

ANTARCTIC

A NEWS BULLETIN

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NEW ZEALAND ANTARCTIC SOCIETY



ON THE SUMMIT OF MT. EREBUS

ROGER BARTON, BILL LUCY, CARLO MAURI, DICK COWAN, BEVAN MacALEER,
NIGEL PITTS.

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"ANTARCTIC"

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LES QUARTERMAIN: A TRIBUTE

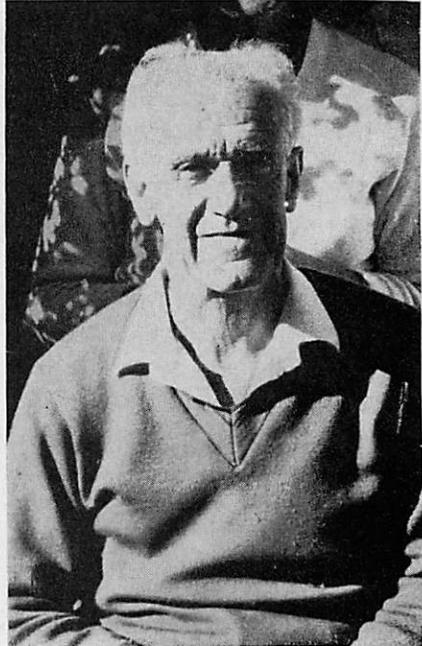
Few men have done more to promote interest in the Antarctic and its affairs than Les Quartermain who has just retired as Editor of "Antarctic".

From the inception of the "Antarctic News Bulletin" in August 1950 to the production of the 50th number of "Antarctic" he has emphasised the international aspect in the Continent, and has firmly resisted any temptation to be parochial.

I have looked once more through my copy of that now extremely rare No. 1 Bulletin—a two-page cyclostyled publication—and noted that it dealt with British, Argentinian, French, American and Russian activities; with international whaling, and with the splendid example of international co-operation in the Norwegian-Swedish-British party to "Maudheim" in Queen Maud Land. At that time, of course, New Zealand had no direct association with the Antarctic Continent.

Les Quartermain's interest in the Antarctic goes back to the "heroic age" for as a boy at Christchurch Boys' High School he watched the return of Shackleton's "Nimrod" to Lyttelton in 1909, heard Shackleton's lecture; watched the departure of Scott's last expedition in 1910, and never lost interest in the far south. Soon after being appointed Head of the English Department at Wellington College he became one of the foundation members of the N.Z. Antarctic Society, and was elected to the first Council in 1933. In 1950 he suggested that the Society should publish a periodic news-sheet for its members—hence the Bulletin. He was President of the Society in 1957-59.

Other literary work in this field has been the publication of the booklets for schools, "Into the Antarctic" (1956), "Down to the Ice" (1966), and the books "Two Huts in the Antarctic" (1963), "South from New Zea-



LES QUARTERMAIN.

land" (1964), "The Ross Dependency in Pictures" (1965) and "South to the Pole" (1967). The latter major work was made possible through a University of New Zealand Research Grant which enabled him to make two visits to Australia for research purposes. He is now writing a complete history of New Zealand's association with Antarctic exploration and research to be published by the N.Z. Government Printer next year.

He was invited to join Operation Deep Freeze II as a member of the Press party and spent six weeks in the Antarctic including a visit to Scott Base, which we were then in the process of building. His obvious enjoyment and enthusiasm was an inspiration to us all. Later he was

the leader of the party which restored the two historic huts at Cape Evans and Cape Royds, now among the show places of Antarctica.

Work on his various publications has brought him in close touch with many explorers and scientists, ranging from the "heroic age" men of the early expeditions through to the present time. Over the years he has numbered among his friends men like Ford, Hare, Dell and Plumley of Scott's First Expedition, Captain J. K. Davis, Griffith Taylor; Jack and Richards of Shackleton's expeditions; and modern leaders such as Larry Gould, Paul-Emile Victor, Harry Wexler and George Toney.

In 1967 he was awarded the M.B.E. for his work in connection with Antarctic affairs.

It has been my good fortune to have known "Q" and to have worked closely with him almost since the inception of the Bulletin; first as Hon. Secretary of the Society, later as Secretary of the Ross Sea Committee, and in various other Antarctic capacities. His keen interest, wide knowledge and good judgment have been of great value to me as they undoubtedly have been to others. Already many tributes have come in from overseas correspondents.

In his well-earned retirement from the post of Editor he will have the best wishes of all who have enjoyed his writings and his friendship.

JAPANESE PREPARE FOR POLE JOURNEY

Members of the 9th JARE, led by Mr. M. Murayama now wintering at Syowa Station, are being kept busy with the return of the sun. Especially busy with their preparations are the twelve members taking part in the coming over-snow traverse from Syowa to the South Pole and return.

They expect to leave Syowa Station on September 20 with four KD-60 over-snow vehicles and to arrive at the South Pole Station, via Plateau Station, in time for Christmas dinner.

GRANTS FOR ANTARCTIC EXPEDITIONS

When the Trans-Antarctic Expedition came to be finally wound up, there was a considerable cash surplus left, due to the payment of some royalties for books and film rights accruing after all accounts had been met.

By agreement between the London and New Zealand Expedition Committees, this sum was placed into a Capital Account and invested, and from the income received by way of interest, grants are made available each year for Antarctic exploration or for projects associated with the Antarctic.

One-third of the proceeds is available for applications lodged with the New Zealand Advisory Committee, and two-thirds for applications dealt with in the United Kingdom. There is a three-year accumulative period, and any money left unexpended at the end of that period is added to the Capital Account. The amount in the Capital Account is at present approximately £Stg.25,000.

Applications for the 1969-70 season from the New Zealand sector will close with Mr A. S. Helm, Secretary, New Zealand Advisory Committee, Trans-Antarctic Association, 37 Worcester Street, Wellington, N.Z., New Zealand, on February 1, 1969.

Enquiries should contain as full information as possible of the purpose for which assistance is sought, the aims and objects of exploration, the personnel and qualifications of expedition members, the amount of financial assistance sought, the total cost of the expedition, etc. There is no special application form.

Enquiries for grants from the United Kingdom should be made to: Mrs E. Honnywill, Secretary, Trans-Antarctic Association, 30 Gillingham Street, London, S.W.1, England.

The final decision on awards is made by the Committee of Management in London, consisting of representatives from both the United Kingdom and New Zealand.

NEW ZEALAND PARTY TO WINTER IN ANTARCTICA

The following men have been selected to winter-over at Scott Base and Vanda Station (see June "Antarctic") throughout the 1969 winter.

SCOTT BASE

Robin Foubister, Leader (see June "Antarctic").

Peter J. Lennard (27), Christchurch, Technical Officer in Charge. When selected, Mr. Lennard was Flight Commander Communications, Wigram, and Assistant Base Signals Officer. Born in Auckland, he attended Auckland Grammar. Mr. Lennard is married with three sons, and his interests include swimming, hockey and skiing.

Keith G. Mandeno (24), Auckland, Technician. Born in Auckland, Mr. Mandeno is another Old Boy of Auckland Grammar and has had several years' experience in sales, servicing and laboratory development of electronic equipment. He is single and his interests include hockey, table tennis, badminton, tramping and photography.

H. Nigel Millar (21), Auckland, Technician. At present Mr. Millar is employed in the Naval Dockyard on the testing and maintenance of Sonar and Asdic equipment on R.N.Z.N. ships. He is holder of the Trevor Evans Memorial Award 1966. He is single and his interests include surfing, playing piano and guitar, and photography.

G. Allan Guard (31), of Fairlie, Base Engineer. Born in Fairlie, Mr. Guard served his motor mechanic's apprenticeship in Timaru and is the holder of two A grade certificates. He was Mechanic Handyman on Campbell Island for two consecutive terms, 1964-65 and 1965-66. He is single and his interests are photography, free-hand and technical drawing, reading, mineral and gemstone collection, skiing, ice skating, tramping and power boating.

Chris. M. Rickards (31), Fitter-Electrician. Mr. Rickards will be serving his second term at Scott Base as he was at Scott Base for the 1966-67 season in the same capacity. He is single, interested in photography and an accomplished pianist.

Wayne T. Maguiness (23), Auckland, Fitter Mechanic. Mr. Maguiness has served an apprenticeship in fitting and turning and was employed as a turner in H.M. Dockyard when selected. He has just completed a two-month voyage on the U.S.N. Research Ship "Eltanin" as a laboratory technician. He is a Venturer Scout and underwent a course at Outward Bound in November 1965. He is single and is interested in yachting, photography, and he plays a trumpet.

G. F. (Geoff) Gill (24), Auckland, Cook. Mr. Gill is of farming stock and accomplished in many things. He has served in the R.N.Z.N. as a cook for six years and has made eight trips to McMurdo Sound in H.M.N.Z.S. "Endeavour". He is married with one child and his interests include photography, cinematography, deer stalking, and he is learning to play the guitar.

Brian C. Hool (24), Thames, Postmaster. Mr. Hool was educated at Thames High School and has been employed by the N.Z.P.O. as an R.T. and C.W. operator at Wellington Radio five years and Chatham Islands 18 months. He is a single man and his interests are music (he plays a guitar), photography, reading and calisthenics.

David F. Blackburn (23), Auckland, Post Office Technician. Mr. Blackburn is an old boy of Otahuhu College and has been employed by the Auckland branch of the N.Z.P.O.

since he left school. He is single and his interests include photography, reading and the outdoors. He plays a piano-accordion.

VANDA STATION

W. R. (Bill) Lucy (31), Timaru, Leader. Mr. Lucy is well known to "Antarctic" readers and his appointment as Leader, Vanda Station, caps a long history of work in Antarctica. During his visits south he has found time to spend a period surveying in New Guinea and has just completed two trips on "Eltanin" as an Electronics Technician. He has also been selected this year as Deputy Leader, Scott Base.

Simon K. Cutfield (24), Auckland, Scientific Officer. Mr. Cutfield was born in Palmerston North and attended Palmerston North Boys' High School and later Otahuhu College, Auckland. He gained his B.Sc. at Auckland University (1966) and has just submitted a thesis for his M.Sc. His interests are rowing, hockey, rugby, photography, skin curing and outdoor activities. He is single.

Ronald M. F. Craig (25), Ashburton, Meteorologist. Mr. Craig was born in Ashburton and attended Ashburton Technical College. He has been employed with the Meteorological Service since 1960 as an observer and latterly as an inspecting officer. He has been to Campbell Island twice, 1962-63 and 1964-65, and Raoul Island, 1966-67. He is single and his interests include boating, photography and the outdoors.

(A field assistant will be selected from the summer support staff to winter-over, and a technician and the U.S. Exchange Scientist have yet to be appointed for Vanda Station.)

SUMMER PARTIES

Additional base personnel and members of field teams for the 1968-69 summer are as follows:

W. R. (Bill) Lucy: Deputy Leader.
John E. Newman: Carpenter.
Noel C. Wilson: Field Assistant.
Derek W. Cordes: Field Assistant.
Hugh H. Clarke: Asst. Maintenance Officer.
Bruce R. Brookes: Asst. Maintenance Officer.
Graeme K. Connell: Information Officer/Photographer.

Douglas W. P. Spence: Store-keeper.

R. J. (Bob) Hancock: Radio Operator (Post Office).

Arnold J. Heine: Glaciologist.

Charles Hughes: Surveyor.

Alister G. B. Ayres: Asst. Surveyor.

V.U.W.A.E. 13

Dr. Peter N. Webb: Leader/Geologist.

Barry C. McKelvey: Deputy Leader/Geologist.

Barry Kohn: Geological Assistant.

Mike Gorton: Geological Assistant.

Chris Hendy: Geochemist.

Jim Cousins: Geophysicist.

John Whitehead: Field Assistant.

Canterbury University Biological Unit

Dr. Euan C. Young: Field Leader.

Ian Stirling: Zoologist.

Morgan Williams: Assistant.

Another Zoologist.

Tony Harrison: Assistant.

Canterbury Museum — Specimen Collection Unit

Raymond J. Jacobs: Senior Preparator.

Jeffrey Tunnicliffe: Assistant.

Otago University Biological Unit

Dr. Kaj Westerskov: Field Leader.

Don Robertson: Assistant.

Brian R. Johnston: Assistant.

ANTARCTIC TEAM TRAINS

During the week ending August 23 members of the New Zealand Antarctic Research Programme 1968-69 were in training at Waiouru Command and on the slopes of Mount Ruapehu.

The team spent the first two days listening to seasoned speakers on the dangers to be encountered in the world's most vigorous climate and some aspects of New Zealand's past, present and future work in Antarctica. A highlight of this period was the showing of a film recently completed by John Whalan, D.S.I.R., which depicted some aspects of training and the trip south, but in the main dealt with life at Scott Base.

Deep snow and blizzard-like weather (on one day) gave many of the team their first taste of near Antarctic conditions. For most, the

four days on the mountain gave them a first introduction to rope and ski, and instruction in their use was given by the more experienced members of the team.

Perhaps the most important feature of Antarctic Division's "training week" is a chance for the members of the party to meet one another at least once, for it is only at Waiouru that they may be united, as later in the season one group may be in the field as another passes through base en route to a separate destination.

During the week various personalities gradually manifest themselves within the confines of camp life and the sergeants' mess, and this helps to accelerate the settling down process at Scott Base.

At the completion of the week the team dispersed to all parts of New Zealand and selected personnel from Scott Base and Vanda Station staff came down to Wellington for three days' training at the Fire Service's Council Training School at Island Bay. Others have been selected to undergo specialist training under the various disciplines operating programmes at Scott Base and Vanda Station.

"DR. LUCY"

Bill Lucy, Antarctic veteran, this year's Deputy Leader and selected to lead the first winter-over group in the McMurdo oasis, is to undergo six weeks' medical training in the casualty department of Wellington Public Hospital. It is hoped that this will prepare him sufficiently to meet any medical emergencies which may arise at Vanda Station during the party's period of isolation.

GUEST TRAINEE

Mike Smith of John Hopkins University and a member of the United States Antarctic Research Programme 1968-69, was invited to join the New Zealand party at Waiouru as he was unable to travel to the United States to take part in the orientation programme there. He is at present at Canterbury University and will be working at Cape Crozier, Ross Island, during the austral summer.

SPRING PLANS FOR NEW ZEALANDERS

In the early spring a New Zealand party will make a reconnaissance trip from Scott Base across the sea ice of McMurdo Sound to Marble Point, a distance of about 40 miles, thence over the Wilson Piedmont and up the Wright Valley to the site of the new Vanda Station. This will be in preparation for the transportation of materials by tractor and sled from Scott Base to complete the project at Lake Vanda during the forthcoming summer season.

Other spring parties will visit the historic huts of Scott and Shackleton at Cape Evans and Cape Royds respectively to ascertain how they have survived during the winter and carry out any repairs that may be necessary.

ITALIANS MAY JOIN SCOTT BASE PARTY

Mr. R. B. Thomson, Superintendent of the New Zealand Antarctic Division, left for Italy on August 31 to discuss the inclusion of several Italians in the Scott Base party for the 1968-69 season.

The Italians would not necessarily be mountaineers, said Mr. Thomson, but interest in the New Zealand Antarctic programme stemmed from the visit last year to Scott Base of the famous Italian mountaineer, photographer and journalist, Mr. Carlo Mauri. Mr. Mauri spent two months in the Antarctic and covered the New Zealand activities there for Italy's largest newspaper, "Corriere della Sera". His ascent with five New Zealanders of Mount Erebus is depicted on the cover of this issue of "Antarctic".

TESTING THE SEA-ICE

On June 16 three members of the New Zealand Antarctic Research programme team ventured out to the sea ice south of the headquarters at Scott Base. The three men, Grahame Champness of Ashburton, Alan Magee of Invercargill, and John Talbot of Palmerston North, took with them a special drill to test the thickness of the ice. This proved to be 39 inches in depth which is above average for that time of the year.

(Continued on Page 137)

AMERICAN PROGRAMME FOR 1968-69

On June 28 the following ambitious 1968-69 United States Antarctic Research Programme was announced by the National Science Foundation in Washington.

Introduction

The 1968-69 United States Antarctic Research Programme will be conducted at five U.S. Antarctic stations and a number of summer field camps on the continent, aboard the U.S. Antarctic research ship "Eltanin", in the south-western Pacific Ocean, in the Weddell Sea aboard the ice-breaker "Glacier", and through co-operative arrangements with the Union of Soviet Socialist Republics at Vostok, and with Chile at Deception Island.

In addition, the new Antarctic research ship "Hero" will commence work in the Antarctic Peninsula area operating during the austral summer from Palmer Station.

Support of austral summer field programmes will take place from McMurdo, South Pole, and Byrd Stations. The two major programmes are the multi-discipline reconnaissance of Ellsworth Land between the Hudson Mountains and the Jones Mountains, and support of Norwegian and British survey parties in the Queen Maud Land region.

I. THE ELLSWORTH LAND SURVEY

The third season of integrated research along the coastal areas of West Antarctica will take place between November 1, 1968, and late January, 1969, and will consist of five separate projects utilising helicopter support provided by the U.S. Army aviation detachment. The UH-1D helicopters will be used to conduct the multidiscipline survey among the outcrop areas between 110° W. and 90° W. longitudes. This survey will cover the area from the Hudson

Mountains to the Jones Mountains, including Thurston Island.

