

use of a calculator with squaring, storing, and square root capabilities makes the problems much less time-consuming.

The book would be more useful for the education researcher than for the classroom teacher, although the advanced high-school student might find it useful. The problems require no more mathematical training than the ability to add, divide, square, and take square root. Probability and the partition of variance is not discussed, as they require more complicated mathematical procedures. The instructions for use of the *F* tables in the appendix and the tables themselves are adequate for all of the problems in the book and would be satisfactory for most purposes.

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Environmental Biology

FOOD: READINGS FROM *Scientific American*, with an introduction by Johan E. Hoff and Jules Janick. 1973. W. H. Freeman & Co., San Francisco. 268 p. \$5.50 softback, \$11.00 hardback.

The 28 articles selected introduce facets of "Nutrition and Malnutrition," "Conventional Sources and Resources," and "The Future: Feast or Famine."

Body requirements and physiology are discussed in the first division, thus laying the basic body need for food. These 11 articles focus attention not only on body function but on quality needs, resulting diseases of poor diet, and environmental dangers. Protein importance is introduced.

The second section relates the importance of domestication on civilizations. Energy loss through food chains shows the importance of breeding strains of plants that may be directly consumed by man. Mechanization of mass production of animals is an example of the American agriculture contribution. The political aspect of food production from the seas adds a new dimension. "Food Resources of the Ocean" is an excellent article.

The last eight articles consider the future and what the prospect of sufficient food is for the world. Both orthodox and unorthodox methods are discussed. The general conclusion as the author states is that "A look into the next century brings into focus the emergence of a crisis situation (even assuming perfect distribution of resources) because of expanding world population."

After reading all of the articles, one is impressed with the need for protein availability and the fact that this is truly a crisis.

I feel that this may best be used as collateral reading for courses dealing with food, agriculture, human ecology, and both animal and plant sciences. It

is appropriate for both high-school and college reference and as enlightening general reading.

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THE CITIES IN TOMORROW'S WORLD: CHALLENGE TO URBAN SURVIVAL, by David R. Michelsohn and the editors of Science Book Associates. 1973. Julian Messner, New York. 183 p. \$5.29 (hardback).

The book begins by saying, "In the years to come, the urban areas of our land will be faced with their greatest challenge. This book explores the problems besetting our cities, and considers the ways in which technology can provide better housing, untangle the traffic snarls, silence the noise, clean up our poisoned air, supply us with enough power, rid us of our mountains of trash and give us parks to enjoy in cleaner, brighter, more exciting cities of tomorrow."

In reading the book we are led to believe that possibly science and technology have betrayed mankind. However, as readers continue to read and think, the challenge is realized that only through science and technology can human needs be met. Of the seven major challenges to urban survival that are discussed, pro and con, it causes the reader to realize that some of these challenges are being met and some are not; that possibly other problems could and should be listed at this time. Also, some of these challenges are already a problem other than to urban areas.

The print is large but the pictures are dull. The reading is interesting to the extent that many high-school and college students would have trouble putting the book down. The book is not written as a long, drawn-out novel. Every page and paragraph tell something that invites the reader to continue to the next paragraph.

I would recommend the book for class reading and discussion.

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DICTIONARY OF THE ENVIRONMENTAL SCIENCES, by Robert W. Durrenberger. 1973. National Press, Palo Alto, Calif. 182 p. \$4.95 softback, \$7.95 hardback.

This is really a dictionary of geology, soil, and atmospheric sciences, with selected terms from other disciplines. I am a biologist, so I am no judge of the quality of the definitions in geology and atmospheric sciences; but I think it is safe to say that most of the relevant terms in those fields are included. At the same time I am quite sure that many terms essential to classic ecology and the biologic aspect of environmental issues are either omitted or poorly de-

defined. Among the terms omitted are consumer, producer, indicator, commensalism, mutualism, niche, and others equally familiar—not to mention lesser terms of real utility, such as Allen's rule, poikilothermia, and tiaga.

