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ВОСТОК СССР

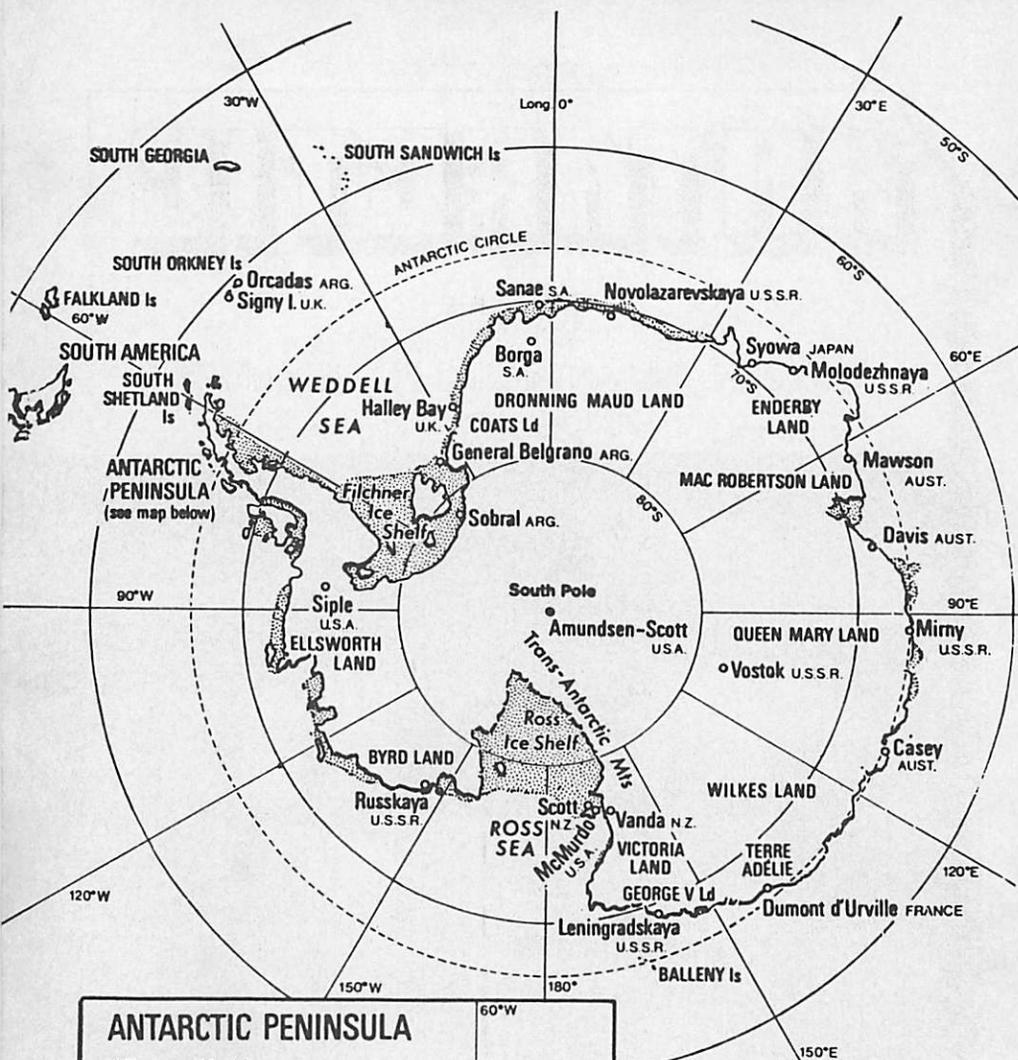
Beneath this large sign are 3100 metres of polar ice. Its Cyrillic letters spell Vostok, the name of the most remote Soviet station in Antarctica, which was built at the coldest place on earth in 1957.

University of Waikato photo

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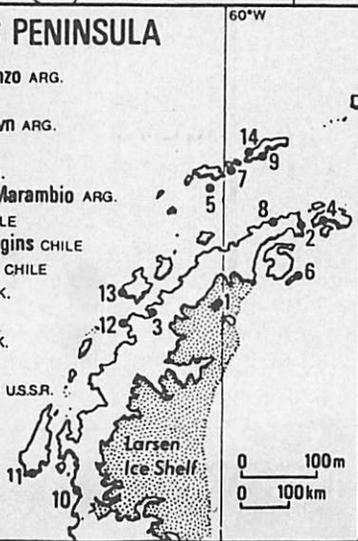
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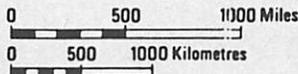


ANTARCTIC PENINSULA

- 1 Teniente Matielzo 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. UK.
- 11 Adelaide I. UK.
- 12 Argentine Is. UK.
- 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

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WINTER DIARY

WORLD OF DARKNESS AND COLD

Winter took its time coming to the South Pole this year after the sun departed in the third week of March. In April the average temperature was 50.6deg Celsius — the highest since records were first kept at the Amundsen-Scott South Pole Station in 1957. But last month 19 Americans, two New Zealanders, and one Soviet exchange scientist, who have been isolated since February 10, realised that winter was upon them. On May 10 the thermometer recorded minus 71.0deg (minus 98.8deg Fahrenheit), the coldest temperature of the year.

Their nearest neighbours, 74 Americans, including one woman scientist, and 10 New Zealanders, and one Australian, on Ross Island 1327km to the north, enjoyed the sunshine a little longer — the sun did not settle until April 25. But like the men at the Pole those at McMurdo Station and Scott Bases have settled down to winter darkness, lower temperatures, and a world of their own until September.

Winter also began slowly for the five Americans at Siple Station, the most remote United States station on the continent, 2250km from McMurdo Station at the base of the Antarctic Peninsula in Ellsworth Land, and 1500km from the Pole. The sun set there on April 30, and north-west storms kept temperatures relatively high in the first weeks. But the weather grew colder early last month, the regular pattern of days of ice fog and blowing snow was broken, and the clear night sky was filled by brilliant red and green auroras.

Preparations for winter at the Pole began after the departure of the last aircraft of the season. The flags of the Antarctic Treaty nations which are flown there all summer, and the South Pole sign, were taken indoors where they will remain until the first aircraft brings mail and fresh food early in November.

FIRST WARNING

Towards the end of February came the first warning of winter — the temperature dropped to minus 50deg C, and remained below that figure. Inside the geodesic dome which houses the station buildings the winter team under the management of Michael Pavlak, settled down to the winter routine, checking stores and equipment, making scientific observations, and coping with the problems of daily living at the South Pole — heating, lighting, and plumbing.

High winds and dropping temperatures marked the first weeks of March. The sun set for the last time officially on March 23, but blowing snow and low cloud obscured the event. A week earlier the station's resident Irishman, John Keegan, and his colleagues, celebrated St Patrick's Day, an occasion for drinking green beer. Outside the temperature dropped to minus 63deg in the second week, and to 65.6deg in the third week.

Stars appeared on April 5, and three days later the Southern Cross was sighted for the first time in six months. April 8 was also the day on which the United States flag was lowered. It will be raised again when the sun returns towards the end of September.

One of the two New Zealanders

responsible for the meteorological observations, John Waller and Kevin Bisset, was the first to sight an aurora. John Waller observed its pale green fleeting colours only briefly on April 12. Those were the main events in April except for the persistently low behaviour of the thermometer. The highest temperature it recorded was minus 36.5deg, but for most of the month temperatures remained in the minus 60s.

MAGNETIC STORMS

May began with celebrations — May Day, and on May 3 the end of the team's first six months at the Pole. Magnetic storms interrupted communications with other stations most of the first week, and the temperature dropped to minus 64deg. The coldest day of the year was May 10 when the temperature dropped still further to minus 71deg. The weather was a little better towards the end of the month — there was an improvement to minus 67deg.

This month the South Pole will still be a Pole of Cold, but the winter team can look forward to Mid-Winter's Day, marking the turn of the Antarctic year. Twilight will start to replace the darkness early in August, and the sun's glow will not be far behind.

Less than a week after the departure of the last aircraft on February 11 the men at Siple Station reported the first visible sunset of the winter. Then came a storm with winds up to 59 knots, and with it ice fog and blowing snow. By the time the storm blew itself out on February 18 snow had drifted to a height of 3m at the end of the dome arch which will house the buildings of Siple II, the new station which will be occupied in January next year.

March brought the first hint of auroral activity, and in the first week a minor storm which covered the hard packed snow round the station with 50 to 75mm of powder snow. John McKinnon, the station engineer, reported that the musical organ had been restored, and a Sunday recital of

Bach in D Minor was planned.

SKI WEATHER

When the temperature dropped to minus 40deg in the second week everyone began to feel the cold but looked forward to dark nights and the expected auroras. But the weather was good enough for ski-ing although exposed nuts and bolts made downhill runs off the Siple II arch a little rough. So the team settled for a less vertical drop at the construction camp.

Temperatures continued to drop in the third week, and the month ended with the ice fog and blowing snow which is part of the Ellsworth Land weather pattern. Easter Day was celebrated by opening the ice-cream crate. The ice-cream was followed by a few beers.

Heavy drifting snow and the usual ice fog marked the second week of April, and temperatures remained in the low 30s. There was clear weather for the last two days of the third week, which made it possible to watch the sun rise and set, and move outside to make the trash run. On April 30 the sun set for the last time.

May arrived with clear weather on most days, and brilliant auroral displays on five out of seven nights. But the temperature dropped to minus 45.5deg. Then the north-west storms began again with ice fog and blowing snow, but warmer temperatures, the highest being 6.6deg in the second and third weeks. The wind kept blowing, and peak gusts of 54 and 57 knots were recorded.

PENGUIN MARCH

Winter at McMurdo Station was marked by relatively milder weather, but it conformed to the same pattern of high winds and low temperatures after the last ships and aircraft departed towards the end of February. The weather was good during the first week of March except for colder temperatures, a trace of snow, and more wind.

Early in the second week there was a warning of bad weather to come when 60 penguins marched past the station. Then winds rising to 40 knots with a peak of 46 knots on March 17 whipped the snow up, and for five hours visibility was reduced to 400m. Sections of sea ice round Hut Point were blown out by the storm on March 16.

Moderate storms moving south from Cape Adare brought winds rising to 58 knots during most of the third week, and one inch of snow. On March 24 the ice extending from Hut Point to Cape Armitage was blown out to sea. Temperatures dropped in the last week, and most of the ice in Winter Quarters Bay refroze. Then high winds blew about half of it out to sea.

OFFICIAL SUNSET

Milder weather with little wind and higher temperatures marked the first two weeks of April. A north-east wind flow aloft brought unseasonably warm temperatures in the third week, the highest recorded being minus 7.2deg. The wind reached a peak of 59 knots on April 17.

Sunset was observed officially on April 24, and the last days of the month were comparatively pleasant until the evening of April 28 when temperatures began to drop. Peak gusts of 43 knots on April 28 and 32 knots on April 29 were recorded.

Winds gusting to 56 knots and blowing snow introduced more wintry weather early in May. Then the three hours of twilight in the first two weeks were replaced by complete darkness, and still lower temperatures.

FULL MOON

Winter darkness and low temperatures are now the daily experience of the Americans' neighbours over the hill — 10 New Zealanders and one Australian at Scott Base, although the weather was relatively warm last month. Also the darkness was relieved by a full moon in a clear sky which lit up the ice and the surrounding terrain.

After the last of the summer support staff left on February 21 the winter team prepared for a month of adjustment to the quiet winter routine after a busy summer. Blizzards and overcast cold days confined everyone inside for most of March. The nights were much darker — the sun shining only a few hours each day — the temperatures were as low as minus 40deg, the average being minus 20deg.

Most of the winter team managed, however, to visit Cape Crozier on two weekend trips. The parties travelled by tracked vehicle across Windless Bight, a windless powder bowl of soft snow about 30km across. Cape Crozier lived up to its reputation for bad weather, and the wind made navigation difficult in the ice fields.

But the parties' efforts were well-rewarded by the comfort of a heated hut, and the sight of towering ice cliffs falling to the sea, and odd sandy beaches. A lonely Chinstrap penguin was discovered on shore, a rare sight in an area known for its population of Emperor and Adelie penguins. It was hundreds of kilometres from its nearest habitat.

WINTER HOBBIES

Indoor bowls, basketball, and volley ball competitions attracted several of the New Zealanders to McMurdo Station during the month. Those who preferred to remain at home began their winter hobbies, which ranged from model-making to brewing ginger beer.

In his April newsletter the leader, John Lythgoe, of Wellington, reported that the month had gone from one of 12 hours of daylight and 12 hours of darkness to one of mainly darkness and about five to six hours of twilight around noon. The sun left the base for the last time on April 13, and disappeared below the horizon for more than three months on April 25.

