

updated in 1979 to include the details of Mitchell's chemosmotic theory.

The first few pages are devoted to a description of mitochondrial structure, the isolation of these organelles from ruptured cells, and some permeability properties. Many electron micrographs and drawings provide clarification and a summary of important facts.

At this point, the text proceeds from basic explanation to a more complicated section of membrane potential and the respiratory chain, and finally to a very difficult explanation of the chemosmotic theory itself. To benefit from this material, a knowledge of chemistry and physics beyond that of most high school students is essential; all the information is valid and up-to-date but written in a biochemistry jargon that makes the reading difficult for a novice. This monograph may find great use, however, as a reference for teachers wishing to keep current or for a college student needing a concise technical summary.

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TIPS AND TRICKS IN OUTDOOR EDUCATION

by Malcolm D. Swan, ed. 2nd ed., 1978. The Interstate Printers and Publishers, Inc. (Danville, Illinois 61832) 190 p. \$7.95 (less educational discounts).

This interdisciplinary collection of guides, plans, ideas, and suggestions is appropriately subtitled "Approaches to Providing Children with Educational Experiences in the Out-of-Doors." It is informally written and easy to read, in spite of the distractingly excessive use of "etc."

Most of the sections have an outline or worksheet format. Approximately half of the activities pertain to biological investigations: animal and plant studies, interpretive trails, ecological and environmental impact studies. Other topics include creative expression, camp songs, games, dances, arts and crafts, weather, geology, measurement and mapping, and community resources. Some of the activities can be performed on the school grounds; others require special areas.

The activities are written for different grade levels, but can be modified by the teacher depending upon the maturity of the children involved. Most units provide references for further information.

It must be mentioned that care in tasting plants in the wild should be *much* more strongly emphasized than it is in the "awareness" activity on page 26: "Taste (using discretion) some of the plants common to the area."

And question 19 from "A Farm Visit" should be modified to include a *daughter*: "Is there a son to continue with the farming operation? What education did (will) the son receive beyond high school?"

On the whole, the book is a useful reference. For new teachers and those who have never conducted field trips, there is some excellent advice. For those teachers who would like to hold interdisciplinary field trips, there are many useful ideas. The book would also be a useful resource for outdoor recreation leaders.

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TEXTBOOK OF LIMNOLOGY

by Gerald A. Cole. 2nd ed., 1979. The C.V. Mosby Company (1830 Westline Industrial Drive, St. Louis, Missouri 63141). 426 p. \$17.50.

Cole's text is attractive, not only from the standpoint of the cover and excellent line-drawings, but because the content is brief enough to be covered in one semester. It is not an encyclopedia of limnology. The major generalizations are presented along with just enough factual data to facilitate understanding. The student is not bogged down in a mass of detail. Cole's book serves as a good introduction to limnology at the undergraduate level.

Topics are those to be expected in limnology texts: lake regions and typology, biota of lentic and lotic habitats, energy and production dynamics, lake origins and morphometry, stratification and lake classification, physical factors, and chemical factors.

Although Cole presents topics found in other limnology texts, his book is different. He introduces the reader to the idea that limnology includes contributions from a diversity of disciplines and provides the student with a brief historical perspective. Early on in the text, Cole introduces the kinds of aquatic organisms. This builds a biological perspective early and allows the author to weave in biological aspects with chemical and physical factors in a much more logical manner than is found in some other texts on the market today.

The book presents concepts with great clarity, does not overdo the presentation of supporting detail, has excellent drawings,

and allows the student to complete the text in one semester. Included are a literature cited section, author index, and subject index, so that both students and instructors may delve into topics in greater depth.

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HANDBOOK OF COMMON METHODS IN LIMNOLOGY

by Owen T. Lind. 2nd ed., 1979. The C.V. Mosby Company (11830 Westline Industrial Drive, St. Louis, Missouri 63141). 199 p. \$11.95.

Handbook of Common Methods in Limnology is a guide for laboratory and field experimentation in aquatic science. Limnology is the study of aquatic ecology investigating the interaction of water organisms and their environment. The book is divided into four areas: physical limnology, chemical limnology, plankton, and benthos.

In the physical limnology section, there are included measurement techniques for such features as: stream flow, turbidity, temperature, and morphometry which is the measurement of the area of a specific environment in relation to volume and shoreline length of a pond.

"Chemical Limnology" covers such topics as: chemical analysis of water samples, hardness test and testing for traces of certain minerals that may be present in the water sample.

The plankton section involves a discussion on various equipment and techniques best suited for collecting these organisms.

"Benthos," the last section in the textbook, stresses the importance of benthic organisms in the aquatic environment as recyclers of organic matter and discusses their position in the food chain. Topics in this section include: collection of benthic samples, production of these organisms in the laboratory, and their diversity within a specific stream environment.

Also included in this textbook are an appendix of various conversion tables, a list of various supplies and companies for future reference and a bibliography of other limnology texts.

This textbook would be useful for courses in field biology on the graduate and undergraduate level. It provides the instructor with a comprehensive guide to the study of aquatic organisms.

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