NUMBER 21

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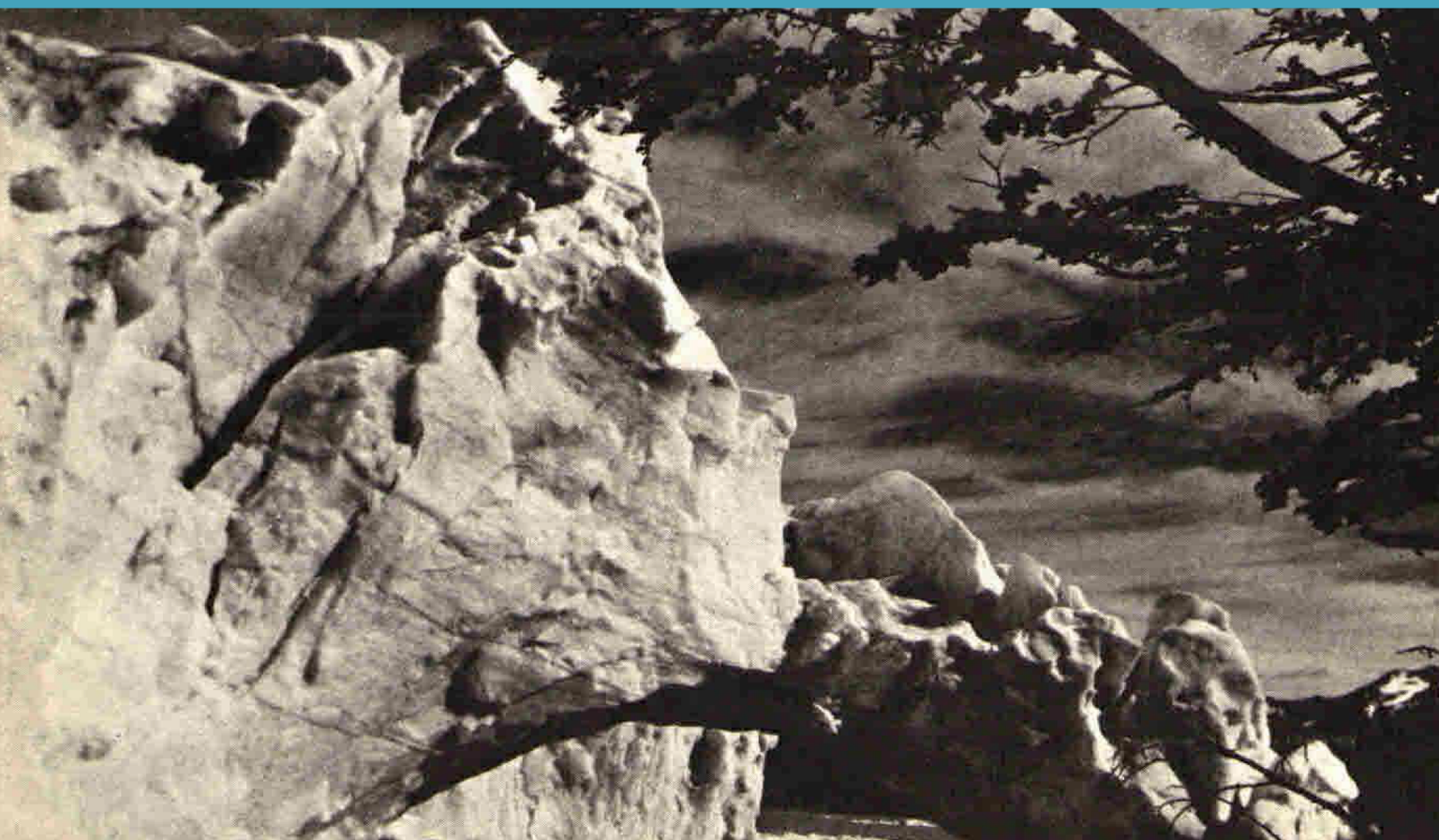
ICE



GLACIOLOGICAL SOCIETY

PRELIMINARY ANNOUNCEMENT

The Glaciological Society proposes to hold a symposium in Cambridge, England, in September 1969.

The Commission of Snow and Ice has suggested that a suitable topic would be the hydrology of glaciers.

Further details will be given in future issues of Ice.

ICE

NEWS BULLETIN OF THE GLACIOLOGICAL SOCIETY

AUGUST 1966 NUMBER 21

CONTENTS

RESEARCH AND EDUCATION FUND. Members' attention is drawn to the statement on page 6 of this issue.

ADDRESS LIST. The new list has been mailed to members with this issue of Ice. The Secretary will be grateful if members will check their entry and also if they can provide further information on those entries for which no current address is available.

NORTHEASTERN NORTH AMERICA BRANCH. Notice of the first annual meeting is given on page 8 of this issue.

We are sorry to report the sudden death of Professor S. E. Hollingworth, Yates-Goldsmid Professor of Geology at University College, London since 1946. An obituary will appear in the Journal of Glaciology.

COVER PICTURE. Photograph, taken by John H. Mercer, of the snout of Moreno Glacier, which calves into Lago Argentino, Patagonia. The glacier is slowly advancing, damming Lago Rico, which periodically breaks through the ice dam. The photograph was taken during the early stages of such a break in February 1966; the arch lasted about one hour.

FIELD WORK

AUSTRALIA

During 1965 work has been continued at the Australian Antarctic bases Mawson and Wilkes by the glaciologists of the A.N.A.R.E.

WILKES

The major study is the dynamics of the 200 km diameter local ice cap. Movement stakes and strain grids were established around one sector of the dome by a tellurometer and theodolite traverse by Allen McLaren. This stake system was remeasured after 8 months to give the first ice movement and strain rates over the area. Associated measurements include barometric levelling and vertical theodolite angles for elevation, seismic and gravity readings for ice thickness, and accumulation rates and prevailing wind directions. This programme is being continued and extended during 1966.

Routine annual measurements of compaction and contraction in the deep (35 m) pit and tunnel at S2 were carried out, and a new density depth profile was determined.

MAWSON

Two complete surface heat budget stations were established — one on the blue-ice plateau and the other on the sea ice. The equipment was developed at the University of Melbourne Meteorology Department and set up and maintained at Mawson by Gunter Weller to measure: low level height profiles of air temperature, humidity, and windspeed; the radiation over the surface; the temperature, conductive and radiative heat flux profiles with depth in the ice; and the ice ablation rate. In addition, on the sea ice an automatic sea ice thickness recorder was developed to give detailed ice growth rates.

The full year's measurements are now being analysed to determine completely closed mass and energy budgets for each of the localities.

The station over the blue-ice is being continued during 1966.

W. Budd

FRANCE

TERRE ADELIE

The 15th French Expedition, Expéditions Polaires Françaises, worked in the coastal area (66°40′S, 139°01′E) during the 1965-66 season. Two corings, of 98 m and 105 m, were made in ice, and one of 106 m in firn. Various samples of snow, firn, ice and air were taken. Measurements were made of deformations, density, resistivity, gas content, temperature, isotopic concentration. Crystallographic studies were also undertaken.

The deep drilling was performed with a Craelius drilling machine (type XCH 60, special cutting tools) and a Spiros air compressor (type CG2, 4700 l/min, 7 kg/cm²).