Temperatures were down with a daily average for the month of minus 23deg, and a lowest temperature of minus 40deg. During the month the

sea ice refroze in front of Cape Armitage and around towards the base, but Winter Quarters Bay and further out in McMurdo Sound the water was still fairly open. Sea fogs continued to rise regularly off the water, and mirages were visible at times across the sea ice to the south in the areas of Black and White Islands, and Minna Bluff.

TIN DOGS

With 17 huskies to care for the dog handler, Steve Chambers, of Waiouru, worked outside as much as possible at first, but in May he turned to the care of the "tin dogs", overhauling the motor toboggans in readiness for the summer programme. Another task undertaken by John Lythgoe was the preparation of 100 food boxes for the summer field parties, which involved packing about three tonnes of food.

Repairs and maintenance of the equipment needed for daily winter living, and overhaul of vehicles did not allow much time for hobbies, although Russell Arnott, the cook from Queens-town, who has gained a reputation for his fine meals, changed from ginger beer to making raspberry wine, and continued making self-steering gear for his model yacht.

Three technicians, Warwick Williams (New South Wales), Will Kimber (Rotorua) and Dean Drake (Hawera) have the responsibility of carrying out the scientific programme of seismic, magnetic, ionospheric, and auroral studies. The auroral camera project kept Dean Drake busy during the month with regular trips to Arrival Heights about 4.8km away to change the film and check the instruments.

WARMER DAYS

Except for a faint glow in the northern sky between noon and 1 p.m. May was a month of total darkness, clear skies, little wind, and relatively warm temperatures. The weather was fairly cool in the first half of the month, but a southerly storm in the second half produced two or three days

which could be described as really warm for an Antarctic winter. The highest temperature of the month was minus 6.6deg, and the lowest 43.6deg.

A change from the perpetual darkness was the arrival of a full moon on May 18. For a week it provided enough light for the men to walk around outside the base, and was the most photographed subject of the month. In the clear air it lit up the ice and surrounding terrain, and at one point produced a bright halo around itself as it reflected off ice particles in the air.

There was some auroral activity during the month, but it was slight, and no good photographs were obtained. On one clear night a red aurora was observed over Mount Erebus; there was little colour in the others.

DAY TRIPS

In the first two weeks there was enough twilight remaining for two day trips, one to the auroral telemetry station at Windless Bight, and the other by dog sledge to Williams Field. Four men made the 25km trip from the base to Windless Bight. They were Dean Drake, Mike Lord, electrician (Howick), Russell Arnott, and Randy Waller, postmaster (Clyde). When they arrived the temperature was minus 40deg, and the whole hut was covered by snow.

Although the temperature was between 39deg and minus 40deg on the day when John Lythgoe and Steve Chambers took one dog team on a run to Williams Field, there was no wind, and still enough twilight. They covered a distance of 12km to 15km, and were away from the base for nearly two hours and a half. The homeward journey was marked by a cloud of steam ahead of the dog drivers, rising not from Mount Erebus but from the huskies' breath.

One effect of the continued darkness last month was an increase in insomnia. Most of the men found it difficult to get a good night's sleep, but lack of sleep has not affected their daily

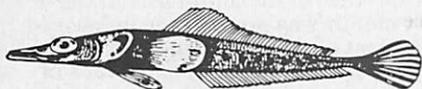
duties or this year's team project of painting the biological laboratory. And on Tuesdays there is time for sports at McMurdo Station. The darkness has stopped John Lythgoe's regular weekly run to Williams Field and back; now he and Warwick Williams have to make do with circuits of the McMurdo Station gymnasium.

Exchanges of visits between the American and New Zealand neighbours, separated by only about 4km, are part of the pattern of winter life on Ross Island. Last month Scott Base entertained a feminine visitor at dinner. She is Miss Sue Williams, of the University of Texas, who works in the geodetic satellite observatory, and is the fourth American woman to winter at McMurdo Station.

FIRST VISITOR

Another visitor arrived on May 16, but did not stay. It was a United States Air Force Galaxy, the world's largest transport aircraft, which made a navigational flight from Christchurch to Ross Island. Scott Base was advised by telephone from McMurdo Station of its expected arrival in the early afternoon. The day was very cold and clear, and although the Galaxy was at a high altitude, it could be seen by the New Zealanders against the stars, and was easily observed because of its long vapour trail and landing lights.

Scott Base will have to wait another three months for its second aerial visitor — one of the two ski-equipped Hercules aircraft which will fly south early in September to prepare for the United States summer research programme. This month the 11 men of the winter team are looking forward to Mid-Winter's Day, a traditional day of celebration at all Antarctic bases. June is also an occasion to celebrate birthdays — the Queen's Birthday, and those of three team members.



Leader at Scott Base



A former New Zealand Army officer who has served in South Korea, Pakistan, and South-East Asia, will be officer-in-charge of New Zealand's Antarctic research programme next summer. He is Mr John Presland, of Christchurch, who will also be the winter leader at Scott Base next year.

Mr Presland, who is 45, retired from the Army in February this year as second-in-command at Burnham Military Camp, and with the rank of major. He has had 25 years' service, and went overseas first in 1953 when he served in South Korea with the 16th Field Regiment, Royal New Zealand Artillery. His later service included two years in Malaysia and South Vietnam. In New Zealand he spent eight years as second-in-command at Linton Military Camp, and then was posted to Burnham four years ago.

In 1965 Mr Presland served for a year as a United Nations observer in Pakistan. He was based in Kashmir, and during his tour of duty visited Nepal and Afghanistan.

Mr Presland took up his appointment with the Antarctic Division, Department of Scientific and Industrial Research, last month. He will fly south early in October to relieve Mr John Lythgoe, the leader of the winter party at Scott Base.

Solo's voyage to Ballenys and Cape Adare

Information which will help to determine the feasibility of towing icebergs to Australia was among the scientific data obtained by the Oceanic Research Foundation's Antarctic research expedition in the 17.3m yawl Solo last summer. The expedition, led by Dr David Lewis, the New Zealand-born navigator and ocean voyager, spent 79 days in Antarctic and sub-Antarctic waters, and the Solo was navigated in areas of pack ice for a month. She sailed 6266 nautical miles, and was hove-to in gales for 243 hours.

In his preliminary report Dr Lewis, who is president of the Oceanic Research Foundation, says that a major objective was to make a reconnaissance to evaluate the efficacy of a privately-financed, low-cost and flexible expedition in a small auxiliary sailing ship. With the help of gifts of fuel, food, and equipment, the whole expedition cost less than \$27,000, and the Solo used only 350 gallons of the 400 gallons of diesel fuel she carried.

Landings were made in the Balleny Islands on Sturge Island, the southernmost and largest of the group, and Sabrina Islet, at Cape Adare, and on Macquarie Island. The expedition collected biological and geological specimens both on shore and from bottom dredging in the areas of the Balleny Islands and Cape Adare as well as off Macquarie Island. Systematic bird, whale, and ice logs were kept, and daily weather observations and reports were made.

ICEBERG STUDIES

Between Cape Adare and 65deg 20min S/165deg 45min E, three icebergs were studied in sea temperatures varying between minus 3deg and plus 3deg Celsius. One of the last bergs — the northernmost seen — was encountered at 65deg 20min S. Salinity and temperature runs at a depth of 15 and 75 metres were made from 150m to 30m off this berg. The sea temperature at

the surface was plus 2deg, and at 75m down plus 3deg.

The unexpected finding was that no diminution of salinity could be detected on any side of this or any other berg investigated. This suggests that attrition by wave action rather than melting is the major factor in the break up of icebergs south of the Antarctic Convergence. These data may be of help in making calculations on the problems of iceberg towing.

Dr Lewis, who first sailed to Antarctica alone in his 9.3m sloop Ice Bird in 1972-74, is an authority on Polynesian natural navigation. When the Solo was in the pack ice on course to the Balleny Islands the magnetic compass was virtually useless because of the proximity of the South Magnetic Pole. The yacht was steered by sun compass, and sun bearings by eye, coupled with alignment by the ocean swell — both ancient Polynesian methods.

LOCATING LAND

In his report Dr Lewis says that use of modified Polynesian natural navigation techniques near the South Magnetic Pole may be useful, especially in emergencies. Similarly, locating land by observation of the behaviour of Antarctic birds and animals may turn out to be as practicable as corresponding Polynesian methods.

Scientific results of the expedition, and other information, including tectonic activity logged on January 1 when the Solo was at 61deg 55min S/160deg 50min E, are being studied by various interested organisations. During the voyage south the expedition discovered a useful anchorage at Sturge Island, and also tested successfully a method of melting blocks of pack ice to produce drinking water by using surplus heat from the engine cooling water passed through a copper coil.

Built of steel with 8mm thick plating, the 25-year-old Solo, which has twice won line honours in the Sydney-Hobart yacht race, has a 100 horse-power auxiliary diesel engine. For the voyage south with a ship's company of eight she was provisioned and carried heating fuel for a year. An inflatable surfboat with a 25 horse-power motor was used extensively on the voyage.

SOLO'S CREW

When the Solo sailed from Sydney on December 15 last year the expedition's objective was King George V Land. But satellite reports of up-to-date ice conditions on the eve of her departure dictated a change to the Balleny Islands and Cape Adare.

In addition to Dr Lewis, who served as master and ship's doctor, the Solo carried two other scientists. They were: Dr Pieter Arriens (geophysicist), who was officer-in-charge at Davis in 1976-77, and who has made several summer trips with Australian National Antarctic Research Expeditions; and Dr Peter Donaldson, research chemist, Australian National University, who has been on three of Sir Edmund Hillary's expeditions.

First mate and second-in-command of the Solo was Lars Larsen, a Danish-born graduate of the Norwegian Army Arctic School, who was a radio operator and sledge expert at Mawson in 1976-77. He spent two years with the North Greenland sledge patrol.

Other members of the crew were Dr

Dorothy Smith, a New Zealand mountaineer, who did most of the cooking on the voyage, Jack Pittar, an electronics technician from the Australian Bureau of Mapping, Ted Rayment, an Australian Broadcasting Commission director and cameraman, who is an experienced ocean yachtsman, and Fritz Schaumberg, a mountaineer and scuba diver.

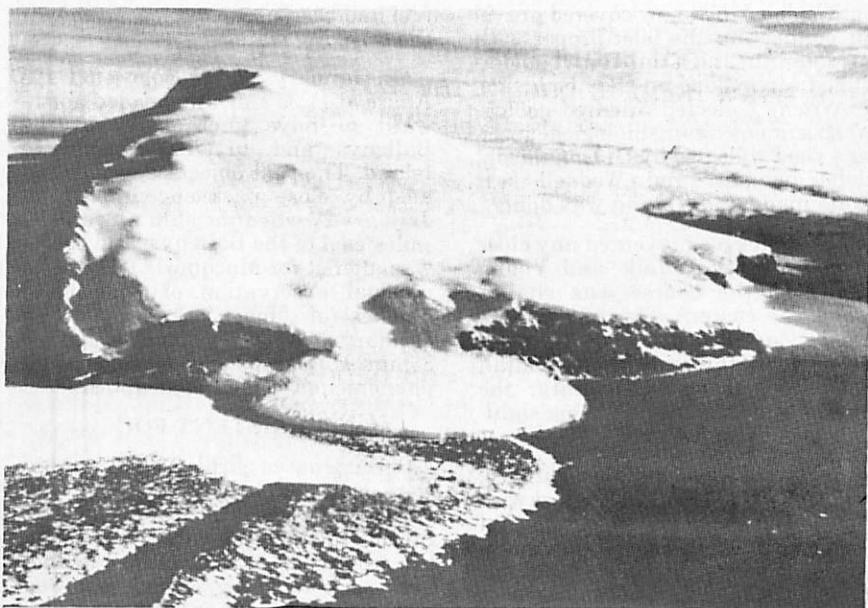
BEST RUN

On her way south the Solo passed well west of Macquarie Island, and it was opposite the island that she made her best noon to noon run of 185 nautical miles (under sail alone). On January 1 in the late afternoon between 3.30 p.m. and 6.30 p.m. heavy, rumbling vibrations transmitted up from the seabed were recorded. The position was 61deg 55min S/160deg 50min E, and charted depths ranged from 900 fathoms over a sea mount near or under the ship's position to 1500 fathoms down to the ocean floor.

First icebergs were encountered on January 2 at 62deg 48min S, and the Solo reached the pack ice next day in 64deg 47min S/160deg 15min E, on the 18th day out from Sydney. Loose pack was entered under sail 82 nautical miles north of the Balleny Islands on the morning of January 3, but the next day, when the Solo was still under sail in fog and falling snow, very heavy pack was encountered. The Solo was forced to retreat northwards in an effort to round a long eastward extension of the pack and approach the Ballenys from the east.

