

ANTARCTIC

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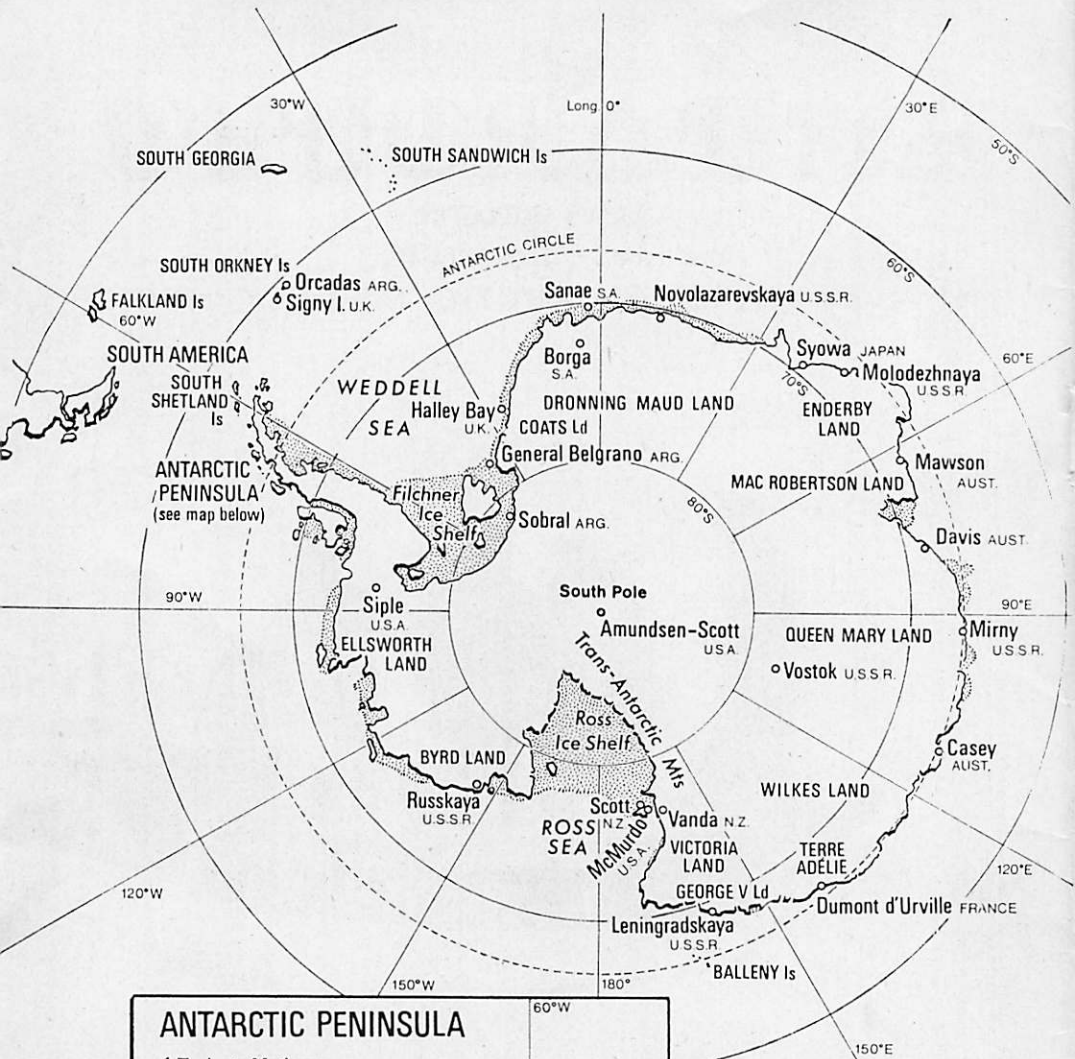
A husky pup, Cherry, studies a strange arrival in Antarctica — a four-man hovercraft tested at Scott Base last season. From left are: Mr J.S. Rankin, base engineer and leader this winter, Dr R.I. Garrod, director, Antarctic Division, Australian Department of Science, Mr R.B. Thomson, director, Antarctic Division, New Zealand Department of Scientific and Industrial Research, and Senator James Webster, Australia's Minister for Science.

Antarctic Division photo: Neville Peat

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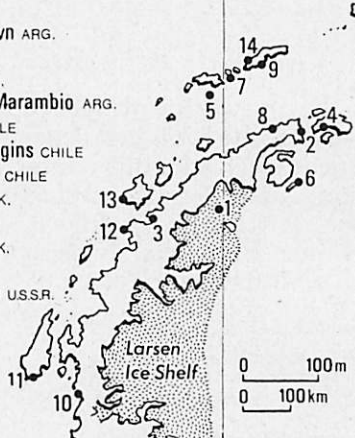
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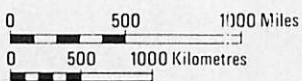


ANTARCTIC PENINSULA

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



ANTARCTICA



ABBREVIATIONS

- ARG. ARGENTINA
- AUST. AUSTRALIA
- NZ. NEW ZEALAND
- S.A. SOUTH AFRICA
- UK. UNITED KINGDOM
- U.S.A. UNITED STATES OF AMERICA
- U.S.S.R. UNION OF SOVIET SOCIALIST REPUBLICS

“ANTARCTIC”

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CONTENTS

POLAR ACTIVITIES

NEW ZEALAND	2 — 11
UNITED STATES	16 — 23
AUSTRALIA	12 — 15
UNITED KINGDOM	28 — 31
SOVIET UNION	26 — 27
JAPAN	24 — 25
NORWAY	25
SOUTH AFRICA	33 — 34
POLAND	32

GENERAL

ANTARCTIC CENTRE	39 — 40
TOURISM	35 — 38

If mineral wealth is discovered in the Antarctic, its lure could bring large numbers of men swarming into the continent and such an unregulated invasion could be chaotic, strife-ridden and dangerous. We ought to prevent this happening if we possibly can, and if prevention is impossible, postpone it for the longest feasible time. The Antarctic Treaty gives us the opportunity both to regulate the exploitation of finds in the Antarctic and to set a timetable for such operations.

Mr C. P. Scott, United Kingdom representative, eighth consultative meeting of the Antarctic Treaty nations, Oslo, June 9–20, 1975.

NEW ZEALAND SEASON

SCOTT BASE TO FRY GLACIER AND POLE

Twenty years of New Zealand scientific research in Antarctica were celebrated early this year by a ceremony to mark the opening of Scott Base on January 20, 1957. But the summer research programme ended last month with a more permanent reminder of New Zealand's presence in Antarctica — the completion of a new summer laboratory, the first major building to be erected at Scott Base in more than a decade, and the first in a proposed new complex which will be 50 per cent larger than the present base, and will accommodate 60 people.

Ten men began seven months of isolation officially on February 14 when the summer leader, Captain Kevin Tasker, of Christchurch, relinquished his responsibilities to the winter leader, Mr Jim Rankin, of Kumara. Except for radio-telephone and telegraph links, the winter party of 10 men will have no communication with the outside world until the first pre-season flights by United States Navy Hercules aircraft in September which bring mail and fresh food.

Deputy-leader this winter is a 22-year-old mechanic, Mr Ian Booker, of Nelson, one of the youngest men to hold the post. His companions are: Kevin Weatherall (senior laboratory technician, Milton), Roel Keizer (cook, Auckland), Rod Fearn (technician, Auckland), Ian Minchington (technician Kaiapoi), Ian Johnstone (postmaster, Taihape), George Money (Post Office radio technician Christchurch), Richard Wills (field assistant-doghandler, Christchurch), and Howard Richards (electrician, Taupo). Ian Minchington replaces P.J. Doherty, who was in the original winter team.

NEW LABORATORY

Construction of the new science laboratory was one of the major projects last season, but more than 120 men and

women were involved in a wide-ranging scientific programme during the four summer months. Field parties worked in the dry valleys, the previous unexplored Fry Glacier region, on Mount Erebus, and in the McMurdo Sound area. As in past seasons New Zealanders worked in international programmes with United States, Italian, and Japanese scientists, and were represented at the Amundsen-Scott South Pole Station, and Siple Station, 2500km from Scott Base.

One of the busiest scientific areas last season was ice-bound White Island, about 30km from Scott Base. A University of Canterbury team of three men and one woman led by Mr Tas Carryer spent three months there studying the food chain, which involves phytoplankton, zooplankton, fish, and Weddell seals. They set up their camp on the ice shelf that surrounds the island in mid-October, and studied the relationship of plankton, fish, and seals through tide cracks and a hole drilled through the ice.

Because of the postponement of the international Ross Ice Shelf Project in which three New Zealanders were to take part the White Island colony was increased later in the season. Dr Janet Bradford, and Messrs Ted Barnes and Bill Whitley, of the New Zealand

Oceanographic Institute, spent three weeks at the New Zealand camp, and completed preliminary studies of the marine environment under the Ross Ice Shelf.

Dr Bradford, a specialist in tiny planktonic animals called copepods, worked with Miss Elspeth Wingham, a B.Sc. honours student in the University of Canterbury team, and found four species of copepod not previously recorded in the region, which might possibly be a new species altogether.

Messrs Barnes and Whitley tested equipment in two separate studies — the analysis of the temperature strata of the sea under the ice shelf, and a study of the seabed fauna. Mr Barnes used a bathythermograph to measure minute temperature changes in a 67m column of the sea under the ice hole. His study will help to establish the pattern of currents under the ice shelf. Mr Whitley sampled fauna on the sea floor with equipment he had designed and built himself.

SEAL COLONY

There is a remote colony of Weddell seals at White Island which University of Canterbury zoologists began tagging in 1964. Since then none has shown up in the McMurdo Sound region. Mr Carryer believes the colony probably spends the winter under the ice shelf, and is virtually isolated because of the distance to the edge of the shelf — 25km.

But one tagged male was found to have come from the Hutton Cliffs area on Ross Island, about 50km away. It showed signs of starvation, and had probably crawled over the ice to reach the island. And on the day before the team left it found a seal pup about 1km from the camp which bore a Ross Island tag.

This pup was an intruder in the colony which the zoologists thought was probably isolated. Mr Carryer now doubts the theory because it would be an extraordinary feat for the pup to reach White Island over or under the ice.

Twenty adult seals and pups were counted at the colony during the season. Mr Bob Zurr, who studied fish in the food

chain took 144 back to New Zealand for further study, and Miss Wingham's luggage on the flight home included samples of the copepods she collected, including four species which she believes have not been recorded before.

COD CATCHERS

Originally Miss Wingham and Mr Paul Ensor, who studied phytoplankton in the food chain, expected to sample the marine fauna only through the hole drilled in the ice shelf. But they discovered a thriving marine community, surprising in its extent, at a nearby tide crack in the ice.

Closer to Scott Base two biologists from the University of Otago, Misses Vicky Cameron and Debbie Teale, spent 11 weeks between November and January catching Antarctic cod through holes drilled in the sea ice of McMurdo Sound. Their fishing was part of a research project for the study of parasites which have their adult stages in the Weddell seal, and the fish were needed to determine the prevalence of parasites in the different species.

Dr D. W. Featherston, of the department of zoology, who initiated the project, joined his fisherwomen for three weeks of the season. Misses Cameron and Teale worked from heated huts placed over 7ft to 8ft holes in the ice. They caught four or five species of cod, using hand lines or a netting fish trap attached to a 40m cable. Miss Teale dissected the fish, and succeeded in keeping the parasites alive in culture.

REMOTE PARTY

New Zealand's most remote expedition in the field was a geological party from Victoria University of Wellington. It was away from Scott Base for two months, and sledged more than 300km in the Fry Glacier region of the Trans-Antarctic Mountains, 200km north-west of the base.

Led first by Dr C. Burgess, and later by A. Palmer, the party made a geological reconnaissance of the previously-unexplored Fry Glacier area, which lies between the Mackay and Mawson

Glaciers. This area had not been mapped geologically, even at reconnaissance level, since it was first charted by Shackleton's expedition in 1907-09.

Also in the party were J. M. Anderson (geologist) and K. R. Sullivan (field assistant). Towards the end of December a botanist, A. J. Frost, replaced Dr Burgess. He continued his study of Antarctic mosses in the Towle and Northwind Valleys.

When he returned to Scott Base early in January, Mr Palmer said that the geological mapping had been an extension of work done by Victoria University parties in Southern Victoria Land over the last two decades. During its stay in the area the party climbed the highest peaks, which were more than 2000m above sea level. Except for two katabatic gales, when winds of more than 70 knots ripped on tent, the weather was fairly good.

SALTWATER SPRING

Last season the seven members of Victoria University's 21st expedition were divided into two teams. Led by J. R. Keys, who was on his fourth visit to Antarctica, the second team, P. H. Robinson, T.A. Stern (geologist) and J. M. Nankervis (field assistant) spent two months studying debris layers within the upper Taylor Valley area, and measured other physical and chemical characteristics of the glacier, and associated soils.

During their study of salts and sediments Messrs Keys and Nankervis found an unexpected saltwater spring. Although there has been a saline discharge from the Taylor Glacier for many years, this was the first time a spring had been sighted. It is believed to be the first such spring discovered in the area, and the discovery ties in with an American theory that subterranean water flows exist there.

When he returned to Scott Base Mr Keys, who is a geochemist, said that the spring had a number of different upwellings. The combined flow was monitored for nine days, and it reached

two litres a second. Because of the high saline content, the flow continued even when the temperature reached minus 7.8deg Celsius.

SNOW MUSHROOMS

Later in the season Messrs Keys and Stern worked on the summit area and the upper northern slopes of Mount Discovery to examine the possibility of recent volcanic activity and salt formation around Mounts Discovery and Morning. Their particular interest was the origin of tephra (ash layers) in the area, and what Mr Keys described as "snow mushrooms" near the summits of the two mountains.

These "mushrooms", which stood up to 20m high, suggested present-day fumarole activity on Mounts Discovery and Morning. Messrs Keys and Stern cut one of the smaller "mushrooms" in half. They found that it had been formed by the deposition of layers of snow, an had also been fashioned by the prevailing winds.

After this project Messrs Keys and Stern moved to Mount Erebus. There they took part in the monitoring of volcanic activity, and studied fumarole ice towers formed by geothermal activity.

LAVAL LAKE

Since 1975 the laval lake in the main crater of Mount Erebus, the highest active volcano in Antarctica, has increased in size, but is less eruptive. The New Zealand expedition which spent two weeks camped 122m below the summit did not observe any of the loud, explosive eruptions reported by the 1975-76 expedition. The temperature of the lava, recorded by optical pyrometer was 980° deg. Celsius.

Before the party was flown from Scott Base to a position on the Fang Glacier, 925m below the summit of Erebus to acclimatise for three days, the volcano was averaging two eruptions a day. Led by Colin Monteath, field operations officer, Antarctic Division, the party,

which included Harry Keys (geochemist) and Tim Stern (geophysicist), Victoria University of Wellington, and John Palmer, a Lands and Survey Department surveyor, was flown to the Fang Glacier by a United States Navy helicopter on December 18.

