

as well as vernacular names, followed by the alternative names used by various authorities.

Following the taxonomic references are brief particulars regarding the external characters and geographical distribution, as well as a systematic note listing the subspecies occurring in South Asia.

A detailed account of ecology, socio-biology, and behavior in two sections "In the Field" and "In Captivity" follows. Topics dealt with are: habitat; food and drink; daily rhythm of activity; territory and home range; movements, social groups and their composition; reproduction and reproductive behavior; breeding seasons; interaction within groups; forms of social communication; dominance hierarchies; grooming; play activities; interactions with other groups of the same species, primates of other species, and other animals; hybridization; and longevity.

The book would be very useful for zookeepers or people going into field studies of these primates, psychologists who were doing animal studies—or studies of anthropomorphism—and would also be an excellent reference book for libraries.

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#### ANIMAL BEHAVIOR

by Edwin M. Banks and John A. Heisey. 1977. Educational Methods (500 North Dearborn Street, Chicago, Illinois 60610). 208 p. \$4.45.

This is one in a series of 16 small programmed textbooks on separate topics in biology. Most of the important ideas in animal behavior are mentioned and many of the narrative portions are exceptionally lucid and instructional. The authors have condensed a great deal of information within the structures of space and format. However, about one third of the space is used for questions, answer blanks, and objectives, so the condensed narrative contains some generalization and special vocabulary to describe abstract ideas.

The book will be self-instructional for only the highly intelligent and motivated students in introductory college and high school courses. It is not nearly as self-instructional as the books in the same series on DNA (2nd ed.) or cell division. The broad, less concrete material probably makes animal behavior less amenable to programmed learning than more specific topics.

The narrative and questions seem sharply separate—not integrated into a

continuous whole. It lacks the conversational rapport between writer and learner found in the best programmed texts. Some of the questions simply convert a sentence to interrogative form. At the other extreme are questions so general that the student's correct answer may vary greatly from the answer given and thus not be reinforced.

Six students (enrolled in my college senior level animal behavior course) worked through the first chapter. Five considered it a positive learning experience. "It was not fun but was a good condensed review."

The book has a good basic outline and framework and improves from front to back. I will certainly want to look at a second edition should one be produced.

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#### Botany

##### THE PLANT KINGDOM

by Harold C. Bold. 4th ed., 1977. Prentice-Hall, Inc. (Englewood Cliffs, New Jersey 07632). 320 p. \$7.50.

The fourth edition of this textbook on plant morphology has been expanded so that it is no longer the "small book" the author claims it to be. Other changes include the addition of questions for review at the end of the chapters and the elimination of the partial sepia tinting of the illustrations which had been used in the third edition. Numerous photos and drawings illustrate the growth habits as well as the various parts of the many plants. Summary diagrams of life cycles, a good table comparing the several schemes for the classification of plants, a glossary, and an annotated bibliography all contribute to this survey of plant structure and reproduction.

Despite the obviously competent treatment of the subject, I am quite uncertain as to how *The Plant Kingdom* should be used. The book contains no more material in its field than the better textbooks of general botany. The latter are generally better illustrated and are written in livelier style. The book that I use in my botany course employs two shades of gray and two shades of green in its diagrams to offset various generations, tissues, and so forth; more labels are included; and, consequently, life cycles are easier to follow. In addition, the book includes inspiring photos of plants in natural settings, but content has not been sacrificed as the book devotes nearly fifty percent more printed area to the topics covered by Bold in *The Plant Kingdom*. Finally, a general botany textbook pro-

vides a ready reference to plant anatomy, physiology, and other topics which a student of plant morphology may need to know something about.

In my opinion, students should begin their study of botany with one of the better general textbooks. After that they are ready to go on to the full-blown textbooks of plant morphology (of which Bold is an author), anatomy, physiology, taxonomy, etc.

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#### Cell and Molecular Biology

##### BIOLOGY OF THE CELL: LABORATORY EXPLORATIONS

by William DeWitt and Eleanor R. Brown. 1977. W. B. Saunders Company, (West Washington Square, Philadelphia 19105). 205 p. \$6.95.

This manual contains experiments that are suitable for junior and senior college students who have had some preparation in organic chemistry and introductory cell biology. It is designed to be used with *Biology of the Cell: An Evolutionary Approach*, by William DeWitt.

The manual has two parts. The first set of experiments illustrate some major steps in the process of chemical evolution as it relates to the origin of cells. Miller's classic experiment on the synthesis of amino acids is incorporated into a chromatographic technique. This investigation is followed by some new laboratory exercises on (1) S. W. Fox's production of proteinoids; (2) the formation of microspheres; and (3) the preparation of protein-polysaccharide and protein-DNA coacervates. Excellent quantitative and qualitative biochemical techniques are used.

The second part examines the structural and functional characteristics of cells. The structure is presented with an emphasis on the origin of eucaryotic cells. Cellular metabolism is presented through a study of photosynthesis, respiration, and active transport. Experiments on plant pigments and the classical Hill reaction are used to facilitate the discussion of the evolution of photosynthesis. An interesting firefly ATP assay system demonstrates photophosphorylation. Work with isolated liver mitochondria and manometric measurement of oxygen consumption in yeast cells serve as an excellent physiologic and evolutionary approach to the study of aerobic metabolism. Examination of the energy requirements for the active trans-

port of chloride ions into the aquatic plant *Elodea* concludes the studies.

