

authorities. The information presented in the Anniversary Volume by Mr. Browne was gathered chiefly on trips to the area in connexion with this investigation.

The article contains a description of the glacial features in the highly glaciated area around Mount Kosciuszko, illustrated by a sketch map, and a short concluding paragraph on the interpretation of the observations. The description is too detailed and the map too crowded for satisfactory reading in one's study; but it will be invaluable to anyone on the site wishing to get a grasp of the work already done, and of the interpretation reached by previous workers. It is to be hoped that good use will be made of it for this purpose, for a great deal more field-work is necessary before all the information which the region can give has been extracted. Mr. Browne's interpretation of the observations can be summarized in a few sentences, chiefly in his own words:

"The glaciation of the Kosciuszko region is capable of being divided into three episodes. The first was a calotte or ice-cap glaciation, the next was characterized by valley-glaciers, and the last was marked by small cirque and valley-head glaciers. Whether these are all phases of one cycle of glaciation or were independent and distinct and separated by long time-intervals is a debatable question." Two questions are asked "(a) Were the three glaciations distinct and separated by interglacial stages, or were they all phases of one stage? (b) With what glaciation of the Northern Hemisphere are they to be correlated, if we assume synchronism of glaciation?" After a discussion of these questions the following answer is reached: "All the circumstances considered, it seems better to refer the glacial phenomena to three distinct glacial stages than to group them as phases of one glacial stage. . . . There are at present no reliable bases for correlating these with the Pleistocene glacial stages of Europe and North America, and the best that can be done is to refer them provisionally to the Mindel, Riss and Würm stages respectively." G. C. SIMPSON

LA GLACE ET LES GLACIERS. V. ROMANORSKY *et* ANDRE CAILLIEUX. Paris: Presses Universitaires de France, 1953. 120 pages, 20 text-figures. Price 150 francs.

THIS small book is number 562 in the "*Que sais-je?*" Series of Presses Universitaires de France, an excellent collection roughly equivalent to the Pelican Series. It sets out to discuss the physical properties and occurrence of ice, and, in particular, its presence in glaciers of to-day and of the past. In such a field it would seem to have a place to fill, since a small and authoritative book at a reasonable price is not readily available. Unfortunately this book does not completely supply the need, for it is marred by several errors of fact in the first part, where, for example, it is stated that "la température de fusion de la glace augmente avec la pression, ainsi à 50000 kg/cm² la glace ne fond qu'à 200°." This statement gives a totally wrong impression, for the melting point of ice at first drops as the pressure increases, reaches a minimum of -20° C. at 2,000 kg./cm.² and then rises to reach 200° C. at the pressure quoted. Other mistakes include the statements that one angström unit is a ten-thousandth (instead of a ten-millionth) of a millimetre, that the iceberg aircraft-carrier was an American project and that the *Journal of Glaciology* is published by the Royal Geographical Society. The diagram given for the position of the atoms in the structure of water is incorrect; all the points marked are the sites of oxygen atoms, not half oxygen and half hydrogen as indicated (this figure has been miscopied from a correct version in the quoted source). Apart from these errors and several misspelt names, the book covers its ground adequately, the second part being much the more satisfactory.

The subjects dealt with in the first part include the relation between water and ice, the structure of ice and its physical and mechanical properties, methods of studying ice in glaciers, ice in the atmosphere (but rather curiously omitting snow), ice in lakes and rivers, sea ice, icebergs and the industrial production of ice. The second part comprises a general description of glaciers, secondary effects of glaciers, glacial erosion and sedimentation, history of glaciations and mechanisms and causes of glaciations. In a book of this kind new ideas are not to be expected, and the matter in this volume is mostly of an agreed nature, although the use of the term "*zonation*" for structures

in glacier ice formed by pressure during its motion is new to the reviewer. With the exception of the mistakes mentioned above, this book is a useful concise summary of the field, and also introduces most of the French equivalents for most of the more common glaciological terms. Its format is, of course, not lavish, but, for the price, quite adequate.

J. W. GLEN

THE ANTARCTIC TODAY. *Ed.* FRANK A. SIMPSON, A. H. and A. REED in conjunction with the New Zealand Antarctic Society. 1952. 389 pages, 46 plates, 50 text-figures, folding map. 47 shillings and 6 pence.

THE New Zealand Antarctic Society has recently produced an attractive volume in order to portray the Antarctic from the view-point of the South Pacific and South Indian Oceans. As a timely mid-century survey of the problems of Antarctic research a number of contributors provide useful accounts and critical summaries of different fields of work in that region.

The primary importance of glaciological studies to any general understanding of the Antarctic is well realized throughout the book, and emphasized by making glaciology the first subject for specialized discussion. The introductory chapter states the delightfully long-term view that "It may eventually be necessary to chart the ice movements much as the currents of the sea are charted." Practicable future developments are, however, indicated by the former leader of the Australian National Antarctic Research Expedition who states "The future development of the Antarctic would seem to be not in economic exploration, but in providing sites for bases where meteorological and other physical studies can be made in high southern latitudes." This appears to be the aim of the present leader, Mr. P. G. Law, and it is hoped that glaciology will benefit considerably from his long-term planning.

The chapter dealing specifically with glaciology has been written by Professor N. E. Odell, a glaciologist of wide experience in the northern hemisphere who is now Professor of Geology at Otago University. He has drawn carefully on a wide range of recognized authorities up to almost the middle of the century and expresses the general ideas of the late nineteen-forties. He has drawn attention to the importance and nature of the preliminary reports from the expedition to Dronning Maud Land, but their work, the French results from Greenland, and recent theoretical work on ice sheets have appeared too late to influence the author. Being in close touch with these changes I have an unfair advantage as a reviewer. The author's acceptance of 600 m. as the probable maximum thickness of the ice sheet is now too small by a factor of around five. In consequence I would like to modify his reference to the "now only historic calculations of James Croll." I feel Croll deserves more credit than this, as in 1879 he considered the surface inclination necessary to cause flow, and according to my reading he consequently calculated the ice thickness at the South Pole to be 7 miles, but gave 3 miles as a reasoned guess. Both this figure, and the factors he considers as necessary for ice flow roughly agree with some current views. Gould's concept of an Ice Divide parallel to the Victoria Land Horst is another well-recognized hypothesis which I feel should now be considerably modified in view of recent knowledge.

The connection between floating glacier tongues and depression glaciers is emphasized as providing the major outflows of ice from the continent. With regard to wastage of such tongues and of ice shelves, bottom-melting has been stressed more than the calving of icebergs.

A summary of different forms of sea ice is concise and clear, and the size and density of Antarctic bergs have been soundly discussed as distinct from bergs elsewhere. The passage here on relative movements of icebergs and pack ice in strong winds is at variance with the description given in each of two later chapters on ice navigation with which I agree.

The discussion of the erosive effects of Antarctic ice appears sound. Plastic flow has, however, not been stressed, while other ideas on flow appear to deal mainly with local features. The importance of Antarctic studies as a means of improving our knowledge of Pleistocene glaciation has been well emphasized.