From the reconnaissance geology standpoint, the work will be divided into two segments with the Hudson Mountains and Canisteo Peninsula areas being covered by Texas Technological College and the Jones Mountains, and Thurston Island work by the University of Wisconsin. It is expected that the Texas Technological College group will complete their work about December 10 at which time the University of Wisconsin geologists will join the survey for the remainder of the season. Other disciplines will participate in both segments of the survey. It is recommended that the 1968-69 work be accomplished from two major camps, Camp One located on the ice shelf just to the south-east of the Canisteo Peninsula and the second camp to be located near the old Camp Minnesota site in the Jones Mountains. A third tent camp should be located on Thurston Island to accomplish that portion of the work.

Mr. Kirby Laprade will act as Chief Scientist for the first part of the field season and Dr. Campbell Craddock for the second half.

A brief synopsis of each individual science programme follows:

Texas Technological College— Geology of Ellsworth Land

The three-man field party under the overall direction of Dr. F. Alton Wade will continue the geological survey of the coastal areas of West Antarctica in the Hudson Mountains, the Canisteo Peninsula and the nearby islands. The three-man field party will be under the direction of Mr.

investigations. He will also join the survey group about November 1 at Camp One and will continue his work until the survey is completed at the Jones Mountains.

Chilean Antarctic Institute — Geology of Ellsworth Land

A geologist from the University of Chile will again work with the USARP programme in Ellsworth Land. The geologist is being selected, but his name has not yet been forwarded to NSF. He will join the group about November 1 and work throughout the field season.

Dr. Boris Lapatin, the exchange scientist at McMurdo, may join the Ellsworth Land Survey for all or part of the field season.

II. OTHER REMOTE FIELD PARTIES

Norsk Polarinstitutt —

Geology of Queen Maud Land

A Norwegian field party of six men will conduct a geological, geophysical, and topographic survey of the Kraul Mountains on the Princess Martha Coast in Queen Maud Land. The survey will commence about mid-November with placement of toboggans for their work. The party team of six men will utilize motor LC-130F aircraft. In addition to the six personnel, approximately 11,000 pounds of equipment will require transportation to the Kraul Mountains.

Because of the distance from any U.S. station, it is unlikely that the party will be able to communicate with McMurdo. The Norwegian field party is exploring possibilities of establishing a communications guard with the British station at Halley Bay.

British Antarctic Survey — Geology of Queen Maud Land

A British Antarctic Survey field party of four men will carry out investigations in the Shackleton Range near the edge of the Filchner Ice Shelf. The studies, involving topographic, geological, and glaciological work, will commence about mid-November with a placement of

Kirby Laprade. This group will work from Camp One commencing about November 1 and should terminate work about December 10.

University of Wisconsin — Geology of Ellsworth Land

Dr. Campbell Craddock will be accompanied by three geologists for the second segment of the reconnaissance geology programme. The Wisconsin team will commence their work in the Jones Mountains and Thurston Island areas in early December, or at the time that Camp Two is set up. In addition to the helicopter support, the Wisconsin group will also utilize motor toboggans for work in the immediate area of Camp Two at such times when the helicopters are working on Thurston Island or when they are down for weather, maintenance, etc.

U.S. Geological Survey—Topographic Survey of Ellsworth Land

A party of four U.S. Geological Survey topographic engineers will continue to accumulate control data in West Antarctica with stations located on outcrops throughout the area. As in the past two seasons, electronic measuring equipment will be utilized. The tentative plans call for 43 control stations requiring approximately 940 miles of traverse.

Ohio State University — Botanical Survey of Ellsworth Land

Dr. Gareth E. Gilbert and two field assistants will continue the study of the flora along the coastal areas of West Antarctica. The Ohio State University party will join the survey at Camp One about November 1 and will continue their work throughout the total field season working with the geologists and topographic engineers. Although there are three people in the party only two will be in the field at any given time.

Washington University, St. Louis — Paleomagnetic Survey of Ellsworth Land

A scientist, yet to be selected, will continue the paleomagnetic work started by Dr. Scharon two years ago. The investigator will collect rocks for detailed paleomagnetic

the party by LC-130F aircraft. Although additional details are forthcoming, it is anticipated that the four-man party will utilise motor toboggans for their work which should be completed by the end of January, 1969.

It is anticipated that two of the British Antarctic Survey party will join the Norwegian field party at McMurdo and proceed to the Kraul Mountains via Pole Station. After debarking the Norwegian party at the Kraul Mountains, the aircraft would proceed to Halley Bay Station for refuelling and pickup of the remaining two members of the BAS party and their equipment. The aircraft would then proceed to the Shackleton Range for placement of the British party prior to return to South Pole and McMurdo Stations. In late January the process would be reversed for pickup of the two parties. It is expected that a communication guard will be established with the British station at Halley Bay.

Bernice P. Bishop Museum — Terrestrial Arthropods of Antarctica

A three-man party from the Bernice P. Bishop Museum, Honolulu, under the direction of Dr. Russell W. Strandtmann, will continue their investigation of the terrestrial arthropods of Antarctica. The three-man field party will collect in the Fosdick Mountains commencing about mid-November, terminating approximately six weeks later. The party should be placed at approximately 76° 29' S., 145° 35' W. at the south-western end of the Fosdick Mountains. Operating from a base camp, they will utilise motor toboggans to collect specimens in what is expected to be a biologically rich area for this part of Antarctica.

Texas Technological College — The Triassic Beds, Beacon Group, Roberts Massif, Queen Maud Range

Following completion of the work in the Ellsworth Land area the three-man party from Texas Technological College will return to McMurdo Station and then be placed at the Roberts Massif at the head of the Shackleton Glacier. The three-man party will utilise a tent camp and motor toboggans to complete

the geological mapping of this area begun in the 1962-63 austral summer by Dr. F. Alton Wade of the Texas Technological College. It is estimated that this field project will require approximately four weeks of work.

U.S. Geological Survey, Topographic Division — Topographic Control of Mt. Siple and Nunataks south-west of the Heritage Range

In addition to the topographic survey of Ellsworth Land, the four topographic engineers from the U.S. Geological Survey will attempt to complete the control of the Marie Byrd Land coastal area at Mt. Siple which the multidiscipline survey was unable to reach last year. In addition, several control points are needed to complete the field work in the nunataks south-west of the Heritage Range.

It is proposed to place the four engineers at Mt. Siple by C-130 aircraft where they will conduct the survey from a tent camp, using motor toboggans as a means of transport. It is anticipated that this work, which should not require more than two weeks' time, can be accomplished following the Ellsworth Land survey; it is of secondary priority to the Ellsworth Land work.

III. McMURDO SOUND REGION

University of Kansas — Chronology and Internal Structure of Local Mountain Glaciers, Southern Victoria Land

Dr. Dort and two field assistants will continue the study of Antarctic cirques started during the 1965-66 season. Of particular interest to the field party will be the study of the recent advance and retreat of (1) small alpine glaciers flowing from isolated simple cirques, (2) large alpine glaciers nourished by névés, (3) outlet glaciers draining the plateau ice cap, and (4) piedmont glacier tongues invading the lower parts of dry valleys. Each of these types of glaciers has undergone fluctuation in the past. It is proposed to map recessional moraines and other retreatal features associated with these four types of glaciers.

The party will conduct their field studies by the successive occupation of several field camps in Southern

Victoria Land starting near Lake Bonney. Other camp sites will be in the Pearse Valley near the head of the Taylor Glacier, at Mt. Orestes in the Olympus Range and at two localities in the central Asgard Range east and west of the Obelisk Mountains.

University of Wyoming — Geological and Geophysical Studies in South Victoria Land

A field party of four geologists under the direction of Dr. Robert S. Houston will continue the detailed geological and geophysical research on rocks of Precambrian and Paleozoic age over an area of several hundred square kilometres in South Victoria Land. This work commenced last season in the McMurdo area. Research objectives for the 1968-69 season will be to determine the relationship of the Koettlitz group and the older rocks, study the stratigraphy and metamorphism of the Koettlitz group, study the Granite Harbour intrusive rocks, and further investigate the structural geometry and history in the area. Gravity surveys will also be continued to determine the regional trends outlined during last season.

The field work will commence from McMurdo Station in late October and will terminate approximately two months later. They will spend approximately ten days in the field on each trip then return to McMurdo Station for two days to work up their data before returning to the field again.

American Geographical Society — Glacial Geology and Chronology of the McMurdo Sound Region

Dr. George H. Denton of the American Geographical Society and a field assistant will continue the study of glacial geology of the McMurdo Sound region, started during the 1967-68 season. The party will be in Antarctica from October, 1968, through February, 1969, to examine and map in detail glacial deposits throughout the McMurdo Sound region, to date numerous K-Ar and C^{14} samples associated with glacial deposits, and to use the results to relate Antarctic glacial episodes to world-wide Pleistocene and pre-

Pleistocene events. The party will map in detail the uppermost Taylor Valley, part of the valley system fronting the Royal Society Range, the Mt. Discovery area, Brown Peninsula, Black Island, White Island, and Capes Birds and Crozier on Ross Island.

University of Maine — Investigation of the Origin and Age of the Mawson Tillite, West Antarctica

Dr. Harold Borns and three field assistants will investigate the Mawson tillite in the McMurdo Sound area commencing in late October and terminating in February. The party of four will work from several base camps in the McMurdo area and will require approximately sixty hours of LH-34 and several hours of UH-1D helicopter support. Specific work areas include the Allen and Carapace Nunataks, Mt. Littlepage, Mistake Peak, Shapeless Mountains, the Battlements Nunatak, and several other areas where tillites are known to exist in the South Victoria Land area.

University of Washington — Weathering and Soil Forming Processes in the Antarctic Dry Valleys

Mr. George Linkletter and a field assistant will investigate the weathering and soil forming processes in the ice-free region near McMurdo Sound. This study will permit the evaluation of the importance of several environmental variables in the formation of Antarctic soils. Samples collected from bodies of glacial drifts of different age will be analyzed in the laboratory both at McMurdo and at Washington to determine the degree in which chemical changes have been involved in weathering and soil development.

The initial field work will probably be centred in the Taylor Valley where detailed glacial geologic studies are already under way by Dr. Denton. The upper and lower portions of the Taylor Valley should provide a wide range in age of parent material and in altitude thereby permitting evaluation of the weathering and soil forming factors. It is expected that the field party will commence work in October and terminate in early February.

University of Wisconsin — Patterned Ground Studies in Antarctica

Dr. Robert F. Black and a field assistant will continue the long-term study of the growth rate of pattern ground in the dry valley areas and on Ross Island. As in the past, automatic recording equipment at Mt. Nussbaum and Crater Hill now operating year-round will be serviced in conjunction with the field trips. Growth rate of the pattern ground wedges will provide a measure of the time since these surfaces were covered with glaciers.

The party will be in field for approximately two months commencing in late November.

Ohio State University — Investigations on the Structural Glaciology of Meserve Glacier, Wright Valley

Dr. Gerald Holdsworth and four field assistants will investigate the mechanics of formation of the surface waves which occur on some of the small glaciers in Antarctica and explain these in the terms of the mode of flow of "cold" ice. Most of the investigations will be made on the Meserve Glacier in Wright Valley where the Ohio State University group has worked in past seasons and where the waves are well developed. The studies will also be extended to the neighbouring Goodspeed Glacier in an attempt to explain the absence of waves there. At a point near the centre of the Meserve Glacier temperature profiles will be obtained. With these profiles and information on exact ice depths and bed slopes periodical relationships of the ice floe parameters will be tested. At a small number of points on the glacier attempts will be made to continue the borings to a depth of at least 20 metres below the basal ice to obtain information on the geothermal gradient. Two existing bore holes through the glacier will be relogged to obtain information on the strain and internal velocities of the glacier.

The field work will occupy about three months of the 1968-69 season commencing in early November and lasting through January to 1969. The field party will be housed in the Jamesway hut constructed near the Meserve Glacier in 1965.

Ohio State University — Chemical and Physical Weathering, Surficial Geology and Glacial History of the Wright Valley, Victoria Land

Dr. Parker Calkin and Mr. Robert assistant will conduct geological research in the Wright Valley area from October through early February. The surficial geology of Wright Valley will be mapped in detail with specific attention concentrated in the area east of Lake Vanda, particularly in the critical areas between the Loop Moraine and Bull Pass and in Bull Pass itself where correlation ley system. The weathering criteria developed from the detailed technological studies begun on the Meserve Glacier moraine system will be extended to moraines of adjacent alpine glaciers as well as the axial glaciers. From this work it is hoped to produce a mineralogical weathering index which should be valid for the whole of the Wright Valley and perhaps for all deglaciated areas in southern Victoria Land.

The work in the early part of the season will be based at a tent camp near Heart Glacier. The camp will be moved later in the season to the area of the Wright Lower Glacier, to the Bartley Glacier and adjacent alpine glaciers to the west, and finally to Bull Pass. It is hoped to establish food and fuel depots at these sites at the beginning of the season.

Northern Illinois University — Electrical Depth Soundings Beneath a Saline Discharge and Saline Lakes in Taylor Valley

Dr. Lyle McGinnis and two field assistants from the Northern Illinois University, De Kalb, Illinois, will spend December 1968 and January 1969 making extensive electrical resistivity surveys in Taylor Valley and, time permitting, near Lake Vanda in Wright Valley. The research is designed to determine the relationship between the surface and sub-surface waters in Antarctic ice-free valleys. Of special importance to this determination is the description of the general physical characteristics including thickness of the permafrost zone. Electrical depth soundings will be utilised in the analysis of sub-surface water quality, hydrology and the interrelationships of sub-surface to surface water.

Ohio State University—Effects of Nutritional Factors on Distribution of Antarctic Lichens and Terrestrial Algae

Dr. Emanuel Rudolph and three field assistants will continue the experimental field study of nutritional factors of lichens. The purpose of the work is to ascertain the role of nitrogenous compounds and other essential elements and environmental factors in the growth, establishment and distribution of lichens and terrestrial algae. Quadrats for long-term observations will be established in algal and lichen habitats at Cape Crozier, Ross Island and in the ice-free areas of Victoria Land. Physical environmental factors include total daily isolation, wind speed and direction, air and soil temperature, humidity, soil moisture will be monitored for each quadrat during the growing season.

University of Minnesota—Status and Population Dynamics of Antarctic Seals

Dr. Albert Erickson and two field assistants will study the population dynamics of Antarctic seals as a continuation of the planned five-year study which started in the Weddell Sea last season. The field party will, after completion of the McMurdo Sound work, proceed by U.S.C.G.C. "Glacier" to South America to participate in the second phase of the International Weddell Sea Oceanographic Expedition.

Objectives of the studies are to determine abundance, description and migration characteristics of the four seal species; determine their present population dynamics; and obtain basic information on sex ratios, age structure, population boundaries, and breeding biology for determining corrective management adjustments.

The initial work at McMurdo is mainly to make preliminary surveys in order to gain preliminary knowledge on characteristics of seal distribution.

New Work Zoological Society—Behavioural and Physiological Bases of Avian Navigation in the Adélie Penguin

Dr. R. L. Penney and a field assistant from the Rockefeller University

will conduct further experimental studies essential to the development of the avian navigation problem. Field studies will require transport of captive birds back to the United States for release on frozen lakes in the northern part of the U.S. Dr. Penney hopes that study of the behaviour of the birds in the northern hemisphere and departure orientation under the apparent reversed azimuth motion of the northern hemisphere sun, will contribute correlative data for his southern hemisphere and controlled laboratory experiments.

Research is also planned on the south polar skua to discover whether this species, a flying bird, possesses equivalent orientation mechanisms as the flightless penguins. Dr. Penney will capture skuas at Cape Bird and release them from South Pole, Byrd, and Brockton Stations. Departure orientation will be recorded visually or by radio telemetry and checks will be made for the return to their nest. The work at Cape Bird will require helicopter or ship transportation to and from that area. It is expected that the releases from Pole, Byrd, and Brockton Stations can be carried out in connection with routine C-130 flights to those stations.

University of Washington—Biological Weathering in Antarctica

Dr. F. Ugolini and a field assistant from the University of Washington will continue the long-term study of the role of Antarctic lichens in weathering of rocks and will extend the investigation to evaluate the role of mosses and penguin guano in this process.

Specimens of rocks with lichens attached and soil samples supporting mosses and guano will be collected in the ice-free areas of the McMurdo Sound region. Micro-meteorological and soil moisture measurements will be made at the collection sites. Laboratory studies, including a chemical analysis of the lichens and rock layers below the lichens will complement the field work. Samples from barren areas of geologic, topographic, and climatic similarity will be studied to evaluate biotic versus abiotic weathering.

University of California, Davis — Comparative Biochemistry or Proteins

Dr. Robert Feeney and two field assistants will conduct the biochemical studies on the properties, structures and blood serum proteins of the Adélie penguin and on proteins of blood and muscles of cold adapted Antarctic fish. The principal work will be accomplished in the McMurdo biology laboratory following the initial field collections.

The field party will require helicopter support for egg collection trips to Cape Crozier. The fish work will be accomplished on the sea ice of McMurdo Sound with the support of USARP facilities and vehicles. About 100 Adélie penguin eggs will require return transportation to the University of California at Davis upon completion of the field work.

Johns Hopkins University — Antarctic Avian Population Studies

Mr. Robert Wood and four field assistants will continue Dr. William J. L. Sladen's long-term population studies of the Adélie penguin and the south polar skua at Cape Crozier. Selective banding and identification of newly arrived birds as well as statistical counting of previously banded birds will be the primary objectives of the programme.

