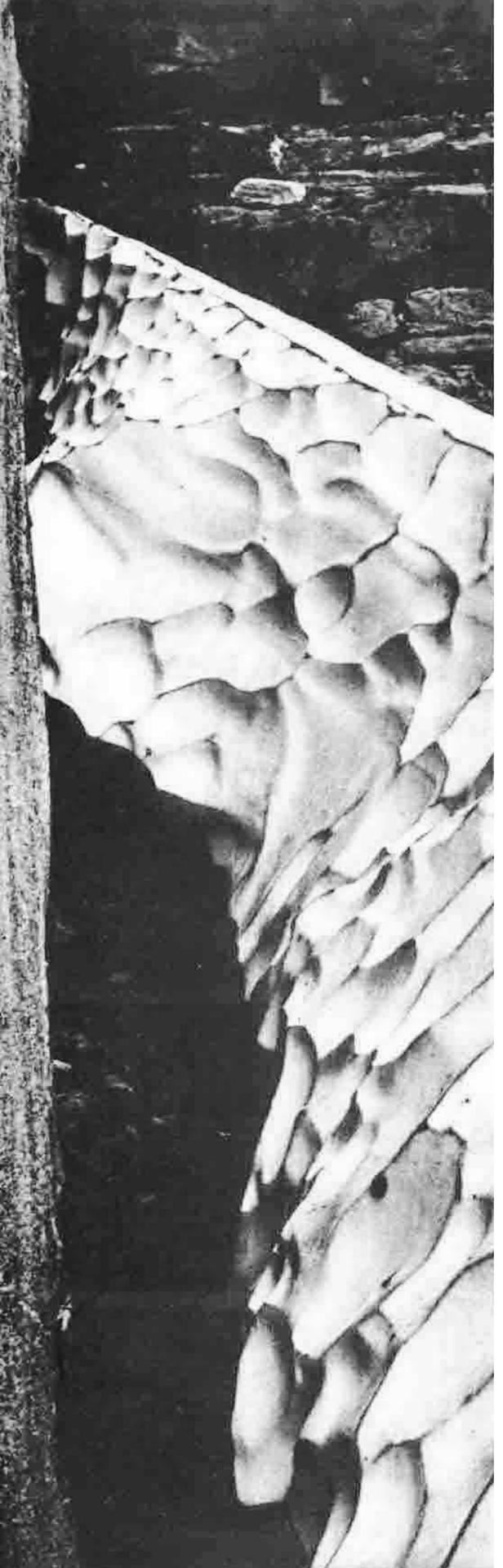


NUMBER 25 DECEMBER 1967

ICE

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH (SCAR)

International Symposium on Antarctic Glaciological Exploration (ISAGE)

organized by

the SCAR Working Group on Glaciology, with the support of the Commission of Snow and Ice (Int. Association of Scientific Hydrology)

Dartmouth College, Hanover, New Hampshire, U.S.A.

2 - 7 September 1968

Details are given on page 16 of this issue of ice

ICE

NEWS BULLETIN OF THE GLACIOLOGICAL SOCIETY

DECEMBER 1967 NUMBER 25

CONTENTS

MOVING. The Society's Library will be moved early in 1968 from Dr. G. Seligman's house in Kent to the Society's office in the Scott Polar Research Institute, Cambridge, England. The move and subsequent reorganization will mean that its contents will not be accessible to members during the first six months of 1968. Members who wish to donate reprints, reports, books, &c. to our Library are asked to note the change of address.

Now that the new extension to the Scott Polar Research Institute is complete, more room has very kindly been made available for the Society's headquarters. Members visiting us now will find us installed in a room on the middle floor of the original building instead of aloft in the gallery.

We apologize for any inconvenience to members during these moves and hope that we can make amends later.

NEW DOLLAR PRICES. As a result of the devaluation of sterling, the U.S. dollar prices which we quote have been changed. These dollar prices are never the direct equivalent of the sterling prices, as allowance has to be made for the conversion charges imposed by Banks. These are as high as 80c on most cheques, and occasionally are higher still.

1968 DUES. Reminder notices have been sent to all members apart from those who pay by Bankers' Order. £3/S8 (or £1/S3 for Junior Members) are the rates for 1968 and are due on 1 January 1968.

COVER PICTURE Polygonal melting of a firn patch, dirt on the edges. Photograph taken by H. Slupetzky, on Hohe Tauern, Salzburg, August 1960.

FIELD WORK

Reports are needed on 1967 glaciological field work (1967-68 for the Southern Hemisphere), giving experimental details and, where possible, preliminary results. Please be sure to send your report promptly and in English to the Editor, Ice, Glaciological Society, c/o Scott Polar Research Institute, Cambridge. England.

EXPEDITION GLACIOLOGIQUE INTERNATIONALE AU GROENLAND (E.G.I.G.)

The following scientific projects were carried out in 1967.

GEODESY GROUP A

K. Nottarp (IFAG) in charge.

(i) Ground survey east to west of the profile Cecilia Nunatak—Qapiarfit (tellurometer and theodolite, astronomical azimuths) linking up of the large stakes with the old stakes.

(ii) Pegging out and measurement of three pentagons of 14 km diameter at Point 420, Jarl-Joset and Crete.

(iii) Measurement of profiles (250 km total) for the Geophysics Group.

(iv) Installation of corner-reflectors and study of wave propagation in the lower levels of the atmosphere.

GEODESY GROUP B

J. Vidal (Institut Geographique National) in charge.

(i) Ground survey west to east of the profile Qapiarfit — Cecilia Nunatak (tellurometer and theodolite). This ground survey is oriented by 8 astronomical azimuths with complete astronomical points.

(ii) Pegging out and measurement of three pentagons of 14 km diameter at Carrefour, M 100 and Station Centrale. Measurement, on return, of pentagons at Point 420, Jarl-Joset and Crete.

(iii) Linking up of the big stakes with the old stakes.

GEOPHYSICS GROUP

M. Thyssen (IRAG) in charge.

(i) Gravimetric profile: BW8-DYE 2, Carrefour, then along the EGIG profile to Point 420, with links up to the west coast points G14, G 1, and Jacobshavn.

(ii) Seismic refraction at Carrefour, Crete, Jarl-Joset and Point 420; more correlation studies between the surface and the bed-rock, repeating measurements of 1959.

(iii) Magnetic measurements from Carrefour to Point 420.

(iv) Recording of a barometric profile.

(v) Thickness of the ice sounded by continuous radar between M 100 and Camp VI EGIG.

METEOROLOGY GROUP—RADIATION

Calculation of climatic data and of all the factors of the thermal budget have been carried out at Station Jarl-Joset by a team directed by O. Reinwarth and at Station Carrefour by a team directed by W. Ambach.