On December 21 the party climbed to the summit in three hours. In spite of the altitude of 3799m the climb and descent presented no problems. On December 22 a helicopter flew the four men back to the summit with more equipment. For the next eight days the party measured the volcanic activity visually, and took seismic measurements.

Outdoor temperatures were as bitter as ever, ranging between minus 20deg and minus 35deg Celsius. Cooler temperature in the ice caves near the summit affected the seismological equipment normally operated there, and disrupted the programme. But the 4km-long crater rim was surveyed for final data to enable the photogrammetric branch of the Lands and Survey Department to compile a map of the crater and the surrounding areas, samples were collected for later geochemical analysis, and Harry Keys studied ash layers on the Fang Glacier, and the fumerole ice towers on Erebus, which form when steam from fumeroles condenses and freezes.

VALLEY CHANGES

A Waikato University research team spent two months in the field on the last section of a four-year study of changes in the dry valleys over the last million years. This project was completed in December, and in January the team moved to the Koettlitz Glacier area to study sediments and slope development. It also studied volcanic and glacial geomorphology around Brown Peninsula, the Dailey Islands, Minna Bluff, and the Cape Royds region.

Leader of the team was Dr Terry Healy, who lectures in earth sciences at the university. With him were two post-graduate students, Nick Rodgers and Peter Kemp, and a student, Allan Willoughby.

When the four men left Scott Base in the first week of December they moved to the Taylor Glacier to continue work on the evaporite carbonated gypsum deposits. Then they drilled into some moraines near the La Croix Glacier to determine if they were ice cored. Ice samples could be used to help to determine the number, extent, and ages of the numerous glaciations.

Then the team moved on into the Beacon Valley where there are some sandstones which maintain their overall rectilinear structure over incredible distances. The object was to find out how the sandstones were cut into that shape, and how it had been maintained. After working in the Asgaard Range on slopes and sediments, the team moved to Vanda Station by way of the Labyrinth in the Upper Wright Valley. After Christmas the next move was to the Koettlitz Glacier region.

Geologists who work in the dry valleys have found the mummified carcasses of seals in the past season, but rarely at an altitude of more than 2,000m above sea level, and 60km from the coast. The Waikato geologists were surprised to find a seal carcass at this altitude on the south-east side of Mount Aeolus. Apparently it had crawled inland from the Ross Sea up the Victoria and McKelvey Valleys.

MARINE FOSSILS

Trace fossils of an extinct marine animal found on Table Mountain in Southern Victoria Land may throw new light on the origins of the Trans-Antarctic Mountains. Mrs Margaret Bradshaw, the Canterbury Museum's geologist, who found the trilobite trace fossils — mainly grooved resting places — believes her discovery suggests that the ocean penetrated farther than was thought previously.

Table Mountain lies at the head of the Ferrar Glacier about 130km west of Scott Base. It is about 60km from the coast, and the trace fossils were found in muddy sediments at heights of almost 2000m. The nature of the sediments also indicates an incursion of the sea in ancient times.

In the same region Mrs Bradshaw found the fossilised walking tacks of eurypterida. These are extinct freshwater marine animals allied to the scorpions. Adult trilobita range in size from 6mm to 75cm; the eurypterida from 10cm to 2m.

When Mrs Bradshaw made her first visit to Antarctica to collect geological specimens for the Canterbury Mseum in the 1975-76 season, she found in Southern Victoria Land fish fossils more than 300 million years old, fossils of freshwater fleas, and petrified plants. Last season she returned to Christchurch with the Table Mountain trace fossils — more than 400 million years old — fish plates, and imprinted leaves of the glossopteris plant, which flourished in Antarctica 275 million years ago.

Mrs Bradshaw and an Antarctic Division field assistant, J. M. Nankervis, spent five weeks in the field. They moved camp six times, and scaled peaks as high as Mount Brooke (2675m) in the search for rocks and fossils for research and display.

BUILDING FINISHED

When a New Zealand Army construction team flew back to Christchurch on February 14 it left behind the new summer laboratory — a two-storey prefabricated accommodation and scientific block which dominates the line of green flat-roofed huts that makes up Scott Base. Led by Lieutenant Selwyn Heaton, and under the supervision of a Ministry of Works building overseas, Mr Vic Erridge, the team from No. 3 Squadron, Royal New Zealand Engineers, completed the building in four weeks. Mr Erridge and another team of engineers will return next season to complete the interior work.

Linked to the existing buildings by a covered walkway, the new building, which cost about \$170,000, has accommodation for 20 people on the ground floor, and desk and sink space for scientists on a mezzanine floor. It is

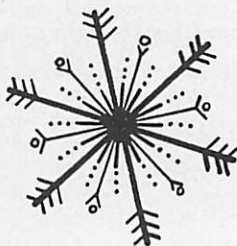
18.5m long and 6m high, and the steel floor trusses have legs to give a clearance of 1m above the permafrost. This is to allow blowing snow to pass underneath, and not drift up against the wall as happens with other base buildings each winter and spring.

Prefabricated materials for the building were taken south in the United States Supply ship Schuyler Otis Bland. But her arrival was delayed because of heavy sea ice, and the construction team had to work day and night after the material arrived to complete the building before the summer season ended. They worked in temperatures down to minus 10deg Celsius, but the weather was kind, and it took nine men only 11 days to put the building's 70 insulated floor, wall, and roof panels into its heavy steel frame — a task finished on February 1. Then the team was able to work indoors on the partitions and lining.

TRAINING FOR SURVIVAL

Nearly 200 men, mainly Americans, took part in snowcraft and survival courses conducted by New Zealand instructors from Scott Base last season. Two instructors, Stuart Allan, of Turangi, and Gary Ball, of Mount Cook, ran 21 courses in three months for the Antarctic Division, D.S.I.R.

These courses are held every season for Americans and New Zealanders on Ross Island. Men at Scott Base, including the winter team, were also shown basic snowcraft, and how to survive in the Antarctic environment. One course was held for nine men from the helicopter detachment of the United States Coast Guard icebreaker Burton Island.



Bases May Exchange Huskies

Scott Base may exchange a breeding husky with the Australian Antarctic station, Mawson, in the 1977-78 season. The stations last exchanged huskies more than 10 years ago.

A husky bitch is needed at Mawson to strengthen the breeding programme among the station's 25 sledge dogs. The proposed exchange was arranged tentatively at Scott Base by Dr R.I.Garrod, director of the Australian Antarctic Division, Department of Science, during his visit to the base in January. He worked out transport plans with the winter dog-handler, Mr Richard Wills, of Christchurch.

The bitch for Mawson would be flown to Christchurch and then to Melbourne to board the Nella Dan on her annual relief trip to Australian Antarctic stations next summer. A reciprocal journey would be made by the dog or bitch for Scott Base.

Scott Base last had an injection of new blood for its dogs in the 1974-75 summer when a bitch and a dog were flown to McMurdo Station from the British Antarctic Survey station at Adelaide Island off the Antarctic Peninsula.

Osman, oldest of the huskies at the base, and the grand old man of the dog

line died suddenly in the middle of January. He was in his 10th year, and although past a normal working age, had continued to work.

Two days before his death from suspected gastro-enteritis Osman was in a team which sledged to White Island - - 30km away - - to resupply a camp of University of Canterbury zoologists. Mr Willis said that he worked as hard as ever on the trip.

Osman had a proud ancestry. He was descended from the 26 dogs of Mawson brought from the Australian Antarctic station in 1956-57 for use by the New Zealanders in their first year in the Antarctic.

Only survivor of a litter of eight, Osman was named after one of the lead dogs in Scott's last expedition. Both Osmans had remarkable escapes from death.

On December 2, 1910, the first Osman was swept from the deck of the Terra Nova during a storm, and was saved by one of the seamen when carried aboard again on the crest of the next wave. On December 2, 1967, when he was less than two months old, the second Osman survived a savage attack by an older dog.



First Hovercraft Tests on Ice

FIRST HOVERCRAFT

Hovercraft may become an additional form of fast, short-range Antarctic transport in the next few years. A small British-made air cushion vehicle made an impressive debut in tests on sea ice and shelf ice from Scott Base in the middle of January.

After the tests by the Antarctic Division, Department of Scientific and Industrial Research, the superintendent (Mr R. B. Thomson) said that the four-man vehicle could be of great use in Antarctica to cross areas of weak ice, pools, and soft snow where other vehicles could not be used. If some modifications could be made, the division would probably buy the hovercraft.

A report on the trials will be made available to other Antarctic Treaty nations which have shown interest in hovercraft as a new form of transport. The use of hovercraft was discussed by the Scientific Committee on Antarctic Research at its meeting in the Argentine last year.

Built by Pindair Ltd, of Gosport, Hampshire, England, the Skima 4 is a utility hovercraft, and costs about \$7000. It has a maximum range of 160km, and with a full payload of 360kg, including fuel and driver, has a top speed of 40kmh over water or a hard surface. Power is provided by three 20 h.p. motors.

A United States Navy Hercules flew the hovercraft south for its evaluation. It reached a speed of about 60kmh on one downwind run. Steering was affected by a strong wind during the tests, and the vehicle ran best with two passengers and a little cargo, although the manufacturers' performance figures are based on the transport of four passengers and a full payload. Also the vehicle did not perform well in rough ice with sharper edges to negotiate.

Mr Thomson, who also tested the Skima 4 at Scott Base, says that some protection is needed for the driver, who now sits in the open when the vehicle is

travelling at high speeds in Antarctic conditions. Also the small controls are unsuitable for gloved hands, and the skirt material is liable to damage from sharp ice.

In 1965 John Green, then operations officer for the British Antarctic Survey, wrote an article in an air cushion vehicle supplement of "Flight International" advocating the use of hovercraft in Antarctica. He said there was a future for air cushion vehicles on the continent, and the sooner they were put to the test the better.

Trials of a Zealand-made rotary-engined hovercraft were planned by the Antarctic Division in the 1970-71 season. The original suggestion to have hovercraft in New Zealand Antarctic operations came from Victoria University of Wellington. The Antarctic Division had ideas of using the vehicles between Ross Island and the Victoria Land coastline, and between Scott Base and Cape Bird.

Powered by two Wankel rotary engines, the New Zealand-made hovercraft was designed to carry two to three passengers and equipment at speeds of 40 to 50kmh. Trials were postponed, however, because the Antarctic Division wanted to know how the vehicle would stand up to use in New Zealand. The manufacturers planned to fit more powerful engines suitable for Antarctic conditions, but did not continue with the project.

COLDEST YEAR

Last year was the coldest at Scott Base since records were begun 20 years ago. The mean temperature for this year was minus 22.5° Celsius - almost a degree lower than the previous lowest mean of minus 21.6°, set in 1960.

In 1975 the mean temperature was minus 19.3° Celsius.

The lowest temperature recorded last year was minus 52.2° on June 3. The all-time low is minus 57° set in 1968.

ANTARCTIC ANNIVERSARIES

Two nations New Zealand and Japan, celebrated 20 years of scientific research in Antarctica in January this year. Scott Base was established on Ross Island on January 20, 1957, and Japan's first Antarctic expedition left Tokyo on January 29 of the same year. Davis, Australia's second and southernmost Antarctic station, also had its 20th birthday on January 13 this year.

A simple flag-raising ceremony marked the anniversary of New Zealand's first presence in Antarctica. After the old flag had been lowered by Mr R. B. Thomson, superintendent of the Antarctic Division, D.S.I.R., the new flag was raised by the youngest New Zealander at the base, Jim Trotter, an 18-year-old venturer scout.

About 40 New Zealanders attended the ceremony. There were also 20 American guests from neighbouring McMurdo Station, and a special Australian guest, the Minister for Science (Senator James Webster). The guest also saw a demonstration of a small hovercraft — a new form of Antarctic transport — and inspected the site of the base's new science laboratory.

Mr Thomson said that both the hovercraft and the foundations for the new building reflected a strengthening of New Zealand's foothold in the Antarctic. Scott Base was designed originally to last the 18 months of the 1957-58 International Geophysical Year. "We had a temporary outlook then. Now our presence is much more permanent," he said.

Japan's anniversary was celebrated at the newly-built polar region research laboratory of the National Institute of Polar Research in Tokyo. After addresses by the Minister of Education (Mr

Toshiki Kaifu) and other dignitaries honours were awarded to 18 individuals and 11 organisations for their contributions to Japan's Antarctic expeditions.

Among them were Dr Takeshi Nagata, director of the institute, who led the first expedition aboard the motor-ship Soya, which established Syowa Station on East Ongul Island in Lutzow-Holm Bay, Mr M. Burayama, leader of the first traverse from Syowa to the South Pole in the 1968-69 season, and Dr Tetsuya Torii, a member of the first three expeditions, and leader of the fourth and eighth. Organisations honoured included the Japan Broadcasting Corporation, the Kyoda News Service, the "Asahi Shimbun" newspaper, the Nippon Telegraph and Telephone Public Corporation, and Isuzu Motors Ltd.

Davis, 650km east of Mawson, in the Vestfold Hills, was named in honour of Captain John King Davis, the famous Antarctic navigator, by the leader of the expedition which established it, Dr Phillip Law, then director of the Australian Antarctic Division. It was closed from 1965 to 1968 during the construction of the new base, Casey (formerly Wilkes).

“DEEPER SOUTH” REUNION

Mid-Winter's Day will be celebrated this year by a tiny Antarctic colony of five men in Gore. They and their wives have organised a reunion dinner to be held on June 25. The prime mover of the function is Harold Lowe, leader at Vanda Station in 1969-70, and summer field leader at Scott Base in 1972-73.

Mr Lowe says that other Antarctic people in the "deeper south" and any interested visitors would be welcome to attend. They can get in touch with him at P.O. Box 147, Gore.

ICE HOCKEY STICK PUZZLE

Did any of Scott's men play ice hockey at Cape Evans 65 years ago? The question arose last season when the New Zealand Antarctic Society's caretakers, Messrs A.W. Burton and J. Sutton-Pratt, spent two weeks at Cape Evans working on Scott's hut, one of the three historic huts on Ross Island maintained each season by the society for the Antarctic Division, Department of Scientific and Industrial Research.

Each summer since 1969 caretakers have uncovered relics inside and outside the huts. Last summer Messrs Burton and Sutton-Pratt found an ice-hockey stick and a pick axe. The hockey stick was something of a puzzle because the only sport played at Cape Evans was soccer.

But a clue to the ownership of the hockey stick can be found in "With Scott: the Silver Lining", written by Griffith Taylor, the Australian geologist in Scott's shore party. The first soccer match was played on the sea ice in North Bay on May 2, 1911. Griffith Taylor

writes amusingly about the players' lack of skill in the game, and says that Wright's knowledge was based on his experience of ice hockey.

Wright was Sir Charles Wright, who died in Victoria, British Columbia, in 1975. He was a young Canadian physicist who became the expedition's geologist. Ice hockey is a peculiarly Canadian game, and it is fair to assume that Wright was the owner of the hockey stick. Perhaps somewhere in the debris at Cape Evans the rubber puck remains to be found.

