

about 170 m. higher than in 1946 and 270 m. higher than in 1945. Some exceptionally heavy recessions of glaciers are noted in the tables given; the Allalin Glacier snout receded 140 m., the Tsanfleuron Glacier, in the basin of the Aar, 41 m., the glacier from Piz Sol in the Rhine basin 73 m., and the Basodino Glacier in Ticino 116 m. In 1946 13 per cent of the glaciers measured had advanced, 7 per cent were stationary and 80 per cent were in recession.† In 1947 none advanced, 2 per cent were stationary and 98 per cent had retreated.

ABSTRACTS

BOWDEN, F. P. Friction. *Science News*. (Penguin Books, London), No. 4, 1947, p. 139-68.

Dr. Bowden discusses the principles of friction of metals and other substances in the light of recent knowledge and shows that through minute inequalities in the unlubricated surfaces of metals the real area of contact is very small and the local pressure considerable, thus impeding sliding.

The sliding properties of snow and ice are due to a lubricating layer of water. This is not caused by pressure melting but by local friction. Friction on snow and ice increases markedly as the temperature falls and is lowest for a slider possessing low heat conductivity, which prevents the heat generated by friction from escaping. Thus wood is a better material than metal for ski and sledge runners, and plastic ski edges or edges of German silver or constantan are better on cold snow than those made of brass or steel. [G. S.]

CWILONG, B. M. Sublimation in outdoor air and seeded sublimation. *Nature*, Vol. 163, No. 4149, 1949, p. 727.

In continuation of the author's expansion chamber tests in England of the threshold temperature for the formation of ice crystals it was found that in strong sea winds in New Zealand (force 5 and more) the value remains constant at -41.2° C. as before. In other weather the value varies between -41.2° C. and -32.2° C., the latter figure being the same as that for the ground layer of air in England.

Expansion chamber and frost point hygrometer tests were made of the seeding properties of silver iodide. The threshold sublimation temperature in both cases was -2.9° C. with small variants. Sublimation on surfaces seeded with silver iodide commences at temperatures somewhat lower than the frost point of the air under investigation, but the process of humidity measurement at temperatures between 0° C. and -60° C. is simplified by the use of this substance owing to the reduction of the temperature range at which the observer can confuse ice and supersaturated water droplets. [G. S.]

DREIBELBIS, F. R. Some influences of frost penetration on the hydrology of small watersheds. *Transactions American Geophysical Union*, Vol. 30, No. 2, 1949, p. 279-82.

An example of the influence of frost penetration on hydrologic as well as agronomic problems is presented and discussed. The data indicate that frost penetration retards percolation, thereby retaining water in the soil profile that normally would drain. Frost penetration through its influence on percolation and resultant available storage may affect infiltration for a considerable time after the frost period. [Author's abstract.]

FOSSA-MANCINI, ENRIQUE. Supuesto vestigios de glaciaciones del Paleozoico en la Argentina. *Revista del Museo de La Plata (Nueva Serie)*, Tomo 1, Sección Geología, 1943, p. 347-406.

This paper discusses the criteria usually employed in interpreting certain lithological features as evidence of past glaciations, a review of the supposed traces of Palaeozoic glaciations in Argentina, and some considerations of the chronological distribution of Palaeozoic ice ages, as suggested by findings in that country.

It has been stated that in Argentina there is evidence of glaciations of Ordovician, Silurian, Early Carboniferous, Late Carboniferous, and Permian age. In most cases the evidence consists of some boulder beds with a few scratched stones and occasionally of polished and striated rock surfaces. Almost always these striated surfaces and the scratched pebbles have been found in districts where thrust faulting or overthrusting are conspicuous. The author believes that the supposed ice pavements and many of the supposed tillites are Palaeozoic aqueous sediments which have locally acquired a peculiar appearance under the action of diastrophic forces. He therefore finds it unnecessary to resort to the hypothesis of multiple Palaeozoic ice ages. He believes that one Late Carboniferous ice age, comparable in duration and phases to that of the Pleistocene, can fully explain the distribution of all true Palaeozoic glacial, limnoglacial, and fluvio-glacial sediments so far known in Argentina. [From author's abstract.]

