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ICE



Sir Vivian Fuchs (right) presenting the first Seligman Crystal to Mr. Gerald Seligman at the Annual General Meeting of the Society on 2 May 1963.

ICE

News Bulletin of the Glaciological Society

July 1963

Number 12

THE SELIGMAN CRYSTAL. As announced in the June 1963 issue of the *Journal of Glaciology*, Volume 4, number 35, the Council of the Society has instituted this award for the occasional honouring of individuals of particular eminence in the field of glaciology, and the first Crystal was awarded to Mr. Gerald Seligman on 2 May 1963 on the occasion of his retirement from the Presidency of the Society. A photograph of the Crystal will appear in number 36 of the *Journal*. This issue of *Ice* contains the minutes of the Annual General Meeting on 2 May 1963, including details of the presentation, and a photograph of the presentation (see inside front cover).

JOURNAL OF GLACIOLOGY, VOLUME 4. The number of pages published each year continues to grow. To avoid excessive bulk in the completed volume, the current volume, which began with number 31 in March 1963, will close with number 36, October 1963. We hope to issue the index to Volume 4 with number 37, February 1964. Contrary to our previous policy, we have decided to issue indexes free to all members and subscribers. There will be no need for special orders to be placed.

SUBSCRIPTIONS. Those members who have not yet paid their 1963 dues will soon receive reminder cards. We will appreciate prompt payment of all outstanding debts.

We were sorry to hear of the death on 25 February 1963 of Prof. P. L. Mercanton, in Switzerland, at the age of 86. We offer our sympathy to his family and friends. An obituary will appear in the *Journal of Glaciology*.

Meetings

SYMPOSIUM ON THE HEAT EXCHANGE AT SNOW AND ICE SURFACES, sponsored by the Snow and Ice Sub-Committee of the Associate Committee on Snow and Soil Mechanics, National Research Council, Canada.

The Symposium was held on 26 October 1962 at the Building Research Centre of the National Research Council. During the morning session papers were presented by Professor Orvig, McGill University, on the heat exchange at glacier surfaces; Professor Pounder, McGill University, on the heat exchange at sea ice surfaces at Churchill, Manitoba; Mr. Williams, National Research Council, on the size of the components of the heat exchange from ice surfaces as shown by observations on ice thickness made by the Meteorological Branch and others; and by Mr. Gold, National Research Council, on the size of the components of the heat exchange at snow surfaces as indicated by observations at Ottawa. In the afternoon there was a useful discussion on net radiometers centred about a paper by Mr. Latimer, Canadian Meteorological Branch, on their experience with two types of radiometer, and a paper by Mr. Boyd, Meteorologist to the Division of Building Research, on a field comparison of these two radiometers. Dr. Langleben, McGill University, presented a paper on the use of fresh ice inclusions for metering heat flow in sea ice. This was followed by a paper by Dr. Stephenson, National Research Council, on the measurement of humidity in the wintertime. There was active discussion on this paper as well. Work is now proceeding on the preparation of the Proceedings of the Conference.

McGILL UNIVERSITY: GEOGRAPHY SUMMER SCHOOL. A course entitled, "Polar lands - a geographical introduction", will be held at the School in collaboration with the Arctic Institute of North America, from 2 July - 14 August 1963 at Stanstead College, Stanstead, Quebec, Canada. Field trips will supplement the formal courses. A seminar on Antarctic meteorology, under the auspices of the American Geophysical Union and the U.S. Air Force, will take place from 8-19 July. M.J. Rubin will be chairman of the polar meteorology sessions, and F.K. Hare, B.W. Boville and S. Orvig will be chairman of the discussions on the stratosphere-mesosphere. Further information may be obtained from Prof. F.K. Hare, McGill University, Montreal, P.Q., Canada.

THE SUMMER INSTITUTE OF GLACIOLOGICAL STUDIES, Juneau Icefield, Alaska, will take place from 5 August to 13 September 1963 and it is sponsored by the National Science Foundation in co-operation with Michigan State University and the Foundation for Glacier Research, with logistic support from the U.S. Air Force. The Glaciological Institute of Michigan State University and the Juneau Icefield Research Program are concerned with the academic and research aspects of the Summer Institute. There will be a staff of 4 professors, covering the fields of glaciology, Arctic-alpine geomorphology, glacio-botany (especially palaeontology and lichenology), glacier mechanics (especially related to survey and mapping), soil mechanics and periglacial phenomena.

In connection with the long-term regional glacier studies which have been carried out by the Glaciological Institute, a report has been prepared in the spring of 1963, on behalf of the Alaska State Department of Highways, on the road building programme in the state.

COURSE ON APPLIED MICROSCOPY. Lectures and practical work will be held from 8-20 July 1963 at the Geology Department, Royal School of Mines, Prince Consort Road, South Kensington, London S.W.7. The course is organised by the McCrone Associates, from whom further information may be obtained: Ann's Place, Albion Street, Southwick, Sussex.

INTERNATIONAL CONFERENCE ON PERMAFROST. The first International Conference on Permafrost will be held at Purdue University in Lafayette, Indiana, from 11-15 November 1963. Details from Robert P. Darlington, Assistant Director for Program Planning, Building Research Advisory Board, National Academy of Sciences, 2102 Constitution Avenue, N.W., Washington 25, D.C., U.S.A.

SOCIÉTÉ HYDROTECHNIQUE DE FRANCE. The 1963 field meeting will be held from 20-26 July in Norway, when some of the glaciers of Jostedalbre will be visited. Further information may be obtained from the Société at 199 rue de Grenelle, Paris 7, France.

GERMAN SOCIETY FOR POLAR RESEARCH. A meeting will be held in Karlsruhe from 6-9 October 1963. Papers will be read on the following subjects: Antarctica - mass budget, meteorology, glaciology, geophysics; high alpine glaciers - mass budget, especially net radiation. Abstracts of papers will be published in "Polarforschung". Further information may be obtained from Deutsche Gesellschaft für Polarforschung, 23 Kiel, Eckernförder Strasse 1, Germany.

INTERNATIONAL SYMPOSIUM ON THE I.G.Y. The Symposium will be held immediately before the XIII General Assembly of the International Union of Geodesy and Geophysics, during the week of 12 August. About 50 papers will be presented on work conducted during the IGY and IGC period, 1957-59. Further information may be obtained from the Geophysics Research Board of the National Academy of Sciences in Washington, D.C., U.S.A.

XIII GENERAL ASSEMBLY OF IUGG, 19-31 August 1963, University of California, Berkeley, California, U.S.A. (See details under Commission of Snow and Ice, below.)

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR) Symposium on Antarctic Geology. The Symposium will be held in Capetown, South Africa, 16-21 September 1963, prior to the Seventh Meeting of SCAR. Papers and abstracts are to be submitted through National Correspondents. Information may be obtained from Dr. F.C. Truter, Chairman, SCAR Symposium Organizing Committee, Geological Survey, P.O. Box 401, Pretoria, Republic of South Africa.

Working Group on Glaciology

(Extract from SCAR Bulletin No. 14, May 1963, published by the Scott Polar Research Institute in the Polar Record, Vol. 11, No. 74, May 1963)

The Working Group on Glaciology met in Obergurgl on 14 to 21 September 1962 after the Commission of Snow and Ice Symposium on the variations of the regime of existing glaciers. On the 19th and 20th a number of glaciologists who had attended the symposium joined members of the Working Group in discussions covering the following points:

(a) Techniques of the measurement of ice thickness in polar regions, the assessment of existing methods and possible new developments; (b) measurement of accumulation and ablation; (c) measurement of glacier discharge; (d) chemistry of ice; (e) the utilization of isotopes in glaciological investigations; (f) techniques of deep drilling; (g) a general glaciological discussion.

The Working Group itself met on 21 September; the following were present: G. de Q. Robin, chairman; C. Lorius, secretary; A. Bauer, C. R. Bentley, W. de Breuck, W. O. Field, J. Jacka, O. Liestøl, E. Picciotto, O. Schauer, P. A. Shumskiy.

The Working Group made the following recommendations to SCAR; these will be discussed at the Seventh Meeting in September 1963:

Bearing in mind the glaciological programmes of the National Committees, the Working Group on Glaciology feels that more attention should be given to the following:

Locations of measurements

1. Determination of the direction of flow lines and position of ice divides. The use of surface strain networks for determination of flow lines and study of surface topography for the location of ice divides is recommended.

2. Measurements in strips along flow lines or ice divides in all fields of glaciological study.

Accumulation studies

3. (a) The need for further determination of the 1952-53 layer by detecting the presence of radioactive debris from the first thermonuclear test. These determinations should be carried out at locations where the stratigraphy is known in order to test the method and annual samples of at least 1 kg. down to about the 1945 level are required.

(b) The establishment of reference horizons at the present level (wires, strings, etc.).

(c) Studies of the microparticle content of ice cores to determine earlier reference horizons.

Nuclear and chemical methods

4. Application of nuclear methods (mainly stable isotope variations and radioactive decay) to glaciological problems.

For this purpose more well-equipped laboratories and trained scientists are required in view of the great number of Antarctic samples already available and likely to be collected in the near future.

5. The need for studies of the geographical distribution of chemical and isotopic content of Antarctic ice. The opportunities for collection by traverse parties should be borne in mind.

Ice thickness determinations

(See also Recommendation V.G1-4, SCAR Bulletin, No. 10, p. 145)

6. Comparative trials of different methods of ice thickness determinations. In particular comparative trials between seismic, electrical, radio, and gravity methods would be welcomed.

Deep drilling applications

7. Development of methods of deep drilling and coring.

8. Development of methods of measurement of strain rate in deep bore holes.

Ice discharge (See also SCAR Bulletin, No.10, p.144)

9. The methods employed by Soviet glaciologists in Antarctica, in which morphological features shown on air photographs have been used to determine ice velocities.

Early publication of details of these methods would be welcomed.

Complementary zones of studies

10. The need for studies of the changing characteristics of glaciers along the islands of the Scotia Arc in relation to conditions in the Southern Andes of South America to determine glacial meteorological relationships, present and past behaviour, and other glaciological characteristics.

Distribution of information

11. The continuing need for the exchange of publications and data. Summarized information on results of tests mentioned in Resolutions VI G1-6 - 3a, 3c, 6, 7, 8, 9, 10, should be distributed as soon as possible.

National Committees are asked to draw the attention of organizations interested in Antarctic research to the possibility of publishing short notes on new results and techniques in the SCAR Bulletin.

12. Individuals or organizations holding translations into western languages of Russian or Japanese papers on Antarctic glaciology which they are prepared to make available to other users are requested to inform the Secretary of SCAR, who will notify National Committees.