The caretakers also uncovered in a corner of the ice-bound stables a small iron blubber stove used to heat mash for Scott's ponies. Its existence was known -- one of Ponting's photographs shows Captain Oates and Cecil Meares, who was in charge of the dogs, crouched over the stove smoking their pipes. But last season Messrs Burton and Sutton-Pratt were able to dig down to the base of the stove, which was set in volcanic scoria as a precaution against fire.

Caretakers for Historic Huts

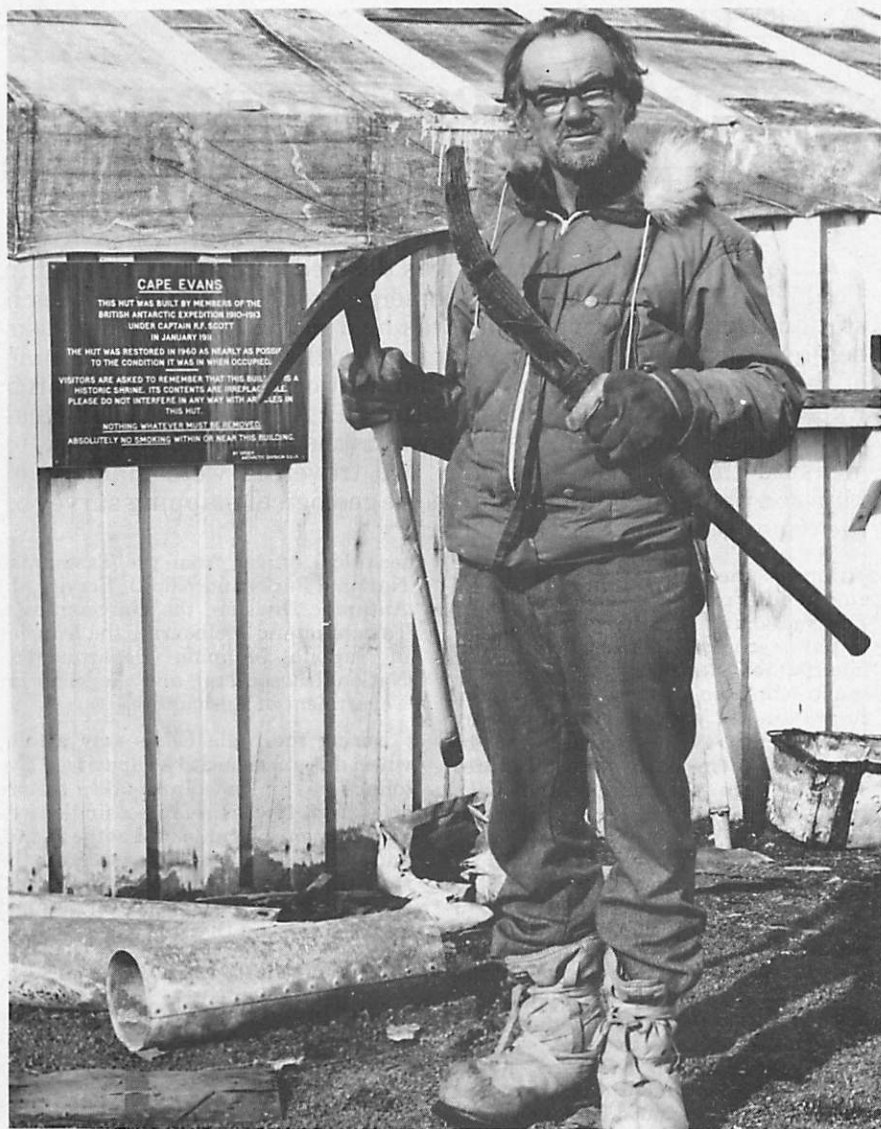
Two members of the New Zealand Antarctic Society will have the opportunity to go south next season to act as caretakers of the historic huts at Cape Royds, Cape Evans, and Hut Point. Applications are invited for two men to spend three weeks in the Antarctic, starting early in December.

The Antarctic Division of the Department of Scientific and Industrial Research, which provides special clothing, transport, food and accommodation, has suggested certain qualifications of value to anyone applying. There have been caretakers working on Ross Island every season except one since the 1969-70 summer, and the project is part of the New Zealand Antarctic research programme.

Qualifications suggested include interest in one or more of the Antarctic research projects, particularly biology or

meteorology, and knowledge of an interest in the historic huts at Hut Point, Cape Royds, and Cape Evans, and the conservation of fauna and flora. Other suggestions are that applicants should have practical experience in some trade or profession, and mountaineering and/or tramping experience.

The two caretakers, who will be required to attend the training camp at Tekapo for the Antarctic research team, will be selected by a panel of representatives from the society, the superintendent of the Antarctic Division, and the leader at Scott Base for the 1977-78 season. Application forms can be obtained by South Island members from the secretary of the Canterbury branch, P.O. Box 404, Christchurch. North Island members can apply to the Wellington branch secretary, P.O. Box 2110. Applications close on May 30.



Mr A.W. Burton, of Christchurch, hlds two newly-discovered relics — a pickaxe and an ice-hockey stick found at Cape Evans, Ross Island, where Scott built his headquarters for his last expedition.

Antarctic Division photo: Neville Peat

ANARE REPORTS

Geological Mapping in Enderby Land

Although the relief of Casey was delayed when the supply ship *Thala Dan* hit an uncharted submerged rock close to the French station, Dumont d'Urville, and was held in the ice for three weeks before returning to Melbourne for repairs, the scientific programme of the 30th summer of the Australian National Antarctic Research Expedition was not seriously affected. A 400km glaciological traverse was made from Casey towards the Soviet base, Vostok, to measure the ice flow line, and two traverses were made from Mawson to Mount King to support the geological mapping survey of the exposed rocks of Enderby Land.

During the changeover at Davis engineers from the Department of Transport and a surveyor from the Department of National Mapping investigated the feasibility and cost of constructing an airfield with a 2500m runway in the Vestfold Hills for use by aircraft such as the *Hercules* and the *Boeing 707*. The party looked at three sites between the station and Lake Dingle.

ANARE's summer programme began when the *Nella Dan* left Melbourne on November 18 for Macquarie Island with the 16 men and two women of the sub-Antarctic station's winter party, and stores and equipment. The leader of the expedition was Mr Alan Humphreys, acting assistant director (engineering) in the Antarctic Division. A summer party of five which remained on the island until last month to carry out scientific work, included Dr A.I.Orlov, a geomorphologist from the Moscow State University, who is a Soviet exchange scientist at the Australian National University, Canberra.

There were two women, Mrs E.J.Kerry (botanist) and Mrs J.E.Marlow (biologist) among the 15 supernumeraries who made the round trip. They included two Queen's scouts, and scientists and

technical officer from the Tasmanian National Parks and Wildlife Service, the Antarctic Division, the Universities of Tasmania and Melbourne, the Division of National Mapping (Department of National Resources), and the Victorian Department of Agriculture.

During the *Nella Dan*'s stay a four-wheel drive crane with a capacity of five tonnes was unloaded and taken ashore on a barge. It was the largest single piece of equipment ever unloaded at the island, and was used last summer to erect the steel frame of an 18m by 24m general stores building, the biggest ever planned by the Antarctic Division.

FIRST VOYAGE

After her return to Melbourne on December 4 the *Nella Dan* sailed again on December 10 on her first continental voyage to relieve Mawson and Davis. The expedition was led by Mr Graeme McKinnon, of the Antarctic Division, and the *Nella Dan* carried 10 men of the Mawson winter party, the winter party for Davis, and stores and equipment for both stations. When the ship reached Mawson she unloaded stores for the Enderby Land programme to be carried out from the base camp at Mount King. Sixteen men who took part in the programme also travelled south to

Mawson.

When the Nella Dan arrived off Davis for the changeover of the winter parties, and the unloading of stores and equipment, she encountered thick ice, and was checked a few miles from the station. But she was able to complete her task, and returned to Fremantle towards the end of January.

CALL AT MIRNY

Before the Nella Dan reached Mawson she called at the ice edge off Mirny where Mr Neil Young, a glaciologist with the Antarctic Division was transferred to the station by Soviet helicopter. This exchange was part of the International Antarctic Glaciological Project in East Antarctica, and Mr Young spent last summer with a Soviet traverse party which travelled from Mirny to Dome C (74° 40min S/123° 50min E) in Wilkes Land by way of the old International Geophysical Year station, Pioneerskaya. He established ice movement markers along the route, using one of the Antarctic Division's satellite surveying devices to obtain their accurate position. This month he returned to Australia in a Soviet ship.

SHIP DAMAGED

On her first voyage south from Hobart to relieve the 33 men who wintered at Dumont d'Urville the Thala Dan was several miles north of the base when she hit a submerged rock on December 12. A 5m section of the ship's 2.5cm thick steel bow was ripped open by the rock, and then she remained held in the pack ice for nearly three weeks.

In the second week of January the Thala Dan freed herself, and was able to transfer the new summer and winter parties to Dumont d'Urville. She was to have relieved Casey later in the month. Instead she returned to Melbourne, and was put into dry dock. The damaged bow section was replaced in time for her to sail south and relieve Casey towards the middle of last month.

Three traverses were completed between September and the beginning of January by parties from Mawson and

Casey. A spring traverse team of six men left Casey on September 15 in two tractor trains on an inland journey of 400km to continue the scientific programme commenced in autumn last year.

BAD WEATHER

Problems on the southward trip were compounded by bad weather, and for the first 42 days in the field 30 were of either blizzard or whiteout conditions. But the party recovered the D5 tractor "Linda" which was left in the field by the autumn traverse party 300km inland because of engine seizure.

Glaciological work was carried out on the International Antarctic Glaciological Project strain network. Intervals between some of the poles were remeasured, and ice radar, accumulation and gravity measurements were also made. Several offset stations were established on the western side of the network, using satellite observations for positioning.

By the end of the first week in November the party reached the D5 tractor. The return journey began towards the end of the month, and was hampered by bad weather. Heavy snow falls meant that the tractor trains had to travel over 20cm of soft snow for much of the journey. Frequent bogging occurred, the recovered tractor had to be towed instead of carried on the recovery sledge, and not all glaciological observations were carried out.

FIRST TRAVERSE

Mawson's first traverse party of nine men in three tractor trains departed on October 4 to establish the camp at Mount King for the Enderby Land summer programme. It reached Mount King on November 1 with 122 drums of fuel, nine tonnes of food, and four tonnes of miscellaneous stores and equipment. Three men remained at the summer camp to await the arrival of the Enderby Land summer party.

More than 300 glaciological measurements were made on the southward trip. The second traverse to Mount King began in early December,

and reached the summer camp with a further fuel load about the same time as the three Hughes helicopters and the Pilatus Porter fixed wing aircraft arrived from the Nella Dan.

Last summer the camp at Mount King was occupied by 18 men, including four geologists and one geophysicist from the Bureau of Mineral Resources. Transported by the helicopters and the Pilatus Porter they surveyed about 250 different sites in Enderby Land. Rocks were examined, and samples collected for later laboratory studies. Other samples were collected for a pilot study in palaeomagnetism and geochronology as a precursor to more extensive studies in these areas in 1978.

ICE THICKNESS

Geophysical programmes were expanded last season, and the parties working from Mount King continued gravity and ground magnetic studies. An experimental airborne magnetic profiling study was carried out in conjunction with the glaciologists' ice thickness measurements.

Ice thickness soundings inland from the coast beyond the 2000m contour in MacRobertson, Kemp and Enderby Lands, were the main feature of the ANARE glaciological programme. The Pilatus Porter aircraft on charter to the Antarctic Division was used for the ice sounding flights. Some of the sorties were flown from Mawson, and the others from Mount King.

Studies of the energy processes involved in the formation, growth, and decay of the annual coastal ice cover, and the dynamics of the ocean beneath the ice, were continued at Mawson last season. A detailed programme of measurements was carried out to obtain data on the exchange of heat between air and sea.

SNOW SAMPLES

During the changeover at Casey helicopters established a gravity tie from the station to the Law Dome summit by way of strain grid points along the route, and surface snow samples were collected

at strain grids P and B. Later an ice drill was taken to near strain grid C to drill as deep as possible down to 500m. When the autumn activities are completed the drilling equipment will be returned to Casey and prepared during the winter for the spring drilling programme.

A pilot programme of oceanographic observations was carried out aboard the Nella Dan and the Thala Dan during their outbound and homeward journeys from the Antarctic. The programme was conducted by the Commonwealth Scientific and Industrial Research Organisation's Division of Fisheries and Oceanography in conjunction with a group from the University of Texas and the Antarctic Division.

Samples of sea water were taken for later analysis in Australia, and one ship towed a thermograph probe to provide a continuous record of sea surface temperatures. Expandable bathythermographs were dropped from both ships at intervals of about 30km on the voyages south and north to obtain temperature against depth profiles down to 460m.

BUOYS RELEASED

When the Thala Dan reached the Antarctic Convergence, two free floating sonar buoys were released, one on either side of the convergence. These buoys, whose position was monitored once each day by the Nimbus-6 satellite, measured water temperature, enabling surface currents and water masses in the region to be investigated for periods of up to a year.

Irradiance meters were fitted to the Thala Dan to record the amount of light energy reaching the ocean's surface. This project was carried out by scientists from Texas A. and M. University. A magnetometer was also towed behind the ship for a group at Macquarie University. The aim was to measure anomalies in the earth's magnetic field produced by various geological structures under the sea floor.

A wide range of biological work was done by ANARE staff last summer both on Macquarie Island and at the

Antarctic stations. Long-term studies of birds and seals were continued at Mawson, and work was also done on the petrels nesting near Casey. During the changeover at Casey botanists from Melbourne University and the University of New England conducted studies in the area.

During the winter an Antarctic Division microbiologist will make a survey of the bacterial flora of Deep Lake, one of the saline lakes near Davis in the Vestfold Hills. Tagging of Weddell and elephant seals, and some bird banding were continued last season.

Intensive studies were made of

wandering albatrosses on Macquarie Island, mainly at Caroline Cove. This species has been studied since the 1950 s and detailed information is needed to discover why breeding numbers have fallen off from the peak reached in the 1960 s.

Tussock grass, the island's lakes, fungal decomposition, and the occurrence of pathogens in sea birds, were among the subjects of study by botanists and other scientists during the changeover period. A winter study of the endocrine control of growth in elephant seals will be made by a University of Queensland biologist.

Footsteps On His Territory

Casey, the nearest Australian base, is more than 2000km from Scott Base and accessible only by sea, but the Australian Minister for Science (Senator James Webster) was able to reach the Australian sector of Antarctica twice on his first visit to the continent. A United States Navy Hercules flew him to the Amundsen-Scott South Pole Station, and during the day he spent there he walked round all Antarctic territories in a few paces.

