Book Reviews

Microwave Theory and Techniques. H. J. Reich, H. L. Krauss, P. F. Ordung, J. G. Skalnik. Van Nostrand, New York-London, 1953. 901 pp. Illus. $10.

Microwave Theory and Techniques presents a profusely documented treatment of theory, components, and measurement techniques employed at frequencies extending upward from approximately 300 or 400 magacycles per second. It is chock-full of useful information, of interest not only to students but also to research workers and communication engineers. It is very well suited either as a classroom textbook or as a reference book. The approach is mainly descriptive rather than rigorously mathematical. For each topic, basic relationships are defined, methods of solving the mathematical forms for specific boundary restrictions are outlined, and final conclusions are formulated as equations involving required variables. Appropriate illustrations appear throughout and include graphs and tables.

The first nine chapters are devoted to field and impedance concepts related to propagation and diffraction in transmission systems. Following an introduction to vector analysis, various electromagnetic laws, theorems, and boundary restrictions are developed as applicable to static and dynamic fields. Distributed circuit theory is explained and applied to the steady-state description of transmission lines under the influence of different load conditions in terms of traveling waves. Applications of resonant lines and transmission line charts are emphasized. This is preceded by the representation of guided waves as modes in rectangular, circular, ridge, and surface wave guides. Numerous wave-guide and coaxial line components are described, such as matching devices, transition sections, phase shifters, wave-guide tees, hybrid rings, directional couplers, wave meters, filters, and duplexers. Also included are devices for the measurement of field strength, power, and standing-wave ratio as well as measuring techniques. There is a chapter on broad-band antennas which delineates characteristics and excitation methods. Another chapter treats microwave resonators, exemplified by parallel-wire, coaxial-line, and wave-guide types, and contacting and noncontacting plungers.

The last six chapters are concerned with microwave tubes, amplifiers, and oscillators. The influence of density-modulated beams on equivalent circuits and performance is first considered. This is followed by a discussion of transit-time effects and the manner in which conventional triodes and tetrodes can be improved for applications at microwave frequencies. Special tubes designed for use with coaxial-line and cavity resonators are described. Among them are acorn and doorknob tubes, lighthouse tubes, pencil triodes, closed-spaced triodes, and disk-seal tetrodes. Two comprehensive chapters are devoted to velocity-modulated tubes or klystrons. A chapter on magnetrons treats various types of magnetron principles and their realization into practical arrangements. The last chapter is on traveling-wave and electron-wave tubes. It includes physical principles of operations and examples of designed tubes.

An outline of typical microwave laboratory experiments is described in the final pages. The MKS system of units is used throughout the book. With the exception of one, each chapter has been concluded with an interesting list of problems.

The subject matter is expertly treated. Since the coverage is intended to be broad, certain topics appear to be briefly mentioned. However, this is not a serious drawback since references are available for the reader who is interested in learning more about specific items. The authors are to be complimented for the diligent choice of topics.

ANTHONY B. GIORDANO
Department of Electrical Engineering
Polytechnic Institute of Brooklyn

Australian and New Zealand Botany. John McLuckie and H. S. McKee. Associated General Publ., Sydney, Australia, 1954. xx + 758 pp. Illus. £4 4s.

At first thought it seems odd to have a national botany textbook, but immediately one realizes that British, French or American is usually implicit in the title of botany textbooks. Considering the uniqueness of the Australian and New Zealand flora, it is reasonable that a book should be written for Australian and New Zealand university students which relates the general facts learned about plants from study of those of the Northern Hemisphere to the plants with which they have been familiar since childhood.

McLuckie and McKee's textbook teaches its main lessons from the well-known plants such as bean, sunflower, corn, and *Tradescantia.* Students will be familiar with the anatomical and physiological facts derived from study of these plants when they go on for graduate work at home or in other countries, or when they read research reports based on work with crop or ornamental plants of Europe and North America that are also grown commonly in their own country. In addition, they will be able to see wherein the native plants of their countries are like or unlike those plants.

The chapters on the Australian flora and the New Zealand flora will be most helpful to students in those countries. They will also be valuable to visiting European or American botanists. A great deal of information is in these pages that was unavailable in any one place before. The chapters on the botanical history of the two countries are also very useful and, among other things, remind us that Darwin, Wallace, Huxley, and Hooker were all familiar to some extent with the flora of this part of the world and were undoubtedly influenced in their thinking by this knowledge.

In the more standard parts of a botany textbook,

McLuckie and McKee have done a good job, profusely illustrated with line drawings and diagrams. There are few photographs and the reproduction of some is not up to a standard one would like. One wonders why, and also why some could not have been included to show the ecological types found in the two countries. But the diagrams of cytological and anatomical structures are excellent; the graphs and data in the discussions of physiological processes are clear and meaningful.

