NUMBER 11

JANUARY 1963

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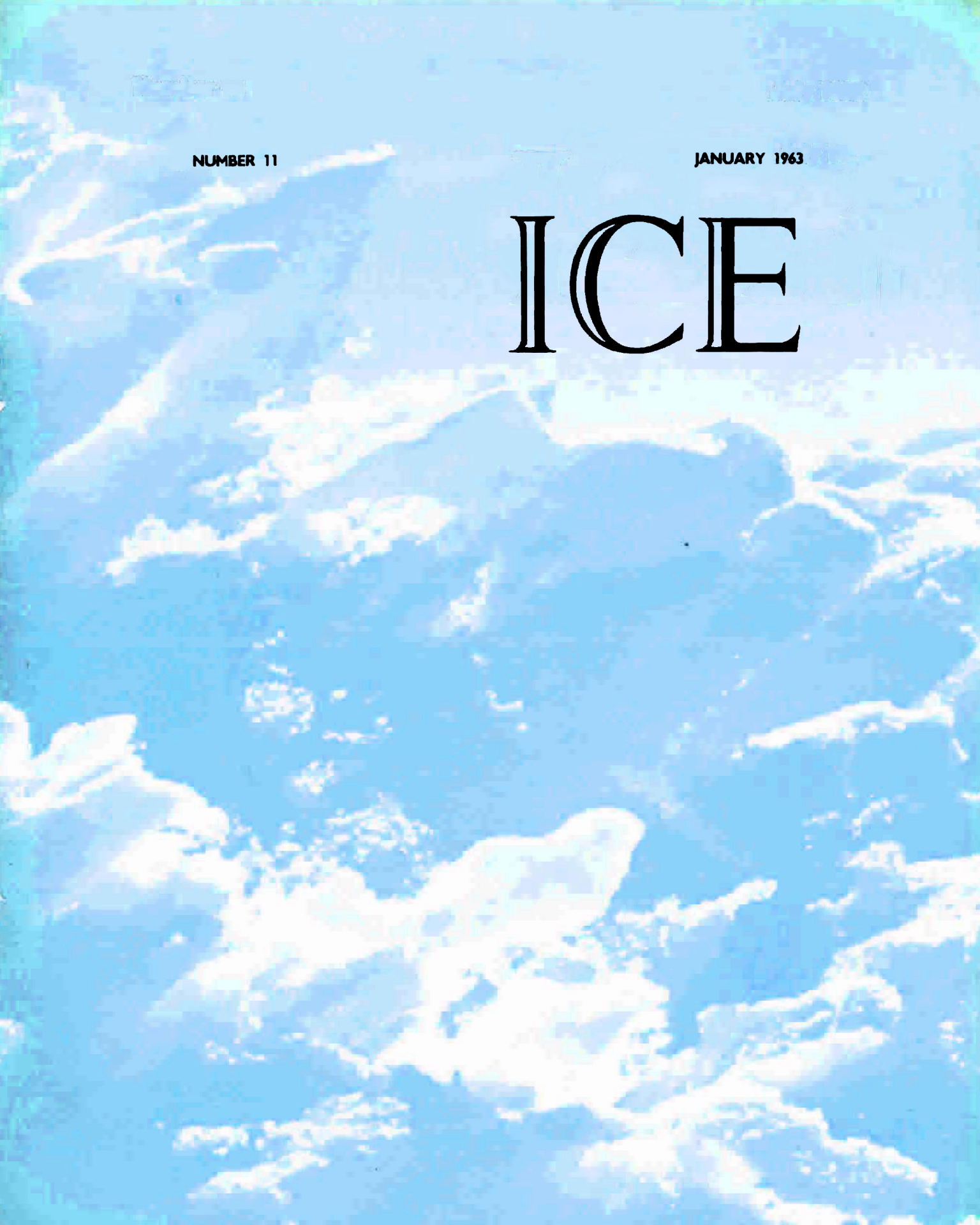


VOYAGE PITTORESQUE AUX GLACIERES DE SAVOYE,

Fait en 1772.

Par Mr. B.

A GENEVE,

Chez L. A. CAILLE, Imprimeur-Libraire, au bas du Collège.

1773.

CHAPITRE XIV.

Hypothèſe ſur les différents phénomènes des Glaciéres réduits à un ſeul principe.

IL eſt tems maintenant de conſidérer tous ces objets avec les yeux de la Raiſon, & d'abord d'étudier la marche & la poſition des Glaciéres, & de chercher la ſolution des principaux Phénomènes quelles préſentent. Au premier aſpect des Monts de glace une obſervation s'offrit à moi, & elle me parut ſuffire à tout. C'eſt que la Maſſe entiére des Glaces eſt liée enſemble, & pèſe l'une ſur l'autre de haut en bas à la maniére des Fluides. Conſidérons donc l'aſſemblage des glaces non point comme une maſſe entièrement dure & immobile,

AN EIGHTEENTH CENTURY THEORY OF GLACIER FLOW

See Page 1

ICE
News Bulletin of the Glaciological Society

January 1963 **Number 11**

MEMBERSHIP DUES. 1963 dues are payable now. For your convenience a form is enclosed. Please remit promptly.

We are most grateful to those members who add some extra shillings or dollars to their £2 or $6. In 1962 these small amounts brought in £40.

AN EIGHTEENTH CENTURY THEORY OF GLACIER FLOW. In 1772 there was published in Geneva a short book of 303 pages, "A picturesque journey to the glaciers of Savoy", whose anonymous author signed himself simply by the initial of his surname: "Mr. B.". According to Sir Douglas Freshfield the author was the parish priest of Geneva, César Bordier. The contents of the book gave rise to local disputes and only a few copies were sold.

For glaciologists the main interest in this book lies in chapter 14, which is 13 pages long, called "A theory which reduces to a single principle the different glacial phenomena", which explains the movement of a whole glacier by the "ductability" of ice under stress - the term "plasticity" was introduced later by Forbes. This theory can be considered to be exceptionally advanced in the light of the scientific knowledge of that period.

A photographic reproduction of part of this work, containing 55 pages 15 x 21 cm, in the original French, can be obtained from Professor A. Renaud, Avenue Rambert 20, Lausanne, Switzerland. The price will be between 50 and 60 Swiss francs depending on the numbers of copies ordered.

CORRESPONDENTS. The Council have recently appointed representatives from several countries to serve as Correspondents of the Society for three years, 1962-65. Their duties are to foster the objects of the Society by getting new members and financial help for the Journal of Glaciology, and to send to the Secretary news and a brief annual report of glaciological activities in their country.

Australia	- U. Radok	Japan	- Z. Yosida
Austria	- H. C. Hoinkes	New Zealand	- I. C. McKellar
Canada	- G. Hattersley-Smith	Norway	- K. Strøm
Denmark	- B. Fristrup	Poland	- A. Kosiba
Finland	- E. Palosuo	Sweden	- V. Schytt
France	- C. J. Lorius	Switzerland	- R. Haefeli
Germany	- R. Finsterwalder	U.S.S.R.	- P. A. Shumskiy
Iceland	- S. Thorarinsson	U.K.	- W. H. Ward
Italy	- M. Vanni	U.S.A.	- R. P. Sharp

INDEX TO VOLUME 3. The index is now ready and has been mailed to those members and subscribers who placed orders. Bound editions of Volume 3 are now also available.

McGILL SUB-ARCTIC RESEARCH LABORATORY. McGill University offers graduate assistantships for post-graduate research, tenable at the Laboratory, which is situated in central Labrador-Ungava. The stipend is $4080 under an arrangement with the Department of Transport, Canada, for whom the students act as meteorological observers. Students are expected to assist in various routine observations for various research programmes under way at the laboratory, such as the Snow and Ice Survey for the National Research Council of Canada, permafrost studies in the surrounding area and collection of meteorological data from several small local stations. There are many research opportunities: problems of the sub-Arctic and Arctic in all the natural sciences await solution. Laboratory and field equipment is available, and comfortable furnished quarters are provided at a nominal charge. Residence at the Laboratory for 12 months is equivalent to one year's full-time University residence as part of the requirements for a research degree at McGill University. Students interested should write for further information to P. D. Baird, Director of Northern Field Studies, McGill University, Montreal, P. Q., Canada.