Carefully written introductions with clear, concise, theoretical background information should help to maximize student performance. The rationale for each experimental design is an added plus for both teacher and student. This is one laboratory manual that deserves attention from the teachers of cell biology.

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**INTRODUCTION TO BIOCHEMISTRY**  
by John W. Suttie. 2nd ed., 1977. Holt, Rinehart and Winston (383 Madison Avenue, New York 10017). 434 p. Price not given.

This textbook fulfills its stated intention well. Designed for a one semester course in beginning biochemistry, it will admirably aid the essential but sometimes exasperating memorization of biological macromolecular structure, metabolic chains, and regulatory mechanisms. It does not, to my eyes, introduce any novel way to accomplish this task; explanations of difficult concepts such as free energy and electron/proton transport are standard. The author intends the exhaustion of the textual material within the time span of a course, rather than the availability of further reference material. As such, the text might form the basis for self-paced learning aided solely by question and quiz sections.

The design of the book is pleasing; significant points and structures are effectively highlighted with copious figures. The graphs are clear, appropriate, and use published data. The suggested further reading in books and journals are well chosen. I especially applaud the problem answers at the back of the book.

A biologist is always fascinated with the location of chemical reactions within the cell and organism. Consequently, the juxtaposition of biochemistry and physiology is especially helpful in considering, e.g., membrane composition and permeability, vitamin structure and role in specific reactions, oxidative phosphorylation and mitochondrial structure, and DNA structure and genetic code. Similarly, electron micrographs of cellular structure, the use of data from the experimental literature, and the illustration of isolation techniques for cellular fractions adds to the interest and ability of the student to bridge to more advanced courses with laboratory procedures.

The stated audience is the beginning chemistry, biochemistry, and biology major who may apparently have had organic chemistry but not physical chem-

istry, introductory biology but not genetics, algebra but not calculus. The varying level of background knowledge that students bring to a biochemistry course remains a problem not entirely solved in this standard and useful text book.

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#### CELLS AND ENERGY

by Richard A. Goldsby. 2nd ed., 1977. Macmillan Publishing Company (866 Third Avenue, New York 10022). 162 p. \$4.95.

The dynamic field of biochemistry has expectedly produced much new information and many new concepts. This second edition is a recognition of the past decade of progress in molecular biology and chemistry.

Much of the new material is found in chapters entitled "The Nature of Cells" and "The Origin of Life." A discussion of cells and the cellular basis of life is a useful preamble to a treatment of the production and use of energy by cells.

The rest of book is organized around the concepts of energy production and use, which provide a unifying framework for discussions of metabolic control, conservation and expression of genetic information, enzymology, and protein structure and synthesis.

The book summarizes biochemical topics without losing a basic understanding of cell chemistry. The author shows considerable expertise in discussing biochemistry at an informed layman's level of understanding.

The book is very valuable for use in advanced high school or college level biology classes. It could be used as a textbook for a cell biology course. The book is highly recommended.

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#### BIOLOGY OF THE CELL: AN EVOLUTIONARY APPROACH

by William DeWitt. 1977. W. B. Saunders Company, (West Washington Square Philadelphia 19105). 568 p. \$13.95.

This book offers students an alternative to the bioenergetics theme organizing the descriptive and experimental knowledge of cell biology. The theory of evolution and the cell are presented throughout this book. Concepts of compartmentalization, bioenergetics and the integration of structure function are

closely tied to the origin and evolutionary development of the living cell. While the textbook contains recent information, the book refreshingly is not overburdened by such knowledge. Cell structure, photosynthesis, respiration, membrane structure and function, cell division and the expression of genetic memory are the topics offered in the text. These topics are preceded by an introduction to the evolutionary theme and background information in the field of bio-organic chemistry.

This book will probably be of limited use at the freshman-sophomore undergraduate college courses in general biology or cell biology. For those beginning students who are mentally ready, the book offers a rewarding challenge. An excellent laboratory manual written by W. DeWitt and E. Brown, *Biology of the Cell: Laboratory Explorations*, contains a number of experiments illustrating the conceptual ideas present in this book.

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#### Ecology and Environmental Biology

##### WAYS OF WILDLIFE

by Eleanor Horwitz, ed. The Wildlife Society 1977. Citation Press (50 West 44th Street, New York, 10036) 176 p. \$7.95 hardback, \$2.95 softback.

This book is the collective effort of several wildlife managers and biologists. Unfortunately, the writing is poorly edited, with unit headings not always indicative of what follows and lapses of unity within the chapters themselves. A single black-and-white photograph graces each chapter with a few charts and pen-and-inks appearing periodically. The factual information, though accurate, includes the same information as the ecology section of most standard biology texts. Therefore, at first, I was very disappointed.

Then I re-read the book in view of its stated purposes: to provide elementary teachers with "basic principles of the wildlife science" and to serve as "a source book for wildlife." I realized that for teachers with limited biology background, this book provides the most fundamental concepts of animal ecology, furnishes a few interesting examples for the major points that could be used in the classroom, and suggests many different types of activities allowing students to take active roles in learning about wildlife. Re-evaluated in this light, the book has substantial value.

The introductory chapter tries to show the traditional ties between humans