Preliminary results: core recovery was about 87%. From isotopic content (deuterium) it was deduced that the ice flowing into the coastal area originated not more than 100 km inland. The pattern of ice flow from the plateau to the coast was worked out.

C. J. Lorius

REPUBLIC OF SOUTH AFRICA

ANTARCTIC GLACIOLOGICAL PROGRAMME 1962-63-64-65

A long-term glaciological research project planned for the South African National Antarctic Expeditions to western Dronning Maud Land began during May 1962. Networks of geophysical-glaciological traverse lines and stake patterns erected in the vicinity of SANAE Base and observations along the oversnow route on to the inland ice form the basic framework of the glaciological study of the Fimbul Ice Shelf, the hinge area and its continental hinterland.

All of the glaciological measurements, apart from the tellurometer strain levelling projects and stellar observations, were made by the expedition geologists while wintering-over at SANAE and during the summer geological field work. Maintenance and measurement of the stake patterns established by the Norwegian IGY-Expedition and the 1st and 2nd South African Expeditions at Norway Station were maintained and measured. Of these latter stakes, the Lunde network established during 1957 represents one of the very few Antarctic surface accumulation stake patterns which has been maintained and measured continuously up to the present day.

Further information may be obtained from Dr. D. C. Neethling, Geological Survey, P.O. Box 401, Pretoria, South Africa.

D. C. Neethling

SWITZERLAND

ANNUAL SURVEY OF GLACIERS

Autumn 1965 was characterized by very early snowfalls, and 88 of the 105 glacier tongues were measured. About a quarter of these showed advances, but in some cases the "advance" was due to firnification of snow below the old snout. The year was notable for low firn lines and small ablation totals, indeed some small glaciers were never free of snow.

JUNGFRAUJOCH ICE CAP

The mean accumulation measured along a transverse profile across the ice cap was 1.05 m.

In order to measure the mass balance of the ice cap during the International Hydrological Decade, a photogrammetric survey of the surface was made on 21 September 1965.

An outbreak of water into cross-tunnel Q100 occurred in the night of 20-21 July 1965. Water emerged from a hole about 100 cm^2 in area, and an estimate of the quantity yielded 260 m^3.

SPECIAL GLACIOLOGICAL STUDIES

Steinlimmigletscher. The avalanche reported last year (Ice, No. 18, p. 7) was repeated in the Spring of 1965 on a rather smaller scale. Whereas ablation in the previous year at the glacier tongue had been about 8 m, in 1965 it was only 3.0 m, or about half the long-period mean. Daily ablations varied considerably and one can distinguish three periods: 17 July—19 August with mean ablation 5.63 cm/day; 19 August—2 October with 1.78 cm/day; and 2 October—28 October with 1.44 cm/day.

The longitudinal compressive strain-rate of a 24 m length (A_3—A_4) along the axis of the glacier during its first measurement period (3 August 1964—17 July 1965) was 3.4% per year, while in the following 95 days to 2 October 1965 the strain-rate increased to 6.1% per year. This indicates a considerable increase of the longitudinal stress during the Spring. For 44 days (19 August—2 October) a point on the edge of the glacier had an average sliding velocity of 2 cm/day.

Unteraargletscher. Work to compare the present behaviour of this glacier with the measurements made by L. Agassiz in 1840 has continued. A map at 1:10,000 has been prepared by photogrammetry, and a large number of measurements of velocity have been made along a longitudinal profile. The location of the ogives has been studied and a comparison with annual velocity made.

BASIC STUDIES ON ICE AND SNOW

At the Eidg. Institut für Schnee- und Lawinenforschung the following projects have continued:

a) Apparatus for measuring small deformations of snow (Salm).

b) The deformation of ice under high pressures with small stress deviators (Jaccard).

c) The static pressure of the natural snow cover (de Quervain).

d) The "tonometer", an apparatus to analyse thin sections automatically, has been brought nearer to realization (Jaccard).

e) Investigation of a method for measuring simultaneously the surface and volume electrical conductivity (Jaccard).

In Zürich the theoretical study of the problem of the static pressure and stress state of both sloping and horizontal snow and firn covers has been continued, and the clinometer for measuring creep in snow and ice has been further developed.

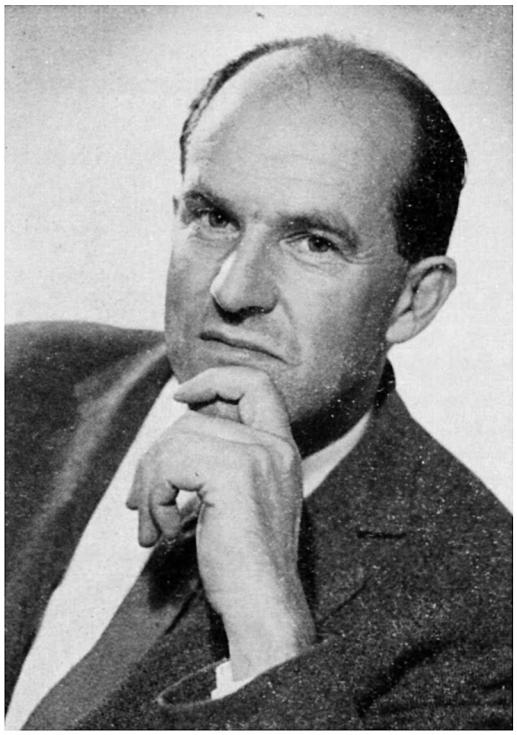
INTERNATIONAL HYDROLOGICAL DECADE

The three projects announced by the Gletscherkommission (yearly variations of 80-100 glacier tongues in the Swiss Alps, glaciological observations on the tongue of the Steinlimmigletscher, and study of the ice cap on the Jungfraujoch) have now all begun, see above.

MEETINGS

The two full meetings of the Gletscherkommission took place in Zürich on 6 July and 10 December 1965. At the Annual Meeting of the Schweizerische Naturforschende Gesellschaft the two candidates nominated by the Kommission, Dr. H. Röthlisberger and Dr. C. Jaccard, were appointed members of the Gletscherkommission.

R. Haefeli



JOHN NYE

John Frederick Nye was born in Hove, Sussex, in 1923, son of a chartered surveyor. He went to school in Hove and in 1936 won a scholarship to Stowe School. In 1941 he went to King's College, Cambridge, as a major scholar in Mathematics and Physics, and read for Part I of the Mathematics Tripos and Part II of the Natural Sciences Tripos (Physics), graduating in 1944. From then until 1951, he did research at the Cavendish Laboratory under Sir Lawrence Bragg and Dr. E. Orowan on the physics of metals and transparent crystals, getting his Ph.D. in 1948.

Nye worked on the plastic deformation of crystals, particularly on the development of an idea of Orowan's for using the photoelastic effect in silver chloride crystals to study under the microscope the internal stresses produced by plastic deformation. The results were interpreted according to the hypothetical concept of dislocations existing at that time (G. I. Taylor and E. Orowan). He also helped to develop Sir Lawrence Bragg's "bubble model" of a crystal, a model which he feels has helped in teaching about dislocations. He taught in the Department of Mineralogy and Petrology and helped with the crystal physics course in the Physics Department, proving to be an excellent teacher with a flair for explaining difficult ideas. It was his teaching which eventually led to the writing of "Physical properties of crystals. Their representation by tensors and matrices" (Oxford University Press, 1957), which represented a marked advance over any other book then available and which is a leading text on this subject.