DATING OF OLD ICE

H. Oeschger in charge.

Extractions, in situ, of occluded air in old ice for ^{14}C and ^{32}Si datings have been made at 12 stations near Camp III and 7 at Camp IV in the ablation zone west of the inland ice. In total, 21 tons of ice have been melted. This programme was carried out in connexion with the Danish expedition for dating the ice of icebergs under W. Dansgaard.

ITALY

VARIATIONS IN ITALIAN GLACIERS DURING 1967

Winter 1966-67 saw heavy snowfalls, and thus a great deal of snow accumulated in the high basins and remained throughout the summer. Many patches of residual snow were conserved until October 1967, when the winter falls began again.

A marked retreat of snouts was again noted but the percentage of stationary, uncertain and snow-covered glaciers was high once again. The results of the 1967 glaciological survey seem to confirm the tendency of the retreat to slow down, which is typical of recent decades.

Here we report the measurements made by glaciologists on ninety-one glaciers, 90 in the Alps and 1 in the Apennines.

Variations in 1966 and 1967

	1966	1967
Retreating	70 (49%)	49 (54%)
Advancing	21 (15%)	10 (11%)
Uncertain	12 (9%)	6 (6%)
Stationary	14 (10%)	12 (13%)
Under snow	24 (17%)	14 (16%)
Total investigated	141	91

Legend: + advancing, – retreating; stat. Stationary; ? uncertain; snow = under snow.

WESTERN ALPS

Register Number	Glacier	1966 Variations in m	1967 Variations in m
1	Clapier	–2	–3
2	Peirabroc	–1.5	–2
3	Maledia	–2	–4
4	Murajon	–1	–2
5	Ciafraion	–1	–2
6	Gelas	–1	–2
40	Bessanese	stat.	–2
43	Ciamarella	stat.	–1
72	Noaschetta	—	stat.
130	Gran Paradiso	stat.	–10
132	Moncorvè	–6.6	–22
131	Monciair	–2.9	–6
148	Goletta	snow	?
155	Trayo		–?
57	Nel	–?	–?
168	Gliairetta-Vaudet	—	–4.3
180	Morion Or. le	—	—13 (since 1964)
209	Lex Blanche)	—	stat.
208	Estellette) Monte	—	–3
213	Miage) Bianco	—	stat.
235	Pré de Bar)	+6	+20
221	Toula)	+20	+20

CENTRAL ALPS

259	Tza de Tzan	–13	–15
260	Grandes Murailles	–130	–19
272	Roisette (Cian)	–?	snow
284	Tyndall	stat.	stat.
285	Cervino	stat.	stat.
286	Forca	stat.	+11
289	Valtournanche	stat.	–20 (?)
297	Grande Verra	–5	20
298	Piccolo Verra	+6	stat.
299	Castore	stat.	stat.
468	Cardonnè Or.	–15	–2
469	Cardonnè Occ.	–1	–1.5
471	Verva Maggiore	stat.	stat.
473	Dosdè Or.	–46	12
488	Mer. le di Campo	—	stat.
997	Sett. le di Campo	+6	stat.
996	Val Nera	–1	–1
439	Fellaria Occ.	–10	–7
365	Ferret	–6	–10

371	Suretta	−?	snow
367	Val Loga	?	snow
372	Orsareigls	−?	snow
408	Preda Rossa	stat.	stat.
409	Corna Rossa	stat.	stat.
388	Cedeh	—	−8.5
506	Rosole	—	−9
507	Forni	−30.5	−6.5
762	Solda	−11	−7.5
733	Lunga	−14.5	−14
732	Cevedale	−11	+3
731	Forcola	−22	−17
729	Ultima	−4.5	−5.5
483	Vitelli	−14	−25
511	Tresero Sett. le e Mer. le	−4.5	−1.5
512	Dosegù	−2	+14
516	Sforzellina	snow	+1.5
517	Lago Bianco	+47	+34
518	Gavia	snow	snow
577	Pisgana Occ.	−19	−5
581	Venerocolo	+7	+1
583	Centrale d'Avio	+23	−2
632	Carè Alto	?	snow
633	Niscli	?	−4
743	Lares	−7	−5.5
637	Lobbia	+3	+1
639	Mandron	−4	−6
640	Nardi	−8	?
644	Amola	−1.9	−2
646	Cornisello Mer.	−?	?
678	Presanella	−0.3	−7
649	Vallesinella	?	−8
650	Tuckett	?	−?
652	Brentei	?	?
653	Sfulmini	−2	−3
657	Lagol	−6	snow
655	Crozzon	snow	snow
658	Prafiori	−2	snow
659	XII Apostoli	?	?

EASTERN ALPS

973	Sorapis Or.	snow	−3
974	Sorapis Centrale	snow	−1.3
975	Sorapis Occ.	snow	−1
937	Cristallo	snow	?
963	Cresta Bianca	snow	−1.50
985	Canin Occidentale	snow	snow
984	Canin Orientale	snow	snow
983	Ursic	—	snow
980	Montasio Occ.	snow	snow
981	Montasio Or.	snow	snow

APPENINES

1006	Calderone	—	−3

JAPAN

The oversnow traverse party of 9 men, led by Dr. T. Torii, left Syowa Station in the Antarctic on 4 November, for Plateau Station, 80°S, 40°E. The party hopes to return to Syowa in the middle of January 1968. The Antarctic programmes have been planned by the Glaciological Section of the Japanese National Antarctic Committee; the Section consists of H. Oura, S. Yamamoto and T. Yoshikawa. The field work in 1967-68 has been in the hands of T. Ishida.

UNITED KINGDOM

UNIVERSITY OF ST. ANDREWS WEST GREENLAND EXPEDITION 1967

The expedition visited Upernivik Island in the Umanak region of West Greenland during the summer of 1967. Glaciological work was carried out on the accumulation region of the glacier basin at 1200 m in the centre of the island at 71° 17'N, 52° 55'W. by Dr. P. W. F. Gribbon, W. T. Band, R. H. Nisbet, and D. T. Meldrum. The capacitance and dielectric loss of glacier snow and firn were measured using an a.c. bridge powered by a transistorised oscillator, working between 150 c/s and 100 Kc/s. The capacitance and loss of two parallel wires placed on, and also within, the surface were measured for selected separations, in continuation of previous work on dielectric relaxation in temperate glaciers carried out by the University of St. Andrews 1965 expedition. These parameters were also measured for small samples placed in a parallel plate capacitor box, the samples being taken for snow of varying density and temperature. Measurements were also obtained using thin wires lowered down the walls of a crevasse. The results are being processed to give further information of the dielectric properties of snow and ice.

A small glacier, Sermikavsak, on the south-west corner of the island was re-surveyed using photographic methods. Photos taken from the fixed points of the 1957 IGY survey showed that this glacier was still receding at the uniform rate of about 30 m per year. Lichen dating carried on the glacier foreland will enable the retreat of the glacier front over the past century to be determined and correlated with plant recolonization in the foreland.

P. W. F. Gribbon

U.S.A.

