrated with a selection of Wilson's own delicate watercolours and his pencil drawings of Antarctic scenes and wildlife. It contains also some of the drawings from the sketchbooks found with his diary near the dead men on November 12, 1912.

Appropriately half of the royalties received from the sale of the book will be used to provide Wilson Memorial Grants to help young men and women to undertake field work in polar regions. The remainder will be used to assist the work of the Scott Polar Research Institute.

BADEN NORRIS

# ANTARCTIC

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

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

You are invited to become a member, South Island residents should write to the Canterbury secretary, North Islanders should write to the Wellington secretary, and overseas residents to the secretary of the New Zealand Society. For addresses, see below. The yearly membership fee is NZ\$6.00 (or equivalent local currency). Membership fee, overseas and local, including "Antarctic", NZ\$12.50.

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

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Four attractive postcards depicting aspects of Antarctica are now available from the New Zealand Antarctic Society. They show Scott Base, Emperor penguins on the sea ice of McMurdo Sound, a New Zealand dog team outside Scott's hut at Cape Evans, and Don Juan Pond in the Wright Valley.

These cards sell at four for \$1 plus postage. Surface mail postage rates are 30 cents (New Zealand) and 50 cents (overseas).

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