

Book Reviews

• Readers' comments on reviews should be addressed to the Editor.

Biochemistry

ORGANIC CHEMISTRY OF LIFE, ed. by Melvin Calvin and William A. Pryor. 1973. W. H. Freeman & Co., San Francisco. 459 p. \$6.95 softback, \$12.00 hardback.

One of the most recent in the series of books known as "Readings from *Scientific American*," this assemblage of 47 articles published in that journal between 1954 and 1972 contains 23 newly collected reviews of currently relevant topics in biology and biochemistry. Of the remaining 24 articles, 23 first appeared in *Bio-organic Chemistry* (ed. by M. Calvin and M. J. Jorgenson), 8 appeared in *The Molecular Basis of Life* (ed. by R. H. Haynes and P. C. Hanawalt), and 7 can be found in both of these 1968 *Scientific American* collections. Because *The Molecular Basis of Life* also has been reissued recently (1973) as *The Chemical Basis of Life*, there is undoubtedly some further redundancy.

The book has four sections. "Biological Regulators" deals with drugs, pheromones, and cyclic AMP. "Macromolecular Architecture" includes discussions of protein and nucleic acid structure and function. "Cellular Architecture" contains three articles on membranes and cell walls. In "Chemical Biodynamics" the topics range from chemical fossils and the metabolism of fats to memory and aging. There is a brief index, and the bibliographies have been updated somewhat to reflect developments that have occurred since the earlier reviews were written.

The editors intend the book to be used as supplementary reading in a sophomore organic-chemistry course for "life science" majors. "Our practice is to assign these articles at a rate of about one a week to be reported on in a short paper or on examinations," they say. Considering the disproportionate amount of time organic chemistry quite often demands from a student, one can only wonder whether a few choice assignments to be read in the library might not be sufficient supplementation, while preventing a significant, and perhaps unnecessary, increment in students' expenses.

The high quality of *Scientific American* articles is well known, and there is certainly utility in assembling some of the best of the reviews on related subjects under a single cover. I am happy to have the collections (along with my subscription to the journal), for they provide easy access both to

fascinating reading and to records of many milestones in science (see, for example, F. H. C. Crick's "The Structure of the Hereditary Material," published in 1954).

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Botany

WONDERS OF THE CACTUS WORLD, by Sigmund A. Lavine. 1974. Dodd, Mead & Co., New York. 78 p. \$4.50 (hardback).

At a time when Americans of all ages are turning as never before to house-plant and container gardening—on their windowsills, on balconies, on outdoor terraces—an experienced naturalist-writer gives cactus fans a lively little handbook. Illustrated with nearly 70 excellent photographs and several helpful line drawings, the book is filled with cactus lore and cues to cactus cultivation. (The writer's intended audience is the amateur gardener.) Many hours of careful research have gone into this brief but handsome survey. Cactus shapes, habitats, classification, biology, flowers, fruits, spines, enemies, legends, and uses are all part of the author's bonanza. His writing style is light and interesting—and highly informative. The book should be on the shelves of the elementary-school library and the high-school biology lab. It is sure to stimulate interest in the Cactaceae, a plant family that stands quite apart from all others. In doing this, it might also call the reader to the enticing groves of natural history.

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BOTANY: A FUNCTIONAL APPROACH, by Walter H. Muller. 3rd ed., 1974. Macmillan Publishing Co., New York. 620 p. Price not given.

This textbook is specifically designed for a one-semester general botany course on the college level, with the assumption that it is to be followed by a course on the survey of the plant kingdom. Consequently, this latter aspect is not dealt with to any great extent. Although the book is largely traditional in its approach, there are a number of appealing features. There is an introductory chapter on basic principles of chemistry and physics which

should promote a better understanding of the chapters on photosynthesis and respiration. Concluding chapters deal with relevant topics usually not found in botany texts: human population problems and various aspects of pollution. Each chapter concludes with a summary, review topics and questions, and suggested readings. The summary should be especially useful for review purposes. The topics and questions are, in general, thought-provoking and not simply recall. Suggested readings are in readily-available sources such as *Scientific American*. A glossary is present along with a useful appendix on English and metric units.

