

Physiology

ANIMAL PHYSIOLOGY, by Knut Schmidt-Nielsen. 3rd ed., 1970. Prentice-Hall, Inc., Englewood Cliffs, N.J. 155 pp. \$2.95 softback, \$6.95 hardback.

Schmidt-Nielsen, a highly regarded animal physiologist, has done an excellent job of putting extensive and complicated information into simple terms. This small book, in the Prentice-Hall "Foundations of Modern Biology" series, is in its third edition—a fact that reflects not only its popularity but also its accuracy and its scientific acceptability. Physiologic processes are interestingly discussed, using a comparative approach; the human circumstance is always included along with fascinating insights into the functioning of certain invertebrates and lower vertebrates. There is apparent a masterful job of selecting those salient physiologic mechanisms and functions that have intrigued the professional physiologist as well as the layman and student.

I believe that the topics encompassed by this little volume would be those that the majority of physiology and biology teachers would wish to include in any discourse or presentation on animal physiology. The author organizes physiology under seven concepts: food and energy, oxygen, temperature, water, movements, information, and integration. The orthodox physiologic organ systems are skillfully interwoven with these major principles. Minimizing technical terminology, the writer nevertheless addresses himself to the important topics and concepts of modern physiology, such as countercurrent mechanisms, nerve-muscle action potential, osmolality, postsynaptic potentials, and neuroendocrine integrative processes. Lucid diagrams and simple tables supplement the perspicuous and lively writing style. Especially helpful is the utilization of footnotes to aid the non-technical reader in understanding units of measurement and certain quantitative material, such as graphs. For example, when millivolt or millisecond is used, it is explained in a footnote and when metabolism and Q_{10} are discussed, a footnote elucidates the reason for using logarithmic or semilogarithmic plots.

A final and very important observation should be made in regard to this physiology book. It does not avoid the important, the up-to-date, nor the abstruse material; however, it does make it clear enough and pleasing enough for application at the high school level or the popular level. It is this reviewer's opinion that a remarkable objective has been attained with this third edition; namely, a publication with appeal for advanced as well as beginning students of physiology.

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Textbooks and Programmed Materials

THE SPECTRUM OF LIFE, by Harold A. Moore and John R. Carlock. 1970. Harper & Row, Inc., New York and Evanston. 822 pp. \$9.20.

The Spectrum of Life biology program consists of a student textbook and a laboratory manual. Teacher's editions of the text and the manual are available, and there is also a teacher's handbook. The student text is colorfully illustrated with carefully selected, attractive photographs. The drawings are well done. A fast "thumb through" leaves a very good impression, but careful interrogation reveals some very serious drawbacks.

The text is interesting to read, and a lot of effort apparently has gone into trying to humanize the material. This humanization is accomplished by the use of short biographies of some of the "prime movers" of biology. These sketches are designed to make the study of biology appear as a human endeavor and not as a mechanistic enterprise for gathering data for data's sake. The authors try to show that biology is a human pursuit of nature's secrets. *The Spectrum of Life* probably is more successful in humanizing biology than most high school textbooks. It should be pointed out that the biographies of the "prime movers" have not been developed in a social context of the period in which they did their work.

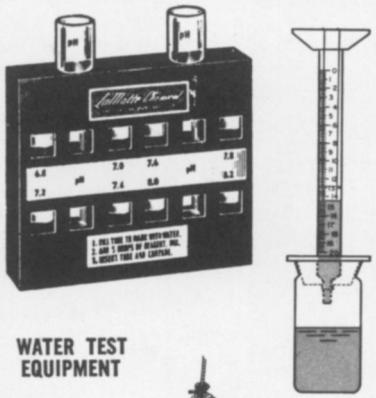
The text is organized on the principle of beginning with familiar information and moving toward the unfamiliar. The laboratory manual has perforated sheets; this provides a teacher with greater flexibility in the use of the manual. For example, one sheet can be removed for the teacher to examine. This permits a teacher to look over the completed laboratory activities without tying up the entire manual. Completed sheets can be placed in a loose-leaf binder for future reference. Laboratory activities are of four categories: probe, conformation, technique, and aids to study. The probes are open-ended activities. Conformations and techniques serve the purposes that their names imply. Aids to study are "structured lessons which will improve your understanding as you are guided to a logical sequence of information." Also provided in the laboratory manual are punch-out sheets of two-dimensional models. These punch-outs can be used at several points in the book for developing models of chemical structures of the many compounds mentioned in the program.

Several liabilities of the *Spectrum of Life* are serious enough to be mentioned. The text is lengthy. The length is going to scare some students before

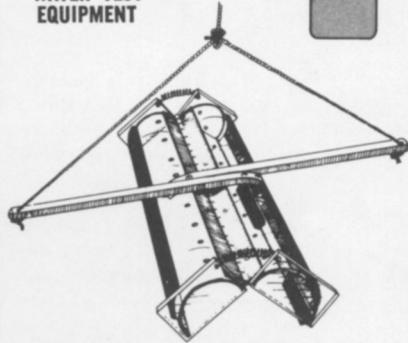


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they open the cover. This text requires that a large amount of reading be done to complete the program and has many terms to be committed to memory. These last two points concern me a great deal, as much time and effort has been spent in the past decade in moving away from the long unbroken text with large vocabularies. This program is basically a chemical approach to biology; therefore it is not surprising to find the chapters of genetics, historical geology, and ecology at the end of the text. This is unfortunate, as ecology is getting much desired attention today and with its position being at the end of the course it will probably be skipped or glossed over.

