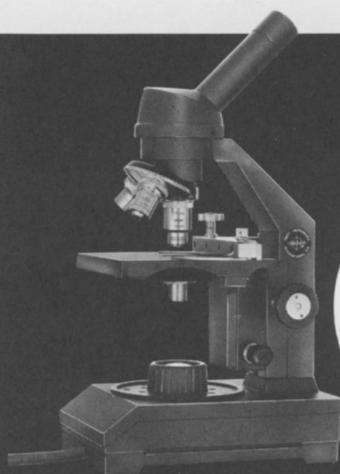
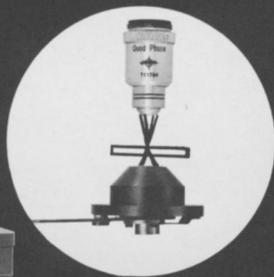


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techniques. It assumes that he has already had formal mathematics courses in which they were covered. The choice of techniques included is perhaps somewhat more suitable for the physical than the biologic sciences.

Unfortunately, the idea is not brought off well in the book. First, the jargon is closer to that of the mathematician than to that of the scientist with a somewhat shaky math background who may want to use this book. Secondly, there are mistakes, which undermine confidence: a liter of water does *not* have a mass of 2.2 kg, for example. Third, the most useful methods are not always given. For example, Swartz

gives only the definitional formula for the calculation of standard deviations, and this requires the tedious calculation of the squared deviation of each value from the mean. The alternative method, which uses the square of the sum of the values and the sum of the squares of the values, is not mentioned.

Nevertheless, the book is likely to be of use to scientists who need to look up some specific mathematical procedure from time to time or who wish to review some of the math they learned in the dim, dark past.

Werner G. Heim  
Colorado College  
Colorado Springs

CHALLENGING BIOLOGICAL PROBLEMS: DIRECTIONS TOWARD THEIR SOLUTION, ed. by John A. Behnke. 1972. Oxford University Press, New York. 502 p. \$10.95.

Each year, on the anniversary of the birth of Linnaeus, it is traditional for the president of the Linnean Society of London to review the society's scientific contributions for the preceding 12 months. In a somewhat similar spirit but with a different inclination the American Institute of Biological Sciences, on its 25th anniversary, has published this collection of special papers, which look to the *future* rather than the past.

*Challenging Biological Problems* consists of 21 essays on biologic topics that are not only "current and choice" but are also supposed to represent the concerns of biology for the next quarter-century. An introduction focuses on the status of AIBS, and three research papers by students complete the anniversary volume.

Many anthologies have a single, restricted theme. This AIBS volume, on the contrary, scans a broad frontier—the frontier of biologic endeavor today—while speculating about what lies beyond it. (The authors were told to conjecture, and conjecture they did.) The most important frontier outposts (perhaps a better term than the title-word "problems") were identified from a list of over 100 contributed by the community of biologists. A different editorial group might have named different outposts, but at least there is a wide spectrum: abnormal growth, aging processes, timing mechanisms, cell differentiation, pest control, ecosystem analysis, aggression, biogeography in the light of plate tectonics (a geologic theory), cellular mechanisms of learning, population regulation, classification, environmental contamination, intervention in genetic systems, and several more. In addition to consideration of 17 problems that are strictly biologic, there are essays on the communication of biologic findings, on graduate education, and on the manifold relationships between biologists and society. The reference lists at the ends of chapters are valuable, but the inclusion of the student research papers seems of questionable import.

Inevitably, there is some unevenness from author to author; and no editorial tie or overview links chapter to chapter. Whether or not the choices seem readable and provocative will depend largely on the interests of the reader. Although the future belongs to our students, most of them will not find this book appealing in toto unless they are far advanced in biology. Certainly the book is a timely and generally well conceived addition to the bookshelf of the professional biologist. He should read selections as the fancy strikes him,

read some for his own edification even if the fancy doesn't strike him, and share pertinent chapters with able students.

Richard G. Beidleman  
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Colorado Springs

#### Zoology

**BIOLOGY OF THE INVERTEBRATES**, by Mary S. Gardiner. 1972. McGraw-Hill Book Co., New York. 964 p. Price not given.

Typically, textbooks on the invertebrates are systematic. This book is different: the invertebrates—protozoans and insects included—are seen from the viewpoint of function. They are studied not only as a varied and interesting group of organisms but also as the overwhelming majority of the earth's inhabitants and as useful research organisms. Gardiner considers the relationships of invertebrates to each other and their adaptations to environmental conditions. The book is quite up-to-date: there are many examples of research studies, a chapter dealing with invertebrate histology, and discussions of biochemical topics, including pigments, oxidative metabolism, metabolic products and their uses (toxins, attractants), and neural transmission. Section topics are body plans, skeletal structures, and locomotor devices; classification; food procurement; ingestion, and digestion; food habits and dietary requirements; transport mechanisms, respiratory gases and their transport, and excretion; ionic and osmotic regulation; sense organs, neural secretions, endocrine regulation, and rhythms; and reproduction, development, and regeneration. The illustrations are clear, accurate, and well labeled. There are chapter bibliographies, a general bibliography, and suggestions for further reading.

Because it is carefully written, easy to read, and interesting, *Biology of the Invertebrates* is ideal as a college textbook and would be a valuable reference book for high-school biology teachers and students. There are hundreds of fascinating examples of basic biologic concepts from which a teacher could draw for course enrichment.

W. Robert Stamper  
Cheltenham High School  
Wyncote, Pa.

#### For Young Readers

**HOW MAN BEGAN**, by Carla Green. 1972. Bobbs-Merrill Co., New York. 80 p. \$4.95.

I asked a high-school teacher to try this book on his students. He said they could read it in 2 hours, because apart

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