HEVERLY, J. ROSS. Supercooling and crystallization. *Transactions American Geophysical Union*, Vol. 30, No. 2, 1949, p. 205-10.

The supercooling of droplets of water under conditions of cooling rate and pressure that bracket those found in nature has been quantitatively studied. Also the temperature at which water vapour in ordinary atmospheric air will crystallize to form snow crystals has been determined. The spontaneous freezing point is presented in a graph as a function of droplet size. Such varied water sources as tap water, distilled water, mountain stream water, and water condensed from the atmosphere were used. A photomicrograph of "formvar" (polyvinyl formal dissolved in ethylene dichloride) replicas of the snow crystals formed is presented, and the size distribution and relative number of the accompanying supercooled water droplets is given in tabular form, as a function of temperature. The results of the supercooling and crystallization investigations indicate that the current precipitation theories need modification. A new concept of the initiation of precipitation is presented. [From author's abstract.]

† *Journal of Glaciology*, Vol. 1, No. 3, 1948, p. 139.

silty sands against muds. A new description of the classical section in glacial deposits at the Bay of Nigg, South Cliff, enables significant comparisons to be made with the Tullos sections. The combined evidence from the two localities makes possible certain deductions about the succession of glacial events. It is shown that the fine-grained sediments of Tullos are contemporaneous with the melting of the "second" ice sheet of north-east Scotland. At this time sea-level was about 80 ft. (24 m.) higher than at present. Evidence is given which indicates that the morainic gravels on the high ground flanking the Tullos depression were also a product of the melting of the "second" ice sheet. This is at variance with Bremner's view that these gravels belong to the "third" ice sheet. It is pointed out that the variation in composition of the Nigg Bay boulder clay does not justify the postulation of two ice sheets for its formation. [From author's summary.]

WILSON, JAMES T. and HORETH, JOHN M. Bending and shear tests on lake ice. *Transactions of the American Geophysical Union*, Vol. 29, No. 6, 1948, p. 909.

This paper reports the results of bending and shear tests made on ice from Lake Michigan and on artificial ice so frozen as to have the same crystal orientation. The bend specimens normally failed in tension with an indicated tensile strength of about 200 psi. A marked increase of tensile strength with decreasing temperature was indicated. The shear strength was found to be about 100 psi. No temperature coefficient for shear strength could be detected. Specimens of the ice were studied in polarized light. It was observed that the optic axes of the crystals were usually normal to the surface of refrigeration. The crystal diameters were usually less than one inch. [Author's abstract.]

GLACIOLOGICAL LITERATURE

THIS bi-annual list of glaciological literature aims to cover the scientific aspects of snow and ice in all parts of the world. Attention is drawn to the bibliographies in each number of *The Polar Record* (Cambridge) which aims to cover the significant work dealing with expeditions, research, equipment and conditions of living in the Polar regions. Both journals, however, deal with Polar literature having specific glaciological interest and with general matters of a practical nature such as snowcraft.

Readers will greatly assist the Editor by notifying him of their own, or any other, publications of glaciological interest.