The party will re-establish the camp at Cape Crozier about mid-October. Several Adélie penguins and south polar skuas will be returned to the laboratories at Johns Hopkins aboard the animal lift.

Two visits to the Emperor rookery at Cape Crozier will be required in late October and again in early December. These visits, each of about three hours' duration, will allow banding of Emperor chicks.

It is proposed that two members of the Cape Crozier party spend about five days banding penguins at the Possession Islands in late December.

IV. HALLETT STATION

University of South Dakota — The Ecology of the Protozoa of Antarctica

Dr. Raymond Dillon and a field assistant will survey the protozoa fauna at Cape Hallett in continuation of his ecological work which has

included previous surveys of the McMurdo and Palmer Station areas. Information will be sought on dominant species, range of distribution, and physical environmental parameters. Dr. Dillon will proceed to Hallett Station in October and will return to the McMurdo area aboard an icebreaker in late December or early January.

In order to complete the McMurdo survey started two years ago, the field party will investigate the areas in the ice-free region of southern Victoria Land either prior to or following the Hallett work.

Iowa State University — Early Embryology of the Adélie Penguin

Dr. J. R. Baker and a field assistant from the Iowa State University, Ames, will continue the study of the early stages of the Adélie penguin embryology. The research will again be conducted at Hallett Station and Dr. Baker will seek to determine the effect of climate on incubation and how the Adélie embryo is formed. It is hoped that these studies may provide information on the evolutionary origin of penguins, whether from flying birds or reptiles. Following the Antarctic field work additional work will be carried out at the Iowa State University laboratories.

Dr. Baker and his assistant will arrive at Hallett Station in late October and should complete their field work by November 25, 1968. Dr. Baker will collect about 50 Adélie penguin eggs at Hallett for return to Iowa State University.

V. INLAND STATION SUMMER PROGRAMMES

U.S. Army Cold Regions Research and Engineering Laboratory/University of Berne — Down Bore Hole Carbon Dating Project

As a result of the successful penetration of the ice cap at Byrd last season, scientists from the Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, and the University of Berne, Berne, Switzerland, will continue the drilling into the bedrock beneath the ice and at the same time attempt to determine the absolute age of ice from several selected depths in the experimental drill hole.

At the University of Berne a large diameter down bore hole device is being constructed for use in collection of the carbon dioxide samples. At several depths in the drill hole carbon dioxide samples will be obtained by sealing off a predetermined portion of the hole, melting a large quantity of ice adjacent to the sealed off section, and by extracting the carbon dioxide released from the melted ice. Carbon-14 radio-isotope age will be determined from the carbon dioxide at the University of Berne laboratories. These age dates will be basic to the understanding of ice deposition and ice flow in Antarctica.

U.S. Army Cold Regions Research and Engineering Laboratory—Analyses of Ice Cores from the Deep Drill Hole

Mr. Anthony Gow and a field assistant from the Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, will continue the physical property and crystal structure studies of the ice cores from the deep hole at Byrd Station. These studies were started last year as a part of the initial drilling programme. Since the cores from the new drill hole are the first ever to be recovered from top to bottom of the inland ice sheet of Antarctica it is felt that priority should initially be given to profile studies of the major physical structural and geochemical properties of the ice. Densities will be redetermined periodically, crystal growth as a function of depth in the ice sheet will be measured, and a comprehensive study of the entrapped dirt at the base of the ice sheet will be initiated.

In addition to the above work planned for the new drill hole at Byrd Station, further measurement of closure will be made in the 10-year-old drill hole at old Byrd Station. The two long accumulation stake lines established near Byrd Station in February, 1962, will also be remeasured.

VI. AERIAL PHOTOGRAPHY

U.S. Geological Survey, Air Development Squadron Six—Aerial Photography for Mapping

During the 1968-69 austral season, aerial photographic requirements for mapping will be concentrated in the

general area of the Antarctic Peninsula, Alexander Island, Coats Land, and the Shackleton Range. Tricamera photography is requested of Graham Land, that part of the Peninsula north of 68° S. latitude, including the offshore islands. Tricamera photography for mapping should also be flown over Alexander Island, with fill-in lines over Palmer Land, Berkner Island, Coats Land, and the Shackleton Range. Vertical photographic coverage is requested over Anvers Island and Deception Island.

In keeping with the procedure of past seasons, detailed flight packets and other information will be prepared, and supplied by the U.S. Geological Survey. The regular briefing for pilots, photographers and navigators of Air Development Squadron will also be held during the summer.

A field representative of the Geological Survey will be assigned to the aerial photographic programme during the flying season.

U.S. Geological Survey, Air Development Squadron Six—Special Photography for USARP Investigators

Cape Crozier Adélie Penguin Rookery.—Vertical Aerial photography is needed over the Adélie penguin rookery at Cape Crozier as a part of the continuing population study being carried out under the direction of Dr. W. J. L. Sladen of Johns Hopkins University. The photography should be flown between November 12 and November 16 which is the egg-laying period when the population is most stable. Vertical photography flown by the C-121 at an altitude of between 2,000 and 2,500 feet should suffice.

Colour Photography.—Flight lines of tricamera colour photography at 15,000 feet above terrain is requested in the Queen Maud, Queen Alexandra and Britannia Ranges for geological interpretation. This photography was requested late in the 1967-68 season in place of the Shackleton Range photography as the result of a change in geologic field plans.

VII. ANTARCTIC PENINSULA-PALMER STATION SUMMER PROGRAMMES

Palmer Station

Nine biologists are expected to carry out investigations from Palmer Station during the austral summer,

collecting samples from islands in the vicinity of Arthur Harbour or from the "Hero". Both small boat and helicopter support will be required of "Edisto" at intervals while she is in Arthur Harbour. At times when "Edisto" is absent from Arthur Harbour, the Arctic Survey Boat, or the surfboat as an alternative, with a coxswain, should be left at Palmer Station to provide transport for collecting parties.

A brief synopsis of each Palmer Station programme follows:

Oregon State University — Pycnogonida of the Antarctic Regions

Dr. Joel Hedgpeth and two field assistants will continue the study of the systematics and biogeography of the large collections of the Antarctic pycnogonids (sea spiders). Dr. Hedgpeth will be extending his survey from the Ross Sea where he has worked in the past, to the Antarctic Peninsula.

The methods of collection at Palmer will be initially the same as at McMurdo. The use of scuba will aid the collections being made by Dr. John C. McCain and one other qualified diver. In addition to the work at Palmer, Dr. Hedgpeth and his assistants will join the Antarctic research ship "Hero" for work at Deception Island following the Palmer Station work.

University of California, San Diego — Physiological Studies on Fishes Lacking Hemoglobin

Dr. E. A. Hemmingsen and two field assistants will continue fish physiological studies at Palmer Station and possibly from the new Antarctic research ship "Hero". The research is a continuation of work started two years ago at McMurdo Station which involves the investigation of blood-gas relationships of the chaenichthyidae (white-blooded) fishes. Oxygen consumption, cutaneous respiration, efficiency of the gills, blood volume, heart rate and skin and tissue vasculature will be measured as part of the proposed work. Dr. Hemmingsen hopes to establish by the results of this work the basic metabolic requirements of the animals and the mechanisms for oxygen uptake and support in the animals. Supplemented by comparative mea-

asures on other fishes, he hopes to gain further insight into the respiratory mechanisms in water breathing animals in general.

Ohio State University — Physiological Studies of Antarctic Mosses

Dr. J. R. Rastorfer and a field assistant will study the Antarctic mosses near Palmer Station to relate their physiological differences to particular environmental differences in Antarctic habitats. All physiological aspects of Antarctic mosses will be carefully studied in this research. Collections of mosses will be returned along with cultures to the U.S. for further study at Ohio State University. Other samples will be deposited in the U.S. museums.

Queens College — Systematic Investigation of Ciliated Protozoa of Antarctica

Dr. J. C. Thompson and a field assistant from Queens College at Charlotte, North Carolina, will carry out a systematic investigation of ciliated protozoa at Palmer Station and at other land sites in the vicinity of the station. Extensive collection of hymenostome ciliates will be made from marine environments, including lakes, melt water ponds, and from mosses and lichens. When possible, data will be collected on life cycles, food, cysts, conjugation and ecological habitats.

University of Massachusetts — A Study of Antarctic Hepaticae

Dr. Rudolf Shuster will undertake a study of the subantarctic-Antarctic Hepaticae or liverworts. The initial field work will be conducted at Palmer Station and possibly at the Trinity Peninsula and Deception Island. The subantarctic phase of the research will be accomplished at another time, but not this season. Dr. Schuster will collect lichens and mosses in addition to liverworts to evaluate the role the Hepaticae plays in the land flora of the Antarctic Peninsula.

Deception Island

Two teams of scientific investigators will work at Deception Island during the 1968-69 austral summer. One group will work ashore in cooperation with scientists from Chile.

The second group will use the "Hero" as a scientific platform for marine work.

The land based group, comprised of about five U.S. geological and glaciological investigators will augment a group of about six Chilean geologists, biologists, and geophysicists in joint volcanism research. All logistic support, including transportation between Chile and Antarctica is expected to be provided by Chile. It will probably be necessary, however, to utilise MAC airlift to and from Punta Arenas, and it would be prudent to allow for the possibility of "Edisto" dropping the party off at Deception Island en route from Punta Arenas to Palmer, and "Glacier" picking up the party while en route to Palmer from the Weddell Sea, should this not be included in Chilean plans. More information will be provided as Chilean plans become firm.

The shipboard party of five USARP biologists and perhaps a Chilean biologist will conduct research in the waters of the harbour at Deception Island using "Hero" as a platform. There will be some scuba diving. This programme will be coordinated with "Hero's" support of a field party in the Trinity Peninsula area. Most of these biologists will probably remain aboard "Hero" for the better part of the season, including sorties to relocate the Trinity Peninsula geological party at intervals of several weeks and periodic trips to Palmer Station.

"Hero"

After "Hero's" initial trip to Palmer Station in December and when all is in order and ship/shore compatibility has been established, mid-winter trawling will be conducted on the continental shelf within 100 miles of Palmer for a period of one to two weeks. "Hero" will then proceed to support the Deception Island (shipboard)/Trinity Peninsula parties. This will involve periods of two to three weeks as a research platform in Deception Harbour, followed by two to three days spent in the relocation of the Trinity Peninsula party, followed by return to Palmer Station for a period of three to four days, repeating this cycle for the remainder of the sea-

son. The periods at Palmer Station are planned for maintenance, upkeep and reprovisioning.

VIII. INTERNATIONAL WEDDELL SEA OCEANOGRAPHIC EXPEDITION, 1969 (IWSOE-69)

The second phase of the oceanographic survey of this little-known sea will feature:

- (1) Increased use of "Glacier's" oceanographic capabilities.
- (2) Retrieval of the Norwegian current meters implanted in IWSOE-68.

"Glacier's" capability to sample the ice-covered marine environment will be enhanced by the addition of equipment to retrieve cores of the deep sediments and to continuously record surface temperature and salinity. Several other improvements resulting from experience gained in IWSOE-68 will increase her efficiency as a research platform.

In order to optimise "Glacier's" unique capability to support diverse marine investigators, and at the same time to improve the compatibility of programmes dependent on differing ice conditions, a two-part Weddell Sea cruise over an 80-day period will be conducted.

IX. WINTER PROGRAMMES

Except for the commencement of the PAGEOS programme at Palmer and McMurdo Stations and reinstatement of the Geodetic Satellite tracking programme at McMurdo, the scope of the wintering scientific programme in Antarctica will remain essentially the same as during the 1968 austral winter. Due to the closing of Plateau Station and certain budgetary limitations, there will, however, be a slight reduction in the total number of wintering personnel participating in the long-term synoptic programmes at the U.S. stations in Antarctica. The forward scatter programmes that have been in existence for several years at McMurdo, Byrd, Pole and Vostok Stations will be discontinued in November, 1968.

The deactivation of Plateau will take place during the 1968-69 austral summer season. In discussions with the staff of the Naval Support Force, Antarctica, it was felt it would be

desirable to continue the micro-meteorology programme at Plateau Station, at least until January 25, 1969. This will allow the completion of an additional annual cycle of micrometeorology data. It is expected that the order of priority for the removal of programmes and equipment from Plateau will be aurora, geomagnetic, VLF, meteorology and micrometeorology.

The National Geodetic Satellite Programme (NGSP) is a national effort to establish the accurate positioning of approximately 50 stations in a world-wide network. The programme is divided into two phases, the geometric phase and the dynamic phase. In order to incorporate the Antarctic Continent into NGSP, it is planned that four stations will be occupied during the 1969 austral winter, the U.S. stations Palmer and McMurdo, and the Australian stations, Wilkes and Mawson. Occupation by these four-man teams constitutes the geometric phase, commonly referred to as PAGEOS (Passive Geodetic Satellite) or the BC-4 camera programme and involves the photography of a polar-orbiting passive satellite at an altitude of 2,300 miles, against a background of stars. Simultaneous photographs of the satellite are made from adjacent stations in the network on the islands and continents surrounding Antarctica. From the data obtained from this photography accurate directions between stations in the network can be computed and a network developed. The dynamic or Doppler phase of the programme involves the readout of Doppler signals of the lower altitude satellites to adjust the network developed from geometric phase to the centre of the mass of the earth. This programme involves only a two- or three-week period during the summer and is independent of weather.

Arrangements have been co-ordinated with the Australians to take four-man teams to Mawson and Wilkes by ship. It was originally planned that 13,000 pounds of equipment needed at each of these stations would be transported by ship as part of the regular Antarctic cargo movement. However, the urgent need for the equipment has resulted in

the decision to fly the equipment directly to Melbourne, and the Coast and Geodetic Survey will be responsible for this air movement.

The PAGEOS stations at Palmer and McMurdo will be operated by civilians from the Army Map Service (AMS). Arrangements will probably be made by AMS to fly the equipment to Valparaiso or Punta Arenas and Christchurch from where it can be surface transported and flown to the respective stations.

X. ANIMAL AIRLIFT

On or about December 1 it is proposed that approximately 60 penguins, 11 skuas, and 6 Weddell seal pups will be transported from McMurdo to the United States in the most expeditious manner possible. Stops for offloading animals in the United States will be required near San Deigo, California, St. Louis, Missouri, and New York City. It is anticipated that six to eight personnel will accompany the lift from McMurdo to care for the animals en route to the United States. A temperature of about 38° to 40° F. should be maintained in the aircraft cabin while in the air and on the ground at en route stops. Upon arrival of the aircraft at the designated offloading stops, transportation, and refrigeration equipment as required will be provided by the organisation receiving the animals.

(Continued from Page 126)

The sea began to freeze up in early March and with the absence of any high winds, had remained in the bay undisturbed. The purpose of the party's efforts was a two-fold one for they were also searching for a Weddell Seal which perished on the surface of the new ice during a sudden and prolonged drop in temperature. However, with the total darkness at that time of the year their search was not successful, for even the powerful lights the group were using could not penetrate sufficiently far enough.

JAPANESE ANTARCTIC SELECTIONS

Dr. Kou Husunoki, a good friend and correspondent of "Antarctic" over the years, has been appointed as leader of the 10th Japanese Antarctic Research Expedition, and he will be wintering-over at Syowa Station in 1969. In February he will be taking over from Mr. Masayoshi Murayama, Chief of the Second Polar Research who was in charge of the 9th JARE.

A total of 40 men will make up the 10th Expedition, and of these 28 will winter over, and the party will travel south in the "Fuji" which will be commanded by Captain Shigeo Matsushima, himself a veteran from Syowa Station.

The following members have been selected for 10th JARE:

Members of the 10th JARE

Dr. Kou Kusunoki (age 46)
Mr. Nozomi Murakoshi (42)

Leader (wintering), Glaciology
Deputy-leader (summer), Logistics

Kyoichi Ishika (35)
Shigenori Sakai (25)
Takehiko Suzuki (26)
Goro Kondo (43)
Yasusada Ota (29)
Minoru Masuda (34)
Kanji Hayashi (26)
Koichi Ogura (27)
Susumu Tokuda (25)
Yutaka Suzuki (27)
Dr. Hirohisa Hachisuka (39)
Hisao Ando (35)
Masaru Yoshida (30)
Kunio Omoto (27)
Renji Naruse (25)
Yutaka Ageta (24)
Shinpei Ishiwata (39)
Masao Inoue (36)
Sadao Takeuchi (33)
Yuji Maeda (28)
Hiroshi Okiyoshi (27)
Hiroshi Asano (26)
Shoichi Watanabe (30)
Katsuyuki Murakami (24)
Dr. Masamoto Kikkawa (35)
Minoru Yagi (29)
Koji Seki (27)

Wintering

Meteorology (synoptic observations)
Meteorology (synoptic observations)
Meteorology (synoptic observations)
Physical meteorology
Ionospheric physics
Geophysics (aurora, seismology, ocean tide)
Geomagnetism and aeronomy
Cosmic rays
Radio wave physics
Aeronomy
Human physiology
Geology, glaciology
Geology
Geomorphology, navigation
Glaciology
Glaciology
Chief mechanic
Diesel engineer
Mechanics
Mechanics, electrician
Radio operator
Radio operator
Cook
Cook
Surgeon
Logistician
Logistician

Summer

Ryoki Saruwatari (31)
Ryoji Higano (38)
Eiji Takahashi (38)
Dr. Jiro Mishima (39)
Shoji Hashizume (34)
Kikuo Yamawaki (25)
Kohachior Kirihara (24)
Shuichi Goto (45)
Tadamitsu Yamanaka (32)
Masashi Sano (27)
Minoru Machida (21)

Oceanography (physics)
Oceanography (chemistry)
Oceanography (biology)
Biology
Surveyor (aerophoto)
Rocket engineer
Construction engineer
Aeroplane pilot
Aeroplane mechanics
Logistician
Logistician

NEWS FROM SOUTH AFRICA

METEOROLOGY

As usual, meteorological routine observations consumed the time and attention of the three meteorologists at SANAE base, especially as the floor of the balloon filling hut is already about 45 feet lower than the surface outside — and since the new station will not be built next year but the year after, this hut will have to receive separate and special attention.