INTERNATIONAL GEOGRAPHICAL UNION. The 11th General Assembly of the Union and the 20th International Geographical Congress will be held under the auspices of the Royal Society and the British National Committee for Geography. The Patron is Her Majesty the Queen. The complete Congress period will extend over the period 6 July - 11 August 1964 and will consist of Commission meetings, Sectional meetings, Field Study meetings and Symposia. The General Assembly of the IGU and the main Congress sessions for sectional and other business will be held in London from 21-28 July. Congress sessions in London will be accompanied by a full programme of geographical excursions and visits, together with the main social and cultural events arranged for the 20th IGC. Concurrent with the Congress and arranged in co-operation with the Congress Executive Committee, the 2nd General Assembly and Technical Symposium of the International Cartographic Association will be held from 27-29 July in London, and from 31 July - 4 August in Edinburgh. The London sessions of IGC and ICA will take place in the Imperial College of Science and Technology, at the Royal Geographical Society, in the Royal Albert Hall and other adjacent halls in Kensington, London S.W. 7. The Congress Secretariat has been established at the following address: 20th International Geographical Congress, Royal Geographical Society, London S.W. 7. Further information and application forms may be obtained from the Secretariat. Application forms should be returned to the Secretariat by 1 February 1964. Glaciologists will be interested in the following Symposia and Field Study Meetings:

Pleistocene geomorphology. 15-19 July, centred on Cambridge. General discussion of the significant features of lowland glaciation and a visit to north Norfolk. Papers are invited on ground ice features, glacial diversion of drainage, lowland glaciation deposition, relative efficiency of denudation agents on the Pleistocene landscape. Organizer: B.W. Sparks, University of Cambridge.

Aspects of the geomorphology of Scotland. 11-18 July, from Edinburgh to Fort William, via Aberdeen and Inverness. Examination of the major relief regions of Scotland from the Southern Uplands to the Highlands. Detailed analysis of the pre-glacial and glacial geomorphology of inland and coastal districts. Organizer: Dr. K. Walton, University of Aberdeen.

Geomorphology of Snowdonia and adjacent districts. 28-31 July. Study of the pre-glacial erosion features of Anglesey and Arfon and the effects of glacial erosion and deposition in Snowdonia and the Conway Valley; study of drainage evolution in the Denbighshire moors and the Vale of Clwyd. Organizer: Dr. C. Embleton, University of London.

INTERNATIONAL SOCIETY OF SOIL MECHANICS AND FOUNDATION ENGINEERING. The sixth International Conference will be held in Montreal, Canada, from 8-15 September 1965. Further information may be obtained from the Secretary, Sixth International Soil Mechanics Conference, c/o National Research Council, Ottawa, Canada.

Commission of Snow and Ice

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

OBERGURGL SYMPOSIUM PUBLICATIONS

Eight papers which were not received in time to print in no. 58 of the I.A.S.H. publications have been published in the Bulletin of the Association Vllle Année no. 1, April 1963. The titles of the papers are:

- A. Kosiba: Changes in the Werenskiöld Glacier and Hans Glacier in S.W. Spitsbergen.
- I. A. Zotikov: Bottom melting in the central zone of the ice shield on the Antarctic continent and its influence on the present balance of the ice mass.
- P. A. Shumskiy: On the theory of glacier variations.
- K. Regensburger: Comparative measurements on the Fedchenko Glacier.
- R. P. Goldthwait, I. C. McKellar and C. Cronk: Fluctuations of the Crillon Glacier system, S. E. Alaska.

A. Weidick: Glacial variations in West Greenland in post-glacial time.

O. Lanser: Die technische und wirtschaftliche bedeutung der Gletscher.

H. Schatz: Observations on the Hintereis- and Vernagtferner.

The record of the discussions at the Obergurgl Symposium, the special papers which were prepared about glaciers in the Obergurgl area and the areas visited during the tour of the Swiss glaciers are published in the Bulletin of the Association, Vllle Année no. 2, July 1963.

Both Bulletins, Vllle Année nos. 1 and 2, may be purchased for 75 Belgian Francs (\$1.50) from Prof. L. J. Tison, 61 rue des Ronces, Gentbrugge, Belgium.

XIII GENERAL ASSEMBLY OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS, BERKELEY, CALIFORNIA, U.S.A., 19-31 AUGUST 1963

The provisional list of papers which have been accepted for presentation at the meetings of the Commission of Snow and Ice at Berkeley is given below. These will be published at the end of July and copies may be obtained from Prof. L. J. Tison (address above).

Provisional Programme

Thursday, 22 August, morning. Heat budget at the snow surface.

- a. Lorius: Considérations sur le bilan thermique à la station Charcot (Antarctique).
- b. Lettau, Wollaston, and Dalrymple: South Pole energy budget.
- c. Rusin: Heat budget of the Antarctic surface.
- d. Ambach and Hoinkes: The heat budget of an Alpine snowfield.
- e. Caisley, Lister and Molynieux: Measurement of profiles of wind speed, temperature, and vapour pressure near to the ground.

Thursday, 22 August, afternoon. Heat and mass transfer through snow.

- a. Yen, Tien, and Bender: On the isothermal flow of air through a snowpack with variable permeability.
- b. Bergen: Vapour transfer as estimated from heat flow in a Rocky Mountain snowpack.
- c. Schwerdtfeger: Theoretical derivation of the thermal conductivity and diffusivity of snow.
- d. Dunin: Snow evaporation.
- e. Gold: Influence of the snow cover on the average annual ground temperature.

Friday, 23 August, morning. Sea ice and frozen ground.

- a. Assur and Weeks: Growth, structure, and strength of sea ice.
- b. Schwerdtfeger and Pounder: Energy exchange through an annual sea ice cover.
- c. Porkhayev and Sheykin: On the formation of the temperature regime of frozen zones of the lithosphere.
- d. Black and Berg: Hydrothermal regimen of patterned ground, Victoria Land, Antarctica.

Friday, 23 August, afternoon. Business meeting.

Monday, 26 August, morning. Instruments and techniques.

- a. Tangborn: Instrumentation of a high altitude glacier basin to obtain continuous records for water budgets.
- b. Lliboutry and Brepson: Le viscomètre à glace de Grenoble.
- c. Bull: Measurement of the surface velocity of inland parts of the Antarctic ice sheet by an aerial triangulation method.
- d. Mock: Tellurometer traverse for a surface movement survey in N. Greenland.
- e. Giese: Some results of seismic refraction work at the Gepatsch Glacier in the Ötztal Alps.
- f. Kapitsa and Sorokhtin: On errors in interpretation of reflection seismic shooting in the Antarctic.

Monday, 26 August, afternoon. Thermodynamics and geochemistry of glaciers and ice sheets.

- a. Bogoslovskiy: New results of temperature fields calculation of an Arctic glacier.
- b. Müller: Englacial temperature measurements on Axel Heiberg Island, Canadian Arctic Archipelago.
- c. Orvig and Mason: Ice temperature and heat flux, McCall Glacier.
- d. Langway: Sampling for extra-terrestrial dust on the Greenland ice sheet.
- e. Vickers: Geochemical dating technique as applied to snow samples.

Tuesday, 27 August, morning. Subglacial phenomena.

- a. Ward: Glacier wheel for measuring slip at the bed of a glacier.
- b. Kamb and LaChapelle: Direct observation of the mechanism of basal slip in a temperate glacier.
- c. Shumskiy and Zotikov: On the bottom melting of the Antarctic ice shelves.
- d. Lliboutry: Le régime thermique de la base des calottes polaires.

Tuesday, 27 August, afternoon. Business meeting.

Wednesday, 28 August, morning. Mass transport in glaciers.

- a. Weertman: Profile and heat balance at the bottom surface of an ice sheet fringed by mountain ranges.
- b. Haefeli: Numerical and experimental method for determining ice motion in the central parts of ice sheets.
- c. Wilhelm: Observations of glacier velocity and types of movement by transport of ice masses of arctic glaciers.
- d. Gow: The inner structure of the Ross Ice Shelf at Little America V, Antarctica, as revealed by deep core drilling.

W. H. Ward
Secretary

Field Work

NEW ZEALAND - TASMAN GLACIER

A further complete set of photo panoramas of the Tasman Glacier by Mt Cook National Park Rangers has given a good body of data for estimating quantitative changes in this glacier over the last five years. This awaits preparation for publication. The map of Mt Cook and Westland National Parks, N.Z.M.S. 180 (published January 1961), still remains the only detailed map of the main glacier regions but is proving inadequate for finding accurate areas for budget measurements. A start has been made by B.E. Skinner of N.Z. Geological Survey on a more accurate survey of the lower Tasman Valley and this survey can be used for ground control for future high altitude serial photography. During this work two cross-sections across the lower Tasman originally run in 1891 were repeated

to give the first accurate measurement of changes in these cross-section areas for the first half of this century.

A limited number of ablation stakes were set out on the lower Tasman in November 1962 and reset in January and March 1963 to give an accurate value of ablation at the lower end of the moraine free ice for comparison with past and future years, and in particular to find how ablation rates varied with various types of ice surface. The mean loss at 1160m altitude of 7.9cm of ice per day during November and December 1962 is close to that found in other years. This slowed to 7.3cm per day in the interval January to March. N.Z. DSIR is building Dr. P. Kasser's hot water drill to enable stakes to be set in 10m holes in the coming summer (November 1963). It is hoped that this drill will give a much more comprehensive series of ablation measurements extending to the west coast glaciers with less time needed for redrilling stakes during the melt season.

Accurate estimates of total net accumulation in the Tasman catchment above firn line are delayed for want of hut accommodation. However a flat site at about 2500m altitude was at last found late in 1962 suitable for a small permanent building. Waitaki River catchment, within which the east side Mt Cook glaciers lie, is now one of the most important sources of hydroelectric power in New Zealand, and this gives additional impetus to high altitude snow measurements.

FRANZ JOSEF GLACIER

In an endeavour to obtain accurate records of the movement of the Franz Josef Glacier a photographic programme was begun late in 1950 when the glacier had reached the limit of its most recent advance. Twice weekly photographs were taken regularly up to February 1954 when flooding made the Waiho River change course, and the camera post, located on top of a high bank of moraine, was swept away. No further photographs were taken until August 1956 when the camera post was resited some 150m closer to the glacier. Weekly photographs have been taken from that date for the N.Z. Geological Survey by the Westland National Park Ranger. In addition to the regular photography, the terminal face of the glacier was accurately surveyed by theodolite in August 1951, and from 1958 yearly theodolite surveys have been carried out at the terminal face.

It is apparent from the photographs that in the period 1950-57 the retreat of the glacier was fairly gradual, of the order of ca. 290m, bringing it to the 1946 position of the glacier. In the period 1957-58 the retreat was 300m; 1958-59, 150m; 1959-60, 135m; 1960-61, 90m; and 1961-62, 300m, making a total retreat of ca. 1270m. (All measurements refer to May of each year). When the 1962 survey was carried out the terminal face of the glacier was resting against a steep rock face some 12m high with a narrow gorge on the eastern side of the valley through which the Waiho River flowed. During the years ending December 1957 and 1958 the rainfall recorded at Franz Josef was 12 per cent and 40 per cent respectively above average, the figures being 590cm (232.5 inches) for 1957 and 750cm (295.2 inches) for 1958. For the same periods at Ross the rainfall was only 5 per cent and 20 per cent above average, the recorded figures being 360cm and 403cm respectively (140.1 and 159.1 inches). For all other years from 1951 to December 1961 the rainfall at both Ross and at Franz Josef has never reached average and at both places the recorded rainfall in 1959 was 25 per cent below average.