UNITED STATES GEOLOGICAL SURVEY, TACOMA, WASHINGTON

International Hydrological Decade

As part of the international program to study combined heat, ice, and water balances at selected glacier stations, climatologic and hydrologic instruments were operated and field measurements were made of mass accumulation, ablation, and balance at Gulkana Glacier (Alaska Range) and "Wolverine" Glacier (previously unnamed, on the Kenai Peninsula) by L. R. Mayo, and at Maclure Glacier (Sierra Nevada) by D. R. Scully. However, the Gulkana Glacier streamflow gaging station was unexpectedly engulfed by aufeis (naled) this spring, so that the streamflow records are not complete. At South Cascade Glacier, two pressure pillows that were installed in 1966 failed to provide a continuous record of mass balance changes because of a failure of transducers and recorders. The faulty mechanisms have been replaced, and newly designed equipment will be tested during the winter of 1967-68. Three long-term air thermographs were operated under rather severe conditions, and good records were obtained throughout the winter. Complete mass and water balance information is now being obtained at the 4 basins, but heat balances are being measured only intermittently at South Cascade Glacier.

An informal field seminar was held at South Cascade Glacier during August 19 - 23. Those attending included A. Stanley and S. Outcalt, who are involved in the Canadian IHD glacier program, four meteorologists from the University of Washington, and others. Brief experiments were conducted on heat-balance measurement techniques, both on snow and water.

As part of the international program, an inventory of perennial and seasonal snow and ice in the United States was continued during the year. Detailed information was compiled on several hundred "representative" glaciers in Alaska. Vertical and oblique airphotos were obtained of several thousand glaciers from Mount Shasta to the Alaska Range.

South Cascade Glacier (North Cascades)

The usual detailed measurements of climate, mass balance, and water runoff were made in spring, summer, and fall, and long-term recording instruments for precipitation, temperature, and runoff were operated throughout the year. The balance in early May (the "winter accumulation") was about 22 percent greater than the 1958-66 average. In spite of the large amount of high-albedo material on the glacier, ablation from May through mid-September was larger than normal, because of unusually continuous warm, clear weather. Observations after mid-

September have not yet been made so the net mass balance has not been computed, but it is expected to be close to zero. Thus, the total mass exchange during 1966-67 was exceptionally large.

The distribution of summer precipitation on South Cascade Glacier was measured in 1967 at 24 small "Pluvius" gages, in addition to the 5 regular non-recording and 6 recording precipitation gages. The capacity of the "Pluvius" gages, about 35 mm, was found to be inadequate for even some of the "light" rains in this area with a highly maritime climate. An unforeseen hazard at South Cascade Glacier was the depredation of instrument shelters and supports by marmots and mountain goats, whose insatiable appetites resulted in many of the small "Pluvius" gages being overturned and/or damaged during the summer.

Randi Pytte, a glaciologist with the Norwegian Water and Electricity Board, participated in IHD and regular program work of the Tacoma office from April to September 1967. In exchange, W. V. Tangborn, of the Tacoma office, worked on glaciers in Norway from May to December.

Glaciers in the Pacific Northwest

Snow accumulation during the 1966-67 winter was above normal on most glaciers in the Pacific Northwest. At elevations between 1,000 and 2,500 m, accumulation was particularly great.

The exceptionally long, warm summer removed such quantities of snow and ice that, despite the deep snowpack, negative mass budgets were experienced by most glaciers in the Cascade Range from Glacier Peak southward to the Three Sisters Mountains of Oregon. North of Glacier Peak to the Canadian border, late-summer snow retention indicated that little or no net loss in mass occurred on many of the glaciers.

The negative mass budgets of glaciers on the volcanic peaks of Oregon for the past 3 years has apparently reduced glacier flow, as many glacier termini are now thin and relatively inactive. Thinning of some of the glaciers is also evidenced by the exposure of several years' snow at higher elevations. On Mt. Adams, the only glaciers that were not clearly retreating were Klickitat and Rusk Glaciers. On Mt. Rainier, the recent marked advance of glaciers had diminished greatly, and appreciable gains occurred only on Nisqually, Kautz, and Carbon Glaciers. Mapping of the termini showed the Nisqually to have advanced about 25 m and the Carbon about 10 m during the year. Mt. Baker's glaciers showed greater activity, with gains made by three glaciers on the south-east side and by the Coleman and Roosevelt Glaciers on the north-west side.

Southeastern Alaska

Glaciers in the Alaskan "panhandle" and in the coastal ranges farther west experienced one of the most unusual mass balance years on record. Snowfall during the winter was much less than normal, and in some areas almost nil. Summer ablation was high, presumably due to the low-albedo surfaces and many warm storms. As a result, all glaciers had negative net balances and many small glaciers were completely stripped of their snow cover.

M. F. Meier
W. J. Campbell
Don Richardson
W. V. Tangborn
Austin Post

ANTARCTICA
RADIO ECHO SOUNDING OF GLACIAL AND SHELF ICE

The Geophysical and Polar Research Center of the University of Wisconsin was responsible for the program conducted during the 1966-67 field season. Two systems were used: one electromagnetic system was loaned by the US Army Electronics Command and was used in Marie Byrd Land; the other, belonging to the University, was a transmitter and receiver manufactured by Randall Electronics, St. Albans, England (radio echo sounding equipment, Scott Polar Research Institute model mark II) and a Hewlett Packard H20 175A oscilloscope, and was used at Byrd Station, on the Skelton and Meserve Glaciers, and on the ice shelf near McMurdo Station.

(a) Byrd Station

No bottom echo was received from soundings made in the main tunnel, but two distinct reflections were observed in the top kilometre of ice at the substation. A 2.5 km wide-angle reflection profile was made to determine velocities within those top layers: average velocity, first reflector, at depth of 400 m = 190 m/μsec; average velocity, second reflector, at depth of 1 km = 172 m/μsec.

(b) Skelton and Meserve Glaciers

A transverse profile was made near Bunker Cliff to determine the shape of the underlying valley. Two detailed wide-angle reflection profiles were made along perpendicular lines by using a common reflecting point.

Two ice-thickness profiles were made in the upper portion of the Meserve Glacier for Ohio State University glaciologists, across the névé region. Work on a third profile, along the axis of the glacier, was discontinued when the generator failed. A 55 m tunnel in the base of the lower tongue of the glacier was used for attempts to

measure velocity vertically through the ice. The transmitter was placed on top of the tongue and the receiver was in the tunnel beneath it. The data proved unreliable, however, because of uncertainties about the travel path.

(c) Ice shelf near McMurdo

A 150 m profile was made on the ice shelf south of Ross Island. One wide-angle reflection was also completed, and an experiment was made to determine velocities above, on and below the firn. A team from New Zealand (Antarctic Division, DSIR) helped with this work.

Results showed that there is apparently a sharp change in ice thickness along a north-south line at 167°15 E: west of this line the ice was 40-50 m thick, east of the line it was 95-120 m thick. The wide-angle reflection profile, which was taken between White and Ross Islands, gave a velocity of 182 m/μsec.