The present meteorological team recently performed a feat by finding a box containing an instrument, which was snowed under more than a year ago. This instrument could not be installed immediately after arrival due to missing parts and was inadvertently left with others without a suitable note. The instrument, a Foxboro-thermohygrograph, was badly needed, as it utilises a lithium chloride dew cell to measure humidity and was required to replace a similar defunct instrument. Apparently even the dew cell, however, although relatively useful at low temperatures, is not quite reliable at very low temperatures. The best method for measuring humidity on the Antarctic appears to be the sophisticated cooled mirror technique, which is, unfortunately, less suitable for routine observations at relatively small outposts.

MEDICAL RESEARCH

During 1967 two main lines of research were undertaken. The one was in conformity with the proposals of SCAR's Working Group on Biology. It entailed studies on physical activities and adaptation, ambient conditions and 24 hours' life rhythm with special attention to alteration of patterns. In addition studies were carried out on comfort adaptation, body temperature, maximum oxygen intakes and metabolic reactions to a range of air temperatures after different periods of stay; frustration tolerance affecting the performance

of a small isolated group; virology and bacteriology of a secluded community and nitrogen balances under cold stress and the effect of ascorbic acid thereon.

The work has successfully been carried out by the physiologist and the medical officer in charge with the willing co-operation of the team members. A mass of data and biological specimens has been collected and awaits analysis. A paper on some of the results of 1967 has been published in the March, 1968, edition of "The Journal of Applied Physiology"* and can be summarised as follows:

"A very fat and an average man were exposed for two-hour periods on three different occasions at each of the air temperatures of 27, 20, 15, 10, and 5° C. Measurements were made of metabolic rates and skin and rectal temperatures. In these ranges of air temperatures, the average skin temperature of the fat man was lower than that of the average man. Heat conductances of the average man were twice those of the fat man. A sharp increase in metabolism occurred when the average skin temperature fell below 30° C. in the average man and below 25° C. in the fat man. This suggests that the latter became habituated to a lower average skin temperature. Heat conductances of both men fell sharply to minimum values as the average skin temperatures fell to 27° C. These results suggest that, in cold conditions, vasoconstriction of peripheral blood vessels is directly related to the level of skin temperature whereas the relationship between skin temperature and shivering is influenced by other factors, such as habituation to cold, depth of sleep, etc."

During 1968 no active programme at the Antarctic base is being carried out. Working up of the data will extend well into 1969.

* Wyndham, D. H., Williams, C. G., and Loots, H., Reactions to Cold, *J. Appl. Phys.*, 24: 282, 287, 1968.

PROGRAMME ON COSMIC RAYS

A 3NH-64 neutron monitor is in continuous operation at SANAE from February, 1964, onwards. The monitor pile, weighing about 3 tons, is encased and thermally insulated in a steel container, and was mounted in a hut on scaffolding 10 feet above the surface of the snow. Due to a 5 feet annual rise in the snow level, the monitor pile and hut had to be raised another 10 feet after two years, in January, 1966, and will be lifted again in January, 1969, after being at the same level for three years. At the moment there is still a cavity with about 3 feet clearance below the floor of the hut, with a piling up of snow on the sides, in particular in the down-wind direction.

When the monitor was set up at SANAE, boxes with paraffin wax were placed underneath and on the sides of the monitor pile, in order to simulate the outside environment. This was done as a precautionary measure to reduce any effects of the rising snow level on the counting rate of the instrument. It was found that the snow has little effect on the counting rate, notwithstanding the precautionary measure. Recently, this effect of snow was also observed for monitors on solid earth, when during the winter snow has accumulated around the monitor hut.

The short term variations of cosmic radiation at SANAE are of particular interest because SANAE is situated such that a gap in the distribution of the asymptotic directions for neutron monitors over the globe is filled. Attention is also given to the daily variation of cosmic rays at SANAE. With the elimination of the snow effect, long term variations will also be investigated.

In addition to the neutron monitor recordings on the cosmic radiation, the programme includes also stratospheric measurements with radiation detectors carried aloft by balloons. A 30 MHz riometer records the absorption of cosmic radio noise due to enhanced ionization in the ionosphere by electrons from the Van Allen radiation belts and by auroral electrons. When a balloon has reached level in the stratosphere,

X-ray bremsstrahlung from electrons precipitating into the upper atmosphere, is seen simultaneously with absorption of cosmic noise on the riometer.

Both the investigations on cosmic radiation and cosmic noise absorption events are of particular interest at SANAE, because of the Cape Town Magnetic Anomaly and the Radiation Anomaly, which is a consequence of the Cape Town Magnetic Anomaly. Since the magnetic field of the earth has its smallest intensity on the surface of the earth at the South Atlantic Ocean, the mirror points of many particles trapped on the magnetic field lines are well within the atmosphere or even below the surface of the earth. Consequently, these particles are absorbed in the atmosphere in this region. The relation of these precipitation effects with magnetic storm and solar flare effects is of particular interest.

Geology

A geophysical traverse on the ice bank 40 miles from SANAE, is planned for September. The Geologists will do field work in the Ahlmanryggen region during October.

Whistler Programme

Arrangements are being made for the inclusion of a programme embracing the recording of Whistlers, SEA's and micropulsations at SANAE. This programme will be co-ordinated by Prof. N. D. Clarence of the University of Natal. The work on whistlers started at the beginning of the IGY and has during the past five years met with considerable success. Records from a high latitude station such as SANAE will be a valuable addition to the Durban records. The programme is planned for 1970.

Biology

A meeting of the Biological Subcommittee of the South African Scientific Committee for Antarctic Research held in Pretoria on Monday, June 10, 1968, was attended by Dr. M. Holdgate and Dr. N. M. Wace of the Royal Society, who had just returned from Gough Island and Tristan da Cunha where they fol-

lowed up research work done by the 1955-56 Gough Island Scientific Expedition. Collaboration in biological research in the Southern Ocean Zone was discussed at the meeting.

Miscellaneous

Midwinter's Day was, as usual, one of the highlights of the year. Over 50 messages of goodwill were exchanged with other research stations in Antarctica. Prior to the 21st much painting and cleaning up of the base was done. The kitchen was decorated with brightly coloured paper, balloons, etc., and was very impressive, especially with a lovely laden table by candle light. Bryan Meyer, whose turn it was to be cook, turned out an excellent meal. Everyone enjoyed himself thoroughly.

The scientific members of SANAE X, leaving for Antarctic during December, 1968, have all begun their training. The other posts are gradually being filled. The team will again be assembled in Pretoria by the end of November where they will receive training in the art of cooking, fire fighting, mountaineering, etc.

TENTH SCAR MEETING AT TOKYO

The New Zealand National Committee on Antarctic Research was represented at the 10th SCAR Meeting at Tokyo by Dr. R. W. Willett (Chief Delegate), Dr. R. D. Adams, and Mr. R. B. Thomson.

Dr. Willett has reported on the meeting as follows:

The first Plenary Session opened at 10 a.m. on Monday, June 10, and the Final on Friday, June 14. During the week there were two meetings of the "ad hoc" Working Group of delegates and part of one afternoon was devoted to an illustrated lecture on the work of the Geology Working Party and the Solid Earth Geophysics Working Party.

As Chairman of the Geology Working Party Dr. Willett took the chair at a well-attended session and introduced Dr. Adams (N.Z.) who spoke on the geophysical work in Antarctica, and Dr. Adie (U.K.) who spoke and showed coloured slides of various parts of the Continent.

FIRST PLENARY SESSION

The First Plenary Session was under the chairmanship of Prof. L. M. Gould, and all SCAR countries except Chile were represented, together with delegates of five International Unions (IUGS, IUGG, IGU, URSI, WMO) and observers (IUCSTP, SCOR).

At the Opening Ceremony, Dr. Sin-itiro Tomonaga, President of the Science Council of Japan, and Dr. Kiyoo Wadati, Chairman of the Local Organising Committee, welcomed the delegates to the 10th Meeting of SCAR, and Dr. L. M. Gould, President of SCAR, expressed SCAR's great appreciation for the kind invitation to hold the tenth meeting in Tokyo.

The business of the meeting consisted of the acceptance of reports of executives and working groups.

1. **SCAR Constitution.** — Changes in the Constitution which provide for officers to be appointed for periods of four years were accepted and approved by ICSU.
2. **SCAR Working Groups.** — Reports were received from Working Groups on Biology, Geodesy and Cartography, Geology, Glaciology, Logistics, Communication, Meteorology, Oceanography, Solid Earth Geophysics and Upper Atmosphere Physics. From some of these groups recommendations were accepted.

Biology Group will meet at Cambridge July 27 to August 3, 1968.

Geodesy and Cartography seek a meeting of the Group in 1970.

Meteorology seek to meet at next SCAR Conference in 1970.

The Report by the Working Group on Oceanography was received and a recommendation concerning the transmission of oceanographic data was adopted.

Upper Atmosphere Physics stressed in their report that the National Committee should reconsider their membership with a view to a more effective Working Party.

3. **SCAR Groups of Specialists.** — Reports were received from the following SCAR Groups of Speci-

alists: Quarternary Studies Group, Ice Core Studies, Ice Shelf Studies, Pace Ice Zone, Benthos.

4. **International Antarctic Meteorological Research Centre.**—It reported that a booklet describing its facilities was distributed widely during 1968 and the leader expressed disappointment that no research meteorologists were taking advantage of grants available through WMO and ICSU to work at the Centre. The recommendation was adopted urging encouragement to young workers to work in Melbourne.
5. **Relations with other ICSU Bodies.**—Reports were received from all the bodies of ICSU in whose work SCAR has an interest. Of particular interest was a report on SCAR by S. E. Hemmen of the SCOR Executive Meeting. It was agreed to inform SCOR that SCAR supported the SCOR proposal that IOC establish a Co-ordinating Group for the Southern Ocean but SCAR expected to retain responsibility for the development of marine science programmes in Antarctica in close collaboration with SCOR.
6. **Relation with Inter-Governmental Bodies.**—Antarctic Treaty Organisation. A recommendation was accepted seeking National Committee comments on pelagic sealing.

Geological Map of Antarctica — A Report by Dr. R. J. Adie, SCAR representative on the Commission of Geological Map of the World, was received.

FINAL PLENARY

The Final Plenary Session accepted the recommendations of the ad hoc Working Group of delegates, the Finance Committee and those of the Working Group on Geology and Solid Earth Geophysics.

NEW VICE-PRESIDENT

Admiral Panzarini of Argentina was, under the Constitution, due to step down from the office of Vice-President. The vacancy thus created was filled by the election of Dr. G. A. Avsiuk (USSR). In recognition of Admiral Panzarini's services to SCAR he was unanimously elected an Honorary Member.

POSSIBLE TRANSFER OF HISTORIC HUT

Two interesting suggestions have been put before members of the ANARE Club in Australia to preserve the historic hut used by Mawson in his 1912 expedition at Commonwealth Bay.

The building was originally donated to Mawson by the Timber Merchants of Sydney, and construction commenced on January 20, 1912, and the hut was again used during the BANZAR Expedition in 1931. Then it remained unvisited until a party called there during 1962. They found that all the skylights had disappeared, and consequently the hut had filled with hard-packed snow. Commonwealth Bay lies in the area appropriately named "The Home of the Blizzard", and nature's icy sand-blast had worn the tongue and groove pine roof covering a quarter of an inch down in places. Even though the structure looks solid enough today, another twenty years of such weathering will be sufficient to allow weakened timber to blow off and the hut will disintegrate and be blown away.

Therefore Mr. Bill Burch, a member of the 1962 visiting party, has suggested two alternatives to the ANARE Club Council. The first is to seal the weathered pine timber with a modern-day resin and dig out and make drift-proof the hut, and leave it on its present site for the extremely rare visitor to see. The second alternative is to carefully dismantle the whole building, and reconstruct it faithfully on a site in Australia, so that all Australians might have the chance to visit this historic building.

While leaving it on the site would be the ideal solution, the question of maintenance might prove so costly as to be prohibitive, especially in view of the remote and inhospitable site.

Mr. Burch favours the second alternative provided that approval of the appropriate Antarctic authority can be obtained, and funds are available for the transfer and reconstruction. His suggestion is to allow a five-

year period of preparation and have an expedition timed for the summer of 1973-74. If the building is repatriated, a logical location might be the Mawson Institute at Adelaide University where Sir Douglas spent the bulk of his academic career.

BRITISH ANTARCTIC SURVEY NEWS

SEVERE ILLNESS AT THE ARGENTINE ISLANDS' BASE

At the end of June, 1968, a message was received that Kenneth Portwine, the cook at the British Antarctic Survey geophysical observatory on the Argentine Islands, appeared to be suffering from ulcerative colitis. As there is no medical officer at the Argentine Islands the diagnosis had been made by radio by Dr. Michael Holmes who is stationed at Stonington Island, some 240 miles further south.

A specialist in colonic diseases, Professor J. C. Goligher of the University of Leeds, was immediately asked to advise on the case, and he confirmed Dr. Holmes' diagnosis as probably correct and advised immediate treatment.

As a result of a request to the Argentine Government for help, drugs were successfully dropped to the British base by an Argentine Naval C-54 aircraft on July 17. Later, on July 29, an Argentine Beaver aircraft from Teniente Matienzo Station, with a crew of four including a doctor, landed on Skua Island (one of the Argentine Islands group), and attempted on August 9 to fly the sick man north to the Argentine base Esperanza. Unfortunately, there is no flat ground on the islands suitable as a runway and the aircraft crashed on take-off and was badly damaged. We are thankful to say that the passengers and crew escaped unhurt and the sick man was returned to his bed at base.

The Argentine icebreaker "San Martin" also left Buenos Aires on August 9 and on the 19th was able to get near enough to base to fly Portwine out by helicopter, and he is now safely on the way to hospital.

The whole operation has been another wonderful example of the

unstinted international co-operation which characterises Antarctic activities in the spirit of the Antarctic Treaty. The British Antarctic Survey is deeply grateful to the Argentine Navy for their splendid assistance in this emergency.

NEWS FROM OTHER BASES

Field work from Halley Bay has ceased for the winter period but routine programmes at base continue as usual. A preliminary analysis of the VLF goniometer results obtained last year indicate that Halley Bay has great potential as a site for whistler recordings.

In the Antarctic Peninsula area, topographical, geological and geophysical surveys were extended from Stonington Island northwards towards Horseshoe and Blaiklock Islands, and one field party spent over four months away from base.

Biological programmes are being continued throughout the winter at Signy Island in the South Orkneys. These include work on the biology of petrels and Weddell seals, and on the ecology of small invertebrates inhabiting soils beneath the sparse vegetation. The ways in which sea-floor organisms are affected by the formation of fast ice are also being investigated by aqualung divers operating through holes cut in the ice.

ANNIVERSARY CELEBRATIONS

A reception was held at the Royal Lancaster Hotel, London, on Mid-winter's Day, June 21, to celebrate the centenary of Scott's birth and the 25th anniversary of the Survey. Nearly 400 people attended.

AUSTRALIAN FATALITY IN ANTARCTIC

An Australian radio officer at Wilkes Station died unexpectedly during studies in the field at a glaciological station 52 miles east of Wilkes Base, on July 22, 1968. He was 38-year-old Mr. Reginald Noel Sullivan of Adelaide, South Australia, married, with two young sons. Mr. Sullivan, who died of natural causes, had been in Antarctica for six months. Previously he had served in the Australian Army for 15 years. Mr. Sullivan's body was brought back to Wilkes Base for burial.

ANTARCTIC STATIONS

13
**AMUNDSEN-SCOTT
 SOUTH POLE STATION**
 by Henry M. Dater
 (Continued)

FIRST WINTER

On February 21, the last airdrop was made. Then 18 men, equally divided between the scientific party and the naval support group, were left to face the long Antarctic winter. Whatever may have been their fears, they had plenty to keep their minds and bodies busy. Lt. Bowers and his crew had put up the buildings and installed the utilities but left much of the interior work to the station's winter residents. The wintering party dug a 1,000-foot tunnel out to the seismometer pit, and they drove a mine shaft almost 100 feet into the snow beneath the camp. While primarily for water, the snow mine also served in glaciological studies. Besides glaciology and seismology, work was done on aurora and air-glow, geomagnetism, gravity measurements, ionospheric physics, and meteorology.

Shortly after he arrived, Dr. Siple dug a pit down to about 20 feet and measured the temperature of the snow. It was -60° F. Temperatures at this depth approximate the annual mean surface temperature, and at the South Pole this has worked out to be -56° F. Dr. Siple also believed that the coldest would be about double the pit temperature, or -120° F. Actually, it has not yet sunk quite that low, the coldest being 113.3° F. below zero, recorded in July, 1965.

