lished since, the symposium; the other comprises broader reviews of some important topics in the field of contractility. In the papers of the first type the results are presented against a background sketched in sufficient detail to enable newcomers to the field to get a quick orientation. In fact, the introductions to some of the papers reporting new findings—for example, that by P. Dreizen, L. C. Gershman, P. S. Trotta, and A. Stracher on myosin subunits—would qualify as concise reviews. H. E. Huxley's excellent discussion of recent x-ray work on living muscle focuses on the role of cross bridges in the contractile process. G. F. Elliot's paper raises some important questions, particularly with regard to the role of electric charges in the interaction of cross bridges with actin. T. Hayashi describes some experiments and offers some speculations on the role of the nucleotide bound to actin and explores possible changes in the actin filaments during contraction. B. M. Twarog deals with the role of Ca^{++} in the catch mechanism, and M. Barany presents evidence concerning the quantitative relationship of the speed of muscle contraction and the adenosine triphosphatase activity of myosin.

Those interested in contractility in general, as well as specialists in some narrower aspect, will find the broader reviews of interest. Particularly stimulating are the two papers (by H. A. Scheraga and L. Mandelkern) dealing with conformational changes and molecular mechanisms that may cause contraction. The discussion following these papers brought out the need of considering general principles in the light of the specific structures found in muscle. S. V. Perry's introduction to the session on striated muscle amounts to an excellent introduction to the myofibrillar proteins, whose known number is, it seems, rapidly increasing. It is to be regretted that no paper deals in detail with the interaction among actomyosin, tropomyosin, and troponin, which is subject to regulation by Ca ions and seems to play a key role in the process of excitation-contraction coupling. J. W. S. Pringle's analysis of the rather specialized system of insect flight muscle may be applicable in general to the currently accepted sliding-filament theory of muscle contraction.

The papers reviewing nonmuscular contractile processes are a welcome addition to the volume, since they cover material not well known to those interested in the more conventional processes of muscular contraction. The reversible fibral formation involved in the formation of the mitotic apparatus, discussed by S. Inoue and H. Sato, may have a relevance to the formation of actin filaments; and the mechanism of ciliary and saltatory movement, discussed by P. Satir and L. I. Rebhun, respectively, may bring to light processes that have been overlooked in thinking about possible ways in which the cross bridges between myosin and actin filaments move.

This sampling of the contents of this book shows that it may be profitably used by both novice and veteran investigators in the field of contractility, as well as by those whose chief interest lies elsewhere but who would like to find out what some of the current problems in contractility are.

J. GERGELY

Retina Foundation,
Boston, Massachusetts

Morphology at a Turning Point

The Interpretation of Animal Form. Essays by Jeffries Wyman, Carl Gegenbaur, E. Ray Lankester, Henri Lacaze Duthiers, Wilhelm His and H. Newell Martin, 1868–1888. Translations and introduction by WILLIAM COLEMAN. Johnson Reprint Corp., New York, 1967. xxx + 191 pp., illus. $10. Sources of Science, No. 15.

It has recently become a popular practice to combine within the covers of a single book articles and essays originally published in periodicals or in other books; the advantages to students (and librarians) are evident. Coleman's collection of six essays goes beyond the prevalent custom of republishing articles which professors hope every student in a particular field will read; he has chosen instead to present provocative essays a number of which in the normal course of events may have escaped the notice of scholars as well as of beginning students.

The first essay in the book, by Jeffries Wyman, on symmetry and homology of limbs (1868), used to be called to the attention of graduate students at Yale by Ross Harrison, but one is permitted to wonder how many of them assign it to their students for the benefit of its substance. One other essay in Coleman's book, E. Ray Lankester's "Degeneration" (1880), is, like Wyman's, an interpretation of specific biological data. The remaining four essays concentrate not only on morphological facts but on attitudes for their study. These are by Carl Gegenbaur on "The condition and significance of morphology" (1876); by Henri Lacaze Duthiers on "The study of zoology" (1872); by Wilhelm His "On the principles of animal morphology" (1888); and by H. Newell Martin on "The study and teaching of biology" (1877).

Each of the essays except that of Lacaze Duthiers is presented in its entirety. Coleman has himself translated into English the portion of this essay included in the collection, and he has also translated the article by Gegenbaur. The translations are excellent. The remaining four essays (including the one by His, which was originally published in English) are reproduced in facsimile, or in reduced facsimile. The volume is attractive in appearance; careful bibliographical notes further enhance its value.

Some editors of collected articles have presented without comment the essays they have selected to reprint; others have written introductory notes discussing the separate essays or groups of them. Coleman has instead incorporated his comments on the articles he has chosen in a single coherent introduction which not only points up their significance but which in itself is a brilliant and original essay on morphological thought in the 1800's and its movement into physiology and experimentation toward the turn into the new century. Thus there are seven excellent reasons for owning this book, and, as in the case of the phenomenon of biological organization, which Coleman names as one of the foremost problems of biology, the whole is more than the sum of its parts.

JANE OPPENHEIMER

Department of Biology,
Bryn Mawr College,
Bryn Mawr, Pennsylvania

Modes of Action

Wirkungsmechanismen von Fungiziden und Antibiotika. Mechanisms of Action of Fungicides and Antibiotics. An international symposium, Gotha, May 1966. M. GIRBARDT, Ed. Akademie-Verlag, Berlin, 1967. xii + 443 pp., illus. Paper, DM 29.50.