On January 4 the Solo hit an ice floe and was holed on the port side 3m back from the stem and .6m below the waterline. Dr Lewis says the damage was caused because he was driving the vessel too fast through loose pack under sail. The hole, a bare 12.7mm across was repaired, but the ship's ice capability was reduced in consequence, and she had to be lightened by jettisoning much of the emergency kerosene.

After several frustrating days the



A helicopter view of Sturge Island looking south from the northern end. The photograph was taken in March, 1964, when a New Zealand reconnaissance party visited the Balleny Islands in the American icebreaker Glacier.

Antarctic Division photo by Guy Mannering

Solo rounded the north-east extension of the pack and shaped course south-west for the Ballenys. Young and Buckle Islands, the northernmost of the group, were sighted on January 9. But then followed gales and anxious moments in the pack and fog before a Force 11 northerly storm lasting 42 hours, drove the pack far southward. The Solo followed in the wake of the ice that was being drifted south by the storm, and coasted close down the eastern side of Sturge Island to its south-eastern extremity, Cape Smyth.

In the lee of Cape Smyth the expedition unexpectedly found good anchorage in a partially sheltered bay (67deg 35min S/164deg 50min E) at 3 p.m. on January 13. The anchorage was on the south side of an 804m-long snow-covered gravel spit extending out from the main island to a 91m snow-covered hill of volcanic rock.

After 20 hours at anchor the Solo was forced to leave because the wind

turned southerly, and the main polar pack began drifting north again, its outliers quickly invading the bay. But during the expedition's stay two lands were made on the gravel peninsula where Adelie penguins and Weddell seals were filmed.

A third landing was made at the foot of a rock buttress on the south-west side of the bay. Here Dr Arriens collected oriented rock samples. Dr Donaldson obtained specimens of marine organisms, including jellyfish, from the bay, and a bottom sample was dredged up. Several bottom samples were also dredged up, mostly off the southern part of the east coast of the island after the Solo left the anchorage.

THREE LANDINGS

Landings were made on Sabrina Islet while the Solo remained hove-to in a polynia for six hours on January 15. Two landings were made on the

south side of the snow-covered gravel spit connecting the islet proper with the Monolith, and a third on a boulder-fringed scree slope on the north side. Dr Arriens collected oriented geological specimens again, biological specimens were collected by Dr Donaldson, Adelie penguin and Weddell seal counts made and filming was done.

Heavy pack ice prevented any close approach to Borradaile and Young Islands so the course was shaped around the eastern edge of the pack towards Cape Adare. For the first and last time on the expedition landfall was made in good visibility, the Victoria Land mountains being sighted nearly 160km away.

Robertson Bay was choked with ice, which was streaming anti-clockwise round the bay at about two knots, and sweeping out to sea past Cape Adare. Large bergs were aground off the cape and across the mouth of the bay.

Two parties in turn were landed by the rubber surfboat on Ridley Beach while the Solo was hove-to for five hours and a half on January 23 in a rather transitory polynia, charted as just inside the tip of the cape. The historic huts were filmed and biological specimens collected.

FURTHEST SOUTH

Borchgrevink's tongue and grooved hut erected in 1899 was intact, although full of snow, and his store hut was also intact though roofless (as it had been in 1911). On the other hand, the 1911 hut of Scott's Northern Party was collapsed except for one wall. An enormous ridge of pressure ice towered over the inner margin of Ridley Beach, and the vast Adelie rookery exhibited the same signs of overcrowding that Priestley described (in "Antarctic Adventure").

Cape Adare (71deg 18min S) was the expedition's furthest south. The Solo had logged 3590 nautical miles from Sydney, though the more meaningful noon to noon runs had totalled 3228 miles. Less than a quarter of the diesel

fuel had been used, and less than half the drinking water.

On January 23 the Solo left Cape Adare at 11.30 a.m. and headed northward to have another try at the Ballenys and to visit Macquarie Island. The first objective was frustrated by close pack encountered on January 27 when the ship was still 30 miles east of the Ballenys, and course was altered for Macquarie Island. An unusual observation of widespread patches of "foam" was made on January 26 at 66deg 30min S/164deg 35min E. Samples were taken and phenomenon was photographed.

PERSISTENT FOG

Specimens of krill and plankton were collected between Cape Adare and 65deg 20min S/165deg 45min E. Stormy north-west winds hampered the approach to Macquarie Island, and persistent fog, which allowed neither sun sights nor land sightings, kept the Solo tacking on and off near the invisible island for three days.

Eventually Jack Pittar succeeded in repairing the 24-mile radar, which had frozen up in the fifties, and the island was revealed nine miles off. The Solo anchored in Buckle's Bay in the early morning of February 11, and during the expedition's stay assistance was given to the A.N.A.R.E. team in the resupply of huts at Ballast Bay (Sandy Bay) and Green Gully.

After the Solo left Macquarie Island on the morning of February 16 she ran into extremely rough weather, including a Force 11 storm, which compelled her to lie-to under trysail for 61 hours. South-west of New Zealand, however, the wind freed at last to west and south-west, and, in the 11th week at sea the ship covered 850 nautical miles. Two days later, at 4.15 a.m. on March 4 she rounded South Head to enter Sydney Harbour.



Research in Dufek Massif area likely

Another investigation of the mineral potential of the Dufek Massif area in the Pensacola Mountains is expected to be one of the earth science projects in the United States Antarctic research programme for the 1978-79 season. There are ice-free areas of moraine and extensive exposures of the world's second largest basic layered intrusion, where iron, copper, chromium, nickel, platinum, and vanadium occur in small amounts.

As part of the evaluation of mineral resources in Antarctica investigations of the Dufek Massif between October and February next year have been proposed. United States Navy Hercules aircraft would fly scientists and equipment 1740 km from McMurdo Station to establish a base camp. Motor toboggans would be used for movement in the area.

This would be the third expedition to the Dufek Massif (82deg 36min S/52deg 30min) since the intrusion was discovered in 1957. Geological studies were made in the 1965-66 season, and in the 1976-77 season a United States Geological Survey team spent a month in the area. This team collected samples from the lower exposed half of the igneous rock complex, and made geophysical studies of the nature of the rocks under the ice.

No deposits of potential economic usefulness or of significant size were found in the 1976-77 season. But the intrusion may have future economic importance because of its similarities to other rich metal-producer layered intrusions elsewhere in the world.

EARLY FLIGHTS

To prepare for the complete research programme next season two ski-equipped Hercules aircraft of the United States Navy's VXE-6 Squadron will make up to six flights from Christchurch to McMurdo Station

early in September. On this operation the aircraft will carry 143 passengers and more than 25 tonnes of cargo.

Mail, fresh fruit, and vegetables, will make up much of the cargo. These are eagerly awaited by the 74 Americans and 11 New Zealanders on Ross Island who have been remote from the outside world since late in February. Among the passengers will be scientists who will make an early start on summer projects, and construction staff to make the annual ice runway in McMurdo Sound ready for the major airlift of the season in October.

By the end of next season all traces of the nuclear power plant on Observation Hill which supplied electric power to McMurdo Station for more than 10 years will have gone. Since the plant was closed down in September, 1972, its nuclear fuel, buildings, and equipment have been removed over several seasons.

GRAVEL REMOVED

In the last two seasons, to meet the requirements of the Antarctic Treaty, the United States naval support force has removed many tonnes of marginally contaminated gravel from the area round the power plant site. The supply ship Schuyler Otis Bland carried 7908 tonnes to Port Hueneme, California, in the 1976-77 season, and another 4200 tonnes last season.

Additional contaminated gravel was discovered last season as a result of surveys by the Navy's nuclear waste removal unit, and an independent survey team which has to certify that the area is completely clear of radioactive material. The quantity was small, and some was in areas of limited accessibility for men and equipment. There has been no increase in the level of radioactivity.

Because of various delays the Bland was one of the last two ships to leave McMurdo Sound last season. Some of the additional contaminated gravel could not be removed in time. Therefore the Bland will have to load between 300 and 600 cubic yards — the last of the marginally contaminated material — on one of her voyages south next season.

Although the United States Coast Guard's most powerful icebreaker, the 13,000 tonne Polar Star has spent several months in dry dock this year for repairs, she is expected

to return to the Antarctic next season. She made a successful icebreaking debut in Antarctic waters last season, working with the two veterans, Glacier and Burton Island, but the voyage produced problems.

Because of a fault in a propeller bearing the Polar Star had to return to Wellington, and then went back to Seattle for repairs. Here three variable pitch propeller systems, which caused trouble during her Arctic trials, are being redesigned, and engineers also plan to correct a thrust bearing problem which produced excessive vibration during the Polar Star's Antarctic cruise.

Both the Polar Star and her sister ship, the Polar Sea, were in dock last year for changes in their propeller systems. The Polar Sea has been on limited duty in the Arctic during the northern summer to guard against any damage to the propeller system. She may come south late this year for Antarctic ice trials.

First New Zealand dog sledges

Tradition dies hard in the Antarctic. New Zealand has used huskies at Scott Base for more than 20 years, and now the sledges they pull are made by traditional methods with natural materials. And next summer the sledges will carry plywood food boxes like those used by Scott and Shackleton.

Rising prices and high freight costs have made imported sledges too expensive. So last year the Antarctic Division, Department of Scientific and Industrial Research, decided to have this essential equipment made in New Zealand. Two sledges were made by a Christchurch craftsman, Mr Robert Spence, at a cost of \$800 each, and were used last season on the 40km journey between Scott Base and Cape Royds. A third sledge will be in use next season.

Built to a traditional Norwegian design, the sledges are made of red beechwood. The laminated runners,

bonded by resin syrup, are lashed together with rawhide, and waxed linen thread has been used for other components. The only man-made materials are the resin syrup, glue, and the tufnol sheathing on the runners.

These sledges are the first of their kind to be made in New Zealand. The craftsmanship has been highly praised by an art critic who saw one exhibited at a crafts exhibition in Christchurch this year. T.L. Rodney Wilson described it as nothing short of perfect... it had all the quality of a classic object.

Fifty plywood food boxes have been made in Christchurch for use by New Zealand field parties next season. The Antarctic Division has gone back to the food transportation system used by Scott and Shackleton because the wooden boxes are stronger and lighter than the cardboard boxes used previously.

SOVIET REPORTS

265 men wintering at six permanent stations

Geologists of the 23rd Soviet Antarctic Expedition, who worked in the Pensacola Mountains and the Shackleton Range again last season, studied the structure of the Dufek Massif during their surveys from the summer station, Druzhnaya, on the Filchner Ice Shelf, and also determined the structure of the Shackleton Range more accurately. Their data suggest that the massif represents the remains of magma whose age has been estimated at 300 million years.

This winter there are 265 men at the six permanent Soviet stations—Molodezhnaya, Mirny, Vostok, Novolazarevskaya, Bellingshausen, and Leningradskaya. The winter group is headed by O.K. Sedov, and the leader of the team at Mirny is A. Budretsky, who has wintered twice before. Six ships took about 550 scientists and support staff south last season, and the expedition was headed by Professor V.I. Serdyukov.

Soviet scientists headed by Dr I. Zotikov worked with scientists of other nations in the international Ross Ice Shelf Project last summer. They studied the temperatures of the sea water under the ice shelf, and established that there are two distinct temperature layers under the ice.

These temperature differences are believed to be the product of two counter currents. A warm current which has its source in the open sea hundreds of kilometres from the ice shelf, passes under it, becomes cooler, and forms a cold current that flows from it.

South Korea has advised the 13 Antarctic Treaty nations that it wishes to become a party to the treaty. As it has no Antarctic research programme it will have the same status as nations like Rumania, the German Democratic Republic, Denmark, Czechoslovakia, and Brazil.

United States scientists made similar measurements of water temperatures under the ice by lowering instruments down the 420m hole drilled through the ice shelf. When the Soviet scientists followed their colleagues, their instruments also registered a temperature close to freezing point. But then the thermometer pointer swung to positive, and became still, indicating that the instrument was passing through a layer of warm water.

This warm water layer was 50m deep. The neighbouring cold layer was 100m deep. The results were so surprising that the measurements were repeated to establish that there were two distinct temperature layers under the ice, and an active heat and water exchange.

Among the projects in last season's Soviet programme were the conversion of Molodezhnaya into a regional meteorological centre, and the completion of the modernisation of of Mirny, the oldest Soviet station, established in 1956, and once the headquarters of the research programme. One of the main projects was the construction of an airfield for heavy aircraft at Molodezhnaya.

After the traditional football match, won by the departing scientists, the new team at Mirny settled in for the winter. Scientific activities and months of complete darkness will not

check their vegetable growing, a regular practice at Soviet stations for several years.

With the aid of hydroponics and artificial light the men at Mirny will have tomatoes, cucumbers, radishes, gherkins, and parsley on their menus this winter. They also have a lemon

tree which flourishes and bears fruit despite the lack of sunshine.

Last summer a group of geophysicists at Mirny took the horticultural honours. They managed to bring a water melon almost to full ripeness by January. It was eaten for dessert at the New Year party.