The height above sea level of the base of the terminal face in August 1951 was 226m. In May 1961 after a retreat of 970m the base of the terminal face in the bed of the Waiho River was 238m, but in May 1962 after another 300m retreat the elevation at the base was 295m, a rise of 69m from the 1951 elevation.

A visit to the glacier on the 13 March 1963 disclosed that the retreat during the last ten months has been at the most about 60m. This retreat is on the eastern side of the valley only, where the Waiho River is flowing. On the western side, the ice face is still much in the same position that it was in 1962, namely against the steep rock face. The actual ice face now visible extends in an arc about 75m long from this rock face to the eastern bank of the valley. Although the retreat of the glacier has been less than usual there is however a noticeable shrinkage of the ice at the terminal face.

FOX GLACIER

No detailed investigation of this glacier has been carried out, due mainly to the fact that no readily accessible point is available to site a camera post. All indications however point to a behaviour similar to that of the Franz Josef.

I. McKellar, W. Sara (N.Z. Geological Survey)

U.S. MOUNT EVEREST EXPEDITION 1963. The expedition was primarily sponsored by the National Geographic Society with subsidiary grants from the U.S. Army Quartermaster Corps, Michigan State University Glaciological Institute, the University of California and the Foundation for Glacier Research. Glaciological studies were made in April and May on the Khumbu Glacier and in the Western Cwm, from the terminus of the glacier at 15,000' to the Lhotse face at 23,000' - 25,000', a distance of 12 miles. The main studies were conducted from the base camp at 18,000' to the advance camp in the Cwm at 21,500'.

The work was essentially a reconnaissance and many of the observations were directed to the study of the glacio-physical factors in this high Himalayan valley. Observations were made on the surface regime characteristics, englacial temperatures and movement of the glacier. Basic meteorological observations were made at the two main camp sites. Some geophysical measurements, including seismic and gravity work, were made. Samples of firn and ice covering a period of 24 years were collected, as well as samples for saline, oxygen isotope, natural tritium and pollen analyses. Studies were made in glacial geology and solar radiation.

Preliminary results show that the geophysical characteristics of high Himalayan glaciers verge on polar conditions in the Western Cwm and are sub-polar to almost temperate at lower levels. Observations point to equilibrium conditions or slight recession. The lower glaciers in Nepal are thinning and retreating slowly. The only advance, according to reports of minor resurgence, is on the northern flanks of the inner Himalayan range. Movement of the glacier studied is somewhat lower than was expected, owing to the englacial temperature conditions and to the slightly negative regime. The glaciological-climatological relationship is interesting because of the high radiation and the near arid conditions experienced during the time of the expedition. Ablation, largely in the form of evaporation, is caused mainly by radiation. A tentative evaluation of meteorological records compared with previous expeditions suggests that conditions are warmer and drier than in the 1920s in the north - that is, the world-wide climatic amelioration has affected this part of the Himalaya and has probably been expressed by a regional shift of storm tracks. The expedition received co-operation from the Indian Meteorological Service. Consideration is being given to the problems of the shift of storm tracks and the trends in the arrival time of the monsoon in this area, which affect the glaciological regime.

The scientific leader of the expedition was Dr. Maynard M. Miller, who was assisted in the glaciological work by Barry Prather, also of Michigan State University.

(Contributed by M. M. Miller, during a visit to the
Glaciological Society in Cambridge, 28 June 1963)

ITALIAN GLACIOLOGICAL COMMITTEE. Variations of the Italian glaciers in 1962. As in previous years the glaciological campaign for the control of frontal variations in the main Italian glaciers was carried out regularly. 119 glaciers were checked. 81 of these were seen to be still in retreat. The continuing fine weather favoured ablation, especially in the lowest regions. As always, the fundamental factor of glacialism appears to be the mean summer temperature. In fact, high up on the mountains and on the less sunny slopes, patches of snow remain until late summer and there are numerous glaciers under snow. This explains the fact that the intensity of retreat is less in the Eastern Alps, where mean summer temperatures are always lower, than in the Western Alps, which are exposed to the warmest Atlantic winds. Of the five advancing glaciers, four are in fact in the Eastern Alps. However, the retreat continues to be intense and for the moment it does not seem possible to think in terms of a forthcoming glacier advance as was believed from the results of the 1961 campaign.

M. Vanni

PENNY ICECAP, BAFFIN ISLAND. Work on the ice cap was conducted in 1962 by a team from the Dominion Observatory, under Dr. J. R. Weber, from the Geographical Branch of the Department of Mines and Technical Surveys (K. C. Arnold) and from the Topographical Survey (J. B. Boyd). Some of the work was described in Ice, no. 11, p. 8, in the report from the Geographical Branch. Seismic profiles were shot along traverses on the ice cap and outlet glaciers, and gravity measurements were made and snow and ice densities determined on the same routes. A red nylon cord was strung across the snow of the accumulation area along the southern line of stakes, to mark the 1962 snow level. The stakes will be re-surveyed to determine movement, and new gravity readings will be taken at the original stake locations to deduce from changes in gravity the change in height due to shrinkage or growth of the ice cap.

GLACIAL GEOMORPHOLOGICAL INVESTIGATIONS IN NORTHERN UNGAVA, QUEBEC, CANADA.

The second of two field seasons was spent in 1962 examining evidence of glacial and post-glacial activity in the Deception Bay - Cape Wolstenholme area of northernmost Ungava, Quebec. (See map). A detailed account of the 1961 field work has been published in the McGill Sub-Arctic Research Papers, No. 12. The final results of the two field seasons will be presented as a Ph.D thesis at McGill University. The research work in 1962 was made possible by a research grant obtained from the Air Force Cambridge Laboratory, U.S.A. and administered by the Arctic Institute of North America. Field investigations and air photographs (north of the 62nd parallel) indicate that the area was entirely covered by glacier ice at least once during the maximum of the Pleistocene glaciation. This ice sheet originated mainly to the south of the Povungnituk Trough as the majority of striae, roches moutonnées and drumlins point to a northerly movement of the ice. To the west of Asbestos Hill, however, the trend of roches moutonnées and erratic boulders shows that at one time ice moved southwards and southeastwards from a local ice centre. Similar radial flow from minor ice caps was deduced in 1961 in the area west of Sugluk Inlet. During the equivalent of the last phase of the Wisconsin glaciation some of the plateau areas above 2000ft, such as Asbestos Hill, remained as nunataks allowing the formation of a deep mantle of fine felsenmeer.

The direction of ice flow was determined. In a permafrost area deep excavation was difficult and frost heaving tended to destroy the original orientation of pebbles enclosed in till. Till fabric analysis was attempted, but a more useful method for determining the direction of ice flow was a statistical analysis of the orientation of erratic boulders on flat summit areas.

Evidence in the coastal area suggests that during the disappearance of the major ice sheet valley glaciers were active in the northward draining valleys at the head of the large fjords. Here in the glacial troughs was found a series of retreat and terminal moraines, with some of the material interdigitated with that of fossiliferous marine deposits, as in the valley immediately to the south of Sugluk. The existence of valley glaciers often prevented the incursion of the sea in late-glacial times; the height of the glacier snouts was partly controlled by the height of the contemporaneous sea-level.

Preliminary results of radiocarbon datings on shell deposits suggest that probably part of the southern coastal area of Hudson Strait was free of glacier ice by about 10,500 B. P. and that a general marine invasion occurred approximately 7000 to 8000 years ago, at the onset of the classical Hypsithermal period. The shells were dated by Isotopes Incorporated through the Geographical Branch, Department of Mines and Technical Surveys, Ottawa.

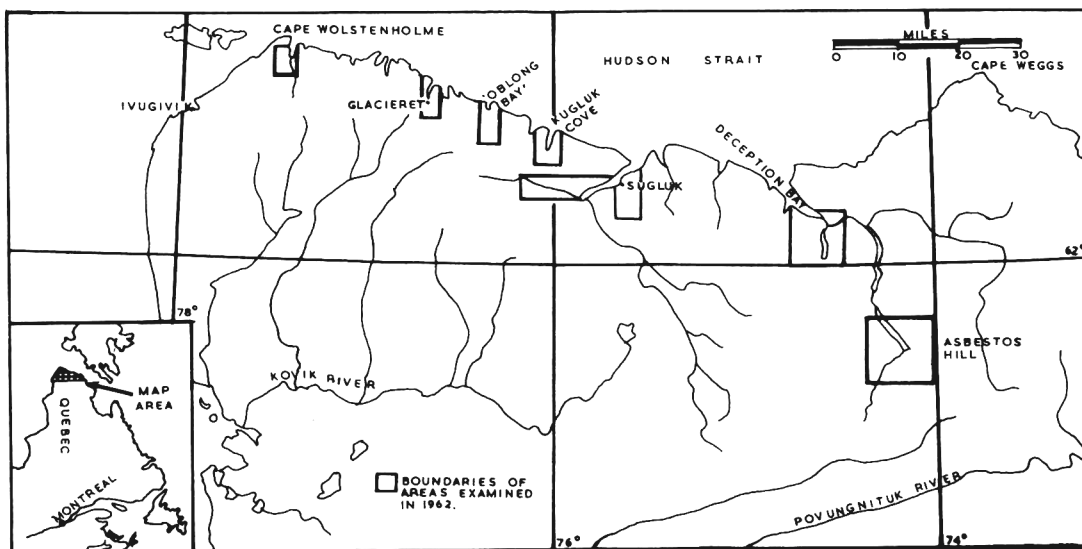
Evidence for late-glacial and post-glacial climatic oscillations has been gained from examination of the mollusc and foraminifera content of the raised beaches and pollen analysis of various peat deposits.

The rate of glacio-isostatic uplift has been calculated for the 'Oblong Bay' and Deception Bay areas, based upon the height and radiocarbon dates of fossil post-glacial marine shells, allowance being made for eustatic rise of sea-level of 0.9m per 100 years prior to 6000 years B. P. The mean rate of uplift of the land has been in the order of 1.2m to 1.4m / 100 years in the Deception Bay area since circa 10,500 years B. P., and 1.7m per year in the 'Oblong Bay' area since circa 7000 years B. P.

