for example the clarification of such topics as force of crystallization and the nature of progressive metamorphism—and Spry is correct to point to chronological analysis as a vital tool for the metamorphic petrologist. But from reading this book I would judge the significance of textural studies to be that of a valuable corrective rather than a pointer to new directions in research, unless they emphasize the need for more experimental work on crystal growth in the solid state.

The reader will find ambiguities in some definitions and classifications adopted in the book. For example, it seems a disservice to define polymetamorphism as repeated metamorphism "of the same kind" and then proceed to discuss the case of thermal metamorphism followed by regional metamorphism. What is meant by "kind" here? Also, the definition makes no distinction between metamorphic complexes that have undergone episodic crystallization during a single metamorphic event and those that have received the imprint of two quite distinct metamorphisms.

However, this is a very useful book and it will be welcomed by research workers. In addition it is hoped that it will be used to broaden the scope of undergraduate teaching of metamorphism.

M. R. W. JOHNSON
Grant Institute of Geology, University of Edinburgh, Edinburgh, Scotland

Microbial Genetics

Episomes. ALLAN M. CAMPBELL. Harper and Row, New York, 1969. xiv + 194 pp., illus. $5.95. Modern Perspectives in Biology.

Following infection of a sensitive cell by a temperate bacteriophage, the phage DNA may be duplicated in either of two mutually exclusive states. Should the infection proceed in the "lytic" direction, the DNA is duplicated about once per minute, the structural proteins of the mature virus particles are produced, particles are assembled, and the host cell lyses. If the infection proceeds in the "lysogenic" direction, such "autonomous" DNA duplication is repressed, as is the expression of most of the phage genes. One (usually) copy of the phage genome attaches to the host cell genome, and any remaining, unattached copies are diluted out of the culture as the infected bacterium resumes its own duplication. The attached phage genome is now duplicated exactly once per cell generation, as are the other, "normal" parts of the host DNA. In 1958, François Jacob and Ellie Wollman pointed out that these features of temperate phages (acquisition by infection, duplication in two mutually exclusive states, attachment to the host genome) are shared by agents which confer fertility or the ability to produce bacteriocins upon their bacterial hosts. The occurrence of the features simultaneously in apparently unrelated biologic entities suggested a fundamental relationship among the features. In order to underscore this relationship, Jacob and Wollman proposed to call by the same name all entities which manifested this constellation—thus, "episomes."

Campbell has recounted, in a personal though modest way, progress to date in the studies of temperate phage, fertility agents, bacteriocinogeny agents, and the medically important and evolutionarily fascinating agents which transfer antibiotic resistance. In so doing he has utilized the Jacob-Wollman definition in a not completely successful attempt to impose coherence upon his review. The book will be bought with high hopes by embryologists, evolutionists, epidemiologists, maize geneticists, and others who feel, rightly, that bacterial episomes may be pertinent models for phenomena of their immediate interest. Many of them will be disappointed. Campbell, though explicitly aware of his potential audience, has forgotten that many people who want to know about episomes do not already know about "marker rescue," "early mutants," "late genes," "anneal" meaning the reassociation of DNA chains by slow cooling of a heated solution of duplex molecules, "hybrid" meaning a duplex composed of annealed chains from genetically distinct individuals, "hybrid" meaning intertypic recombinant, "transfer induction," and "zygotic induction." All these terms and more are used without prior definition. Furthermore, help will not be found in the index—none of the terms listed above are there. For active workers in microbial genetics, *Episomes* will be useful, although, like any primarily technical review, it will not retain a high degree of usefulness for very long. The lasting contribution which could have been made to biology at large lies buried in laboratory slang.

FRANKLIN W. STAHL
Institute of Molecular Biology, University of Oregon, Eugene

Cell Infection

Enzyme Induction by Viruses. SAUL KIT and DEL ROSE DUBBS. Karger, Basel, 1969 (U.S. distributor, Phiebig, White Plains, N.Y.). x + 114 pp., illus. $6.50. Monographs in Virology, vol 2.

This book collates in a straightforward manner a great deal of information on enzyme synthesis in virus-infected cells. As might be expected, a large percentage of the information is concerned with phage-infected bacteria, and much of this information has been reviewed before. The new enzymes found in infected cells are described and evidence concerning their induction and synthesis is presented and discussed. In spite of the brevity the uses of host mutants, virus mutants, and inhibitors are clearly described.

The information on virus-infected animal cells is handled in a similar manner, but, because the subject has not been as frequently reviewed, this section seems fresher. It suffers, however, from extensive use of unfamiliar terminology such as letters, which are not listed in a convenient table, to designate particular cell lines. A list of abbreviations used for common biochemical terms is given, but not for less well known terminology.

I believe the book would be a useful reference for classes in virology or biochemistry or for an individual because it provides a ready means of locating a complete list of original references on metabolic changes in virus-infected cells. In addition, a brief insight is provided about relevance of the papers.

RAYMOND L. ERIKSON
Department of Pathology, University of Colorado School of Medicine, Denver

Cardiovascular Prostheses

Engineering in the Heart and Blood Vessels. GEORGE H. MYERS and VICTOR PARSONNET. Wiley-Interscience, New York, 1969. xvi + 208 pp., illus. $14.95. Wiley Interscience Series on Biomedical Engineering.

In order to expand the possibilities of cardiac surgery, several artificial devices have been developed in the last decade. These include artificial hearts, assisting heart devices, artificial heart valves, cardiac pacemakers, artificial blood vessels, and other implantable devices. Some of these devices are the result of highly sophisticated electronics and mechanical