Many important terms are defined either too generally or too specifically. Examples of the latter (with my emphases) are population density, defined as density of a population in terms of the average number of people living on each square mile; and productivity, defined as the capability of a kind of soil for producing plants under a defined set of management practices (no mention of a time factor or of natural productivity influenced by other biotic or abiotic forces). An example of a too-general definition is biomass, defined as that part of a given habitat consisting of living matter (no mention of a unit of weight or mass).

Another weakness of the dictionary is its inclusion of terms having marginal significance in environmental science or so elementary as to be merely space-taking. Examples are planet and snow-gauge.

The compilation of a dictionary of environmental terms is an excellent idea, long overdue. Durrenberger should be congratulated for starting the ball rolling. But until the book is much improved I cannot recommend it.

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THE TENDER CARNIVORE AND THE SACRED GAME, by Paul Shepard. 1973. Charles Scribner's Sons, New York. 302 p. \$9.95.

The fascinating title introduces the reader to the author's premises, arguments, and blueprint for saving the planet Earth from eventual destruction of its ecologic systems. The villain is agriculture, and the salvation is a return to the philosophy—not necessarily the original life mode—of the hunter-gatherer. By understanding the original life style and mentality of man's beginning as hunter-gatherer, Shepard believes that we have at hand a viable alternative to the "sinister side-effects of industrialized development. . . . It is widely believed that not to progress is unacceptable, that the other choices are catastrophe or a kind of sinking into the past, the more of which we know the less we want to be overtaken by."

Chapter 1, "Ten Thousand Years of Crisis," spells out the indictment of agriculture as a destructive force and special type of mentality that results today in social pathology and organized murder.

Chapter 2, "On the Responsibility of Being an Ape," deals with man's life before history in an attempt to better

understand our relatedness to the natural world. He says, "What problems and characteristics are in fact uniquely human cannot be clear until we know more about what is not human..."

In the next two chapters Shepard builds understanding of the hunter-gatherer's complex philosophy of life. Chapter 5, "The Karma of Adolescence," argues that aspects of man's life cycle "are biological adaptations to conditions of life in the past and make sense only in the perspective of man's niche as hunter-gatherer."

Shepard's final chapter, "The Choice: Industrial Agriculture or Techno-Cynegetics," provides a blueprint for saving our ecosystems from the agricultural revolution. "Reordering our view of time, welcoming the dead as part of us, affirming a planetary ecology centered on food chains, extending the scope of history to the personal and to the cosmic—these are the essentials of the transformation."

This book is well worth the time spent in reading Shepard's castigation of agriculture, animal husbandry, pet-ownership, and other cherished human pursuits, in his development of the above transformations. An additional bonus is the wonderful pen-and-ink illustrations, by Fons van Woerkam.

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UNDER SIEGE: MAN, MEN, AND EARTH, by Kenneth A. Wagner, Paul C. Bailey, and Glenn H. Campbell. 1973. Intext Educational Publishers, New York. 386 p. \$10.00.

Now that environmental courses for the general student have come to be taught in one form or another in almost every college or university, it follows that there would also be many new texts written to support these courses. Although many texts in this area are written with a definite emotional bias in favor of cleaning up our environment and damning the polluters, this cannot be said of *Under Siege*. In fact, although the writing is of good quality, it risks boring the reader at times by its rather straightforward cataloging of environmental problems. In part this is due to the insertion of discussions of the physical and biologic backgrounds underlying, and necessary to, the student's understanding of environmental problems.

This text is divided into five parts. Part 1 deals with an overview of the ecologic-environmental crisis. Part 2 is a rather pedantic review of the biologic and physical knowledge necessary to understand the nature of air, water, soil, and radiation pollution. Part 3 discusses the ecologic and personal stresses now threatening the sanity and safety of our environment. Part 4 assesses the population problem. Part 5 briefly dis-

cusses the progress made towards cleaning up our environment and our emerging awareness of an environmental ethic.

