

Book Reviews

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

Behavior

THE BIOLOGICAL CLOCK: TWO VIEWS, by Frank A. Brown, Jr., J. Woodland Hastings, and John D. Palmer. 1970. Academic Press, New York. 102 pp. \$1.95.

This little book presents, lucidly and convincingly, two contrasting but not mutually exclusive explanations of the mechanisms by which living systems maintain rhythmicity. First, Brown reviews, and helps the reader to interpret, the major experiments that led Brown to the conclusion that biologic rhythms are imposed by external factors—if not by obvious stimuli, such as cycles of light and temperature, then by subtle, rhythmic geophysical forces. His suggestions are most persuasive; moreover, he gives the reader a dramatic glimpse of cosmic forces at work. It is only when the chapter ends that one realizes that the material nature of the timing mechanism—the “clock”—is still obscure.

By contrast, Hastings expounds the idea that the timing mechanism is independent of the environment. He shows how the clock may be viewed as a biochemical system involving DNA-RNA-protein-synthesis interactions. As he does so, the form of the clock begins to emerge from the shadows; at least it did so for this reader.

I liked the little book. Two unresolved ways of viewing a biologic phenomenon are delineated, but no reader will be confused by this; rather, he will receive a lesson in the use of hypothesis and prediction in scientific investigation. Science is seen here as a dynamic process rather than an organized body of facts.

In both chapters graphs and other illustrations liberally supplement or summarize the data presented in the text. When carefully presented, charts and tables encourage the reader to participate in the investigative process; it is therefore most unfortunate that Brown failed to note that the legends to a significant number of the illustrations (taken from previous technical papers) in his chapter were larded with errors. Though minor in themselves, these errors nonetheless tend to discourage the reader's assessment of experimental data—an important aspect of the book.

The Biological Clock: Two Views should be of interest to the high school or college teacher who wants to keep informed, and to advanced-undergrad-

uate and graduate students. It assumes a knowledge of biology somewhat too advanced for the typical high school or beginning college student.

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CONTEMPORARY READINGS IN BEHAVIOR, ed. by Cecil E. Johnson. 1970. McGraw-Hill Book Co., New York. 292 pp. \$3.95.

To a person unacquainted with the science of behavior, this compilation of papers by noted behaviorists offers a good introduction. Several of the articles deal with general concepts, such as the motivation of playing and the function of emotion. Sections by Konrad Lorenz comically describe humans who laugh at and pity animals as they unwittingly observe all-too-human characteristics in the beasts. Part of the book describes specific cases, such as wolves in a zoo and polar bears on Arctic icebergs. A reader may discover what sorts of investigations have been attempted by those curious about animal behavior, and he will learn the importance of differentiating studies made in the wild from studies done on captive animals. Certainly this book will stimulate some behavioral observations of one's dog, at least, and will otherwise be interesting reading for the layman.

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ETHOLOGY, THE BIOLOGY OF BEHAVIOR, by Irenaus Eibl-Eibesfeldt. 1970. Holt, Rinehart, & Winston, Inc., New York. 529 pp. \$10.

Eibl-Eibesfeldt, professor at the Max Planck Institute for Behavioral Physiology and a former student of Konrad Lorenz, is a vigorous and convincing proponent of the comparative biologic approach to behavioral study.

His scholarship is awesome. Although the presentation is based on Lorenzian assumptions, Eibl-Eibesfeldt attempts to present all current viewpoints of behavior. The alternative theories are not merely presented: they are discussed and argued, and the findings are integrated, where possible, into the text. This balanced treatment of alternative behavioral theories makes the author's own position a strong one. He does not hesitate to disagree with behavioral paradigms that he considers to be invalid, but he handles disagreement

with appropriate respect for parallel scholarship, and he quotes from primary sources frequently and persuasively.