Until 1962 no cirque glacier had been recorded in northern Ungava even though latitudinal, climatical, and physiographical conditions are very similar to those of the Kingaita Peninsula, Baffin Island, where two small ice caps, outlet glaciers and cirque glaciers occur. In 1962, however, a small cirque glacier was discovered approximately 24 miles east of Cape Wolstenholme at an elevation of 609ft (basal height) (see map). It was located at the head of a northward facing cirque valley containing a small tarn dammed by a moraine. The valley itself occurs at the southern end of a $2\frac{1}{2}$ mile long fjord, one of the very few major indentations in the 1500 ft high cliff-line that borders this part of the Hudson Strait. It was possible to penetrate into the 144ft high ice mass for about 100ft by way of a series of 20ft high ice caves from which gushed a large torrent. At the rear of the caves the annual ice layers, separated by $\frac{1}{2}$ inch dirt layers, slope down towards the toe of the glacier (i.e. northwards) at 25° . But a reversal of slope was seen near the toe of the glacier where upward shearing of the ice seems to occur in the 2-3ft high basal layer of ice, since $\frac{1}{2}$ -4inch bands of opaque, white and clear ice have a slope of 22° - 25° to the south. Yet above the basal ice the annual layers slopes down towards the north, although mostly at a lower angle than at the rear of the glacier. The glacier has been recently

reduced in size, as a 6ft high arcuate moraine exists 100ft from the edge of the ice. This moraine is formed of angular and sub-angular pebbles, cobbles and boulders. Similar material was seen on the rock floor of the ice caves, while the bedrock that is exposed beneath the ice shows evidence of glacial polishing.

A line of stakes across the top of the ice mass was surveyed in order to determine accumulation and surface movement. In future years it is intended to examine more of the snow and ice patches seen on air photographs of northern Ungava, to ascertain whether some are formed of glacier ice and hence might be classified as cirque glaciers.



(Contributed by Barry Matthews)

RESEARCH ACTIVITIES OF THE SNOW AND ICE SECTION, DIVISION OF BUILDING RESEARCH, NATIONAL RESEARCH COUNCIL, CANADA.

(a) Heat exchange at snow and ice surfaces:

Observations have been made on the net radiation at natural grass and snow cover surfaces at Ottawa for the past 18 months. During the past six months, observations have been made as well on incoming and reflected short wave radiation from the same surfaces. These observations are to be continued for at least the next year. A comparison has been made between the CSIRO net radiometer (manufactured in Australia) and a Suomi type net radiometer constructed by the Canadian Meteorological Branch. It was found that there was a random difference between the outputs of these two instruments, this random difference having a standard deviation of about 40 calories/sq cm/day. This amount of radiation is about equal to the daily net radiation in the Ottawa area during wintertime.

Observations were continued on the influence of the snow cover on the ground thermal regime. Observations were continued as well at a small lake in the Ottawa area on the temperature profiles in the lake during the summer and winter, and on the ice thickness.

(b) Dependence of ice cover thickness on time and region:

Ice cover thicknesses obtained from the observation programme of the Meteorological Branch and other sources were analysed to determine the average dependence of ice thickness on time and region. It was observed that for 50% of the time the average rate of ice

growth over a two-week period was about 0.35 in. per day. For 90% of the time the average ice growth rate was greater than 0.15 in. per day and only for 10% of the time did it exceed 0.7 in. per day. These ice growth rates are typical for all regions for the whole period of ice growth. A paper has been prepared on this study and will be submitted shortly for publication.

(c) Deformation behaviour of ice:

A study on the deformation of ice beams was completed. It was observed that deformation rate for a given load was very sensitive to the thickness of the beam for beams thinner than 1.25 in. The results of this work are contained in a paper submitted for publication in the Canadian Journal of Physics.

Observations are continuing on deformation mechanisms of ice. This includes a study on the dependence on time to formation of the cracks in ice on the applied load and on the temperature. A study on crack formation in ice plates by thermal shock has been completed. A paper has been prepared giving the results of this work and will be submitted shortly for publication.

Observations have been made on an unusual creep behaviour that occurs in previously undeformed ice. It was shown that this creep behaviour is associated with non-reversible changes in the ice structure. The results of this work are to be written up shortly.

(d) Ice dusting:

A literature review was completed on the use of dust for advancing the melting of ice covers. Small scale field observations are being continued on this technique. These studies indicate that once melting has been initiated by the dust, and a pool of water has been formed, the properties of the dust are a minor factor in the process, and what is important is the low albedo of the water surface relative to the surrounding snow or ice cover. This work was reported to the Annual Meeting of the Eastern Snow Conference held in Quebec City, February 1963.

PROJECT TIREC. This summary has been extracted from the Preliminary Report by the Canadian Participating Agencies, published by the Canadian Defence Research Board, Ottawa, February 1963.

Pictures taken by Tiros I, the first photographic meteorological satellite, indicated in April 1960 the possibility of extracting ice information from satellite photographs, coupled with the problem of distinguishing between ice and cloud. In January and March 1961 a series of observations was carried out, timing visual reconnaissance flights to coincide with satellite passes over the area; radar and photo coverage was also obtained. Results were sufficiently encouraging to indicate the need for a broader programme of comparative photography. Accordingly, Project Tirec was planned in connection with the fourth Tiros satellite, to be launched in early 1962. The participating agencies were the U.S. Weather Bureau, U.S. Navy, U.S. National Aeronautics and Space Administration, the Royal Canadian Air Force, the Canadian Defence Research Board and Joint Photographic Intelligence Centre, and the Canadian Department of Transport (Met. Branch).

The objective of Project Tirec was to establish methods of interpreting ice detail directly from the satellite photographs, and particularly of distinguishing between ice and cloud. Thus many photographs from various levels were taken at the time of the satellite passage, for purposes of comparison. Photographic data were supplemented by radar scope photography and visual observations, and meteorological observations at various levels above the land and the sea. There were two periods when full coverage was possible: 8-12 February and 7-18 April.

The Canadian preliminary analysis of results show the techniques used in Project Tirec make the interpretation of ice conditions from satellite photography feasible. Reasonably reliable information can be obtained for operational ice reconnaissance, particularly on the distribution of ice and the position of ice boundaries.

CANADA - A useful publication has recently been issued by the Snow and Ice Sub-Committee of the Associate Committee on Soil and Snow Mechanics, National Research Council: "Summary of current research in Canada on snow and ice". (ACSSM Note no. 7, Ottawa, February 1963). Further information may be obtained from G. P. Williams, Secretary, Snow and Ice Sub-Committee, National Research Council, Ottawa, Canada.

U.S.S.R. - ANTARCTIC ACTIVITIES 1962-63

In the winter of 1962 the Soviet 7th expedition manned two stations; at Mirny there were 62 winterers, of whom 26 were scientists (21 Soviet, 3 East German, 1 Czech and 1 United States), and at "Novolazarevskaya" there were 21 winterers, of whom 11 were scientists (8 Soviet, 3 Czech). In the spring, a party from Mirny set up an automatic weather station about 100km inland, at a height of 1400m. The party was absent for 40 days, being held up by blizzards for much of this time.

The 8th expedition, led by M. M. Somov, left the U.S.S.R. in the Ob' and Estoniya in November 1962 and arrived at Mirny at the end of December and beginning of January. Four East German, 2 Czech and 2 U.S. scientists arrived with it. The main object for the season was to prepare stations for the International Quiet Sun Year, to that end reopening "Vostok" at the south geomagnetic pole on 25 January and completing "Molodezhnaya" in Enderby Land. Stores brought included new aircraft and oversnow vehicles. Unloading was hindered by inability of the ships to get through the last few miles of ice to the normal landing place. The wintering party at "Vostok" numbers 15, including 2 Czech scientists. A field party from "Molodezhnaya" worked at Richardson Lake, 225km away, until early March, when the aircraft was destroyed by winds of exceptional force, and the members of the party were rescued by another aircraft flown from Mirny. The wintering party numbers eight.

The Ob' meanwhile continued round the coast to "Novolazarevskaya", reaching it on 1 March and unloading stores. Twelve winterers were left here and the members of the 7th expedition were taken aboard. The Ob' left about 18 March to carry out an oceanographical programme in the southern Indian Ocean (one of the scientists aboard was the U.S. oceanographer, G. Franceschini). After calling at Cape Town, she returned to "Molodezhnaya" on 8 April to pick up those due to return home, proceeded to Mirny to do the same, and finally left Mirny for the U.S.S.R. on 23 April - the latest date yet on which the Soviet relief ship has been at an Antarctic station.

UNIVERSITY OF WISCONSIN GEOPHYSICAL & POLAR RESEARCH CENTER In the 1962-63 Antarctic summer season, an oversnow traverse studied the region between the South Pole, the Horlick Mountains and the Queen Maud Range. Edwin Robinson was senior glaciologist on the traverse. Ice thickness was determined by seismic reflection shooting at 25 stations and by supplementary measurements. Another group, under Charles Bentley, continued the study of ice flow on Roosevelt Island. Manfred Hochstein was in this group. The network of strain and accumulation stakes now extends completely across the middle of the island, with supplementary networks at each end. Geophysical measurements of ice thickness and observations on the nature of the sub-glacial material have been made in all the network areas.

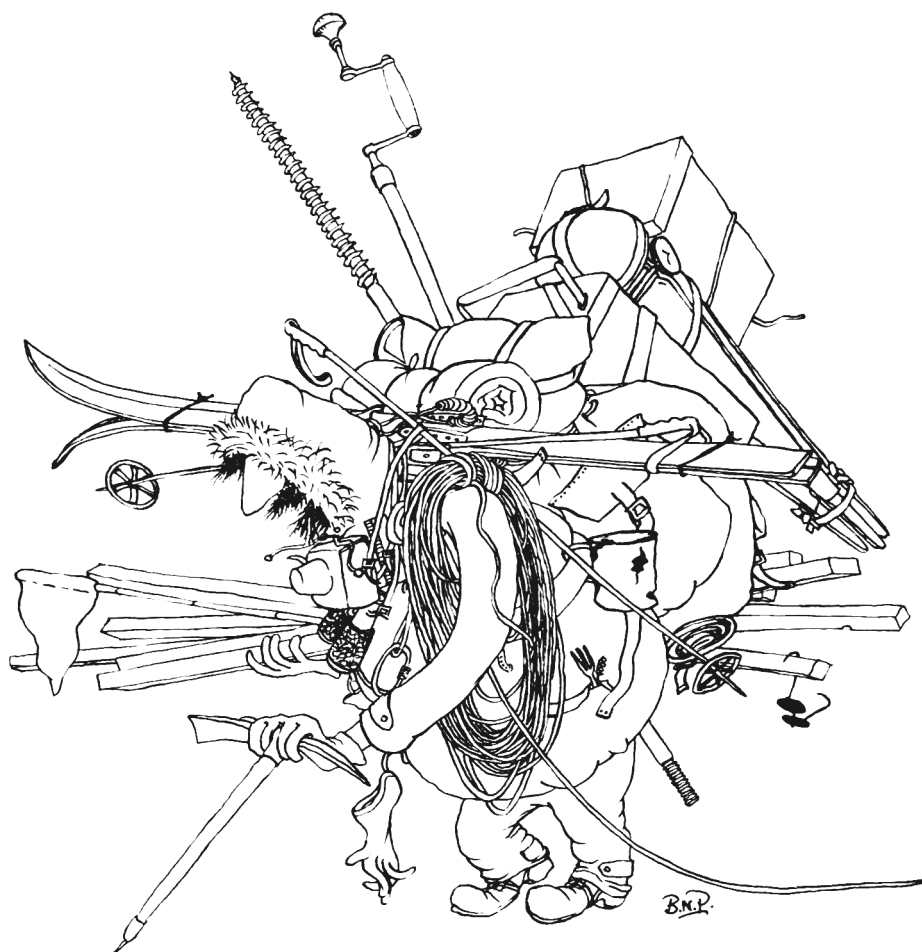
The Center has also made a gravity survey of the Gulkana Glacier, Alaska Range, in co-operation with the University of Alaska. The survey showed that the western half of the valley is shallower than the eastern half.

