and sources outside North America are well represented. Students interested in further reading on specific topics will have to depend mainly on the captions to the figures for references. A handful of general references are provided at the end of the book, but none follow the individual chapters. Many authors are mentioned by name in the text, but rarely is so much as a date given to aid the student who wishes to read further. Many specific studies are mentioned, but the name of the investigator responsible is often omitted.

The text is clear and readable but not very well edited. Incorrect spellings and misprints are conspicuous. The sections on igneous and metamorphic rocks apparently owe much to *Igneous and Metamorphic Petrology* by F. J. Turner and J. Verhoogen (McGraw-Hill, New York, 1960), but the story has lost a great deal in the retelling.

In the preface the author states that: "Modern petrology has become physical chemistry applied to the crust of the earth." This is perhaps true, but this book does little to advance the cause. In the discussion, for example, of the calcite-wollastonite-quartz–carbon dioxide equilibrium curve (p. 355), the author reveals an ignorance of the distinction between homogeneous and heterogeneous equilibria, of the significance of a univariant curve, and of the nature of catalysis. Most instructors will undoubtedly conclude that the labor involved in setting students straight on such matters will more than offset the strong points of this text. It is, in general, a rather disappointing book, not up to this publisher's usual standards.

JAMES B. THOMPSON, JR.
Department of Geological Sciences, Harvard University

Paleobotany

Morphology and Evolution of Fossil Plants. Theodore Delevoryas. Holt, Rinehart, and Winston, New York, 1962. ix + 189 pp. Illus. $4.50.

This excellent book is true to its title. Most chapters, or subdivisions of large chapters, consist of descriptions of the internal and external morphology of important members of the groups considered, followed by a discussion of the evolution of the groups and the evolutionary principles illustrated. Each chapter is terminated by a well-chosen bibliography, but literature citations are not made in the text.

The book is distinguished by beautiful illustrations, including many reconstructions, a large number of which were prepared by Delevoryas and his associates. The text, although comprising only 182 pages, is remarkably comprehensive. The writing is concise. Every sentence is important. Emphasis is placed on significant morphological features, such as the order of maturation of primary xylem, nodal and petiolar anatomy, the nature of the pitting of the secondary tracheids, branching patterns, vascularization of both vegetative and reproductive structures, and the structure of fructifications. The treatment of all groups is not equally comprehensive, however. For example, Devonian plants, especially psilophytes, and angiosperms are given relatively brief treatments, whereas Pennsylvanian plants, especially lycopsids, sphenopsids, coenopterid ferns, and pteridosperms are given a more intensive coverage.

The book is organized around a traditional classification. The initial chapter, on the preservation of fossil plants, is followed by a discussion of fossil algae, fungi, and bryophytes. The remainder of the book consists of ten chapters on vascular plants, a final chapter of summary and conclusions, and an index. Under the division Tracheophyta, subdivisions Psilopsida, Lycopsida, Sphenopsida, and Pteropsida are considered in sequence. Classes of pteropsids included are Pterophyta, Cycadophyta, Coniferophyta, and Angiospermophyta. Subdivisional and class endings do not conform to the current *International Code of Botanical Nomenclature*, but are, instead, those that have been commonly used in the morphological literature. Some confusion may result, since all except the latter of the class names have also been used as the names of divisions or phyla in several recent textbooks. Among the most interesting are several short transitional chapters entitled "The appearance of land vascular plants," "Seed plants," "Problematical cycadophytes," and a section of one chapter called "Problematical and transitional ferns."

Morphological paleobotany today is a dynamic and rapidly progressing field. Many significant discoveries and interpretations have been made during the past decade which have added to our knowledge of plant evolution. Delevoryas has prepared a book which, more than any other in English, emphasizes the evolutionary aspects of paleobotany. Furthermore, where interpretation and speculation are encountered, they are the thoroughly considered opinions of one who combines the best of classical theory with modern evolutionary thought.

Every biologist interested in plant evolution should own this book. There is not a better book on morphological paleobotany available, no matter what its size.

CHARLES B. BECK
Department of Botany, University of Michigan

Autobiography of a Science

Fifty Years of X-ray Diffraction. P. P. Ewald, Ed. Oosthoek's, Utrecht, Netherlands, 1962. ix + 717 pp. Illus. $11.25.

In July 1962 a commemoration meeting was held in Munich, Germany, to celebrate 50 years of x-ray diffraction. The principal actors in the beginnings of that drama, which took place in 1912, were Max von Laue, W. Friedrich, P. Knipping, and P. P. Ewald. Appropriately enough, the president of the International Union of Crystallography, under whose auspices the 1962 meeting was held, was P. P. Ewald who, looking ahead to the meeting, had been working on a history of x-ray diffraction to be published in time for the meeting.

This book contains eight sections of widely differing lengths, an appendix consisting of biographical notes on the authors, and a subject index. The first three sections are entirely Ewald's work. A five-page introduction is followed by a section consisting of four chapters that describe the early days of x-ray diffraction: Röntgen's work on the physics of x-rays, classical crystallography prior to x-ray diffraction, Laue's discovery of x-ray diffraction, and a chapter devoted to the very early work of the pioneers—the Braggs, Darwin, Moseley, Debye, Hull, and others. In the third section (two chapters), Ewald tells about the principles of x-ray diffraction and discusses the methods and problems of determining crystal structures.

It would be impractical to describe in detail the remaining sections, which were written by some 40 authors. Sec-