The book is well written, and the photographs and drawings are excellent and pertinent. It is certainly worthy of consideration as an introductory text, keeping in mind the limitation on the plant kingdom survey.

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EXPERIMENTAL PLANT PHYSIOLOGY, ed. by Anthony San Pietro. 1974. C. V. Mosby Co., St. Louis. 188 p. \$6.75 (softback).

To the research scientist, the laboratory is an exciting place where new discoveries are made. For too many students, the laboratory is a dull place where one tries to confirm ancient experiments described in lecture. This manual is an attempt to develop experiments that reflect the enthusiasm and methods of plant physiologists.

Each of the 23 chapters was written by an acknowledged leader in his field who, in most cases, is also involved in undergraduate teaching. They cover the usual fields of plant physiology: photosynthesis, respiration, growth and development, and water balance. The experiments are quite up-to-date; for example, one series tests the Mitchell chemiosmotic hypothesis for the mechanism of ATP synthesis in chloroplasts. Another chapter describes a statistical approach to collecting identical samples. The theoretical background is discussed in most cases; references are given at the end of each chapter. Detailed calculations are given wherever necessary. Additional experiments are suggested in about half of the chapters.

The manual is designed for any well equipped laboratory; that is, one that contains a dark room, plant growth facilities, centrifuges (and an ultracentrifuge for one experiment), spectrophotometers, an autoclave, pH meters with recorders, microscopes, microbalances, chromatograph chambers, a manometer, and an oxygen electrode potentiometer. Six of the chapters depend upon radioisotopes. Special apparatus is needed for five of the experiments.

As is typical for any collection of writings, the chapters are not as uniform as might be desired. Some of the procedures are outlined in great de-

tail (for example, CO₂ incorporation in isolated chloroplasts and plant water stress) while in other chapters the student must decide the specific procedure to follow (for example, regulation of abscission and inhibitors of stomatal opening). A list of materials is not always included. The specific materials are described in detail in some cases (the telephone number used to obtain fresh, untreated wheat germ for an experiment on protein synthesis is given) but not in others (no source is given for abscisic acid). Very useful information (for example, that kinetin can be dissolved by autoclaving, and that the use of castor beans should be avoided because of the great allergenicity of some individuals) is hidden in the detailed descriptions.

I think the authors have succeeded in their goal: the manual certainly reflects what's happening now in plant physiology. Because of their relevance to current areas of investigation, it is even possible that some of the experiments will find their way into more introductory courses.

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WOODY PLANTS OF THE NORTH CENTRAL PLAINS, by H. A. Stephens. 1973. University Press of Kansas, Lawrence. 550 p. \$20.00 (hardback).

For those whose work and interests are centered in the populous areas of eastern U.S., aid in the identification of woody plants is often a matter of choosing among many fine manuals. Such has not been the case in the plains states. This manual contributes significantly to the resolution of that problem. It contains an introduction to the biogeography of Kansas, Nebraska, South Dakota, and North Dakota; keys to species; descriptions and line-drawings of all of the 255 species included; an annotated list of excluded species; selected references; a glossary; and an index of scientific and common names.

Depending on one's training and needs, either the full-page description of a species or the facing page of illustrations of it will prove to be the most valuable part of the book. Both are unusually complete, carefully prepared, and widely useful as aids to the identification of the woody and common suffrutescent plants of the area at any time of the year. This detailed treatment is of special significance because, in many cases, the plants are at the limits of their natural range. In addition to the technical description, the text includes a distribution map for each species and frequently includes comments on taxonomic problems, natural history, uses of the plant, and folklore. The scientific names used are usually those that are familiar from other manuals, and enough synonymy is included to resolve questions when an unfamiliar name is used.