ANTARCTIC EXPEDITION OF THE REPUBLIC OF SOUTH AFRICA. During 1962 a base, "Sanae", was built on the "Fimbulisen" ice shelf at lat. 70° 18.5'S and long. 2° 31.5'W at an elevation of 52m a.s.l., and 21km due north of Norway Station at which the previous two South African expeditions were based. Glaciological traverses were made on the ice shelf, but investigations inland were limited to the establishment of trail accumulation markers, observations of sastrugi orientations and gravity and magnetism. A network of stakes was begun at the new base and observations of accumulation were made here as well as on the old network at Norway Station. Stratigraphic studies were made at a 42 ft pit and yielded accumulation data for the period 1946-62. A 64 ft core drilled from the bottom of the pit gave data for 1910-45. Preliminary calculations show a mean accumulation of 39cm water equivalent for the period 1910-62. Other studies at the base included measurement of horizontal strain rates, using tellurometers, on the ice shelf between Sanae and the coast, including a portion of the ice rise or grounded shelf ice to the west of the base. Stellar observations taken at Sanae in 1962 will be repeated annually for the next 5 years at least,

to calculate absolute movement of the ice shelf. A pit was dug for the periodic measurement of snow settling.

A major traverse was completed on the inland ice up to lat. 72°S and long. 30°W , using Canadian-built Muskegs and dogteams. 180 accumulation stakes were erected at 3km intervals on the ice shelf and along the 450km traverse. Gravity and magnetic observations were completed at 148 stations along the route. Ramsonde soundings and drill-hole observations were made every 9km.

NOTE. Much interesting information on field work in other areas may be found in Glaciological Notes, issued in January, April, July and October, by IGY World Data Center A Glaciology, c/o American Geographical Society, Broadway at 156th Street, New York 32, N. Y., U. S. A.



Drawn by B. Norman Parker

Annual General Meeting

Minutes of the Annual General Meeting held at 5.30 p.m. on 2 May 1963
at the Imperial College of Science and Technology, London S.W.7.

The President, Mr. Gerald Seligman, invited Professor
Gordon Manley to take the Chair.

1. The Minutes of the 1962 Annual General Meeting were circulated at the meeting and approved. The Chairman signed the Minutes.
2. The President made his report for 1962 - 63:

This is the conclusion of the first full year in which our new Constitution has ruled.

In addition to the change of our name from the British Glaciological Society to The Glaciological Society, in view of its having attracted members from so many countries and become international in character, we have made several adjustments in our organization. As a result of our new status, we now have several overseas members on our Council, and I must record the fact that we held a Council Meeting abroad for the first time at Obergurgl last September; four of the nine members of the Council who attended it came from France, the United States and Sweden, under the Chairmanship of Mr. W. O. Field.

We have also instituted a scheme for having an Editorial Board consisting of the present Editors of our Journal and of Editorial Advisers made up largely of members from abroad. We hope that this will be a useful addition to the editing of the Journal. I would like to state here that I hope that every Editorial Adviser will look critically at our Journal and not hesitate to advise us of any improvement which occurs to him.

We have also appointed correspondents from eighteen countries. The correspondents will collect for us news of any glaciological research taking place in their countries, will stimulate the sending to us of articles for our Journal dealing with such researches, or reprints of glaciological articles published in other Journals, and will try to increase membership of the Society in their countries.

Another innovation has been that during 1962 we published the Journal of Glaciology three times instead of twice as previously. This has been possible without any appreciable reduction in the amount of matter published in each issue. It has given us certain advantages in the task of editing. We are not yet sure whether we shall go to four issues a year, as I foreshadowed in a previous report.

The fourth volume of the Journal was started last year, and it may interest members to know how the Journal has increased in size since its inception.

| | |
|--|--|
| Volume 1, which finished in Oct. 1951, contained 604 pages | |
| " 2, " " " " 1956 " 790 " | |
| " 3, " " " " 1961 " 1,201 " | |

The first issue of Volume 1 contained 42 pages as opposed to an average today of about 130 pages. Because of its present size, we intend to close Volume 4 rather earlier than the previous volumes.

The considerable increase in the size of the Journal would not have been possible without the financial support which we receive from several organizations who have honoured page charges for articles by authors who have connexion with them. We also acknowledge with gratitude a substantial grant from the National Science Foundation to assist in our publication expenses. The other factor contributing to the success of the Journal is the first-rate work done by the three Editors, Dr. J. W. Glen, Dr. R. J. Adie, and Miss D. M. Johnson. This leaves my own share in the editing a very small one, but I hope to be able to continue this for the present.

The past year has seen a further increase in our membership:-

| | | | | |
|--|-------------|------------|-----|-------------|
| Members | 608 | as against | 549 | last year |
| Subscribers to the Journal | 467 | " | " | 492 " " |
| Free and Exchange issues of the Journal | 74 | " | " | 72 " " |
| | <u>1149</u> | | | <u>1113</u> |

That our membership has increased by 59 can be reckoned as satisfactory as far as it goes, but we must strive hard to continue, or to improve on, this increase from year to year, so that we can further strengthen our status, and further extend our services to our members and to our science.

I must refer with deep regret to the deaths of five members - Paul-Louis Mercanton, Ukichiro Nakaya, Vilhjamur Stefansson, Edward Thiel, and Harry Wexler. All were important in their special lines and the loss to the Society is very great.

The Glaciological Research Sub-Committee, with its name now changed to the Glaciological Research Committee, because our former main "Committee" has adopted the title of "Council", will be publishing its Sixth Report in the June issue of the Journal of Glaciology. Dr. J. W. Glen is its Chairman, and under his guidance I think that all will agree that its work constitutes a valuable contribution to the progress of our science, and to the encouragement which the Society strives to give to those of its members who wish to carry out researches in the field.

The task of our Secretary, Mrs. Richardson, has been an onerous one during the past year. Not only has she had to travel abroad on our behalf, where she has "shown the flag" with advantage to ourselves, but she has been handicapped by losing two assistants in succession from quite unavoidable causes. In spite of this she has carried on with her usual courage, and we do hope most earnestly that her task will soon be eased.

Since my last report eight lectures have been given before the Society, in London, Birmingham, Bristol and Cambridge, in addition to the many papers read at Obergurgl last September before the Commission of Snow and Ice of the International Union of Geodesy and Geophysics, which many members attended. We look forward to having more lectures during the coming year, although the arranging of these is an arduous task in view of all our own pre-occupations and of those of our members who have material to present to us.

Our library flourishes. In addition to the many books we have added to it I am now completing the 80th volume of bound glaciological papers.

This concludes what I have to report to you before the end of the Presidency which I have held since our beginning, and I will only add what pleasure it gives me to hand over my office to my successor, Sir Vivian Fuchs, whose name, I am glad to see, stands unopposed for your confirmation presently. In his capable hands the well-being and progress of our Society is assured.

3. Presentation of the Seligman Crystal:

In making the presentation Sir Vivian Fuchs referred to Mr. Seligman as "the founder and father of the Society" and expressed the Society's appreciation of all that he had done in fostering the interests of the Society and its journal. It had been the unanimous decision of the Council that this first Seligman Crystal should be presented to the Society's Founder on the occasion of his retirement from the Presidency. Indeed, the Society was delighted doubly to honour him with the first award and by the perpetuation of his name in the title "Seligman Crystal", which would in future be the highest honour the Society could bestow.

In accepting the Crystal Mr. Seligman said:

Although I had been warned beforehand that this presentation was to be made to me I find it very difficult to return thanks adequately to you, Sir Vivian, and to the Council and the Society for this beautiful and wonderful award.

The reason why it is difficult for me to express myself now is the same as it was just over a year ago, when we were celebrating the first quarter century of our existence. At that meeting our member, the Bishop of Norwich, in proposing the health of our Society, coupled his remarks with my name saying many kind things about me and my services to the Society. In my reply I had to point out that the success which has been achieved in the founding of it, and carrying it on, could never have been accomplished without the co-operation and active help and encouragement which I have received from so many quarters both in this country and from abroad. This has made such services as I have been able to render extremely easy and smooth, and that is why it is now difficult for me to assume more than a part of the credit, so much of which should be shared by so many other people.

As to this magnificent emblem, I also feel tongue-tied. It is so beautiful physically, and its moral conception so generous. Its conception was a thought of genius. I hope that its future recipients will feel as grateful as I do.

I feel deeply moved by this most generous recognition of such services as I may have rendered to the Society, and to our science, which, after all, has become my life's work, and I shall treasure that recognition and this award until the end of my days.

4. The Treasurer, Dr. G. C. L. Bertram, presented the accounts for 1962.

The 1962 accounts show a fairly healthy financial position. Although expenditure had risen since 1961, income had kept pace with the increase. The cost of publishing three issues of the Journal of Glaciology a year instead of two and other increases in the printing and administration costs had been balanced by the higher subscription rate for libraries and greater contributions in the form of page charges, direct grants and donations. For these contributions we were very grateful, and particularly for the grant from the U.S. National Science Foundation, who recognise the need of scientific publications for financial aid. Such help means that the annual dues of private members do not have to be increased every time expenditure increases.

5. Election of auditors for the 1963 accounts.

Dr. G. de Q. Robin proposed and Dr. R. J. Adie seconded that Messrs Peters, Elworthy and Moore, of Cambridge, be re-elected auditors, for the 1963 accounts. This was carried unanimously.

6. Elections to the Council, 1963 - 66.

After circulation to all members of the Council's list of nominations, no further nominations in accordance with the Constitution had been received. The following people were elected unanimously:

| | | Proposer | Seconder |
|-------------------|-----------------|--------------|---------------|
| President: | Sir V. E. Fuchs | G. Seligman | B. B. Roberts |
| Elective members: | T. E. Armstrong | C. J. Lorius | M. F. Meier |
| | J. W. Glen | V. Schytt | J. F. Nye |
| | C. A. M. King | W. H. Ward | R. J. Adie |
| | P. A. Shumskiy | G. Seligman | W. O. Field |

The Chairman of the meeting, Professor Gordon Manley, invited the new President to take the Chair.