OHIO STATE UNIVERSITY INSTITUTE OF POLAR STUDIES offers (1) a fellowship for 1963-64, value $2800, for graduate studies toward any advanced degree involving research

in polar or alpine areas in botany, agronomy, geology, photogrammetry, bacteriology, geography or other pertinent sciences. (2) a summer exchange fellowship for the summer of 1963 for graduate studies toward any advanced degree involving polar research in botany, agronomy, glaciology, glacial geology, geomorphology, lake sedimentology. Support will be $1000, which will be partly used to attend a summer field station at Kebnekajse, Sweden.

Further information may be obtained from the Dean of the Graduate School, The Ohio State University, 164 W. 19th Avenue, Columbus 10, Ohio, U.S.A. Applications must be received before 7 February 1963.

Meetings

COMMISSION OF SNOW AND ICE (International Association of Scientific Hydrology of the International Union of Geodesy and Geophysics). A report on the Symposium on the variations of the regime of existing glaciers, held in Obergurgl, Austria, September 10-18 1962, will be published in the Journal of Glaciology, Volume 4, number 34, February 1962.

For the arrangements for the meetings of the Commission in Berkeley, Calif., U.S.A., August 1963, see major section headed "Commission of Snow and Ice".

SOCIETE HYDROTECHNIQUE DE FRANCE. The 1962 glaciological meeting was held in July. On 2 July a reunion was held in the Institut de Géographie Alpine in Grenoble, and from 3 to 6 July visits were made to glaciers in the Alps and lectures and films were given.

INTERNATIONAL GEOGRAPHICAL UNION. The 20th Congress will be held in London, July 21-28 1964. Sectional meetings, symposia and field studies will be held from 10 July to 7 August. One section will include glaciology. The First Circular was published in the Geographical Journal, March 1962. Provisional application for participation should be made on the appropriate form to the Organizing Secretary by 1 October 1962. Requests for copies of the full circular and the necessary forms should be addressed to the Organizing Secretary, Mr. T.H. Elkins, Secretariat, 20th International Geographical Congress, Royal Geographical Society, Kensington Gore, London S.W.7., England.

INTERNATIONAL GEOLOGICAL CONGRESS. The 22nd Congress will be held in New Delhi, 14-22 December 1964. Excursions will be held before and after the Congress. The First Circular can be obtained from B.C. Roy, Secretary-General of the 22nd Session, International Geological Congress, Geological Survey of India, Chowringhee, Calcutta 13, India. In the U.S A. details can be obtained from the Congress Service, American Geological Institute, 2101 Constitution Avenue, N.W., Washington 25, D.C., U.S.A.

Commission of Snow and Ice

(Int. Association of Scientific Hydrology of the Int. Union of Geodesy and Geophysics)

XII General Assembly of the Union to he held at the University of California, Berkeley, U.S.A., 19 - 31 August, 1963

FIRST CIRCULAR

This circular gives complete and final details for the submission of papers for presentation before the Commission of Snow and Ice during the XIII General Assembly; it also announces a five-day study tour in Washington State following the Assembly.

PAPERS

A. Contents

1. The papers must be original and must not have been published previously.
2. The papers must cover only the following subjects:-
   a) the transfer of heat and mass in snow cover, ice cover, glaciers and frozen ground;
   b) new developments in methods and techniques.
   In item a) papers dealing solely with the transport of mass will not be accepted; mass

is only to be included in so far as it involves a transfer of heat. In item b) the developments may involve any aspects of the study of snow and ice.

Contrary to a previous notice no special emphasis is to be given to Antarctic Glaciology, and papers on this general topic will not be accepted unless the subject matter deals with items a) or b) above.

B. Text, Diagrams and Photographs

The complete paper, including short abstracts (maximum 300 words) in English and French, diagrams, tables and photographs must not exceed 15 pages of typescript, each page containing not more than 300 words with double spaces between the lines.

The paper must be clearly written in good English or French. Where these languages are not the native tongue of the author, he should ensure that an accurate and clear translation is made. Experience shows that many translations are of inferior quality.

The number of photographs must be kept to a minimum; the diagrams must be drawn with firm black lines on white paper, or tracing linen, and be suitable for direct reproduction. The lettering on the diagrams must be of a size that remains legible when the longest overall dimension of the diagram is reduced to about 10 cm.

The paper must be accompanied by a list of all the figure titles in numerical order.

The names and address of the author should be written in the top right-hand corner and the number of reprints in the bottom right-hand corner of the first page.

C. Submission of Papers

The total number of papers that will be accepted for publication is 40. No author may submit more than one paper or one joint paper.

Authors should submit their papers to the National Committees of Hydrology or to the National Correspondents of the Commission who will be responsible for selecting the papers within their country and for fixing the dates when they require titles and abstracts and complete papers to be submitted to them. The National Correspondents should forward the selected documents to Dr. M. F. Meier not later than the dates given below. Late documents and any which are too long will not be accepted.

The proposed titles of the papers, together with short summaries or informal abstracts in English or French, not exceeding 300 words must be sent to Dr. M. F. Meier on or before 1 January 1963. This information will not be published but will be used by the screening committee to decide whether the final paper is likely to contain acceptable material.

Three copies of the complete paper in English or French, and three copies of the final summaries in both English and French must be sent to Dr. M. F. Meier on or before 1 March 1963 who will submit them to a screening committee, arrange for their editing and submission to the printer.

D. Publication

It is the intention of the Commission to publish the volume of papers on 15th July 1963. A charge will be made for the volume and for any reprints.

E. Address for Correspondence

All correspondence relating to the submission of papers should be addressed to:-
Dr. M. F. Meier, Chairman, U.S. Committee on Glaciers, 529, Perkins Building, Tacoma 2, Washington, U.S.A.

STUDY TOUR

After the Assembly, on September 2 - 6 inclusive, a five-day study and discussion tour is planned. There will be a visit to the Department of Meteorology at the University of Washington in Seattle, followed by visits to glaciers and points of interest to glacial geologists in and near the Mount Rainier National Park.

W. H. Ward
Secretary, Commission of Snow and Ice

Tarfala Station, Kebnekajse, Sweden
(See account in Ice number 10, page 4)

Field Work

UNIVERSITY OF ALASKA GULKANA GLACIER PROJECT, 1962. Glaciological and glacial geology studies of 1960 and 1961 on the Gulkana Glacier of the Central Alaska Range were continued during the summer of 1962 by members of the Department of Geology. Previous work included surface motion studies, meteorological, ablation, and accumulation measurements, and a general survey of structures within the ice especially in the lower part of the glacier. (See report in Ice 10).

During the 1962 season, two groups concentrated on special aspects of this continuing project: (1) the reformation of foliation at the base of the ice fall, and (2) the Recent history of Gulkana and East Gulkana Glaciers.

(1) Reformation of foliation: The firn limit lies above the main ice fall of Gulkana Glacier (Gabriel Ice Fall) and thus the internal ice structures are exposed for about one to two months of the ablation season. To study these structures, particularly the reformation of the foliation following disruption in the fall, a closely spaced net of thirty stakes was set within and immediately below the ice fall. This net, in combination with stakes surviving from 1961, was used for motion measurements, as a base for plane table mapping, and for ablation measurements. Internal structures were mapped in detail; these structures included possible stratification which survived the ice fall and various secondary planar structures which develop at the very base of the ice fall and which are progressively modified down-glacier into the typical nested arc pattern. Proposed ice fabric work was not done this summer because of an early onset of winter snow accumulation.

(2) Recent glacial history: Dating of the Recent moraines was done by the use of lichenometry because the area is above tree line. Lichen diameters were measured on the Recent moraines of the glaciers and were compared with the lichen diameters of the Recent moraines of nearby Castner, Canwell, and Black Rapids Glaciers. The terminal areas of the Recent moraines of these other three glaciers have trees growing on them which permits dating of these Recent glacial advances. Although several species of lichens were measured, the lichen, Rhizocarpon geographicum, was the most reliable and provided the bulk of the data.