The Cavendish Laboratory was very crowded during this period. Nye shared a room with Orowan, who was consulted on several occasions by W. V. Lewis, lecturer in geomorphology in the Geography Department, about the problems of the mechanics of cirque glaciers, which at that time were not understood quantitatively, and about other problems of ice mechanics. Out of the conversations arose Orowan's celebrated short contribution to the joint meeting of the British Glaciological Society, the British Rheologists' Club and the Institute of Metals, in April 1948. Nye, who had listened with interest to the exchange of ideas between Lewis and Orowan, was asked by "Nature" to report the meeting. This was the beginning of his serious thinking in glaciology. It was fortunate that in Cambridge at this time other glaciological activities were afoot. Max Perutz, of the Cavendish Laboratory, was busy with his pipe experiment on the Jungfraujoch, and this was a stimulus to theoretical thinking on ice mechanics. Vaughan Lewis's group of research students were working on glacier problems in the Alps and Norway, and Lewis and Orowan arranged for John Nye and John Glen, at that time a research student in the Cavendish, to

have their first taste of exploring and studying Alpine glaciers. Lewis, with his irresistible Welsh enthusiasm and powers of persuasion, invited Nye to see John McCall's tunnel into Vesleskautbreen, in the Jotunheimen, Norway.

1952 was a milestone in Nye's life, for it was then that he spent a year at the Bell Telephone Laboratories, New Jersey, U.S.A., working under Dr. W. Shockley. He was the only member of the research group not working on transistors, which Shockley and two other scientists had just invented. He met in New York his charming wife, Georgiana, who was a dancer specialising in modern dance. Although he stayed only one year in the U.S.A. at the time, he has returned frequently since, for professional and family visits.

On his return to England in 1953, the Nyes went to live in Bristol, where John had been appointed Lecturer in the Physics Department of the University. He became Reader in Physics in 1965. His contributions in solid state physics have been principally in the field of dislocation theory, where he has made significant contributions both to the experimental study of the stress fields round dislocations by his observations on the stress birefringence in transparent plastically deformed crystals, and also to the theory of dislocation density. His work in crystal physics was more of a surveying nature, in preparation for his text book.

In 1959 he was at the California Institute of Technology from October to December, as Visiting Professor in Glaciology, and in 1964 he was the General Electric Foundation Visiting Professor of Applied Science at Yale University and Visiting Geophysicist at the Institute of Geophysics and Planetry Physics, University of California at Los Angeles. During the 1959 visit, Professor R. P. Sharp took him to see the glaciological work on the glaciers of the Pacific Northwest, British Columbia and Alaska, a tour which further stimulated his interest in glaciology, and which expanded work he had been concerned with in Norway.

The Cambridge expeditions to Austerdalsbreen arose largely from the enthusiasms of Vaughan Lewis, who gathered around him a group of scientists and willing students and friends, and took them to the glacier in successive summers during the 1950's. Nye went with them in 1955, '56, '57, '58 and '59, and also in 1963. It was these expeditions that led to happy collaboration with friends such as Bill Ward and John Glen who were themselves making valuable contributions to glaciology. This practical experience of glaciers enabled him to test theories of glacier mechanics. He is recognized in international circles as one of the leading glacier theorists today, and has produced a series of important contributions. He has successfully applied the ideal plastic approximation to glacier flow and has shown how to modify this in the direction of more realistic mechanical models. More recently he has shown how a very general kinematic model may be used to deduce results of great interest in terms of deducing past changes of glacier budget from observations of glacier length.

Nye has also made valuable contributions in glaciology by taking part in the deliberations of the Commission of Snow and Ice and the Council of the Glaciological Society, of which he is now President. He has been at pains to make sure that the work of other glaciologists is directed along lines that are important to the development of the subject.

His friends refute his claim to be a theoretical man who is no good at practical things. He is a valuable member of a field team, designing and analyzing the experiments; he has a keen sense of humour and is a delightful and instructive field companion, as the many students and friends who camped and worked with him in the wild seclusion of Austerdal will recall. His wife was as valuable a member of the team, and much of the success and happiness of the expeditions was due to her lively, sympathetic and practical organization. His practical prowess and his wife's good taste have also created a home of great charm for themselves and their three children. Visitors are liable to be drawn into discussions on house-fixing problems, on gardening, on painting —his grandfather was a landscape painter and John has inherited some of his talent—and on music. If he is fortunate, the visitor may even hear the family ensemble play recorder music.

RESEARCH AND EDUCATION FUND

Following discussions with members of the Society in 1965, the Council has established a Research and Education Fund and has drawn up a statement of inauguration. The statement was submitted to members for approval, in accordance with the resolution passed at a general meeting of the Society in Ottawa, Canada, on 21 September 1965, and is published below. A fund-rasing campaign will be launched early in 1967. The Secretary will be glad to receive ideas for the campaign—please send them as soon as possible to the Secretary, Glaciological Society, c/o Scott Polar Research Institute, Cambridge, England.

STATEMENT OF INAUGURATION
GLACIOLOGICAL SOCIETY RESEARCH AND EDUCATION FUND

Name	1. The name of the Fund shall be the "Glaciological Society Research and Education Fund".
Objects	2. The objects of the Fund shall be to help glaciological research and education. The Fund is initially designed to help the individual research worker or project and the student seeking glaciological training.
Administration	3. The Fund shall be administered by a Committee appointed annually by the Council of the Society in accordance with Rule 10 of the Constitution*. The President and Treasurer shall be ex-officio members of this Committee, the Secretary of the Society shall be its Secretary, and there shall be not more than 4 appointed members.
Finance	4. The Council shall finance the Fund from the Society's own resources and by seeking contributions to the Fund, and shall determine the maximum amount which may be expended on grants in each year.
Applications for grants	5. Applications for grants will be invited through the Society's publications and should be sent to the Secretary of the Society.

* Rule 10—The Council may appoint Committees for which any Member of the Society shall be eligible . . . Committees shall be subject to confirmation each year at the Annual General Meeting.

ANNUAL GENERAL MEETING 1966

MINUTES OF THE ANNUAL GENERAL MEETING HELD AT 5 P.M. ON 5 MAY 1966 AT THE IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON S.W.7

The President, Sir Vivian Fuchs, was in the Chair.

1. The Minutes of the 1965 Annual General Meeting, published in Ice 18, August 1965, were approved, and signed by the President.

2. The President made his report for 1965-66:

I have now had the honour of serving you as President for three years and this is therefore the last report which I shall be presenting.

First of all I would like to say how pleasing it is to see that so many members from different countries are able to be here this evening.

Turning to the various aspects of our activities, I am able to report that membership has again risen in the last 12 months: it now stands at 722 — an increase of 23. In fact, 83 new members joined the Society during the year, but there have been a number of resignations, some (though fewer than we had feared) because of the increased membership fees. In addition we have felt it necessary to be strict in cancelling the membership of those who have fallen behind with their subscriptions.

