engineering, and often the terminology used is difficult for physicians to comprehend. On the other hand, the physiologic response to these devices is somewhat different from the descriptions found in ordinary textbooks of physiology, and it is difficult, particularly for nonmedical personnel, to understand the specifications required of their devices. It is therefore quite important to have a textbook that can easily be understood by both medical and engineering personnel.

Engineering in the Heart and Blood Vessels is such a book. The authors, representing both the field of engineering (Myers) and that of surgery (Parsonnet), show their particular experience with and knowledge of cardiac pacemakers. Their account of these devices, which includes description, physiologic explanations, history, requirements, and surgical problems, is clear, understandable, and sufficient. The wordage given to implantable materials, artificial hearts, and artificial vessels is not sufficient, however. Granted, it is a difficult task to cover all of the problems extensively, but for the reader interested in the latter subjects the book may be somewhat disappointing. It succeeds in giving an overall review of the field, however, and is a good starting point for the novice. For engineers and physicians interested particularly in cardiac pacemakers and in electrical stimulation of the body, this is a most valuable text and reference book. It would be useful as a textbook for biomedical engineering and medical school students.

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Metabolism of Hormones

Androgens and Anabolic Agents. Chemistry and Pharmacology. JULIUS A. VIDA. Academic Press, New York, 1969. xii + 332 pp., illus. $16.50.

The androgens provide an attractive opportunity for studying the relationship of chemical structure to biological activity. The separation of the anabolic (nitrogen-retaining) from the androgenic activity would prove very useful.

The first comprehensive study of correlation of chemical structure with androgenic-anabolic activity was made by the utilization of the renotrophic effect of the androgens in the mouse. A simple correlation between tissue weight and chemical structure was found. The saturation of the α,β-unsaturated 3-keto group resulted in primarily a decrease in androgen activity without a comparable decrease in the renotrophic activity. The most effective compound was androstane-3α, 17β-diol. On the other hand, oxidation of the 17β-hydroxyl group produced a greater reduction in renotrophic than in androgenic activity. These studies were extended to the skeletal muscles of the guinea pig. The temporal and other head and neck muscles gave a relative response practically identical to that of the mouse kidney. Furthermore, androstan-17β-ol,3-one was more potent than testosterone on the seminal vesicles and prostates, and still more potent on the muscles.

The presentation of a practical assay and the observation that the removal of the 19-methyl group resulted in a compound, nortestosterone, which had much more relative activity on the levator ani muscle than on the prostate prompted many of the pharmaceutical companies to prepare large numbers of compounds. Use of the levator ani as representative of the anabolic action has been questioned by many investigators, but the assay of a large number of steroids has nevertheless made it possible to attempt comparisons of biological activity with chemical structure. The author evaluates and compares the several suggested theories and systematically examines the effect of various changes in the molecule on the relative response of the two types of target tissues. The major portion (203 pp.) of the monograph consists of a tabulation of the activities of 650 compounds. The biological properties and metabolism of the androgens are summarized in the first chapter to provide background information for the purpose of the monograph—correlation of chemical structure with the relative response of the levator ani and the ventral prostate (and seminal vesicle) of the rat.

The suggested theories are based on the assumption that the steroids must fit a specific tissue receptor. Each of the theories is supported by some of the biological data, but in every instance several unexplainable facts persist. This is not too surprising. Many factors have to be taken into consideration in the response of any organ to the injection of specific substances. One that has been almost completely ignored is the solubility of the substances in tissue fluid. Unfortunately, the parenteral studies were done by the subcutaneous injection of oily solutions, and the amount of material actually absorbed from the injection site is unknown. The route of administration is another important factor. A good example is 17-methylandrostan-17β-ol, which when administered via a subcutaneously implanted pellet is practically inactive in the mouse because of the inability of the tissue fluids to dissolve the steroid from the pellet, but which when given orally proves to have renotrophic activity comparable to that of methyltestosterone and a much lower androgenic activity. Another important consideration is the chemical nature of the hormone at the site of action. Not only are these hormones metabolized to a variety of compounds but the qualitative and quantitative changes vary among tissues and also among species of animals. The author provides a brief discussion of these factors.

The monograph is a valuable reference source in that it brings together and evaluates all the material in this particular assay. The 85 pages of text are written concisely and clearly. The book does not provide any further enlightenment, however, regarding the relationship of chemical structure to androgenic or anabolic activity. The question still remains: can the anabolic activity of the androgens be separated from the androgenic activity, or is it part of the sex-linked response, as some investigators have claimed, and therefore inseparable from the effect on the accessory sex organs? The differential response of several tissues with alterations in chemical structure, however, provides the possibility of the synthesis (or even the natural occurrence) of a steroid with primarily anabolic activity.

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Wall-less Cells

The Mycoplasmatales and the L-Phase of Bacteria. LEONARD HAYFLICK, Ed. Appleton-Century-Crofts, New York, 1969. xxii + 738 pp., illus. $30.

That organisms which lack cell walls are under intensive study is evident from the table of contents and the size of this book. The editor has drawn together 26 chapters by 35 contributors, mostly from the Second International

Conference on the Biology of the Mycoplasmas held in 1966. Fifteen of the chapters are updated and expanded versions of papers published earlier in the 871-page proceedings of the 1966 conference (*Biology of the Mycoplasmas*, Annals of the New York Academy of Sciences, vol. 143, 1967).