Tentative results of this summer's work on Gulkana and East Gulkana Glacier indicate that there have been two minor advances which occurred during the middle of the 18th and 19th century respectively. Preliminary mapping indicates that the mid-19th century advance was almost equal to, or, in some instances, greater than, the mid-18th century advance.

(Contributed by Troy L. Péwé)

CANADA, GLACIOLOGICAL RESEARCH IN 1962

Field glaciological work was carried out by Government Departments, Universities, and private organizations in the following areas: the Athabasca Glacier area in Alberta; the Selkirk and Monashee Mountains, the Cariboo Mountains, and the northern Coast Mountains in British Columbia; the Icefield Ranges, Yukon Territory; central Labrador; northern and southern Baffin Island; and in five areas of the Queen Elizabeth Islands, namely Devon Island, Melville Island, Axel Heiberg Island, Meighen Island, and northern Ellesmere Island. Photogrammetric and laboratory studies, and work on the inventory of Canadian glaciers were continued. An extensive programme of mapping of glacierized areas is being pursued both in the field and in the office. Space allows publication here of reports on only a few of these projects. Further details may be obtained from Dr. G. Hattersley-Smith, Chairman, Sub-Committee on Glaciology, Associate Committee on Geodesy and Geophysics, National Research Council, Ottawa, Ont., Canada.

During the year, a Glaciological Section in the new Division of Physical Geography of the Geographical Branch (Department of Mines and Technical Surveys) was set up, and an Associate Professorship in Glaciology was established at McGill University.

Devon Island (Arctic Institute of North America): The Devon Island Expedition carried out its second full season's field work in 1962, under the leadership of Spencer Apollonio. Glaciological work was also carried out at the Base Camp at Cape Skogn on the north coast of the island during the 1961-62 winter. The winter work included detailed observations by R. M. Koerner on the growth, temperature, density, petrofabrics and salinity of sea ice, and an analysis by S. Apollonio of the chemical changes of biologically important "micro-nutrients" in growing sea ice. The latter's results suggest a differential loss of the nutrients, in part related to the crystal structure.

In the summer a detailed mass balance study was carried out by R. M. Koerner on the icecap and on one of the outlet glaciers of the east coast. It seems that the northern slope of the icecap has a negative budget and the southern slope a positive budget. A detailed study of a 10-m pit at the top of the icecap was made, and the studies were extended to 22 m with core samples. Sub-surface temperatures were measured to a depth of 10 m on the glacier and in the ablation, equilibrium and accumulation zones of the icecap. An analysis of the ice petrofabrics on a profile across the equilibrium line of the icecap has been completed. Differences in the petrofabrics on the glacier were correlated with differences in ablation across the glacier. Run-off measurements, started in 1961 on one of the outlet glaciers of the north coast, were continued by means of the dilution method. The movement of this glacier had been measured in detail in 1961; it was resurveyed in 1962. The profile of the edge of the north-west side of the icecap was also surveyed by levelling, and a levelling survey combined with a gravity survey was carried across the icecap to Croker Bay.

The geolectric method was used successfully to sound the depth of the outlet glacier of the north coast, and a north-south section across the icecap. J. P. Greenhouse carried out extensive experiments for the purpose of tracing the flow and source of particular ice bands within the glacier, the variation of the resistance of ice with reference to the ice petrofabrics, and the depth of the firn-ice contact.

Extensive and detailed comparative meteorological, micro-meteorological and radiation observations were made at the Base Camp at sea level, and on the icecap at 1,370 m (a little below the equilibrium line).

Northern Ellesmere Island (Defence Research Board, Department of National Defence): Massive calving of the Ward Hunt Ice Shelf occurred between August 1961 and April 1962, as shown in air photography by the Royal Canadian Air Force. An estimated 596 km^2 of ice shelf with a volume of 18 to 24 km^3 became detached to form ice islands, five of which are very large with areas ranging from 70 to 140 km^2. In late July four of the large ice islands were 50 to 60 km west of their place of origin; on the other hand, the fifth and largest ice island had drifted 80 km eastward towards the Lincoln Sea. The new configuration of the ice shelf and the size and distribution of the new ice islands have been plotted from R. C. A. F. photographs of mid-June. Radar reflectors, to assist identification from the air, have been placed on the largest island through the cooperation of the Polar Continental Shelf Project.

It is planned to open a new field station on Tanquary Fiord, 70 km south-west of Lake Hazen, in the 1963 spring. Equipment and supplies were landed in August 1962 at a site near the head of the fiord, reconnoitred on the ground during the spring. Glaciological studies will form part of the field programme in the Lake Hazen-Tanquary Fiord area during the 1963 summer.

Glaciological Activities of the Geographical Branch, Department of Mines and Technical Surveys:

(a) Baffin Island

Barnes Ice Cap: Following the reconnaissance expedition of 1961 a larger party was fielded during 1962 to tackle an integrated programme of glaciological and glacio-geomorphological research. A maximum of twelve Branch personnel were involved during August.

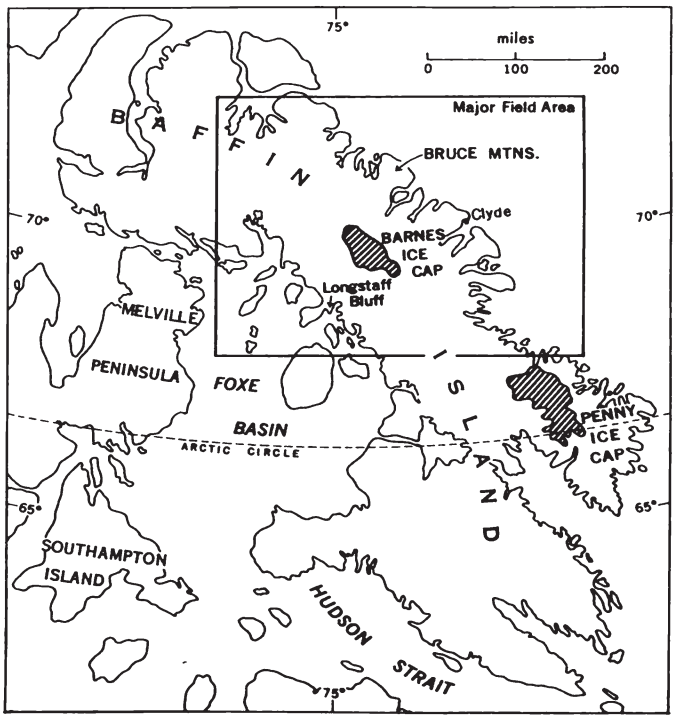
1. R. B. Sagar led a group which occupied a camp on the crest of the ice cap from mid-May until late-September (lat. 70° 13' 30" N; long. 73° 54' 30" W; alt. 1,075 m). The work involved glacio-meteorological reconnaissance during the pre-ablation and ablation seasons aimed at laying the foundations for a long-term study of glaciological conditions. Mean 1961-62 accumulation in the camp vicinity was 27-30 cms water equivalent and summer precipitation amounted to 5 cms, of which 75% fell as rain. The budget

year showed a net loss of 5 to 8 cms water equivalent at the highest levels of the ice cap, no superimposed ice remaining, except in a few scattered hollows. Compared with studies by S. Ørvig in 1950, 1962 showed ablation greater by about 15 cms of water, while the previous winter's accumulation was similar. It seems likely that the previous few seasons also showed a net loss, and this is in accord with studies at the margins.

During the early part of the field season a Dominion Observatories team led by H. Weber co-operated by completing a 56 km long SW-NE straight line traverse across the highest part of the ice cap. Bamboo poles were drilled into the ice at 1 km intervals and accurately surveyed in relation to monuments established on land at either end of the traverse. Seismic profiles were shot and gravity observations were made. J. B. Boyd of the Department's Topographical Survey was in charge of the surveying.