The number of subscriptions to the Journal of Glaciology has fallen slightly from 525 to 517, but this seems to be a normal fluctuation due to bulk orders from the U.S.S.R. and China.

As you will have noticed, the size of the Journal has increased, 506 pages being published in 1965 compared with 384 pages in 1964. This has been possible because of the increased income from membership fees and subscriptions, when these were raised at the beginning of 1965. By the time that the June 1966 issue is received, 328 pages will have been published in 1966, and we may expect the final figure for 1966 to be about the same as for 1965. I should add that neither in 1965, nor in 1966, have we been dependent upon a grant from any outside body such as the Royal Society or the National Science Foundation. Nevertheless, our present position of strength is the direct result of the assistance we have received from these two bodies in the past.

In spite of this happy situation we have to remember that because of wage increases in the printing industry during the last six months, publication costs have risen, and we have to expect a further rise in 1966.

Now that we have an adequate reserve at the bank and in investments, as you will hear from the Treasurer, it seems right that we should devote a high proportion of our income to publication. It is to be hoped that we shall not have to curtail the activities of our hard-working editors by telling them that a future issue of the Journal must be smaller because there is not enough money.

This leads me to say "thank you" once again to the Editors for undertaking all the painstaking work which they do. We also owe a great debt to the Editorial Advisors and others from all over the world who have helped with the Journal. We certainly could not function efficiently without so much willing assistance.

Shortly the Treasurer will be giving you an account of the Society's financial affairs. During the last three years I have been able to see how your Treasurers, first Dr. Colin Bertram and now Dr. Terence Armstrong, have nursed the finances until we now have a Contingencies Fund standing at £2,000 and current reserves in the bank of £1,000. This, as the Treasurer will tell you, is a very different picture from only five or six years ago. As you know it was the National Science Foundation grants in 1962, 1963 and 1964 which increased our working balance and got us into a higher gear of working. Thus we were able to publish all the material submitted which was of sufficiently high quality. These grants also provided for expansion in other ways such as increasing the coverage of Ice to include field reports and notices from the Commission of Snow and Ice, besides helping us to send one of the Editors and the Secretary to conferences of glaciological interest.

At these conferences we have attempted to draw together in general discussions members of the Society from many countries who might otherwise feel that they were remote from the activities and policy-making meetings.

In the summer of 1965 there were two such meetings for members, one in Boulder, Colorado, during the Congress of the International Quaternary Association, and one in Ottawa during the Symposium on Glacier Mapping organized by the National Research Council and the Commission of Snow and Ice. At both these meetings there were full and interesting discussions about the Council's suggestion that a Research and Education Fund should be established to help individual research workers in glaciology. This is a big step forward for a society which only a few years ago had an annual income of £2,214 and expenditure of £2,165. At that time the Contingencies Fund stood at a mere £200 and current reserves at £136.

In 1966 we have sufficient reserves to inaugurate the Research Fund, and feel justified in launching a world-wide appeal for contributions for it. I am sure you will agree that we should try to get donations from organizations and firms as well as from individuals, so that the Research Fund can make a really effective contribution to glaciology. For this reason I would like to ask every member to help this drive for funds by sending the Secretary the names and addresses of organizations, firms and individuals that are considered suitable for an approach.

Since I last reported to you we have seen the emergence of a branch of the Society in the northeastern part of the North American continent. This has been entirely due to the initiative of members of this Society. The actual title of the branch has not, I believe, been decided yet, but we shall watch with interest the activities of this first branch outside the British Isles. Perhaps other centres where there are several members will be inspired to follow this example.

Finally may I say, in advance of decision, how pleased I am to be handing over to John Nye, whose name has been circulated by the Council and is now before you for formal approval. He will head a Council drawn from Australia, Austria, Canada, Japan, the U.S.A. and the United Kingdom. I know he will find this access to wide experience and advice of the greatest value when administering the future of the Society.

3. The Treasurer, Dr. T. E. Armstrong, presented the accounts for 1965.

He pointed out that 1965 was the first year for some time in which no grant had been sought from outside sources and it was satifactory to note that the Society was now able to function unassisted at a higher level of working than ever before. Few members had

resigned (under 3%) as a result of the higher dues. The Contingencies Fund, at £2,000, provided adequate cushioning against any unforeseen drop in income, so we could now transfer £500 from our current account to inaugurate the Research and Education Fund. The Treasurer emphasised that the Society would not be able to contribute to the Fund on this scale in future, but expressed the hope that the Fund would attract direct support.

4. Election of auditors for the 1966 accounts.

Dr. J. W. Glen proposed and Dr. J. F. Nye seconded that Messrs. Peters, Elworthy and Moore, of Cambridge, be re-elected auditors for the 1966 accounts. This was carried unanimously.

5. Elections to the Council, 1966—69.

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

	Proposer	Seconder
President		
J. F. Nye	V. E. Fuchs	H. Bader
Vice-President		
M. F. Meier	H. Hoinkes	T. E. Armstrong
Elective Members (3)		
U. Radok	W. F. Weeks	H. Hoinkes
C. W. M. Swithinbank	T. E. Armstrong	W. H. Ward
Z. Yosida	D. M. Johnson	W. F. Weeks

Sir Vivian Fuchs, retiring President, then handed over the chairmanship of the meeting to the incoming President, Dr. J. F. Nye.

6. Appointment to the Post of Founder.

Under Rule 10 of the Constitution, the Council of the Society recommended that Dr. Gerald Seligman's name be put to the Annual General Meeting for appointment to this Post. The appointment was confirmed unanimously.

After the meeting, Dr. H. Hoinkes, University of Innsbruck, spoke on "Glacier variations and weather".

MEETINGS

THE GLACIOLOGICAL SOCIETY

NORTHEASTERN NORTH AMERICA BRANCH—FIRST ANNUAL MEETING

The following circular has been sent to members of the Society in eastern Canada and north-east U.S.A.:

It is our pleasure to invite members of the Glaciological Society and others interested in the science of snow and ice in all its forms to participate in the 1st Annual Meeting of the Northeastern North America Branch of the Glaciological Society. The Meeting will be held in Hanover, New Hampshire, U.S.A., with the U.S. Army Cold Regions Research and Engineering Laboratory and Dartmouth College as co-hosts. The Meeting will start at 0900, Saturday 1 October and finish at 1200, Sunday 2 October. People wishing to present papers should send titles of their subjects to:

Organizing Committee, Glaciological Society Meeting,
c/o Snow and Ice Group, USA CRREL,
P.O. Box 282,
Hanover, New Hampshire 03755, U.S.A.

Closing date for receipt of titles is 1 September 1966. No abstracts will be necessary. Normal presentation time will be 15 minutes, with 15 minutes allowed for discussion. Speakers of selected papers will be notified by mail and informed of the precise final scheduling. Presentations of results of current field work and experiments are encouraged. The only documentation of the Meeting will be the publication of a list of titles in Ice.

A cocktail party and informal dinner will be held on the evening of 1 October. Inasmuch as the Meeting occurs during the New England fall foliage season, people planning to attend should inform the Organizing Committee as soon as possible so that suitable housing information can be provided to them.