As a teaching taxonomist I find the keys to be the least satisfactory part of the book. Some sections are good; most are adequate; but others are skimpy, misleading, or even erroneous. The deficiencies will not always be easy to correct, but they must be if the book is to be widely used by beginning students.

The book is rather heavy but is rugged enough for field use. Typographic errors are virtually nonexistent. I regard this as an important book, which should be widely available to teachers, students, and laymen in the region. Biology teachers will certainly want to own it.

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Ecology-Environment

EARTH, THE GREAT RECYCLER, by Helen Ross Russell. 1973. Thomas Nelson & Sons, Camden, N.J. 160 p. \$5.95 (hardback).

Youngsters in junior and senior high school would benefit from reading this book. It presents, with examples, all of the basic biologic processes that account for what we recognize as nature's balance; and there are many pictures (in black and white).

The author relates physical and chemical principles to living organisms. For example, the chapter entitled "The Undercover Crowd" describes the importance of microorganisms as decomposers in the biogeochemical cycle. Russell emphasizes the wise use of farmland. Good agricultural practices, such as crop rotation and composting, are mentioned, and the theme of conservation is sounded loudly and clearly. The misuse of DDT and other chlorinated hydrocarbons is dramatized in the chapter entitled "Food Chains." Altogether, Russell succeeds in her attempt to express to the reader the intricate balance of nature and man's effect on this balance.

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ECOLOGY OF POPULATIONS, by Arthur S. Boughey. 2nd ed., 1973. Macmillan Co., New York. 188 p. Softback; price not given.

Autecology—individual ecologic relationships—is central to this introductory textbook. The author attempts to describe the direction in which autecologic theory is currently heading. Thus, systems analysis and model construction are discussed, as expected. However, a new chapter on human ecology has been added to this edition, and it goes beyond the traditional treatment

of systems and models. As Boughey remarks, a major task of the new ecology is to begin the autecologic investigation of the behavior of our own species.

The book is meant for the beginning student of ecology. The book "assumes no greater an acquaintance with biology than would be obtained from a high school or college survey course," according to the author. Not all beginners will find this to be the case—so the teacher should be prepared to give some background on, for example, the ecosystem concept. (This is mentioned on p. 1 but is not discussed; and, believe it or not, some high-school and college biology courses just do not include this in the package.)

Each of the seven chapters has a good list of references. Chapter 1 discusses population characteristics, including growth, density, structure, survivorship, and behavior patterns. Chapter 2 surveys environmental parameters, from limiting factors to energy exchange. Chapter 3 discusses the evolution of populations. It includes variation, natural selection, speciation, and niches. Different types of population interactions are the subject of chapter 4. Chapter 5 takes a look at behavior mechanisms at the population level. Energetics through the community level are discussed in chapter 6.

The last chapter—on human ecology—is vital to a modern study of populations. The parts on evolution and variation could have been curtailed, and more emphasis could have been given to other matters, such as urbanization, that are rarely discussed in beginning-biology courses.

The declared intention of the book is "to explore the ecology of populations." Boughey has done so, in his usual good style.

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COASTAL ECOLOGY: BODEGA HEAD, by Michael G. Barbour, R. R. Craig, F. R. Drysdale, and M. T. Ghiselin. 1973. University of California Press, Berkeley. 353 p. \$10.95 (hardback).

The authors have attempted to develop a book that might be used by a "wide spectrum of people": from those who simply enjoy reading natural history to the professional biologist. The book deals specifically with Bodega Head, which is located in northern California and is representative of an extensive part of the North American coastline. The theme of this study is habitat ecology. Each habitat—grassland, intertidal rocks, strand and dunes, mudflats, and freshwater marsh—is briefly treated as to its geologic, physical, and climatic parameters, together with an indication of its representative organisms. The authors note general tendencies for most areas; but in their field work they performed only one or, at most, two transects. More detailed