2. Gunnar Østrem initiated a study of ice-cored moraines, both marginal to the ice cap and to selected valley glaciers in the Bruce Mountains. A sample of 400 kgm of ice was taken from an ice-cored moraine along the western edge of the ice cap. Studies of the crystal fabrics revealed a striking contrast between ice from the moraines and the nearby glacier ice. It is concluded that the moraine cores originated from snow banks accumulating along the margin of the ice cap and that organic matter, deposited on the original snow banks, should yield a radiocarbon date for the end moraines.
3. J. T. Andrews continued detailed geomorphological studies along the perimeter of the ice cap. Additional evidence was obtained on the earlier extent of the ice cap, the drainage of former ice-dammed lakes, and glaciological processes in a high arctic environment.
4. G. Falconer extended a study of the regional glacial geomorphology to include the northern half of the Cockburn Land 1:500,000 map sheet.

The field programme was organized and directed by J. D. Ives. The acquisition of a permanent building at Longstaff Bluff and the setting up of a small field laboratory at the north end of the ice cap will permit the continued expansion of this programme over the next few years. The Surveys and Mapping Branch of the Department have produced four 1:40,000 preliminary map sheets, with 25-ft contour intervals, of the northern margins of the ice cap. Others are in preparation.



Areas of Glaciological Field Work, Geographical Branch, Department of Mines and Technical Surveys, Ottawa.

Penny Ice Cap: In conjunction with the Dominion Observatories' gravity team led by H. Weber, K. C. Arnold initiated a series of glaciological studies on the Penny Ice Cap during parts of April and May.

Camp was set up on a major outlet glacier on the southwest side of the ice cap at about 1,100 m. 15 stakes were drilled across the glacier at 200 m intervals and down-glacier and cross-glacier movement components were measured. The maximum rate of movement on an extrapolated yearly basis is 120 meters. A double line of stakes 9 km long and drilled to a depth of 6 m was established across the crest of the ice cap. The two lines were 1 km apart and individual stakes 1.5 km apart. End points were tied into permanent rock markers by tellurometer trilateration and simultaneous reciprocal vertical angles were observed between the stakes to establish accurate local height differences.

Pits were dug at the base camp, at each end of the surveyed lines, and at other localities, while cores were taken from the higher pits. At 1,100 m the 1961-62 winter provided 30 cms of water equivalent accumulation.

(b) Meighen Island

K. C. Arnold studied the Meighen Island ice cap for the fourth summer in succession as part of the Geographical Branch's Polar Continental Shelf Project commitments. As in the two previous summers, regular weather observations were taken at the main camp. Winter snowfall was measured at the ablation stakes set up earlier and weekly ablation measurements were taken until freeze-up. Temperature, humidity and run-of-the-wind observations were measured at screens north and south of the ice cap. 1962 ablation was similar to that of 1960 with the higher areas losing about 50 cms of ice, while marginal stakes lost up to 150 cms. Additional ice cores were taken from the ice cap, special attention being given to areas close to the margins in which it was thought older ice might be found. Preliminary study revealed that it is unlikely that true glacier ice, in contrast to superimposed ice, will be found, unless it be in the deeper parts of the ice cap. Studies were also made of the ice-free areas of the island.

(c) Sea Ice Studies

W. A. Black has been mapping systematically from the air the growth and dissipation of winter ice in the St. Lawrence River and Gulf. Attempts are being made to analyze the results statistically and to relate ice distribution and type to climatic parameters.

Ice studies are also conducted in the eastern Canadian arctic. In 1961 and 1962 airborne studies were made of sea ice distribution and movement in the northwestern Queen Elizabeth Islands as part of this Branch's contribution to the Polar Continental Shelf Project.

(d) Fresh-water ice studies

Statistical analyses of dates of break-up and freeze-up of selected Canadian rivers are being undertaken. J. Ross Mackay, of the Geography Department of University of British Columbia, has completed studies on the Mackenzie River, and D. K. MacKay of the permanent staff, initially under J. Ross Mackay's direction, has extended this work to the Prairies and has worked with W. A. Black on the St. Lawrence programme.

(e) Inventories of Canadian Glaciers

G. Falconer has continued compilation of material and the first volume has appeared in print: "Glaciers of northern Baffin and Bylot islands, N. W. T." by G. Falconer, 1962, Geographical Paper No. 33, Geographical Branch, Ottawa.

(f) Branch Organization

In recognition of the Geographical Branch's growing activities in glaciology and geomorphological processes, the internal organization has been re-arranged. A "Division of Physical Geography" has been created which includes at present three sections: Glaciology, Geomorphology and Data Processing.

The Glaciology Section at present has five permanent staff members and its work will also embrace the Branch's studies of sea ice distribution and fresh water ice.

(Contributed by J. D. Ives and published with permission of the Director, Geographical Branch, Ottawa.)

Jacobsen-McGill University Arctic Research Expedition to Axel Heiberg Island, N. W. T.:

During the summer of 1962, the fourth and final year of the expedition's fieldwork, a party of nine people was working on Axel Heiberg Island from 22 June until 29 August. The aim of this summer's work was to complete vital long-term measurements in glaciology, meteorology, geomorphology and botany, and to fill various gaps which had become apparent. The field work was under the leadership of F. Müller. Senior scientists participating this year were R. E. Beschel (Botany) and J. M. Havens (Meteorology).

Meteorology

Preliminary analysis of the measurements of the two previous summers made it desirable to (1) continue the use of the Base Camp as a reference station for general observations; (2) re-open the Lower Ice Station, White Glacier, for detailed micro-meteorological and radiation observations for a glacial-meteorological investigation during the height of the ablation season; and (3) initiate a comparative study of ice-covered and bare-ground environments. The 1962 Base Camp programme was supplemented by sunshine and short-wave radiation data. It covered an observation period of 67 days (23 June - 28 August).

Botany

Re-measurement of many lichens for information on glacier retreat showed minute increments. Increased caution is required in the use of lichens for dating the retreat of polar glaciers because of the important discovery that lichens are able to survive under the ice in a dormant, deep-frozen state. Many more samples were collected for dendrochronological analysis, a method which yields very promising results.

Geomorphology

Last year's survey of glacier-dammed lakes was supplemented by many more observations. Some additional measurements on the recent and sub-recent development of arctic slopes were also made. In an older moraine, which is over-ridden by the present terminal moraine of the White Glacier, organic material was found and submitted for C_{14} age determination.

Glaciology

The White, Thompson, Baby and Crusoe glaciers and the Akaioa Ice Cap were investigated in order to compute their mass budget for a third time. The 1959/60 budget of the White Glacier was strongly negative whereas the 1960/61 budget was found to be slightly positive. The measurements made in 1962 on approximately 300 stakes and in some 80 snow pits indicate that the mass budget 1961/62 is clearly negative. It was found that Axel Heiberg Island received extremely little precipitation between September 1961 and June 1962. This lack of winter snow explains the early start of the spring season 1962. The Ice Cave stake No. 4 registered the extremely high amount of 486 cm net ablation. In the table below some of the glaciological data for the summer 1962 are compared with figures from the previous years. The survey of four glacier tongues in the expedition area was repeated. For the first time the frontal cliff of the Iceberg Glacier was included in this survey. The Thompson Glacier is still advancing, whereas the Iceberg Glacier, the only tidewater glacier on Axel Heiberg Island, is strongly receding.

The study of the temperature regime of the ablation and accumulation areas and near the equilibrium line was continued. An additional thermocable of 10 m length was inserted near the Upper Ice Station I. Just before, and for six days after the onset of winter, a detailed study of the thermal regime in the snow and firn layers at the Upper Ice Station II (highest part of the accumulation area) and above Crevasse Camp (above equilibrium line) was made to understand the stratigraphically important layers of depth hoar and superimposed ice. The ice shaft at the Upper Ice Station II (27.2 m deep) was re-opened and supplementary observations were made concerning the stratigraphy of the highest parts of the Akaioa Ice Cap.

The surface movement survey of the tongue and the western margin of the lower part of the White Glacier was continued and supplemented by mapping the main structural features (thrust planes, faults, cracks, etc.) at the scale 1:5,00. The Moraine and Eureka cross-profiles were also resurveyed. In the Ice Cave (leading horizontally approximately 150 m underneath the White Glacier) further measurements were made concerning glacial erosion and bottom slip of a polar glacier.