This program is worthy of your consideration. It might have a place in your curriculum plans but doesn't seem to be very appropriate for a general audience.

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THE PROCESS OF BIOLOGY: PRIMARY SOURCES, ed. by Jeffrey J. W. Baker and Garland E. Allen. 1970. Addison-Wesley Publishing Co., Reading, Mass. 388 pp. \$4.95.

This is a collection of 30 great research papers. The shorter papers appear in full; the longer papers are

abridged without sacrifice of content. There are six sections, each with an intergrating introduction: method and communication in science; the cell and general physiology; heredity and the chromosome theory; the nature of cell differentiation; ecology, species, and evolution; and the origin of life.

It is not necessary to read the sections in sequence. However, to derive the greatest benefit from an individual paper, a section, or the entire book, one must have a profound interest in approaches to science, techniques of science, and objective reporting of science.

The Process of Biology: Primary Sources should have great appeal to students in college biology courses who wish to examine complete or carefully abridged manuscripts of papers that are landmarks in biology.

Richard H. Dunn
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SYMBIOSIS: ORGANISMS LIVING TOGETHER, by Tomas C. Cheng. 1970. Pegasus Division, Western Publishing Co., New York. 256 pp. \$2.25 softback, \$6.95 hardback.

The Biological Sciences Curriculum Study is starting off its new series, "Pegasus Topics in Biological Science," with *Symbiosis*. It is a brief, easy-to-read introduction to a subject that is touched on in every high school and college biology course. The study of symbiosis is growing, primarily because of the new interest in the environmental sciences. Starting with an historical review, the author quickly updates the reader with current research. He then concentrates on the effects of symbiosis on relatively insignificant biomes and on our social welfare in general.

Typical high school texts do little more than define symbiosis, mutualism, parasitism, and kindred relationships—citing an example or two at most. However, this monograph treats the subject in sufficient detail to interest any teacher or student fortunate enough to study a copy. The technical vocabulary is minimal. Instead of concentrating on overworked textbook examples, Cheng concentrates on dozens of organisms that are likely to affect tourists, servicemen, and the home citizen. He also discusses many colorful but harmless marine forms—some of them economically important. Readers may recognize some of the organisms from courses in parasitology: Cheng treats the concept of symbiosis rather broadly. He provides anatomic descriptions and explains life cycles, defense mechanisms, nutrition, and hormonal relationships. These details enhance the value of the book for elementary and advanced students alike. There are recommended references for each of the topics covered.

The book has a superior index and many diagrams, charts, maps, graphs, and photographs.

If the quality of *Symbiosis* is typical of the new series, biology teachers and students can look forward to another superior series from BSCS and its array of versatile writers.

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PATTERNS OF LIFE [booklet series], ed. by Biological Sciences Curriculum Study. "Animals of the islands," by C. J. McCoy (46 pp.); "Tortoise behavior and survival," by Walter Auffenberg (38 pp.); "Antibiotics," by D. Perlman (35 pp.); "Energy transfer in ecological systems," by Richard G. Wiegert (36 pp.). Rand McNally & Co., Chicago. Prices not given.

These pamphlets, being prepared for BSCS by authorities in various fields, are designed to supplement any general-biology program. Each "emphasizes the ecological aspects of the subject at hand and stresses the explorations and methods of investigation which led to the present knowledge in that field." The 8½-by-5¼-inch size makes these booklets convenient to handle and carry. They are attractively covered with nicely illustrated, colored hard paper, and the text paper is of a quality that renders the halftones in good detail. The type is easy to read. Each booklet is liberally sprinkled with photographs, drawings, graphs, charts, and devices for breaking the monotony of print. Also, each has an index and a list of suggested readings. Well-done, authoritative booklets of this sort are always welcome. Four of the booklets are reviewed here.

Jack McCoy has first-hand knowledge of islands in the Caribbean, the Pacific, and the Sea of Cortez. A description of the kinds of islands is followed by a map showing the world's most important islands. The author explains the determiners of an island fauna: location and size of the island, its age, and its distance from habitable land. Of particular interest is the discussion of dispersal, with examples of organisms that have invaded new lands by flying, rafting, or swimming. A good account is given of adaptation to island life and of the genetics of rapid evolution in insular populations: the Galápagos fauna, especially Darwin's finches, exemplifies adaptive radiation. McCoy points out the vulnerability of island forms to introduced predators and parasites and to changes in the environment. Examples are given of species that have become extinct because they have been caught in "evolutionary traps" (Sewall Wright's phrase).

Many of the illustrations are whole-page. Some add to an understanding of

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