When he toured the McMurdo Sound area by helicopter Senator Webster actually landed just inside Australian territory. The United States Navy helicopter flew across the Trans-Antarctic Range west of the sound, and set down near Horseshoe Mountain, which is beyond the Asgaard Range at the edge of the Polar Plateau, and just inside Australian territory.

On the first visit by an Australian Minister for Science to Antarctica Senator Webster was accompanied by Dr R.I.Garrod, director of the Antarctic Division of the Department of Science. Blue skies, no wind, and temperatures surprisingly high at around zero greeted the Australians when they arrived at McMurdo Station from Christchurch on January 17.

During his five-day visit Senator Webster was the special guest at celebrations to mark the 20th anniversary of Scott Base. On the same day he went on a tour of the west coast of Ross Island in a United States Navy helicopter and saw the historic huts of Shackleton at Cape Bird. He also visited New Zealand parties in the field during the week, and watched the first tests over Antarctic ice of a British-built helicopter.

Before he flew back to Christchurch on January 23 Senator Webster saw scientific research at McMurdo Station, and spoke to National Science Foundation representatives about the prospects of improved transportation for Australian Antarctic expeditions. He mentioned that there was the possibility of an airfield being built at the French station, Dumont d'Urville, which was close to the Australian area.

Senator Webster spoke to New Zealand field parties by radio before he left Scott Base. In Christchurch he had discussions with the New Zealand Minister of Science and Technology (mr L.W.Gandar) on co-operation in scientific programmes in the Antarctic, and problems of Antarctic transportation.

U.S. Research to Evaluate Mineral Resources

Although the United States Antarctic research programme last season suffered a setback when the Ross Ice Shelf Project had to be terminated early in December because of drilling difficulties, all other projects were completed successfully. Ten American and three New Zealand projects were directly affected by the halting of the drilling operation, but nearly all the scientists concerned were able to continue research in other areas. The Ross Ice Shelf Geophysical and Glaciological Survey was not affected.

Last season 270 scientists worked on 85 different projects in the Antarctic under the auspices of the National Science Foundation. Geological studies directed towards an evaluation of mineral resources were among the principal projects of the research programme.

With air support a United States Geological Survey team was able to spend a month at the Dufek Massif in the Pensacola Mountains about 2415km from McMurde Station. Chromium, nickel, cobalt, and platinum occur in trace amounts in the Dufek Massif, and the complex has a greater resource potential than most Antarctic mountain areas. Another geological team made a search by helicopter for uranium in the mountains of Victoria Land.

Because of restraint on spending and the temporary loss of two aircraft, nearly all the field activities of the Ross Ice Shelf Project, which has cost \$5 million since 1973, had to be deferred in the 1975-76 season. Last season 60 scientists from 10 countries - - United States, Britain, Soviet Union, Denmark, Switzerland, Norway, Australia, Japan, New Zealand and West Germany - - were involved in the third year of field work, which was planned to continue surface geological and glaciological investigations, and to drill through the ice shelf to allow investigations of the shelf ice, the water and possible life beneath the shelf, and of the sea bottom sediments.

DRILL CAMP

A drill camp was established on the ice

shelf about 645km from McMurde Station in October, and the RIGGS camps were occupied again near Roosevelt Island, and four other sites on the shelf. RISP was supported by United States Navy Hercules aircraft which transported men, supplies, and equipment, and Twin Otter aircraft chartered from the British Antarctic Survey and Bradley Air Services, of Canada, were used to support the mobile aspects of RIGGS.

Three holes were drilled through the ice for RISP in November and early December. The first was for a water well to supply the camp, and was taken to a depth of 48.3m. A second hole was drilled to a depth of 100m for geochemical and isotope studies by a team from the University of Bern, Switzerland.

Drilling the the main access hole began early in November at a site where the ice is about 420m thick, and the water beneath the shelf is about 250m deep. Progress was slow because of bad weather and mechanical problems. But on December 14 when the hole had reached a depth of 330.3m, the ice, flowing under the pressure of its own weight to fill the hole, locked the drill assembly. All attempts to recover the drill failed, and all drilling was stopped



Members of a United States Geological Survey party in the Pensacola Mountains, 1740km from McMurdo Station, load a sledge from a U.S. Navy Hercules before beginning their research in the Dufek Massif, 740km from the South Pole. U.S. Navy photo

for the season.

Four projects were directly affected as a result of the drilling halt. The first was the drilling project itself. A second was a joint project of the Norwegian Polar Institute and the University of Bergen, which involved lowering equipment through the access hole to measure the mass balance and heat flow at the ice-seawater interface beneath the Ross Ice Shelf. The third was a project by Flinders University, South Australia, to measure the transfer of heat, salt and momentum in seawater immediately below the shelf.

The fourth United States project affected was the logging and curating of geological material from the shelf by a team from Northern Illinois University. New Zealand projects affected were an oceanographic study and two marine biology programmes.

DUFEK MASSIF

No deposits of potential economic usefulness or of significant size were found by the United States Geological Survey team during its study of the Dufek intrusion, one of the world's

largest layered complexes, which might prove to be one of the most important ore-bearing structures in the world. Discovered in 1957 by an International Geophysical Year traverse party from Ellsworth Station, which visited the Dufek Massif, the complex comprises the norther one-third of the Pensacola Mountains, and includes the Dufek Massif and the Forrestal Range.

Situated 1740km from McMurdo Station and 720km from the South Pole, the complex is about 50km long, 100km wide and roughly 9km deep. It is covered by ice except for outcroppings in the two mountain ranges. It was the chief focus of United States geological research last season because of its striking similarities to some of the most productive formations in the world.

Among these formations are the bushveld complex in South Africa, the Stillwater formation in Montana, and the Sudbury region in Ontario. These areas have yielded important deposits of platinum, nickel, copper and chromium. The bushveld complex has also yielded lead, zinc, vanadium, iron, cobalt and some gold.

Dr Arthur B. Ford, who studied the Dufek intrusion in the 1965-66 season, led last season's team of six, including two women. The team was flown to the area at the beginning of December by a United States Navy Hercules aircraft, and established its camp in the Enchanted Valley area at the west end of the Dufek Massif. During its investigations the team collected about 680kg of rock samples from the lower exposed half of the igneous rock complex for microscopic study and chemical analysis.

Geophysical studies of the nature of the rocks under the ice were also made by the team, and four geophysical traverses were run. One was 50km long, and ran from the Dufek Massif to the Filchner Ice Shelf. Another was 15km long and ran the length of the Jadbürg Glacier. Ice thickness was measured with radar at 600m intervals, and on the Jadbürg Glacier the ice ran as deep as 1km.

After his research in the Dufek Massif Dr Ford flew to Druzhnaya, the Soviet summer station on the Filchner Ice Shelf, on January 16. He worked with Soviet geologists in a study of the metamorphic complex of the Shackleton Range, which is about 325km south-east of Druzhnaya. This was the first time a geologist from the United States Geological Survey had worked in Antarctica with a Soviet expedition. Dr Edward S. Grew, a geologist from the University of California, who was the United States exchange scientist last season, also worked with the Soviet geologists in the Shackleton Range.

URANIUM SEARCH

Another geological study of importance in the evaluation of Antarctica's mineral resources was a radioactivity survey, using airborne gamma-ray spectrometry, of rocks in the dry valleys of southern Victoria Land, and the topmost Beacon sandstone layers of mountain ranges in the McMurdo Sound area. The survey, which covered a rectangular area of about 200km by 70km was designed to assess the potential for uranium and thorium resources in the areas.

Dr Edward J. Zeller, of the department of geology, University of Kansas, and Dr Gisela Dreschhoff, deputy director of the university's radiation physics laboratory, made the survey with Dr Franz Tessensohn, of the West German Geological Survey, and Mr Kent Crisler, a University of Kansas student. They used a portable gamma-ray spectrometer which was mounted in a United States Navy helicopter.

Beacon sandstone formations in the area covered appeared to be related to those of similar age and structure that produces uranium in the Karroo area of South Africa, and in India. Dr Zeller, who was in charge of the project, says that part of the Karroo formation contains 2 per cent uranium. Readings obtained during the survey did not indicate a very rich resource, but they may show that uranium concentrations exist in the Beacon sandstone - some perhaps of economic importance.

INFANT DEATHS

Studies of the cardiovascular and metabolic response to diving and endocrinology of Weddell seals in McMurdo Sound last season by a team of United States, Canadian and New Zealand scientists, may help to establish the cause of the sudden infant death syndrome (formerly called cot death or crib death). This syndrome is responsible for the deaths of between 7,500 and 10,000 babies each year in the United States, and about 150 in New Zealand.

Because of many unique modifications of its biochemistry and physiology, the Weddell seal is the deepest-diving seal in the world, and can stay down longer than other species. Adult seals can dive to 450m and remain submerged for up to an hour. Scientists have established that during such dives certain reflexes stop the seals' breathing, slow their heart beats, and redistribute their blood.

Led by Dr Warren M. Zapol, of the Massachusetts General Hospital, Boston, the research team studied the seals' blood circulation to the lungs during simulated diving. Blood flow to all parts of the body was measured with

radioactively tagged microphones, and the metabolism of food and hormones was studied. Plastic catheters were placed in the umbilical vessels of pregnant seals, and oxygen, carbon dioxide, hormones and other important blood concentrations were studied during pregnancy and birth in undisturbed seals, and during simulated diving.

SEAL DIVING

After his return to the United States Dr Zapel said that Weddell seals, while diving, might undergo reflex activity similar to that of the victims of S.I.D.S. But the seal lived and the infant died, and the scientists were trying to find out why. In both the seals and infants the reflex mechanism might be triggered when the face was immersed in a liquid or when certain liquids accumulated at the back of the throat. This caused the brain to slow the heartbeat and halt breathing.

Professor Graham C. Liggins, of the National Women's Hospital in Auckland, studied the effect of throat stimulation on the heartbeat of the adult seal as well as the effects of diving by the pregnant seal on the foetal heartbeat. He said that reflexes similar to those of the Weddell seal were likely to be a major factor in causing cot deaths.

Dr Zapel said that the studies had improved understanding of the complex mechanism the Weddell seal had developed to withstand long dives. In the future this might lead to improved strategies for human therapy in states similar to long diving - - heart and lung failure.

PENGUIN BEHAVIOUR

Biological and geological studies in the Antarctic Peninsula area were among the 85 projects of last season's programme. Scientists did research on sea birds and seals in the pack ice, and the behaviour of Adelie, chinstrap and gentoo penguins formed another project.

Projects in the McMurdo Sound area ranged from the study of shallow-water benthic communities to investigations of

volcanic rocks, and measurement of cosmic ray intensity variations. Stratospheric chlorofluorocarbon samples were taken at McMurdo Station to assess the global extent of this possible ozone-destroying agent.

A very high frequency radar system was established at Siple Station in Ellsworth Land to examine echoes returned from electron density irregularities in the ionospheric E-region. Equipment was installed in preparation for the planned launching of three Nike Tomahawk rockets next season. Payleads aboard the rockets will investigate electron precipitation triggered by very low frequency radio wave emissions.

Scientists from seven universities and the National Oceanic and Atmospheric Administration made upper atmosphere and auroral studies at the Amundsen-Scott South Pole Station. A summer N.O.A.A. project of geophysical monitoring for climatic change by the measurement of trace atmospheric constituents is being continued this winter. The search for the pendulum mode of the earth's inner core made during the summer will also be continued for the rest of the year.

WORK AT POLE

For several seasons Dr Harold G. Muchmore, of the Oklahoma Medical Research Foundation, has conducted studies of immunologic changes in people who winter at the South Pole in collaboration with scientists from the Universities of Otago and Wisconsin. These studies, designed to evaluate any loss of immunity that may result from prolonged winter isolation, were continued last season.

In southern Victoria Land scientists searched for meteorites and surveyed the dry valleys for endolithic algae. Studies of rock samples from the dry valleys revealed the presence of endolithic blue-green algae under the surface of some samples - - the first evidence of primary producers in the cold Antarctic desert ecosystem.

Navy Hercules Flights to Soviet Stations

United States Navy Hercules aircraft flew to remote parts of Antarctica in support of the scientific research programme last season. They made four flights to Soviet stations - - Vostok in the heart of the Polar Plateau, and Druzhnaya, the new summer station on the Filchner Ice Shelf - - and two flights to the Dufek Massif in the Pensacola Mountains, 1740km from McMurdo Station.

Support for supply operations by sea was provided by two veteran United States Coast Guard icebreakers, the Burton Island and the Northwind, both with 30 years' service in Arctic and Antarctic waters. The icebreakers cut a channel through 38km of ice in McMurdo Sound for the supply ships, and escorted them to the ice wharf in Winter Quarters Bay.

Next season VXE6 Squadron's Hercules aircraft will support a programme of detailed geological and geophysical research in Marie Byrd Land. An airborne reconnaissance will be made in preparation for the establishment of field camps from which scientists will work to obtain geological and geophysical data and rock specimens to develop a geological history of West Antarctica. The Hercules aircraft will fly men and equipment to the field camps from McMurdo Station and also helicopters for close support work.

RECOVERY PLAN

Last season the United States Navy recovered the last of three Hercules aircraft damaged in takeoff accidents from Dome C, an ice dome in Wilkes Land. Next season, in collaboration with the French Antarctic research team, it may try to recover another Hercules which crashed in Wilkes Land on December 4, 1971. The aircraft was supporting a French scientific traverse party on its journey from Carrefour towards Vostok. It landed on the ice-cap to deliver fuel, fresh food, and mail, and then crashed while making a jet-assisted

take-off.

Because of the rough terrain in the area where the Hercules crashed, a skiway would have to be prepared before aircraft could fly men and equipment to the site. A reconnaissance of the area last season revealed that the abandoned aircraft was still visible but almost buried under snow. Tentative arrangements have been made for a team from Dumont D'Urville to prepare a skiway at the crash site which is about 200km from the station.

INLAND FLIGHTS

Two Hercules aircraft began inland flights last season on October 30 when they flew 30 men and nearly 15,000kg of cargo, fresh food, and mail to the 16 Americans and two New Zealanders who spent nine months in winter isolation at the Amundsen-Scott South Pole Station. On November 29 a Hercules flew a United Geological Survey team to the Pensacola Mountains for geological studies in the Dufek Massif. This was the first time an aircraft had landed in the area.

Siple Station, 2250km from McMurdo Station at the base of the Sentinel Mountains in Ellsworth Land, was temporarily closed in January last year. VXE6 Squadron aircraft flew scientists, supplies, and fuel to the reopened station for the summer research programme. More than 30 flights were made to deliver supplies and fuel to support the summer and winter research teams. Cargo included material for the construction of a new station, which will begin next season.

In December Vostok, the coldest place on earth, 3300m above sea level, had its second group of visitors in two years. When a VXE6 Squadron Hercules landed there after a 1110km flight from McMurdo Station, the flags of the Soviet Union, the United States, and New Zealand, were flown to mark the occasion. One of the passengers aboard the aircraft was Captain Kevin Tasker, the summer leader at Scott Base.