Comparison of some glaciological data for the three budget years 1959-1962

Mean net ablation on the White Glacier in cm. of water equivalent

	1959/60	1960/61	1961/62
Anniversary Profile (11 stakes)	143	95	226
Lower Ice (5 stakes)	214	119.0	224
Moraine Diamone (5 stakes)	95	14.85	127.5
Tongue (lowest 3 stakes)	255	166.4	393
Ice Cave (3 stakes with greatest values)	-	-	444

Mean accumulation on the Akaioa Ice Cap in mm. of water equivalent

	1960/61	1961/62
Upper Ice II (10 sites)	383	89
Upper Ice I (29 sites)	162	148

(Contributed by Fritz Müller)

CAMBRIDGE EXPEDITION TO SVARTISEN, NORWAY, 1962. H. C. Fitzwilliams and W. H. Theakstone and 7 other members worked in the field from 28 June - 26 August, making observations in geomorphology, glaciology, meteorology and ornithology. The glaciological studies included surface movement, ablation, accumulation, crevasses, ice caves and the retreat of the eastern outlet of the glacier.

Surface movement: Stakes set up in 1960 were surveyed by theodolite and by taping. New stakes added at the beginning of the 1962 field season were measured by taping each week and showed longitudinal compression along the main line and a divergence eastwards.

Ablation: The metal stakes showed an average ablation for the year August 1961 - August 1962 of 563 cms. In 1962 ablation by calving was active. A gorge was formed by the collapse of the ice above a meltwater channel; the walls were 30m high and continuous changes were observed. The discharge through the new gorge into the lake near Kamplien was considerably greater than the discharge of the meltwater stream draining to Svartisdal. Calving also took place at other points along the shore of the glacier-dammed lake, and to a lesser extent at the Svartisdal terminus of the glacier.

Accumulation: Much snow remained on the ice cap during the 1962 summer, in contrast to conditions in 1961 and 1960, when the snow disappeared. No detailed accumulation studies were made. General observations showed that the weather of the period March-May is principally responsible for the snow conditions to be found in the Østerdalsisen accumulation zone during the summer.

Ice caves: Sub-glacial observations again formed a major part of the expedition's programme. Caves on Svartisfjell were examined for basal movement, and measurements showed that the mean movement of the ice at the base of the glacier was about 4.9 cms per day. Measurements were also taken of the surface ice above and around the caves; results are not yet available. Other observations showed that the major geomorphological process associated with the caves was deposition of material washed in from outside, beyond the glacier border; the bottom of the Østerdalisisen is clean and free from material in transport.

Crevasse study: The crevasse pattern noted in previous years showed little change. Measurements were made of the advance of concentric crevasse patterns, an ice ridge, and of profiles of crevasses in three different parts of the glacier.

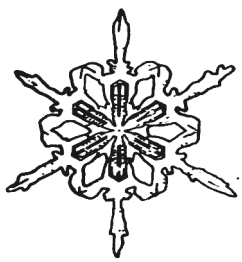
Retreat of the eastern outlet: The steady retreat was continued in the 1961-62 season. The lake at the snout has grown considerably.

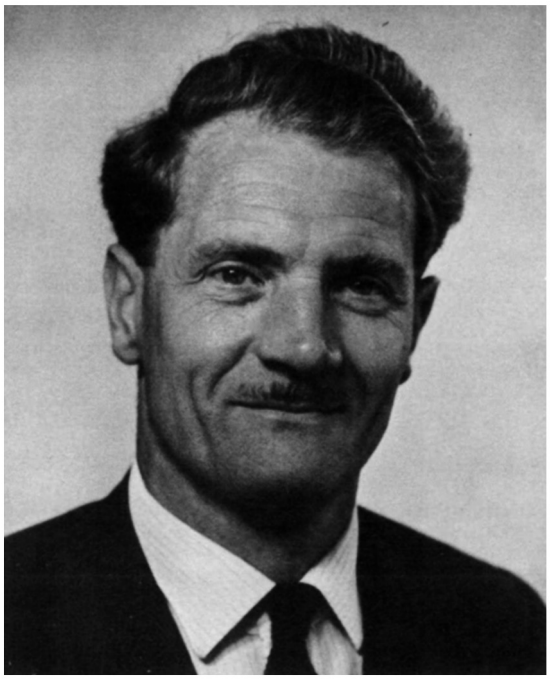
SOVIET ANTARCTIC ACTIVITIES, 1962. The winter of 1962 was relatively uneventful at the two Soviet stations, Mirny and "Novolarzarevskaya". In September, an automatic weather station was set up on the ice sheet 100 km south of Mirny at a height of 1500 m.

The 8th Soviet Antarctic expedition is to be led by Dr. M. M. Somov, the leader of the first expedition in 1955-57. The ships Ob' and Estoniya left the USSR with the party and its stores in November and December. The main object is to prepare stations for the International Quiet Sun Year. To this end, the expedition will reopen "Vostok" station at the south geomagnetic pole, and will complete construction of the new station "Molodezhnaya" in Enderby Land, which will then become a permanent station (it was occupied in the summer of 1961-62).

ICEFIELD RANGES RESEARCH PROJECT. In this second season (the first season's work was briefly reviewed in Ice number 10) R. H. Ragle led the field party and continued the studies of regime, movement, firn particles and tritium content of falling snow. The gross accumulation on 1 August for the previous 12 months was about 4 m, slightly less than in the previous year; the ablation season began at the same time as in 1961, but the isothermal layer is somewhat deeper than in 1961. A new series of accumulation and movement markers has been set up along a 25 km traverse which begins on the Kaskawulsh Glacier at 2417 m, follows the apparent axis of the glacier trench to the snow divide at 2606 m and continues down the Hubbard Glacier. Ram hardness measurements have been made along a 14 km traverse down the Kaskawulsh Glacier. Seismic observations revealed that the thickness of snow and ice reaches 853 m and that the sub-glacier bedrock divide between the Hubbard and Kaskawulsh valleys lies 3 km to the east of the prevailing snow divide and at a depth of 457 m beneath the surface. Meteorological observations were recorded at the upper station and at base camp, and semi-automatic recording instruments were established at the ends of the glaciological traverse across the divide. During the 1961-62 winter members of the Ohio State University Research Foundation made a topographical map of the area using 1961 data, scale 1:25,000, contour interval 10 m. Surveying in the summer of 1962 was integrated with the glaciological work and the 1961 network was extended.

MICHIGAN STATE UNIVERSITY GLACIOLOGICAL INSTITUTE SUMMER FIELD CAMP, JUNEAU ICEFIELD. In 1962 a 5-week course of lectures and demonstrations was held on the icefield, in addition to 3 weeks of directed research and observations at selected localities along the coast. Studies included a regional assessment of the depth and distribution of the 1961-62 snow-pack and firn stratigraphy, thermal conditions in boreholes, pit investigations, stone stripe and stone circle studies, lichen dating, and geological mapping. The programme will be continued in 1963.





W. H. Ward

As a Vice-President of the Glaciological Society, Secretary of the Commission of Snow and Ice, and organiser of the recent successful symposium at Obergurgl, Dr. William H. Ward is well known among glaciologists. His lean, laconic presence is equally well known in soil mechanics and civil engineering circles, wherever building problems concerned with shrinking and swelling clays are under discussion, tunnelling problems or thermal problems in the ground. Glaciology, surprising as it may be to those who know the extent of his work in it, is his spare-time hobby.

Ward is very much a Londoner. The first 22 years of his life were spent in the same Victorian house in Westminster where he was born in 1917. That he was the son of a cabinet-maker will surprise no one who has observed his keen pleasure in good tools and craftsmanship. From the Polytechnic Secondary School, where he studied science, he gained an Open Exhibition to Imperial College. Here he chose civil engineering. It seemed to provide challenging problems in combat with nature, and an outdoor life into the bargain. A first-class degree led to a start in research, on the seepage of water through the ground, but this work was interrupted by the war.

As a boy Ward read a great deal about travel and polar exploration, but it was in 1935 that, on a visit to Switzerland, to produce "A Midsummer Night's Dream" at Lucerne Casino, he climbed his first mountain and had his curiosity aroused by the Rhône Glacier. Climbing in Wales, the Lake District and Norway followed, and in 1938 he went as a surveyor on the first expedition organised by Imperial College, to Jan Mayen. There he received from J. N. Jennings his introduction to glaciology.