3 June 1966

The Organizing Committee —
Charles M. Keeler — Steven J. Mock
René O. Ramseier — Wilford F. Weeks

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS — SCIENTIFIC COMMITTEE ON WATER RESEARCH (COWAR)

A meeting was held in Paris 22-25 February 1966 and was attended by representatives of various Commissions in the International Association of Scientific Hydrology, including the Commission of Snow and Ice, and by representatives of the Unions of Geological Sciences and Geography, the Co-ordinating Council of the Hydrological Decade, and other bodies concerned with water research. Because glaciologists are concerned with the work of the Hydrological Decade, we publish here extracts from the Constitution of COWAR.

COWAR is a Scientific Committee of ICSU. The object of the Committee is to study the problem of international water resources in all its aspects, to formulate and execute a programme of research on that subject, and to act as adviser, on behalf of ICSU, to UNESCO and other interested bodies (WMO, WHO, FAO, & C.) on problems pertaining to the International Hydrological Decade. In view of the organizations already studying this problem the COWAR will keep itself informed of other international activities in this field in order to ensure co-operation and to avoid unnecessary duplication of effort.

Initially the composition of the Committee shall be as follows:

(a) A number of representatives of the International Association of Scientific Hydrology of the International Union of Geodesy and Geophysics; the President of the Commission on Surface Water of IASH; the President of the Commission on Ground Water of IASH; the President of the Commission on Continental Erosion of IASH; the President of the Commission of Snow and Ice of IASH; a representative of the International Association of Physical Oceanography, a representative of the International Association of Meteorology and Atmospheric Physics; and a representative of the International Biological Programme.

(b) One representative to act as observer to be designated by each international scientific union federated in ICSU which desires to participate in COWAR.

(c) One representative to act as observer to be designated by the following non-governmental associations that may desire participation in COWAR: International Commission on Irrigation and Drainage, International Water Supply Association, Commission on High Dams of World Power Conference, International Association on Water Pollution Research, International Association on Hydraulic Research, and International Association on Soil Science.

(d) The Special Agencies of the United Nations interested in the work of the Committee may designate observers to attend the meetings of COWAR.

COWAR shall elect from among its members a Bureau, consisting of a President, two Vice-Presidents and a Secretary, each elected for a period of two years and eligible for re-election for a further period of two years. The method of election shall be such as to ensure adequate representation of the various disciplines in water research among the members of COWAR. These nominations are subject to confirmation by the Executive Committee of ICSU.

The Bureau shall be responsible for implementing the policies and programmes approved by the COWAR, and shall be responsible to ICSU for the co-ordination of the scientific programme adopted by COWAR.

COWAR may appoint ad hoc committees for the examination of special problems.

ROYAL METEROLOGICAL SOCIETY CONFERENCE ON WORLD CLIMATE, 8000—0 B.C.

The conference was held in Imperial College, London on 18-19 April 1966. The following papers of interest to glaciologists were read:

G. Manley — The problems of the Climatic Optimum. The contribution of glaciology.

R. P. Goldthwait — Evidence from Alaskan glaciers of major climate changes.

C. J. Heusser—Polar hemispheric circulation; palynological evidence from Chile and the Pacific Northwest of America.

The proceedings of the conference will be published in a special issue of the Quarterly Journal of the Royal Meteorological Society in November-December 1966.

INTERNATIONAL UNION OF CRYSTALLOGRAPHY

The Union's Seventh General Assembly was held in Moscow on 12-21 July 1966. There was a symposium on crystal growth on 20-21 July. Further details may be obtained from Prof. N. V. Belov, Institute of Crystallography, Leninskiy Prospekt 59, Moscow B-333, USSR.

MICHIGAN STATE UNIVERSITY, GLACIOLOGICAL INSTITUTE

The 6th summer institute of glaciological and arctic sciences will be held on the Juneau Icefield, Alaska, USA, from 20 July to 5 September 1966. The programme provides academic and field training at the graduate level for students of polar and mountain sciences.

INTERNATIONAL CONFERENCE ON PALYNOLOGY

This conference will be held from 29 August to 5 September 1966 in Utrecht, Netherlands. Further information may be obtained from F. P. Jonker, Botanical Museum, Lange Niewstraat 106, Utrecht, Netherlands.

SOCIETE HYDROTECHNIQUE DE FRANCE

The 1966 field meeting for glaciology will be held in the Haute-Maurienne 2-7 September. Visits will be paid to the Glacier des Sources de l'Arc and the Glacier d'Arnès. Further information may be obtained from M. J. Messines du Sourbier, Président de la Section de Glaciologie, Société Hydrotechnique de France, 199 rue de Grenelle, Paris 7.

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

The Ninth Meeting of SCAR will take place in Santiago, Chile, 20-24 September 1966. A symposium on Antarctic oceanography, sponsored by SCAR, the International Association of Physical Oceanography, the International Union of Biological Sciences and the Scientific Committee on Oceanographic Research will be held in Santiago 13-16 September.

SYMPOSIUM ON THE USES OF ISOTOPES IN HYDROLOGY

The symposium, organized by the International Atomic Energy Agency and the International Association of Scientific Hydrology, will be held in Vienna, Austria, 14-18 November 1966. The purpose of the symposium is to bring out new developments in many subjects including snow hydrology and glaciology. Emphasis will be put on developments leading to the solution of practical problems. This is the second symposium on isotopes in hydrology held by the IAEA. A symposium on radioisotopes in hydrology was held in Tokyo in 1963. It is hoped to hold one on radioactive dating and low level counting in 1967. Further information may be obtained from the Administrative Secretary of the symposium, Mr. Zybylski, Division of Scientific and Technical Information, International Atomic Energy Agency, Karntner Ring 11, Vienna 1, Austria.

THE GEOLOGICAL SOCIETY OF AMERICA

The Society will hold its 79th Annual Meeting in San Francisco, 14-16 November 1966. Interested persons should write to Raymond Becker, Executive Secretary, GSA, 231 East 46th Street, New York, N.Y. 10017, U.S.A.

INTERNATIONAL GEOGRAPHICAL UNION

The XXI International Geographical Congress and the XII General Assembly of the IGU will be held in New Delhi from 1-8 December 1968. Various symposia, field studies and excursions will be held in other parts of India before (10-30 November) and after (9-23 December) the main meetings. The First Circular for the Congress was published in the January 1966 issue of the IGU Newsletter (Vol. 17, No. 1). Correspondence should be addressed to Prof. S. P. Chatterjee, c/o National Atlas Organization, 1 Acharya Jagadish Bose Road, Calcutta 20, India.

COMMISSION OF SNOW AND ICE

REPORT OF A MEETING OF THE OFFICERS OF THE IUGG-IASH COMMISSION OF SNOW AND ICE AT UNESCO HOUSE IN PARIS, 3-4 MAY, 1966

INTRODUCTION

The meeting was convened by UNESCO in Paris primarily to implement various tasks assigned to the Commission in resolutions 12, 13 and 14 of the first report (NS/198) of the IHD Co-ordinating Council. These resolutions concern the world inventory of perennial and annual ice and snow masses, the measurement of glacier variations on a world-wide basis and combined water, ice and heat balance measurements at selected glacier basins, respectively. The Commission also had to consider several problems of organization and publication in connexion with the General Assembly of IUGG in 1967.