Waiting to greet the visitors was Dr R. N. Johnston, the United States exchange scientist, who had wintered at the Soviet station. Turkey was on the menu for the visitors who brought with them for the Russians 80kg of fresh vegetables and about 45kg of Antarctic cod caught in McMurdo Sound. After dinner the Russians and Americans exchanged gifts and souvenirs.

Soviet scientists at Druzhnaya turned out to welcome Dr Arthur B. Ford, of the United States Geological Survey, and the crew of a VXE6 Squadron Hercules which landed on the Filchner Ice Shelf for the first time on January 16. Also there to welcome Dr Ford was the United States exchange scientist, Dr Edward S. Grew. Later another flight was made from McMurdo Station to bring back Dr Ford after his geological work with Soviet scientists in the Shackleton Range.

On January 25 40 men at Vostok turned out to welcome their third group of visitors, and the Soviet Union, United States, and New Zealand flags were flown again. One of the visiting party was Mr Jim Rankin, the base engineer and winter leader at Scott Base.

GIFT OF FLOWERS

Vostok holds the record for the coldest temperature ever recorded on earth — minus 88deg Celsius. But on January 25 the temperature was a summery minus 34deg.

Gifts and clothing were exchanged during the visit, and mail was franked in the station's dimly-lit post office. There was a surprising gift for the only woman on the flight — Lieutenant Elaine Roberts, of the administration office at

McMurdo Station. It was a bouquet of three fresh, scent-filled flowers, one a carnation. The nearest earth at Vostok is 4km away — straight down through the plateau ice. But the Russians have grown radishes and tomatoes there by hydroponic methods since 1974 so flowers were no problem.

In addition to all these special inland flights VXE6 Squadron provided helicopter support for United States and New Zealand field parties in the McMurdo Sound area. Also supplies of fuel were flown to Byrd Station, which has been closed for several seasons, in preparation for next season's operations.

SHIP MOVEMENTS

Icebreaker support last season was to have been provided by the Coast Guard's two most powerful icebreakers, the 13,000-ton new Polar Star, and the Glacier, which has worked in southern waters since 1955. But the Polar Star suffered propeller trouble while under test in Bering Strait, and the Glacier had to remain in Boston.

Instead, they were replaced by the Burton Island, which was to have been decommissioned at the end of the 1975-76 season, and the Northwind, which made her first trip south in the 1956-57 summer. The Burton Island completed her 13th and probably last trip last season, and the Northwind made her fourth.

First task for the two icebreakers was to cut a channel through the sea ice in McMurdo Sound to Winter Quarters Bay. The Northwind began cutting on January 3 after supporting oceanographic work in the Ross Sea. She was joined on January 5 by the Burton Island, which called at Campbell Island with stores for the New Zealand meteorological station on her way south.

Unusually thick ice made cutting the channel more difficult than in past seasons. But by January 14 the two icebreakers had cut 38km of channel through ice 1m to 2m thick. A new ice wharf 260m long, 106m wide, and nearly 7m deep, built in Winter Quarters Bay

last winter, was ready for the arrival of the Schuyler Otis Bland and the tanker Maumee.

FIRST TRIP

A new supply ship, the 16,000-tonne Bland replaced the veteran Private John R. Towle, which completed her last trip in the 1975-76 season. When she left Lyttelton on January 12 for McMurdo Sound she carried a year's supply of food for Scott Base, including potatoes, flour, eggs, whitebait, and oysters, 12,000 cans of New Zealand beer, and 30 pieces of heavy machinery which had been repaired and overhauled in Christchurch.

On January 18 the Bland reached the outer pack ice of the Ross Sea, and escorted by the Burton Island and the Northwind, she berthed in Winter Quarters Bay on January 21. She suffered damage to her propeller and rudder in her passage through heavy pack ice, but after discharging her cargo, and loading 6500 cubic yards of marginally contaminated crushed rock removed from the nuclear power plant site on Observation Hill, she sailed on February 2 for Port Chalmers.

After escorting the Bland from Winter Quarters Bay to open water, the Northwind led the tanker Maumee to the ice wharf on February 4 to discharge 5.5 million gallons of aviation and Antarctic diesel fuel. After her eighth visit to McMurdo Sound she sailed in company with the Northwind on February 7.

When the two ships reached Tent Island on the trip down the channel the ice made one last attempt to trap them, setting up a blockade of wind-driven pressure ridges. The Northwind broke through the ice after several attempts, and as the two ships moved north the ice closed in behind them.

Before she sailed to pick up equipment from the former joint United States—New Zealand station at Cape Hallett on her way to Wellington, the Northwind spent several days cutting a channel round the annual ice runway so it would move out to sea. The two-year-old ice of the runway had developed numerous faults.

INSPECTION TEAM

Assigned to support oceanographic research in the Weddell Sea, the Burton Island left McMurdo Station on January 22 for Palmer Station where she arrived on February 2. She then proceeded to Ushuaia, Tierra del Fuego, to pick up the United States science contingent, and the Arms Control Disarmament Agency team which inspected Antarctic bases last season in the terms of the Antarctic Treaty.

After leaving Ushuaia the Burton Island proceeded to the South Shetland Islands where the ACDA team inspected the Soviet and Chilean bases, Bellingshausen and Presidente Frei, on King George Island. Before the icebreaker began her scientific work in the Weddell Sea, the team also inspected the Argentine base, Vicecomodoro Marambio, on Seymour Island, and the Chilean base, Bernardo O'Higgins, which is on a small island off Trinity Peninsula, Graham Land.

Until March 8 the Burton Island remained in the Weddell Sea. She cruised off the Filchner Ice Shelf, and before she departed was checked by two miles of fast ice and large blocks of pressured shelf ice from reaching Vahsel Bay, and making a record ship penetration of the Weddell Sea.

SEAL CENSUS

When staff from Scott Base made their fifth and final census of the Weddell seals around McMurdo Sound in the first week of January they found fewer on the ice than in the previous season. From a United States Navy helicopter they counted 670 seals on a 45km section of the coast of Ross Island.



RETURN ON CHRISTMAS DAY

No. 319, one of three Hercules aircraft damaged in takeoff accidents on the East Antarctic ice-cap in 1975, came back to McMurdo Station on Christmas Day, 1976, after an absence of nearly two years. Champagne and congratulations marked its return from Dome C, an ice dome in Wilkes Land 1150km from McMurdo Station, where it had been on the ice since January 15, 1975, and the completion at a cost of about \$2.5 million of the recovery of three aircraft which would have cost about \$27 million to replace.

Two Hercules aircraft were recovered from Dome C in the 1975-76 season. Recovery of No. 319, the most severely damaged of the three was planned to take 74 days. But nearly 50 United States Navy and civil technicians finished the job 30 days ahead of schedule. They were determined to have No. 319 in the air by Christmas Day.

Nearly all the heavy repair work on the aircraft was completed by December 20. Both outer wing sections and the four engines were in place early in the morning, and at 8.15 p.m. the Hercules was ready to be towed about 1070 metres from its 2m-deep repair trench to the Dome C skiway.

Commander D. Desko, who commands the United States Navy's VXE-6 Squadron, was the pilot of No. 319 on January 15, 1975. Before he took off with a skeleton crew of four at 9.15 p.m. on Christmas Day for Williams Field he launched his aircraft by breaking a bottle of champagne on its nose ski.

BEFORE MIDNIGHT

Escorted by another Hercules which carried the last detachment of the recovery team, No. 319 reached Williams Field five minutes before Christmas Day ended. But midnight did not mean the end of the celebrations by the crowd waiting to see No. 319 again after its long absence.

After additional work on the aircraft the next stage of the flight back to the United States began on December 29. No. 319, escorted by another Hercules, took off for Christchurch at 9 a.m. but

returned 45 minutes later because of mechanical faults. The escorting aircraft continued to Christchurch.

No. 319 finally reached Christchurch at 7.57 p.m. on December 30 after a nine-hour flight from McMurdo Station. It left for the United States on the morning of January 10.

With the recovery of its three Hercules aircraft from Wilkes Land, and the expected delivery of two new ones in April and May this year, VXE-6 Squadron will have seven aircraft available for next season's operations. There is another in Wilkes Land — it has been there for five years — but its recovery depends on whether the National Science Foundation needs it.

60 Hut Visitors

Sixty members of the crew of the United States Coast Guard icebreaker *Northwind* signed the visitors' book in Shackleton's hut at Cape Royds on February 7. The 70-year-old wooden hut had a steady stream of callers throughout the day as the *Northwind's* two helicopters shuttled the sightseers back and forth — nearly four times as many men as wintered at Cape Royds in 1908.

About 200 scientists, staff from McMurdo Station and Scott Base, and icebreaker crews, visited the hut last season. The tourist traffic on February 7 probably set a record for one day's visiting.

JARE—18

First Meteorites Found in Victoria Land

Meteorites were discovered for the first time in Victoria Land by a Japanese geologist who worked with United States geologists in the McMurdo Sound area and the dry valleys last season. Dr Keizo Yanai was one of six Japanese scientists who carried out an earth science programme under the supervision of the National Institute of Polar Research, Tokyo. Meteorite specimens have been found before in only five other places on the continent.

Two of the scientists, Mr Genki Matsumoto, of the department of chemistry, Tokyo Metropolitan University, and Dr Yosio Suzuki, of the Institute of Low Temperature Science, Hokkaido University, did geochemical research with the Ross Ice Shelf Project before it was cancelled. Mr Matsumoto then joined the party led by Dr Tetsuya-Torii, professor of geochemistry at Chiba Technical Institute, which spent three weeks on geophysical and geochemical studies in the McMurdo Sound area and the dry valleys.

Japanese field work in the dry valleys was partly supported from Scott Base. The whole programme was under the direction of Dr Takesi Nagata, director of the Institute of Polar Research. He visited McMurdo Station, the Ross Ice Shelf Project, and the Amundsen-Scott South Pole Station in December.

Since 1969 Japanese geologists have done meteorite research in the Yamato Mountains about 300km south of Syowa Station. Since then they have discovered more than 1000 meteorites on the surface of bare ice areas in the mountains. Dr Yanai, who was a member of the Japanese South Pole traverse in 1958—59, took part in the search for Yamato meteorites in the 1974—75 season. His party found 663 samples in three weeks.

DRY VALLEYS

Last season Dr Yanai worked with two United States scientists in Victoria

Land. They were Dr William A. Cassidy, of the department of earth and planetary resources, University of Pittsburgh, and Dr Edward J. Olsen, curator of mineralogy and meteorites at the Field Museum of Natural History, Chicago. They spent nearly three months in the field and searched for meteorites in the dry valleys, the Upper Wright Valley, and the Shapeless Mountain region.

Dr Yanai collected more than 450kg of meteorite specimens. He found the pieces by scanning with binoculars, and by spotting from a United States Navy helicopter on systematic searches. His first two specimens, which weighed 4kg and 13kg respectively, were found on December 15 at Mount Baldr in the Upper Wright Valley. The other nine which ranged in weight from 3kg to 47kg, came from the Allan Nunatak, 200km north-west of Scott Base.

TEN SEASONS

One of Japan's most noted Antarctic scientists, Dr Torii, made probably his last visit to the McMurdo Sound region last summer. Dr Torii has worked in Antarctic since 1957, and has spent 10 summer seasons in the McMurdo Sound region since 1961.

Dr Torii was a member of the first three Japanese Antarctic Research Expedition as the winter leader at Syowa Station for JARE—IV and VIII. His field of research in the McMurdo Sound region has been the study of salts in the

lakes of the dry valleys 100km west of Scott Base. In the course of his research he discovered a new mineral, antarticite.

Last season Dr Torii, who is secretary

of the Japanese Polar Research Association, spent three weeks in the McMurdo Sound area and the dry valleys with Mr Matsumoto and Mr Yoshiki Tanaka, a research assistant from the Chiba Technical Institute.

Norwegians work in Weddell Sea

Norway's first independent scientific expedition to Antarctica since 1960 completed its work in Queen Maud Land and the Weddell Sea this month. Nine members of the expedition, which was organised by the Norwegian Polar Institute, worked on the Larsen Ice Shelf and Vestfjella, and 14 spent six weeks aboard the 500-ton icebreaker-sealer, Polarsirkel, carrying out research along the coast of Queen Maud Land and in the Weddell Sea.

Members of the expedition were selected from the Norwegian Polar Institute, the Universities of Bergen and Oslo, the Institute for Norwegian Continental Shelf Research, and the directorate of the Fisheries Research Council. The research undertaken was a new venture for Norway. It included studies of climate changes, ocean currents, glacier movements, and other geophysical, geological, and biological relationships. Some research methods and instruments used by the Norwegian

team had not been employed previously in these areas.

This expedition, according to a report issued by the Norwegian Ministry of Foreign Affairs, was designed to reinforce Norway's image as a polar nation with an active interest in the Antarctic Continent, and to re-emphasise its territorial rights on the continent. The report noted that other countries were actively engaged in research in Antarctica, some of which was near or on land claimed by Norway since 1939.

Resources in Antarctica may be of vital importance in the future, according to the report, and thus Norway's participation in scientific investigation is paramount. A spokesman for the expedition was quoted as saying that any exploitation of minerals or ocean food — particularly krill — would take into consideration the environment, and the fragile ecological balance of Antarctica.

Christmas Cake on Erebus

Christmas cakes and biscuits from the New Zealand Antarctic Society reached some extraordinarily diverse places in Antarctica last season. United States Navy helicopters uplifted the Christmas gifts from Scott Base in the week before Christmas and distributed them to New Zealand camps on the summit of Mount Erebus, on the ice shelf at White Island, and through the dry valleys.

For the Erebus expedition the cake and biscuits completed a *hangi* (Maori oven) which was devised in the warm volcanic soil near the summit (3779m). Four New Zealanders and two Americans enjoyed *hangi*-cooked lamb in their polar tents on Christmas Day.

Out at White Island, 30km from Scott Base, a group of zoologists from the University of Canterbury zoologists received a parcel of cake and biscuits and radioed their thanks which they asked to be passed on to the society.

Most of the New Zealand scientists in the field were in the dry valleys, the most remote being a geological party from Victoria University of Wellington camped at the snout of the Towle Glacier 180km from Scott Base at Christmas.

Geologists from the University of Waikata, led by Dr Terry Healy, moved camp several times over the Christmas period. But the cake and biscuits still got through to them.

SOVIET EXPEDITION

Weddell Sea to Pole ice thickness survey

An aerial reconnaissance along the 40th meridian from the Weddell Sea to the South Pole to plot the thickness of the ice-cap was made by an Ilyushin-14 aircraft of the 22nd Soviet Antarctic Expedition last season. The aircraft, which operated from the new summer station, Druzhnaya, on the Filchner Ice Shelf, flew 3059km in difficult weather, and made radar surveys of glaciers along the route.

Last season's party of 135 scientists and support staff, which was led by V. Masolov with A. Karandin as his deputy, worked for two months at Druzhnaya. During that time the flags of the Soviet Union, the United States, and the German Democratic Republic flew from the messhouse; geologists from the two latter countries, Dr Edward Grew and Dr Hans Peis, worked with the Soviet scientists.