Working as a civil engineer during the war he was led to realise that there was a lack of knowledge of the design of foundations, cuttings and embankments. So he went to the Building Research Station of the Department of Scientific and Industrial Research to learn about soil mechanics - at that time there was no other centre of knowledge in the country. That was 20 years ago. Now he is himself head of the Soil Mechanics Division of the Building Research Station, and lives close by at Watford, with his Cornish wife, his daughter and his son (who studies science at Cambridge).

Much of Ward's glaciological knowledge was gained in his two visits to Baffin Island in 1950 and 1953 with P. D. Baird's expeditions, to study the two largest icecaps. He, together with Baird, Orvig and the pilots, were the first to set foot on the Penny and Barnes icecaps. These expeditions led to a series of papers on the physics of deglaciation, heat exchange at the surface of a glacier, glacier flow and a wide range of problems in glacier physics. Subsequently his glaciological work has been on Austerdalsbre, Norway, in the expeditions started in 1955 by W. V. Lewis. All the later expeditions, and there was one each year from 1955 to 1960, were organised and led by Ward.

Mechanical and thermal boring technique in ice owes much to Ward's innovations, tested in Baffin Island and Norway, for he excels in the design and making on scientific principles of efficient equipment, whether for research or for anything else (he has been chairman of the equipment sub-committee of the British Mountaineering Council for many years). At a time when glaciology badly needs the stimulus that can be given to a science by new techniques and new instruments, Ward's combination of skills is a highly valuable commodity in our subject.

He has published more than 30 papers on soil mechanics, glaciology and related subjects, and was recently honoured with a D. Sc. degree from London University. As one would expect, his services on professional committees are in great demand - and there are many who have cause to be grateful to him for sound, friendly advice, whether it be on the proper design of a high altitude hut, the right way to make an ice-drill, the best way up a mountain, the siting of a new capital city in Central America, or the difficulties of making Underground Railway tunnels in the clay substructure of his native city, on which incidentally his knowledge is unrivalled.

Current Research on Snow and Ice

3. ITALY

(This account includes a brief history and a review of the work of the Italian Glaciological Committee.)

The Italian Glaciological Committee, with its headquarters in Turin, has been mainly responsible for glaciological research in Italy. It was founded by the Turin section of the Alpine Club in 1895 under the name of the Italian Glaciological Commission. In 1914 the name was changed to the Italian Glaciological Committee, under the auspices of the Italian Society for the Advancement of Science and the Italian Alpine Club. In those days the President was Carlo Somigliana, a mathematician to whom we owe several studies of the mechanics of glacier flow. Also in 1914 began the publication of what was to become the official review of the Committee, the Bulletin of the Glaciological Committee, which published almost all the results of the various studies carried out by Italian glaciologists. Descriptive memoirs and some topographical information were published between 1914 and 1927. After this "descriptive" period there began a new "metric" period. In 1925 a list of Italian glaciers was published and annual expeditions were organised which continued without interruption until the present. The object of these is to carry out a periodic check on the frontal variations of the principal glaciers of the Alps and Apennines. Data exist of the frontal variations of about 110 glaciers over a period of 35 years. These glaciers are a tenth of the Italian total but they were chosen as representative of each section of the system. The reports, together with other special papers, were published in the Bulletin.

A series of precise topographical surveys was begun in 1950. Depths were measured by means of the seismic prospecting method and research was carried out into climate, radiation, ablation and movement. These studies continue at the present time. Maps on larger scales than in previous years have been made by stereophotogrammetric methods. Some have already been published.

1952: (Massif de Mont Blanc) Pré de Bar Glacier, scale 1:2500; the surveyed area was 1800 m by 1000 m of which 0.50 km^2 represented the glacier tongue. Triolet Glacier, scale 1:5000; the surveyed area was 2000 m by 800 m of which 0.36 km^2 represented the glacier tongue. This survey was carried out to compare the tongue, which had become completely cut off from the body of the glacier and was covered with large quantities of debris, with that of the nearby Pré de Bar Glacier.

1953: (Massifs of the Matterhorn and Breithorn) Valtournanche Glacier, scale 1:5000, with contour lines every 5 m. Tyndall Glacier, scale 1:10,000.

(Monte Rosa) Lys Glacier, scale 1:4000, frontal tongue.

(Ortles group, Valtellina) Forni Glacier; the survey gives good comparison with the surveys of 1929, 1934 and 1936.

1953-54: (Massif of Gran Paradiso, Valnontey) Tribolazione, Gran Croux, Money and Coupé di Money Glaciers, scale 1:8000; the surveyed area was about 17 km^2 of which about 10 km^2 were covered by glaciers.

1956: (Aosta Valley) Grande di Verra Glacier, scale 1:5000. The rate of recession has been determined by comparison with previous surveys.

During the International Geophysical Year planimetrical and depth surveys by means of seismic prospecting were completed of the Miage Glaciers on Mont Blanc and Belvedere in Monte Rosa. In 1960 surveys were completed of the Calderone Glacier on the Italian Gran Sasso and the front of the Brenva Glacier on Mont Blanc; the Calderone Glacier, the small and only glacier in the Apennines, was also surveyed.

In addition to glacier surveying, the Italian Glaciological Committee made a List of Italian Glaciers during the I. G. Y. This is published in four volumes and is the collective work of G. Nangeroni, M. Vanni, G. Morandini, and other glaciologists. The first volume includes a general list of all the 1028 Italian glaciers and their main features, geographical coordinates, surfaces, exposure, cartography and an extensive bibliography. Volumes 2, 3 and 4 contain descriptions of individual glaciers in the Piedmontese Alps. Each glacier is described together with its fundamental morphometrical data. Following each description there is a bibliography, a topographical map on a scale of 1:25,000 and a photograph. The surface area of the Italian glaciers is distributed as follows: about 67.7% in the Central Alps, 25% in the Western Alps, 7.3% in the Eastern Alps; the single Apennine glacier represents only about 0.001% of the total.

Special studies on many topics are published in the various numbers of the Bulletin: glacial morphology, theories on glacial movement, climatic features, influence of glacial masses and the speed of water-courses, etc.

For the past 12 years the Committee has extended its research into studies of snow cover, particularly those physical features of snow which help to evaluate the water reserves at the beginning of spring. These reserves are important for mountain irrigation and the hydroelectrical industry. A commission for the study of snow cover has been set up for the purpose. At present there are 9 nivometrical stations in the Alps and five in the Apennines, making a periodic collection of data on density, depth, and temperature of snow. For the density measurements a special type of snow weighing machine is used, but since these measurements do not give immediate results the commission has used immediate measurements of the equivalent in water from the snow cover by using cobalt isotopes. An experimental station is in operation for this purpose on the Fedaia Plain, in the Marmolada Massif; it will eventually operate automatically by radio and will transmit the required measurements at any time.

All the results of the research carried out by the various stations are published annually in the Committee's Bulletin. Further information may be obtained from the Secretary of the Committee, Professor Manfredo Vanni, Piazza Adriano 17, Torino, Italy.

(Contributed by M. Vanni)

The Society's Library

Works received for the Society's library since June 1962.

We thank the following authors or donors of papers and pamphlets and regret that it is impossible to acknowledge them individually. The glaciological works, with their complete references, will be listed in the "Glaciological Literature" at the end of the "Journal of Glaciology" and bound in the Society's collection of glaciological papers.

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University of Michigan, Office of Research Administration
Weather Bureau, Pretoria (2 items)

OTHER BOOKS RECEIVED

The World of Ice. James L. Dyson. New York, Alfred A. Knopf, 1962. 292 p. + xiii, 24 cm. $7.00

Die Grimsel. Otto Zinniker. Bern, Paul Haupt, 1961. (Berner Heimatbücher, Bd. 78), 64 p., illus., map. 5 Fr.

Principles of Stratigraphy (Vols. 1 and 2). Amadeus W. Grabau. New York, Dover Publications Inc., 1960. 1,185 p., illus., 20 cm. $5.00 (2 vols.).

Treatise on Sedimentation (Vols. 1 and 2). William H. Twenhofel. New York, Dover Publications Inc., 1961. 926 p., illus., 20 cm. $4.70 (2 vols.).