French team drills to 900m at Dome C

Glaciological studies of Dome C, the ice dome in Wilkes Land 1150km from McMurdo Station, were resumed last season by a French team led by Dr Claude Lorius, who first worked there in the 1973-74 season. The team planned to drill into the ice-cap to a depth of 1000m, but drilling stopped at 900m.

Dome C (74deg 39min S/123deg 10min E) is one of three ice domes in the region, which is one of the significant centres of ice flow in East Antarctica. The ice at Dome C is about 3400m thick, and at the lower levels is estimated to be 30,000 years old.

Last season's programme was part of the International Antarctic Glaciological Project, which is a joint study of a large part of the East Antarctic ice sheet by scientists of five nations — Australia, France, the United Kingdom, the United States, and the Soviet Union. Dr Lorius and his team of scientists and technicians, which included a 28-year-old woman glaciologist, Martine Briat, used the Dome C camp established by the United States naval support force for the recovery of Hercules aircraft damaged in Wilkes Land in previous seasons.

Before the French team flew from McMurdo Station the camp and skiway were prepared by construction workers of the support force. Nearly 30 tons of supplies and equipment were flown to Dome C by U.S. Navy

Hercules aircraft, which also brought ice cores back from the drilling site.

As Dome C is more than 3214m above sea level, the French team spent a short time at the Amundsen-Scott Pole Station to acclimatise. After several weeks at Dome C the team returned to McMurdo Station on January 26, and the ice cores were brought back for study on January 28. Some were taken to France for further study in a glaciological laboratory.

These cores will help to establish the glaciological history of the Polar Plateau, and climatic changes over the last 25,000 years. Cores recovered from levels down to 100m will be studied for traces of pollution, and also to measure and gauge atmospheric conditions.

Third Norwegian expedition

Norway is expected to send a third expedition to Antarctica in the 1978-79 season. It will continue the research done in western Queen Maud Land and the Weddell Sea during the last two seasons.

Organised and led by the Norwegian Polar Institute, the last two expeditions have used the chartered 500-tonne icebreaker Polarsirkel. It will probably be chartered again this season.



Herald and Weekly Times photo

Australian thanks for Soviet aid

Five months ago an Australian radio technician, Mr Colin Perger, of Launceston, Tasmania, was evacuated by air from Davis to hospital in Christchurch after he had collapsed and become seriously ill with a bleeding duodenal ulcer. He was flown 700km by Soviet helicopter from Davis to Mirny, and then transferred to a United States Navy Hercules aircraft for the 6300km flight to New Zealand.

In April when the Mikhail Somov, flagship of the Soviet Antarctic fleet, called at Melbourne, Mr Perger, now fully recovered, was able to meet and thank the pilots of the helicopter who flew him from Davis on the first leg of a flight which saved his life. The Minister of Science (Senator James Webster) and officers of the Antarctic Division, went aboard the ship also to express their gratitude to members of the 22nd Soviet Antarctic Expedition for their assistance in the evacuation.

Senator Webster presented a colour photograph of Davis Station to the leader of the expedition, Dr Valeriy Serdyukov. The inscription reads: Presented to Mirny Station in grateful recognition of the assistance rendered by the 22nd Soviet Antarctic Expedition in the evacuation of a seriously ill A.N.A.R.E. expeditioner from Davis in January, 1978.

In the photograph above Captain Mikhail Mikhailov, master of the Mikhail Somov, is holding a balalaika which he presented to Senator Webster. Others from left to right are: Mr Perger, Senator Webster, Dr Serdyukov, and Mr Philip Sulzberger, assistant director, Antarctic Division.



B.A.S. NEWS

Geologists wintering at General Belgrano

Persistent ice south of the Argentine Islands, which blocked the west coast of the Antarctic Peninsula, and bad weather which grounded aircraft, made the end of last season frustrating for the ships and aircraft of the British Antarctic Survey. The Royal Research Ship Bransfield faced many difficulties in the relief of Rothera and Faraday (Argentine Islands), and a geological reconnaissance party which worked in the Shackleton Range during the summer is now spending the winter with 20 Argentinians at their base, General Belgrano, where the party was stranded in February.

This winter the B.A.S. has 70 men at its five bases, and three at General Belgrano. There are 10 at Faraday, 19 at Grytviken (South Georgia), 17 at Halley, 12 at Rothera, and 12 at Signy in the South Orkney Islands.

Originally the geological party was flown to the Shackleton Range by way of General Belgrano in mid-November and remained there until mid-January. But the three men could not be picked up from General Belgrano by one of the B.A.S. Twin Otter aircraft because of the persistent bad weather in February. An Argentine aircraft which flew over the base at the end of April to drop additional supplies and equipment was unable to land because it was not ski-equipped.

Bad weather grounded the two B.A.S. Twin-Otter aircraft for much of the season, and the aeromagnetic flights were also held up by faults in the equipment. Both aircraft were due to return to Canada in March for their annual overhaul, but one was damaged beyond local repair while trying to take off with a full load from a very rough surface at Rothera, Adelaide Island. Fortunately, the occupants were uninjured.

The Bransfield, which had been delayed by persistent ice in Marguerite Bay, was still in the area, so the crashed aircraft was dismantled and

put on board. Parts of the aircraft were used to repair the American Survail Twin-Otter which was damaged in a gale at Rothera in mid-February ("Antarctic", March, 1978). The aircraft, which was in transit from McMurdo Station after supporting the Ross ice Shelf Project, was able to fly out and continue its flight to the United States.

ICE HAZARDS

The Bransfield was unable to reach Rothera until the end of February, as the west coast of the Antarctic Peninsula south of the Argentine Islands had been blocked by persistent ice. After relieving Halley the ship made a series of geophysical traverses in the Weddell Sea and Scotia Sea.

Then it revisited Signy and Grytviken en route, and went north to South America to pick up the ship's co-master and summer visitors. The latter included Dr Raymond Adie (B.A.S. deputy director), Dr Leslie Kent (a South African observer) and Captain Fernando Nogueira de Araujo (a Brazilian Navy observer).

When the Bransfield returned to the west coast of the Antarctic Peninsula ice conditions were still bad, and it was very doubtful whether the ship would be possible to reach Rothera. It was even difficult to complete the relief of Faraday. The Bransfield arrived there on February 25 but was able to discharge only part of the cargo before sailing on February 27 as the scow and launches were unable to make headway through the ice.

About this time, H.M.S. Endurance was also unable to sail further south, because zero visibility added to the hazards. However, the 14m French yacht *Damien II* had managed to slip into the Argentine Islands for shelter, and the husband-and-wife crew were welcome visitors at the base. After five days they left for the south, intending to winter in Marguerite Bay.

On February 28 the Bransfield at last managed to reach Rothera. She spent 10 days discharging cargo, but strong southerly winds and low temperatures then consolidated the ice off the base, and the ship had to stand off. During this time equipment was picked up from the Adelaide base.

JETTY DEMOLISHED

When the Bransfield was able to return to Rothera, the ice foot near the base collapsed on to the jetty and demolished it, but then it was possible to unload on to the ice foot.

Ice conditions were still extremely difficult, but at last all the general stores, 1,000 drums of aviation fuel, 136 tonnes of concrete and building materials were unloaded and the ship left finally on March 24. On board were a number of summer field workers who had been airlifted back to the base in early February, to await the ship's arrival, and fortunately were available to help with the unloading.

The concrete and building materials to have been used for the construction of a large store and workshop, which would have completed the

Rothera buildings, but by then the temperatures had dropped too low for laying concrete, and the construction work had to be postponed until next summer. *Damien II* was reported to be wintering at the old Adelaide base.

On the voyage north, the ship called at Faraday, Palmer and Almirante Brown stations, and geologists visited a number of localities. Two weeks were then spent in the South Shetland Islands, and off the northern tip of the Antarctic Peninsula where geociever stations were established and geological landings were made. After a final visit to Signy, Bird island and Grytviken, the Bransfield returned to the Falkland Islands (Islas Malvinas). She reached Southampton late last month.

MARINE WORK

Meanwhile, the Royal Research Ship *John Biscoe* spent six weeks on the first season of the new Offshore Biological Project (O.B.P.) near South Georgia, the scientific work being supervised by Mr Nigel Bonner, head of the B.A.S. Life Sciences Division.

The purpose of the O.B.P. is to investigate the environment and biology of krill and its major predators, in order to provide a sound scientific basis for rational management of stocks, and to ensure against over-exploitation. A draft convention on the conservation of Antarctic marine living resources was drawn up at a special Antarctic Treaty consultative meeting in Canberra in February-March.

Dr Richard Laws, director of the B.A.S. attended the meeting. Earlier in October-November he took part in an international expedition, sponsored by the National Science Foundation, which spent one month on Hero in the Bransfield Strait pack ice, studying the breeding biology and population dynamics of the crabeater seal — the world's most abundant species.

Last season large numbers of trawlers and fisheries research vessels

operated around South Georgia and the South Orkney Islands. There were two Russian and two Polish mother ships with 35 Russian, Polish and East German trawlers, a Polish research trawler, the two German research vessels Walther Herwig and Julius Fock, and a Russian whale-catcher. A number of these called at Grytviken. The South African naval survey vessel S.A.S. Protea, and the Hero also spent some time in the area.

During the O.B.P. the John Biscoe encountered large quantities of ice, including the largest iceberg ever seen

by anyone on board, and the largest ever known to have drifted north of 60deg S. It was first sighted by the John Biscoe about 32km north of Shag Rocks, 53 deg 33 min S/42 deg 2 min W of South Georgia. This iceberg was a tabular berg about 30m high, measuring 38 x 50km, which has been followed by B.A.S. on satellite imagery since 1967. It is now known to have calved from the Trolltunga Glacier tongue near the Greenwich meridian, possibly as a result of the impact of a giant iceberg originating from the Amery Ice Shelf in 1963.

World whaling convention

Proposals for a new international convention for whales and/or cetaceans may be considered at the annual meeting of the International Whaling Commission this month. Arrangements for a preliminary meeting of all nations which might be interested were discussed at a special meeting of the commission in Tokyo last December.

Revised 1978 catch limits for North Pacific sperm whales were set at the special meeting. The new limits are 5105 males and 1339 females, a reduction of 10.5 per cent on the 1977 quota of 4320 males and 2880 females.

When the commission held its annual meeting in Canberra earlier last year it set precautionary interim 1978 limits of 763 females but no males, pending a further review by its members and the scientific committee. This was done to allow a speedy recovery of male stocks to the maximum sustainable yield level.

As a result of objections from the Soviet Union and Japan the scientific committee was asked to review all the evidence on the state of North Pacific sperm whale stocks. Its revised catch estimates were accepted by the commission, and the quotas were increased, the 16 nations represented voting 15-1

in favour. New Zealand was not represented.

Last year the commission prohibited the hunting of the Bering Sea stock of bowhead whales, which was in danger of extinction because catches by Alaskan Eskimos were increasing, and more whales were being struck but not landed. United States Government proposals for a curtailment of catching because of the Alaskan Eskimos' subsistence and cultural needs were not accepted by the commission. However, it agreed to allow a very limited and strictly controlled catch for 1978 only.

When the commission met in Tokyo it agreed to introduce a regulation that for 1978 the hunting shall stop when 18 Bering Sea bowhead whales have been struck or 12 landed. The striking, taking or killing of calves or any bowhead whale accompanied by a calf is also forbidden.

In addition the commission adopted a resolution which called on the United States to introduce strict controls on the aboriginal hunt for bowheads. The whole question of bowhead whale hunting will be reviewed at this month's annual meeting.

POLAR MEDAL AWARDED TO SIX NEW ZEALANDERS

Six members of New Zealand expeditions to Antarctica have been awarded the Polar Medal for distinguished services in scientific research and exploration. Three are scientists — Drs P.J. Barrett, M.G. Laird, and A.T. Wilson; two, Major J.R.M. Barker (retd.) and Mr A.M. Bromley, have been station leaders; and the sixth, Mr J.H. Hoffman, has spent eight seasons in Antarctica, the first in 1956-57.

The Polar Medal is awarded by the Queen from time to time, under the terms of a Royal Warrant, in recognition of individual merit arising from enterprise and hardship, outstanding personal contribution in exploration, scientific research or general service on polar expeditions. It was first awarded for service on an Arctic expedition in 1818. The first medal with an Antarctic inscription was awarded for service in Captain Scott's first expedition of 1901-04.

Major Barker, of Christchurch, who was second-in-command of the 2nd Battalion, Royal New Zealand Infantry Regiment, when he first went south, served as deputy leader at Scott Base in the 1970-71 summer. He was seconded from the Army to the Department of Scientific and Industrial Research in 1971 to serve as officer-in-charge of the 1971-72 research programme, and wintered at Scott Base in 1972.

