

Manitoba to survey the present status of Lake Agassiz studies. The outgrowth of that meeting was an attractive volume of papers, ranging over a variety of subjects, which illustrate the effectiveness of a multi-disciplinary approach to the investigation of Pleistocene problems.

The proceedings of the conference are divided into three principal parts which deal with the physical, biological, and archeological history of the lake basin. Approximately half the book consists of nine papers on the geology of Glacial Lake Agassiz; of these, two deserve special mention. The longest, and what many will find to be the most useful paper, is an extensive summary of the geology by John Elson which emphasizes contributions made since Upham's work was completed and attempts to place the geologic history of the lake in a chronologic framework. The literature on postglacial uplift is concisely surveyed in a review paper by Walter Kupsch who discusses the evidence for uplift in the Lake Agassiz basin and draws analogies between the Laurentide Ice Sheet and the Scandinavian, Greenland, and Antarctic ice sheets. Other papers, which are more local in emphasis, deal with the geology in the vicinity of the principal lake outlets, with subsurface geology, and with present and former drainage.

The contributions of paleoecologic studies to the environmental history of the Lake Agassiz region are presented in seven papers which are concerned largely with the paleontological record. Although considerable data has been accumulated on the fossil floras and faunas, the difficulties in correctly interpreting the evidence are repeatedly emphasized. These difficulties arise primarily because ecologic factors influencing modern populations are as yet poorly understood. To quote one author: "If, with inadequate ecologic information, we insist upon detailed paleoecologic-paleolimnologic reconstructions we can be assured of failure. We can and should attempt to reconstruct the fossil populations, but we should not attempt to go beyond the limits of our knowledge of Recent ecologic information." The degree to which certain paleoecologic information can be used in reconstructing past climates is effectively demonstrated in a paper by Reid Bryson and Wayne Wendland who propose some "tentative climatic patterns for some late glacial and post-glacial episodes in central North America." On the basis of geologic evidence, fossil pollen, vertebrate fossils, and archeology they have reconstructed the pattern of atmospheric circulation for the critical periods of 13,000 to 10,000, c 8000,

and 5000 to 3500 years ago. Such attempts at synthesis are to be applauded not only for bringing together a voluminous mass of data, but for pointing out areas where additional information is needed.

The final section of the symposium volume includes two papers on the human population of the Lake Agassiz region. A review of the prehistory of the lake basin by William Mayer-Oakes provides the reader with a concise history of archeological work and with the framework within which the present research is being carried on. Archeologists are among the greatest beneficiaries of interdisciplinary research, for all aspects of the environment relate to man. Although when compared with geologic studies archeologic work in Manitoba is still in its early stages, the potential for fruitful environmental archeologic research is obvious when one reviews the list of titles in this symposium volume.

The success of the Conference can be measured to a large degree by the stimulus it provided for these workers to publish the results of their current research collectively, thereby providing scientists in many different disciplines with a most-welcome and up-to-date survey of Glacial Lake Agassiz. Hopefully this volume will serve to encourage the organization of similar environmental conferences on selected geographic regions.

Stephen C. Porter

LE PÉRIGLACIAIRE PAR L'IMAGE — ILLUSTRATED GLOSSARY OF PERIGLACIAL PHENOMENA. BY LOUIS-EDMOND HAMELIN and FRANK A. COOK. Québec: Les Presses de l'Université Laval, 1967. 7 x 10 inches. 237 pages, 121 illustrations. \$10.00.

The scientific study of landforms and sediments in the contemporary periglacial regions and in the periglacial zones of the cold phases of the Pleistocene, has made great progress in the last two decades. Major developments followed the establishment of a 'Commission on Periglacial Morphology' by the International Geographical Union in 1949, including the creation of a scientific journal, *Biuletyn Peryglacjalny*, in 1954. A characteristic of research in the period has been the close contacts between central European (particularly Polish), Scandinavian, French, and Anglo-American field workers. Despite this development of international contacts, serious problems of terminology have occurred, inherited largely from the

isolated national growth of periglacial research in the early part of the century. One of the objectives of the I.G.U. commission was to provide acceptable definitions of periglacial terms, but in this it has not been productive.

It is consequently a pleasure to record the publication of an illustrated glossary of the major elements in the periglacial landscape. The book is divided into three parts: the first describes features that result from the presence of ice in the ground, on the surface (including snow) and floating ice; the second illustrates the features developed by running water and wind action in periglacial environments; and the third deals with periglacial patterned ground and mass movement. Over fifty distinct phenomena are identified, illustrated with photographs, and described briefly, often with reference to the earliest use of the term. Nearly half the illustrations, in keeping with the field experience of the two authors, are from Canada, and the remainder, equally, are from other northern lands and Pleistocene periglacial regions.

The choice of terms to be described was obviously not easy. For example, the effects of frost shattering are depicted adequately whilst the section on patterned ground is, for this reviewer, too brief; the simple classification introduced by Washburn is followed and consequently the great variety of 'frost-soils' is not emphasized. Possibly, if space was limited, it would have been better to leave out the landforms which are *sensu stricto* periglacial, having been formed adjacent to glacier ice as in the discussion of ice thrust moraines illustrated from Axel Heiberg Island. Several of the sections are outstanding. Note should be taken particularly of the essay in French on ice wedges. Inevitably field workers will find detail to criticize in pioneer work of this nature, but congratulations are deserved for the authors and for the former Geographical Branch for encouraging this study.

The decision not to restrict the glossary to one language, but to make it bilingual, English-French, not only has the effect of reaching a wider audience, but has brought out most effectively the differences of approach between French (including many French-speaking Canadians trained in France and Belgium) and Anglo-American periglacial geomorphologists. It has long been obvious that there are subtle and, in some cases, not so subtle differences in the translation of periglacial terms between English and French. Indeed, there is often no term in the one language for a word used in the other. The authors have, in these cases, been forced

to retain the term in the other language or, in some cases, to translate it directly into English. It follows that rather unusual words appear in the English section as, for example, nivo-karst, for the microforms that commonly develop on carbonate surfaces in the presence of melting snow.

Before the glossary could be completed, the English language co-author (F. Cook) died and no attempt was made to achieve close agreement between the English and French descriptions of the various phenomena. The result is that a highly interesting study can be made of the contrasting descriptions of the English and the French versions. In most cases, they are similar although rarely is a direct translation used. In a few cases, however, there are major differences and these have been retained. For example, in the section on Involutions, the English view is apparently that they are a periglacial phenomenon whereas the French opinion is more guarded and leads to a choice of origins. This difference between a somewhat dogmatic approach in the English version and a greater awareness on the French side of the value of several hypotheses is evident in places. The result is a book that will be of interest and value as an introduction to the subject in the field whilst close analysis will provide rewards for the advanced worker.

Laval University Press has shown considerable imagination in the production of a book where page layout was complicated by large numbers of photographs, diagrams and references, but it was perhaps unfortunate that a more pleasing type face was not chosen. The glossary is, however, an excellent piece of work and one which must be recommended to all arctic field workers, whether or not they are specialists in periglacial morphology and additionally, to earth scientists who can expect to find many of the sediments and landforms that are described in fossil localities in mid-latitudes.

J. Brian Bird

GUIDE TO THE CLIMATIC MAPS OF CANADA. BY M. K. THOMAS and S. R. ANDERSON. *Canada Department of Transport, Meteorological Branch, 1967. 8½ x 11 in. 108 pages. \$1.00.*

This publication brings under one cover the references to all or nearly all published climatic maps (since 1938) of Canada. It is divided into four parts: Part I is an index of national climatic maps arranged alphabetically by climatic elements such as clouds,