

vaguely, at the level where first signs of a marked cooling appeared. The next four chapters deal with existing glaciers and ice sheets, height of snow line, structure of firn and glaciers, rate and nature of flow including extrusion flow (which is by no means generally accepted), ablation, erratics and moraines. The maintenance of the Greenland ice sheet is attributed mainly to rime, with heavy snow in the relatively warm air of the occasional cyclones which are not deflected by the ice. An analysis of the Antarctic sheet leads to the conclusion that it is larger than is warranted by the present climate. Periglacial effects and the forms of glacial erosion are fully described and illustrated.

The remaining twelve chapters deal with the Quaternary Ice Age. First the various types of glacial and periglacial deposits are described and illustrated, including loess and dune formation. These are well done, but the treatment of interglacial and interstadial formations is disappointingly brief, as also is the chapter on duration and correlation. The biological history of the Quaternary is treated in some detail—fauna and flora, man and his cultures. In view of recent developments it is interesting to note that the author was obviously doubtful about the Piltdown skull. The chapter on movements of the Earth's crust is of considerable interest. The variations of sea level pose an interesting problem, the oscillations due to locking-up and freeing of water in the ice sheets being superposed on a steady fall of over 150 m. from the Calabrian to the present. As the melting of all existing ice would only raise sea level by 60 m. at most, this retreat can only have been due to deepening of the ocean basins.

The chapter on the climate of the Ice Age includes a useful review of recent German work on the Quaternary climate of Europe, which is beginning to lead to a real understanding of the meteorology of that difficult period. The problem of reconciling weakened solar radiation with the fact that the greatest cooling was in northern latitudes outside the tropics is met by invoking increased cyclonic activity in the early stages of the glaciations, due to oceanic temperatures relatively high compared with the land. The final chapter, however, on the causes of ice ages, merely describes some of the innumerable theories which have been put forward, without any attempt at a synthesis.

The reference value of the book is enhanced by the bibliography, which occupies 18 pages or roughly 500 entries. These are of course only a selection, made as a guide to further reading, but apart from the rather great preponderance of German works, the selection appears to have been made with good judgement.

C. E. P. BROOKS

SNOW CRYSTALS. UKICHIRO NAKAYA.

THIS book, noted in the last issue of this *Journal* as published by the Harvard University Press, is now also published in Great Britain by Geoffrey Cumberlege, Oxford University Press, at £4 net.

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 aim 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, publication of glaciological interest.

AHLMANN, H. W.: SON. Glaciärer och klimat i Norden under de senaste tusentalen år. *Norsk Geografisk Tidsskrift*, Bd. 13, Ht. 3-8, 1951-52 [pub. 1953], p. 56-75. [Climate in northern regions during last thousands of years and its effects, especially on glaciers.]

ANTEVS, E. Climate of New Mexico during the last glacio-pluvial. *Journal of Geology*, Vol. 62, No. 2, 1954, p. 181-91. [Cary glaciation in New Mexico resulted from heavier snowfall with a lower mean June-September temperature.]

ARAKAWA, H. Fujiwhara on five centuries of freezing dates of Lake Suwa in central Japan. *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Serie B, Bd. 6, Ht. 1-2, 1954, p. 152-66. [Description of Lake Suwa and table of freezing dates from 1443 A.D. to present day.]

BALL, F. K. Dirt polygons on snow. *Weather*, Vol. 9, No. 10, 1954, p. 322-23. [Polygons observed with no dirt: possible explanation.]