Dr Barrett, director of the Victoria University of Wellington Antarctic research unit, is internationally known as the geologist who discovered in 1967 the first land vertebrate fossil — part of the jawbone of a labyrinthodont amphibian — ever found in Antarctica. He made his discovery while working with an Ohio State University Institute of Polar Studies team.

EIGHT SUMMERS

In the last 16 years Dr Barrett has spent eight summer seasons in Ant-

arctica, the first in 1962-63 as a field geologist with the University of Minnesota. Since then he has worked with the United States research programme, and has taken part in or led several Victoria University of Wellington expeditions. In the 1974-75 and 1975-76 seasons he worked with the Dry Valley Drilling Project, an international programme conducted by the United States, New Zealand, and Japan

Mr Bromley, who began his service with the New Zealand Meteorological Service in Christchurch, now works in Wellington. He went south first as a meteorological observer in 1967-68 on sub-Antarctic Campbell Island. Then he went to the Antarctic for the 1968-69 summer, and worked at the newly-established Vanda Station in the Wright Valley. He remained at Vanda for the winter of 1970, and was station leader and meteorological observer there for the 1973-74 season, including the winter of 1974.

SCOTT BASE

Mr Hoffman, who is a drilling expert, has been with the Geophysics Division, D.S.I.R., for more than 30 years. He was a member of the International Geophysical Year team at Scott Base in the 1956-57 summer when the base was established. His wide knowledge of drilling techniques enabled the Scott Base construction team to master the problem of drilling 200 holes through permafrost to anchor the buildings and secure the guy wires of the radio antennae masts.

In the 1957-58 summer Mr Hoffman went back to Scott Base. He worked at McMurdo Station for three months in the 1960-61 season, and again at Scott Base in the 1962-63 season. Then he spent four more summers — 1972-73 to 1975-76 as supervisor of the New Zealand drilling team which did the drilling for the Dry Valley Drilling Project.

Dr Laird, of Christchurch, who is district geologist with the New Zealand Geological Survey, has led three geological field parties in Victoria Land since he first went south in the 1960-61 season. He was in the southern party, led by Captain P.J. Hunt, of a topographical and geological survey team which explored the coastal area of Victoria Land south of Cape Selborne and north of the Nimrod Glacier.

In the 1964-65 summer Dr Laird led one of two groups in a southern party which worked north of the Nimrod Glacier between Ross Ice Shelf and the fringe of the Polar Plateau. Dr Laird's team of four worked in the Holyoake, Cobham, and Swithinbank Ranges to the north of the Nimrod Glacier, and for a short time on the western side of the Queen Elizabeth Range to the south.

MARINE FOSSILS

When Dr Laird returned to Northern Victoria Land in the 1971-72 summer he led a geological party from the 16th Victoria University of Wellington expedition which made a discovery of major geological importance — fossils in an area where no marine fossils had been found before. The fossils were found at the head of the Marine Glacier in the Evans Neve area.

Dr Laird worked again in Northern Victoria Land in the 1974-75 season when he led one of two field parties in a major New Zealand geological expedition to the Bowers Mountains. The parties, which worked independently in the field for two months, discovered rocks and fossils which indicated that Tasmania was joined to Victoria Land

in the Cambrian period 500 to 600 million years ago.

Dr Wilson, who is a geochemist, has been director of the University of Waikato Antarctic research unit since it was established in 1971, but he spent the first of his eight seasons in Antarctica with the 1961-62 Victoria University of Wellington expedition. It consisted of himself and Dr H.W. Wellman, and they studied Lake Vanda to discover the reason for the surprising warmth of its bottom water.

WORK AT VOSTOK

In the 1963-64 season Dr Wilson worked with the Victoria University expedition in the Taylor, Wright, and Victoria Valleys, and spent a week at the South Pole studying the chemical composition of polar snow. He went south again in the Victoria University expedition of 1967-68.

Since he was appointed to a chair at the University of Waikato Dr Wilson has spent five summers with Antarctic research expeditions — 1969-70, 1971-72, 1973-74, 1974-75, and 1977-78. Last season he and Dr C. Hendy were the first New Zealand scientists to work at the Soviet station, Vostok. They continued studies of the geochemistry of Antarctic snow made at Byrd and Plateau Stations in 1967-68 and Pole Station in 1964-65.

Twenty-six members of Australian National Antarctic Research Expeditions have also been awarded the Polar Medal. All served with A.N.A.R.E. at the three Antarctic stations, Mawson, Casey, and Davis. Mr D.J. Luders, who was officer-in-charge of Casey in 1972 was awarded the medal for outstanding service; he also received a second clasp for service while in charge at Mawson in 1974.

Among the 26 recipients was a New Zealander, Mr Brian Francis Clifford. He was awarded the medal for his service as an ionosphere physicist at Mawson in 1972.

Inventory of relics in historic huts

Continuing deterioration of relics in the three historic huts on Ross Island was observed by two caretakers from the New Zealand Antarctic Society who worked for four weeks at Cape Royds, Cape Evans, and Hut Point last season. They found that many items were close to total disintegration because of the effects of corrosion, exposure to the dry atmosphere, continual handling, dust, and dampness. In their report they suggest that selected items should be returned temporarily to New Zealand for urgent treatment to ensure their survival.

Each summer since 1969 caretakers from the society have worked on the huts for the Antarctic Division, Department of Scientific and Industrial Research, which is responsible for their maintenance and preservation. This was the seventh season in which members of the society worked on the huts project. No caretakers went south in the 1975-76 season because of lack of air transport.

As in past seasons the two caretakers, Messrs D.L. Harrowfield and C.C. Buckley, of the Canterbury branch, spent much of their stay between December 12 and January 13 removing accumulated snow and ice from the interior of the huts, and doing necessary repairs and maintenance. The most important part of their programme was the compilation of an inventory of historic relics in and about the huts and in the immediate vicinity for the National Antarctic Centre, Canterbury Museum. This was done by Mr Harrowfield, who is curator of the centre.

ICE REMOVAL

Associated with the inventory of relics at Cape Evans was the formidable task (largely undertaken by Mr Buckley) of removing more than 100 cubic metres of ice from the stores annexed of food cases built by Bowers when Scott's men settled into their hut in 1911. In the course of this work more

historic material was uncovered, some items previously known, and others left there by Shackleton's Ross Sea Party in 1917. From a picture sent by Mr Harrowfield, the last survivor of the Ross Sea Party, Mr R.W. Richards, was able to identify a canvas tent with a curved metal frame as the new tent brought south in the Aurora and used on the first depot laying journey by Mackintosh's team early in 1915.

After travelling from Scott Base to Cape Royds by dog team the caretakers began their work on Shackleton's hut, which had sustained no exterior damage since the previous summer. Small areas of snow and ice were removed from the interior, and ice was also removed from parts of the stables and latrine. All stores (which had collapsed) were removed from Douglas Mawson's laboratory which was then cleaned, and sealed where necessary. Badly rusted and leaking cans were removed, and the others were replaced in separate stacks.

Although a comparatively small quantity of relics remains at Cape Royds, the recording of material inside and outside the hut, and in the immediate vicinity (supply dumps etc) took 25 hours. It was discovered that metal objects outside were corroding because of salt transported in wind-blown snow off the sea ice, leather items, including a set of pony harness, were cracking badly because of the dry

atmosphere, and paper (books, periodicals, newspapers, manuscripts, and labels on provisions), was suffering from handling, dust, and dampness.

CAR SKIS

Several wooden items retrieved from Pony Lake in December, 1974, were also found to be deteriorating. The skis from Shackleton's Arrol-Johnston car, extracted with considerably difficulty from ice on the garage floor, were distorted and badly split. A collection of wooden blocks (stored in the hut) belonging to a wheel of the car, were found to be extremely damp and covered with ice crystals and algae. The skis and blocks were dried as well as possible and placed in the hut.

When the caretakers examined the hut they discovered dampness up to one metre above ground level on both the north and south sides. It appeared to have been caused by capillary action of moisture within the timber as a result of an accumulation of ice along the north side in the sides, and the south side behind the stores. Apart from this, the timber was sound in the main, except for some splitting on the north-west end, and surface weathering.

In the course of the inventory stores outside the hut and in the immediate vicinity were inspected. Few were in good condition, and identification was difficult, particularly in the depots at Derrick Point and Arrival Bay. At the south-west corner a number of venesta (plywood cases were carefully removed, and 40 intact jars of Marmozet salt and 37 packets of candles, were transferred to the hut. The candle packets were in bad condition because of the damp. They were removed to the hut.

Then the stores were reconstructed with the empty cases being filled with rocks, and damaged jars being placed in positions where bottles had been exposed. Rocks were placed at the corner to prevent further damage by erosion. Several items of historic interest were collected from the old rubbish dump and placed in the hut.

These included a woollen glove, an iron hut bracket, pipes for the ice auger, one .32 calibre cartridge, the damaged cup from a Munro anemometer, a soda syphon cartridge, and a Price's lubricant tin punctured by bullet holes.

ICE REMOVED

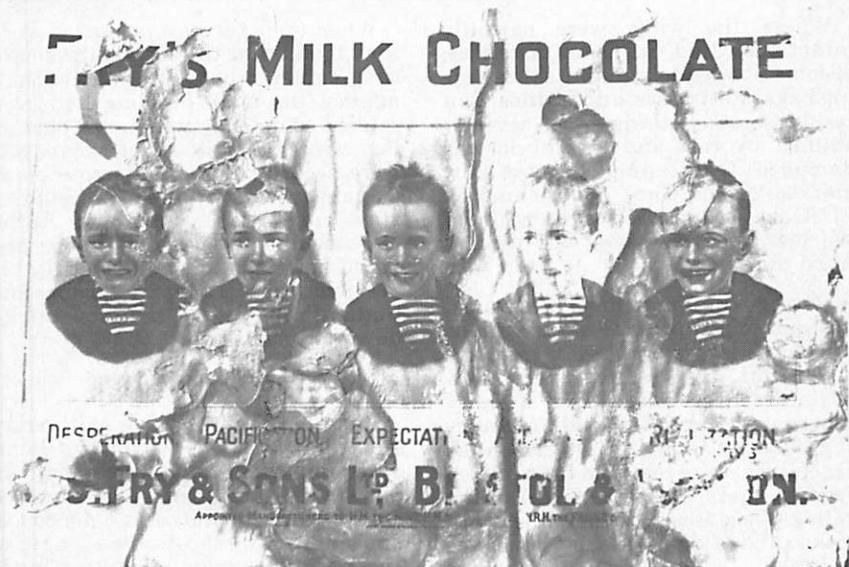
After restoration and maintenance work at Cape Evans, which included the removal of snow from the stable roof, and the entrance porch of the hut, the major tasks of removing the ice from the stores annexe, and recording the large amount of material uncovered, occupied most of the time spent at Scott's hut. Some of the ice apparently had accumulated in the annexe since the original restoration of the hut in 1960-61. The annexe was never completely cleared of ice at that time.

To make the inventory, and complete photography took Mr Harrowfield more than 50 hours, and he spent two full days in the physicists' section and Ponting's dark room. As a result of random checks, the error of items missed inside the hut was estimated to be less than one per cent. Unfortunately some material known to exist in the immediate vicinity outside (e.g. a second anchor from the Aurora) could not be located because of heavy snow accumulation from last winter.

In the summer of 1916-17 the Ross Sea party made preparations for a third winter on Ross Island. Evidence of their stocking of food and fuel was found among the relics recovered from the annexe — a venesta case containing Adelie penguin eggs packed in pony fodder, and several slabs of seal blubber 30 to 50 centimetres deep. The details appear in "The South Polar Trail", by Ernest Joyce, who took charge of the party after the death of Mackintosh.

EGGS FOR WINTER

Late in September, 1916, Joyce went to the Adelie penguin rookery at Cape Royds with Wild and Gaze. They lived in Shackleton's hut, and towards the



A J.S. Fry and Sons poster badly affected by the damp in Scott's hut at Cape Evans. In "Scott's Last Expedition" Teddy Evans lists Fry and Sons as one of the great English firms which supplied the expedition. "Messrs J.S. Fry and Sons supplied our cocoa, sledging and fancy chocolate — delicious comforts, excellently packed and always in good condition."

Photo by D.L. Harrowfield

end of October, when the birds started to lay, collected about 2400 eggs for their winter supply. Joyce remained at Cape Royds until December to make a collection of Adelie and Emperor penguins, skuas, petrels, and seals, but Gaze and Wild returned many weeks ahead of him. When he arrived at Cape Evans he found that all the party except Richards, who was ill, had been sealing and had stocked a huge supply for food and fuel.

Two other venesta cases held food for dogs and men, probably of Scott's expedition. One contained Spratt's cod liver oil dog cakes, the other tins of Moir's roast veal and McDoddie's dried vegetables. Other items included a tin of Huntley and Palmer's biscuits, the frame of the bicycle ridden by one of Scott's geologists, Griffith Taylor, with his name carved in the leather saddle, a bundle of new Universal pick heads, two linen ration bags, four grey woollen socks, and a Burberry over

boot.