Charles Lyell. Sir Edward Bailey. London, Thomas Nelson & Sons Ltd., 1962. 214 p., illus., 21 cm. 15s. 0d.

Reviews

GEOPHYSICS APPLIED TO THE STUDY OF GLACIERS AND ICE CAPS. C. R. CRATCHLEY, M.Sc. Dissertation, Geophysics Department, Imperial College, London, May 1957. Microfilm ($\frac{1}{2}$ Reel), Micro Methods Ltd., East Ardsley, Wakefield, Yorkshire, England, 1962. £3. 10s. 0d.

Micro Methods are making theses and dissertations of various British universities available to a wider public through the medium of micro-films, and this represents one of the first of a glaciological character. The general principle is very welcome, since much useful material is often presented in such theses and is not readily available to researchers generally; micro-films represent a way of making this material available in a form which is not too expensive where the number of potential purchasers is quite small. The quality of the micro-film supplied for review is good on the whole, though two pages were sufficiently out of focus to be illegible down one side.

The particular dissertation under review is not what might be expected from its title. It contains no original experimental work, and while seismic and gravity soundings of glaciers are discussed, the major part of the dissertation is taken up with a review of theories of glacier flow. In fact the dissertation is a useful review of early theories of glacier movement and of the physical properties of ice, together with a summary of the plastic theory of glacier flow up to the date when it was written - but as that was five years ago, its value as a general introduction is now rather limited, since it does not, for instance, include any of the recent work on the kinematic theory of wave propagation in glaciers. However there is at present no good introduction to glacier physics available in book form in English, and anyone wishing to get an introduction to the subject could do much worse than to read this dissertation.

J. W. Glen

PRINCIPLES OF STRATIGRAPHY. A. W. GRABAU. 2 vols. New York, Dover Publications, Inc., 1960. 1185 p. $2.50 each vol.

TREATISE ON SEDIMENTATION. W. H. TWENHOFEL. 2 vols. New York, Dover Publications, Inc., 1961. 926 p. $2.35 each vol.

The unabridged republication in paperback form of these two classical works on geology is to be welcomed, especially by the less pecunious student of the subject. Throughout both works there is ample information to interest both the glaciologist and glacial geologist. In Grabau's book Chapter 8 is one of the more important ones, since it is here that the characteristic features of snow and glaciers, ice stratification, shear zones and flow structures are carefully described, so as to give the reader the correct background for other sections of the book.

As its name implies, Twenhofel's book deals directly with processes, environments, the products of sedimentation and their interpretation. The transport mechanism of debris by glacial means, tills and tillites, glacial and fluvio-glacial clays, and varve structures are all assiduously described, with mechanical analyses of the glacial sediments. One of the most fascinating sections of this book is the one on "glacial environment and its sediments", which incorporates a vast amount of information in a relatively short space.

Both of these books are produced in a similar pocket-size format, with copious illustrations and references, and a superb index. To the interested reader they are exceptional value for money.

R. J. Adie

INTERNATIONAL YEARBOOK OF CARTOGRAPHY, II. Ed. E. IMHOF. London, George Philip and Son Ltd., 1962. 191 p., illus., maps.

Although there is no specifically glaciological matter in this work cartography is so near to the studies and interests of many glaciologists that it should be of interest to members of the Society. The preface is written in English, French and German and the majority of the articles are in English.

COURS DE GEOMORPHOLOGIE: LE MODEL PERIGLACIAIRE. J. TRICART & A. CAILLEUX. Paris, Centre de Documentation Universitaire (Cours de l'Université de Strasbourg), 1961. 350 p., illus., maps.

This is an important work dealing comprehensively with the geomorphology of the cold regions of the earth, and specifically with the periglacial features. Chapters are devoted to the various cold climates, to the mechanisms of freezing and thawing of soils, to biochemical reactions, to the geographic distribution of frozen ground, to permafrost and to the whole problem of periglacial phenomena. It is a pity that so important a work, by such distinguished authorities on the subject, should only be reproduced in offset typescript with a soft cover instead of being printed as a book.

News

SOVIET ANTARCTIC ATLAS. It is expected that a two-volume atlas of the Antarctic will be published soon in the U.S.S.R. The first volume will be of most interest to glaciologists. Its object is to present cartographically the data obtained in many disciplines and by many countries up to 1962, and therefore among its 500 maps and charts are likely to be many of glaciological interest. Volume two will contain a large historical section. The coordinating body in the production of the atlas is the Arctic and Antarctic Institute of Leningrad, and the chief editor is V. G. Bakayev, the Minister of the Merchant Fleet (to whom the Institute is responsible).

Jökull, the journal of the Iceland Glaciological Society, completed in 1960 its first decade of publication. During this period the journal has been the organ of the society and has published papers on glaciology and closely related fields of the earth sciences. The publication in Iceland of a relatively specialised journal is invariably a venture. But the editors feel that the journal has been received with interest in glaciological circles, and there is little doubt that it possesses a considerable ability for survival. The future of the journal can be viewed with optimism.

Icelandic activities in many branches of the earth sciences have increased considerably during the past decade. In addition to geology, glaciology and vulcanology, which have a tradition in Iceland, research work is now being conducted in geochemistry, geomagnetism and aeronomy, geothermy, isotope geology, meteorology, oceanography, paleomagnetism and seismology. It is well known that Iceland is a fertile ground for studies in these fields.

Due to the increased research activities there is now a substantial need for an Icelandic journal with a broad coverage in the earth sciences. This matter has been discussed in the Icelandic Glaciological Society and it has been decided to make an effort to meet these requirements by enlarging the coverage of the Jökull and thereby inviting physical earth scientists to publish papers in the journal. The Jökull will therefore enter its second decade of publication as a journal of the earth sciences in Iceland.

(Extract from "Jökull", 11 Ar, Reykjavik 1961)

The American Meteorological Society announces a new publications policy. The "Journal of Meteorology" has been replaced by a new bimonthly periodical, the "Journal of Atmospheric Sciences", and an entirely new periodical, the "Journal of Applied Meteorology", has started publication on a quarterly basis. Authors interested in contributing papers should write to the Editors, c/o American Meteorological Society, 45 Beacon Street, Boston 8, Mass., U.S.A.

The U.S. Board on Geographic Names has approved the names Battle Glacier and Vaughan Lewis Glacier for glaciers in the Juneau Icefield.

Battle Glacier: in the Juneau Icefield at about 58° 41' N, 134° 35' W, and trending generally northward 5.5 miles to Gilkey Glacier about 32 miles north of Juneau; named for W.R B. Battle, glaciologist, died 1956.

Vaughan Lewis Glacier: in the Juneau Icefield at about 58° 48' N, 134° 12' W, and trending generally northwestward about 3.5 miles to an icefall where it joins Gilkey Glacier about 36 miles north-northeast of Juneau; named for W. Vaughan Lewis, glaciologist, Vice-President and Chairman of the Glaciological Society, who died 1961. A full description and a photograph will appear in a future issue of the Journal of Glaciology.

The general retreat of the Swiss glaciers is continuing, but at a slightly lower rate, in the period 1960-1961. Tests made on tree trunks uncovered by the retreat of the Aletschgletscher showed that since the year 1200 no retreat has been greater than the present one, with the last important advance in 1850. The average decrease in length in the 1960-61 period was 7.3 m; 84% of the glaciers surveyed during the year were retreating. Measurements on the mass of ice showed that the reduction in mass is less than in recent years, indicating a slowing down of the retreat.

A U.S. team of 18 men is to attempt to climb Mount Everest in 1963, the tenth anniversary of the success of Sir John Hunt's team. The team will be led by Mr. Norman Dyhrenfurth and is sponsored by the National Geographic Society. The expedition will carry out research in glaciology, meteorology, solar radiation and geology, with Dr. Maynard M. Miller in charge, and research into the physical and psychological stresses of high-altitude climbing.