The reader often feels he is reading the final chapters of a doctoral dissertation. The 62 pages of bibliography are cited by author and date within the text—a practice that aids the reviewing of related literature but, for American students, probably detracts from readability.

The 18 chapters progress from a discussion of the philosophic and historical roots of ethology to a discussion of man. Eibl-Eibesfeldt first identifies what he calls a behavioral “drive mechanism” and then assimilates evidence from comparative studies to illustrate the diversity of ways in which that drive is expressed in the animal world. If evidence seems equivocal he rarely remains neutral; instead, he argues for a preferred interpretation.

It is hard to find fault with a book that bridges gaps between the disciplines of biology, psychology, sociology, and anthropology—especially when there are so few books with which it may be appropriately compared. The book is well illustrated, but its format and appearance are encyclopedic—a quality that falls considerably short of inviting readership. The subject index, of slightly more than four pages, is barely adequate, and the author index, of more than seven full pages, is more than adequate: most American students will probably be unable to appreciate a bias that indexes authorship more fully than it indexes ideas.

Probably the most convincing evidence of the esteem in which I hold the book is that I plan to use it as a textbook this fall.

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ANIMAL BEHAVIOR, by V. G. Dethier and Eliot Stellar. 3rd ed., 1970. Prentice-Hall, Inc., Englewood Cliffs, N.J. 148 pp. \$3.25 softback, \$6.95 hardback.

The problems of what to emphasize and what to exclude are always difficult in a book as short as this, especially when that book is also one in a series. The 12-volume “Foundations of Modern Biology” series was launched several years ago, with the college undergraduate in mind. Revision of most of the books has occurred either once or twice, and the present volume is a second revision of the earlier *Animal Behavior: Its Evolution and Neurological Basis*.

Animal behaviorists disagree sharply about whether their subject should be approached from the viewpoint of ethology, of physiology, or of natural history. They also disagree sharply about the emphasis to be given to social behavior, learning, and the physiologic basis of behavior. I find I dis-

agree with both the approach and the emphasis of this book.

In the introduction the authors state that animal behavior is an analysis of the potentialities of the nervous system and that to understand behavior we must look first to certain aspects of the nervous system. I feel these statements are unnecessarily restrictive, especially when interpreted as narrowly as these authors do. Six of the nine chapters focus primarily on phylogenetic differences in nervous-system morphology. The quality of these presentations is good, but the relationship of the morphology of the nervous system to behavior seems more remote than does the relationship of that morphology to evolution. The final three chapters of the book have to do with stereotyped behavior, learning and intelligence, and social behavior. These chapters are entirely behavioral in emphasis and approach and give some validity to the title of the volume. The section on instinct is a model of clarity in an outstanding chapter. The topic of social behavior is treated too briefly for my taste, but obviously many matters cannot receive the treatment they would receive in an expanded work.

The authors are always mindful of their audience. The book is psychologically and physically attractive. It has wide margins for note-making, and the margins carry a topical outline of the text. The illustrations are good; most are in two colors.

Animal Behavior has both good and not-so-good features. I doubt that most behaviorists would find it a satisfactory introductory text, because of the excessive emphasis on comparative anatomy of nervous systems and the scant attention given to the comparative behavioral functioning of those systems.

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Botany

CONTROL MECHANISMS IN PLANT DEVELOPMENT, by Arthur W. Galston and Peter J. Davies. 1970. Prentice-Hall Inc., Englewood Cliffs, N.J. 199 pp. \$3.95 softback, \$6.95 hardback.

Advanced students of plant physiology, molecular biology, and plant and animal development will find here an engaging analysis of several concepts and problems of plant morphogenesis. This work is concerned primarily with how a green plant controls its activities and attunes its development to nature's seasons. Focusing on stimuli that control the developmental cycle of higher plants and the mechanisms through which they probably act, the authors examine the phytochrome system and the action of several plant hormones and inhibitors. Applications to practical problems are suggested throughout.