Many of these items showed signs of deterioration, but another major matter of concern was dampness within the hut, possibly brought about by a change of climate within the structure since removal of ice in 1960-61. This dampness was especially evident along the southern wall where ice was present along much of the wall up to one metre above the floor. Outside snow accumulation was level with the eave — most of the stores annexe was concealed.

EFFECTS OF DAMP

On the north side the dampness was attributed by the caretakers to an accumulation of ice in the stables. As a result of the dampness bed wires on bunks along the south wall had rusted almost entirely away. This was probably caused initially by the accumulation of ice (before excavation) on the bunks causing the wires to collapse.

Where the wires were partially intact they had, in some instances, become bonded to reindeer skin sleeping bags, mattresses, and textiles. As a result some clothing was severely stained by rust and the fabric was damaged. One example was a shirt marked "Owen Gaze", left behind by I.O. Gaze, of the Ross Sea Party, one of the last two survivors, who died in April this year.

During the inventory a detailed examination was made of the various structures and stores away from the main hut. A disintegrating New Zealand cheese case from a dairy company in Geraldine, and a quantity of provisions, including Dutch canned vegetables, were removed from broken venesta cases and transferred to the galley. The cases were then filled with rocks and tidied up as much as possible.

GROUND UNDERMINED

In their report the 1976-77 caretakers, Messrs A.W. Burton and J. Sutton-Pratt, expressed concern for the state of the ground surface immediately in front of the latrines, which was being undermined by the movement of visitors on the scoria slope as they circled the hut. Messrs Harrowfield and Buckley also photographed and examined the area. They found that the top of the slope was firm 30cm below the surface, but considerably disturbance was being caused by many visitors (30 called in one day) walking about the spot. The caretakers agreed with their predecessors' suggestion that about 50 bags (synthetic fabric) of gravel should be placed on the slope, and visitors should be advised to keep clear of the area.

Like their predecessors and previous caretakers, Messrs Harrowfield and Buckley found that the condition of the stables was not good. In the 1976-77 season all seven stables were filled with the snow and ice of two winters, but Messrs Burton and Sutton-Pratt managed to remove nearly half of the ice.

When their successors started work they found that the area at the south-east corner where the stables butt against the main building had been refilled completely with snow during last winter. Two hours of excavation were needed before it was possible to examine the record the small blubber stove on which Oates and Anton Omelchenko, the Russian groom, prepared hot mash for the ponies. In the previous season Messrs Burton and Sutton-Pratt cleared the stove of ice down to its base.

DISCOVERY HUT

Last on the caretaker's itinerary was the Discovery hut on Hut Point where only four days were spent. All snow and ice deposits were removed from within the hut, and a deposit of snow extending most of the length of the northern verandah from floor to ceiling was removed with willing assistance from Peter de Jong, the Scout Association representative who worked at Scott Base last season. Because of their heavy programme the caretakers were unable to attend to the false ceiling in the hut, which is in bad condition and needs urgent attention.

Signs of deterioration in the historic material were also observed during the inventory at Hut Point. Although many parties have occupied the building between 1902 and 1917, little material remains. But the temporary removal of selected items for proper preservation is also necessary. Before they completed their work on January 11 the caretakers inspected the memorial cross to George Vince, the seaman who died at the beginning of Scott's first expedition, and the better known cross erected on Observation Hill in memory of Scott and his companions on the South Pole journey. Vince's cross is in good condition although slightly loose in the ground, and the timber, which has been weathered mostly on the southern side, is in excellent condition considering that it is 76 years old.

There is nothing wrong with the Australian jarrah timber of the cross

on Observation Hill which has been there since 1913. But four of the bronze bolts which hold together the vertical components of the cross are missing — three from the north side and one from the south. As a result a gap has opened between the laminations.

A plaque with inscriptions in four languages — English, French, Russian, and Spanish — is wired to the base of the cross. The caretakers suggest it could be better sited on sound flat rock nearby. Two broken screws on the English plate need replacing because someone has tried to remove it.

As a result of their work on the three huts Messrs Harrowfield and Buckley recommend that urgent consideration should be given to the temporary removal to New Zealand of certain deteriorating relics for conservation to ensure their survival. They believe it would be preferable if facsimiles only of manuscripts were returned to the hut at Cape Royds.

STABLE AREA

Ice should be removed as soon as possible from the stable area at Cape Royds, particularly along the north wall of the hut. The caretakers say that excavation would not cause collapse of supply cases as they are firmly frozen to the ground. They suggest also that a notice should be prominently displayed in the porch of the hut advising visitors not to handle any relics.

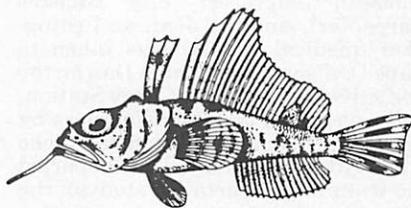
To eliminate dampness in the hut at Cape Evans it is recommended that all snow and ice needs to be removed from the south wall and the stable area. Until this is done, gradual deterioration of the building, and rapid deterioration of material inside, will take place. Snow will always tend to accumulate along the south wall, but the problem can be controlled in the stables area. After excavation the stables could be sealed in the manner outlined by Messrs Burton and Sutton-Pratt.

As at Cape Royds a notice should be

displayed in the porch of the hut advising visitors not to handle the relics. Also, after bags of gravel are placed on the slope in front of the latrines, visitors should be encouraged to keep clear of the area, although this will be hard to do.

Sections of the floor in the hut at Hut Point need replacement, particularly in the room at the south-west corner where two mutton carcasses are stored. The false ceiling also should be repaired.

Although Vince's cross is deteriorating only gradually, the caretakers suggest it should be taken down temporarily and treated with an epoxy compound containing a polyamine hardener. This would not harm the timber, and would not only emphasise the lettering of the inscription, but also protect the engraving from further weathering.



Busy snow toads

Snow toads, blamed by American pilots for everything that went wrong during the early years of Antarctic operations, were busy in the March issue of "Antarctic". They removed the map to the back page of the cover, and put two pages in the wrong order.

Worst of all was the picture caption on Page 149, which put the Ross Ice Shelf Project drill camp 6444km south-east of McMurdo Station. We missed the extra figure added by a snow toad. In future we will try to keep the snow toads and the errors from creeping in.

FUTURE OF MAWSON'S HUT

Sir Douglas Mawson's historic hut at Cape Denison, Commonwealth Bay, may be restored at its present site where it has resisted the elements for more than 65 years. There have been moves in Australia to have the hut dismantled, brought back, and placed in an Antarctic museum.

No decision on the future of the hut will be made, however, until the Minister of Science (Senator James Webster) has studied a report by an Antarctic Division team which spent six weeks at Cape Denison last summer to evaluate the structural soundness of the hut, and study the feasibility of its restoration. The team found the hut was almost full of ice, and the roof and other sections had deteriorated.

Led by Mr Rod ledingham, who is a geologist, the team, Messrs Guy Macklan (engineer), Ray Brookes (carpenter), and Dr Jeannie Ledingham (medical officer) was taken to Cape Denison by the Thala Dan on the annual relief voyage to Casey Station, and was picked up late in February by the last French expedition to Adelie land. After the Thala Dan departed the team made a detailed study of the area around the hut.

Several weeks were spent removing some of the ice from the interior of the hut so that an inspection could be made. Artefacts found inside included magazines and newspapers dated 1912, cans of mustard, sauce, jam, and other foods, and chemicals used for scientific studies by members of Mawson's expedition.

SLEDGE ON LOAN

Senator Don Devitt, one of the few Australian politicians to have visited the Antarctic, believes that the hut will collapse within two years unless major restoration is carried out. He is one of the chief advocates for restoring the hut and leaving it where it stands.

When the Thala Dan called at Cape Denison Senator Devitt went ashore and visited the hut. He saw embedded in the ice which almost filled it tins, boxes, sledges, a deck chair, ice axes, and a cake tin.

Meanwhile, the half sledge which Mawson dragged alone across the ice for 170km after the deaths of his companions, Ninnis and Mertz, in 1912, has come back to Australia — on loan. Since 1920 the sledge has been held in storage by the Royal Geographical Society.

Mawson gave the sledge to the society in recognition of the help he received with his 1911-14 expedition. After long negotiations the society has agreed to lend the sledge. It will be placed in an Antarctic exhibition at the Adelaide Museum.

Adelie chicks

Sixty Adelie penguin chicks were hatched at the Hubbs-Sea World Research Institute in San Diego, California, late last year. Dr Frank S. Todd, curator of birds and senior research associate at the institute, plans to put the Adelies on public display behind glass, but not until 1980 at least.

Dr Todd says it is the first time any substantial number of Adelies has been hatched away from Antarctica. Their parents were among 95 Adelies collected in the McMurdo Sound area and flown to California in November, 1976. Another 80 Adelies were brought back last year for behavioural and biological studies.

SUB-ANTARCTIC

Biological expedition to Macquarie Island

By
Donald S. Horning

Marine and terrestrial studies were conducted at Macquarie Island during the 1977-78 summer season by four scientists sponsored by the Australian Museum, assisted by the Australian Antarctic Division. They made the most extensive marine biology survey at the island since Mawson's Australasian Antarctic Expedition, 1911-14.

Highlights of the expedition included an extensive diving programme to survey the intertidal and shallow subtidal flora and fauna, and also the collection of microscopic invertebrates from terrestrial plants. The four scientists and their interests were: Dr Jim Lowry, marine biology (Australian Museum) who was the co-ordinator; Dr Gary Poore, marine biology (National Museum of Victoria); Mr Rob Ricker, botany (University of Melbourne); and myself, marine biology and terrestrial ecology (Salem, Oregon). Reference: "Antarctic", March, 1978, Page 146).

We arrived at Macquarie Island on November 15 aboard the Danish ship *Nella Dan* and spent a day steaming along the east coast because of unsuitable landing conditions. It took several days to unload equipment and to become familiar with the facilities of the island before the diving programme was underway.

Conditions for diving at Macquarie Island were very good, considering the location of the island. The sea temperature ranged between 4 and 7° C, and water visibility was more than 3m and often up to 20m. Dives were made from rocky shores, sand and gravel beaches, and offshore from a 4m rubber dinghy. The surge was bothersome, even down to 2m depth, when collecting delicate specimens, but it was not too much of a handicap. Only 10 days were lost to diving because of poor sea conditions.

Fine weather allowed us to complete

more than half of our 84 man dives before Christmas. Our first efforts were centred on collecting at the extreme north end of the island around Wireless Hill and the A.N.A.R.E. station because of the diverse habitats and relative ease of getting equipment to the dive sites. After Christmas, the team worked from huts located southward on the island. This necessitated carrying 350 to 500 kg of diving equipment, an air compressor, spare diving tanks, personal gear, and specimens distances of more than 35km. Fortunately we were ably assisted by willing station staff.

Our first dive site on the southern trip was on the west coast at Bauer Bay. Unfortunately, strong westerly seas limited us to intertidal and shallow subtidal collections. However, gear was carried to Sandy Bay, on the east coast, daily and these efforts resulted in several productive dives.

Royal penguins accompanied us on every dive here, even down to 15m depth.

Later, during foul weather conditions, we moved the diving operations to Green Gorge, midway down the east side of the island. The weather co-operated and many fine collections were taken near this site. Diving amongst the *Macrocystis* algae beds and in heavy surge proved to be most interesting. The weather was once again particularly bad when we moved to the southwest end of the island at Caroline Cove. Equipment was taken from Green Gorge for only two divers because of the limited time left and the tremendous effort required to transport the gear.

Dr Horning, formerly a visiting research associate in the zoology department of the University of Canterbury, spent seven years in New Zealand. In that time he took part in two university expeditions to the Ross Dependency, and made five expeditions to New Zealand's sub-Antarctic islands, four to the Snares Islands, and one to the Auckland Islands.

Diving conditions were good during the latter part of the southern trip because of the more uncommon easterly winds and seas which prevailed while we were at Caroline Cove. Six dives were accomplished in the cove, and the species of algae and animals were found there that had not been seen on other dives. During this time, intertidal collections were taken from Hurd Point, on the southeast corner of the island, thus completing the island marine survey. Gear was again moved back to Green Gorge during snow, sleet, rain, wind, and fog, and finally the equipment and collections were labouriously backpacked to the A.N.A.R.E. station.

This was the most extensive marine biology survey at Macquarie Island since Mawson's Australasian Antarctic Expedition, 1911-1914. Because the emphasis was directed toward the subtidal zone during the 1977-1978

expedition, many newly recorded species of algae and invertebrates were discovered. Large series of bottom dwelling fish were taken that previously had been represented by only a few specimens.