By usual definition, mycoplasmas are found in nature and L-phase organisms, as the editor prefers to call them, are derived from bacteria. Various properties shared by mycoplasmas and L-forms have led to a hypothesis that is difficult to substantiate, that is, that mycoplasmas are descendants of bacteria. The requirement for sterol, a property of animal cells not yet reported for bacteria, and the failure of nucleic acid homology techniques to confirm genetic relatedness are cited in this volume as evidence to the contrary. One may wonder, nevertheless, why other opposing arguments are not included.

Investigators delving into the possible role of L-phase organisms as agents of clinical disease will do well to read the chapter by W. Hijmans and his colleagues from the Netherlands. The thinking in this chapter, supported by 18 pages of references, does not seek to debunk the hypothesis that L organisms have such roles. However, the pitfalls for the researcher investigating this hypothesis are clearly and forcefully presented. Another chapter, by Z. A. McGee and R. G. Wittler, establishes acceptable terminology for the wall-defective variant phases of bacteria and brings together the most recent information on their clinical significance A discussion of the taxonomic position of the mycoplasmas and the reasoning that led to their present classification was enlightening to this reviewer. *Mycoplasma*, the only genus so far assigned to the family Mycoplasmataceae, has 35 species which are listed by name in the book. Just what will be done with the T-strains of M. C. Shepard is not clear, but the possibility of another genus being assigned to this group appears to be under consideration. Since mycoplasmas are free of cell walls and differ in other important respects from bacteria, they should be aligned into a new class, and the suggested name is Mollicutes (soft skin).

The repetition appearing in the introductory sections of various chapters could have been avoided; however, the articles are well organized, clearly written, thoroughly referenced, and comprehensive. The book is not abundantly illustrated, but does contain sparkling photographs of mycoplasma organisms as viewed under the electron microscope. Photographs shown in the chapter by W. A. Clyde which reveal the diversified morphology resulting from progress of growth are especially striking. The book, covering topics which range from studies of ultrastructure to the epidemiology of *Mycoplasma pneumoniae*, should be a useful addition to the wealth of reference material now available to educators, research workers, and students of microbiology.

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Binary Semiconductors

Semiconducting II-VI, IV-VI, and V-VI Compounds. N. KH. ABRIKOSOV, L. V. PORETSKAYA, L. E. SHELIMOVA, and E. V. SKUDNOVA. Translated from the Russian edition (Moscow, 1967) by Albin Tybulewicz. Plenum, New York, 1969. viii + 25 pp., illus. $19.50. Monographs in Semiconductor Physics, vol. 3.

In recent years the rapid development of the use of compound semiconductors for many diverse applications ranging from optoelectronic to thermoelectric devices has precipitated a correspondingly rapid increase in interest in their crystallography, phase chemistry, thermodynamic properties, and stoichiometry and in a range of preparative techniques. Interest in a more chemical approach to the materials aspects of semiconductors has arisen somewhat late in comparison to the rapid development of semiconductor technology. This is primarily because, compared to the elemental semiconductors silicon and germanium, which were the first developed and are still the most used, compound semiconductors are more sensitive to variations in preparative techniques and thermal history.

In this book the authors present a compendium of information of interest to the semiconductor materials scientist for the semiconducting compounds formed from elements of group II, IV, or V, and sulfur, selenium, and tellurium. There are three chapters, dealing respectively with $A^{II}B^{VI}$, $A^{IV}B^{VI}$, and $A_2{}^{V}B_3{}^{VI}$ compounds. In each chapter there is a concise and informative description of the crystal structure of the binary compounds. Also presented are phase diagrams and, in many instances, a discussion of nonstoichiometry and thermodynamic properties of the binary systems. Tables of physical properties pertinent to semiconductor applications are also presented. Preparative techniques are discussed quite briefly. Each chapter finishes with a brief but useful description of the phase diagrams of some multicomponent systems based upon the binary systems discussed in that chapter. It does not appear that, for any of the reported data, a critical evaluation of the source material has been made.

This book will be of general interest to people who are concerned with materials problems encountered in the study and use of compound semiconductors. It is not, however, complete enough in detail to serve as a primary reference source for those who are doing research with a particular semiconductor, and to achieve such detail does not appear to have been the intention of the authors. An annoying drawback is that the bibliography has significant omissions, at least for the systems with which this reviewer is most familiar. Since one purpose a monograph such as this is expected to serve is to aid the researcher more quickly to find primary sources of data, this may be a serious limitation of the usefulness of this book for some readers.

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On the Uses of Applied Physics

Properties of Matter under Unusual Conditions. In Honor of Edward Teller's 60th Birthday. HANS MARK and SIDNEY FERNBACH, Eds. Interscience (Wiley), New York, 1969. x + 390 pp., illus. $19.50.

This book, honoring Edward Teller, consists of 16 articles by some of his colleagues and co-workers. The scope of the book, like the scope of Teller's scientific contributions, is rather broad, ranging from the study of elementary particles up to the study of cosmology. In between these extremes, there are articles on atomic, molecular, and solid state chemistry and physics, neutron and plasma physics, and geophysics. Personal appraisals of Teller's career and scientific style are included in brief articles by E. P. Wigner and W. Heisenberg. In some cases, the articles discuss work presently in progress under Teller's di-