

GLACIAL AND PLEISTOCENE GEOLOGY. RICHARD FOSTER FLINT. New York, John Wiley, 1957, XIV, 553 pages, illus., maps. 23½ cm. £5 os. od.

STUDENTS of glaciology and of Pleistocene or Quaternary times in all its aspects are all too well aware of the tremendous rate of publication of the results of research activity. Quite outstanding developments giving a "new look" to these subjects have taken place during the last decade as a consequence of the improvement of techniques or introduction of novel methods of investigation. Among these may be mentioned the three-dimensional studies of glaciers by tunnelling and bore-hole techniques; the introduction of new methods of dating of deposits, such as the use of radio-carbon for late and post-glacial times; the great increase in exploration of the ocean floors leading to the study of continuous deposition from pre-Pleistocene times by means of cores giving standard successions permitting comprehensive correlation by faunal, physical and chemical data, including inferences as to the occurrence of temperature changes from oxygen isotope data, absolute correlation by volcanic ash layers, etc., and the elaboration and extension of the results of pollen analysis. In addition to all these fields of progress there is the growing body of specialist research workers on both ice masses and glacial deposits, covering ever wider regions, in all presenting a wealth of material that is difficult for any one individual to comprehend. Nevertheless, knowledge of the nature of ice movement, the changes of climate and process, with the accompanying alterations in the type and character of weathering and of erosional depositional activity, the local and world-wide oscillations of sea-level, contribute to our knowledge of glacier regimens past and present. They are indeed so intimately interlocked that it is still highly desirable that the glaciologist should keep a broad view of this vast kaleidoscopic panorama as a whole.

In 1947 Professor Flint presented his "Glacial Geology and Pleistocene Epoch" which provided such a broad view. As a medium-sized book, entirely up to date, it has had a deserved high place in the text-books dealing with glacial geology and the Pleistocene.

It is with understanding that one reads in the preface to his new work "Glacial and Pleistocene Geology" that he found an attempt to revise his earlier work necessitated a new book. This new volume is significantly shorter than the earlier one, and it is of interest to ascertain how so much new work has been incorporated in a smaller space. The first clue is given in the new title; there is in fact a closer integration of glaciology and glacial processes with the principal events of Pleistocene times. "A larger treatment" of glacial geology is claimed. This is particularly true of processes which are clues to the interpretation of Pleistocene deposits. The treatment of such interesting topics as the physics of ice and indeed also the mechanism of ice movement in rather a summary form is justifiable in that knowledge is still limited and its application to geomorphological processes in glacial geology still tentative. Changes of the relative levels of land and sea are now treated in two chapters rather than one, thus separating two quite distinct aspects, crustal warping and fluctuations of sea-level.

Descriptive matter, for example distribution of present ice masses, is treated somewhat more briefly and there are many minor improvements such as the abandonment of genetic expressions such as "friction cracks" for descriptive terms and the transfer of rock glaciers from the section on glaciers to a frozen ground association.

There is naturally and deliberately considerable emphasis on North American Pleistocene stratigraphy, but a balanced coverage of the Pleistocene of the world is nevertheless provided.

The achievement of the incorporation of much new material in spite of an overall decrease in size is linked with an increase in the number of valuable text figures from 88 to 140, and, most useful of all, by a similar proportional increase of tabulated matter, of which the correlation charts are of outstanding merit.

Our thanks and congratulations are once again due to the author for a masterly, closely knit, and well integrated volume essential to all interested in glacial geology.

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