Brittle stars had previously been unknown here but we obtained specimens from the north and south ends of the island. Additional species of sea slugs and sea spiders will be added to the faunal list after they are identified by Australian and New Zealand scientists. Large collections of tunicates, bryozoans, hydroids, and sponges also will add many species to those already known from Macquarie Island.

Amphipods and isopods were of particular interest to Drs Lowry and Poore. Many species were taken from rocky subtidal habitats. However, we did not have access to fine sand or mud bottoms, where many more species occur. These "soft bottoms" are not available near the shores of Macquarie Island, nor in depths that are suitable for scuba diving.

The marine algae collections were particularly extensive, and again, many newly recorded species were found. They were collected on different substrates down to 20m depth. Collection information recorded included data on substrate type, light conditions, degree of wave exposure, associated algae species, and water quality. The results gained from the study of these algae collections will form the basis of a M.Sc. thesis for Mr Ricker.

One interesting discovery was the *Durvillea*, or bull kelp, lives down to a depth of at least 15m at Macquarie Island. This plant generally has been considered to be an intertidal zone alga in other Southern Hemisphere areas.

The terrestrial ecology programme was of particular interest to me. However, because of unexpected commitments to the marine biology programme, some projects had to be cur-

tailed. Terrestrial invertebrate collections were generally limited to short trips to specific localities, or en route to the diving sites.

The main emphasis of the programme was a survey of the microscopic invertebrates, especially tardigrades or water bears. Marine invertebrates that may serve as hosts for tardigrades and interstitial samples from ocean beaches and lakes on the plateau were sampled. Ecological information was taken to help better understand the biology of these minute invertebrates at Macquarie Island.

More than 200 samples of mosses, lichens, and flowering plants were collected during the summer. This project is a continuation of similar studies in New Zealand and its off-lying and sub-Antarctic islands, and the Ross Dependency. Though only

one species of tardigrade had previously been known from Macquarie Island, more than 15 species will be added to the faunal list based on the 1977-1978 expedition collections. A most interesting group, *Echiniscus*, that is poorly represented from other sub-antarctic islands and Antarctica, is abundant at Macquarie Island.

The 1977-1978 expedition was a great success because of the fine cooperation from the Australian Antarctic Division, especially the A.N.A.R.E. station staff. Results from the various studies will help fill important gaps in the distribution of algae and invertebrates, and will provide additional information for biogeographers in relating Macquarie Island marine flora and fauna to that of other sub-antarctic areas as well as to the Antarctic continent.

BACK TO BALLOONS OVER ICE

A New Zealand balloonist, Squadron Leader Roland Parsons, Royal New Zealand Air Force, plans to make three flights over Antarctica in a hot air balloon. The first would be from Scott Base to the Royal Society Range, the second a re-enactment of the first Antarctic balloon ascent by Scott on February 4, 1902, and third would trace the final routes of Scott and Amundsen over the Polar Plateau to the South Pole.

Squadron Leader Parsons has set no date for the flights as his project depends on sponsorship. He needs about \$26,000, and will not start planning until sponsorship has been agreed upon. Since 1974 he has made several pioneer flights in New Zealand — the first crossing of the Southern Alps (1974), the first crossing of Cook Strait (1975), and the first flight over Mt Cook (3763m) in 1976.

To imitate Antarctica's first aeronaut Squadron Leader Parsons does not intend to go to Balloon Inlet, the little bight in the Ross Ice Shelf where

Scott ascended in a captive observation balloon. The inlet no longer exists so the ascent will be re-enacted by a flight of about 213m over Hut Point.

Scott used the balloon — named *Eva*, and the gift of an enthusiastic lady supporter of the expedition — for Antarctic reconnaissance at the suggestion of Sir Joseph Hooker, who had been with Ross in 1839-43. But only two ascents were made. On the first the balloon with Scott in the basket rose to 152m, and then shot up like a rocket when the observer hurled out all the sandbags. It was checked at just under 243m by the heavy wire rope tethering it to the ice.

Shackleton became Antarctica's first aerial photographer when he ascended to 243m with a camera and took some good photographs. But that was *Eva's* last ascent. Other members of the expedition were promised ascents in the afternoon, but the balloon was found to be leaking badly. It was deflated, packed away in the *Discovery*, and never used again.

TOURISM

More Antarctic cruises planned next season

After a lapse of five years the Antarctic cruise ship Lindblad Explorer will make another visit to the Ross Dependency early next year. The cruise, one of three to the Antarctic next summer, is described as a circumnavigation of Antarctic from Argentina to New Zealand, but it will begin at Ushaia, Tierra del Fuego, and end at Lyttelton after calls at Australian and New Zealand sub-Antarctic islands.

In the 1973-74 season the Lindblad Explorer sailed south from Bluff, calling at the Auckland Islands, Campbell Island, and Macquarie Island before proceeding to Robertson Bay and anchoring off Cape Adare. After steaming through heavy ice to Cape Hallett, and then to Cape Bird, Ross Island, the ship spent three days at Cape Royds. She was unable to reach Winter Quarters Bay, but the tourists were able to visit the historic huts at Cape Royds and Cape Evans, and meet New Zealanders who had travelled from Scott Base by dog sledge and tracked vehicle. From McMurdo Sound the cruise continued to the Antarctic Peninsula where the tourists visited British, Argentinean, Soviet and Chilean bases.

Next season the Lindblad Explorer will sail first from Ushaia, the most southern city in the world, on January 14 to the Falkland Islands (Islas Malvinas) and call at West Point, Carcase, and New Islands. Her scientific staff will be led by Sir Peter Scott, and will include Dr Nigel Wace, of the Australian National University, Canberra, and an Australian naturalist, Mr Michael McDowell. Dr Wace is the author, with Dr Martin Holdgate, of a study of the Tristan da Cunha-Gough Island group. He went to Gough Island in the South African supply ship RSA in October, 1976, worked his way north in fishing vessels to Nightingale and

Inaccessible Islands, and Tristan da Cunha where he joined the Lindblad Explorer for her Antarctic cruise.

During January the Lindblad Explorer will make calls at Hope Bay, site of the Argentine Army base, Esperanza, and King George Island where there are Soviet, Polish, and Chilean bases — Bellingshausen, Arctowski, and Presidente Eduard Frei. After a call at the old whaling station in Port Lockroy, Wiencke Island, the ship will proceed to the United States Palmer Station on Anvers Island. Her last call in the Antarctic Peninsula area will be at Paradise Bay where there is an Argentine station, Almirante Brown. She will sail from there on January 29.

In the first week of February the Lindblad Explorer will sail round the coast of West Antarctica and into the Ross Sea. She will arrive in McMurdo Sound on February 6, and the tourists will visit Scott Base the next day. They will also visit the historic huts at Cape Evans and Cape Royds on February 8.

From McMurdo Sound the ship will sail north to Cape Hallett where, subject to ice conditions, a landing will be made at the joint United States-New Zealand station in Moubray Bay, which has been closed for several years. Another landing will be made at Cape Adare if ice conditions are favourable.

Depending on the weather landings will be made on some of the Balleny Islands, which straddle the Antarctic Circle. There have been few landings in the last 137 years. The most recent were by members of the Oceanic Research Foundation's expedition led by Dr David Lewis in January this year.

From the Ballenys the Lindblad Explorer will sail to Macquarie Island

where the tourists will remain for two days. The ship will arrive at Campbell Island on February 18, and the next day the tourists will go ashore on Enderby Island, one of the Auckland Islands. On February 22 the ship will arrive at Lyttelton.

On February 25 the Lindblad Explorer will sail for Picton. After calls at Golden Bay, Kapiti Island, and New Plymouth, she will leave for Norfolk Island on the first leg of a Pacific cruise.

Because Campbell Island and the Auckland Islands are flora and fauna reserves a wildlife ranger for the Lands and Survey Department will accompany the tourists on their visits. The ranger will be Mr B.N. Norris, of Christchurch, who was on the Lindblad Explorer's last sub-Antarctic and Antarctic cruise from New Zealand in 1973-74. Mr Norris will join the ship at McMurdo Station, and will escort the tourists on their visits to the historic huts on behalf of the Antarctic Division, Department of Scientific and Industrial Research.

When the ship calls at Cape Adare Mr Norris hopes to be able to mark the grave of Nicolai Hanson, zoologist with Borchgrevink's Southern Cross Expedition in 1899, who was the first man to be buried on the continent. The grave, high on Cape Adare, is one of the historic places in Antarctica for which New Zealand is responsible under the Antarctic Treaty.

Four bronze plaques provided by the Antarctic Division were erected outside Borchgrevink's hut on Ridley Beach when the Lindblad Explorer last called. These outline the history of the building in English, French, Spanish, and Russian. Similar plaques were provided for Hanson's grave, but Mr Norris and Mr Keith Shackleton, a member of the ship's scientific staff, did not have sufficient time to place them in position. The plaques were left on Ridley Beach when the Lindblad Explorer sailed.

Next summer there may be cruises

from Australia to Cape Adare and the sub-Antarctic islands. The promoter is Mr Dick Smith, owner of an electronics firm in Sydney, who arranged the first charters with Qantas for day trips to Antarctica. He hopes to offer a cruise of three weeks for about \$1450.

Mr Smith's cruises would include visits to Stewart Island, Macquarie Island, the Auckland Islands, and Cape Adare. He is negotiating to charter the cruise ship Marco Polo for the first cruise early in 1979. Passengers would go ashore from the ship in inflatable rubber boats.

Climbers lost at sea

After a full-scale air and sea search of Smith Island in the South Shetlands by H.M.S. Endurance, the Royal Navy's Antarctic ice patrol ship, eight members of a privately-financed British climbing expedition are believed to have been lost at sea. There has been no news of the expedition since it sailed from Rio de Janeiro for the Falkland Islands (Islas Malvinas) on November 1 last ("Antarctic," March, 1978).

Late in February the expedition's ship En Avant, a 35-year-old converted Dutch tug, was reported overdue on the voyage to Smith Island where the climbers planned ascents of three peaks. Among those on board was Major H.W. Tilman, the noted British mountaineer, navigator, and writer, who led the 1938 Everest expedition.

When the Endurance made her search of Smith Island particular attention was paid to Cape Smith, the northern extremity of the island, where the seaward approached are marked by consistently rough water. An independent search was also made recently by the Argentine Navy. A ship visited Deception Island, 67km westward of Smith Island, which the expedition leader, Simon Richardson, had planned to visit.

THE READER WRITES

Sidelights of Antarctic Research

Sir, — The huts which Scott and Shackleton built on Ross Island have been there long enough to be the subject of legends. One which has almost achieved historical respectability in the last 20 years is that the huts were left to the mercy of the blizzards for 30 years, and the penguins saw no human visitors until 1947 and 1948.

Visits by American in 1947 and 1948 are not legends. They were reported, and there is photographic evidence of them. But the legend of who came after Scott and Shackleton's men does not agree with the facts. There were men in McMurdo Sound earlier than 1947.

On January 17, 1917, the *Aurora* sailed for New Zealand with the survivors of Shackleton's Ross Sea Party, and, according to the legend, men did not return until late February, 1947. The icebreaker *Burton Island* entered McMurdo Sound and reached Cape Evans. A small boat party went ashore on February 20 and examined Scott's hut, and in the afternoon two visits were made by helicopter to the old Discovery hut on Hut Point.

Then, in 1948, men of the United States Navy visited the old huts again, this time by helicopter from the icebreaker *Edisto*. Two photographers went to the hut at Cape Royds on January 29.

But the penguins and the seals had visitors only seven years after the departure of the *Aurora*. In the 1923—24 whaling season the Sir James Clark Ross, accompanied by five chasers, operated in the Ross Sea, using Discovery Inlet as a base.

On January 29, 1924, the chaser, *Star I* (Captain Alf Kaldager) entered McMurdo Sound as far as Cape Royds. She then followed the coast of Victoria Land to Cape Adare.

How long did the Norwegians stay

in McMurdo Sound? Did they visit Shackleton's hut? And did Captain Kaldager ever make a report on his visit? The answers to these questions might be hidden away in old whaling records. They might give us something more substantial than a legend.

Yours etc.
"JAMES PIGG"

Rescue after 73 days

A 36-year-old Italian yachtsman, Ambrogio Fogar, who planned to circumnavigate Antarctica in his 11m sloop *Spirit of Surprise*, and winter at McMurdo Station, was rescued on April 2 from a life-raft after drifting for 73 days in the Atlantic. His yacht sank on January 19 off the Falkland Islands (Islas Malvinas) after a collision with a school of whales.

With Mr Fogar on the raft was Mario Mancini, a 50-year-old journalist from "La Nazione", Florence. He died on April 5 as a result of his privations after the two men had been picked up by the Greek freighter *Master Stefanos* 1120km east of Buenos Aires. The ship, bound for Cape Town, diverted to Montevideo so Mr Mancini could receive treatment, but he died before she reached port.