7. Appointment to the Post of Founder.

Under Rule 10 of the Constitution the Council of the Society recommended the creation of the Post of Founder and proposed that Mr. Gerald Seligman's name be put forward for confirmation at the Annual General Meeting. In this way the Council can retain Mr. Seligman's services in an advisory capacity.

| | | Proposer | Seconder |
|----------|-------------|-----------------|------------|
| Founder: | G. Seligman | Sir V. E. Fuchs | J. W. Glen |

This was passed unanimously. Mr. Seligman thanked members for their kindness and said that he would be pleased to be of service to the Council.



Valter Schytt

Valter Schytt was born in Stockholm on 17 October 1919. When he entered the University of Stockholm in 1939 he had no particular interest in polar research or glaciology, but this developed two years later when he became a student of Hans W:son Ahlmann, then Professor of Geography. His association with Ahlmann, which is still close, has become a constant source of inspiration. In 1943 he was appointed Ahlmann's assistant and in 1944 began field work on avalanches. Regime studies on Storglaciären, Kebnekajse, from the spring of 1946 further cemented Schytt's interest in glaciology, and in 1949 he was appointed glaciologist and second-in-command of the Norwegian-British-Swedish Antarctic Expedition 1949-52. During the period at Maudheim he drilled to a depth of 100 metres to study the structure of an ice shelf; it was the longest and most carefully analysed core ever taken from a polar glacier. He also led two exploratory parties to the mountains of Queen Maud Land. The results of the expedition were published by Norsk Polarinstitut.

From 1953 to 1954 he was Research Associate at Northwestern University, Evanston, Illinois, U.S.A. and led an American field party working on the Greenland ice sheet near Thule. In 1955 he returned to Stockholm, where he still lives with his wife and three daughters, as Lecturer in Geography, becoming Docent in 1958 and Laborator in July 1963. He is a teacher of outstanding quality - inspiring, exacting and friendly; and in any company of glaciologists he is outstanding - tall and personable, with the inevitable bow tie.

Schytt has a wide knowledge of glaciology in many countries. In addition to his work in Scandinavia, Antarctica and North America, he has taken part in a Soviet Arctic expedition in the "Ob", in August and September 1956. After an oceanographic cruise between Spitsbergen and Greenland, the "Ob" went in towards Nordaustlandet, where Schytt and four others were put ashore on top of Vestfonna and began observations for the International Geophysical Year. He led the Swedish IGY glaciological expeditions to Nordaustlandet during the summers of 1957 and 1958. The expeditions found that the regime conditions were different from what was previously believed. Schytt has been in charge of the Tarfala Research Station in Kebnekajse, Swedish Lapland, since 1960; with its 38 beds and good facilities it is also open for glaciologists from other countries. In 1962 he was elected to the Council of the Glaciological Society.

Schytt's particular contributions have resulted from well-planned field observations continued over long periods. His careful studies of Antarctic snow stratigraphy served as a basis for most of the extensive pit work in Greenland and Antarctica during the IGY. Ever since 1946 students from many countries have continued to profit from Schytt's guidance and teaching during visits to the glaciological research station in Kebnekajse.

Current Research on Snow and Ice

4. UNITED KINGDOM

The SCOTT POLAR RESEARCH INSTITUTE is a sub-department of the Department of Geography in Cambridge University. In addition to a fine library, which includes many glaciological works, the Institute publishes the Polar Record three times a year. The Institute houses the I.G.Y. World Data Centre C Glaciology and the headquarters of the Glaciological Society. The Director, Dr. G. de Q. Robin, is well known for his contributions to glaciology and under his guidance research at the Institute into various aspects of glaciology has expanded during the last few years. Three other members of the staff are involved in this research.

Dr. Charles Swithinbank has recently returned to the Institute from the Glacial Geology and Polar Research Laboratory in the University of Michigan. He has been appointed to a post which is supported by the British Antarctic Survey and which is expected to give a boost to the glaciological work of the Survey and to strengthen the research activities within the Institute.

Dr. Stan Evans is working on radio echo sounding techniques as applied to ice, and Colin Dean is studying the attenuation of sea waves by pack ice.

The Royal Marines have done a useful piece of work for the Institute in making temperature observations along the coast of Graham Land. It is hoped that this work will continue as it will help to determine the different states of temperature down the coast.

International Co-operative Field Experiments on Glacial Sounding: Greenland 1963:

At the invitation of the United States Army Electronics Research and Development Laboratory, S. Evans took part in comparative tests of glacial sounding techniques in the vicinity of "Tuto", Greenland, headquarters of the United States Army Polar Research and Development Center, between 14 and 22 April 1963. Members of the staff of ELRDL, with A. H. Waite as Project Director, and J. Rinker (Cold Regions Research and Engineering Laboratory) as co-sponsor, took part, as well as the following specialists: M. Andrieux (Centre de Geophysique Appliquée, Paris), A. Bauer (Expeditions Polaires Françaises), C. R. Bentley (Geophysical and Polar Research Center, University of Wisconsin), M. Hochstein (Geophysical and Polar Research Center, University of Wisconsin), C. Lorus (Attaché C.N.R.S., Paris), C. Queille (Centre de Géophysique Appliquée, Paris), K. V. Pearson (Honeywell Company, Seattle, Washington). In addition H. Röthlisberger (Abteilung für Hydrologie und Glaziologie, Zürich) was present in the area and took an active interest in the tests.

The party travelled from McGuire Air Force Base, New Jersey, to quarters at "Tuto". From "Tuto" a ramp built of crushed rock provides access for vehicles on to the trail across the ice cap to "Camp Century". The first tests were conducted on the ice immediately beyond the end of the ramp.

The French party, under Bauer, used a system of 'ELTRAN' electrodes spaced up to distances of 1500m to search for discontinuities in direct current conductivity in the underlying strata. Serious practical difficulties were encountered with untraceable sources of emf even under perfect fine weather conditions.

Radio echo sounding techniques (see Evans, Polar Record No. 73, January 1963, p. 406-10) were successfully used by Waite and Evans. The SCR 718 aircraft radio altimeter operating on 440 Mc/s recorded echoes from depths of the order of 300m (see Waite, Proceedings of the Institute of Radio Engineers, Vol. 50, No. 6, 1962); echoes were several times stronger on a 110 Mc/s equipment produced by the United States Army Signal Corps. The thirty-two Mc/s apparatus used by Evans suffered from paralysis of the receiver immediately after the transmitter pulse and the transmitting and receiving apparatus were therefore used at least 100m apart in separate vehicles. With all the radar apparatus it was found that the echo strength varies by more than 30dB as the vehicle moves over distances of a few radio wavelengths; the variation is presumably a diffraction pattern set up by an irregular reflecting screen.

Bentley and Hochstein took seismic soundings and gravity measurements which were compared with the radar observations.

Pearson used a Honeywell radio altimeter installed in a helicopter for tests over various thicknesses of snow and ice. This instrument operates at 4 300 Mc/s and reliable

echoes and altitude indications were obtained from the top surface of the snow or bare ice. An oscilloscope presentation was used to search for echoes from the snow-ice and ice-rock boundaries but none was observed. The top surface echo was strong under all conditions, approaching specular quality.

On 17 April the majority of the party travelled to 'Blue Ice Valley', 13 miles inland, where Rinker was conducting his research programme. During the following two days, Waite was able to obtain continuous echoes along a fifteen mile journey where the same 440 Mc/s apparatus had failed to detect an echo at many places under summertime conditions in 1962. This was attributed to lower losses in propagation through the ice at the lower mean ice temperature in the springtime. Bauer's party were seriously handicapped by drifting snow which caused static electric fields to upset their readings. Bentley, Evans, Hochstein and Röthlisberger travelled inland to approximately 'mile 27' in an attempt to find the limiting depth of the thirty two Mc/s apparatus, but no ice thicker than approximately 550m was found. Random variations in echo power were so large as to obscure any systematic decrease of strength with increasing depth in the range 250 to 550m. A 600m baseline of approximately uniform depth was chosen to make echo strength and delay time measurements for different spacings of transmitter and receiver from which the velocity and attenuation of radio waves in ice has been derived. Seismic soundings were taken on the baseline.

A tremendous debt of gratitude is due to the United States authorities for making it possible for various specialists to compare techniques in the field. Realistic development of Evans' apparatus is now proceeding in the Scott Polar Research Institute.

(Contributed by S. Evans)

BRITISH ANTARCTIC SURVEY: The attenuation of sea waves by pack ice.

During the 1959-60 Antarctic summer, the R.R.S. John Biscoe carried a ship-borne wave recorder on her passage through the Weddell Sea to Halley Bay. From the subsequent analysis of these wave records, together with the prevailing ice conditions, Robin (Phil. Trans. Roy. Soc. A, 255, no. 1057, 1963) has shown that several quantitative conclusions can be drawn concerning the attenuation of sea waves and swell by ice floes of various sizes.

Measurements of swell within heavy pack ice have also been made from ice islands and large floes in the Arctic Ocean (see Hunkins, Journal of Geophysics, 67, no. 6, 1962, p. 2477). The stable nature of the measuring sites in these cases has enabled gravimeters and seismometers to be used to measure the small wave amplitudes involved. These two investigations are thus complementary. The latter provides measurements of long term changes in a particular small area and their relationship to overall ice and weather conditions. The former gives a quantitative indication of the processes involved when a train of waves of known open ocean amplitude is "followed" into an area of pack ice.

The Antarctic studies were continued during the 1960-61 and 1961-62 seasons, when wave measurements were again made from the R.R.S. John Biscoe. For these two summers, however, the ship was working between the British Antarctic Survey bases on the Graham Land Peninsula. The variable ice conditions encountered, together with the complex modification of the swell patterns by islands and shallow water, make analysis of these data more difficult than in the previous cases, although some observations of the break-up of fast-ice in Marguerite Bay by a 12-second swell period were useful. However, since the observations were made by British Antarctic Survey personnel who were only in transit on the ship for a short time, the consistency of the records was not as satisfactory as during the first voyage. As a result, the equipment was installed in 1962 in the m.v. Kista Dan, so that further studies could be made in the Weddell Sea pack ice, whilst the ship was en route for Halley Bay. The new series of observations was started by C.H. Dean during the 1962-63 Antarctic summer, and he will continue the programme of collection and analysis of data. More attention is now being paid to the accurate estimation of floe sizes. Some new techniques for measuring very small swell amplitudes have been tried, which, with further development, should enable data to be obtained next season for ocean swell with periods in excess of 24 seconds - the long-period limit of the N.I.O. ship-borne wave recorder. A detailed investigation of the rapid attenuation of short-period waves at the open-ocean/pack-ice boundary has also been made. The analysis of these records is being done on the Cambridge EDSAC computer and the hydrodynamical side of the problem is also being studied.

