

distribution of present day glaciers in terms of the alimentation-ablation balance. The remainder of the first chapter is devoted to the classification of glaciers mainly from the point of view of the geomorphologist. The second chapter outlines the methods available for the determination of the age of Quaternary glacial deposits and summarizes the chronology and extent of Quaternary and earlier glaciations. The final part of this chapter briefly describes the hypotheses developed to explain the climatic changes of the Quaternary period.

The second part of the book (Chapter III) is more directly concerned with the study of snow and ice. The changes that occur in the transformation of snow to ice are described, but little attempt is made to explain the mechanism of the process. By way of introduction to the mechanism of glacier movement, numerous observations on the velocity of glaciers (mostly temperate) are given, and brief mention is made of the properties of ice as determined in the laboratory. The authors note that some 80 theories have been evolved to explain the movement of glaciers, but consider that most are marred by two serious errors:

(1) The extrapolation of laboratory results without sufficient understanding of natural conditions.

(2) Incorrect extrapolation from oversimplified hypotheses.

The hypotheses of Demorest, Nye, Finsterwalder and Haefeli are outlined, but without comment. This part of the book is completed by a review of the theories of glacial erosion and their modification in relation to the development of land forms. The "ultra-glacial" theory, developed towards the end of the nineteenth century, claimed that moving ice was a sufficiently powerful erosive agent for the ultimate land form to be independent of the pre-glacial one. At the opposite extreme was the "anti-glacial" theory developed by Heim, Freshfield and others, that the glaciers acted as protective agents and prevented erosion. A more modern form of this extreme view has supposed that glaciers were capable of acting in the manner of a bulldozer and removing loose surface material. Current morphological opinion would seem to steer a moderate course between these extremes.

The third and largest part (Chaps. IV, V & VI) of this volume deals with the development of those land forms attributable to the action of snow and ice. The problem of cirque formation is dealt with at some length, the older ideas being dismissed in favour of those of W. V. Lewis.

While of considerable interest to the geologist and the geomorphologist the bulk of this part and the whole of the last part (Chaps. VII & VIII), which deals with the indirect consequences of glaciation, would seem to be beyond the scope of glaciology.

The authors have covered a great deal in a comparatively small space and have succeeded in putting forward many points of view, albeit somewhat briefly. The bibliography of some 500 references appears to be well chosen and provides ample material for further study.

It is unfortunate that the quality of production of this book is so poor; line drawings of photographs have suffered especially.

D. W. HUMPHRIES

GEOGRAPHY OF THE NORTHLANDS. *Edited by* GEORGE T. KIMBLE *and* DOROTHY GOOD. (American Geographical Society Special Publication No. 32.) New York, The American Geographical Society *and* John Wiley & Sons, Inc.; London, Chapman and Hall, Ltd., 1955. 534 pages, 43 text-figures, 75 plates, map. Price £4 4s. *od.*

THE very comprehensiveness of this book forces it to deal in a general manner with its vast subject. There are thirteen chapters on such varying subjects as physiography, weather, biogeography, aboriginal and immigrant populations, economy, transport, and strategic aspects. In addition there

are fourteen chapters on regional studies of the districts and countries of the Northlands—the North American, the northern Atlantic, the north Scandinavian, the various Siberian districts and north Russian islands.

These twenty-seven chapters have been contributed by fifteen authors, each an expert on his or her particular subject or subjects. Those of the regional studies devoted to Russian territory, all by Professor B. Zaborski of McGill University, should make particularly interesting reading for those to whom this part of the world is almost entirely unknown.

For the glaciologist the chapter on water masses, circulation and ice cover by Professor Maxwell J. Dunbar and that on weather and climate by Professor Kenneth Hare give a general summary of the subjects, but the emphasis must be on the word "general". The diagrams in these two chapters suffer a little from their small size and the absence of easily detected coast-lines.

Great credit is due to the Editors who have accomplished what must have been a most difficult task in its complexity and the enormously wide field covered. The production, with the minor exception mentioned above, is admirable and the index is excellent.

G. SELIGMAN

GLACIOLOGICAL LITERATURE

Owing to a dispute in the printing industry, this has been unavoidably deferred and a larger bibliography will be included in the next issue.

ERRATUM

BRITISH RUWENZORI EXPEDITION, 1952. Herr E. Bergström requests that the first two sentences of the caption to Fig. 7, p. 471, of his article in No. 17 (April 1955) of this Journal be amended as follows:

Diagrammatic sketch showing the formation of lichen zones in front of a Ruwenzori glacier. The area outside the outermost zone and moraine has probably never been covered by recent glaciers. The innermost zone . . .