ning graduate students, and the material covered should constitute a good one-semester course. In addition, life scientists who are interested in obtaining a start in the field, or in surveying its possibilities, would do well to start with this book.

The first section deals with the physical aspects of the field, briefly describing the different kinds of radiations, how they are generated, and how they interact with matter. Special emphasis is placed on radiations and radiation reactions of biological interest. It is very interesting to see emphasis placed on the historical approach to the field.

The author then turns to radiation effects at the cellular level, and quite correctly emphasizes the effects produced in the chromosomes. As a research tool, radiations have had their greatest impact in the science of genetics, and several chapters are devoted to this subject.

The next section discusses the effects of radiation on tissues and organs in plants and animals. Many of the effects discussed here were, only a few years ago, thought to be quite mysterious. In the light of modern concepts, as succinctly outlined in these chapters, they fall neatly into place.

There follow several chapters on the more practical aspects of radiobiology, including a treatment of the consequences of overexposure in mammals and the possibilities for protection and therapy. A chapter is devoted to ecology and the consequences of contamination of an ecosystem by radioactive materials. The problem of fallout from atmospheric testing of nuclear weapons is treated in a rational manner. In the final chapter a number of uses of radiation, including insect control by male sterilization and food preservation, are briefly treated.

Each chapter includes a number of references for the further pursuit of specific topics. Such a short book must necessarily be quite incomplete in attempting to cover such a wide field. However, the author has chosen carefully to make it a very readable introduction to all facets of the subject.

HOWARD J. CURTIS
*Brookhaven National Laboratory, Upton, New York*

## The Rutgers Symposium on Evolution

**Evolving Genes and Proteins**. A symposium (New Brunswick, N.J.), September 1964. Vernon Bryson and Henry J. Vogel, Eds. Academic Press, New York, 1965. xxiv + 629 pp. Illus. $19.50.

Those who feel that many of the recently published conference proceedings have been compressed at the expense of style and comprehensibility will be especially pleased with *Evolving Genes and Proteins*. The editors and publishers have preserved much of the discussion following each group of papers and have not obviously condensed any of the presentations, some of which are very discursive in tone. The result is an unusually readable (and rather expensive) volume. In most cases, this has added greatly to the sense of being present at a very exciting symposium. Occasionally this prodigality with the spoken and printed word was used for jurisdictional warfare between organismal and molecular biologists. At their best, these exchanges are short and witty, and reading them is good malicious fun. Unfortunately there are also one or two tedious filibusters alleging the superiority of one approach over another. An uncommitted reader will almost certainly feel that amino acid and nucleotide sequences will add tremendously to our understanding of evolution; just as surely he will hesitate to throw the classical taxonomists onto the pavement on the grounds that biochemists can now (laboriously) distinguish a fish from a bird.

An excellent summary of the symposium appeared in advance of the book [V. Bryson and H. J. Vogel, *Science* **147**, 68 (1965)], and little more need be said here. The book itself is organized along somewhat different lines, starting with a section on the general and specific evolution of metabolic pathways, proceeding to the evolution of the amino acid sequences of various single proteins as it can be reconstructed from our knowledge of present-day organisms. This group of papers is followed by a valuable series on the mechanism of action of enzymes, their active centers, and their quaternary structures as related to phylogeny. Finally, there is a section on the consideration of evolution at the polynucleotide level. Each of these approaches, ranging essentially from the phene to the gene, brings new and qualitatively different insights; in the terminology of evolution, the grouping of papers is phylogenetic, though perhaps in a retrograde sense. There are relatively few presentations on prebiotic organic evolution, but the subject is certainly not ignored. Although evolution is the thread that holds the various chapters together, the material will be invaluable to geneticists and chemically oriented biologists whose interest in evolution may be incidental. This book comes at a time when knowledge of our biochemical history is very fragmentary but rich in promise. As such, it is heartening that solid facts and unabashed speculation have been successfully juxtaposed without losing their separate identities.

Each paper in *Evolving Genes and Proteins* is followed by a list of references, and these are compiled into a complete alphabetical author index. There is also a subject index. The printing and proofreading are very good.

In short, this book can be recommended as a remarkable assortment of papers and discussions by eminent biologists. It will be of great value to specialists in evolution and comparative biochemistry and to interested bystanders. No doubt it will be a useful adjunct in the teaching of a number of graduate-level courses.

ROBERT L. METZENBERG
*Department of Physiological Chemistry, University of Wisconsin Medical School, Madison*

## Space Technology

**Dynamics of Rockets and Satellites**. G. V. Groves, Ed. North-Holland, Amsterdam, 1965. xii + 313 pp. Illus. $11.20.

*Dynamics of Rockets and Satellites* is based on a series of lectures presented at Cambridge, England (in 1963), at a summer school of the same name. It suffers from many of the faults common to books derived in this manner. The material is very spotty. Some authors cover their subject matter very thoroughly, while others are content to outline the problem. Very few references are given; there are no abstracts; the index is inadequate; and