(Contributed by C.H. Dean)

The BRITISH ANTARCTIC SURVEY, under its Director, Sir Vivian Fuchs, (President of the Glaciological Society 1963-66) has launched a new periodical: British Antarctic Survey Bulletin. The first number, June 1963, published by the Survey in London, price 10s, has the following foreword:

It has been found that the existing series of monographs entitled "British Antarctic Survey Scientific Reports" is not suitable for the publication of preliminary reports or short notes and papers. A vehicle is also required for reports which are not specially scientific.

The "British Antarctic Survey Bulletin" has been devised for both these purposes. It is expected that the Bulletin will appear two or three times a year, but publication will not occur at regular intervals, the timing being controlled by the volume of material which is considered worthy of publication.

Although the Bulletin is only intended for the publication of the Survey's work, correspondence concerning papers appearing in it will be considered for inclusion.

V. E. Fuchs

The following two articles are of interest to glaciologists:

An ice caldera in North-east Graham Land, by N. Aitkenhead (p. 9).

Meteorological observations at Fossil Bluff, Alexander Island, by C. J. Pearce (p. 17).

In addition to glaciological research by these two main organizations, field work, and laboratory and theoretical research are undertaken by experienced glaciologists and by student expeditions. The series of expeditions to Austerdalsbreen, NORWAY, initiated by the late W. V. Lewis, is typical. Direction of research has been continued by Dr. W. H. Ward, with Drs. J. W. Glen, C. A. M. King and J. F. Nye, and many groups of students, particularly from the Geography Department, Cambridge University, have helped in the field work. Drs. Nye and Ward, with a small group of assistants, have returned to Austerdalsbreen this July to re-survey the pipe which was sunk into the glacier in 1958 and re-surveyed in 1959, and to measure bed-slip near the snout of the glacier.

BRATHAY EXPLORATION GROUP A party is going to Tunsbergdalsbreen, a distributary glacier from Jostedalsbreen, the Norwegian ice cap. Earlier measurements of the flow of this glacier will be continued and a detailed study made of dirt bands and ice-cored ridges. Glaciologist: P. Howarth, Pembroke College, Cambridge.

THE ARMY BOYS' EXPEDITION 1963. A party of 10 senior members and 32 boys will start from Tunsbergdalsbreen, move up on to the ice cap of Jostedalsbreen and come down to Austerdalsbreen making observations en route.

Another group of expeditions are going to EAST GREENLAND and are making measurements essentially of the type asked for by the Commission of Snow and Ice. The Commission recommended that observations be taken in 1963, 5 years after the I. G. Y. Details of these expeditions are given in the following notes.

CAMBRIDGE EAST GREENLAND EXPEDITION 1963. The expedition consists of 12 men, and will work in the central Stauning Alps, east Greenland (lat. 72° N., long. 25° W.). The scientific programme will include glaciology, ionospheric physics and geology. The glaciological programme is based on the resolutions put forward by the Commission of Snow and Ice of the International Association of Scientific Hydrology, and is in two parts, firstly basic observations necessary for recording the variations of one or two short glaciers in the area, and secondly measurements to continue previous observations on the Sefstrøms Gletscher. The first part consists of those measurements recommended in section 4 of the report of the Sub-Committee on Variations of Existing Glaciers (published in the Colloque d'Obergurgl of the International Association of Scientific Hydrology), the second part consists of an attempt to resurvey any markers of the 1960 expedition (leader: Sir John Hunt, glaciologist: J. C. G. Sugden) and to establish a line of markers along the centre line of the glacier from which to measure flow and ablation. These markers will be drilled to a minimum depth of four metres in the hope that they will survive for further seasons. If appropriate an attempt will be made to measure the velocity gradient near the side wall. Members of the expedition include: C. F. Knox (leader, ionospheric physics), A. J. Robinson (deputy leader, glaciology) and J. C. Lendon (organiser).

IMPERIAL COLLEGE EXPLORATION BOARD. THE EAST GREENLAND EXPEDITION, 1963. 8 persons are going to Stauning Alps, east Greenland. Their programme includes glaciology, the aim being to survey the glaciers in the north Stauning Alps. Photographs will be taken from identifiable positions of the glaciers, together with more detailed study of two or three small glaciers. The base camp will be set up on Bersaekerbrae, about 13 miles north-east of the Sefstrøms Gletscher, which is being studied by the Cambridge expedition, and it is hoped to make flow measurements on transverse and longitudinal stake profiles on this glacier as well as to make a plane-table map of the snout. The glaciologist is G. J. Pert.

1963 SCOTTISH EAST GREENLAND EXPEDITION. A group from St. Andrews University Mountaineering Club and from The Royal College of Science and Technology (Glasgow) Mountaineering Club is going to the Schweizerland region of east Greenland to study the glaciers draining to the east side of the valley at the head of Tassissarssik fjord. The programme will include geology, botany and glaciology, and a survey of the snout of the glacier at 66° 7' N., 37° 0' W.

The Society's Library

Works received for the Society's library since January 1963.

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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 Rocky Mountain Forest and Range Experiment Station, Fort Collins, U.S.A.
 Societas Scientiarum Łódziensis, Poland
 U.S. Antarctic Projects Officer
 U.S. Navy Hydrographic Office
 University of Idaho, U.S.A. (3 items)

OTHER BOOKS RECEIVED

International Year Book of Cartography. Eduard Imhof (Ed.). London, George Philip and Son Limited, 1962. 191 p., illus., 25 cm. 40s.0d.

Géomorphologie des régions froides. Jean Tricart. Paris, Presses Universitaires de France, 1963. 289 p., illus. (Paper back) (Orbis, Introduction aux études de Géographie, André Cholley (Comp.))

Principles of Geodynamics. (2nd. Edition) Adrian E. Scheidegger. Berlin, Springer Verlag, 1963. xii + 362 p., illus., 23 cm. DM 49.60.

Antarctic Research, The Matthew Fontaine Maury Memorial Symposium. H. Wexler, M. J. Rubin, and J. E. Caskey (Eds.). Washington, American Geophysical Union (Geophysical Monograph No. 7, NAS-NRC 1036), 1962. 228 p., illus., map. 25 cm. \$10.00.

Clouds, Rain and Rain-making. B. J. Mason. Cambridge, University Press, 1962. 145 p., illus., 22 cm. Cloth 22s.6d. Paperback 13s.6d.



Mr. G. Seligman in the Society's Library

Reviews

GHIACCIAIE FENOMENI GLACIALI DEL BACINO DEL RAVI E DELLA VALLE DELL'UHL (BACINO DEL BEAS), HIMALAYA DEL PUNJAB: OSSERVAZIONI E STUDI. GIOVANNI MUSSIO. Milano, Società Editrice Vita e Pensiero, 1962. 138 p. Università Cattolica del Sacro Cuore. Saggi e Ricerche, Ser. 3, Scienze Geografiche, 1.)

The author of this small volume, during his imprisonment in India from 1943 to 1946, carried out some excursions from Yol, in the Kangra Valley (Himalaya of the Punjab). These excursions with a few companions took place between 15 and 30 October 1944, and between 21 September and 20 October 1945. The author dwells - perhaps with more detail than the scanty original data require - on the illustration of the physiographic characteristics of the valleys he visited, and of the manifestations of the local glacierization.

The glaciers briefly described or mentioned by the author in his paper are numerous. They are mostly small alpine glaciers; some of them are simply ice spots or snow fields. However, there are also some valley glaciers, such as the Tapni Laluni (about 10km long), but these are glaciers of alpine not of Himalayan type.

The greater part of the data reported by the author is drawn from topographical maps (on different scales) of the Survey of India.

Ardito Desio

AUSTRALIA IN THE ANTARCTIC: INTEREST, ACTIVITY AND ENDEAVOUR. R.A.SWAN. Melbourne, Melbourne University Press (London and New York, Cambridge University Press), 1961. xxiv, 432 p. £2.17s.6d.

Without question the Australians have played an important role in the exploration of Antarctica. From the early days of sealing and whaling, through the hard times at the turn of the century, until the International Geophysical Year of 1957-58 they have been in the forefront, regarding Antarctica as a land of potential achievement. Numerous accounts of Australian exploration in Antarctica have been published, but this is the first occasion on which all aspects have been drawn together in one book. Much of the present work is historical and political, but the author has managed to indicate the nature of scientific work in one short chapter. For the student of Antarctic affairs this book is a distinct asset, because it is so clearly written and illustrated, and the source material is equally well documented.

R. J. Adie

ASSAULT ON THE UNKNOWN. WALTER SULLIVAN. New York, McGraw-Hill, 1961. xiv, 460 p., illus., maps.

The New York Times was probably the only newspaper in the world to assign one reporter full time to cover the IGY. The result was not only that the paper was able to provide a better and fuller picture than any of its rivals, but Walter Sullivan, the man who did it, became more knowledgeable in the matter than any other journalist, and indeed most scientists. There could be no better person to produce a popular book on that multifarious subject, and he has done it excellently.

Glaciologists will be especially interested in four chapters, making up a fifth of the book. They describe the work of drifting stations in the Arctic Ocean, observations on glaciers, and the Antarctic programme. The method is to give in some detail the narrative of particularly interesting expeditions or undertakings, sketch in others of the same sort to fill in the picture, and then point in simple terms the significance of the scientific work done. Mr. Sullivan speaks often with first hand knowledge, for he travelled widely in the polar regions both before and during the IGY, and he brings his own warm enthusiasm to his exposition.

Terence Armstrong

News

Dr. A. P. Crary, chief scientist of the U.S. National Science Foundation's Office of Antarctic Programs, visited England recently to receive the 1963 Patron's Medal of the Royal Geographical Society, in recognition of his contributions to glaciology. During the IGY Dr. Crary was director of the U.S. glaciological and seismological programmes and deputy chief scientist for the entire U.S. geophysical programme. He has made important contributions to the study of ice drift and has led many glaciological traverse parties on the Ross Ice Shelf and Victoria Land Plateau, Antarctica, between 1957 and 1962.

Colonel J. Helk has been appointed Director of the Arktisk Institut, Charlottenlund, Denmark, in succession to Dr. Helge Larsen, who has been made Chairman of the Board.

The Royal Canadian Geographical Society has awarded the 1963 Massey Medal to Graham Rowley, secretary to the Advisory Committee on Northern Development, for outstanding achievement in the exploration, development and description of the geography of Canada in the last 25 years.

The Founder of the Glaciological Society, Mr. Gerald Seligman, has been awarded a Ph.D. Honoris Causa by the University of Innsbruck, Austria, for his services to the science of glaciology. Mr. and Mrs. Seligman visited Innsbruck during the last week of June for the University ceremonies. A full account of the proceedings will be published in the next issue of Ice.

James L. Dyson, head of the Department of Geology at Lafayette College, Easton, Pennsylvania, has been awarded the Phi Beta Kappa Science Award of \$1000 for his book "The world of ice" (Alfred A. Knopf, New York, 1962). The book was reviewed in the Journal of Glaciology, vol. 4, no. 34.

