

appreciation of the physical processes underlying image formation render such arguments sterile. Unfortunately, this does not seem to have penetrated to all writers of text-books on microscopy, and one often finds a good deal of heat generated on the relative merits of Köhler and "critical" illumination, on the reasons for using highly corrected condensers and on the exact limits of resolution. Professor Martin's book discusses such matters and many more. It is a considerable achievement to have covered so much ground while striking a nice balance between mathematics and physical principles. To have done so after official retirement is little short of amazing.

R. BARER

## ELECTRON MICROSCOPY

### Introduction to Electron Microscopy

By Cecil E. Hall. Second edition. (International Series in Pure and Applied Physics.) Pp. ix + 397. (New York: McGraw-Hill Book Company, Inc.; Maidenhead: McGraw-Hill Publishing Company, Ltd., 1966.) 140s.

It is unusual to find a second edition of a book concerned with applied physics which is shorter than the original. When the subject is electron microscopy, it is little short of astonishing. As the author says in the opening sentence of his preface, the rate of advance has been rapid since the first edition appeared in 1953. Yet he has been able to cut the text by more than 50 pages, while including a certain amount of new material.

It is questionable whether his efforts have been altogether successful. Some of the matter excluded, chiefly descriptions of commercial models of electron microscopes and of particular applications, could well have been retained if only to give the reader a clearer view of what the finished instrument is like and of its power as a research tool. On the other hand, the positive revision of the text has been much less thorough than is suggested by the blurb. The main body of the text, in fact, remains unchanged although a certain amount of re-arrangement has been done, such as the transfer of the historical survey from Chapter 8 to the opening chapter where it properly belongs. The "considerable revision" of Chapters 8 and 9 comes down to the addition of a few paragraphs on electron scattering, on measurements of Fresnel fringes and on television display systems. Chapter 10, on "Techniques and Applications", has necessarily received greater revision.

From the point of view of microscopy as at present practised, there is inadequate treatment of anticontamination devices, photographic emulsions for electrons and the examination of metal films. In respect of current research with a bearing on the future of electron microscopy, there is only a bare mention of quadrupole lenses and of energy analysis of the imaging beam, and none of Riecke and Ruska's new type of objective lens. The section on high voltage microscopes has now been omitted, in spite of the striking work going on in France and Japan. In general, recent work in France and Germany is little mentioned; the names of Castaing and Möllenstedt do not appear in the author index.

That said, it remains true that this is the best text-book on the subject we have. It was originally, and still is, based on a one-term course given in the Biophysics Department of M.I.T. As such, it is rightly concerned with fundamentals and not with a complete presentation of the state of the art. To do the latter now calls for the combined efforts of a team of specialists in its various branches, as for the recent French work in two volumes, *Traité de Microscopie Électronique*. Taken together with the books listed in his appendix, Professor Hall's text will continue to serve as the recommended introduction for research students and others new to electron microscopy.

V. E. COSSLETT

## REINVASION OF CANADA

### Evolution of Canada's Flora

Edited by Roy L. Taylor and R. A. Ludwig. Pp. viii + 137. (Toronto: University of Toronto Press; London: Oxford University Press, 1966.) 44s. net.

THE Founding Meeting of the Canadian Botanical Association held in Ottawa in 1965 developed the scientific theme of the evolution of the flora of Canada, and this volume is a symposium of the chief papers presented. Since the Tertiary uplift of the Rocky Mountains system, Canada has undergone a sequence of glaciations of great extent and severity. Very little trace remains of the effect of pre-glacial or even interglacial conditions and the whole of the existing fauna and flora is the consequence of migration and re-establishment since the maximum of the Wisconsin glaciation about 20,000 years ago. Canadian botanists have begun to exploit the essential tools for reaching objective conclusions on the Quaternary history of their vegetation—radiocarbon dating, palynology, the identification of macroscopic plant remains, the applications of genetic analysis and the detailed study of patterns of distribution. This symposium reflects the progress made by the use of these methods since the pioneering research into biogeography by Marie-Victorin and Fernald early in this century. Contributions on algal zonation on the Pacific coast and on the nature of vegetational propagation have only a marginal link with the main theme of the volume, but are very interesting in themselves. Those contributions which lie in fields of current scientific activity are of a high standard and great interest. One or two others concern themselves less rewardingly with consideration of general concepts. The general unevenness is a consequence of the sparsity of botanical scientists in so vast a territory as Canada, but the symposium affords very welcome evidence of activity and advance towards biogeographic studies which will be of great importance not only to botany but to associated disciplines of archaeology, geology and climatology.

H. GODWIN

## ADVANCING BOTANY

### Advances in Botanical Research

Vol. 2. Edited by R. D. Preston. Pp. xii + 382. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1965.) 75s.

THIS second volume of *Advances in Botanical Research* contains six articles by leading authorities in their respective fields, which include the phyletic implications of flagellar structure (I. Manton), numerical taxonomy (W. T. Williams and M. M. Dale), the ultrastructure of the wall in growing cells (P. A. Roelofsen), cell wall protein (D. T. A. Lamport), embryology (P. Maheshwari and N. S. Rangaswamy) and soft rot fungi (J. Levy).

In his introduction to the first volume, the editor explained that the authors had been invited to express opinions freely and "to speculate as widely as they dare". The articles, therefore, differ in character from the somewhat colourless catalogues so frequently encountered in review journals, and we have lively and stimulating accounts, in which the personalities and viewpoints of the authors come through clearly.

With so wide a range of specialisms, it would be presumptuous to comment in detail on the particular articles. But, judged from the standpoint of the non-specialist reader who wishes to bring his reading up to date in fields outside his own specialism, the articles differ considerably in intelligibility and in interest to the general reader; some, such as the articles on cell wall ultrastructure, embryology and soft rot fungi, can be followed easily and profitably by the non-specialist, whereas others are too difficult or too specialized and are primarily of value to