Those present were: Commission of Snow and Ice—
Dr. H. C. Hoinkes (Austria), President; Dr. M. F. Meier (U.S.A.), Prof. G. A. Avsiuk (U.S.S.R.), Dr. V. Schytt (Sweden), Vice-Presidents; Dr. W. H. Ward (U.K.), Secretary; Dr. M. de Quervain (Switzerland), Chairman, Division of Seasonal Snow Cover & Avalanches; Ing. P. Kasser (Switzerland), Glacier Fluctuation Project. IASH—Prof. L. J. Tison (part-time), Secretary.
UNESCO Observers—Mr. J. A. da Costa, Secretary, IHD Co-ordinating Council; Mr. N. A. Bochin, UNESCO Consultant.

GENERAL ASSEMBLY IUGG SWITZERLAND 1967

In connexion with the meetings of the Commission, it was agreed to recommend to the Secretary of IASH that:

a) Authors should prepare complete summaries of their papers not exceeding 3 pages in length and remit about 100 copies 2 months before the meeting for distribution to participants at the meeting. These summaries would be used to select and arrange a programme of sessions.
b) A discussion secretary should be appointed for each session to solicit and collect written contributions.
c) The complete papers would be accepted up to 2 months after the meeting. These would be screened and published together with the discussion.
d) In addition to the topics already proposed at Berkeley, the meetings at Berne would include one session devoted to scientific contributions (not merely results of data collection, or descriptions of national programmes) which develop the themes in the IHD programme in snow and ice, and another session on the results of recent field work or new developments for which summaries are not required and which will be selected during the Assembly.
e) Four sessions be held in Berne during Wednesday and Thursday 27-28 September, 1967, followed by two independent 4-day excursions to glaciers and research institutes over the weekend 29 September-2 October, two sessions on Tuesday, 3 October, one session on Wednesday afternoon, 4 October and two sessions on Thursday, 5 October.
f) Proposals for arrangements and announcements for the excursions mentioned in e) should be prepared jointly by Ing. P. Kasser and Dr. M. de Quervain for consideration by IASH and the Swiss National Committee and published in the second bulletin of the Assembly.

COMMISSION—IASH PUBLICATION

Prof. Tison was anxious to increase the circulation. It was agreed that the Secretary of the Commission with the help of the other officers should send to Prof. Tison a list of names and addresses of Editors of journals who might be willing to review the publications of the Commission and also a list of the names and addresses of libraries that might purchase these publications. It was further recommended that Editors of suitable journals should be sent free copies for review.

IHD PROGRAMMES IN ANTARCTIC AND ARCTIC

The Secretary of the I.H.D. Co-ordinating Council and the Commission hoped that SCAR would soon take initiative on co-ordinating the decade projects in Antarctica. It was also agreed that in due course it would be desirable to co-ordinate studies of the hydrology of basins draining into the Arctic Ocean, as a knowledge of the hydrological cycle of all lands bordering the Arctic Ocean is important to the sea ice cover, heat exchange between land and air, and the global hydrological cycle. It was recommended that these views should be conveyed to COWAR.

WORLD INVENTORY OF PERENNIAL AND ANNUAL ICE AND SNOW MASSES

It was agreed to recommend to COWAR and IHD Co-ordinating Council that the Commission should set up a working group, consisting of Dr. Fritz Müller (Chairman) and three other

members (to be appointed) to prepare a manual making recommendations for recording and mapping the perennial ice and snow of the world on and beneath the land surfaces, taking into account the recent Russian manual on the subject. The Chairman should co-operate with the existing working groups on hydrological maps and the world water balance, and also with Dr. M. de Quervain in respect of seasonal snow cover, see below. It was considered that the group should make a definite recommendation for a minimum standard of accuracy, and that in any case the degree of accuracy and the means by which the data was collected should be stated. The Commission welcomed the issue of the first section of the inventory of Russian glaciers (Katalog Ledinkow CCCP, Tome 3, part 1, Franz Josef Land, Moscow 1965).

The meeting considered the WMO Guide to Hydrometeorological Practices in respect of its various recommendations on the measurement of snowfall and temporary snow cover. It was agreed that some of the practices appear to be inappropriate to scientific studies of snow and ice, and that some have been superseded by new developments. It recommends to COWAR that the Guide should not be recommended for general and uncritical use for snow and ice studies during the Decade.

It was agreed to recommend to COWAR and the IHD Co-ordinating Council that Dr. M. de Quervain, Director of the Swiss Snow and Avalanche Research Institute, should be responsible for preparing a manual making recommendations for recording and mapping the world-wide distribution and water equivalent of the total seasonal snow cover. It was considered that the manual would need to specify precisely what was meant by total seasonal snow cover in relation to its extent and time variations.

It was agreed to recommend COWAR to take the necessary action to implement with all possible speed the use of remote-sensing techniques in satellites for the measurement of the extent and masses of seasonal snow cover, of permanent snow and ice on the land, and of sea ice.

MEASUREMENTS OF GLACIER VARIATIONS ON A WORLD-WIDE BASIS

Ing. P. Kasser reviewed his draft document of the Pilot Study on the fluctuation of glaciers, copies of which were available at the meeting. He indicated that in some cases he had found difficulty in collecting the data and a lack of co-ordination within some countries. However he felt that publication of the Pilot Study would improve the return of data significantly. The meeting expressed unanimous appreciation of the considerable task he had already completed and officers of the Commission agreed to send him any detailed comments as soon as possible. It was agreed that the form of the study should be developed in the course of time, particularly in respect of the inclusion of more hydrological and meteorological data.

It was recommended that UNESCO-IHD should arrange in co-operation with FAGS a further contract for $2000 with Ing. P. Kasser to complete by November 1966 the Pilot Study manuscript, its translation into English, printing of the necessary copies of the Aletschgletscher map, and to continue the collection of data during 1966.

It was also recommended that the Pilot Study should be mimeographed in at least 500 copies by UNESCO for free distribution.

Finally it was recommended that FAGS should establish a permanent service on the fluctuation of glaciers and that for the year 1967 a sum of $3000 should be allocated for the purpose.

The document prepared by the Commission on the measurements of the Variation of Existing Glaciers was recommended for publication as a technical note and for distribution by UNESCO to National IHD Committees for use during the Decade, subject to the following changes being made by the Secretary of the Commission:

i) its relation to the pilot study should be made clear;

ii) the section on publication be revised to indicate that data should be sent to the permanent service on the fluctuations of glaciers as well as the IGY World Data Centres;

iii) the check list be omitted and reference made to the form of data submission to be given in the pilot study in terms of non-polar glaciers.

COMBINED WATER, ICE AND HEAT BALANCE AT SELECTED REPRESENTATIVE GLACIER BASINS (N-S, E-W CHAINS OF GLACIER STATIONS)

The meeting reviewed, to the limited knowledge of those present, the locations of glaciers which were likely to be established as representative basins for the Decade. These are summarised below (the date is the year mass-budget studies were initiated):—

A) **N-S chain**

1. Gulkana, Alaska Range, Alaska, U.S. Geological Survey, 1966.
2. Unnamed (near King's Bay), Kenai Range, Alaska, U.S. Geological Survey, 1966.
3. Place, Coast Mountains, B.C., Canada, Dept. Mines and Tech. Surveys, 1965.
   Sentinel, Coast Mountains, B.C., Canada, Dept. Mines and Tech. Surveys, 1966.