DEEP CORE DRILLING AT BYRD STATION

The program of the US Army Cold Regions Research and Engineering Laboratory began on 20 November 1966 with the installation of the equipment. The site selected was in the main tunnel, and two holes were augered through the tunnel ceiling and the overlying snow cover for the cables, drill and drill-hole casing. The 1 inch armored cable is 3,600 m long; the hydraulic cylinder and sheave are housed in an aluminum tower 21 m high. Work was also done on the construction of a workshop, the installation of the electrical system and the plumbing system. In January, the 10-ton winch was moved into position, the 10-ton cable reel installed on it, fuel moved into the tunnel, and, at the end of the month, the tower was completed and the cylinder and cable sheave raised into position. Drilling began on 2 February and continued until 18 February, when a depth of 227 m was reached. The operation was then suspended for the season. The work was the responsibility of B. Lyle Hansen and H. T. Ueda.

KOETTLITZ GLACIER

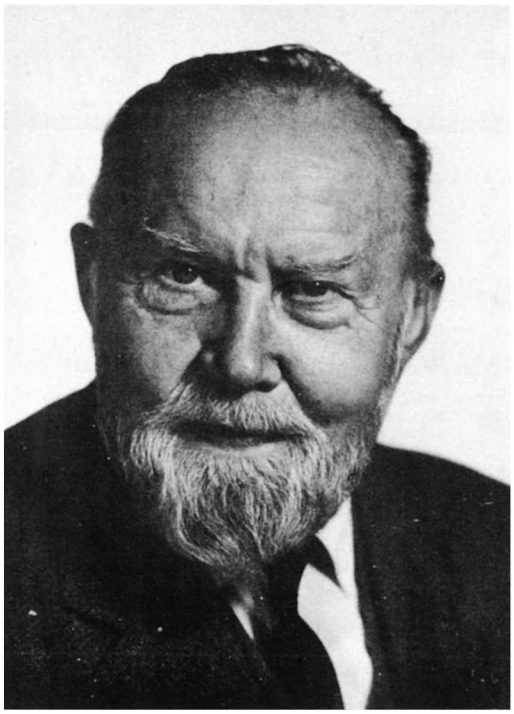
Studies, begun in November 1963, of the composition, structure and mass balance of the tongue of the glacier were completed by December 1966. The work has been the responsibility of A. Gow of CRREL. In the 1966-67 summer the work was mainly concerned with core analyses and measurements of ice flow and surface ablation. The lower half of the 60 km tongue is composed of sea ice varying in thickness from 9 to 15 m along the centerline. In the vicinity of the Dailey Islands, ablation was about 0.5 m per year, and a comparable thickness of ice appeared to be accreting annually on to the bottom of the ice tongue. Movement of the tongue is about 5-10 m per year. It is calculated that it would therefore take less than 50 years for the bottom ice to reach the surface and that as the ice tongue traverses the last 30 km to the terminus it would reconstitute itself at least fifty times. There is an accompanying increase towards the terminus in surficial debris, originally frozen on to the bottom of the glacier.

BYRD STATION: ACCUMULATION AND SNOW CRYSTAL NUCLEI

Stakes placed on the surface near Byrd Station show that accumulation is higher in the depressions than on the crests. Although the depressions might be expected to fill in about 50 years at the present rate of accumulation, observations show that they are probably migrating across the surface and thus perpetuating themselves.

Studies on the abundance and composition of nuclei in freshly precipitated snow crystals show that about 50% of those crystals contain solid-particle nuclei, mostly composed of clay.

The chief investigator is A. Gow (CRREL).



JON EYTHORSSON

Jón Eythórsson, Iceland's pioneer geologist and its first meteorologist, was born on the farm Thingeyrar in Húnavatnssysla, Northern Iceland, on 27 January 1895, son of a farmer. He matriculated from the "gymnasium" in Reykjavik in 1917, studied natural science at the University of København 1917-1919 and then went to Norway and got his cand. mag. degree at the University of Oslo in 1923. During the years 1921-1926 he worked as a meteorologist in Bergen, partly at the Weather Bureau (Værvarslingen), partly in the Geophysical Institute (Geofysisk Institutt). These were just the years when V. Bjerknes and his assistants at the Geofysisk Institutt, T. Bergeron, J. Bjerknes and H. Solberg, were laying the foundation of modern synoptic meteorology ("The Bergen School"). And during these years a young Swedish geographer, H. W. Ahlmann, started his studies of glacier regime in Jotunheimen. He needed the co-operation of a meteorologist, and Eythórsson became his colleague during the summers 1924-1926. Together he and Ahlmann built the first high alpine meteorological station in Norway, on the summit of Fanaraken (2070 m above sea level) in the massif. They had to carry the timber and the scientific equipment on their backs or haul it on strings to the summit.

In 1926 Eythórsson returned to Iceland. From then until 1963 he worked as a meteorologist in the Weather Bureau in Reykjavík. This job was certainly a full time one and at times even more than that, yet his work in other fields was a full time job, too—or would have been for most people. Eythórsson was one of the pioneers of the Icelandic Broadcasting Company and one of its most popular lecturers in the 1930s. He has been on the board of the Icelandic Tourist Association since 1932, and was its president for five years and the editor of its yearbook since 1944, writing two of them completely. He has also written a great number of articles in periodicals and newspapers, translated many books and edited others.

But his most important scientific work lies within the field of glaciology and climate history. In 1930 he began systematic observations of the position of glacier fronts in Iceland, examining that summer the outlet glaciers of Myrdalsjökull, Eyjafjallajökull, Tindfjallajökull and Snæfellsjökull, and building cairns in front of them. The number of glacier tongues observed annually rapidly rose during the following years and since the middle of the 1930s the longitudinal variations of most glacier outlets in Iceland, both coastal and inland ones, have been measured by Eythórsson