With the coming of the winter night, the men settled in. Earlier apprehensions gradually vanished, and a routine was established. All this has been described admirably by Dr. Siple in his book, *90° South* and in articles in the "National Geographic Magazine" and elsewhere, as have the occasional irritations between navymen and civilian scientists. These incidents are perhaps inevitable. As recorded by Dr. Siple, they seem little different from those

set down by Dr. Wilson in his *Diary of the "Discovery" Expedition*. Probably, neither group will ever completely understand the mentality of the other.

The time passed quickly. Before they knew it, the first men to winter at the Pole were on their way home, some with books unread and personal projects uncompleted. By December 1, 1957, the original crew had been relieved by 18 others. The second scientific leader was Mr. Palle Mogensen, a retired army officer, who the previous year had pioneered the trail from Little America to Byrd Station. Lt. Tuck was not replaced, and, as at other small U.S. stations, the medical officer, Lt. Vernon N. Houk, did double duty as doctor and officer-in-charge of military personnel. This arrangement still persists at Pole.

SCIENTIFIC STUDIES AND TRAVERSES

The station's winter population has remained remarkably stable through the years, varying only from 17 in *Deep Freeze IV* (1959) to 22 in *Deep Freeze 64* and *65*. Currently it is 21. In part, this stability arises from the fact that the scientific programme has changed little over the years. During the IGY, of course, it was fixed. After 1958, biology and geology were added to the Antarctic scientific programme, but the South Pole offered no opportunities in either of these fields, so the principal scientific effort has remained in the various aspects of upper atmosphere physics. Six of the 11 projects being carried on during 1968 are in this field. Present studies include auroral observations, measurements of the Earth's magnetic field and of cosmic ray intensities, recording fluctuations in the ionosphere's electron density, and investigations of extremely-low-frequency and ultra-low-frequency radio phenomena. The South Pole also participates, along with Byrd and Vostok Stations, in the Antarctic radiometer programme, and with those stations and McMurdo in the

forward-scatter programme. In the field of earth physics, seismological observations — which have been part of the science programme since the station opened — are still being made, and to them have been added measurements of fortnightly earth tides. Meteorology is another programme that has been continuous since 1957. Two years ago, psychiatrists commenced a study of sleep patterns, using recently developed techniques.

The use of aircraft to establish and maintain the station has not stopped overland travel to it. The first visitor to arrive by surface transport was Sir Edmund Hillary, at the end of his depot-laying traverse for the Commonwealth Trans-Antarctic Expedition. Leaving Scott Base on October 14, 1957, with a Weasel, three Ferguson tractors, and two dog teams, he ascended to the polar plateau by way of the Skelton Glacier, reaching the South Pole on January 4, 1958. Fifteen days later, the expedition's Trans-Polar Party, led by Sir Vivian Fuchs, appeared with two Weasels, three Sno-Cats, a Muskeg tractor, and two dog teams. Their journey had started at Shackleton Base on the shore of the Weddell Sea on November 4, 1957. After a few days' rest at the Pole, they continued on their way, following the trail laid out by Hillary to Scott Base, where they arrived on March 2. Subsequent overland "tourists" have included a Soviet party from Komsomolskaya in 1959, two United States traverses, one from Byrd Station and the other from McMurdo Sound, in 1961, and an Argentine expedition in 1965.

During **Deep Freeze 63**, a scientific traverse operated out of the South Pole Station. By this time, however, an important change had occurred in method of resupply and support. The U.S. Air Force had succeeded in fitting large Hercules C-130 aircraft with skis for operation in Greenland. The first tests of these aircraft in Antarctica occurred in January 1960, when an Air Force squadron flew to McMurdo Sound. The first landing of a C-130 at the South Pole was made on January 28. The advantages of these aircraft over the Globemaster was immediately apparent.

Delivery on the surface made expensive parachutes and special packaging unnecessary, and avoided the damage and loss of cargo inevitable in any airdrop. Station crews no longer had the arduous job of collecting cargo from the drop zone, sorting and assembling it, and hauling it, frequently over considerable distances, to the station. Instead, the aircraft landed close by and its contents were unloaded directly on to sleds.

Even before the Air Force carried out its successful demonstration, the Navy had ordered four of these aircraft. The version obtained by the Navy was an improved model with greater range and carrying capacity. The revolutionary effect of these Hercules (LC-130F) aircraft on United States Antarctic operations is a well-known story, and South Pole Station was a prime example. During their first years, the Hercules delivered only dry cargo, while fuel continued to be parachuted from Globemasters, but in **Deep Freeze 63**, a Hercules was fitted with a large fuselage fuel tank, from which fuel could be pumped directly into storage bladders at the station. During the following season, this type of fuel delivery was adopted for all of the United States' inland stations.

Not only could supplies and fuel be moved more efficiently than before but so could personnel. This was dramatically demonstrated on October 30, 1961, when a ceremony was held to commemorate the 50th anniversary of the discovery of the South Pole by Amundsen and Scott. The governments of Norway and the United Kingdom gave the station a plaque, and their representatives were present, as were those of New Zealand, the National Science Foundation, and the United States Navy. In January 1957, it had been necessary to hold the dedication ceremony at McMurdo because it had been impossible to transport that many extraneous people in the types of aircraft then available. The 1961 anniversary ceremony showed how much the ability to move construction and other summer support

personnel in and out of the station had improved.

REHABILITATION

The station's construction would have proved quite satisfactory if, as originally expected, the United States had withdrawn from Antarctica at the end of the IGY. When, however, it was decided to remain indefinitely, the inherent structural weakness quickly became apparent. Snow piled up over the buildings, and as they sank below the surface, the ice, which is plastic, moved in from all directions, crushing the station, as if in a giant vise.

At first, it was planned to replace the original South Pole Station with a type of under-snow construction first developed by the United States Army at Camp Century in Greenland. Basically, this technique called for digging tunnels in the snow, and placing the buildings inside them in the expectation that the snow would blow over the level surface and not pile up in drifts. Byrd Station, which was more immediately threatened, was rebuilt in this manner at a new site between 1960 and 1962.

Precipitation at the South Pole, however, is considerably less than at Byrd Station, and an extensive engineering survey carried out during **Deep Freeze 62** showed that a rehabilitation and improvement programme would assure several additional years of useful life. At the same time, it was decided to improve and enlarge the rather austere facilities provided for the limited period of the IGY. The next two seasons were ones of concentrated activity. Snow was removed from older buildings, tunnels and roofs were repaired, and ribbed metal arches were erected to protect the structures from overhead pressures. Many new buildings were erected to accommodate science projects and to insure better living conditions. Construction tapered off during **Deep Freeze 65**, and since then has been pretty much limited to routine maintenance and repair.

At the present time, the station has 27 buildings, exclusive of Jamesways.

Over half the buildings, 14 in all, accommodate the various scientific projects; some of these are quite specialised and small. There are two sets of quarters and two buildings housing generators. The following each occupy a single building: communications, mess hall, dispensary, recreation, garage, and shop. Three buildings are simply listed as miscellaneous. Fuel capacity, using 10,000- and 25,000-gallon fuel bladders, has been built up so that small reserve stocks are available. The South Pole, which in 1957 was at the end of the line, has in recent years been used as a staging base for Plateau Station and to support the South Pole-Queen Maud Land Traverse. Air facilities consist of a 14,000-foot skiway equipped with some landing aids, such as GCA. In addition to United States aircraft, the Argentines have landed at the South Pole on two occasions.

Considering the uncertainties that surrounded its birth, Amundsen-Scott South Pole Station has had a surprisingly long life. The United States built seven stations for the IGY. Little America V was abandoned in 1959, and Ellsworth Station — also built on permanent ice — has long since been closed down. Byrd Station has been rebuilt, and Wilkes, turned over to the Australians in 1959, has reached the end of its day and is being replaced. Since 1965, Hallett has been occupied only during the summer. When the Australians move to Wilkes REPSTAT, South Pole and McMurdo, alone of the "Seven Cities of Antarctica", will remain active on a full-time basis.

OBITUARY

Alan Blyth, who was officer in command at Wilkes Station in 1966, died suddenly in Australia in December, 1967. He had served with the Australian Fourth Field Regiment in New Guinea during the war as Lieutenant-Colonel, being awarded the D.S.O. for parachuting into the Ramu Valley during the Japanese occupation.

NEWS OF THE SUB-ANTARCTIC ISLANDS

CAMPBELL ISLAND

(NEW ZEALAND)

Reg Blezard, the Officer in Charge at Campbell Island, reported by radio telephone on August 21 that the 1968 winter to date had been quite mild, with only an occasional "low" or freeze-up. As a result of one storm half of the wharf store roof was blown away, one of the navigation beacons was flattened, and a stack of empty oil drums broke loose, causing superficial damage to the power house. Frozen water pipes delayed a couple of radiosonde flights and created a minor inconvenience to the domestic system, but was far from the extent to which their counterparts at Macquarie Island were affected.

June saw U.S.N. "Eltanin" in the harbour and the ten Campbellites gave Commander Thornton a warm and appreciative greeting. On board were two lady scientists who were likewise warmly welcomed as was an old friend, Bill Lucy, the leader of Vanda Station this coming year. Technical stores, fresh food and mail were carried ashore with a small party from the ship's company and scientists. A whirlwind party and brief tour of the station took place before "Aurora" escorted the visitors half way down the harbour as a farewell gesture.

A solid programme of overhaul of the base filled the winter months, plus the traditional painting spree, renovations and laying-up "Aurora" kept all hands busy. Work on the station survey was given a novel embellishment when the true meridian was determined by celestial

observation, a rare opportunity under Campbell skies. With this fairly accurate orientation, coupled with an earlier satellite position fixes correct to within a quarter of a mile, the rest is up to the cartographers.

Midwinter was indulged with due custom, the cook providing a magnificent buffet dinner lasting nine hours.

The study of the Royal Albatross has continued, and many other species have been banded, and some first sightings have been added to the Campbell Island list. Nearly all hands contributed to a modest collection of intertidal fauna and plankton stations during the year, and tramping parties have brought in additional specimens for an already abundant entomological collection. Localised counts and general observations of phocidae and otariidae have been recorded, although no branding was done this year. To date this season no member of the order cetacea had put in an appearance for the visitors' book! Preparations for the next season included the survey for a helicopter pad and a new scientific building which will house equipment for auroral investigations. Consequent upon the installation of the latter, the station power supply logistics have been reassessed to permit the continuous running of two diesel generators next year. This will free the incoming Expedition from many time-honoured domestic restrictions and brighten the night life of Beeman City.

In concluding his report, Reg paid a tribute to Les Quartermain and the printers of "Antarctic" for the splendid job they have done in the past.

The 1968-69 Expedition personnel at Campbell Island are:

Officer in Charge: B. A. C. Smith.
Mechanic: N. D. Robertson.
Telecommunications Technician:
M. J. Bell.
Cook: E. H. Creed
Electronics Technician: C. J. Jacobson.

*Electronics Technician: A. J. Ellis.
Senior Met. Observer: R. J. Taylor.
*Met. Observer: B. T. Dowie.
*Met. Observer: J. R. Powell-Phelps.
*Met. Observer: J. N. Walden.

* For the summer season only.

MACQUARIE ISLAND (Australia)

One of the problems on Macquarie Island is over-population, which is threatening to destroy one of the world's most remarkable wildlife sanctuaries.

At the last census of sea-elephants the final number of completed forms showed 110,000, ranging in size from new-born pups to scarred old veterans weighing up to five tons. Their propensity for mud-wallowing has turned areas of the island into stinking swamps.

Rabbits, introduced by the early sealers, have multiplied like rabbits and are creating an erosion problem in the thin topsoil which supports the native vegetation, and the island is riddled with their burrows.

Another animal left behind by the sealer was the domestic cat, including at least one ginger cat. These have since become extremely fierce and have assisted in keeping down the number of rabbits. However, they are also most partial to a meal of chicks of the rare and beautiful birds which nest on Macquarie Island. Most of the present cats are ginger.

AMERICAN STATION'S LOW TEMPERATURES

The coldest temperature ever experienced at an American station in the Antarctic was recorded at Plateau Station on July 19. It was -122°F. , less than five degrees off the record low temperature recorded at the Soviet Vostok Base, 850 miles from Plateau Station. The previous lowest temperature at Plateau Station, which is also the smallest scientific station, was -121.4° , registered on August 24, 1966. Eight men are wintering at the station, which lies about two miles above sea-level and rests on the surface of an ice cap one and a half miles thick. The American record lasted one day—for on July 20 the temperature reached 123.1°F. below zero.

The present world record of cold at Vostok, -126.9°F. , was also established on August 24, 1966.

POLAR FARMS "POSSIBLE"

It was conceivable that the Antarctic wastes could be productive farms in the future, Professor P. F. Low, the Professor of Soil Chemistry at Purdue University, Lafayette, Indiana, told the International Soil Science Congress at Adelaide on August 6.

He said that heating from electrical cables, such as those used beneath American football fields and golf courses during winter, could transform snowy wastes into productive fields.

It was not beyond the realm of speculation, he said, that plants could be evolved by plant breeders to grow in such areas.

Russian scientists used coal dust on the soils in northern regions to melt snow faster at spring.

POLAR FLIGHT PLANNED FOR AMERICANS

Sixty Americans have paid deposits on a round-the-world flight planned to take them to the South Pole.

They will each pay \$U.S.10,000 for the trip which will take about 26 days, land them on every continent, and cross both polar regions.

They will fly in a four-engined Convair 990 jet aircraft.

The organisers of the trip are the directors of the Admiral Richard F. Byrd Polar Centre in Boston.

The flight will leave Boston on November 8 for Thule, Greenland, on the way to the North Pole, then down to Anchorage, Alaska, and across the Pacific to Japan, the Philippines, Darwin and Sydney to Christchurch.

The party will be in New Zealand from November 19 to 22, and from Christchurch will be flown to McMurdo Sound.

From McMurdo the jet overflies the South Pole to Punta Arenas, in Chile, on to Rio De Janeiro, across the Atlantic to Dakar, Senegal, Rome, London, and Boston.

The flight will be led by Commander F. G. Dustin, a veteran of six Polar expeditions, and an advisor to Admiral Byrd.

Antarctic Ice from Time of Christ is Melted

An unusual event took place at the U.S. Naval Academy on July 10, 1968, in another illustration of scientific co-operation between the National Science Foundations' Antarctic Research Programme and Operation DEEP FREEZE.

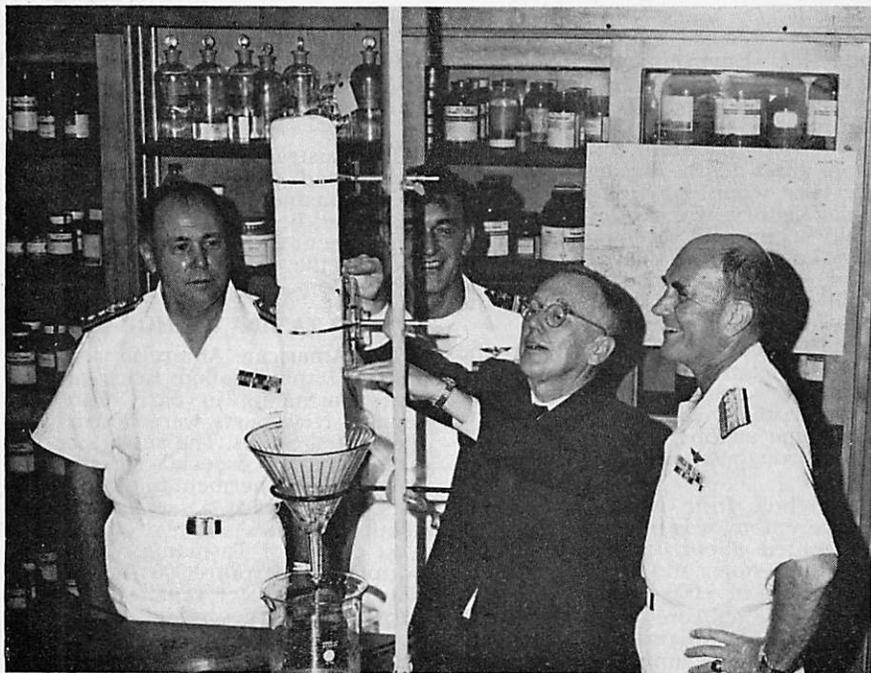
Ice which fell as snow near the present location of Byrd Station, Antarctica, in approximately the year of the birth of Christ, was ceremoniously melted into water.

The ceremony took place in the Maury Hall chemistry laboratory of the Academy. Three infra-red lamps were used to melt the ice core into a large beaker.

Four speakers took part in the ceremony. Rear Admiral J. W. Kelly, Chief of Naval Chaplains (and formerly senior chaplain at the Academy) gave the prayer. He said, in part:

"No matter where man may reach, You (God) are there—in the depths of ice—in the heights of space—"

Rear Admiral J. L. Abbot, Jr., Commander, U.S. Naval Support Force, Antarctica, explained that the ice was brought up during last summer season from Byrd Station. He had requested that a column spanning the depth from 842½ to 857½ feet be returned to the United States.



MARKING THE ICE CORE.

Abbot said, "Our best calculations show that the ice from a depth of 842½ feet to 857½ feet almost certainly contains at least some molecules of snow which fell during the year Christ was born."

