Traité de Paléobotanique

Many years have elapsed since the publication of A. C. Seward's comprehensive summary of paleobotany (*Fossil Plants*, vols. 1–4, 1898–1919, and *Plant Life Through the Ages*, 1933). Not only has our knowledge about fossil plants increased greatly during the intervening years, but much of the new knowledge is derived from the application of techniques that were not known, or had been applied to rather few fossils, when Seward's works were written. Also, palynology has flourished spectacularly, exerting a pressure against the conception of paleobotany as a discipline exclusively for academic morphologists. Thus, for some time now, the need for a modern critical summary of the prehistoric record of plants has been apparent, since there is danger that paleobotany will begin to founder in its sea of diffusion literature. Édouard Boureau has courageously taken the initiative in this onerous task that others have been unwilling to attempt.

Nine volumes are proposed in this treatise, **Traité de Paléobotanique**, edited by Boureau, which is designed as a standard work for paleobotanists and others with an interest in fossil plants. Although it is anticipated that many authors will contribute to the other volumes, volume 3, *Sphenophyta Noeggerathiophyta* (Masson, Paris, 1964. 544 pp., F. 185), the first volume to be published, is exclusively the work of Boureau. It is a systematic treatment of the closely related divisions, Sphenophyta and Noeggerathiophyta, with some considerations on their evolution. The scheme of classification adopted adequately summarizes current knowledge and provides a solid core of respectability on which the rest of the book is built. Minor objections can perhaps be raised to the absence of families in the classification of the Noeggerathiophyta and to the inclusion of *Sphenostrobus* in the Sphenophyllales. Many people believe, with good reason, that *Sphenostrobus* is the only known petrified genus of noeggerathiophytes.

Well over 600 species are included, and just under half are illustrated by extremely well-produced photographs and line drawings that make the volume a beautiful thing to possess. Considered as a whole, the illustrations are well chosen and informative, but a systematically important genus like *Discinites* perhaps merits more extensive illustration than it has received. (The critical reader will note that figure 59 is upside down.) All except 14 of the genera included in the volume are illustrated, and where illustrations are lacking, the fault is usually attributable to the fact that the authors who established genera provided illustrations that were not suitable for use in compilations like the *Traité*, although, in a few cases (for example, *Raniganjia*), perfectly good illustrations are available.

It is inevitable that in a compilation of this sort coverage of recognized species and of synonyms is sometimes selective rather than comprehensive. Diligent search through up-to-date card indexes, floras, and bibliographies cannot fail to reveal additional sources of information. For instance, careful comparison with the *Index of Generic Names of Fossil Plants* (1955) reveals that more than 30 generic names of putative sphenophytes have been omitted. Some of them, like *Chlamidostachys*, deserve careful consideration, while others are perhaps suited only for reduction to synonymy. Then, a careful comparison with the species listed for almost any large genus in the *Paleobotanical Species Catalog* will reveal many omissions. Furthermore, in a number of cases, old literature on species is cited with no direct reference to modern critical works. Cases like the description of the sporangiophore of *Calamostachys binneyana* as peltate (as in Equisetaceae), when it is known to be cruciate (as in protoarticulates), will be misleading to students of evolution.

Paleobotanical nomenclature is notorious for its special difficulties, particularly those associated with formulation of names for combination genera and with the typification of form genera, and it is doubtless a subject that calls for more than usual tolerance. But even the most forbearing nomenclators might complain about such errors as the following: citing a date of publication of a genus (*Calamites*) more than 30 years before the starting point of paleobotanical nomenclature; a genus (*Asterophyllites*) without a type species; and the clear violation of the principle of priority in substituting the generic name *Sphenophyllostachys* for *Bowmanites*. In the systematic treatment, formal definitions of taxa higher than species, are sometimes omitted. Thus, there are no definitions of Sphenophyta or Noeggerathiophyta; families as important as Sphenophyllaceae and Archaeocalamitaceae are not defined clearly, while the descriptions of others—for example Sorocaulaceae and Equisetaceae—leave much to be desired. Predictably, the treatment of fossils that perhaps represent modern genera is not clear. If only all those species included in *Equisetum*, as distinct from *Equisetites*, were in fact really known in all respects, as is suggested here! Differentiation of these two genera is all too often a function of the adventurousness or the timidity of the investigator, rather than a reflection of knowledge.

An elaborate attempt has been made to give effective information on the geologic and geographic distribution of most species, and it is obvious that this task has been approached with considerable diligence. An abundance of information is therefore available, but since no consistent attempt has been made to present it in terms of geologic systems and periods in addition to their subdivisions, most of it is readily available only to specialists. Plant morphologists may reasonably be expected to be aware of the relative significance of common geologic terms like Jurassic and Carboniferous, but it is doubtful that many are familiar with terms like Tournasian, Keuper, and Jido Series, which sometimes represent the complete stratigraphic information given in this volume. This problem has been partially resolved by the inclusion of a range table based on major geologic units for most of the species of the Sphenophyllales, but such tables are not provided for other orders. Lack of formality in the application of stratigraphic terms has led to some peculiar hybrid terminology. It is, for example, typical that strati-

graphic data for many specimens from the American midcontinent are given in terminology applicable to the Appalachian region. The curious French practice of translating foreign geologic names has been followed strictly and has introduced at least one source of confusion—plants from the British Lower Coal Measures (Upper Carboniferous) are almost invariably represented as originating from Lower Carboniferous rocks.