Excellent illustrations and a rich collection of references enhance the book's usefulness to biology teachers. Teachers who are enthusiastic about the process of science can use material from this book to illustrate what is accomplished by the combined efforts of chemists, physicists, and biologists. If this is typical of other titles in the "Foundations of Developmental Biology" series, secondary and college teachers of biology will find it worth their time to examine the companion volumes.

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THE BIOLOGY OF HIGHER CRYPTOGAMS, by William T. Doyle. 1970. Macmillan Co., New York. 163 pp. \$4.95 (softback).

The higher cryptogams include the bryophytes, psilopsids, lycopsids, sphenopsids, and ferns. This assemblage of spore-producing plants is treated as a natural evolutionary group. In presenting the life cycle of the group, the author describes the general morphology and function of the essential plant structures, leaving the anomalies and accessories to the more detailed textbooks in plant morphology. Each chapter is a skillful amalgam of classical morphology and current research in experimental plant development, all presented with an evolutionary overtone. Basic unresolved morphologic problems are pointed out to the reader. Many references are made to investigations utilizing axenic cultures. The discussions of apogamy, apospory, spore development, and spores are outstanding. One chapter is devoted to the morphologic adaptations of the higher cryptogams to their predominantly terrestrial existence. A useful summary of each higher cryptogam group provides a brief account of fossil forms; major characteristics, including those with particular evolutionary significance; and some little-known but interesting details about the group. The final chapter is a progress report on current topics relating to plant development—especially to the role environmental factors play in regulating the expression of genetic potential during development. Special topics include sex determination and sex expression; regulation of embryo development; bud initiation in mosses; regulation of sporangium induction; and spore germination.

This book is highly recommended for students of plant morphology and development. Developmental biologists who are not familiar with the research potential of some of the higher cryptogam systems should find the book informative and thought-provoking.

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SEAWEEDS AND THEIR USES, by V. J. Chapman. 2nd ed., 1970. Barnes & Noble, Inc., New York. 304 pp. \$14.50.

This is the most recent, comprehensive, and up-to-date volume on the subject. Written by a well-known algologist, it deserves the attention of botanists, marine biologists, and persons interested in the living resources of the seas.

The first of 10 chapters is a general review of the occurrence and distribution of seaweeds of economic importance. (More detailed information on various groups and species of algae is scattered throughout the text.) Special attention is given to the early kelp industry, to iodine and potash production, and to algae as food for man and domestic animals. The tables of chemical analyses are of great value. Uses of algae as manures and fertilizers are discussed at some length. (The work of W. A. Stephenson—see the review of his *Seaweed in Agriculture and Horticulture*, in *Choice*, 6 [4]: 535—is an important and exciting supplement to Chapman's treatment.)

A whole chapter is devoted to laver and Irish moss; another, to agar-agar. Here again are useful tables on production and physical and chemical composition. The occurrence of algae from which algin and alginates are derived, together with data on occurrence, properties, and uses, is reviewed at length. Industrial, medical, and miscellaneous uses are covered in considerable detail. The world's supplies and potential supplies are estimated and the techniques used in making surveys are described.

The book has 66 tables and 56 figures, a 30-page bibliography listing about 1,200 papers, a five-page author and person index, a five-page plant index listing more than 150 genera, and a seven-page subject index.

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AN INTRODUCTION TO PLANT BIOLOGY, by Ross H. Arnett and Dale C. Braungart. 3rd ed., 1970. C. V. Mosby Co., St. Louis. 492 pp. \$9.75.

This textbook is designed for a beginning college botany course but should prove useful as a reference book for high school teachers as well. According to the preface "complete re-writing" was deemed necessary because of the wealth of information available since 1965, when the second edition appeared. It is true that the organization of the material has been considerably revised, but it is disturbing to see passages lifted verbatim from previous editions and simply inserted under new headings, where their relevancy is questionable. For example, in the chapter entitled "Adaptive Structures