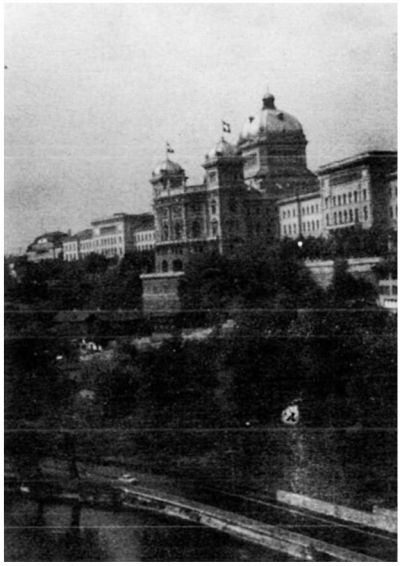
and his voluntary assistants. As some of these glaciers are very difficult to reach, this is a most creditable performance. In 1935 Eythórsson published an important paper on glacier variations: On the Variations of Glaciers in Iceland I. Drangajökull, Geogr. Ann. Stockholm, Vol. XV. In a later paper, Temperature Variations in Iceland, Geogr. Ann. Vol. XXXI, 1949, he treated the recent climatic ameloriation in Iceland. Together with his friend Ahlmann he organized and led the Swedish—Icelandic Vatnajökull expedition in 1936, which laid the foundation for the present knowledge of the regime of this vast plateau of ice and its outlets. In 1951 he organized and led, together with French geophysicists, the Icelandic-French Vatnajökull expedition, which mapped the thickness of Vatnajökull by seismic soundings. He has also led a number of smaller expeditions to Myrdalsjökull and Vatnajökull. During the last decade he has followed, mainly from air planes, the changing position of the drift ice border off the coasts of Iceland and published annual reports on these changes. In 1950 Eythórsson founded the Iceland Glaciological Society and has been its president and chief editor of its periodical Jökull since then. No one has really dared to think about what will happen to this Society when he is no longer able to lead it. He has succeeded in inspiring with enthusiasm a surprisingly large group of men and women from all kinds of professions: bus drivers, engineers, carpenters, teachers, for example, who have spent most of their leisure time for the last 15 years building huts for the Society's stations at Jökulheimar and Grímsvötn, driving vehicles and assisting in the glaciological research work in many other ways. All these volunteers have it in common that they adore their old leader.

In recognition of Eythórsson's outstanding pioneer work in the glaciological field the Iceland Glaciological Society unveiled a bust of him in the Society's main hut at Jökulheimar on 16 September 1967.

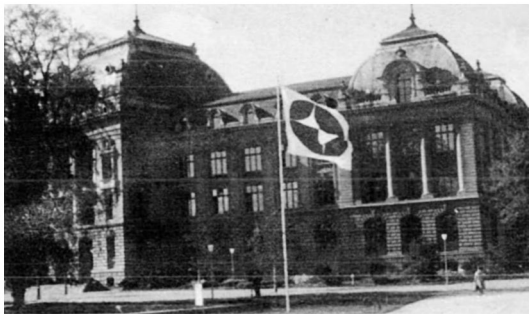
PROFILES IN ICE

No. 5, Jan. 1960	Richard Finsterwalder (President, Comm. Snow and Ice)
No. 6, July 1960	Gerald Seligman (President, Glaciological Society)
No. 7, Jan. 1961	Robert P. Sharp
No. 8, July 1961	Robert Haefeli
No. 9, Jan. 1962	Hans W: son Ahlmann
No. 10, July 1962	Petr A. Shumskiy (President, Comm. Snow and Ice)
No. 11, Jan. 1963	W. H. Ward (Secretary, Comm. Snow and Ice)
No. 12, July 1963	Valter Schytt
No. 13, Dec. 1963	Henri Bader
No. 14, Apr. 1964	Sir Vivian Fuchs (President, Glaciological Society)
No. 15, Aug. 1964	Marcel de Quervain
No. 16, Dec. 1964	Herfried Hoinkes (President, Comm. Snow and Ice)
No. 17, Apr. 1965	Fritz Loewe
No. 18, Aug. 1965	Geoff Hattersley-Smith
No. 19, Dec. 1965	Bert Crary
No. 20, Apr. 1966	Z. Yosida
No. 21, Aug. 1966	John Nye (President, Glaciological Society)
No. 22, Dec. 1966	Bill Field
No. 23, Apr. 1967	L. Lliboutry
No. 24, Aug. 1967	Max Perutz
No. 25, Dec. 1967	J. Eythórsson

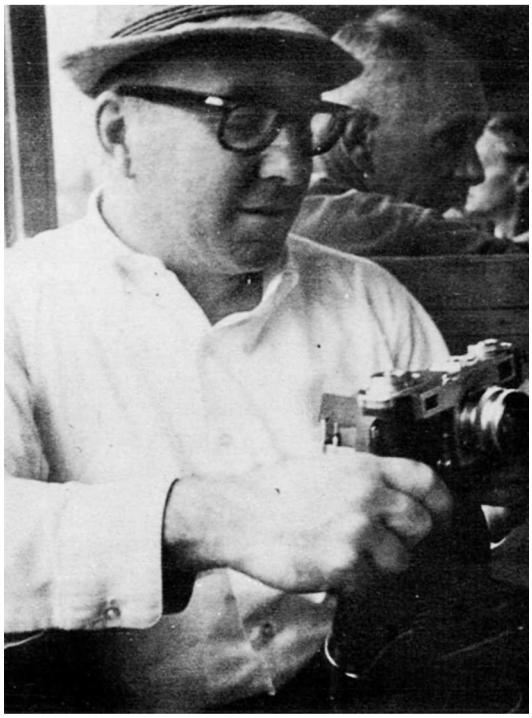
SWISS INTERLUDE



During the last week-end of September, 1967, glaciologists left the beautiful city of Berne and the busy sessions of the IUGG Congress

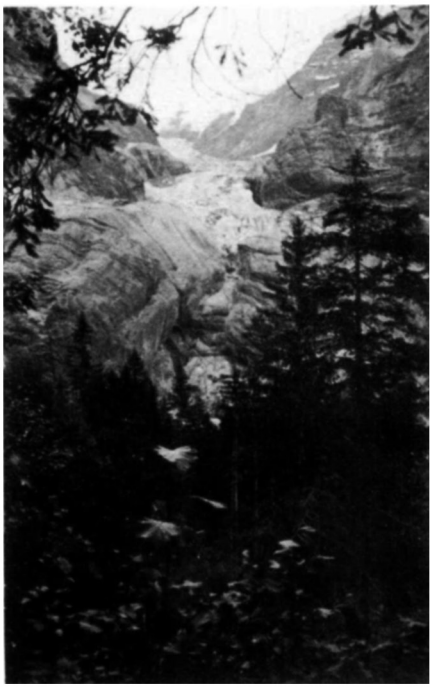


and went on a Glacier Tour —



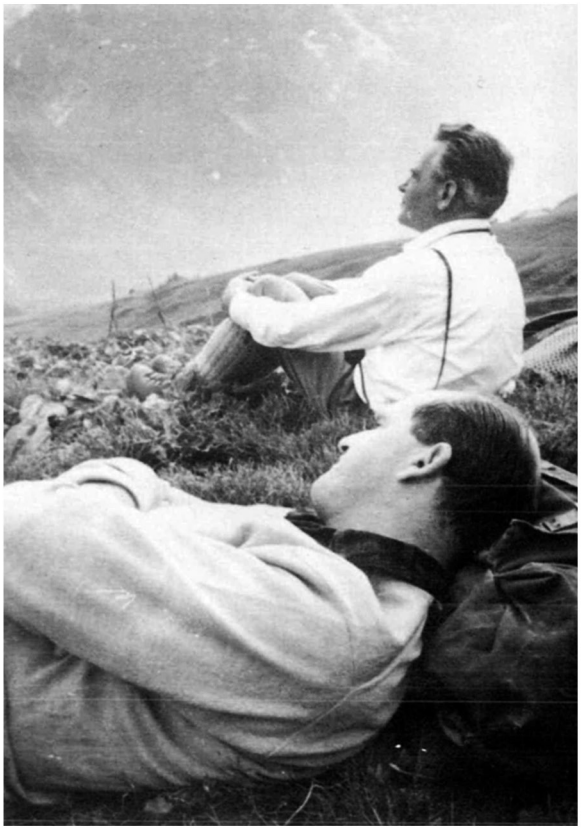
cameras at the ready.