Several members of the Society are in the Antarctic during the 1962-63 summer season. Glaciologists from the polar research institutes of the universities of Michigan, Ohio and Wisconsin are working on Roosevelt Island and on traverses on the Ross Ice Shelf, on the polar plateau in the vicinity of the South Pole and near Byrd Station. Australian glaciologists have made a 900-mile traverse from Wilkes to the Soviet station Vostok. Seismic soundings gave readings of nearly 5000m in one section of the traverse. Another glaciological team is working on the Amery Ice Shelf.

The 1962 Nobel Prize for Chemistry has been won by Dr. Max Perutz, F.R.S., jointly with Dr. J.C. Kendrew, F.R.S. Dr. Perutz, a member of the Glaciological Society in 1937, in the days when it was called the Association for the Study of Snow and Ice, at one time worked on the crystallography of ice, joining Mr. G. Seligman's expedition to the Jungfraujoch in 1938. He is chairman of the Medical Research Council's Laboratory of Molecular Biology in Cambridge University.

Another member of his team, Dr. F.H.C. Crick, also received a 1962 Nobel Prize, sharing the Medicine Prize with Dr. M.H.F. Wilkins and Professor W. Watson. The Chemistry Prize was awarded for work on the structures of globular proteins and the Medicine Prize for work relating to the structure of nucleic acid. The Molecular Biology Laboratory in Cambridge is now in the probably unique position of having four Nobel Prize winners under its roof: Dr. F. Sanger, F.R.S., was awarded the 1958 Chemistry Prize for work on the structure of insulin. We offer Dr. Perutz and his team our congratulations.

The Royal Geographical Society has announced the following awards: the Victoria Medal to Prof. Carl Troll: the Mrs. Patrick Ness Award to Dr. Hal Lister. The Geological Society of London has awarded the Lyell Medal to Prof. L.R. Wager.

A conference on "Palaoclimates", sponsored under the N.A.T.O. Advanced Institute programme, will be held in the Physics Department, King's College, University of Durham, Newcastle upon Tyne, during January 7 - 11, 1963.

New Members

New members of the Society since July 1962 are:

Adams, W.P., 539 Pine Avenue West, Montreal, P.Q., Canada.
Aitken, Miss Judith M., 10102 Wenonga Drive, Leawood, Kansas, U.S.A.
Anderson, Neil P., 1876 Arch Street, Berkeley, Calif., U.S.A.
Anderson, V.H., RFD Greensboro Road, Lebanon, N.H., U.S.A.
Beeson, Stephen, 408 Skyhill Road, Alexandria, Va., U.S.A.
Bowker, Lee H., 533 Maple Street, Bethlehem, Pa., U.S.A.
Bridge, C.W , 308 Waterloo Avenue, Downsview, Ont., Canada.
Budd, William F., Meteorology Department, University of Melbourne, Parkville N.2, Vic., Australia.
Chisholm, Miss M.C., Girton College, Cambridge, England.
Clark, M.J., Department of Geography, The University, Southampton, England.
Corbel, Dr. Jean, 30 Chemin de Boutary, Caluire, Rhône, France.
Cullingford, Robin A., Department of Geography, University of Edinburgh, High School Yards, Edinburgh 1, Scotland.
Curry, Robert R., Department of Geology, University of Alaska, College, Alaska, U.S.A.
Davies, Martin H., King's College School House, 28 Arterbery Road, Wimbledon, S.W.20, England.
Davies, William E., U.S. Geological Survey, Washington 25, D.C., U.S.A.
Dawson, John Alan, Bentham Hall, Cartwright Gardens, London, W.C.1, England.
Dean, Colin H., Corner Croft, 148 Willingdon Road, Eastbourne, Sussex, England.
Dobar, Walter I., Department of Geology, Michigan State University, East Lansing, Mich., U.S.A.
Dunham, Frederick, Foundation for Glacier Research, 2029 Market Street, Seattle 7, Wash., U.S.A.
Egan, Christopher, Department of Geology, Michigan State University, East Lansing, Mich., U.S.A.
Eisbacher, Gerhard, Corneliusweg 12, Graz-Gösting, Austria.
Gabel, Louis F., 522 Hamline Street, Grand Forks, N.D., U.S.A.
Gabl, Franz X., P.O. Box 424, Cadillac, Mich., U.S.A.
Haynes, Miss V., Girton College, Cambridge, England.
Heuberger, Dr. Helmut, Geographisches Institut der Universität Innsbruck, Innrain 52, Austria.
Higashi, Dr. Akira, Department of Physics, Faculty of Science, Hokkaido University, Sapporo, Japan.
Hodgson, Ronald, Department of Geology, Michigan State University, East Lansing, Mich., U.S.A.

Hofmann, Dr. Walther F., Heinrich Voglstrasse 7, München-Solln, Germany.
Homeister, Owen, Michigan State University Glaciological Institute, c/o U.S. Forest Service, Juneau, Alaska, U.S.A.
Jahn, Dr. Alfred, Chairman, Geographical Institute, The University, Wrocław, Poland.
Johnsson, Stig, Thunbersgsgatan 9, Johanneshov, Sweden.
Lang, Herbert, Siebererstrasse 3, Innsbruck, Austria.
Lyons, Dr. John B., 4 Read Road, Hanover, N.H., U.S.A.
Kakela, Peter, Department of Geography, Michigan State University, East Lansing, Mich., U.S.A.
McCaul, M.T., 703 Lone Pine Hill, Bloomfield Hills, Mich., U.S.A.
Mayo, Larry, Box 184, College, Alaska, U.S.A.
Miller, Miss Christine, Maria-Theresia-Strasse 10, München 8, Germany.
Miller, Louis R., Empire, Mich., U.S.A.
Odle, Ronald L., 509 North Willis, Champaign, Ill., U.S.A.
Olesen, Ole B., Ullerupgade 3/III, Copenhagen V, Denmark.
Osmaston, H.A., Elms, Wisborough Green, Billingshurst, Sussex, England.
Outcalt, Samuel I., 4664 Ingram Court, Boulder, Col., U.S.A.
Paulczinsky, Walter, Ampfererstrasse 1/VIII, Innsbruck, Austria.
Peel, R.F., M.B.E., Professor of Geography, University of Bristol, Bristol 8, Glos., England.
Reed, Dr. John C., Artic Institute of North America, 3458 Redpath Street, Montreal 25, P.Q., Canada.
Reger, Richard D., Box 447, College, Alaska, U.S.A.
Rudolph, Dr. R., Brandenburgstrasse 43, Berlin/West, Germany.
Sawyer, John F., North Road Farm, Dorset, Vt., U.S.A.
Schimpf, Hans, Hydrographisches Zentralburo, Marxergasse 2, Wien III, Austria.
Seifert, Waldemar J., c/o Dr. Kurtz, Kreillerstrasse 132E, München 58, Germany.
Slupetzky, Werner, Gatterburggasse 7, Wien XIX, Austria.
Smalley, I.J., Northampton College, St. John Street, London E.C.1, England.
Smith, D.E., 53 Northumberland Street, Edinburgh, Scotland.
Thomas, Rear Admiral Charles W., Museum of Comparative Zoology at Harvard College, Cambridge 38, Mass., U.S.A.
Tongiorgi, Dr. E., Laboratorio di Geologia Nucleare, Via S. Maria 22, Pisa, Italy.
Towson, Peter, 62 Hillcrest Avenue, Greenacre, N.S.W., Australia.
Travis, Jack W., Department of Geology, Michigan State University, East Lansing, Mich., U.S.A.
Van Alstine, Jack, Department of Geology, Michigan State University, East Lansing, Mich., U.S.A.
Waite, Amory H., 46 Monmouth Boulevard, Oceanport, N.J., U.S.A.
Wiseman, E.J. 77 Woodville Road, New Barnet, Herts., England.
Witte, H.J., 2000 South Boundary Street, Olympia, Wash., U.S.A.

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Further details may be found in the *Journal of Glaciology*, published in February, June and October.

ICE

Editor: MRS. H. RICHARDSON

This news bulletin is issued free to all members and subscribers of The Glaciological Society, and is published in January and July. Contributions should be sent to Mrs. H. Richardson, c/o Scott Polar Research Institute, Lensfield Road, Cambridge, England, to arrive not later than the 15 November and 15 May.

Metcalfe & Co. Ltd., Rose Crescent, Cambridge