quantitation and toward conjointly mechanical and chemical understanding. However, that perspective is conveyed somewhat remotely, two chapters later, in the discussion that essentially concludes the book. The final chapter is actually an appendix of methods and materials. It is comprised of abstracts arranged alphabetically by author, and references to them in the preceding chapters are conveniently distinguished by enclosure in brackets rather than parentheses. There are 13 pages of references through 1967, an author index, and a subject index. The numerous line drawings and electron micrographs are well chosen and well labeled to illustrate discussed points. Most are reproduced better than passably in spite of the economies of coarse halftone screen and paper, but about half a dozen evidence poor control of contrast and exposure. That lapse may be discounted as merely esthetic, and the book is recommended for specialists in the field of fertilization, biologists in related disciplines, and advanced biology students.

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Tropical Crop

Yams. An Account of the Nature, Origins, Cultivation and Utilisation of the Useful Members of the Dioscoreaceae. D. G. COURSEY. Humanities Press, New York, 1968. xiv + 230 pp., illus. $9.50. Tropical Agriculture Series.

This work, the eleventh in the Tropical Agriculture Series, is the third dealing with a major tropical staple. A preferred crop and often the basis of a prestige economy, yams are also a major institution in themselves in the few areas of the intertropical world where they are known to be indigenous. From time to time different writers have analyzed one or more of the many aspects of the "yam culture." The author of this study brings together a vast amount of material in what is the first attempt at anything like a comprehensive overview of the edible yams of the tropical world.

This book is divided into ten chapters which could be conveniently grouped according to three major themes: yams in space and in time, their agricultural and institutional environments, and the technical aspects.

The first two chapters take the reader on a journey "into space and history," introducing him to the crop, the places where yams developed as a "cultivated crop," and the major centers of production and consumption. By a careful examination of the major species and their distribution pattern (such as the tendency to local concentration), Coursey isolates four distinct centers of origin for edible yams, including a West African area.

The agricultural and institutional aspects of yam production are covered in chapters 4, 5, 6, 8, and 9. The conventional topics, including the agronomy of the crop, pest and disease problems, the economics of yam production and consumption, and the social and cultural role of yams in the West African area, are treated. A reference to the "yam traditions" of Asia might have enhanced the comparative value of the West African data. There are gaps and some unevenness of treatment in this section, but these do not detract greatly from the value of this pioneer effort.

Further work is needed on the economics of yam production. This reviewer finds no convincing evidence in this study which leads to the conclusion that yam farming "belongs primarily to subsistence rather than to commercial agriculture" (pp. 3, 68). The labor-intensiveness of commercial yam production notwithstanding, high seed requirement remains one of the problems. One or two statements in this section can be misleading to the ignorant and annoying to the informed: First, despite the ritual ambivalence which the Igbo manifest toward them, *Ajokuji* and *Mmaji* do not constitute a "group of tabu persons (*Osu*)" (p. 201) and must not be confused with *Osu,* a caste group. Second, the number 400 is not "synonymous with infinity" (p. 201) but is a maximal counting unit, and the qualification for the first rank in an Igbo yam title is not 400 yams but 400 yam stakes—a stake carrying from 40 to 120 yams (see plate 28).

Technical questions regarding yams, ranging from taxonomy, storage, and processing to toxic and pharmacologically active ingredients, are discussed in chapters 3, 8, and 10. Despite the technical treatment demanded by these subjects, the writing in the book is exceptionally literate, and it can appeal to a wide range of readers: professionals, students, agricultural administrators, and laymen.

The book is well documented, a reference list following each chapter. There are 16 figures and 28 plates, including closeups of yam barns. Coursey does not claim to have said the last word on yams. He has written a book which no serious student of yams can afford to ignore.

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Paleobotany

Les Plantes Fossiles dans Leurs Rapports avec les Végétaux Vivants. Eléments de Paléobotanique et de Morphologie Comparée. LOUIS EMBERGER. Second edition. Masson, Paris, 1968. 758 pp., illus. 198 F.

This volume, a very substantial and handsome and expensive elaboration of the previous edition (the plan and spirit are said to be the same) with new material added, is a strange blend of old and new. Americans may be inclined to view the cryptogam and phanerogam classification of plants as a now outmoded relict of a pre-evolutionary era, but, with the intercalation of an intermediate group, called the Prephanerogams, these taxa still form the basis for organization of higher plants in Emberger's new edition. Perhaps this organization reflects an ultra-causal rather than a conventional philosophy and a theoretical rather than a practical approach to the subject. Theoretical aspects are discussed at considerable length, but Emberger generally leaves the issues unresolved. Unfortunately, it is frequently difficult to relate statements in the text with the original works on which they are based. Written in French, the book must be judged as a reference volume for Americans.