Dr. Fritz Müller, Associate Professor of Glaciology at McGill University, gave a course in glaciology during the present academic year. The course, which included three days of field work at the beginning of the second term and two hours of lectures or seminar per week, is described in Glaciological Notes, no. 13, January 1963.

The American Geophysical Union has undertaken the publication of a new quarterly journal, "Reviews of Geophysics", which will provide a link between those people working at the frontiers of geophysics and the growing number of students and researchers entering the field. The aim is to publish about 250 pages per issue by the fourth year and to make the journal an international medium. Subscription prices and other information are available from the A. G. U., 1515 Massachusetts Avenue N. W., Washington 5, D. C., U. S. A.

The Royal Society's series of volumes on the observations and data obtained at Halley Bay station during the IGY - IGC will consist of four volumes, of which the first three have already appeared. The fourth volume will be published in 1963 and will include glaciological observations. The price is £7 (\$23) for each volume, obtainable from booksellers or from the Royal Society, Burlington House, Piccadilly, London W. 1.

An English translation of P. A. Shumskiy's book, Principles of Structural Glaciology, will soon be published by Dover Publications. The translation has been made by David Kraus when employed by the American Meteorological Society and the Arctic Institute of North America. Further details may be obtained from IGY World Data Center A Glaciology, c/o American Geographical Society, Broadway at 156th Street, New York 32, N. Y., U. S. A.

Colorado State University announces a one- to two-year programme leading to a Master of Science Degree in Hydrogeology (the study of the interaction of water with geologic materials). Information about the programme - admission, assistantships, fellowships - may be obtained from Prof. D. V. Harris, Department of Geology, Colorado State University, Fort Collins, Colorado, U. S. A.

A Commission of Glaciology has been established at the Bavarian Academy of Sciences, with Prof. R. Finsterwalder as permanent secretary. The Commission aims to encourage glaciological research in Germany. Two assistants will be employed in an extensive programme. Geophysical and meteorological studies will be made on the Schneeferner (Zugspitze) and the Langtalerferner (near Obergurgl in the Ötztal Alps, Austria). An important objective is the determination of the relationship between the mass budget and the changes in volume as ascertained from photogrammetric measurements. In both areas long and reliable meteorological records are available. The Commission also hopes to take part in polar exploration and high mountain research.

Fast-Flowing Pamir Glacier:

High up in the mountains of Tadzhikistan near the Khaburabad Pass and less than a hundred miles from the Afghan and Chinese borders, a glacier called Medvezhiy (Bear) has begun to move at an unprecedented rate according to a report published in Izvestiya on May 29, 1963. At the urgent request of the Tadzhik Council of Ministers and the editorial board of Izvestiya a special correspondent, V. Surkov, was sent by aircraft and land vehicle to this remote region in order to investigate.

Surkov reported that the glacier had been moving down the bed of the river Vanch in this accelerated fashion for about forty days. It is now in the process of slicing off the top of a large high moraine at an average rate of 140 to 150 feet a day. This barrier is now largely overcome and the glacier has before it a steep downward slope with no obstacles. The Abdu-Kagor, an upper tributary of the Vanch, has been cut off and "dammed" by the glacier, forming a new lake at a height of 11,600 feet. The rapidly rising lake is already 260 feet deep which is giving cause for great anxiety since, if it erodes the top of the "dam", floods of ice and water will cascade down into the village of Dal'ni and carry away bridges and flood kishlaks (villages) in the Vanch valley. An ice-dam is also being laid across the Dustiroz, a right tributary of the Vanch, but the water in the lake being formed is at present being drawn off through the body of the glacier.

Great blocks of ice, the size of a motor vehicle, continually crash down from the 330 foot high leading edge of the glacier accompanied by a deafening noise. All buildings in the path of the glacier are assaulted, reduced to rubble and buried under the ice. A hydro-electric power station has been abandoned. All workers, their families and belongings have been evacuated from Dal'nii to a point 5 miles downstream. The moving glacier has also added to the difficulty of reaching important deposits of rock crystal which is mined in the area.

Surkov maintained that the situation has received insufficient attention, maybe partly because reports sent back by radio to Dushanbe had been misleading and had minimised the danger. No glaciologists were available to give the necessary expert advice; an engineer-hydrologist and the leader of a geological expedition were the only technically qualified workers there to do battle with the elements.

A report received at the beginning of June indicates that the movement of the glacier has slowed considerably. By 26 May the advance of the snout was 15m per day. Regular radio contact is being maintained with the geological party.

(Contributed by the British Embassy in Moscow)

International Glaciological Greenland Expedition: The first scientific publications of the International Glaciological Greenland Expedition (EGIG) will appear during 1963. The whole series of EGIG publications will be as follows:-

| | Volume | Section | Author |
|-----|--------------|---|--|
| I | Generalities | 1. History and performance 2. Scientific synthesis | P. E. Victor A. Bauer |
| II | Geodesy | 1. Reconnaissance 1957-58 2. Coastal geodesy 3. Astronomy 4. Geodesy of the Ice Cap | A. Bauer J. V. Helk J. Commiot W. Hofmann |
| III | Levelling | 1. Geometrical levelling 2. Barometric levelling 3. Barometric profile | H. Malzer K. Gerke B. Brockamp |
| IV | Glaciology I | 1. Speed measurements 2. The Equip Glacier 3. Ablation measurements 4. Heat balance in the ablation zone | A. Bauer " " W. Ambach |

| Volume | Section | Author |
|--------|---|------------------------------------|
| V | Glaciology II | |
| | 1. Glaciology during the 1959 campaign | M. de Quervain |
| | 2. Glaciology during the 1959/60 wintering | M. de Quervain and R. Schneider |
| | 3. Rheology | F. Brandenberger and R. Haefeli |
| | 4. Physics and chemistry | A. Renaud and others |
| VI | Meteorology | |
| | 1. Meteorology during the 1959 campaign | O. Reinwarth |
| | 2. Climatology at Station Jarl-Joset | " |
| | 3. Heat balance at Station Jarl-Joset | " |
| VII | Hydrology | |
| | 1. Morphology of the Kangerdlugssuaq Fjord | F. Nusser |
| | 2. Hydrology of the Kangerdlugssuaq Fjord | J. Joseph |
| | 3. Sedimentation in the Kangerdlugssuaq Fjord | L. Berthois |
| | 4. Foraminifera in the Kangerdlugssuaq Fjord | F. Nusser |
| VIII | Geophysics | |
| | 1. Seismic sounding | B. Brockamp and R. Arnd |
| | 2. Magnetic measurements | M. Hochstein |
| | 3. Electric sounding | M. Hochstein |
| | 4. Gravimetry | R. Hoisl |

The whole series will be published in "Meddelelser om Groenland", from København, Denmark.

New Members

New members of the Society since January 1963 are:

- Adam, David P., 2339 E. Mabel Street, Tucson, Arizona, U.S.A.
 Allen, Miss Rosalind, 8 Lathbury Road, Oxford, England.
 Baranowski, Stanislaw, Wrocław, Ul. Kotlarska 18/1, Poland.
 Bartlett, Dr. John T., Department of Cloud Physics, Imperial College, 10 Princes
 Gardens, South Kensington, London S.W. 7.
 Bengtson, Dr. Kermit B., University of Washington, Center for Graduate Study,
 1112 Lee Boulevard, Richland, Washington, U.S.A.
 Bibby, John S., c/o Soil Survey Dept., Macaulay Institute for Soil Research,
 Craigiebuckler, Aberdeen, Scotland.
 Bloch, Dr. M.R., The Negev Institute for Arid Zone Research, Beer-Sheva, P.O. Box 79,
 Israel.
 Brooks, David, St. John's College, Cambridge, England.
 Clement, Prof. P.M.C., Agrégé de l'Université Ecole Normale de Pointe à Pitre,
 Guadeloupe, West Indies.
 Fletcher, Richard J., 72 Haslingden Road, Blackburn, Lancs., England.
 Hoff, James Harold, Jr., 836 NE-170 Street, Seattle 55, Washington, U.S.A.
 Judge, Alan Stephen, c/o Geophysics Department, University of Western Ontario, London,
 Ontario, Canada.
 Kenney, T.C., Norwegian Geotechnical Institute, Forskningsveien 1, Blindern, Norway.
 Kohler, William F., 23 W. Boston, Seattle 99, Washington, U.S.A.
 Lawrence, Robert D., Box 375, Earlham College, Richmond, Indiana, U.S.A.
 McGregor, V.R., 58 Campbell Road, Onehunga, Auckland S.E. 5., New Zealand.
 Marshall, Ernest W., Department of Geology, University of Michigan, Ann Arbor,
 Michigan, U.S.A.
 Matthews, Barry, 21 Hawthorn Grove, Rodley, nr. Leeds, Yorks., England.
 Mitcell, Dr. J. Murray, Jr., Office of Climatology, U.S. Weather Bureau, Washington 25,
 D.C., U.S.A.
 Moore, D. Warren, RT-1, Timberville, Virginia, U.S.A.
 Norton, Denis L., University of California, Department of Geology, Riverside, California,
 U.S.A.
 Priebe, Ronald C., 4421 S. 168 Street, Seattle 88, Washington, U.S.A.
 Pytte, Terje, Rogstadgt, Kongsberg, Norway.
 Readings, C.J., 13 Howells Road, Exeter, Devon, England.
 Schaerer, Peter A., Haldenweg 4, Solothurn, Switzerland.
 Schwerdtfeger, Dr. Peter, Meteorology Department, University of Melbourne,
 Carlton N.3., Victoria, Australia.
 Slater, John Michael, 69 Colenso Road, Blackburn, Lancs., England.
 Smith, Daniel A., 768 Union Street, Bangor, Maine, U.S.A.
 Solly, Ian G., Fitzwilliam House, Cambridge, England.
 Stafford, Robert, 35 Dalkeith Grove, Stanmore, Middx., England.
 Whaley, William Norman, c/o Imperial College Union, Imperial College, Prince Consort
 Road, South Kensington, London S.W. 7., England.
 Whyte, Miss Anne Veronica Tennant, Girton College, Cambridge, England.
 Young, James A.T., Department of Geography, High School Yards, South Bridge,
 Edinburgh 1, Scotland.
 Zanon, Dr. Giorgio, Istituto di Geografia, Università di Padova, Padova, Italy.

THE GLACIOLOGICAL SOCIETY

c/o Scott Polar Research Institute, Lensfield Road, Cambridge, England

President: SIR V. FUCHS

Secretary: MRS. H. RICHARDSON

DETAILS OF MEMBERSHIP

Membership is open to all who have scientific, practical or general interest in any aspect of snow and ice study. Members receive the *Journal of Glaciology* free. Forms for enrolment can be obtained from the Secretary. No proposer or seconder is required. Annual subscription rates are as follows:

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| | U.S. dollars: | \$2.40 |
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| | U.S. dollars: | \$12.00 |

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

I C E

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.