The three five-foot long columns of ice were flown from Byrd Station to McMurdo Station by ski-equipped C-130 Hercules aircraft and then brought to Baltimore by the U.S. Coast Guard icebreaker "Westwind". They were brought, still frozen, to the Naval Academy, via Washington, D.C., by car.

Some of the melt water was given to Chaplain Kelly to be sent ultimately to the Vatican. Another portion of the water will be added to water from each of the seven seas and used in the Naval Academy's traditional ring dipping ceremony to add a religious significance to this recognition of nautical and academic achievement. Due to the very limited quantity, the melt water could not, of course, be made available to the public.

Dr. T. O. Jones, Director of the National Science Foundation's Division of Environmental Sciences, reviewed the history of ice drilling in Antarctica. Since the International Geophysics Year, 1957-58, scientists have tried to obtain samples of ice from great depths, because a vertical ice core would provide a profile of polar history. In 1966, the U.S. Army's Cold Regions Research and Engineering Laboratory (CRREL) of Hanover, N.H., developed and tested a drill capable of sampling ice all the way through the thick ice cap.

On January 29 of this year the CRREL team broke through the ice cap at Byrd Station and hit bedrock at a depth of 7,100 feet. It was the first time anyone had drilled all the way through Antarctica's continental ice cap.

The hole from which the ice for the ceremony was obtained, however, is located about 75 feet from this 7,100-foot hole, and only penetrated to a depth of 1,000 feet.

With the ice cores from the 7,100-foot hole scientists can investigate rate of snow accumulation, seasonal temperature variations and average annual temperature, rate of deposi-

tion of meteoritic material, and the composition of the earth's atmosphere from ancient times as recorded in air trapped in the ice.

TABLE OF DISTANCES

(In Nautical Miles: 1 nautical mile equals 1.1 statute miles; 1 statute mile equals 0.91 nautical mile.)
Davisville, U.S.A., to

McMurdo Station	.....	.....	10,855
Christchurch to McMurdo	.....	.....	2,080
McMurdo to Byrd	.....	.....	801
McMurdo to South Pole	.....	.....	730
McMurdo to Plateau	.....	.....	1,224
McMurdo to Hallett	.....	.....	338
McMurdo to Palmer	.....	.....	1,832
McMurdo to Mirny	.....	.....	1,370
McMurdo to Vostok	.....	.....	695
McMurdo to Wilkes	.....	.....	1,179
McMurdo to Mawson	.....	.....	1,640
South Pole to Byrd	.....	.....	600

* * *

In June, 1968, "Aurora", the official journal of the A.N.A.R.E. Club, celebrated its fifth birthday. Edited by Frank Smith, it covers all aspects of the Australian Antarctic Stations and gives news items of those who have served in previous years.

* * *

The Australian Antarctic Division which had previously been under the Department of External Affairs, has now been transferred to the Department of Supply, with which it has in the past had many close associations.

"ELTANIN" AT HOBART

The American Antarctic research ship "Eltanin" called twice at Hobart, Tasmania, in early July for repairs. New parts were flown from the United States. The vessel's activities were of especial interest to Tasmanian fishermen for her scientists discovered a sea mountain about 150 miles south of the southwest corner of Tasmania, where the bottom rose from 1,900 fathoms to 700 fathoms. After repairs had been carried out the vessel proceeded about 1,000 miles south of Hobart for routine oceanographical survey work before proceeding to Adelaide where she was scheduled in August.

TIPS FOR PHOTOGRAPHY IN ANTARCTICA

American authorities have supplied the following tips for photography in the Antarctic.

All photographic equipment should be winterised before your arrival in Antarctica. There are no camera repair or winterising facilities at U.S. Navy stations so it is advisable to check with the manufacturer or camera dealer to determine what winterising will be necessary.

The major problems with camera operation in the Antarctic are cold and condensation. For casual shooting cameras should be carried under the parka where they will be kept warm and removed only for picture taking. Keeping the camera reasonably warm outdoors will eliminate the problem of condensation forming when a cold camera is brought into a warm building.

The condensation problem can be minimised after extensive outdoor work by wrapping the camera in a plastic bag before bringing it indoors. The wrapped camera then can be stored near a colder area—on the floor or near the door—where it will warm to room temperature gradually.

Do not breathe on any cold lens. Warm breath freezes on contact and is extremely difficult to remove in sub-zero temperatures. A camel's hair brush may be used to wipe off accumulated snow on the lens and should be carried in an outside pocket to keep it cold.

The danger of frostbitten fingers is a grave risk when wearing inadequate hand coverings. The use of lightweight cotton, rayon or nylon gloves keeps hands from sticking to bare metal when it is necessary to remove heavy bulky outer gloves or mittens to make equipment adjustments. Another danger is frostburn which may result from the skin coming in contact with unpainted or unenamelled metal surfaces, when

using the eyepiece or touching the back of the camera. This can be avoided by attaching a layer of chamois, thin felt, or other similar material to those areas so as to provide insulation against the cold of the bare metal.

Dark glasses always should be worn as protection against intense glare from the snow and ice. They also should be worn as protection against the diffused light of Antarctic white-out or snow-blind conditions.

Light meters operate accurately in extremely cold polar temperatures and are recommended as intense reflective light can be deceptive.

Dry cell batteries are not dependable for use in operating flash equipment in cold weather. If dry cell batteries must be used, always use fresh ones. They are best operated if they are warmed with body heat by being carried under outer clothing. Attach them to the equipment by means of lead-in wires run through the sleeve. Electronic synchronisers are a much more reliable source of power.

Although a small Navy Exchange store exists at McMurdo, film supplies are very limited, and in many cases not obtainable. It is strongly suggested that all film and accessories be purchased prior to leaving for Antarctica. Hi-speed film such as High Speed Ektachrome, High Speed Kodachrome, Super Ansochrome, are **not recommended** for use outdoors in the Antarctic. However, the above-mentioned films are very satisfactory for indoor use. ASA film speeds are not appreciably affected by the extreme cold temperatures. A skylight filter is recommended for use with colour film outdoors. This filter will eliminate the harsh "cold" blue rendition that is predominant in colour photographs taken in the Antarctic. If black and white film is to be used, the yellow or the red filter should be used.

Photographic film becomes brittle at low temperatures. Rewind film **slowly** to prevent breakage and to eliminate the possibility of static electricity marks on the film.

OBITUARY

ARTHUR LEIGH HUNT

The founder of the New Zealand Antarctic Society, Mr Arthur Leigh Hunt, died in Wellington on June 18, 1968, at the age of 92.

A man of many and varied interests, Leigh, as he was known to his myriad friends, was for most of his life an innovator, a leader, a fighter, a man ahead of his time. Many of the causes he championed were unpopular at the time. He was fortunate in that he lived so long that he saw most of the projects he fathered grow to sturdy independence in his own lifetime—something which is not always granted to gifted visionaries.

Leigh called the meeting to consider the formation of the New Zealand Antarctic Society in the Board Room of the Dominion Farmers Institute Building on November 2, 1933. At this gathering Leigh was in the chair. He said that he hoped that the Society's formation would be followed by branches in the four main centres, and outlined the objects which the Society should adopt. Characteristically he did not seek office as Patron, President or Vice-President, and was appointed to the Committee; but at the first Council meeting a week later he was appointed Chairman.

The Society had many ups and downs over the years, but Leigh always took a keen interest in its affairs, and no one was more pleased than he was when the first New Zealand Expedition to the Antarctic was announced.

It was my good fortune to have known Leigh for almost twenty years. During that time, despite a great difference in age, a firm



ARTHUR LEIGH HUNT.

friendship grew up between us, cemented by a mutual interest in the Antarctic.

He numbered among his friends both Sir Douglas Mawson and Rear-Admiral Richard E. Byrd. With the latter in particular he had much in common and they kept in close touch for over thirty years. I recall a wonderful evening in December 1955 at the American Ambassador's home in Wellington when Admiral Byrd was the guest of honour at dinner to a select few New Zealanders—and Leigh's name was the first on the list of those invited.

We were together too, at a meeting of the Antarctic Society in March 1957 when word came that Admiral Byrd had died. Knowing the strong bond between them I asked Leigh to advise the members of the sad news, and it was obvious from the moving way in which he did so how deeply he was affected. Later he was one of those who inaugurated the proposal for the Byrd Memorial on Mount Victoria, which was unveiled on March 11, 1962.

There were men and women from all walks of life, and from the various organisation with which Leigh was associated, at the well-attended funeral service at St. Paul's Cathedral, Wellington, not least among them a large and representative gathering of Antarctic Society members, paying tribute to the founder of the Society and to an old friend.

NEW SOUTH POLE STATION

Plans are being made in the United States for the construction of a new United States research station at the South Geographic Pole. The station now in use is the oldest remaining inland station constructed for the period of the International Geophysical Year and was built in 1956. It has begun to show the sign of increased age in the deterioration of structural members, and water leaks into the various buildings during the summer. The station is not in imminent danger of collapse. The hazard that may be created by the stretch or breakage of electrical wires or by similar sorts of mechanical failure are the reasons for the concern.

The major programmes at the South Geographic Pole will continue to be those related to the upper atmosphere sciences. Accordingly, discussions are going on between the National Science Foundation and investigators who have, or who may, work at the South Pole in the atmospheric science fields through the National Science Foundation support. Information on space requirements and facilities needed is being assembled in the Office of Antarctic Programmes for the U.S. Naval Support Force, Antarctica. The principal design agent for the Navy, the Naval Facilities Engineering Command, is studying these requirements along with those related to the station housekeeping needs. It is expected that a preliminary design will be completed by September or October, 1968.

The new station will most likely be built on the snow surface and covered with a protective arch that

shields the station from snow accumulation and winter winds. Since the six-inch annual accumulation of snow is relatively slight, the accumulation will be much less than that which has been encountered at Byrd Station. It is expected that a station built on the surface and covered by an arch will be suitable for 10 to 15 years of use and that the costs, which are greatly reduced in this form of construction, are the most economical of the various designs studied.

For continued work at the South Pole, much attention is being given to new methods of data acquisition, storage, and retrieval. It is expected that a small computer will be installed in the new station. Sensing equipment itself will be located remotely with the impulse from the instrument sent into the station's computer by cable. Some data will be stored for shipment to the United States during the austral summer resupply. Other data will be separated out by the computer and prepared for transmission by radio to McMurdo and the United States, perhaps by means of satellites. Other innovations, such as the utilisation of waste heat from the electric generator which was employed at Plateau Station, will be used.

The new station will be built perhaps one mile away from the present station and "upstream" from the Pole to offset the movement of the ice sheet. It is expected that procurement of material will take place during the 1969-70 austral summer and the field work of construction will take place during the 1970-71 austral summer.

LEOPARD SEAL IN AUSTRALIA

A young leopard seal, weighing about 300 lb., came ashore a long way from home when it beached at Altona, in Victoria, Australia, about 2,000 miles from the Antarctic. Wildlife officers who examined it found that it was sick and injured, and obtained police permission to shoot it.

FIRST TANDEM WINTER FLIGHT TO ANTARCTICA

Two U.S. Navy ski-equipped C-130 Hercules aircraft, flying in tandem, left Quonset Point, R.I., for the Antarctic on August 28. This was the first winter flight in which more than one aircraft has travelled the entire distance to "the ice".

The two Hercules landed at McMurdo, Antarctica's largest station.

The main purpose of the winter flight was to bring in 13 university scientists sponsored by the National Science Foundation's United States Antarctic Research Programme.

A seven-man Navy helicopter unit was also on the flight. This was the first time a helicopter unit has been used during the austral winter to help in supporting the scientists.

The 13 scientists will conduct five projects: a study of sea bottom plant and animal life, a study of the ability of micro-organisms in the ice-free "dry valleys" to survive the Antarctic winter, two studies of the deep diving behaviour and physiology of Weddell seals, and one geodetic and upper atmosphere study. One scientist now at McMurdo will return to the U.S. on the winter flight.

The two aircraft carried internal fuel tanks to increase their operating range. In addition, there was room for over 5,000 pounds of scientific equipment, high priority spare parts, fresh provisions, and the first mail the men at McMurdo and Scott Base had received since February.

The first scheduled winter flight occurred in June and September of last year. There have, however, been four emergency winter flights to Antarctica to evacuate injured personnel—in 1961, 1964, and two in 1966. This will be the seventh winter flight made to Antarctica by Air Development Squadron Six (VX-6), the U.S. Navy's Antarctic air arm.

No other nation has landed aircraft in Antarctica during the winter.

The two Hercules arrived in Christchurch, New Zealand, on September 1 and departed on the 2,300-mile last leg of their 10,000-mile flight to McMurdo on September 3, flying four hours apart.

For the 196 Navymen and scientists now "wintering-over" at McMurdo Station the September flight was the first direct contact with anyone from the outside during the long Antarctic winter since February.. In preparation for the flight the men of McMurdo bulldozed and smoothed the Williams Field skiway on the Ross Ice Shelf, seven miles from McMurdo. The skiway was lined with Coleman lanterns so it could be more easily seen by the Hercules pilots.

Commander A. J. Toth, Deep Freeze Air Operations Officer, was commander of the special flight unit for the winter fly-in operation. Lieutenant Commander W. B. Stewart was the commander of one aircraft and Lieutenant Commander W. R. Hayes was commander of the other.

AN INDEX to Volume 4 1965-1967

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SUB-GLACIAL RELIEF OF ANTARCTICA

The Russians have done much work on the sub-glacial relief of Antarctica, and their findings have been published in Russian by A. P. Kapitsa in a volume of the "Results of Researches on the International Geophysical Projects" series, entitled "Sub-Glacial Relief of Antarctica". An abstract of the findings is as follows:

ABSTRACT

1. The only accurate method of determination of ice sheet thickness ($\pm 4-5$ per cent.) is the method of seismic sounding. Using gravity measurements, profiles can be detailed, with the precision of measurements being twice as poor as that with the seismic method. Most promising is the method of radio-location sounding, now under way of being developed. When measuring ice thickness and determining sub-glacial relief heights, the accuracy of levelling is important. The presence of basic points in the centre of the continent determined by optic levelling has made it possible for the precision of the barometric method to be improved by two to three times.

2. The results have been analysed of ice thickness determination carried out with seismic soundings in 934 points and with gravity measurements in 6,655 points by the expeditions of the U.S.S.R., the U.S.A., Australia, Great Britain, France, Japan and Belgium. The summary length of the profiles was 48,000 km. Causes of failures of some investigations have been considered, related to the techniques of seismic measurements.

3. The collected data of ice thickness measurements allowed to create a map of the sub-glacial bed relief and a map of ice thickness on a scale of 1:20,000,000. When compiling the map, a number of indirect indications were taken into consideration, such as ice cover surface relief, surface inclination, geological regularities, manifested in the relief, crevasses in glaciers, etc.

4. New large forms of the sub-ice relief are distinguished on the map of the relief and on the orographic schematic map, namely, the Gamburtsev, Vernadski, Golitsyn and Shchukin Mountains, the Schmidt Plain, and the East and West Plains in East Antarctica, and the Byrd Plain Basin and the Trans-Antarctic Trench in West Antarctica.

5. The main lines of ice flow have been determined according to the data of the map of surface relief, ice thickness and sub-ice relief. The following centres of diffluence were distinguished: East Antarctic Ice Divide, Marie Byrd Land Dome, Mid-West Antarctic Ice Dome, and Ice Rampart of the Antarctic Peninsula. The total ice volume in Antarctica is 24 million cu. km.

6. The new data obtained have shown the tectonic structure of the central areas of East Antarctic in quite a new light. The existence of a vast range emerging above the surface as the Yamato Mountains and stretching far into the sea as the Gunners Bank, enables one to draw a conclusion that an old folded massif exists in the centre of the Antarctic Plateau, broken by more recent faults and elevated like the Antarctic ridge fault.

7. Through an analysis of the gravimetric data a conclusion can be drawn as to the Antarctic plain territories being underloaded by an average of 15 mgl. On the basis of this and of an analysis of glacier sections, a hypothesis is suggested of the reduction of the Antarctic ice sheet volume and of the earth's crust lagging behind with its compensation

uplift as compared with the load removal speed. The tentative estimations indicate that the reduction began in the Holocene.

8. An uplift of the bedrock with complete deglaciation has been estimated, and a schematic map is given of the contours of the continent after the complete compensation uplift, with East Antarctica retaining its monolithic character of a continent and West Antarctica appearing as an archipelago of islands.

9. A hypothesis is suggested that with the present shrinkage of the ice sheet, the vast bay Ross and Filchner Ice Shelf glaciers are transitional forms of the continental glaciation on its way to reduction.

10. The created scheme of the Antarctic sub-glacial relief does not lay claim to being precise or complete, it might undergo some changes with further research, but its basic features would remain.

RUSSIAN PROGRAMME

Mr. B. I. Silkin, Secretary of the Soviet Geophysical Committee, reports that on the Waterloo (or King George) Island the Russian base has been constructed and the scientific equipment has been installed. In a cable to the Arctic and Antarctic Scientific Research Institute at Leningrad, Dr. A. Budretsky, the station leader, reported that the weather at this station differs sharply from the one to which the Russian explorers had been accustomed.

Several foreign scientists are working at the Soviet Antarctic stations. These are: Dr. B. Zakhariyev — weather forecaster from Bulgaria, Dr. H. Gernand and I. Newerman — geophysicists from the German Democratic Republic are wintering over at Mirny; Dr. Lisignoli — a glaciologist from Argentina, and L. Sharon — an American geophysicist are at Molodezhnaya.