Geologists worked in the Shackleton Range 200 miles south-east of Druzhnaya, and the Pensacola Mountains. They analysed outcrops of ancient rock, and made a rich collection of fossil plants during their studies of the geological history of the areas.

For transport to the mountains and glaciers where they studied the thickness of the ice and the underlying geological formation, the scientists used Antonov-2 ski-equipped biplanes. A twin-engined Ilyushin-14, equipped as a flying laboratory, was used for a magnetic survey of the coast and mountainous hinterland of the Weddell Sea.

One visitor during the season was the Argentine Navy's icebreaker, General San Martin. It called at Druzhnaya to enlist the services of a Soviet helicopter to make an ice survey.

Another American geologist, Dr Arthur B. Ford, of the United States Geological Survey, joined Dr Grew and Soviet geologists to work in the Shackleton Range in mid-January. He

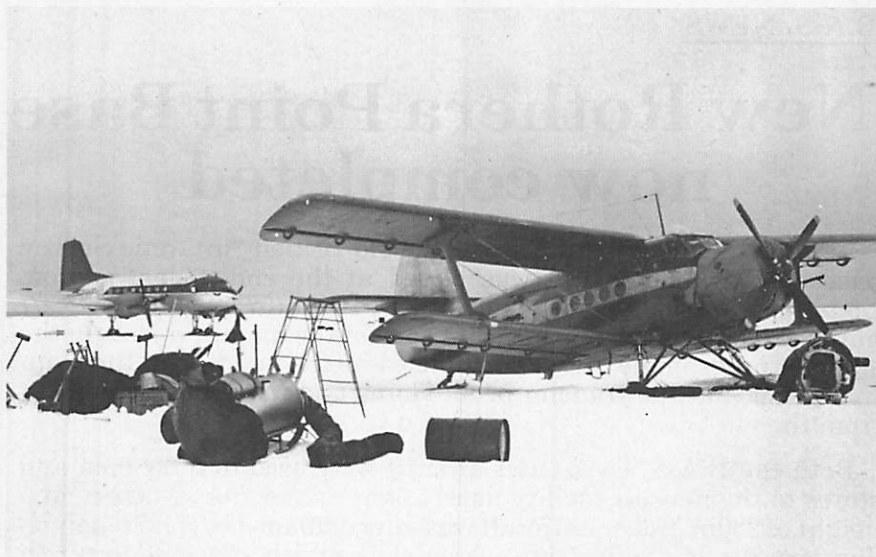
was flown to Druzhnaya from McMurdo Station by a United States Navy Hercules. Dr Grew, of the University of California's geology department was the United States exchange scientist with the Soviet expedition last season; he had the same role with the 18th expedition, and worked in the Prince Charles Mountains in the 1972-73 season.

MOVING ICE

Druzhnaya is situated on the Filchner Ice Shelf at 77deg 58min S/39deg 18 min W, and is located 1.5km from the shore, and about 50m above sea level. The ice is more than 400m thick, and astronomical observations have established that it moves about 2km a year at an average speed of 6m a day.

Several small prefabricated huts make up the station. Power is supplied by a twin-engined diesel-electric plant, which, last season, was run by the chief mechanic, P. Belshakov, a veteran of several Soviet expeditions. Dr Y. Dymshits, a surgeon with a distinguished record of polar work, was responsible for the health of last season's party.

Radio communication was established with Molodezhnaya, the main Soviet Antarctic station, in Enderby Land, Novolazarevskaya in Queen Maud Land, and Bellingshausen, on King George Island in the South Shetlands. The station operators also talked to two of the expedition's ships, the Kapitan Gostsky and the Penzhina.



Two Soviet aircraft on the ice at Druzhnaya, the summer station on the Filchner Ice Shelf. In the foreground is an Antonov-2 biplane, and in the background is a twin-engine Ilyushin-14 transport. U.S. Navy photo

NEW SHIPS

Last season the Soviet Antarctic fleet was headed by the new flagship, Mikhail Somov. In addition to the Kapitan Gostsky and the Penzhina, the Malinovsky and the research ship Professor Zubov took part in support and research operations. The Professor Zubov made observations in the Indian Ocean sector as part of the international global atmospheric research programme, Poles-South.

This programme was conducted jointly with the United States research ship Thomas G. Thompson, which worked in Drake Passage between South America and the Antarctic Peninsula. Soviet and American scientists worked together aboard each ship, making oceanographic measurements and meteorological records to study the interaction of the atmosphere and the oceans.

From Leningrad the Professor Zubov sailed south to the Indian Ocean sector. Then she called at Wellington in January to pick up a meteorologist,

Eduard Lysakov, who spent last winter at McMurdo Station as the Soviet exchange scientist. After an Australian visit, she returned to the Antarctic. She is expected back at Leningrad at the end of next month.

Soviet Scientist at Pole

A Soviet scientist is spending this winter at the Amundsen-Scott South Pole Station with 20 Americans and two New Zealanders. He is Dr Alexander Zaitsev, whose field is geomagnetics. His New Zealand companions are Simon Norman, of Hokitika, a meteorologist, and Lloyd Anderson, of Auckland, a technician.

Before he flew to Pole Station Dr Zaitsev met New Zealanders at Scott Base, including the winter party. He also inspected the base laboratory. Another Soviet visitor at the same time was Eduard Lysakov, who was the exchange scientist at McMurdo Station last winter.

B.A.S. NEWS

New Rothera Point Base now completed

Established in 1961 at Base T, the old British Antarctic Survey base on Adelaide Island was closed at the end of last season. Construction of a new base at Rothera Point (67° 34min S/68° 07 min W), 64km to the north-east . . . one of the major projects in the summer programme . . . was completed by the building of the main living hut and the transfer of all stores and moveable equipment from the old base.

Both the B.A.S. Twin-Otter aircraft were used to ferry men and stores to the new air facility nearly 5km inland from Rothera at a height of 280m. But one aircraft was later damaged beyond repair on January 22 when it flew into a snow slope which appeared flat from the air while landing a field party south of George VI Sound. The first serious accident to a B.A.S. aircraft since 1968 is a severe blow to the logistic and field programmes, and it is uncertain whether the Twin-Otter can be replaced in the present financial situation.

Five men aboard the aircraft escaped with only minor injuries and shock, but the under-carriage and fuselage of the aircraft were very badly damaged. Later a number of components, including the engines, were salvaged, but completion of the work was hampered by new snow to a depth of 1.5m.

Another B.A.S. Twin-Otter, which had been under charter to the United States National Science Foundation since late November to assist in the Ross Ice Shelf Project, was in the McMurdo Sound area when the accident was reported. It was immediately recalled, and after a 2,550km flight by way of the South Pole and Siple Station, picked up the stranded men and took them to Adelaide Island. The scene of the accident was approximately 74° S/68W at a height of 185m.

There were eight scientific parties in the field at the time of the accident. All of them were equipped with motor-boggans and ample stocks of food and fuel and were therefore able to continue working for a while, but some had to be

withdrawn early as only one aircraft was available to ferry them back to base.

FLYING HAZARDS

This was the first serious accident to a B.A.S. aircraft since 1968, although they are flown under very difficult conditions in a mountainous area subject to very changeable weather. White-out and general poor visibility are frequent hazards. But the skill and sound judgement of successive pilots have enabled the aircraft to operate successfully in support of field parties, and to carry out airborne geophysical, glaciological and topographical projects.

The 1975-76 season was particularly notable. One hundred hours of magnetometer runs were flown, and a topographical survey project carried out in co-operation with the United States Geological Survey, using Doppler satellite-receiving apparatus. This equipment, which fixed the positions of 26 stations over the whole of the Antarctic Peninsula, provided a satisfactory net for 30 years'

trilateration, and ground control for future mapping from satellite imagery. Simultaneous gravity surveys were also outstandingly successful.

Last season, work was done by glaciologists off the west coast of Alexander Island, at the northern end of George VI Sound, and on the previously unvisited De Atley Island east of the Ronne Entrance. Geophysicists also worked in the Eternity Range and in the mountains on the east side of the Sound.

FIELD PARTIES

Before the accident the two aircraft had ferried men and stores to Rothera base from Damoy Point, Wiencke Island where they had been landed by the Royal Research Ship, John Biscoe at the beginning of November. Much of the flying was done at night to avoid softer day-time surfaces.

The aircraft then transported field parties working in the southern part of the Antarctic Peninsula, on Alexander Island and in George VI Sound. A mishap to one of the ski-wheel assemblies necessitated a mid-season visit by the second aircraft, which interrupted its work on the Ross Ice Shelf Project to pick up spares from Punta Arenas and assist the field parties until the first aircraft was again operational.

All these activities were hampered by bad weather. A Canadian Twin-Otter, also taking part in the Ross Ice Shelf Project called at Rothera in December. It spent three days there awaiting good weather for the onward flight to McMurdo Station.

SHIP MOVEMENTS

After supplying Damoy, the R.R.S. John Biscoe returned to South Georgia, as fast ice prevents access to the southern part of the Antarctic Peninsula until later in the season. She spent most of the next six weeks supporting field parties working in a number of areas around South Georgia, including Annenkov Island and Bird Island. Another small refuge hut was built — this one for botanists working at Maiviken.

During this period a few days were spent relieving the Signy Island base in the South Orkneys, and a number of visits were also made to the B.A.S. base at King Edward Point, South Georgia. On one of the latter, cargo was transferred to the Biscoe from the R.R.S. Bransfield. As usual, all these activities in the northern areas were restricted by bad weather and rough seas.

Then the Biscoe visited Punta Arenas to collect six men and stores for the United States Palmer Station on Anvers Island and at the same time command of the ship was handed over by Captain Malcolm Phelps to the co-master, Captain Chris Elliott. The ship then proceeded to Palmer Station, arriving there on January 8, and the next day relieved the B.A.S. base at the Argentine Islands.

The next call was to the old B.A.S. base at Prospect Point, Graham Coast, where a transmitting station was set up for an International Magnetosphere Study ionospheric experiment. As the Grandidier Channel was still blocked by ice the ship had to sail west of the Biscoe Islands, but managed to continue south to Adelaide Island, arriving there on January 12.

FAST ICE

Cargo was taken on board at the old base for transfer to the new base, Rothera, about 130km away by sea. Fast ice prevented access for three days, but the ship was then able to get sufficiently close to unload on to the sea ice.

While unloading was in progress a sudden gale broke up the ice. Men and vehicles were stranded and had to be taken on board. Further unloading was impossible so the Biscoe returned to Adelaide to collect more cargo. Back at Rothera conditions had improved, although they were still very difficult, and unloading was completed on January 24.

Meanwhile, a building team had started work on the main living hut, a small hut having been constructed in the 1975-76 season to house a four-man wintering party. A small hut had also

been moved across from the old base in December. All stores and moveable equipment were transferred to Rothera.

After a final call to the old Adelaide Island base the Biscoe turned north. She forced a way through heavy pack ice and re-visited the Argentine Islands before returning to South Georgia by way of the South Orkneys.

EARLIER RELIEF

Meanwhile the Bransfield successfully relieved Halley Bay, having reached there at the end of December after negotiating 320km of medium pack ice in the Weddell Sea. In marked contrast to the previous two seasons, when the relief was very difficult, unloading this year was possible within four miles of the base, and was completed in a week. As was hoped, by going in a month earlier than usual, the Bransfield was able to unload on to the fast ice and ice ramps before they broke out from the ice cliffs.

A magnetometer traverse was carried out on the return voyage across the Weddell Sea, and more stores were delivered to Signy Island before the ship returned to South Georgia. After re-visiting King Edward Point and several field sites, the ship proceeded to Punta Arenas by way of the Falkland Islands, arriving there at the end of January.

OTHER SHIPS

More stores were picked up, and Captain John Cole handed over command to the ship's co-master, Captain Stuart Lawrence. The stores were then taken to the Antarctic Peninsula bases, including Palmer Station, and the Bransfield later spent some time at Adelaide Island, assisting with the construction of the new Rothera base.

H.M.S. Endurance, the Royal Navy's ice patrol ship, carried out reconnaissance work for B.A.S. at Bird Island and Elsebul, South Georgia, in December. The tourist ship Lindblad Explorer visited South Georgia in December, and the Argentine Islands in January, and at the beginning of January escorted canoeists of the Joint

Expedition to the Elephant Island Group.

At the end of January the Norwegian expedition's ship, the 500 ton icebreaker-sealer Polarsirkel, was sighted from Halley Bay, and the Argentine icebreaker General San Martin, called at the base a few days later.

The United States National Science Foundation research ship Hero, called at Signy Island twice in January, while supporting an American geological party working in the South Orkneys. Included in the party were Dr M.R.A.Thomson, head of the B.A.S. stratigraphy/palaontology section, and his wife, who is also a geologist.

A number of other B.A.S. senior scientists also worked in the field again last summer. They were joined by an American biologist, Dr David Parmelee, from Palmer Station, who had been working on Bird Island and a French biologist, Dr Bernard Despin, who worked at Signy Island. In addition, senior members of the B.A.S. administrative staff inspected the bases and supervised the summer activities.

JOINT SERVICES

For its first phase, the Joint Services Expedition was divided into two groups. In December one group of eight men, was landed with stores and canoes, by H.M.S. Endurance at Cape Bowles, Clarence Island, depots having previously been laid at various points around the island.

Two weeks later the group canoed around the southern cliffs to Chinstrap Cove and continued work from two sites, one in the cove and the other 180m above it. It was picked up by the Endurance at the beginning of February. Four were taken to Elephant Island, and the rest to Cornwallis Island for a few days before joining the others on Elephant Island.

Meanwhile, a second group of seven men, including the expedition's leader, Commander Chris Furse, R.N., had been landed on Gibbs Island. It spent three weeks working on Gibbs, Aspland and Eadie Islands. At the beginning of January, the party canoed more than

10km across open sea from Gibbs Island to Aspland Island where three men climbed to the island's summit (734km) — a difficult snow and ice traverse in poor visibility.

The Lindblad Explorer accompanied the group back to Gibbs Island, where it remained until it was picked up by the Endurance in mid-February and taken to Elephant Island to join the rest of the expedition. Re-united, the expedition members celebrated Christmas on February 15!

The canoes proved valuable as local transport around the small but very rugged and inhospitable islands of the

group. Many difficulties were encountered. A 10-km traverse on foot along the east coast of Clarence Island took 13 hours, and the ascent of Aspland Island (734m) and a horizontal distance of about one mile, took 11 hours.

In addition, the weather was very variable, with some good days but also frequent poor visibility, and strong winds. In mid-January hurricane-force winds destroyed some camping equipment used by the two groups. During one storm the sea overwhelmed a camp site on Gibbs Island, but all the equipment was saved by four men working waist-deep in surf.