The book is a report of proceedings of a symposium sponsored jointly by the Biological Society of the German

Democratic Republic and the German Academy of Sciences in Berlin. The organization of the volume is of some interest because of the presuppositions involved. Three large sections comprise the bulk of the book: (1) cell components affected by the active compounds (divided into subsections for the following components: membranes, cell walls, enzymes, nucleic acids); (2) active compounds (discussions of test methods, uptake by the organism, experimental and biological transformations, synergisms and antagonisms); and (3) a general discussion of primary and secondary actions of fungicides and antibiotics. The presuppositions referred to are mainly that antibiotics have specific sites of action and that we know something about the "primary and secondary" inhibitory actions of antibiotics. Both of these assumptions are largely unwarranted at this time.

The work, thus organized, is made up of some 50 papers reporting original research and including the questions and responses that their presentation evoked from the participants in the conference. For the most part the papers describe effects of antibiotics on metabolic reactions, and few of them report experiments on systems simpler than the cell. In this sense, the classification of papers in the first section is somewhat misleading in that a site of action is assumed although the experimental systems most frequently involved are whole cells.

Nevertheless, the papers present a good cross-sectional view (though an unbalanced one) of ways of studying modes of action of antibiotics, and the book illustrates the common (and often deplorable) assumptions derived from them regarding "*the* mode of action" of antibiotics. For example, and at random: "Nigericin . . . is one antibiotic of a group of antibiotics which under certain conditions inhibits respiration in mitochondria" (p. 13). This—a type of sentence that occurs in several of the papers—implies a known specificity for mechanism of action which does not exist. In practically all cases, such statements should be amplified by the phrase "which under certain conditions *and among their other effects* inhibits respiration." The point is emphasized because of the too-common practice of assuming that because the antibiotic has a certain effect it has only that effect. This leads (and has led) to the error which I call an implication of false specificity, which gives rise to spurious and misleading classifications of antibiotics according to mode of action; it has also led, in some notable cases, to a circular type of reasoning in which the supposed specific mode of action of the antibiotic is used to "establish" the presence or absence of a given metabolic pathway in a microorganism or tissue. Studies should not focus on specific inhibition reactions or groups of reactions until the many other possibilities have been ruled out or included. It is to be hoped that some critical mind, sophisticated in this general field, will sometime take up the task of establishing, from the plethora of literature on these subjects, just what is and is not known regarding "Wirkungsmechanismen" of each antibiotic.

Some of the contributions from the Slavic countries are presented in imperfect English, but they are readily understandable to one familiar with this area of research. About half the contributions are in German. The papers all have valuable bibliographies, and the book is well indexed.

J. F. SNELL
Department of Biochemistry and Molecular Biology,
Ohio State University, Columbus

Plasma Physics

Theoretical Methods in Plasma Physics. N. G. VAN KAMPEN and B. U. FELDERHOF. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. x + 215 pp., illus. $9.50.

This is a charming book which can fill many needs. First it is a very readable introduction to plasma physics for the student. Being short and not encyclopedic, it provides a quick overall picture of the field. As compared to conventional treatises it does not get the reader bogged down in tedious (even if important) details. The book also would make excellent reading for any young student of theoretical physics. Many techniques are introduced. Although these are not always explained fully enough so that the novice can completely master them from what is presented, the power of the methods is made abundantly clear. I would assume that when stumped the student would rush to the literature to find out further details. Lastly, the book will make delightful light reading for the mature theorist. Things he may already know are discussed very lucidly and from a somewhat unconventional approach. Particularly good are the discussions of the various types of waves that can exist in a plasma, the statistical mechanics of an electron gas, and the derivation of kinetic equations.

K. M. CASE
Department of Physics,
University of Michigan, Ann Arbor

Spectroscopy

Structure of High-Resolution NMR Spectra. P. L. CORIO. Academic Press, New York, 1966. xii + 548 pp., illus. $15.

This is a useful book for chemists who are skilled in quantum mechanics and thoroughly familiar with the principles of high-resolution nuclear magnetic resonance spectroscopy. It presents in a formal manner the relevant theory of spin quantum mechanics and many of the mathematical techniques required for analysis of the multiplet structure of NMR spectra. In addition, a number of figures and tables provide representative calculated spectra of the simpler spin systems containing two groups of magnetically equivalent nuclei.

The author accomplishes his purpose well, although his meticulous style in some cases sacrifices clarity for the sake of generality. Thus, his nomenclature is occasionally unnecessarily esoteric, even for this specialized audience. The inclusion of only the moment method for analysis of complex spectra is unfortunate in a book which is otherwise so thorough, since both the iterative and direct analysis techniques are at least as useful as the moment method.

This is a good book, competently prepared, but it is not very interesting, there is little or nothing new, and even the mathematical treatment is distinguished more by its thoroughness than by its elegance. Thus it is hard to see who really needs it, good as it is. Perhaps the time is coming for a protest movement against good, solid, superfluous books. If libraries stop buying them, then publishers may begin to insist that their books be instructive, or interesting, or new, or *something* besides just sound. We would have fewer authors—but more readers.

DONALD R. WHITMAN
Department of Chemistry,
Case Western Reserve University,
Cleveland, Ohio