Two Russian scientists are working at foreign stations: at the American McMurdo Station is Dr. B. Lopatin, geologist, and at the Argentine Almirante Station is G. Kudashkin, a meteorologist-actinometrist.

The preparations are well advanced at Mirny for the traverse to Vostok Station which is planned for the summer months.

RARE PHENOMENON

A rare phenomenon — nacreous clouds — was observed in Molodezhnaya. They were seen twice — once lasting for 30 minutes, and the other for two hours. Professor A. I. Dolgin, the Soviet Chief Meteorologist of the Institute, said that these clouds occur at a height of 22–30 kilometres above the earth. Systematic observations of them began in 1871, and since then they have been observed a little more than 100 times, mainly at high latitudes in winter. They can be used to determine the velocity of air motion in the middle stratosphere.

SOVIET PLANS FOR LONG TREK

Soviet and French explorers have decided to repeat the crossings of the Antarctic they began four years ago, by traversing between South-Polar stations Mirny and Vostok.

A 300-strong expedition will set off for the Antarctic on board the diesel motor-ship "Ob" and the research vessel "Professor Zubov", from Leningrad by early November.

During the crossing, which will be part of the research programme of the fourteenth Soviet Antarctic Expedition, the rate and direction of movement of the ice shelf will be checked against the records made last time.

The construction of a centre to sound out the atmosphere with the help of meteorological rockets at the Molodezhnaya Station on Enderby Land is now to be completed.

The thickness of the ice cover will be measured by radio-location, and the geological team on the expedition will test an electric drilling rig for sinking deep wells.

SKI CLUB FLOURISHES

Members of the ANARE Club have their own ski lodge at Mount Baw Baw, and have been working hard to bring their club-house up to a very high standard indeed. Membership is restricted to 25, and they have to remain active otherwise they run the risk of creating a vacancy for someone who is anxious to join.

NEW ZEALAND ANTARCTIC PLACE NAMES COMMITTEE

by A. Evans

The New Zealand Antarctic Place Names Committee whose principal function is the assigning of geographical names in Antarctic Territory is the authority appointed by the New Zealand Government for place naming in the Ross Dependency in Antarctica.

The Committee comprises the members of the N.Z. Geographic Board: Mr. R. P. Gough, Surveyor-General, Chairman; Sir John Te H. Grace; Dr. G. Jobberns; Mr. J. D. Pascoe; Mr. P. Te H. Jones; Mr. P. J. O'Dea; Mr. J. H. Miller and two co-opted members: Dr. R. A. Falla and Mr. A. S. Helm, and Secretary Mr. A. Evans.

In 1956 when the New Zealand Antarctic Place Names Committee was set up, the constitution of the New Zealand Geographic Board provided that persons with specialised knowledge could be co-opted and in this way Dr. R. A. Falla and Mr. J. H. Miller attended the meetings at which Antarctic names were being discussed, while Mr. A. S. Helm acted in a secretarial capacity.

Mr. Helm became a co-opted member of the Committee in June, 1964, when the secretarial duties for the N.Z. Antarctic Place Names Committee were taken over by the office of Secretary of the N.Z. Geographic Board. Following a retirement on the membership of the N.Z. Geographic Board, Mr. J. H. Miller was appointed a member of the Geographic Board in March, 1968.

The N.Z. Committee works in close co-operation with the Antarctic Names Committee of Australia, the United States Advisory Committee (Antarctic names) of the U.S. Board on Geographic Names and the Antarctic Place Names Committee of the United Kingdom.

Much work has been done by the N.Z. Committee in forming a system

of geographical nomenclature in the region and the naming of features in the Ross Dependency are usually in accord with some accepted rules of nomenclature, e.g., recognition of the historical significance of a feature; classification of the historical significance of a feature; classification of features with regard to geographic discovery, scientific value, magnitude or prominence in the history of the region as well as the avoidance if possible of duplication.

Only those names of features which can be positioned on maps of the area concerned are usually accepted as submissions while the names submitted by the leaders of field parties are normally supplied with derivation or reasons for choice and preferably supported by narrative and illustrative material.

The early explorers who were responsible for the initial allocation of place names in Antarctica did not have available to them the instruments which are in use today. With regard to more positive identification and fixing of locations, the Committee has made several recommendations for amendments or modifications and corrections of generic terms, the geographic positions being taken from the most reliable sources available for the original feature named.

In the assigning and amending of place names in Antarctic Territories more accurate and complete maps of the Ross Dependency which have now been published by the Department of Lands and Survey have enabled some earlier namings to be amended or modified to be in accordance with what is believed to be the original intention in the application of that name.

The preparatory research in matters of nomenclature has filled in many of the gaps in information and

provided more knowledge of the areas for naming purposes, particularly in Northern Victoria Land, which have been visited and explored by recent New Zealand Expedition parties.

AMERICAN ANTARCTIC POLICY

The United States State Department has made a policy statement with regard to support of foreign government, commercial, and private aviation in Antarctica.

Under the provisions of the Antarctic Treaty, access to Antarctica is free to all peaceful enterprises. However, in view of the special characteristics of flight operations in Antarctica and of the limited United States aircraft support facilities available, the U.S. Government will be unable to support operations of foreign government aircraft, or any commercial or private aircraft except as noted below:

- (a) Aircraft under charter or contract to the U.S. Government operating in support of the United States Antarctic programme.
- (b) Jointly planned programmes with other signatory governments.
- (c) When the operation of commercial or private aircraft clearly furthers the interests of the United States Antarctic programme.
- (d) When determined to be otherwise in the national interest.

The Antarctic Policy Group will determine national interest in this regard. However, when no other question of national interest or foreign policy is involved, the Commander, U.S. Naval Support Force, Antarctica, may at his discretion provide logistic support for flights listed in (c) providing the logistic support requirements are minimal.

Because of the special navigational and safety problems attendant on aircraft operations in Antarctica, when a flight is proposed under one

of the above listed exceptions, the Commander, U.S. Naval Support Force, Antarctica, will judge whether the flight would meet proper safety standards and will make the decision as to whether or not the flight is feasible.

Detailed planning concerning liability, insurance fees, sale of material and approval for the use of U.S. facilities will be in accordance with current directives of the Department of Defence.

This policy does not prevent any aircraft from landing at a U.S. station in case of a bona fide emergency. However, following such instances the operator will be required to establish the existence and nature of the emergency.

SURVIVAL THREAT TO SKUAS?

Speaking to the Geographical Society of the University of Otago, Mr. B. Johnston, an Honours student in Zoology, said that the survival of the skua gull in Antarctica was being threatened by the various bases, established there over the last few years.

Mr. Johnston, who was in Antarctica with a scientific survey in 1967-68, said that the survival rate of the chicks was low, and this was especially evident in the Cape Hallett area where only 25 per cent. of the chicks survived.

The low survival rate was mainly because of damage to breeding grounds by waste material and interference from Antarctic stations, he said.

Although the skua is predatory, preying on penguin colonies, it is regarded as useful in the natural balance of Antarctica.

The succulent toheroa and the Antarctic might seem poles apart, but Mr. P. Redfearn, formerly a marine biologist with the British Antarctic Survey and a graduate of the Imperial College of Science and Technology, will spend three years studying the biology and behaviour of the toheroa to ensure conservation of the species.

PHILATELIC MAIL FOR U.S. VESSELS

Deep Freeze has advised the arrangements which have been made for handling philatelic mail for the forthcoming Antarctic season.

Unfortunately the closing date for mail for Byrd and South Pole was September 1, but the following are the dates for which mail for cancellation for particular ships must be received. There is a limit of one cover per person for each ship, and they should be sent in a covering envelope to the address of each ship as follows:

Ship's Name and Address	Closing Date for Covers
U.S.C.G.C. "Southwind" (WAGB-280)	4.10.68
FPO New York N.Y. 09501 U.S.A.	
U.S.C.G.C. "Burton Island" (WAGB-283)	12.10.68
P.O. Box 20820 Long Beach, Calif 90801 U.S.A.	
U.S.C.G.C. "Glacier" (WAG-4)	15.10.68
P.O. Box 20900 Long Beach, California, 90801 U.S.A.	
U.S.C.G.C. "Edisto" (WAGB-284)	5.11.68
Boston, Mass. 02109 U.S.A.	

Covers postmarked aboard DEEP FREEZE ships will be returned to collectors during the operating season as expeditiously as postal backlogs permit.

Philatelic mail will be returned unprocessed when more than the authorised number of covers is submitted, or if covers are received after the closing dates.

NEW AUSTRALIAN ANTARCTIC STAMP

A five-cent Australian Antarctic Territory stamp will be issued on September 25. The stamp, in vertical format, shows the branding of elephant seals, and it complements the other stamps of the 1966 series, all of which have designs significant of the activities and research work being carried out by the Australian National Antarctic Research Expedi-

tions. Like the other stamps in the series, the five-cent stamp was designed by Mr. John Mason of Melbourne and will be printed by multi-colour photogravure at the Note Printing Branch of the Reserve Bank of Australia.

The stamp is intended for use in the Australian Antarctic Territory and at Macquarie Island and will not be placed on sale at post offices in Australia.

However, collectors will be able to purchase the stamps at the Australian Post Office's philatelic bureaux. The stamps will be conveyed to Post Offices at Mawson, Wilkes and Macquarie Island by the ships carrying the 1968-69 relief parties.

NEW AUSTRALIAN STAMP ATTACKED

The Australian Antarctic Territory's new postage stamp, to be released on September 25, showing the branding of elephant seals, did not win any compliments from animal welfare organisations in Melbourne when it was announced. The stamp shows one man holding a seal while another man brands it.

The president of the Blue Cross Society, Mrs. M. Lynch, said she thought the seals would "suffer terribly by being branded with irons". "I cannot see any reason for it, and I feel that any unnecessary branding is cruel," she said.

The secretary of the Animal Welfare League of Victoria, Mrs. P. Taylor, said she thought the stamp was in poor taste.

"I think it is a bad example for children," she said. "I'm glad it won't be released for general distribution throughout the Commonwealth."

BELGIANS WORK ON PUBLICATIONS

While the Belgians await word about a possible further joint summer expedition to Dronning Maud Land with the South Africans, research work on the results of the previous winter and summer expeditions has been continuing. It is expected that the first series of publications will be ready in the immediate future.

Australian Antarctic Programme 1968-69

The opening of a new station at Wilkes and the reopening of the station at Davis are two features of Australia's 1968-69 Antarctic programme. There will be long-term programmes of research at both these stations and also at Mawson and Macquarie Island.

The summer programme will be carried out as usual with two polar ships, Nella Dan and Thala Dan.

Nella Dan has been chartered to make three voyages to relieve parties wintering at Macquarie Island and Mawson, to recover the glaciological party spending the winter at the Amery Ice Shelf and to reopen the Australian station at Davis which has been temporarily closed since February, 1965.

These voyages include a call at Fremantle at the end of January, 1969.

Thala Dan will take the 1969 party to relieve the men wintering at Wilkes.

WILKES

The new party will go into a new station at Wilkes which has been under construction chiefly during the short summer seasons for the last four years.

The old station, established by the U.S. in 1957-58 and transferred to Australian custody in 1959, has become almost submerged in permanent snow drift extending back half a mile in the direction of the prevailing wind to merge with the natural snow surface leading up to the ice plateau behind Wilkes.

This has been growing steadily worse over the years, making it difficult to maintain the station and carry out its scientific programmes efficiently, and creating a serious fire risk.

The new station, five miles away around the bay, is designed on radical principles to minimise the accumulation of permanent snow drift and has excellent facilities for continuing and supporting the current research programmes.

At Wilkes, glaciological investigation of the local ice cap will be extended further. Extensive measurements on the Wilkes ice cap have shown that it is subsiding, the first time that subsidence has been demonstrated on such a large Antarctic ice mass. The ice cap studies are now moving into a new phase of deep drilling and coring. In 1969 balloon flights at this station will be made to study electric fields on the atmosphere, and cosmic rays. A new high-speed neutron monitor is being installed.

MAWSON

Additional features at Mawson will include an extension of earlier work on lichens and mosses, described in the Antarctic Division's book, "The Lichens and Mosses of Mac. Robertson Land," the first scientific work on Antarctic lichens to have been illustrated in colour. This will be carried out on the coast near Mawson, and in the mountains of the hinterland: the new work will be a detailed examination of the Antarctic ecology of these very interesting primitive plants. Additions in the physical science studies at this station include a recently installed telescope which is being used to study further the Australian observation that cosmic rays come from a preferred direction in space. Successful glaciological studies of the heat budget of sea ice at Mawson are being extended in 1969 to cover energy balance over the sea, with special reference to the period of ice formation and break-up. Equipment for this purpose will be mounted on a tethered raft.

MACQUARIE ISLAND

At Macquarie Island a wide-ranging programme of biological research on the wildlife of this natural sub-Antarctic sanctuary, meteorological observations, and studies in upper atmosphere physics will predominate. During the summer, a short-term party of scientists will use high altitude balloons to study cosmic rays and the aurora. The European rabbit flea will be introduced as a vector for the control of the large population of rabbits by the use of myxomatosis.

DAVIS

The station at Davis will be reopened to conduct programmes in meteorological observations and upper-atmosphere physics, and the station once again will become part of the important international network of weather stations in the Antarctic.

Davis was inspected last February and was found to be in excellent

condition, so that it will be relatively simple to resume activities at this base.

Another important feature of the summer programme is a planned aerial survey and geological investigation of the Northern Prince Charles Mountains, 250-300 miles south-east of Mawson.

For this programme, Nella Dan will carry three helicopters and a fixed-wing turbine-powered aircraft to support the party of 22 men who will be engaged in the exploration of this immense mountain range.

The centre of their operations will be a base camp and airfield on the ice plateau among the mountains 6,000 ft above sea level.

In all, 84 Australians will be wintering at the four stations in 1969.

In addition, there will be four Americans at Mawson and four at the new station at Wilkes undertaking camera observations of satellites as part of a world-wide geodetic survey programme.



N.Z. 1968-69 PARTY AND LECTURERS AT WAIOURU.

EXPEDITION TO ANTIPODES IS.

A New Zealand scientific expedition will in January visit Antipodes Island, the least-known biologically of all New Zealand's sub-Antarctic islands, and make the most thorough investigations so far.

Members of the party will be Mr. J. Warham, of the Canterbury University zoology department, as leader; Dr. E. J. Godley, director of the Botany Division, D.S.I.R., as botanist; Mr. P. Johns, of the Canterbury University zoology department, as an entomologist; Professor G. A. Knox, of the zoology department, as marine zoologist; Dr. G. Kuschel, of the entomological division, D.S.I.R., as an entomologist; Mr. R. W. Taylor, animal ecology division, D.S.I.R., as vertebrate ecologist; and Dr. G. R. Williams and Mr. B. D. Bell, of the Wildlife Branch, Department of Internal Affairs, as vertebrate zoologists.

The party plans to sail from Lyttelton on January 3 and return on March 8 aboard H.M.N.Z.S. Endeavour, which will be making trips to the Antarctic. If a landing on Antipodes Island is impossible on the way down, the expedition will be landed on Campbell Island and picked up for a second attempt about January 26. The Navy will provide a beach party to help unload stores and equipment.

The party will have to sleep on deck or elsewhere in the Endeavour, as extra accommodation is not available. On Antipodes Island, they will use two large Army tents with wooden floors.

However, a 20ft by 12ft sectional hut has been provided by Fletcher Industries to serve as a laboratory. Igloo and alpine tents will be used on sorties away from the base.

There will be communication with Awarua Radio.

The scientific investigations will cover all plants and animals on the island and its littoral zone, and their relationship to other sub-Antarctic islands and the southern land masses. The programme also will

include a bird census, bird banding, and soil sampling.

Although the R.N.Z.A.F. has provided aerial photographs, mist has made them unsuitable for map-making, and some of this will be done by the party.

Meteorological records will also be kept.

This expedition has been supported by a grant of \$500 from the New Zealand Committee of the Trans-Antarctic Association.

ANTARCTIC TOURS BEING PLANNED

Air New Zealand and Holm and Co. Ltd. have announced that they are "actively pursuing" the matter of Antarctic tours.

Two tours were made from New Zealand last year in the Magga Dan under charter to Holm and Co. Organised in New York, they were patronised by wealthy Americans and cost about \$7,000 a person. This included a return air flight from San Francisco to New Zealand.

However, Captain Holm, Managing Director of Holm and Co., has stated that these costs could probably be brought down considerably. He thought the costs for the next tours would be within the reach of many New Zealanders.

But there will be no tours this season. A joint statement by Air New Zealand and Holm and Co. stated that arrangements for this season had been postponed till the summer of 1969-70 because of insufficient time for organisation.

Holm and Co. were tied to an agreement to give Linblad Travel Inc. of New York first option on the Magga Dan for tours this coming season.

The General Manager of Air New Zealand, Mr. F. A. Reeves, said that no details of cost for flights had yet been worked out. Probably only a small number of flights would be made to the Antarctic during the 1969-70 season.

Asked if he was confident of getting co-operation with the New Zealand and American Governments involving the use of facilities at the American military air strip at McMurdo Sound, Mr. Reeves replied: "I am sure this will occur."

YOUTHS TO GO SOUTH

Two Queen's Scouts and a member of the Boys' Brigade have been chosen to go south with the New Zealand Antarctic expedition this summer.

They are David Craig, 17 (Timaru), Sea Scout; Graeme Pollock, 17 (Christchurch) from the Boys' Brigade; and John Gemming, 18 (Te Puke), Venturer Scout.