4. South Cascade, Cascade Range, U.S. Geological Survey, existing.
   Blue, Olympic Mountains, U.S., University of Washington, existing.
   Emmons, Cascade Range, U.S., Geological Survey, 1966?
5. Maclure, Sierra Nevada, U.S., Geological Survey, 1966.
6. ?, Cordillera Blanca, Peru, Corporacion Peruana del Santa, 1966.
7. ?, South Georgia, U.K., British Ant. Survey (?) ?
8. Palmer Station, Antarctic Penn., U.S., Ohio State University, ?
9. Halley Bay, (?) Antarctic Penn., U.K., British Ant. Survey (?) ?

B) **E-W chain** (≃ 45°N Lat.)

1. (to be selected), Tien Shan, Kazakhstan, USSR, Acad. Sciences (?), 1966.
2. (to be selected), Pamir, Tadzhikistan (?), USSR, Acad. Sciences (?), 1966.
3. (to be selected), Caucasus, Ukraine (?), USSR, Acad. Sciences (?), 1966.
   (to be selected), Caucasus, Georgia (?), USSR, Acad. Sciences (?), 1966.
4. Uebergossene Alm, Hochköning, Austria (?)
5. Sonnblick-kees, Hohe Tauern, Austria, Univ. Salzburg, existing.
6. Schneeferner, Zugspitze, Germany, Bavarian Academy of Sciences, existing.
7. Hintereis, Otztaler Alpen, Austria, Univ. Innsbruck, existing.
   Kesselwand, Otztaler Alpen, Austria, Univ. Innsbruck, existing.
   Vernagt, Otztaler Alpen, Austria, Univ. Innsbruck, and Bavarian Academy of Sciences, existing.
   Langtaler, Otztaler Alpen, Austria, Bavarian Academy of Sciences, existing.
8. Aletsch, Berner Oberland, Switzerland, VAWE-ETH Zürich, existing.
9. Glacier de Sarennes (?), Western Alps, France, ?
   Saint-Sorlin (?), Western Alps, France, ?
   Glacier Blanc (?), Western Alps, France, ?
10. Ram River, Rocky Mountains, Alberta, Canada, Dept. Mines Tech. Surveys, 1966.
    Peyto, Rocky Mountains, Alberta, Canada, Dept. Mines Tech. Surveys, 1965.
11. Woolsey, Selkirk Mountains, B.C., Canada, Dept. Mines Tech. Surveys, 1965.
12. Place, Coast Mountains, B.C., Canada, Dept. Mines Tech. Surveys, 1965.
    Sentinel, Coast Mountains, B.C., Canada, Dept. Mines Tech. Surveys, 1966.

C) **E-W chain** (≃ 66°N Lat.)

1. Stör, Kebnekaise, Sweden, Univ. Stockholm, existing.
2. Blaisen, Skjomen, Norway, Water Resources Electricity Board, existing.
   Nigards, Jostedalen, Norway, Water Resources Electricity Board, existing.
   Stör, Jotunheim, Norway, Water Resources Electricity Board, existing.
   and others.
3. Decade, Central Baffin Island, Canada, Dept. Mines and Tech. Surveys, 1965.
4.* White, Axel Heiberg Island, Canada, McGill Univ., existing.
   Baby, Axel Heiberg Island, Canada, McGill Univ., existing.
5. Gulkana, Alaska Range, Alaska, U.S. Geological Survey, 1966.

* far north of the profile.

D) **Some important gaps which need to be filled:**

1. Mexico
2. Colombia-Ecuador
3. Argentina-Chile (2 stations minimum, plus one in extreme south)
4. Bolivia
5. Pyrenees mountains
6. Polar Urals
7. Iceland
8. India, Pakistan, Nepal

It was recommended that the Secretary of the Co-ordinating Council should circulate the above list to the National Committees concerned, requesting them to confirm the information and urging them to set up new basins where suggested above.

Dr. M. F. Meier reported on the progress made in mass budget studies at the field seminar he had recently organized on South Cascade Glacier, and also at the recent meeting in Montreal of the Glaciology Panel of the Committee on Polar Research of the U.S. National Academy of Sciences, where a Working Group to prepare a manual on standardized measurements for glacier mass budgets had been set up. He referred in particular to progress in standardization of terminology and drew attention to the field manual on mass balance measurements prepared by G. Østrem and A. Stanley recently issued by the Canadian Department of Mines and Technical Surveys. The Commission welcomed both the progress being made in this work and the co-operation between glaciologists in the U.S.A. and Canada in connexion with the Decade, and considered the Canadian field manual to be a useful document.

It was agreed to recommend to COWAR and the Co-ordinating Council that Dr. M. F. Meier should act as Chairman and co-ordinator of the project on combined water, ice and heat balance measurements at selected glacier basins, that he should co-operate with the Working Group on Representative Basins and that he should form a working group to prepare documents clearly defining the objects of this important research project of relating glacier flucuations to the weather and giving guidance on the requisite

measurements to be made, taking into account the Canadian field manual on mass balance measurements and the work of the U.S. Glaciological Panel.

PARTICIPATION AND CO-ORDINATION OF IHD PROJECTS IN SNOW AND ICE

The Commission emphasizes the need for all appropriate countries to participate in the projects mentioned in 5), 6) and 7) above, recommends to COWAR and the Co-ordinating Council that the duly-appointed Chairmen of the working group on each project should act as its co-ordinator through the Commission and the IHD Secretariat, and recommends that the Secretary of the Co-ordinating Council should inform National Committees accordingly.

TRAINING COURSE IN SWEDEN, AUGUST 1967

The Commission welcomed the proposal by the Swedish National Committee for the IHD to hold a training course on glacier mass and heat budget studies and on glacier hydrology at Tarfala in northern Sweden in August 1967 as part of the educational activities of IHD and recommended that UNESCO should provide financial assistance out of IHD funds estimated at about $8000. To implement this activity it requests the Swedish National Committee to submit to the Secretary of the IHD Co-ordinating Council details of the proposed arrangements for the training course in the form of a preliminary circular for distribution to all national committees as soon as possible.

CONCLUSION

The officers of the Commission in conclusion thanked UNESCO and the Secretary of the IHD Co-ordinating Council for affording them the facilities for a most profitable meeting and expressed a desire to meet each year for the purpose of co-ordinating the Decade projects in snow and ice and of developing interests in snow and ice studies in all countries.

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

NEWS

THE JAPAN POLAR RESEARCH ASSOCIATION

The Japan Polar Research Association was officially approved by the Ministry of Education on 11 November 1964. The Association is a private, non-profit organization supported by the fees of the associate members and donations from various organizations in Japan.

The main objects of the Association are research in polar regions, the development of logistics techniques and the promotion of polar studies. The Association also closely collaborates with the Japanese Antarctic Research Expedition. International co-operation in the research and the exploitation of the polar regions is another interest of the Association.

The Association is managed by the Board of Governors consisting of thirteen members and the Board of Council of thirty members. All the members are representatives from both governmental and private organizations.

