

analytical procedures and presentations available for selection.

The final book section is a guide to various optimal and sub-optimal sequences of studies, depending on whether the investigator has both pre- and post-impact data, and has full spatial and temporal information.

Literature citations and cross-referencing are frequent and the references listed are briefly annotated. This book can serve as a commendable reference for environmental workers and as a textbook for an upper-level college course preparing environmental assessors.

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MATHEMATICS FOR THE BIOLOGICAL SCIENCES

by Jagdish C. Arya and Robin W. Lardner. 1979. Prentice-Hall Inc. (Englewood Cliffs, New Jersey 07632). 709 p. Price not given.

This substantial book is meant as a text for a college math course in lieu of the customary year of calculus taken by biology majors. It includes most of the elements of such a calculus course, although with different emphases and examples, a few topics from more advanced courses, such as periodic functions, and five chapters containing materials that, though important to biologists, are not usually included in first-year college mathematics. The subjects here include an introduction to probability, functions of several variables, differential and difference equations, and vectors and matrices. As a result, the book is, by the author's estimate, 20 to 25% longer than would normally be suited to two semesters of instruction. Some selection of topics by the instructor would appear necessary.

The first seven of the twelve chapters appear directed at biologists only in the sense that many, but not all, the exercises are of a biological sort. To this biologist, some have an aura of unreality about them. Further, there is less than the usual emphasis on proof and more on an intuitive, but still rigorous, development of the subject. Much of the same can be said about the remaining five chapters except that here the choice of topics itself is dictated largely by the perceived needs of the biologist.

How well does the book and a course based on the book meet the needs of today's biologist? To the extent that the biologist needs to use the calculus and a few branches of "higher mathematics" closely related to it, the needs would be met quite adequately. The book might

also be useful to the practicing biologist who suddenly needs to recall some mathematical technique first learned ten to twenty years ago. But the range of the quantitative abilities required of the biologist today are wider than the calculus and related topics. Linear algebra, a wide variety of statistical techniques, and some skills in computer programming are often at least as necessary. This book goes only a short way toward the development of the total mathematics curriculum now needed by the new generation of biologists.

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SCIENTIFIC ILLUSTRATION

by Phyllis Wood. 1979. Van Nostrand Reinhold Company/Division of Litton Educational Publishing, Inc. (135 West 50th Street, New York 10020). 148 p. \$16.95.

Although this is a techniques book, aimed primarily at the practitioners of the art of scientific illustration, it is a fascinating book for non-artists, as well. It will make valuable reading for any scientist, most of whom are engaged at some point in the publication of their research. The information will certainly help the scientist understand the challenges faced by an illustrator, which should greatly aid in cooperation between them to produce illustrations with the maximum impact.

The book is beautifully written, covering many detailed points, but always with a finely honed, rather insistent sense of aesthetics. In compelling ways, the author points out that scientific illustration is not merely dedicated to accuracy, although that is surely one aim of the field. The true emphasis is communication, and the illustrator who is an artist as well as a craftsman will attempt to highlight the beauty and individuality of the subject, whatever it may be.

The writing is authoritative and technical where appropriate, but the sensitivity is always apparent. Consider an example.

In order to interpret what you are looking at, try to identify the patterns of growth: the spirals and successions of curves, the methods of branching, the unequivocal design of the mosaics, the rhythms and repetitions, the symmetries and asymmetries. There is always some kind of inherent order in shapes, textures, and colors. Nothing in nature is random. It is clear that accuracy and appreciation are finely melded in this presentation.

The book is full of information. Ms. Wood explains in great detail the tools of the trade, shading, measuring, erasing,

reducing and enlarging, to name just a few covered. She offers advice on such purely technical subjects as tone, background, dusting, finishing, and color reproduction.

Chapters range from such technically useful ones as perspective, color, and light and shadow to professional concerns such as printing for publication, exhibits, and career guidance. There is an adequate index.

For those contemplating a career in scientific illustration, the book will be a treasure. For others who are touched by this field professionally, it will certainly be interesting and probably helpful. It would be excellent for courses in illustration, and would be a first rate addition to science libraries.

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Social and Ethical Issues

BIO-REVOLUTION: DNA AND THE ETHICS OF MAN-MADE LIFE

by Richard Hutton. 1978. New American Library, Inc. (1301 Avenue of the Americas, New York 10019). 246 p. \$2.25.

This book is intended to provide a clear perspective on genetic engineering, the issues and implications of DNA, and what it can mean to the future of life on earth. The author, as a free-lance writer with interests in science and medicine, has geared his publication towards the general public, college student, and medical staff.

It is knowledgeably written, with many indications by the author of historical events of DNA through various studies of Levene, Morgan, Crick, Watson, and others. The greatest strength of this book is in its organizational levels of the background of DNA, its structure, cloning, genetic sabotage, and future thought including the controversy within and outside the scientific community about profound and moral questions, and possible consequences of genetic tampering.

The author clearly discusses a rather difficult topic. Each section is well explained and expertly demonstrated using examples in discussing the issues used in DNA research, and in human control over the biological revolution, the benefits it offers, and threats it poses.

However, because the book covers a difficult subject, charts and diagrams would have been helpful additions to the examples provided by the author.

In all, the author has handled a particularly difficult subject well. This