Although the work is published on high-quality paper and much expense and care has gone into production, some routine editorial chores have been given skimpy attention. There are many typographical errors; all too frequently, works cited in the discussion are not listed in the bibliography; in some cases, references in the text are over abbreviated (most people will be frustrated by examples like "*Neocalamites squamulosus* Turutanova-Ketova 1962," for "*Neocalamites squamulosus* Turutanova-Ketova, in Prynada and Turutanova-Ketova, 1962"); many works listed in the bibliography are nowhere cited in the text.

It is clear that this volume has shortcomings, but they must be considered in relation to the nature of the task so ambitiously undertaken. It then becomes surprising that one man has been able to accomplish so much. There is no doubt that this volume stands as the most significant single source of information on sphenophytes and noeggerathiophytes. The nonpaleobotanist will find it a useful guide to a complex field, and the professional paleobotanist cannot fail to learn from it. The latter should be particularly grateful for the fine coverage of much recent literature from Soviet Russia. All sorts of intriguing questions are apparent when this largely unfamiliar work is placed alongside the more familiar. How different is *Umbellaphyllites* from *Raniganjia* and *Phyllotheca*? Should the genus *Gamophyllites* really be separated from *Equisetinostachys*? Can the distinctions between *Equisetina, Koretrophyllites*, and *Phyllotheca* really be maintained? Are the differences between Sorocaulaceae and Phyllothecaceae really significant? Clearly, Boureau has presented students of fossil plants with a valuable reference volume that will provoke anticipation of the volumes yet to appear in this treatise.

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Nuclear Technology: Analysis of Materials

Analysis of Essential Nuclear Reactor Materials. Clement J. Rodden, Ed. Atomic Energy Commission, Oak Ridge, Tenn., 1964 (order from Superintendent of Documents, Washington, D.C.). xiv + 1280 pp. Illus. Paper, $4.25.

The purpose of this book, as stated in the preface, is to provide assistance in analyzing materials used in nuclear reactors. This purpose has been achieved, and the result is a valuable reference source that provides the information required for the analysis of reactor materials without the need for further literature searching.

The book is a collection of published and unpublished information, with extensive references up to 1961. The practical aspects of analysis have been stressed with minimal attention given to physical and inorganic aspects of the subject. This, however, does not detract from the value of the book.

Each of the 16 chapters was written by one or more experts in the field. The fuel elements uranium, plutonium, and thorium are each given a chapter, as are the moderator elements beryllium and graphite. The poison element boron is discussed in detail in a separate chapter. The reactor coolants water, helium, carbon dioxide, sodium, sodium-potassium, and polyphenyls are treated in one chapter; heavy water is discussed separately. The trace elements that occur in reactor materials are also discussed in one chapter. The last four chapters are devoted to a description of analytical techniques—for example, mass spectroscopy, radiochemistry, electrometric methods, and x-ray spectroscopy.

The main criticism that can be made of the book is that it is disorganized and contains a certain amount of duplication. This, undoubtedly, results from the many types of materials discussed and from the multiplicity of authors. Thus, to locate a particular analytical method, one may have to consult several chapters. This, however, is a minor point that should not seriously affect the usefulness of the volume. Although the quality of the printing is excellent, the paper binding will not withstand the wear and tear that should be expected in a frequently used reference book.

This book can be recommended as a valuable reference book for those concerned with the analysis of materials used in nuclear reactors.

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NATO Advanced Institute on Books and Non-Books

Algae and Man. Based on lectures presented at the NATO Advanced Study Institute (Louisville, Ky.), 22 July–11 August 1962. Daniel F. Jackson, Ed. Plenum Press, New York, 1964. x + 434 pp. Illus. $14.50.

"With the continuous increase in human population and its constant demands on the aquatic environment, there has been a compounding of the interrelationships between algae and man." This opening statement clearly gives the *raison d'être* of the symposium and at the same time intimates the strong bias toward plankton ecology evident in the assemblage of contributions.

These proceedings join the rapidly lengthening list of non-books which result from the combined zeal of publishers and academic entrepreneurs. Granted the propriety of these principals to seek financial compensation and prestige, the effect on science is not wholly salubrious. As if the information explosion is not enough to cope with, we are faced with a far more formidable phenomenon—the publication explosion. The relationship between the two is not linear: the number of cepts per printed page has declined markedly during the past few years. No one can doubt this downward trend after having read the third, fourth, and even fifth rehash of the same review in as many months.

The subject of non-books is fascinating. To those who may think that the term "non-book" is merely *Timese* and hence cleverly meaningless, let me hasten to say that non-books unfortunately exist, although I should like to believe that they are not here to stay. They may be defined as bound fascicles of printed pages ("signatures" in the trade) without literary purpose