

enterprise. Although two examples, Snow's study of the transmission of cholera and Black's and Rumford's experiments on the nature of heat are over 100-years-old, the problems faced and the techniques employed are comparable to those given in the third example, the current psychoanalytical analysis of schizophrenia. In all cases, the fallacies, the egos, the mistakes, and the triumphs of science and of scientists are portrayed.

The general principles of science are discussed, and examples from the writings of Freud and Newton dispel any misconceptions concerning the dispassionate nature of scientists. The authors explicate the method of science by examining its components: experiment, theory control, hypothesis, measurement and cultural roots. Furthermore, they compare methods of scientific research with those of scholarly research in the humanities by a careful analysis of imagery in Shakespeare's poems. The parallels drawn are interesting and important for teachers who try to relate science to other creative endeavors. Last, the book presents a clear, concise overview of the roles of logic and of mathematics in the sciences, a feature which may be particularly applicable for science teachers.

There are minor inconsistencies such as the insertion of a few overly general ideas about cancer at the end of the chapter on cholera and the oversimplification of terms and directions that precede the section on heat. A more serious flaw, however, is the omission of any women in the myriad of examples. Although the Virgin Mary, St. Anne, Anne Sullivan, and Helen Keller are mentioned, they hardly qualify as scientists. A woman's scholarship is used to develop the Shakespearean analogy; but unless some woman was overlooked (because an initial was used instead of a first name), none were mentioned as part of the scientific endeavor. This fact is particularly surprising because many examples are inserted from epidemiology, the field of the woman author.

Overall, this is an excellent book and one which is important for science educators. Its appeal, and possible use in the classroom, is diminished only by the lack of female examples. However, it is a beautiful illustration of how the case history approach may be used to make science more humane, understandable and appealing to students, teachers and the general public. As the authors state, "Science works by consensus, and does not require that each individual practitioner have all of the contradictory qualities that characterize the scientific venture itself... There are those who like the power and conciseness of mathematics and those who prefer the library. One

person wants to deal with human-beings and human problems and is willing to pay the price of vagueness and uncertainty; another person prefers atoms and molecules, about which precise questions can be asked and definitely answered... But, for all, one goal is the joy and excitement of discovery" (p. 259).

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General Biology

LIFE SCIENCE

by Gerard J. Tortora and Joseph F. Becker. 2nd ed., 1978. Macmillan Publishing Company, Inc. (866 Third Avenue, New York 10022). 830 p. \$16.95.

This general biology textbook is designed for use in introductory biology courses, and is particularly useful to students planning on entering an allied health profession. The text is organized around three concepts: structure and function of organisms at all levels of organization, interrelationships among organisms, and interrelationships between organisms and their environments. To develop these concepts, the text is divided into six sections.

Section one provides the student with an understanding of basic concepts of chemistry, including the essentials of atomic structure, bonding, and chemical reactions as well as organic constituents. The author's treatment of proteins is one of the best I have read in any general biology book. The chapter on the origin of life begins with early hypotheses of the Greeks and progresses to Pasteur's experiment on spontaneous generation. This chapter along with the section on exobiology should be one of the most interesting areas of the book to many students. Section one concludes with brief, perhaps too brief, explanation of taxonomic criteria used to classify organisms. A major change in the second edition was to place Whittaker's five kingdom classification system in the Appendix.

Section two presents the structural and functional aspects of the cell including photosynthesis, cellular respiration, muscle contraction, nerve impulse, control of cellular metabolism, DNA, the genetic code, and protein synthesis. Some instructors may find this section too detailed for college freshmen; however for those teachers who wish to emphasize energy metabolism, this section provides a thorough treatment.

Section three discusses biological processes related to maintenance at the

organismic level. Reproduction, development, genetics and evolution are covered in this section. The genetics portion might have more continuity if the DNA structure and replication discussion of section two were moved to section four, just preceding the genetics section.

Section five is a typical presentation of ecological concepts and problems. The authors use many examples to help illustrate the concepts of ecology and conclude with a particularly good discussion of the effects of humans on the environment through various kinds of pollution.

The textbook concludes with a short section on behavior. The authors explain the nature and study of behavior, how organisms adapt to their environment and a final discussion of social and human behavior.

Overall the content of this textbook differs little from most traditional general biology books, but its major strength is the clear, succinct writing of the authors and the liberal use of line drawings, photographs and electron micrographs that complement the written text. The use of guide questions at the beginning of each chapter instead of at the end is a different and effective approach. The textbook would be of little use to those teachers who place considerable emphasis on plant and animal survey, but is highly recommended for general biology courses at the college and university level where emphasis is on a broad overview of the science of biology.

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THE GREAT CHAIN OF LIFE

by Joseph Wood Krutch, with illustrations by Paul Landacre and a new preface by Edward Abbey. 1977. Text copyright 1956, preface copyright 1978. Houghton Mifflin Company (110 Tremont Street, Boston, Massachusetts 02107). 227 p. \$3.95.

This book is written by a well-known scholar and literary critic who later in his career turned to writing about nature. The reader will value it for its steadfast expression of comradeship between humans and the rest of nature, whose inhabitants Krutch believes share emotional as well as biological kinship with us. Partly for reasons of being outdated, the biology is rather unsound, although I believe that his chief heresy, that animals have emotions, and intense ones at that, is probably correct. Krutch panics at the discovery that the common dandelion is without sex. "But love is not the mother of dandelions. And that is the first of a