genetics, and evolution. DNA is carefully described and even embryology is taken up in some detail. Yet the ecological approach is not ignored for there are beautifully written chapters on it. Approximately half the book is on genetics, embryology, and evolution.

A most unusual elementary biology book which reflects current trends in more sophisticated and advanced treatments. Every elementary teacher will want this book.

Botany

PLANTS, VIRUSES, AND INSECTS, Katherine Esau, viii + 110 p., $3.75, Harvard University Press, Cambridge, Massachusetts, 1961.

The title of this book is misleading, since most of the text is devoted to a review of our knowledge of the translocation of organic materials in plants. Viruses and insects rate a chapter each, but they are considered principally in relation to our knowledge of the vascular tissue of plants.

Esau has given us an excellent discussion of the structure and probable function of the components of the phloem. Conduction of organic material is effected in the enucleate sieve elements at rates of 50 to 100 cm/hr or more. She believes that the mechanism is a mass-flow rather than diffusion, and that the movement into and out of the sieve elements is brought about by the activities of nucleate cells associated with them.

This book is recommended to teachers as a means for stimulating student interest in plant structure and physiology.

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PLANT LIFE OF PALESTINE, Michael Zohary, Ed., 262 pp., $8.00, The Ronald Press Company, New York 10, 1962.

This book presents a geographical and ecological survey of the vegetation of the area comprising Israel, Jordan, and the Gaza Strip. The land is a strange combination of desert, sand dunes, calcareous hills, heavy clay soils, and extensive swamps and marshes, a part of it occupying the deep rift of the Jordan valley and the Dead Sea. The annual rainfall ranges from scarcely an inch to as much as 40 inches, with wide fluctuations from year to year, especially in the desert regions. The area has been the meeting point of three great floras, one from the north, one from the Mediterranean, and one from Africa and Asia to the south and southeast. All these factors of soil, climate, and geographic position have given it a far richer flora than is to be found in most areas of similar size. The more than 2200 species, at least 160 of them endemic, are distributed among 718 genera. Centuries of human occupation have also had profound influences on the flora.

The book utilizes the heavy language of modern ecology, much of which could have been avoided without loss of clarity. It will give much new meaning to the taxonomic data already available for the area. The Bible student will probably find it disappointing. The typography and illustrations are excellent. The price for 226 pages of text and illustrations seems high, but this may be unavoidable in a book which is so highly specialized.

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RADIATION BOTANY, A. H. Sparrow, Ed., 100 pp., $10.00 yearly, Pergamon Press, London, 1961.

The first issue of this journal "devoted to plant radiobiology and closely related fields" is a collection of excellent papers which, at first glance, seems to justify the addition of another journal to the already burgeoning list. Closer inspection reveals that many of the papers would have been more closely associated with similar research areas if they had been published in journals devoted to cytology, physiology, or morphogenesis. In these papers, radiation enters the picture as a tool for the investigation of some fundamental problem. As a consequence the papers are quite substantial, but the coherence within the journal seems artificial.

Nevertheless the first issue does credit to the publishers, to the editors, and to the authors. Although all the papers in this issue are in English, the journal will be multilingual and each article is provided with summaries in French, English, and German. Typographical errors abound in the German but the French and English summaries, as well as the text, are singularly free of them. There are few reproductions of photographs, but those included are very clear. If the high quality is maintained the new journal should provide a valuable reference for the effects of radiations on plants. It is also possible, with some reservations, to regard as a service the grouping together of investigations in various disciplines which employ radiations as a tool.

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THE LICHEN FLORA OF THE UNITED STATES, Bruce Fink, 426 pp., $12.50, The University of Michigan Press, Ann Arbor, Michigan, 1935 (Third printing, 1961).

The standard authority in the field of lichen study published in this country is this book finally republished. Since the author's death, certain changes have been made in conformance to his own intended changes in the book as well as a few others.

The introductory chapters are complete ones on the structure and life histories of lichens. The plates are clear and distinct. The major section of the book is a history of the species, carefully annotated and described. It is too bad that the black and white illustrations and accompanying line drawings are together in the back of the book. Color reproductions would have been most helpful to the amateur student of the lichens. This group is a ubiquitous one yet seldom studied in any detail in elementary courses —a fate which is not warranted. This is a book which is seldom found in the biology library, but it certainly belongs there.

LICHEN HANDBOOK, Mason E. Hale, Jr., 178 pp., $4.00, Smithsonian Institute, Washington, D. C., 1961.

It is difficult to imagine a biology library, whatever its level, being without this book. As the author points out, lichenology has been a neglected subject, even among amateurs. But its potential is quite extensive.

This is more than an identification handbook, although that is there, including an errata sheet for Fink's well-known work. In fact, for identification both books must be used. The chapter titles in this book will give one its scope: Morphology and Anatomy, Reproduction, Physiology and Growth, Symbiosis, Chemistry, Lichen Acids, Chemical Strains, Economic Uses, and Phytogeography. The reviewer knows of no other work where all this is incorporated into one book. The chapters on Chemistry, Symbiosis, and Physiology and Growth are particularly stimulating—especially for the teacher looking for teaching aids to enrich his lab and class work for student project ideas. Highly recommended.

ELECTROLYTES AND PLANT CELLS *in Botanical Monographs*, G. E. Briggs, A. B. Hope, and R. N. Robertson, Eds., 217 pp., $8.00, Blackwell Scientific Publications, Oxford, 1961.

Volume one of the *Botanical Monographs* promises well for the rest of the series. The authors present an authoritative treatment of an area which has needed unification. Such individual topics as the Donnan equilibrium, the free-space concept, membrane structure, and ion accumulation have been dealt with previously and rather frequently, but not recently, and seldom with such a clear concept of the interrelations of the various subtopics. While the authors take cognizance of the more recent knowledge of submicroscopic structure of cells, they miss an opportunity to link this morphological information with the newer functional concepts. This is perhaps the greatest weakness in the book.

Much of the text requires a mathematical sophistication which will place the material beyond the high school student, but it should be useful for his teacher and indispensable as a reference for specialists in plant or cellular physiology.

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A MONOGRAPH OF THE WORLD SPECIES OF HYPOXYLON, Julian Miller, Ed., 158 pp., $6.50, University of Georgia Press, Athens, Georgia, 1961.

The culmination of more than thirty years of research by the author, this monograph will be the standard taxonomic reference to *Hypoxylon* for many years to come. It will be invaluable to students of the stromatic Pyrenomycetes, but its rather specialized nature makes it of rather limited value in secondary school science programs.

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Zoology

COMPARATIVE ANIMAL PHYSIOLOGY, Second Edition, C. Ladd Prosser and Frank A. Brown, Jr., 688 pp., $15.50, W. B. Saunders Company, Philadelphia, 1961.

All teachers of biology should have ready access to this book as a source of sound information concerning physiological problems. Its scope is greater than the title suggests since it not only concerns itself with animals of all phyla but considers adaptive and ecological aspects. It would be possible to extract from its pages a modest book on biochemistry and another on animal adaptation; that is, it is simultaneously mechanistic and teleological.

This new edition is thoroughly rewritten, not merely patched up. For example the echolocation sounds of bats were described in the 1950 edition; now we have records obtained from electrodes placed on the auditory nerves of moths preyed on by bats and these are fair imitations of the bats' moth-locating cry! The role of the counter-current principle in the interpretation of mammalian kidney function is new since the earlier edition. The discussion of ameboid movement brings into focus new experiments and interpretations (e. g., Goldacre