Walking across beautiful alps, and
absorbing local colour.



some of us examined
the advancing
Oberer Grindelwaldgletscher.

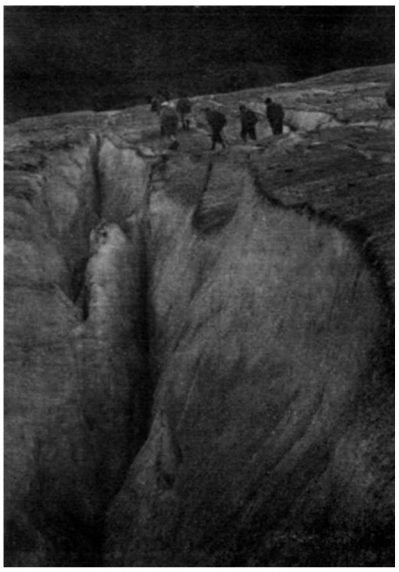
We gazed contentedly



at the exciting views of

the Unteraargletscher, and even disputed

heatedly about problems



on the Aletschgletscher.

But more frequently the long walks
in hot sunshine

made us concentrate
on food and drink.

(Photographs by M. M. Prebble, H. Richardson, W. F. Weeks)

MEETINGS

THE GLACIOLOGICAL SOCIETY

REPORT ON THE SECOND ANNUAL MEETING OF THE NORTHEASTERN NORTH AMERICAN BRANCH

An enthusiastic group turned out for the second annual meeting of the Branch held on 28 and 29 October at Carleton University, Ottawa, Ontario, which was admirably arranged by Dr. Peter Johnson, Department of Geography, Carleton University, and Dr. E. Fred Roots, Polar Continental Shelf Project. Carleton University and the Department of Mines, Energy and Resources very generously provided meeting rooms, transportation facilities and the annual cocktail party.

The following papers were read and discussed with considerable vigor:

R. A. Ragle: Field report on the Icefield Ranges Research Project, 1967.
D. Nelson: Investigations of radio echo sounding of glaciers in the Icefield Ranges of the St. Elias Mountains.
J. K. Sedgewick: Historic records of Peyto Glacier, Alberta.
R. M. Koerner: Fabric analysis of an ice core from the Meighen Ice Cap, Canada.
P. J. Morgan: Photogrammetric measurement on the Hoseason Glacier, Kemp Land, Antarctica.
A. W. Kovacs, W. F. Weeks, F. Michitti: Variations of some mechanical properties of polar snow with depth, Camp Century, Greenland.
F. Müller: Glacier surface movement, White Glacier, Axel Heiberg Island, N.W.T.
K. Arnold: Possible movement on a thin polar ice cap.
L. A. Brayrock: Steele Glacier surge: incorporation of dead ice.
M. P. Langleben: The albedo of melting arctic ice.
S. L. Dingman, W. F. Weeks, and Y. C. Yen: The effects of thermal pollution on river ice conditions.
E. R. Pounder and O. M. Johannesen: Ice drift in the Gulf of St. Lawrence.
J. Brown: Calculation of ground ice volumes, Northern Alaska: a first approximation.
S. J. Jones: The effect of HF on the mechanical properties of ice crystals.
N. Maeno: A concept on the nucleus of Tyndall Figures in ice crystals.
W. Dort and E. F. Roots: Firn ice relationship on Sandy Glacier Antarctica.
J. T. Andrews, R. G. Barry, M. Drapier: Preliminary report on the distribution of snowbanks, corrie glaciers, mountain glaciers and unoccupied corries in two contrasting areas of east Baffin Island, N.W.T.
A. Stanley: Program of the Glaciology Section, Inland Waters Branch.
R. M. Koerner: Determination of accumulation by stratigraphic methods in the firn at Plateau Station, Antarctica.

Session chairmen were Dr. W. O. Field, Dr. H. Bader, Dr. W. S. B. Patterson, Miss Moira Dunbar, Dr. E. R. Pounder and Dr. G. Hattersley-Smith.

The evening program consisted of a banquet of the gourmet quality by which the Branch hopes to typify its activities, the presentation of the Seligman Crystal to Dr. Henri Bader by Dr. W. F. Weeks on behalf of the President of the Society, Dr. J. F. Nye, and the presentation to Dr. W. A. Wood by Dr. E. F. Roots of a medallion struck by the government of the Yukon Territory and the Alpine Club of Canada to commemorate Dr. Wood's long association with the St. Elias Mountains and the Steele Glacier and his role in the Alaska-Yukon Border Centennial Celebration.

Dr. E. F. Roots assumed the office of President for 1968; Dr. E. R. Pounder was elected to the Vice-Presidency and C. M. Keeler continued as Secretary-Treasurer.

BRITAIN

13 October 1967, Birmingham University:
C. A. and N. C. Knight—Hailstone structure studies.
27 October 1967, Bristol University:
(Joint meeting with University Geographical Society)
M. M. Prebble—New Zealand's role in the Antarctic.
16 November 1967, Birmingham University:
(Joint meeting with the Lapworth Society)
M. M. Prebble—New Zealand research in the McMurdo Sound area of Antarctica.

FUTURE MEETINGS

INTERNATIONAL SYMPOSIUM ON ANTARCTIC GLACIOLOGICAL EXPLORATION

The International Symposium on Antarctic Glaciological Exploration (ISAGE) will take place between 2 and 7 September 1968 in Dartmouth College, Hanover, New Hampshire, U.S.A. The symposium, staged by the SCAR Working Group (WG) on Glaciology with the support of the Commission of Snow and Ice (IASH), will cover the following broad fields of Antarctic research:

(a) glaciological techniques (geochemical, geophysical, geothermal, cores etc.)
(b) ice sheet dynamics
(c) ice sheet heat and mass balance
(d) ice shelves
(e) sea ice
(f) glacial meteorology
(g) related quarternary studies.