They were chosen from 24 scouts and four members of the Boys' Brigade from all parts of New Zealand. They will sail south in the Endeavour on January 4, 1969, calling at the Antipodes Islands and Campbell Islands, and will arrive at McMurdo Sound about mid-January. They will perform watch-keeping and other duties during the voyage.

They will be away for about six weeks, and at Scott Base will perform a variety of chores. They will visit areas of the base that cater for their particular interests before returning to New Zealand by air.

SOCIETY NEWS

WELLINGTON BRANCH

The "Antarctic Week", from June 17 to June 22, organised by the Wellington branch in the N.Z. Display Centre, was a great success. At the closing ceremony for the display a cocktail party was held on June 22 at the Display Centre to celebrate Midwinter. Mr. Len Donnelly, Chairman, Mr. Eric Gibbs, President of

the Society, and the Hon. Brian Talboys spoke to Scott Base, and Mr. Donnelly, on behalf of the Wellington Branch, made a presentation to Mr. L. B. Quartermain on his retirement as Editor of "Antarctic". About 150 people attended the party.

CANTERBURY BRANCH

The Canterbury Branch held its annual meeting on May 16 and discussed whether to continue with the bursary of \$240 which had been awarded to five university students in the past four years or to concentrate after the 1968-69 award on an Antarctic Hall project for the Canterbury Museum. It was agreed that the suggestions raised in the discussions would be considered by the Committee. A motion was passed admitted schoolchildren as junior members on a subscription of 50 cents.

Officers elected were: President, Mr. R. M. Heke; Vice-Presidents, Mr. C. Gray and Miss R. McLean; Secretary, Mrs. D. Braxton; Treasurer, Mr. B. Hearfield; Auditor, Miss I. O. Orchard; Committee, Rev. J. Keith, Messrs. F. Gurney, J. Claydon, A. Anderson, J. Mather, I. Williams, B. George and P. Whiteford, Mesdames M. Wright and M. Williams.

On June 21, 200 members and friends of the Canterbury Branch met to celebrate Midwinter. Sir Edmund and Lady Hillary were guests of honour, and Sir Edmund outlined his experiences in the Antarctic. He called on the Society to support the sending of topographical and mountaineering expeditions to the Antarctic, which he still regarded as being a land of adventure. Paying a tribute to the contributions made by the Society, he hoped that it would lend its influence to many expeditions in the future.

NEW PRESIDENT

A new President of the New Zealand Antarctic Society has just been elected. He is Mr. Harold F. Griffiths, of Christchurch, who has taken over from Mr. Eric Gibbs, of Taihape, the retiring President.

THE READER WRITES

Sidelights of Antarctic Research

Letters, preferably not longer than 500-600 words, are invited from readers who have observed some little-known facet of Antarctic life or who have reached conclusions of interest on some Antarctic problem. — Ed.

DEVIL'S ADVOCATE

Sir,

W. H. (Wally) Herbert looks like becoming the Champion of the Underestimated. Englishman by birth, after three years with the Falkland Islands Dependencies Survey, a Kiwi by adoption, he was a member of the New Zealand Southern Exploring Party, after a winter at Scott Base, 1961-62.

During that expedition his party descended the Axel Heiberg Glacier, Amundsen's route to the Pole, and they were the first men to travel the length of the glacier after Amundsen's time. His personal experience of sledging on the Axel Heiberg convinced him that Amundsen's success was in no way due, as his jealous detractors said it was, to his having stumbled on an easy route. He formed an extremely high opinion of Amundsen and in an article in "Antarctic"* he said: "He had sufficient determination, courage and skill to tackle practically any route."

Now the same Wally Herbert has provided some vital evidence in support of the discredited and abused F. A. Cook's claim that he reached the North Pole on April 21, 1908, ahead of Peary. In an article in "Polar Notes"† the "occasional publication" of the Stefansson Collection, U.S.A., Russell W. Gibbons discloses that Herbert's Trans-Arctic Expedition, still in progress, is the first "fully equipped and scientifically staffed expedition to retrace, as nearly as possible, the 60-year-old

journey" of Dr. Cook in the vicinity of the as-then-undiscovered Meighen Island. Of Herbert's party he says, "By deliberate plan, they followed the first 550-mile phase of Cook's journey to land's end, where he departed on to the sea ice for his probe toward the Pole." One object of this training journey of Herbert's for his trans-Arctic crossing was to follow Cook's route more than half-way to the Pole. Herbert took copies of Cook's diary and a copy of Cook's "My Attention" with the photographs captioned to facilitate recognition of physical features.

Cook's critics say in effect that if he had taken the route he claimed to have done he must have seen Meighen Island: he made no claim to have seen it: therefore he was a liar. Herbert's answer, in a letter to the author of the article, is: "It is more than likely that at the time Cook was passing Meighen Island the island was shrouded in fog. When we ourselves were approaching Meighen from Cape North West we did not get our first glimpse of it until we were only three miles away. On the day we left the island visibility was 50 yards for five hours."

Mr. Gibbons concludes: "Has Herbert . . . provided a key to Cook's role in polar history?"

L. B. QUARTERMAIN.

OLD SALT DIES

Captain Austin P. R. Le Gros, aged 80, died in Australia in July. He was sailing master of the "Aurora" when that vessel sailed to McMurdo Sound to rescue the Ross Sea Party of Shackleton's Imperial Trans-Antarctic Expedition.

* Vol. 3, No. 1, March, 1962.

† No. VIII, June, 1968.

ANTARCTIC BOOKSHELF



NEW VOLUME OF ANTARCTIC ATLAS

The second volume of the big Russian Antarctic Atlas will be published in Leningrad this year.

Under the general editorship of Evgeny Tolstikov, it will give a history of Antarctic exploration since the first Russian Expedition of Bellingshausen and Lazarev (1819-21), and a wealth of expert articles on the geography, climate, geology and physiology of the continent by both Soviet and foreign authors.

DEVELOPMENT AND GROWTH OF THE SOUTHERN ELEPHANT SEAL (*Mirounga leonina* (Linn.)).

By M. M. Bryden, reprinted by the Government Printer, Tasmania, from "The Papers and Proceedings of the Royal Society of Tasmania".

This article contains a review of the literature, with some further observations on the development and growth of the Southern Elephant Seal. The author studied his subject when a member of the Australian National Antarctic Research Expeditions, 1964-66.

To be published in October by Eyre and Spottiswoode —

A WORLD OF MEN

by W. W. Herbert, who wintered at Scott Base in 1961 after bringing twelve dogs from Greenland. He was a member of the Southern Field Party in 1961, and led the field trip in 1961-62 on the Polar Plateau, descending the Axel Heiberg Glacier on the return journey. Wally also spent two winters with FIDS and is at present leading the Trans-Arctic Expedition to cross the North Pole. His book is a study of men in the Antarctic.

A. S. H.

ANTARCTICA by John Béchervaise (Longmans Australian Geography Series, No. 29). Published by Longmans, Melbourne, June 1968, Aust. \$0.75.

This small geography study of 48 pages by the well-known Antarctic writer is one of a series designed for Australian students. Competently written and well illustrated with maps, diagrams and photographs it covers such specific subjects as the fauna of the continent, the weather, the life in the surrounding oceans, heat loss in Antarctica, Australian interests, and the effect of human habitation. This, and the following book by the same author would make an excellent introduction to any young person with an interest in the Antarctic.

AUSTRALIA AND ANTARCTICA by John Béchervaise. Published by Nelson Doubleday (Australia) Pty. Ltd., Sydney, 1967.

A splendid addition to the "Around Australia Program", this well-written booklet of 64 pages not only gives a good introduction to Antarctica but also brings the Continent into focus for Australians. Béchervaise has been at pains to emphasise different aspects than those covered in the other booklet he has just produced. The coloured photographs taken by the author are of a high quality and interest. The booklet is also profusely illustrated by good black and white photographs, and two maps.

MAGNETIC AND GRAVITY MAPS OF THE ANTARCTIC by J. C. Behrendt and C. R. Bentley, Antarctic Map Folio Series No. 9 (1968). Published under a contract with the National Science Foundation by the American Geographical Society, Broadway, at 156 Street, New York, N.Y. 10032. \$4.00 (U.S.).

The objective of the Antarctic Map Folio Series is to summarize in a succinct manner the present knowledge of the Antarctic, and the Series will consist of some twenty folios, each devoted to one subject or scientific discipline. To date nine folios have been pro-

duced, and the latest consists of nine maps, in colour, of a nominal scale of 1:15,000,000 on a Polar Stereographic Projection. They show each Antarctic station, and the first five plates are taken from the South Polar Magnetic Charts published by the U.S. Naval Oceanographic Office in 1965, and compiled by the U.S. Coast and Geodetic Survey in consultation with the Royal Greenwich Observatory. The plates cover the following subjects:

1. Magnetic Inclination or Dip (epoch 1965).

2. Horizontal Magnetic Intensity (epoch 1965).
3. Vertical Magnetic Intensity (epoch 1965).
4. Total Magnetic Intensity (epoch 1965).
5. Magnetic Variation (epoch 1965).
6. Residual Total Magnetic Intensity.
7. Magnetic Anomalies of Short Wavelength.
8. Free-air Gravity Anomalies.
9. Bouger Gravity Anomalies.

BIOLOGY OF THE ANTARCTIC SEAL III

By George A. Llano and Waldo L. Schmitt, Editors, Volume II of the Antarctic Research Series, published by the American Geophysical Union of the National Academy of Sciences, 1967, 261 pp. US\$13.50.

There has been a tradition dating from the earliest days of polar exploration that the scientists on the various expeditions should set forth in detail a report of everything which was seen and studied. With so many American stations now in operation, and so many ships engaged in scientific pursuits as well as in supply duties, one expedition blends into the next and it would make for endless duplication if individual reports of each station and ship's work were to be produced. Hence the Antarctic Research Series is designed to provide a medium of publication, in a dozen volumes, of papers resulting from the intensive scientific research being done in Antarctica.

This volume is the third in the series which deals with the biology of the Antarctic Seas, and it comprises 12 original papers which range in subject matter from an investigation of the life processes of the microalgae of sea-ice, to the physiologic behaviour and reactions to diving of the Weddell Seal.

One paper describes the first new family of oegopsid squid to be recorded in 30 years. Four specimens of this new family were captured by the USNS Eltanin which since 1962 has been conducting a continuous series of oceanographic cruises.

Of particular interest is the article on the Weddell Seal.

Although a large amount of information is available about almost every biological aspect of marine mammals, one major part of their biology has been neglected: their diving behaviour while unrestrained in the sea. Because of the large number of Weddell Seals close to McMurdo Station, and that for at least 8 months each year the sea ice provides a solid cover except for tidal and pressure cracks along the coast, this area was chosen for study. Seals were captured and recording instruments attached to them. Seal behaviour was studied by observation at seal holes, by scuba diving and by means of a sub-ice observation chamber. The deepest dive recorded was approximately 600 metres, and the longest submersion duration observed was 43 minutes 20 seconds. Hunting was associated with deep, vertical dives directly below the hole. Prolonged horizontal dives are made during movements to or in search of other holes. The observed interactions between seals at isolated breathing holes were aggressive.

HUSKIES TO STAY AT SCOTT BASE

There is no intention of bringing huskies back from Scott Base to New Zealand, or of reducing their present number, said the superintendent of the Antarctic division of the Department of Scientific and Industrial Research (Mr R. B. Thomson).

He said a request was made a few months ago for permission to bring through New Zealand some huskies which were to go to Australia's Mawson Base in the Antarctic.

"We are endeavouring to have an exchange of the dogs at the bases in an attempt to improve the breed," he said.

He said that there was a rare chance that an aircraft might make the flight from McMurdo Station to Mawson, in which case it could perhaps take the dogs directly.

An icebreaker might possibly travel to Mawson, and the dogs might be taken.

There are 22 dogs at Scott Base. This provides for two teams of nine dogs and four spares.

Mr Thomson said that there was a feeling among the Ross Dependency Research Committee that dogs would be kept at Scott Base for an indefinite period, and there was certainly no intention of decreasing the present number.

Although powered sleds were being used in the Antarctic there were many locations where it would be difficult to work with anything but dogs, he said.

Dogs were used to a large extent for scientific work on the Ross Ice Shelf, and were available for search and rescue work if required.

They also had recreational value for men at the base who went out with them and the sleds for exercise.

ANTARCTIC TOURISM

The question was asked in the New Zealand Parliament: "What was the Government's policy towards the development of tourist traffic to the Antarctic and was any significant build-up in such traffic

anticipated in the next few years?"

The Minister of Science (Mr Talboys) replied that the Government's policy towards tourist traffic in the Antarctic was partly dictated by the interests of other signatories to the Antarctic Treaty. No visits could be carried out by ship or aircraft without consultation with other Governments and without facilities in the Antarctic no significant build-up was anticipated in the next few years—partly because of the rough weather conditions encountered between New Zealand and the southern continent and the cost of such business.

Air New Zealand and the Holm Shipping Company had discussed the matter with Government departments, but no flights were planned for this summer.

ANTARCTIC NOT EQUIPPED FOR AIR TOURISTS

Any scheme to fly tourists to Antarctica would encounter difficulties because of lack of facilities on the continent, said the Commander of the U.S. Navy Antarctic Support Force (Rear Admiral J. L. Abbot).

Admiral Abbot said although there was no official objection to having tourists in Antarctica, it was not the policy of the U.S. Government, or of the New Zealand Government, to provide facilities for tourists.

He said the position was different with ship tours, as facilities were provided on ships that could not be provided on aeroplanes.

NO AUSTRALIAN DIRECTOR YET

The Leader of the Opposition (Mr Whitlam) in the Australian Parliament has queried the fact that the post of Director of the Australian Antarctic Division has remained vacant since May 18, 1966 when Dr P. G. Law resigned. No permanent Director of the Antarctic Division would be appointed until the Division's future activities and organisation was determined, the Minister for Supply (Senator Anderson) said.

FAMOUS POLAR EXPLORER DIES

ADELAIDE.—Mr. John Riddoch Rymill who died on September 7 was the last of three famous South Australian Arctic and Antarctic explorers.

The other two, who predeceased him, were Sir Hubert Wilkins and Sir Douglas Mawson.

Mr. Rymill, 63, who spent nine years of adventure in the frozen wastes near the North and South Poles, gave up exploring in 1938 to settle down as a pastoralist on the family station at Penola in the south-east of S.A.

Mr. Rymill, who was a qualified air pilot and experienced navigator, made three trips to the Arctic and one to the Antarctic in the nine years he devoted to exploration.

In 1930, he was chosen as a member of the first British Arctic air route expedition, led by Mr. H. G. Watkins.

The following year, he joined a second British Arctic air route expedition led by Mr. Watkins and took charge of the party when his leader was drowned while hunting seals in an Eskimo kayak in east Greenland.

Perhaps his greatest achievement was as leader of a 16-man expedition to Grahamland in the Antarctic in 1934.

He sailed from England in the 130-ton three-masted schooner Penola, named after the family station.

The vessel cost Mr. Rymill £1800.

It had been an old Brittany fishing schooner and had once been used as a French girls' training ship and by an American boot-legger.

The Penola was sold for \$3000 when on the expedition's return to London it was found that \$6000 still had to be found to defray the cost of the trip.

Its purchaser this time was a man with a large property in Scotland, who trained boys in various trades during the depression.

He used the vessel to transport goods made by the boys to London. On the Grahamland expedition, Mr. Rymill's party spent three years exploring about 1000 miles of coastline south of South America.

On returning to England in 1937, Mr. Rymill reported that his most important discovery was that Grahamland was a part of the Antarctic continent and not, as had been thought, a group of islands.

He proved that the end of the Andes mountain range was in Grahamland.

He received a number of awards for his work.

He is survived by a wife and two sons, Peter and Andrew.

TWO SUMMER STATIONS OPEN

Two American summer support stations, Hallett and Brockton were opened on October 11 by Hercules aircraft.

Hallett Station, 338 nautical miles north of McMurdo serves as a weather reporting and communications station between Christchurch and McMurdo. Fifteen U.S. Navy personnel under Chief Mechanic F. Bak, who was also Petty-Officer-in-Charge at Hallett last summer, will man the station.

Brockton Station is 228 nautical miles inland south-east of McMurdo, on the Ross Ice Shelf, and serves as a weather reporting and communications station from McMurdo to the South Pole and Byrd Stations. It will be manned by three men.

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Volume 2, numbers 1, 2, 3, 4, 7, 9	number 8
Volume 3, number 7	number 5

Some other issues are in very short supply. Copies of available issues may be obtained from the Secretary of the Society, P.O. Box 2110, Wellington, at a cost of 50c per copy meanwhile. Indexes for volumes, 1, 2 and 3 are also available, 30c each.

Copies of our predecessor, the Antarctic News Bulletin, are available at 50c per copy, except for numbers 9 and 10. The copies of numbers 1, 2, 3, 4, 7, 11, 17 and 18 are authorised reprints.

The New Zealand Antarctic Society

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

The Society has taken an active part in restoring and maintaining the historic huts in the Ross Dependency, and plans to co-operate in securing suitable locations as repositories of Polar material of unique interest.

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

You are invited to become a member. **South Island** residents should contact the Canterbury secretary, **North Islanders** should contact the Wellington secretary, and **overseas** residents the secretary of the New Zealand Society. For addresses see below. The membership fee includes subscription to "Antarctic".

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