Lamb Cooked in Volcanic Oven

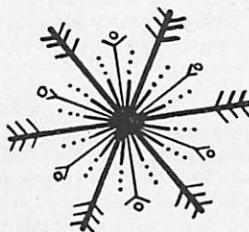
Four New Zealanders and two Americans have found a use for the volcanic activity of Mount Erebus. They missed Christmas dinner at Scott Base last season, but had no regrets. Their Antarctic Christmas dinner was unique — a leg of lamb cooked hangi-style in hot volcanic earth. [A hangi is a Maori oven in the earth.]

Dinner was eaten at a height of 925m below the summit of Erebus. The temperature of the volcanic soil there was about 50° Celsius. The lamb, well-sealed in plastic bags and brown paper, was left buried in the warm orange soil for three days, a day longer than planned because a snow storm confined the party to their tents. "It was delicious, just fell away from the bone," said Dr Sam Treves, of the department of geology, University of Nebraska. But he believes that is probably the only use Erebus will have for man because its activity is too localised and unpredictable.

There is no warm volcanic soil near Scott Base, but that did not prevent 25 New Zealanders from having a dinner of pork, chicken and vegetables cooked in their own version of a hangi early last month. Conditions were far from ideal for catering; a weekend of snowstorm lowered temperatures at the base to minus 15°.

But Basil Nissen, an Army storeman, who has prepared dozens of hangi back home was not deterred. He scraped a hole in the permafrost, lit a fire with packing timber, and cooked the pork, chicken, kumaras (sweet potatoes), potatoes, and pumpkin, over heated steel bulldozer tracks. Wet sacks were thrown over the food, and everything was covered by volcanic rubble and snow, and left to cook for five hours.

When the oven was opened the food was brought indoors. Hangis are usually outdoor affairs. But the chill factor from 20 knots of wind outside was equivalent to minus 35°.



A Devon man, George Bloom, who is interested in Antarctic photographs and stamps, would like to hear from anyone with similar interests. His address is: Tristan House, Smallack Drive, Crownhill, Plymouth, Devon, United Kingdom.

POLISH KRILL EXPEDITION SETS UP WINTER BASE

A winter base has been established by a Polish marine research expedition in Admiralty Bay, King George Island, in the South Shetlands. This expedition of more than 400 men in five ships began operations in Antarctic waters towards the end of December.

Construction of the base where the expedition will remain until its return to Poland in the northern summer began early last month. When the tourist ship Lindblad Explorer called at Palmer Station, Anvers Island, on February 13, she reported the presence in Admiralty Bay of a large Polish vessel and several trawlers. On shore the construction of a large prefabricated base was in progress, using cranes and bulldozers. Concrete was being poured for foundations.

There are two other bases on King George Island. Bellingshausen Station was established by the Soviet Union in 1968 at 62° 12min S/58° 25min W, and the Chileans established the base Presidente Frei in 1969 at 62° 12min S/58° 56min W. Poland has acceded to the Antarctic Treaty, but is not yet a signatory.

In the 1975-76 season Poland sent the research vessel Professor Siedlecki and the motor-ship Tarzar to the Antarctic for several months to study krill and fish. The West German research ship Walther Herwig was also there between October, 1975, and May, 1976. The main purpose was to catch krill, but scientists also studied other Antarctic marine resources. West Germany is reported to have sent a second expedition south in the 1976-77 season.

Poland's second expedition consists of the Professor Siedlecki, the trawler-processor Gemini, and the trawlers Yazar, Manta and Gryf. Its purpose is to define more precisely the regions inhabited by krill, and the reasons for their concentration, and to discover whether they can be harvested on an industrial scale.

Dr Zbigniew Karnicki, scientific director of the expedition, told the Warsaw newspaper, "Zycie Warszawy", that the expedition would also study

conditions for the growth of krill, harvesting and methods for processing krill into commercial foods and stock feeds.

New and improved harvesting equipment built since the return of the first expedition would be used to determine whether industrial harvesting was feasible. Dr Karnicki said that in view of the great distances involved, and the high costs of processing, the economics of krill harvesting had not yet been fully evaluated.

Sixteen Polish research institutions are continuing to process data from the first expedition which returned in May last year and brought back a krill harvest of 100 tonnes. Preliminary findings show that krill is an excellent substitute for fish meal, according to Polish newspaper reports.

There are 12 species of fish of major importance in Antarctic and sub-Antarctic waters, and on their first expeditions the Poles and the West Germans caught significant quantities of six species. Some of the catches were made off South Georgia and the waters of the South Sandwich Islands, which lie outside the Antarctic Convergence, but are within the area of interest of the Scientific Committee on Antarctic Research (SCAR).

SANAE 18

R S A Relieves Sanae and Weather Stations

Led by Gideon le Roux, the 18th South African National Antarctic Expedition (SANAE) began work at Sanae in Queen Maud Land towards the end of January. The supply ship RSA left Cape Town on January 5 and docked at Polarcircle Bukta in the early hours of January 17. It passed Bouvet Island on the voyage south, and was in pack ice for only an hour before docking.

As Sanae is 16km inland, the first task was to offload all the freight and fuel on the ice shelf in the docking area to allow the RSA to make a survey trip. During the survey scientists aboard made a seal count, and carried out cosmic ray and geophysical research.

While the RSA was on survey the old and new teams transported tons of freight to Sanae. The SANAE 17 winter team's labours were lightened by the sight of new faces, and the arrival of fresh fruit and letters from home.

South Africa's sub-Antarctic weather stations on Gough Island and Marion Island were relieved by the RSA in October, and the new teams settled down to make the most of the summer weather in their research programmes. The leader and radio technician of the 22nd relief team to Gough Island is Mike Maurin, and John Riley is the leader, radio technician and ionospheric of the 33rd relief team to Marion Island.

Mike Maurin reports that the new team has settled in, and all is running smoothly. The meteorologist's task has been made easier with the installation of an electrolytic hydrogen generator, which replaces the outdated caustic soda aluminium generator. A transponder ranging system for balloon tracking has also been installed.

The weather satellite picture-receiving system, brought into use a while ago, is now producing pictures of high quality. A navigational directional beacon has

been fitted to improve navigational facilities for aircraft and ships, plying between South Africa and South America.

FAIR WEATHER

Spring on Marion Island brought clear and beautiful days after the wet, gloomy and windy weather of winter. John Riley reports that the fair weather enabled most of the 33rd relief team to make many trips round the island.

Work increased tenfold for the ornithologists, Alan Burger and Tony Williams. They are doing breeding and biological studies of four types of penguin, three types of albatross, the northern and southern giant petrel, kelp-gull and the cormorant. The information obtained will be used to assess energy cycling in the sea birds and in particular their energy and mineral contribution by way of guano, shells, feathers and corpses to the island's ecosystem. Alan Burger is also doing an intensive study on the Paddy (sheath bill).

The mammalogists, Marthan Bester, and his assistant Grant Craig, have a very busy programme on the mammals. These include the southern elephant seal, two species of the fur seal and killer whales. Seals are tagged for research in the long-term and counted throughout the year for short-term purposes. The presence of killer whales around the island gives information about their group size, sex ratio and seasonal movements.

Towards the end of November the RSA brought five new members to the island. They were Kevin Hall (geomorphologist) and Han Lindeboom (micro-biologist) with their assistants, Doug Langley and Tim O'Connor respectively, who are working through the University of the Free State for the Institute for Environmental Sciences, and Hennie Erasmus who represents the University of Pretoria Mammal Research Institute.

Kevin Hall will continue the study of the effects of the last ice age on Marion Island. He will analyse the glacial deposits and eroded forms to try to build up a picture of the glaciers and the direction of their movement. So far extensive coastal areas of glacial debris

(till) have been recognised and a number of depositional forms, notably moraines and hummocky ablation drift. Glacial erosion forms of marginal stream channels, striated pavements and roches moutonnees have also been observed. Initial interpretation indicates two major glacial phases, each with stadials and interstadials.

Han Lindeboom will be continuing his work on the nitrogen cycle which he started last summer. The soil has a deficiency of nitrogen, but for biological life the nitrogen is brought in by sea birds and mammals or by nitrogen-fixing bacteria and green algae. This year special attention is being to the micro-biology and water and soil chemistry of this cycle.

Sledge Trips Before Winter

Seven New Zealanders at Scott Base made two sledging journeys this month - last before the approach of winter darkness towards the end of next month. One party made a five-day trip to Cape Crozier, about 70km east of the base, towing their sledges with two motor toboggans, and the other took the two dog teams on a three-day trip to White Island, about 30km away.

Messrs Howard Richards (fitter-electrician, Taupo), Ian Booker (fitter-mechanic, Nelson), and Kevin Weatherall (senior science technician, Milton), made the journey to Cape Crozier in temperatures as low as minus 27° Celsius. At Cape Crozier they visited the remains of the stone hut built by Wilson, Bowers, and Cherry-Garrard on their winter journey from Cape Evans in 1911 to collect Emperor penguin eggs.

Mr Richards, who led the party, said they had been confined to their tents at Cape Crozier for 36 hours by blizzard which reached about 60 knots at its peak.

Four men made the journey by dog team to White Island to survey the isolated Weddell seal colony there. This colony was studied by scientists from the University of Canterbury last summer.

Members of the party were Richard Wills (dog handler, Christchurch), George Money (Post Office radio technician, Christchurch), Roel Keizer (cook, Wakefield) and Rod Fearn (science technician, Auckland)

Argentine Air Crash

Argentine operations in the Antarctic last season ended with a third fatal crash. Three members of the crew of an Argentine Army helicopter died when it crashed while returning to the icebreaker General San Martin in Half Moon Bay, King George Island, near the north-west tip of the Antarctic Peninsula.

The helicopter was involved in the recovery of an Argentine Navy Neptune aircraft which crashed in Half Moon Bay in September last year with the loss of 10 lives.

Another Argentine helicopter crashed in December, but it is not known how many men were killed. It was an Argentine Army helicopter engaged in transferring supplies from a ship to the Argentine air base, Vicecomodoro Marambio, on Seymour Island.

TOURISM

FIRST DAY TRIPS TO ANTARCTICA

More than 1200 Australian and New Zealanders made "day trips" to Antarctica by air last month and this month. Two international airlines, Qantas and Air New Zealand, made five flights from Australia and New Zealand.

Qantas flew a Boeing 747B to the South Magnetic Pole on February 13 and 20, and a Boeing 707 to Cape Washington in Victoria Land on March 20. Air New Zealand's two DC10 flights were to the McMurdo Sound area on February 15 and 22.

Next year Air New Zealand plans to make six Antarctic flights in January and February, and will offer seats to Americans and Canadians through a Los Angeles travel firm. This year's flights were not chartered, but were sponsored by two New Zealand travel firms. They were not classified as international because they began and ended in New Zealand, and passengers were not ticketed to an international destination.

Qantas has not announced its plans for next year, but is expected to make more charter flights like the three this year. To meet public demand it will consider inquiries from prospective passengers as from August.

Qantas made the first commercial flight from Australia to the Antarctic, but Air New Zealand had no priority on the route south from New Zealand, although the flight was described -- not be the airline -- on a special cachet used for mail carried on the first DC10 as the first commercial flight between New Zealand and Antarctica. But Pan American Airways blazed the way on October 15, 1957, when one of its Boeing Stratocruisers made a charter flight from Christchurch to McMurdo Sound. Passengers included 160 United States Navy Seabees, and newspaper and radio correspondents.

SPECIAL CHARTERS

Qantas made its two Boeing 747B flights to the South Magnetic Pole from Sydney on special charters for a Sydney electronics retailer, Mr Dick Smith, who decided to provide the opportunity for "anyone in the world who has always wanted to go to the Antarctic for the day." Both these flights, which received worldwide publicity, were open to the public, and were fully booked. Fares were \$A230 (economy) and \$295 (first-class).

For the Boeing 707 flight to Victoria Land from Melbourne the charterer was Mr Don Sinclair, of the Victorian Education Department, who had been involved in the preparation of a school course and textbooks on Antarctica. Some of his colleagues mentioned that they knew much about Antarctica but would never have the opportunity to see the continent. The flight was privately organised, and most of the 140 passengers were geography teachers.

For the first flight from Sydney on February 13 the Boeing 747B was commanded by Captain Ken Nicholson, the airline's flight superintendent (line operations), and the second on March 16 by Captain Alan Terrell, Captain Ken Davenport was in command of the Boeing 707 on its flight on February 20.

MAGNETIC POLE

On the first flight to the South Magnetic Pole the passengers included the two daughters of Australia's most distinguished polar explorer, Sir Douglas Mawson, and his grandson. This was appropriate because Sir Douglas Mawson was one of the party which established the position of the South Magnetic Pole on the Victoria Land plateau 68 years ago, and led the Australasian Antarctic Expedition of 1911-1914 to an area over which the Boeing 747B flew.

Both 747B flights carried 300 passengers and 160 tonnes of fuel, and the aircraft were airborne for approximately 10hrs 35mins. The total distance flown in each case was approximately 4505 nautical miles. On the flight to Victoria Land the Boeing 707 carried 70 tonnes of fuel, was airborne 10hrs 43mins, covered 4805 nautical miles, and reached 74° 38min S.

Two of the passengers were Antarctic experts, who gave talks about the continent and answered the many questions asked. They were Mr Harry Black, who has been concerned with Antarctic affairs for more than 20 years, and was in charge of Wilkes Station (now Casey) in 1960, and Mr Charles Barton, of the Australian National University, who explained the properties of magnetism in relation to the South Magnetic Pole.

Although the Boeing 747B carried \$300,00 worth of navigation equipment, some passengers apparently believed that some assistance was needed, having heard that ordinary compasses went awry over the South Magnetic Pole. One man brought his own ship's compass which he clutched lovingly during the whole flight. Another brought a full-sized globe on which he faithfully checked the aircraft's position every few minutes and reported it with monotonous regularity to nearby passengers.

Other passengers came to the airport prepared for Antarctic temperatures. One woman shuffled along in heavy ski boots, woollen pants, furlined parka and

snow gloves. Almost every passenger carried a camera to record the historic flight. Equipment ranged from well-worn household instamatic cameras to \$2000 Hasselblads with \$1000 lenses.

ICY HORIZON

From Sydney, which it left at 10 a.m. the City of Canberra headed south for Macquarie Island. It was hidden by dense cloud, but radio contact was established with the Australian winter team. Then the aircraft began its descent from about 35,000ft to about 3,000ft, and passengers crowded to the windows to gain their first view of Antarctic waters and an icy horizon.