Short-wave radio operators in Italy and Chile lost contact with the *Spirit of Surprise* late in January. She sailed south from Mar del Plata on January 6. When the yacht sank Messrs Fogar and Mancini boarded the life-raft, which then drifted 2000km with the north-east Falklands Current.

A search for the yacht was launched by the Argentine Navy. It was abandoned on March 26 after ships and aircraft had covered more than one million square kilometres of ocean in six weeks.

OBITUARY

"Jimmy" Gaze, Ross Sea Party survivor

One of the last two survivors of probably the most tragic and least known episode in Antarctic history died near Melbourne on April 22 after a long illness. He was 88-year-old Irvine Owen Gaze, one of 10 men in the Ross Sea Party of Shackleton's Imperial Trans-Antarctic Expedition (1914-17), who were marooned without warning on Ross Island for 20 months, and endured two bitter Antarctic winters without fresh stores, fuel or changes of clothing.

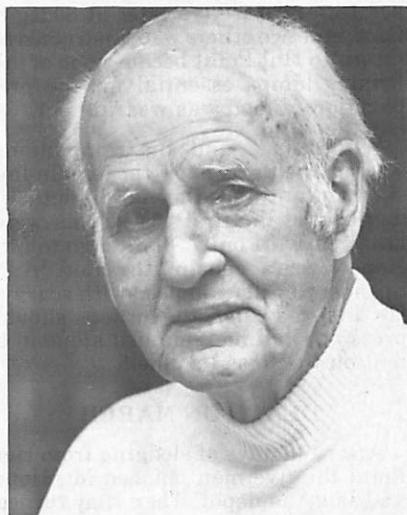
When the *Aurora* brought the seven survivors of the party back to New Zealand early in 1917 the First World War had been in progress for more than two years. A world concerned with battles, mounting casualties, shipping losses, and air raids, had paused to applaud Shackleton's perilous boat journey across stormy seas to South Georgia, and the rescue of his men from Elephant Island. But there was only passing recognition of the heroism and devotion to duty of the men who made one of the most notable polar journeys in history.

There are few written records of the fortunes and misfortunes of the Ross Sea Party. Shackleton outlined the tragic sequence of events in "South", but the desperate efforts of the Ross Sea Party to lay the food depots they believed would be vital to their leader's crossing of the continent took a minor place beside the exciting story of the main party in the Imperial Trans-Antarctic Expedition.

When Shackleton planned his Imperial Trans-Antarctic Expedition the purpose was to make a trans-continental journey from the Weddell Sea to the Ross Sea, a distance of about 2896km. The task of the Ross Sea Party was to proceed in the *Aurora* to McMurdo Sound, and then lay food and fuel depots every 96km as far south as the Beardmore Glacier at 83deg 37min S. It was expected that the party would meet Shackleton and

his crossing team coming from the other side of the continent.

But the plan failed because on January 19, 1915, the *Endurance* was caught in the ice of the Weddell Sea. By a tragic coincidence the *Aurora*, which was being prepared for wintering in McMurdo Sound, was blown out to sea on the night of May 6-7, 1915, trapped in the pack ice, and then drifted helplessly for nearly a year. She broke free on February 12, 1916, but did not reach Port Chalmers until April 3.



Back at Cape Evans "Jimmy" Gaze and his companions were cut off from the world, and knew nothing of the

fate of either ship. But nothing stopped them from completing their allotted task, although it cost the lives of three men. The depots were laid by man-hauling heavily-laden sledges, and the men, living on short rations, faced blizzards, appalling snow and ice conditions, and temperatures of 60deg below zero. All, in the final stages, suffered severely from scurvy, frostbite, and snowblindness.

FIRST JOURNEYS

To lay the depots as planned involved a series of sledging journeys. The first was in the autumn of 1915 during which depots were established at Minna Bluff and at 80deg S. Then came the spring journeys of 1915-16 to reinforce the Bluff depot with stores to be carried southward on the third and greatest journey in 1916 to lay depots at 81deg, 82deg, and on Mt. Hope at the foot of the Beardmore Glacier (83deg 33min S).

"Jimmy" Gaze was one of nine men who set out from Hut Point in the summer of 1916 with four dogs and two sledges on the third and greatest of the sledging journeys. They left on December 13, and 24 days later at 80deg S Gaze and two others were instructed to return to Hut Point because one of the Primus lamps essential for the preparation of food was wearing out.

While Gaze and his companions were on their way back, the remaining six men continued the march south. In due course the first two depots were laid, but with only 48km to go to Mt. Hope Gaze's cousin, the Rev. A.P. Spencer-Smith, collapsed with scurvy. He insisted that the others should press on, and he remained alone in a tent on the Ross Ice Shelf.

DEATH ON MARCH

After 148 days of sledging from Hut Point the five men reached Mt. Hope and laid the depot. Then they turned northward and began the dreadful march to Hut Point, which was 595km away. Six days later they picked up Spencer-Smith, and struggled on.

Spencer-Smith died on March 9, 1916, having been drawn on the sledge by his friends for some 480km. The party was then 32km short of Hut Point and safety.

Joyce, the tough and experienced veteran of the Discovery and Nimrod expeditions, Richards, and Ernest Wild, struggled on with the scurvy-stricken Mackintosh and V.G. Hayward, and reached the safety of Hut Point on March 18. The two sick men recovered, but after two months of spartan living at Hut Point they disappeared on May 8 when they attempted to reach Cape Evans over the still insecure sea ice.

Although Gaze did not participate in the last stages of the third sledge journey, he shared in all the others, and was highly regarded as a sledger by Joyce, who took him on the first of the autumn journeys. In "The South Polar Trail" Joyce notes in his log of the journey from Hut Point to Minna Bluff: "Gaze and Jack have settled down to sledging conditions, and they are two splendid mates and an excellent sample of Australians".

THREE AUSTRALIANS

Gaze joined the Ross Sea Party in December, 1914, when the Aurora was in dock at Sydney for overhaul. He was then 24, and was one of three young Australians added to the shore party; the others were Richards and A.K. Jack. Gaze, who joined the expedition at Spencer-Smith's suggestion, was engaged as a general assistant but became commissariat officer in charge of the food supplies.

When the Aurora reached McMurdo Sound and anchored off Cape Evans on January 16, 1915, Gaze had his first experience of the dangers of travelling on sea ice. He was with a party which made a night trip over the sea ice to Hut Point on January 18. The ice was cracked and ready to go out, Gaze and two others went through it into the water, and arrived at the Discovery hut in the early hours of January 19 practically frozen. A blizzard confined

the party to the hut until January 21 when the six men returned to the ship.

Because Shackleton wanted a depot laid at 80deg S in case he was able to make the crossing as soon as he reached the Weddell Sea, two parties, each with a heavily-loaded sledge and nine dogs, headed south towards the end of January. First away were Joyce and the two Australians, Gaze and Jack. They arrived off Minna Bluff on February 9, and were joined by Mackintosh, Wild, and Spencer-Smith on February 11. Five dogs died on the way, being used too early for heavy sledging after their sea voyage.

AURORA'S STORY

Mackintosh, Joyce and Wild pushed on from Minna Bluff with the nine stronger dogs, and Gaze, Spencer-Smith and Jack were sent back with the four poorest dogs. Gaze's party reached Hut Point safely on February 22, and it was decided that he and Spencer-Smith should return to the Aurora with the four dogs. But they were held up at Hut Point until collected by the ship on March 11.

What happened to the Aurora while six men were sledging or stranded in the Discovery hut can be summarised. After strenuous efforts to find shelter from tearing winds and frequent blizzards in McMurdo Sound where the ice from Hut Point to Cape Evans was constantly moving, J.R. Stenhouse, who had taken over command of the Aurora, finally moored the ship for the winter off Cape Evans on March 14. A.O. Stevens, chief scientist, Spencer-Smith, Richards, and Gaze, were landed, and took up their quarters in Scott's hut to make routine observations.

In spite of a blizzard from April 10 to 12 which caused two of the stern hawsers to part the Aurora remained firmly secured. But on the night of May 6-7 the worst happened. The Aurora, locked in the pack ice, broke away from her moorings and was driven northward in a raging three-day blizzard.

Four men were left in the hut at Cape Evans, knowing that they might well be marooned for two years. They had food left behind by Scott's last expedition, but no fuel, and only the clothing they were wearing. Of greater concern was their lack of knowledge of the six men who had been sledging in the south, and who had been unable to get back to Cape Evans before the winter closed in.

But under the leadership of Stevens the four men faced their situation with courage. They started a scientific programme, went hunting for seals to obtain the precious blubber, and searched frequently for provisions hidden in snow drifts. Their hearts were lightened when Mackintosh, Joyce, J.L. Cope, Jack and Hayward reached the hut on June 2.

Quickly the 10 men settled down to a regular winter routine. Then as spring approached they began to prepare for the vitally important depot-laying. The first journey to Hut Point was made on September 1. During the second on September 6 Gaze sustained a badly frost-bitten heel, and had to be carried all the way back on the sledge pulled by the four remaining useful dogs.

Because of his injury Gaze was temporarily replaced by Stevens when the actual depot-laying journeys began on October 1, and remained at Cape Evans to take the weather observations and care for the dogs. But he rejoined the field party, and took part in most of the arduous sledging journeys from Hut Point to stock Minna Bluff in preparation for the southern march to Mt. Hope, which was begun on December 13.

When Gaze returned to Cape Evans on January 16, 1916, he and his companions, Stevens, Cope, and Jack, faced another grim winter, and the strain of not knowing what had happened to Mackintosh and his men. The strain was too much for Cope, and he was not normal for some time. Not until July 15 when the barking of the dogs announced the arrival of a sledge

party did the hut party learn from Joyce, Richards, and Wild, how Mackintosh, Hayward, and Spencer-Smith, had died.

Seven men were left to continue their second winter, and face the possibility of a third. Only five were fit enough to carry on the essential task of killing seals because Richards collapsed, having strained his heart, and Cope was called on to nurse him back to health.

When the sun returned in August the men were able to travel further afield. The everlasting hunt for seals continued, and at the end of the month Gaze went with Joyce and Jack to Shackleton's old hut at Cape Royds to look for stores. They returned with welcome finds — a large case of matches, and cans of salmon, haddock, and butter, all in good condition after eight years.

Late in September Joyce went by dog team with Wild and Gaze to the penguin rookery at Cape Royds. He remained there December to make a zoological collection of Emperor and Adelie penguins, seals, skuas, and petrels. In October before Gaze and Wild returned to Cape Evans the three men collected about 2400 Adelie eggs for their winter supplies.

CROSS ERECTED

When Joyce returned he found that all the party except Richards had been sealing, and had stocked a huge supply for food and fuel. Then he prepared for another journey south with Wild and Gaze to erect a cross over Spencer-Smith's grave about 32km from Hut Point, and to bring in some geological specimens which had been dumped about 80km south of the point.

Later in December the party trekked south with eight dogs. Earlier Gaze and Jack had made a cross out of some hard wood found around the hut, and carved on it a simple tribute to Spencer-Smith: "A brave man". On the fourth day out this cross was erected on a cairn over the grave.

On their journey north from Hut Point to Cape Evans, which they reached on January 3, 1917, the three men made a search for Mackintosh and Hayward, but found no trace. They had been back in the hut for a week when "the weary months of hard work, disappointment, deprivation, and tragedy" which all had endured, ended on January 10. Richards went outside after breakfast and saw the Aurora lying off the Barne Glacier away to the north-west.

A week later the Aurora turned northwards again to take the seven men back to New Zealand. They were warmly received when the ship reached Wellington on February 9, but their story was quickly forgotten by a world still at war. This did not concern Gaze. Despite all he had endured he, like others in Shackleton's expedition, was eager to play his part in a war of which he had heard nothing for more than 20 years.

Gaze and the rest of the party returned to Australia. Then he went on to England and Shackleton helped him to join the Royal Flying Corps. He served as a pilot until the armistice, and towards the end was shot down twice in 11 days.

After the war Gaze returned to Australia where he was an executive with a boot and shoe firm. Later he farmed in the western region of Victoria, and finally retired to live near Melbourne.

Sixty years after the Aurora returned to rescue the survivors of the Ross Sea Party the New Zealand Antarctic Society brought Gaze to Christchurch as one of the guests of honour when the Duke of Edinburgh opened the Canterbury Museum's new centennial wing of which the National Antarctic Centre is the heart. There he took his place of honour with William Burton, one of the last survivors of the crew of the Terra Nova, Sir Vivian Fuchs, who achieved what Shackleton had tried to do more than 40 years earlier, and Sir Edmund Hillary, leader of a more fortunate Ross Sea party.

Please disregard all references to subscriptions on this page. The figures quoted are out of date.

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