The Association publishes an illustrated journal entitled Kyokuchi (Polar News), twice a year. The first issue was published in August 1965 and the second one is expected to be published in March 1966. The journal is distributed to all the associate members and many other organizations.

The address of the head office is Shoko-Kaikan, No. 1, Sannen-cho, Chiyoda-ku, Tokyo, Japan.

Board of Governors:

Officers: Dr. Seiji Kaya, Chairman (Ex-President and Professor Emeritus of University of Tokyo. Ex-Chairman, National Antarctic Committee and the Science Council of Japan); Dr. Masashi Miyadi, Executive Secretary (Secretary, National Antarctic Committee); Dr. Tetsuya Torii, Executive Secretary (Professor of Chiba Institute of Technology. Secretary, National Antarctic Committee).

Members: Dr. Tadao Sasayama (President, Alaska Pulp Co., Ltd.); Dr. Kiyoo Wadati (President), The National Research Centre for Disaster Prevention. Chairman, National Antarctic Committee); Mr. Kenjiro Imaida (Auditor, Nippon Yusen Kaisha); Dr. Takeshi Nagata (Professor of University of Tokyo. Secretary, National Antarctic Committee); Dr. Eizaburo Nishibori (Director, Japan Nuclear Ship Development Agency); Mr. Akiyoshi Yamada (Director, Teito Transit Operation Authority Association); Mr. Masayoshi Murayama (Chief, the Second Polar Section, National Science Museum. Secretary, National Antarctic Committee); Dr. Kou Kusunoki (Chief, the First Polar Section, National Science Museum. Member, National Antarctic Committee).

Treasurers: Mr. Shinrokuro Hidaka (Vice-President, the United Nations Association of Japan); Mr. Nobuhiko Kinashi (Director, Taiyo Fishery Co., Ltd.).

NORTHICE, GREENLAND

Members will be interested to learn that "Northice", the camp established by the British North Greenland Expedition and last occupied in 1954, has been visited for the first time since that date. Dr. W. F. Weeks and Dr. S. J. Mock, of U.S. Army Cold Regions Research and Engineering Laboratory, on returning from their two-man trail across North Greenland, report that they were able to get into the vertical pit and measure the stakes set up by Dr. Hal Lister. A total of 3.2 metres accumulation, or 27 cm per year, was recorded.

SYMPOSIUM ON THE SCIENTIFIC ASPECTS OF SNOW AND ICE AVALANCHES

The papers and discussions of the symposium held in Davos, Switzerland, in April 1965 are now available as Publication No. 69 of the International Association of Scientific Hydrology. Application should be made to Professor L. Tison, Secretary of I.A.S.H., Braamstraat 61, Gentbrugge, Belgium. The price is 300 francs belges.

ANNALS OF THE INTERNATIONAL GEOPHYSICAL YEAR

Volume 36 of the Annals is available from Pergamon Press, Oxford. It catalogues the data collected at the World Data Centres during the IGY. Chapter 9 covers glaciology.

The Annals Volume on Glaciology is in the final stages of preparation and should be available in 1967. The editor of the Volume is Dr. Gordon Robin, who was Reporter for Glaciology.

AWARDS

Recent awards to glaciologists include:

Royal Geographical Society

—Founders' Medal to Dr. Geoffrey Hattersley-Smith for glaciological investigations in the Canadian Arctic.

—Back Grant to Dr. Stanley Evans for the development of radio echo-sounding of polar ice sheets.

Royal Society of Edinburgh

—W. S. Bruce Memorial Prize to Dr. Stanley Evans.

Swedish Society for Anthropology and Geography

—Anders Retzius Prize to Dr. Charles Swithinbank for contributions to Antarctic glaciology. The Prize was presented to Dr. Swithinbank by H.M. King Gustav Adolf of Sweden.

THE SOCIETY'S LIBRARY

WORKS RECEIVED FOR THE SOCIETY'S LIBRARY SINCE MARCH 1966

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.

Ambach, W. (6 items)
Fristrup, B. (2 items)
Gerhold, J.
Grötzbach, E.
Hallett, J. (2 items)
Hobbs, P. V. (3 items)
Hoinkes, H.
Lliboutry, L. (5 items)
Løken, O. H.
Magun, S. (20 items)
Miller, H. (2 items)
Østrem, G.
Tuthill, S. J. (2 items)
Weidick, A. (3 items)
Wyllie, G.
Zeller, G.

Akademiya Nauk Kazakhskoy SSR, Sektor Fizicheskoy Geografii, USSR.
Arctic Institute of North America (2 items).
Association Internationale d'Hydrologie Scientifique.

British Schools Exploring Society.
Cold Regions Research and Engineering Laboratory, U.S. Army (26 items).
Department of Geography, University of Oulu, Finland (2 items).
Department of Geology, University of Alaska, U.S.A. (2 items).
Department of Mines & Technical Surveys, Ottawa, Canada.
Division of Building Research, Canada (6 items).
Forest Service, U.S. Department of Agriculture.
Geography Department, University of Bratislava, USSR.
Geophysical & Polar Research Center, University of Wisconsin, U.S.A.
Hydrographischen Zentralbüro im Bundesministerium für Land- und Forstwirtschaft, Wien, Austria.
Institute of Polar Studies, Ohio State University, USA (5 items).
Instituto de Geologia Caritiba, Parana, Brazil (4 items).
Instituto Nacional del Hielo Continental Patagonico, Argentina.
Internationale Union für Geodesie und Geophysik, Wien, Austria (4 items).
National Research Council, Canada (2 items).
Royal University of Lund, Sweden.
Société Polonaise de Géographie, Warsaw (3 items).
Sveriges Meteorologiska och Hydrologiska Institut (5 items).

BOOKS RECEIVED

Les Andes Centrales du Pérou et Leurs Piémonts (Entre Lima et le Péréné). Olivier Dollfus. Lima (Peru), Institut Français d'Etudes Andines, 1965. 404 p., illus., map.

The Avalanche Enigma. Colin Fraser. London, John Murray, 1966. 301 p., illus., map, 22 cm. 42s. 0d.

The Six-cornered Snowflake. Johannes Kepler. (Kepler's Latin booklet of 1611, A new Year's Gift or on the six-cornered Snowflake, edited and translated by Colin Hardie, with Essays by L. L. Whyte and B. F. Mason). Oxford, The University Press, 1966. 74 p., illus., 24 cm. 21s. 0d.

The Mountain World, 1964/65, Malcolm Barnes, Ed. London: George Allen & Unwin Ltd., Chicago: Rand McNally & Co., 1966. 215 p., illus., map insert, 24 cm. 42s. ($6.95).

NEW MEMBERS

Adler, Dr. W. F., Fundamental Physics Division, Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201, U.S.A.
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THE GLACIOLOGICAL SOCIETY

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

President: Dr. J. F. Nye

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:

Private members—	Sterling:	£3 0s. 0d.
	U.S. dollars:	$9.00
Junior members (under 25)	Sterling:	£1 0s. 0d.
	U.S. dollars:	$3.00
Institutions, libraries—	Sterling:	£6 0s. 0d.
	U.S. dollars:	$17.00

(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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ICE

Editor: Mrs. H. Richardson

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