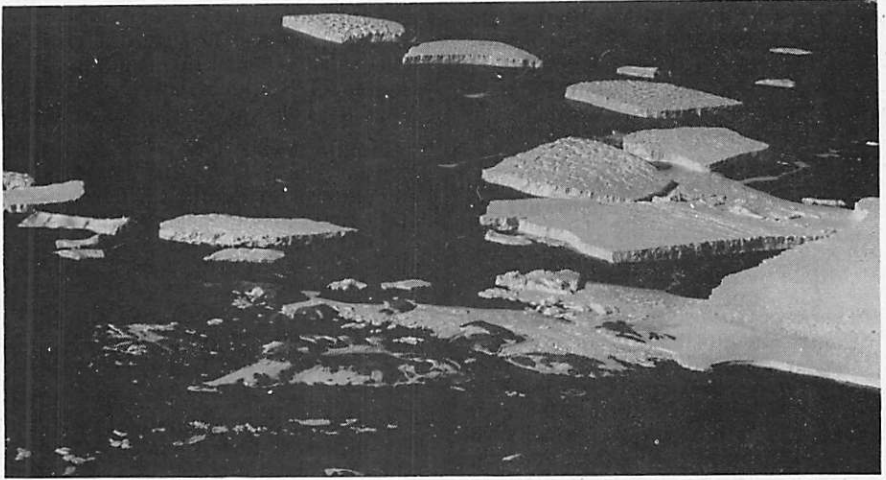
First landfall was desolate Cape Hudson at the tip of the Mawson Peninsula. Then the 747B cruised along the coast of George V Land towards Commonwealth Bay where Mawson established his base at Cape Denison. Next the passengers sighted what appeared to be red-roofed houses. They were the buildings of the French base, Dumont d'Urville, where the aircraft's arrival caused as much excitement on the ground as in the air.

After circling the base twice at an altitude of 1000m the 747B headed towards the South Magnetic Pole. Its arrival there was anti-climatic after the earlier excitement. There was nothing to see except water; the Magnetic Pole has shifted to the waters off George V Coast since Mawson's day. So the passengers settled down for the flight back to Sydney.

FIRST ICEBERG

Passengers on the second 747B flight saw the same sights and followed the same route and saw the same sights. The aircraft carried 300 equally enthusiastic day-trippers. On the Boeing 707 flight those aboard saw a different part of Antarctica - the rugged Admiralty Range on the north-east of Victoria Land with peaks more than 3,000m high.

From Melbourne Captain Davenport flew to Macquarie Island, and then headed for Cape Washington at 74° 30min S. The first iceberg, more than



Massive ice floes, the largest up to 50m high, behind the French base, Dumont d'Urville, on l'Île des Petrels (foreground) in the Point Geologie archipelago. Passengers on the first Qantas passenger flight to the Antarctic looked down on this scene when they flew south to the continent on February 13.

48km long by 11km wide, was spotted on the aircraft radar at 63° S. Approaching Cape Washington the 707 flew at 615m, and found a break in the heavy cloud to descend to 115m. Under the cloud visibility was 48km, and the passengers could see the pack ice, icebergs, and the rugged coastline near Cape Washington.

After circling a few times for the benefit of photographers, the aircraft flew on to 74° 38min S, and then turned for home. It passed over the former joint United States-New Zealand station at Cape Hallett, and Cape Adare, and then headed for Melbourne at 3,000ft. Favourable winds enabled the aircraft to circumnavigate Tasmania before returning to Melbourne by way of King Island.

HISTORIC AREA

Passengers on Air New Zealand's first flight were offered champagne for breakfast, prawns and an appropriate Peach Erebus for lunch, and were able to watch two films on the flight south for which they paid \$NZ245 as a "super economy class" fare. But these were minor attractions compared with the flight itself which took 232 passengers of

all ages, and including a 10-year-old girl, into an historic area of Antarctica -- Mc Murdo Sound, where the explorers of the Heroic Age, Scott and Shackleton, established their bases, and began their journeys towards the South Pole.

Captain Ian Gemmell, chief pilot of Air New Zealand, was in command of the flight. The DC10 carried a double crew, and one of the passengers had a link with the Heroic Age. She was Mrs B.Mullan, of Auckland, a grand-niece of Scott. Her grandfather was Scott's elder brother. Also aboard was an Antarctic veteran of the modern era, Mr R.B.Thomson, superintendent of the Antarctic Division, Department of Scientific and Industrial Research, who gave commentaries during the flight, and told the passengers about New Zealanders' work in Antarctica. He knew the route well -- he had flown it 42 times before.

When the DC10 took off from Auckland at 8 a.m. its total fuel load was 110,000kg, and it carried 4,000 letters from places as far apart as Cincinnati and Curacao. The departure was made from Auckland because the 11,000ft runway enabled the aircraft to take off at its maximum weight.

From Auckland the DC10 flew the length of New Zealand, and then headed south for the Auckland Islands, which were hidden beneath the cloud. For most of the 11 hours the aircraft was in the air it flew at heights of 31,000ft to 37,000ft. The first iceberg was sighted at 61° 20min S/164° 15min E, and brought passengers to the cabin windows at 11.40 a.m. Over the Balleny Islands the aircraft turned and headed towards McMurdo Sound.

There was a glimpse of Cape Adare at the north-east tip of Victoria Land, Cape Hallett was passed at 1.20 p.m., and then more icebergs appeared as the DC10 headed towards historic McMurdo Sound. Captain Gemmell brought the aircraft down to 16,000ft, and the sightseeing trip began.

After a wide sweep over Franklin Island, which lies 60 miles north-east of Ross Island, the DC10 flew past Ross Island's two volcanoes, Mt. Erebus, still active, and Mt Terror, long extinct. Then it passed over Cape Royds and Cape Evans, where Shackleton and Scott built their huts, and on around Cape Armitage to Scott Base where the ground temperature was minus 7° Celsius, and the winter team welcomed the passengers with mirror flashes.

Then Captain Gemmell flew over the Ferrar Glacier, named for the geologist with Scott's first expedition, and the Taylor and Wright dry valleys. The DC10 returned to the coast at the Oates Piedmont Glacier on the Scott Coast of Victoria Land, and a course was set for Campbell Island and Christchurch.

TALKS TO BASES

When the aircraft was over the McMurdo Sound area conversations with Scott Base, McMurdo Station, and the Amundsen-Scott South Pole Station were relayed through the public address system. An earlier conversation relayed to passengers was with the captain of a United States Navy Hercules in flight from McMurdo Station to Christchurch.

Air New Zealand's first flight to the Antarctic ended when the DC10 landed at Christchurch a few minutes after 7

p.m. It had been in the air 11 hours, used about 98,000kg of fuel, and flown 4971 miles - - 300 miles further south than the Qantas 747B which flew to the South Magnetic Pole.

Captain Peter Grundy's flight on February 22 followed the same course and pattern. Sir Edmund Hillary, leader of the first party to reach the South Pole by land since Scott, was aboard to talk about Antarctica to the passengers. Also among the 220 passengers were Sir Edmund Hillary's 22-year-old son, Peter, and Mr Peter Mulgrew, one of the New Zealand party which reached the South Pole.

Just past the Antarctic Circle the passengers sighted their first iceberg when the cloud lifted at 12.25 p.m. The aircraft was in communication with the South Pole Station 15 minutes later, and then Cape Adare and Robertson Bay came into view. Pack ice could be seen far below, and briefly the passengers were back in New Zealand when Captain Grundy gave them the latest score in the cricket test with Australia.

EREBUS WELCOME

Mount Erebus welcomed its visitors when the DC10 flew past just before 2 p.m. Its familiar white spiral of steam from the crater suddenly appeared against a brilliantly blue sky. Scott Base provided a flashing mirror welcome again, and the winter dog handler had brought out the huskies for the occasion - tiny black dots against the ice.

Tourists have been travelling to the Antarctic for nearly 20 years, but always by ship. In some quarters Antarctic tourism on the scale of the five day trips is regarded as a future threat to the continent's environment.

Sir Edmund Hillary expressed one view on his return: It is better to have tourists fly over Antarctica than to have them on the ice itself. A cartoon in the Sydney "Daily Telegraph" summed up another way. It showed one penguin addressing others as the Qantas 747B flew over them in these words: It means this . . . today, sightseers, tomorrow developers and urban sprawl.

Antarctic Centre Links Eras of Exploration

Two ages of Antarctic exploration and research were linked early this month when the Duke of Edinburgh officially opened the Canterbury Museum's new wing of which the national Antarctic centre is an integral part. The occasion brought together a notable gathering of veterans of the Heroic Age and the modern era, representatives of the Antarctic Treaty nations, and scientists and others who have taken part in exploration and research in the last 25 years.

Some of the Antarctic veterans were known to the Duke of Edinburgh, who visited British Antarctic Survey bases in Graham Land in the 1956-57 season. Sir Vivian Fuchs and Sir Edmund Hillary represented the modern era. Next to them were two veterans of the Heroic Age - Irvine Gaze, who, as a young Australian, served with the Ross Sea Shore Party of Shackleton's Imperial Trans-Antarctic Expedition (1914-17), and William Burton, who served in the Terra Nova on Scott's last expedition (1910-13). And another guest of honour was Sir Ernest Shackleton's son, Lord Shackleton.

Age and indifferent health prevented three other veterans of early expeditions from attending the formal opening of the centre on March 4. They were two Australians, Dick Richards, a member of the Ross Sea Shore Party, and Captain Morton Moyes, Royal Australian Navy (ret'd.), one of only two survivors of Sir Douglas Mawson's Australasian Antarctic Expedition (1911-14), and William McDonald, who also served in the Terra Nova with Scott's last expedition. But they were remembered by men who followed the same course south the next day when the Canterbury Museum Trust Board and the New Zealand Antarctic Society entertained veterans and many others with Antarctic interests.

Four New Zealanders served with Mawson's Australasian Antarctic Expedition. Of these only one, Eric Webb, now living in Wales, survives. But

the link with the great Australian explorer was preserved with the presence among the official guests of two other New Zealanders, Sir Robert Falla and Dr Ritchie Simmers, who served with him on the British, Australian, and New Zealand Antarctic Research Expedition (1929-31).

DUKE'S TRIBUTE

"Those who go to the Antarctic are not as other men," said the Duke of Edinburgh when he paid tribute to the explorers whose activities are recorded in the Antarctic centre. "They may look the same, but inside is something special, which the rest of us can idly remark but fail to comprehend."

Prince Philip said that Antarctic explorers and scientists deserved a special place in the human record, and there was no better place for it than in Christchurch with its long and close association with Antarctic expeditions. The decision to establish an Antarctic centre was a courageous act of faith, in a similar tradition to the original decision to establish the Canterbury Museum.

After the speeches Prince Philip made a brief tour of the Antarctic centre and unveiled a commemorative plaque. Among the relics he saw on exhibition were Shackleton's motor sledge, and one of the Ferguson farm tractors used by Hillary and his party on their journey to the South Pole.

To mark the occasion Prince Philip received from Mr P.J. Skellerup, chairman of the Museum Trust Board, a

print of a painting of Mount Erebus and Cape Barne by the English artist, Keith Shackleton, and the first print of a watercolour of Shackleton's hut at Cape Royds by a Christchurch artist, Maurice Conly. Mr Skellerup also presented him with a copy of Mr Conly's book, "Ice On My Palette", and an Amundsen-Scott commemorative medal. In addition he was given a New Zealand Antarctic Society tie by the president, Mr J.M.Caffin.

VETERANS HONOURED

An Antarctic roll call of veterans of past expeditions from Scott's 1910-13 expedition down the years to 1976, and the unveiling of a bronze bust of Rear-Admiral Richard E.Byrd, were features of the function for Antarcticans on the evening of March 5. Two veterans of Byrd's second expedition, a New Zealander, W. McL. Loudon, and an American, P.J. Dymond, who served aboard the Jacob Ruppert, were there to watch the ceremony. Enthusiastic speeches, toasts and presentations marked an historic occasion which brought together after many years New Zealand members of the Commonwealth Trans-Antarctic Expedition (1955-58), and leaders from New Zealand and Australian Antarctic bases since 1960. The function began with the unveiling of the bust of Byrd by the United States Ambassador, Mr Armistead I. Selden.

Mr Selden, one of several diplomats representing the Antarctic Treaty nations, said that Antarctica had brought together some of the finest minds and adventurers in the world. The centre was a fitting means of honouring those who had contributed to Antarctic exploration.

GIFTS TO CENTRE

Lord Shackleton read goodwill messages from the Scott Polar Research Institute, and the Royal Geographical Society of which he is a past president. On behalf of the society he presented a document with the seal of the society congratulating the museum on the opening of the Antarctic centre, a magnetic compass, ruler and spirit level used by the later Sir Raymond Priestley.

A New Zealand Antarctic historian, Mr L.B. Quartermain, author of "South to the Pole", who died in 1973, was remembered when his portrait painted by Howard Mallitte, was presented to the centre as a memorial from the New Zealand Antarctic Society by a former superintendent of the Antarctic Division, Mr G.W.Markham.

Lord Shackleton, Sir Vivian Fuchs, and Sir Robert Falla, a former director of the Canterbury Museum, received copies of "Ice On My Palette" from Mr Conly. Sir Vivian Fuchs exchanged his tie for the New Zealand Antarctic Society's tie, presented to him by Mr R.M.Heke, chairman of the Wellington branch.

THREE EXPEDITIONS

Toasts to members of past and present expeditions were proposed by Mr Caffin. When the name of Captain Moyes was called, Mr Caffin recalled that he had served aboard the Aurora when she sailed south to rescue the Ross Sea Shore Party, with Mawson's 1911-14 expedition, and with B.A.N.Z.A.R.E. on the first voyage of the Discovery in 1929-30.

On behalf of Captain Moyes Mr Caffin presented to the centre an historic set of navigation tables first used by Captain John King Davis, chief officer of the Nimrod on Shackleton's 1907-09 expedition, and captain of the Aurora on Mawson's first expedition. Captain Moyes used the tables in the Aurora (1916-17) and in the Discovery (1929-30).

Mr Walter Seelig, representative of the United States National Science Foundation in Christchurch, spoke for the scientists who have worked in the Antarctic since 1956 with American expeditions, and for the men of the United States Navy, Coast Guard and Air Force, who provide the support for their work.

Sir Vivian Fuchs, who replied for all those who have gone south since 1910, said that Antarctic exploration was far from over. He wound up an historic occasion by calling on everyone present to toast not only those who had been to Antarctica, but also those yet to go.

“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 world-wide circulation.

Yearly subscription NZ\$4.50, Overseas NZ\$5.50, includes postage (air mail postage extra), single copies \$1.00. Details of back issues available, may be obtained from the Secretary, New Zealand Antarctic Society (Inc.), P.O. Box 1223, Christchurch, New Zealand. Back issues more than five years old are \$1.50. Discount of 10 per cent for 20 or more copies.

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

The New Zealand Antarctic Society (Inc.)

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

The society has taken an active part in restoring and maintaining the historic huts in the Ross Dependency, and has been involved in the establishment of a national Antarctic centre at the Canterbury Museum, Christchurch.

There are two branches of the society and functions are arranged throughout the year.

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 address, see below. The yearly membership fee is NZ\$3.00 (or equivalent local currency). Membership fee, overseas and local, including “Antarctic”, NZ\$6.50.

New Zealand Secretary

Mr. G.D. Sylvester, P.O. Box 1223, Christchurch.

Branch Secretaries

Canterbury: Mrs J. Kerr, P.O. Box 404, Christchurch.
Wellington: Mr G.D. Sylvester, P.O. Box 2110, Wellington.