- AHLMANN, HANS WILSON. The Present Climatic Fluctuation. *Geographical Journal*, Vol. 112, Nos. 4-6, 1949, p. 165-95. [Climatological, glaciological, oceanographical, biological and eustatic evidence of present climatic fluctuations, with special reference to Arctic regions.]
- AHLMANN, HANS WILSON. Den nutida klimafuktuationen och dess utforskande. *Norsk Geografisk Tidsskrift*, Bd. 11, Hefte 7-8, 1947, p. 290-326. [Present world climate change and its study. Glacier recession in north and south polar regions.]
- ALBE, E. M. FOURNIER D'. Some experiments on the condensation of water vapour at temperatures below 0° C. *Quarterly Journal Royal Meteorological Society*, Vol. 75, No. 323, 1949, p. 1-14. [Description of apparatus used and experiments made in the investigation of the behaviour of individual condensation nuclei.]
- ALBE, E. M. FOURNIER D'. Condensation of water vapour below 0° C. *Nature*, Vol. 162, No. 4128, 1948, p. 921-22. [Results obtained by ultra-microscopic observation of individual condensation nuclei; suggests that ice crystal formation occurs through condensation and freezing of incipient water droplets rather than sublimation.]
- AMPFERER, OTTO. Geologische Methoden zur Erforschung von Wegrichtungen von abgeschmolzenen Eismassen. *Sitzungsberichte der Wissenschaften in Wien, Mathematisch-naturwissenschaftliche Klasse*, Abt. , Bd. 155, Heft 1 und 2, 1946, p. 34-47. [Direction of ice streams determined by geological observations.]
- ANDRADE, E. N. DA C. Creep of metals and recrystallization. *Nature*, Vol. 16, No. 4115, 1948, p. 410. [Recrystallization during creep produces increased rate of flow in polycrystalline metals.]
- [ANTARCTIC OCEAN: SEA ICE.] Southern ice reports during the years 1946 and 1947. *Marine Observer*, Vol. 18, No. 139, 1948, p. 44-55.
- [ANTARCTIC OCEAN: SEA ICE.] Southern ice reports during the years 1946 and 1947. *Marine Observer*, Vol. 18, No. 140, 1948, p. 114-15.
- [ANTARCTIC OCEAN: SEA ICE.] Southern ice reports during the years 1946 and 1947. *Marine Observer*, Vol. 18, No. 142, 1948, p. 230-33.
- [ARCTIC OCEAN: SEA ICE.] *Bibliography on ice of the northern hemisphere*. Washington: U.S. Hydrographic Office 1945, H.O. Pub. No. 240, xii, 179 pages. (Biblio. for H.O. Pub. No. 550, *Ice atlas of the Northern hemisphere*, 1946, with index of authors, subjects and places added.)
- [ARCTIC OCEAN: SEA ICE.] *Monthly ice charts. Arctic seas. Hudson Bay to Kara Sea. (Revised.)* London, Meteorological Office and Naval Meteorological Branch, 1944, 28 p., 2s. 6d. [Ice conditions during each month.]
- ARMSTRONG, TERENCE. Recent Soviet research on permanently frozen soil. *Polar Record*, Vol. 5, Nos. 35-36, 1948, p. 217-18.
- BADER, HENRI. Theory of non-calorimetric methods for the determination of the liquid water content of wet snow. *Schweizerische Mineralogische und Petrographische Mitteilungen*, Bd. 28, 1948, p. 355-61. [Three field and one laboratory methods are described.]
- BANNON, J. K. Rain making. *Weather*, Vol. 3, No. 9, 1948, p. 261-66. [The seeding of clouds, physical changes in seeded clouds, production of ice crystals, practical possibilities of the method.]
- BESKINE, J. M. Thermic boring. *Forecast* (London), Vol. 10, No. 11, 1948, p. 469-76. [Describes a method of boring by means of a hollow iron lance which burns away in a stream of oxygen passed through it.]
- BRADLEY, CHARLES CRANE. Geologic notes on Adak Island and the Aleutian chain, Alaska. *American Journal of Science*, Vol. 246, April 1948, p. 214-40, illus. maps. [Includes information on glaciation of Adak, from observations made in 1944-45.]
- BROWN, DOUGLAS M. The fourth Neil Douglas Glacier Expedition. *Appalachia*, New Series, Vol. 13, No. 8, 1947, p. 514-17. [Expedition to obtain glacier data for the American Geographical Society visited the principal glaciers of Prince William Sound, Alaska.]
- CAILLEUX, ANDRÉ. *Études de crypédologie*. Paris, Centre de Documentation Universitaire, Tournier & Constans, 1948, 68 p., illus., diags. [Comprehensive account, based mainly on western European and American studies.]