The book may be regarded as a compendium of how paleobotany appears in review to a neobotanist who has attempted a comprehensive summary of literature. A tremendous number of groups of fossil plants are mentioned, and many good new illustrations are included. Few, if any, taxa are critically discussed in detail. Points others regard as having importance are given little emphasis, and features that seem too indefinite to be of value commonly are given exaggerated importance (as in Prephanerogams). Quite a few neobotanical matters are dis-

cussed that are normally not treated in paleobotany textbooks, such as the concept of a flower (= an inflorescence). However, Emberger has been most diligent; almost every topic usually mentioned in other paleobotany textbooks finds some representation here. His discussions are brief, written in French that is easily translated, but he avoids critical issues. For example, specimens of microfossils from the Lower Carboniferous of Russia, assigned to the genus *Tetraporina*, are illustrated with the noncommittal statement that the Russian authors consider the fossils to be angiospermous pollen grains but other palynologists consider them indeterminable or as algae. Greguss' examples of *Musciphyton* and *Hepaticaephyton* are illustrated and discussed as mosses, with mention that their "identifications are controversial." Emberger does not express a preference, and as a result questionable material acquires a measure of sanction.

Emberger's discussion of angiosperm polyphylesis is stimulating. He does not regard double fertilization and embryo sac necessarily as precluding derivation of angiosperms from several different gymnospermous groups. He points out difficulties in comparison of different primitive angiosperm types that have contrasting modes of placentation. Apparently the leaves of both *Sanmiguelia* (palm type) and *Furcula* (dicot type) are taken as evidence that monocot and dicot lines may be very ancient. Emberger does not consider the possibility that these modern-appearing types of foliage belonged to plants that reproduced like gymnosperms. His suggestions as to the different types of gymnosperms from which angiosperms may have been derived are no more convincing than previous suggestions. Nevertheless, these ideas probably deserve more consideration.

In a book of this size, some inconsistencies are inevitable. The text is not well coordinated with the extensive bibliography. The sources of quoted statements often are vaguely referenced, and it may be difficult to recognize innovations of interpretation. French vernacular terminations commonly are used in referring to families and taxa of higher rank. These contribute a certain amount of ambiguity, but are less objectionable than the attempt to change the spelling of *Ginkgo* (p. 490), Ginkgoales, *Ginkgoidium*, and so on to "Ginkyo-" because of questionable meaning and etymology. Such changes are contrary to both the preamble and article 73 of the Code of Nomenclature. Emberger also has used the term "phylum" in various applications. For this and other reasons, the book would not serve as a good basis for systematic study. Nevertheless, it is evident that much information is included in this volume, and, in conjunction with its adequate index (but names of authors are not indexed), the volume serves as a useful compendium.

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Data on Catalysis

Scientific Selection of Catalysts. A. A. BALADIN, B. A. KAZANSKII, V. E. VASSERBERG, G. V. ISAGULYANTS, and G. I. LEVI, Eds. Translated from the Russian edition (Moscow, 1966) by A. Aledjem. Israel Program for Scientific Translations, Jerusalem, 1968 (U.S. distributor, Davey, Hartford, Conn.). viii + 274 pp., illus. $11.50. Problems of Kinetics and Catalysis, No. 11.

One of the axioms of being an expert in catalysis is to avoid predicting the behavior of catalysts. The present book attacks this difficult problem. It presents most of the papers given at a conference that was organized by the late A. A. Balandin and was held in Moscow in July 1964.

The first chapter, by Balandin, presents probably his final thoughts on catalysis and the multiplet theory. This theory is mentioned in most chapters and is seriously considered in some. The book contains scores of correlations of data from catalytic reactions (bond energies, activation energies, reaction rates, the nature of the rate equation, and rates of exchange) with properties of the catalyst (magnetic moments, ionic radius, heats of formation, forbidden-zone width, contact potentials, holes in *d*-bands, Fermi levels), as well as cross-comparisons of different reactions. Many of these comparisons are interesting, but critical appraisal will require more than a casual reading. The "scientific" selection of catalysts still remains a process of collecting available data on catalytic reactions and properties of catalysts and making an educated guess. Nevertheless, it is a rewarding exercise to pause occasionally to evaluate the problems of catalyst selection.

Many of the principal Russian catalytic chemists are represented in this book. Most of the papers are summaries of substantial research, and are not the irksome short communications common in the Russian literature. Some papers are so highly condensed that the reader may find the text difficult; possibly the symposium audience had heard these arguments before. The chapters are crammed with practical catalytic data, reaction rates, and activation energies. The work of the surface physicist with his clean surfaces in ultrahigh-vacuum environments is not included.

The translation is good, except for an infrequent choice of a word or two that might cause the reader to pause momentarily. The book is nicely printed, but the type is too small for rapid reading. There are no indexes. A subject index would have been useful for finding work on particular reactions, correlations, and catalysts.

The translation merits a place in scientific libraries and in the personal libraries of those interested in the correlation of catalyst behavior with properties of catalytic materials.

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Vasoconstrictor

Serotonin. IRVINE H. PAGE. Year Book Medical Publishers, Chicago, 1968. 144 pp., illus. $7.95.

Two decades have elapsed since Irvine Page and his co-workers isolated and identified serotonin as the vasoconstrictive principle in serum, and during this period publications numbering in the thousands have attempted to elucidate the physiological function of this biogenic amine. Such an effusion of papers sometimes leaves even the most diligent reader with an impression that the serotonin literature is hopelessly chaotic, and the appearance of a succinct appraisal of this important field of research corrects a major deficiency in the literature. Few authors could equal Page's perspective in providing this timely overview of serotonin.

The monograph admittedly is not comprehensive and omits many tangential topics. Its chief value is in presenting a concise account of the trends and highlights in the major areas of serotonin research. In addition to an