The title and a brief summary of each paper for the symposium should be submitted in duplicate through national SCAR committees, who will send one copy to the WG secretary (Dr. U. Radok, Meteorology Department, University of Melbourne, Parkville, Vic. 3052, Australia) and the second copy to the Secretary of SCAR **not later than 1 March 1968.** In general the authors will be expected to present their papers in person. A definite selection of papers and final programme arrangements will be made on the basis of extended abstracts which must reach the WG secretary **before 1 May 1968.**

A First ISAGE Circular with full details of the symposium will be issued shortly through national SCAR committees and other channels. Enquiries concerning the symposium should be directed to the WG Secretary (Dr. U. Radok) and/or the Chairman of the Local Organizing Committee, Dr. John B. Lyons, Department of Earth Sciences, Dartmouth College, Hanover, N.H. 03755, U.S.A.

GLACIOLOGICAL DIARY

1968

24 - 31 January
Australian & New Zealand Assocn. for Advancement of Science, congress. Christchurch, N.Z. (R. H. M. Langer, Lincoln College, Christchurch, New Zealand.)

16 - 19 April
Symposium on the remote sensing of environment. University of Michigan, U.S.A. (Dana C. Parker, University of Michigan, Willow Run Laboratories, P.O. Box 618, Ann Arbor, Mich. 48107, U.S.A.)

6 - 8 June
Symposium on surging glaciers. Banff, Alberta, Canada. Sponsored by Univ. of Alberta and National Research Council. Topics include glacier flow, geomorphological effects, hydrology of glacial surges. (C. M. Lockwood, Dept. of Extension, Univ. of Alberta, Corbett Hall, Edmonton, Alberta, Canada.)

19 - 28 August
International Geological Union, congress. Prague, Czechoslovakia. (Int. Geological Congress, 23rd Organizing Committee, Malostranske namesti 19, Praha, Czechoslovakia.)

2 - 7 September
SCAR Working Group on Glaciology—International Symposium on Antarctic Glaciological Exploration. (With support of Commission of Snow and Ice, IASH.) Dartmouth College, Hanover, New Hampshire, U.S.A. See page 16 of this issue of Ice for details.

11 - 13 November
Geological Society of America, annual meeting. Mexico City. (GSA HQ, 231 E 46th Street, New York, N.Y. 10017, U.S.A.)

1969

30 August - 5 September

International Union for Quaternary Research (INQUA), VIII Congress. Paris, France. Excursions and symposia before and after the congress. (INQUA Secretariat, Institut de Géographie, 191 rue Saint-Jacques, Paris 5, France.)

7 - 13 September

Glaciological Society, symposium on the hydrology of glaciers. (Jointly sponsored by the Society and the Commission of Snow and Ice, IASH.) Cambridge, England. (Mrs. H. Richardson, Glaciological Society, c/o Scott Polar Research Institute, Cambridge, England.)

1971

Pacific Science Association, congress. Australia. (Geography Chairman: Akira Watanabe, Dept. of Geography, Ochanomizu Univ., Bunkyo-ku, Tokyo, Japan. Meteorology Chairman: J. F. Gabites, Director, Met. Service, P.O. Box 722, Wellington, New Zealand. Solid Earth Sciences Chairman: W. H. Mathews, Dept. Geography, Univ. of British Columbia, Vancouver 8, B.C., Canada.)

NEWS

AWARDS

Dr. Henri Bader was awarded in September 1967 the Seligman Crystal of the Glaciological Society. A report will appear in the Journal of Glaciology in 1968.

Dr. John Ross Mackay was awarded the 1967 Massey Medal of the Royal Canadian Geographical Society for his distinguished contribution to knowledge of the physical geography of Canada, in particular the influence of glaciers on land form.

Dr. W. A. Wood was presented in October 1967 with a medallion struck by the government of Yukon Territory and the Alpine Club of Canada to commemorate his long association with the St. Elias Mountains and the Steele Glacier and his role in the Alaska—Yukon Border Centennial Celebration.

NEW ZEALAND: FOX GLACIER

For no very obvious reason, the Fox Glacier has received comparatively little attention from glaciologists although it is no less accessible and not many miles distant from the better known Franz Josef. Generated from adjoining icefields flanking the loftiest parts of the Southern Alps, both glaciers descend repidly north-westwards more than 1100 m to altitudes of less than 300 m, and both have conformed to the general world-wide pattern of glacier shrinkage and downwasting during the first half of this century. Late in 1963, when both were pathetically reduced, and local despondency at its deepest, the Fox Glacier raised hopes by rapidly thrusting its snout forwards a few metres, thrusting over dead ice and moraine. No one seems to have noticed the slight wave of thickening which must have preceded this temporary advance. Naturally, the Franz Josef Glacier was watched closely for signs of a sympathetic response, but although shorter and on the average steeper, the Franz Joseph showed no corresponding thrust at this stage, and it may therefore be inferred that the Fox advance had some local or special origin. Before long, however, pilots making regular ski-plane landings on the Franz Josef névé were reporting consistently higher altimeter readings while on the snow and obvious thickenings of the Fox ice below the névé. About July 1965 a wave rapidly arrived at the Franz Josef snout, which thickened suddenly and advanced at rates initially as much as 1.3 m/day. Having now reached a wider and generally flatter part of the valley, its rate of progress has reduced to above 0.3 m/day but the advance is being maintained despite calamitous losses of ice

by melting and collapse during warm rainy periods, and it continues to thicken. The total gain since the advance began is about 400 m.

The Fox advance began in June 1965, and although slower it has continued steadily. By August 1967 it had advanced 120 m and gained 66 m in height at the snout, and the rate is reported to be increasing. In February and March of 1966, Dr. D. V. Harris, a visitor from Colorado State University, Fort Collins, assisted by Westland National Park staff, measured surface flow-rates of up to 1.5 m/day and surface ablation of 0.12 m daily at about 180 m up from the snout of the Fox.

Debris covered mounds of dead ice are now being overridden and forced downstream at the same time. In the view of the Park rangers, pressure ridges of old ice are heaving up and shedding their former debris cover while buried dead ice beneath the river bed is affected by the pressure for a distance of several hundred metres downstream from the active snout. This may be the case, though one may doubt the ability of dead ice to transmit a compressional thrust over such a distance. The visible disturbances of the more distant parts of the buried ice may be the continuing effects of melting and collapse which still cause fresh sinkholes to appear and undermine the valley-side debris so as to make it difficult to maintain any kind of vehicular access to the active snout. Moreover, the apparent unheaving of old ice may be partly relative, a consequence of the general lowering of the river bed through melt-out of dead ice. Repeated level surveys would have helped to settle this question. On the other hand, observations relative to markers on the trough wall and the burial of a former camera-post alongside the glacier opposite the position of the snout when readvance commenced combine to show a build-up of some tens of metres thickness of very coarse unsorted but essentially water-deposited debris on the true right hand side of the valley. Most of the build-up occurred during short periods of high-intensity rainfall of a few hours' duration earlier this year, which also caused a similar amount of aggradation by the Waiho River for several kilometres below the snout of the Franz Josef Glacier.

