



Book Reviews

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BIOTECHNOLOGY



Biotechnology: A Textbook of Industrial Microbiology. (2nd ed.).

By Wolf Crueger and Anneliese Crueger. 1990. Sinauer Associates (North Main St., Sunderland, MA 01375). 357 pp., 242 illus., 125 tables. Hardbound \$44.95.

Industrial microbiology is an economically important field, yet most people are unaware of the vast number of consumer products that have microbial origins. News reports of ecological disasters are bringing microbes into public awareness: as bioremediators of oil spills and hazardous waste, or potential vectors of biological warfare. Pharmaceutical manufacturers, the mining industry and many processes of food production have long depended on the actions of microbes. Nowadays, recombinant DNA technology is changing how new strains of microbes are generated. Modern applications of microbes, in sewage treatment, gas generation and synthesis of biodegradable plastics, are entering the economic mainstream as our understanding of the organisms and engineering improvements in facilities design make these uses cost-effective.

Thomas Brock has provided a wonderfully readable translation of this excellent text, which clearly and concisely explains the biology, biochemistry, production strategies and hardware of industrial microbiology.

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Important terms are set off in boldface with clear explanations. Chapters progress from an introductory overview to increasing complexity. Bibliographies at the end of each chapter list primary research articles (including titles) and other books and reviews helpful in further library research. Here is a wealth of information at a reasonable price.

The 20 chapters begin with an introductory definition of biotechnology and its importance to industrial microbiology, with traditional and modern examples. General considerations are the subjects of the next five chapters: how new products are discovered, strain development, nutrient sources for large-scale growth of microbes, fermentation methods and product recovery. Chapters on microbial generation of specific classes of products follow, including: organic feedstocks (fuel and primary materials for synthesis of other organic chemicals), organic acids, amino acids, nucleic acid components, enzymes, vitamins, antibiotics, therapeutic drug precursors, stereospecific chemical modifications (called microbial transformations). Several chapters on newer uses of microbes encompass: single-cell protein from waste sources (wood lignin, sewage and carbohydrate by-products), sewage treatment, microbial leaching for purifying metals from ore, polysaccharide production and a final chapter on future prospects.

Extensive illustrations range from sketches to photographs with cut-aways that show the inner workings of machine parts and clear schematics of complicated processes. Recently I had the opportunity to see real fermentors in action. Reading this book was extremely helpful to me in preparing for the visit as its up-to-date pictures correspond to the actual machinery operating in a local bioprocess scale-up facility.

This concise yet comprehensive text conveys the diverse approaches to growing microbes and applications of microbes in our present and future. I highly recommend the Cruegers' book for two- and four-year colleges as a text for a major's course in industrial

microbiology. It will be an excellent reference work for introductory courses and as a resource for high school libraries that are updating their biology curricula as well.

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MEDICINE



Microorganisms: From Smallpox to Lyme Disease, Readings from Scientific American

Magazine. Ed. Thomas D. Brock. 1990. W. H. Freeman and Company (41 Madison Ave., New York, NY 10010). 173 pp. Paper \$11.95.

As the title implies, this book is comprised of 12 chapters, each containing a *Scientific American* article from the year 1976–1988 dealing with microbial infectious diseases and their treatments. The book is divided into four sections:

- I. Natural History of Infectious Disease (three articles: The Bubonic Plague, Legionellosis, Lyme Disease),
- II. Prevention Is Better than Cure (four articles: Immunization Against Smallpox Before Jenner, The Eradication of Smallpox, Obstacles to Developing Vaccines for the Third World, Synthetic Vaccines)
- III. Protozoal Diseases Out of Africa (three articles: The Biochemistry of Resistance to Malaria, Molecular Approaches to Malaria Vaccines, How the Trypanosome Changes Its Coat)
- IV. The Perilous Arm of Infectious Disease (two articles: Island Epidemics, The Birth of the U.S. Biological-Warfare Program).

Brock has chosen articles that are interesting in their own right and comprise a somewhat cohesive group of readings that define the history and scope of the infectious disease process. The only article that may be out of place is the last one dealing with the birth of the U.S. biological-warfare

program; nonetheless, biological warfare and its development in the United States is current and thought-provoking. I also believe that an article on AIDS would have been a worthy and important addition to this text and should have been included.

The book is written primarily as a collection of articles that could easily be used as a reading supplement to a college-level microbiology, epidemiology or infectious disease course. However, it would serve nicely for advanced high school biology classes that are interested in the history and development of infectious disease. The book might also be appropriate for a course using a seminar or independent study rubric. The strong points of this collection are the clear and interesting writing style found in *Scientific American*, the use of illustrations, pictures and tables to emphasize material in the written text and the appropriate use of a prologue following each article to bring the reader up to the current level of knowledge in each area.