Under Siege is different from many texts in the environmental field in that it discusses at length the role of diseases and drug abuse in creating personal environmental stresses. Although some may feel that such discussions have no place in the ecologic-environmental area, my own experience with college students is that they desperately need such information and understanding. This book also has one of the best up-to-date and extensive discussions of contraceptive technology this reviewer has encountered in a general text. I am only sorry that such knowledge comes too late. It should be old hat to a college student, but, alas, it is not.

If this book has any obvious weakness, it is that it fails to discuss adequately how political and economic forces constrain us from making rapid changes in our pollution- and population-control technology.

Under Siege is profusely, perhaps unnecessarily, illustrated. Many of the photographs supplement the text; but others, like a photograph of crates of sterilized screw worm flies being loaded on a small plane or a picture of *Psilotum*, could have been omitted. Graphs and tables are timely, well prepared, and easy to understand. This text should find wide acceptance in one-semester courses for the nonscience- and even science-oriented student.

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FOCUS ON ENVIRONMENTAL GEOLOGY, ed. by Ronald W. Tank. 1973. Oxford University Press, New York. 424 p. \$8.95 hardback, \$4.95 softback.

I am disturbed to see how often geology is excluded from serious consideration in books on environmental studies. For this reason I am especially pleased to review *Focus on Environmental Geology*.

W. D. Keller, in a recent issue of *Journal of Geological Education*, attributes to Will Durant the assertion that "Civilization exists by consent of geology." Part 1 of the present book emphasizes this in 21 readings on geologic hazards and hostile environments. Primary topics include vulcanism; earthquake activity; tectonic movements and sea-level changes; mass movement; and erosion, sedimentation, and floods. Part 2 contains 11 readings on mineral resources and the impact of their exploitation. Part 3, with 10 readings devoted to urban geology, focuses on city planning, water supplies, and waste disposal.

Ronald Tank has done an excellent job of selecting pertinent and (mainly) up-to-date articles from a variety of geology, engineering, and water-re-

source journals, government reports, and general-science magazines. In general, the quality of the papers is high, and the vocabulary used by their authors is not too technical (perhaps owing in part to Tank's editing). In addition, Tank has grouped the papers into units that sustain a reasonable continuity. Many of the articles make compelling reading, with their eye-witness accounts of natural catastrophes and their elucidation of causes and future risks. Readings on the geologic bases of many urban problems provide useful and fascinating perspectives. We see clearly that the earth is really in control in the long run and that man had better recognize this and learn to take natural geologic factors into account in his planning.

Tank introduces each of his major groups of readings with a useful summary to whet the reader's appetite. He also has selected appropriate short quotations and photographs to make attractive section-dividers.

References originally cited in each article have been retained. These lists, supplemented by longer lists of more general readings at the end of each of the three parts, provide the reader with routes to follow-up studies. There is a glossary of some of the more technical geologic terms that crop up in the readings.

Focus on Environmental Geology could be used as the basis for a highly contemporary beginning-geology course. It is an obvious "must" for any serious environmental-studies program, and it can be read with pleasure and profit by biologists as well as by other scientists. It is even a good bedside book.

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THE CHALLENGE OF ECOLOGY, by Clair L. Kucera. 1973. C. V. Mosby Co., Saint Louis. 240 p. \$5.95 (softback).

For those that get bogged down in histories and introductions, perhaps they will appreciate the author's moving man the gatherer, through the agricultural revolution, urbanization, industrialization, pollution of his environment and attrition of his natural resources in the course of a paragraph. At this point the author lays a strong foundation and develops an understanding of relationships between organisms and their environment.

Chapter 2 offers a refreshing and new look at biologic diversity. Chapters 3, 4, and 5 deal with energy relationships, turnover, cycling processes, and succession in a rather routine manner. Chapter 6 presents a thorough look at soil, its composition, structure, and ecologic relationships to organisms. Chapter 7 was written by John J. Rochow. This chapter is presented in a most scholarly manner and deals with