Similarly impressive bursts of upbuilding have occurred previously, and have been followed in ensuing months by steady downcutting by the river, lateral planation and the production of sets of terraces for which in other settings a guess of Pleistocene age might have been pardonable. Even to the New Zealand geologist, compelled in his experience to accept the reality of major geological changes having happened in a short time, such demonstrations of greatly accelerated geomorphic tempo are none the less amazing and instructive.

The trough walls flanking the Fox Glacier and the Fox River downstream from the snout are highly unstable, shedding frequent rockfalls and debris avalanches especially in wet weather. While this is by no means a new situation, and in fact generally understandable in view of the fractured nature of the schist terrain, weakness especially of the upper slopes does seem to have intensified recently, and the hazards of travelling on the valley floor have increased. It is true that shrinkage of the glacier during the past 200 years, and especially during the past 60 years, has withdrawn former ice pressures from the lower trough walls. At the Franz Josef Glacier there have indeed been indications of delayed strain effects of the rapid unloading of hundreds of metres thickness of ice from the trough floor in a few years (ICE, No. 20, April 1966, p. 26). Though visibly unstable, the rock walls of the lower Fox trough have an established vegetation cover both below and above the prominent 1750 A.D. trimline (Lawrence and Lawrence, MAZAMA, Vol. 47, No. 13, p. 17-27, 1965), and the severely fractured rock appears in no condition to have retained pent-up unloading stresses for two centuries. Lowering of the Fox river-bed downstream from the snout at its maximum retreat position in 1963, following melting out of buried dead ice, has unquestionably affected the stability of the fringing apron of fan material, moraine and other debris that has accumulated since the ice retreated; but many of the rock falls are coming mainly from upper slopes, which presumably would not be affected by slight weakening of lateral support at the base. If the apparently increased instability is real, the explanation must be sought in another direction.

I am greatly indebted to Mr. Jim Taylor, Head Ranger at Fox Glacier, for refreshing my memory of the events at Fox Glacier, and for supplying additional information. I should also add that Mr. Taylor has kept a regular photographic record of changes at the glacier snout.

Maxwell Gage

Department of Geology,
University of Canterbury, New Zealand.

Photo — Jim Taylor

The instability of the trough walls at the side of the Fox Glacier can be seen in the slumping on the righthand side of the picture and in the very active, steep debris fans towards the bottom left corner of the picture.

JAPAN: AN ARTIFICIAL GLACIER

In the spring of 1967 a project on the artificial production of a valley glacier was started at the Water Research Laboratory, Nagoya University. The Project leader is Prof. K. Higuchi. In Japan, there is no valley glacier, but firn fields are found in the high mountain areas of central and northern Japan. In 1962 and 1963, Toyama University Science Research Organization did some glaciological work on a firn field at 2750 m above sea level in the Tateyama Mountains (36° 36'N and 137° 37'E). Prof. Z. Yosida, Director of the Institute of Low Temperature Science, Hokkaido University, took part in the work and reported that the density of firn ice was higher than 0.8g/cc and the age of the firn ice was estimated as 15 years from the number of layers seen in the vertical section of the firn. The artificial production of a valley glacier by Prof. Higuchi will be developed from the firn mentioned above, through an artificial control such as increased accumulation of snow and reduced melting in the firn area. The main purposes of this project are to study the progressive changes from firn to a glacier as existed in the ice age, and also to examine whether or not the valley glacier can be used as a reservoir of water.

Snow accumulation in the firn area during the winter season may be increased by the following methods: In the firn area near the mountain ridge, drift fences may be effective in altering the deposition pattern of wind-borne snow. As the ridge near the firn area is broad, deposited snow can be brought from the surrounding area with a grader or a bulldozer. Snow accumulation may also be increased by generating snow avalanches with explosives; snow from the sides of the valley will then converge on the firn area at the bottom of the valley.

Snow melt can be reduced by covering the firn surface with insulating materials such as plastic sheets. Selection of a method for the control of snow accumulation and melt will be dependent on the characteristics of the firn area.

Prof. Higuchi surveyed the areas around the Tateyama Mountains firn in the spring of this year. According to his plan, three years will be needed for the collection of glaciological data on the firn, before the methods of artificial control can be selected and applied.

Z. Yosida

U.S.S.R.: PROJECTED NEW GLACIOLOGICAL CENTRE

The proposal has been made, and a Committee appointed to look into it, that an Institut Kriologii Zemli [Institute of Cryology of the Earth] be established under the wing of the Academy of Sciences' Otdel Nauk o Zemle [Earth Sciences Department]. Such an Institute, if created, would include all aspects of ice study: in particular, the nucleus would be the present glaciology section of the Institut Geografii, containing such people as Avsyuk, Shumskiy, Grave and Kotlyakov, and the Institut Merzlotovedeniya at Yakutsk. There would be a journal, called perhaps **"Kriologiya Zemli".** The creation of the Institute is, however, by no means certain. Further news will be given when available.

T. E. Armstrong

PERMAFROST INSTITUTE, YAKUTSK

The Permafrost Institute at Yakutsk has a number of major projects in hand, of which two may be of special interest to non-Soviet scientists. One is that a party from the Institute is at present working in the Mongolian People's Republic, by arrangement with the latter's Academy of Sciences, to produce a permafrost map of that territory. The other is that a new permafrost map of the USSR itself is in preparation, to be published at a scale of 1:5 million. This will show much finer detail than anything yet available.

T. E. Armstrong

CANADA: PERMAFROST MAP

A new permafrost map of Canada in colour has just been published jointly by the Division of Building Research of the National Research Council of Canada and the Geological Survey of Canada, Department of Energy, Mines and Resources. Information on the distribution and occurrence of permafrost in Canada collected by Dr. R. J. E. Brown (of DBR/NRC) during fourteen years of research and field work is plotted on the map. The extent of the continuous and discontinuous permafrost zones and the occurrence of permafrost at high elevations in the western mountains are shown. Ground temperatures and thickness of permafrost at 24 stations are included. Isotherms of mean annual air temperature, and the physiographic regions show the relation of permafrost distribution to climate and terrain, respectively.

Explanatory notes on the definition of permafrost, distribution and occurence, physical factors influencing permafrost and a bibliography of source information are printed on the map. The scale is 1:7,603,200 and the single sheet measures approximately 40 in. by 30 in. This map is a first edition and will be reissued as new information becomes available. Copies of the map may be obtained at a cost of 50c, either from the Division of Building Research, National Research Council, Ottawa, Canada (published as NRC 9769) or the Geological Survey of Canada, Department of Energy, Mines and Resources, 601 Booth Street, Ottawa, (published as Map 1246A).

THE SOCIETY'S LIBRARY

WORKS RECEIVED SINCE JUNE 1967

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:

Autenboer, T. van (2 items)
Brown, R. J. E.
Gold, L. W.
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c/o Scott Polar Research Institute, Lensfield Road, Cambridge, England

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Secretary: Mrs. H. Richardson

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(The dollar rates include Bank conversion charges)

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

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I C E

Editor: Mrs. H. Richardson

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