I found Brock's comments in the prologue sections to be timely and interesting; they give the reader an increased awareness of the importance of each chapter. The soft, paper-bound book appears to be a little fragile but has held up well despite continual use. In conclusion, Brock in his closing statement in the general introduction says: "The chapters in this book tell some of the most interesting stories in ancient and modern medicine. They are all stories in which microorganisms, the smallest of creatures, play major roles."

After evaluating this book, I believe that a better summary statement could not have been written for this collection of papers. It is certainly worthy of purchase by biology teachers and their students because the price is low, it is well-illustrated and would make an excellent reading supplement for college/university and upper-level high school courses dealing with the history of infectious disease, disease production by microorganisms and the scientific measures used to control the spread of these diseases.

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GENETICS



Human Genetics (2nd ed.). By John B. Jenkins. 1990. Harper & Row Publishers, Inc. (10 East 53rd St., New York, NY 10022-5299). 544 pp. Hard cover \$41.95.

Jenkins' 1983 edition was an excellent book to introduce non-scientists to genetics in general and to the genetics of human beings in particular. His second edition is even better. It is thoroughly up-to-date with good coverage of those topics (such as composition of the genome, cancer, sex determination) where our understanding has advanced the most, yet it is still accessible to the non-biologist. The presentation of modern methods of gene localization, an area changed beyond recognition in the last two decades, is excellent.

Both editions are directed toward students either just beginning a college curriculum in science or else taking AP biology in high school. The book would make an excellent text in a one-semester course for liberal arts students, and it could be a fine resource for high school students who are interested in modern genetics. While the book is not comprehensive enough for biology majors in college, it can serve as a valuable supplement even at that level because of its excellent treatment of two important topics: behavioral and evolutionary genetics. These subjects are often slighted or omitted altogether in genetic textbooks, yet they are important and, if well presented, of great interest to students.

In his chapter on behavior, Jenkins summarizes the most interesting work of the last decade on schizophrenia, alcoholism and Alzheimer's disease; his bibliographic references provide a good start for any student interested in writing a term paper on these subjects. Jenkins also gives balanced and temperate treatment of the touchy subject of IQ and the cultural bias in its determination. When he discusses population genetics and evolution, Jenkins goes beyond a sterile statement of the Hardy-Weinberg principle and its corollaries, giving a clear account of genetic variation for biochemical markers both within and between various races. He closes the book with one of its best sections, a discussion of the evolutionary origins of human beings and their relationship to both fossil and living hominoids. Most modern instruction in evolution stresses micro-evolution and short-term changes in gene frequencies. Students need to learn evolution at the paleontological level as well and to be familiar with the historical sequence of events.

Jenkins presents the basics of both Mendelian and molecular genetics with clarity and a minimum of fuss. Why he chooses to use Mendel's pea

plants rather than human beings as examples of basic transmission genetics is a mystery, as is his use of the outmoded terminology of "monohybrid" and "dihybrid" crosses. These terms should now be reserved for the rare cases when a geneticist actually hybridizes true-breeding agricultural stocks. However, these are small complaints to make against an otherwise excellent book.

The book is well illustrated throughout with black-and-white line drawings and diagrams which are easy to understand and convey important information. These are actually superior to the three- and five-color diagrams that are becoming so common in introductory textbooks because they allow you to concentrate on content and to construct customized, photocopied transparencies for lectures. Each chapter ends with a bibliography, a summary of its key terms and concepts, and a series of problems to test the student's mastery of the material. Solutions to all problems are given at the end of the book along with a glossary and a thorough index. These features, combined with a pleasant writing style, make the book a pleasure for both teacher and student to use.

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TEACHING



Ways To Teach Biology: The Whys and Hows of Changing to a Process Approach. By Sharon La Bonde Hanks. 1989. Peter Lang Publishing, Inc. (62 W. 45th St., New York, NY 10036). 188 pp. \$31.95

For the many of us who have endured boring college lectures, the question keeps arising, "Why can't they make it more interesting?" Sharon Hanks' book, *Ways to Teach Biology: The Whys and Hows of Changing to a Process Approach* offers some radical twists for improving both interest and understanding in college-level biology classes.

The first third of the book is divided into 13 chapters describing factors influencing Hanks' personal evolution from teaching biology with an initial "fill-the-bucket" lecture to that of a content-process approach. Writing with a concise and easy to follow style, she discusses learning theory, academic abilities, ways of writing, assessment and evaluation, and teaching strategies such as brainstorming