Anyone writing or revising an elementary textbook would do well to ponder this book for its organization of topics and for the integration of biochemical and anatomical material. It presumes a knowledge of chemistry and, hence, includes many more advanced discussions of physiology than American introductory textbooks. On the whole, it is clearly written, and rarely can there be doubt in the reader's mind as to what sentences or paragraphs mean. There are remarkably few misstatements or misleading statements that I caught. The emphasis on the physiology of all kinds of plants, especially heterotrophic flowering plants, is most welcome. All in all, McLuckie and McKee have put many people in debt to them for this solid first Australian and New Zealand botany textbook. It will be a valuable addition to the libraries of botany teachers anywhere else in the world for the wealth of information that is in it.

HARRIET B. CREIGHTON
Department of Botany, Wellesley College

Protozoaires: Rhizopodes, Actinopodes, Sporozoaires, Cnidosporidies, vol. 1, pt. II of *Traité de Zoologie: Anatomie, Systématique, Biologie.* Pierre-P. Grassé, Ed. Masson, Paris VI^{e}, 1953. 1160 pp. Illus. Paper, 9035 fr.; cloth, 9215 fr.

With the appearance of this second section of a tripartite treatise on the Protozoa, French biologists have made another signal contribution to their ambitious program of reviewing the phyla of the animal kingdom. The first section dealt with flagellates; the third is to deal with ciliates; the present one covers the intervening groups. It is indeed a far cry from Bütschli's solitary monographic effort (1880–89) to the present treatment, in which nine authorities have collaborated on this single section. Under Grassé's active leadership as editor and coauthor, the Protozoa are being subjected to an extensive reevaluation, group by group. Five subphyla (*sous-embranchement*) are recognized in the *Traité*: Rhizoflagellata, Actinopoda, Sporozoa, Cnidosporidia, and Ciliata. In the present volume, greatest attention will probably be attracted to the rearrangement proposed within the first two of these groups.

The Flagellata (vol. I, fasc. I) and Rhizopoda are established as superclasses of the Rhizoflagellata, in recognition of overlapping affinities and of the polyphyletic derivation of rhizopods from flagellates. The Rhizopoda are separated according to basic pseudopodial types into three classes: Lobosa, Filosa, and Granuloreticulosa. Each of these in turn contains both naked and testate forms. The book opens with Chatton's account of the naked amebas (order Amoebaea). Two distinct groups have been separated: suborder Mastigogenina, possessing flagellate stages in the cycle, and suborder Amastigogenina, exclusively ameboid. In turn, Deflandre has replaced the Testacea of most authors by two orders. The order Testacealobosa (containing most well-known testate amebas) is combined with the Amoebaea to form the class Lobosa, while the remaining forms, bearing filopodia (for example, Euglypha), are placed in the class Filosa. Deflandre also treats the two basal orders (including, for example, Allogromiidae) of the class Reticulogranulosa, while Le Calvez presents a full, authoritative account of the third order, Foraminifera. Cushman's taxonomic system is followed in the interests of expediency, but Le Calvez evaluates it in a critical manner.

The subphylum Actinopoda is subdivided by Trégouboff into three classes: Heliozoa, Acantharia (Actipylean Radiolaria of other systems), and Radiolaria. Evidence is adduced to link the first two of these groups into an evolutionary sequence leading from chrysomonad flagellates, while the independent status of the Radiolaria is emphasized by a suggestion of their dinoflagellate ancestry. In an appendage to the Rhizopoda, Pavillard has presented a relatively brief, informative, and impartial treatment of "doubtful rhizopods or lower fungi": the orders Acrasiae, Mycetozoa, and Plasmodiophorales.

The two remaining subphyla, Sporozoa and Cnidosporidia, have been subjected to more classical treatment. Grassé is responsible for most of the account on Sporozoa. The two principal classes, Gregarinomorpha and Coccidiomorpha, are clearly established as coordinate groups with suggestions of flagellate ancestry. Subgroupings have been modified to form apparently more natural sequences. Grassé chooses to retain the Sarcosporidia as a third class, remaining unconvinced by recent evidence of their fungous affinities. Poisson has written a highly thorough account of the Haemosporidiidea (suborder of Coccidiomorpha), with detailed references to all aspects of the biology of malaria. Poisson is also responsible for the lucid treatment of the Cnidosporidia, without altering the usual arrangement. A few miscellaneous groups of Sporozoa-like organisms are collected in appendiceal chapters; for example, Babesioidea (Poisson), Haplosporidia (Caullery), and certain still more obscurely related types, such as Bartonella, Toxoplasma, Rickettsia, and so forth (Poisson).

The general organization of the book deserves special commendation. Each chapter is introduced with a well-outlined account of the biology of a given group and concludes with a treatment of systematics. There is a complete, up-to-date bibliography at the end of each chapter; the practice of including full titles and pagination of articles cited can be commended to others. The wealth of illustrations is notable for clarity and full documentation of the text; two colored plates,