control of the localized cell divisions which produce wings, genitalia, and other structures. In relation to the development of body form and pattern, Wigglesworth also considers substances which are not hormones, *sensu stricto*. These are the so-called "tissue hormones" and "inductors" which are apparently involved in intercellular communication but which have thus far eluded extraction, not to mention characterization.

Although the control of growth and metamorphosis comprises the main theme of the book, other aspects of insect endocrinology are discussed. A chapter is devoted to the role of juvenile hormone in the control of sexual maturation and ovarian cycles in adult insects. Also, there are brief treatments of various neurosecretory hormones and of pheromones.

The value of this book to the student is somewhat diminished by the choice of cited literature. In order to economize on space Wigglesworth refers the reader to his prior books and reviews for citations of most of the literature prior to 1964. Thus the primary references for even the classic experiments are inaccessible unless one first consults these other works. Despite this disadvantage biologists in general will profit from a thoughtful reading of *Insect Hormones*.

JAMES W. TRUMAN
Society of Fellows, Harvard University, Cambridge, Massachusetts

Molecular Genetics: An Updating

Molecular Biology of the Gene. J. D. WATSON. Second edition. Benjamin, New York, 1970. xxii, 662 pp., illus. Cloth, $17.50; paper, $10.95.

In some ways the appearance of the second edition of *Molecular Biology of the Gene* at this time seems sadly ironic. The book brilliantly shows that the patient application of the scientific method can solve major biological problems in simple organisms and strongly implies that the same experimental and intellectual techniques will lead to complete understanding of eukaryotic cells as well. Discoveries in this field would, of course, contribute enormously to human biology and medicine, but on the apparent brink of such developments funds for this type of science are being severely restricted in the name of human welfare.

In my opinion, in every aspect this work is an outstanding success. Indeed, the more deeply I inquired into the literary mechanisms by which it was produced the more impressive the final product appeared.

The original edition appeared in 1965. The present book is much longer (and more expensive) than the first edition because of the many new topics considered and because of the greater elaboration now required to give an up-to-date picture of the processes discussed in the earlier work. This increase in detail and scope is a reassuring indication of the viability of molecular biology (a subject sometimes feared dead) and augurs well for future successes in solving more complicated problems.

As in the original, the author considers first the historical origins of cell biology and genetics, and in the process gives the reader a thorough, though much abbreviated, treatment of Mendelian genetics as it appeared before being revolutionized by the physical sciences. The next section takes up with beautiful simplicity the physical and chemical bases of the major cellular biochemical processes. The author discusses only those concepts that are required for an understanding of biology but considers them in enough detail to make the subsequent chapters intelligible. With this background, the next group of chapters presents the central issues of contemporary molecular biology: the mechanisms of DNA replication and of the expression of genetic information. Here we see how chemistry and physics have resolved the biological problems set forth in the beginning of the book. These chapters contain masterly presentations of basic principles, recent results, and penetrating suggestions as to where to go from here. Although sophisticated readers will be acquainted with much (but very likely not all) of the material discussed, the breadth and clarity of the presentation cannot fail to inspire many readers with the beauty of present-day biological science.

The final chapters are devoted to more complex topics, including the mechanisms of viral replication, certain aspects of immunology and developmental biology, and the current status of cancer research. Some of these subjects are clearly only beginning to be developed, but the author's presentations show how the knowledge of the molecular biology of simpler processes can be used to analyze more complicated problems. As in the preceding chapters, both basic ideas and sophisticated results are presented with the same directness. The author also gives his opinions on where research in these areas should go in the future. His advice is frequently (and to my mind, very sensibly) to find simple models for complicated processes and to select models where genetic techniques have been or can be used to analyze the process in question.

Each chapter ends with a concise summary, and a glossary of technical terms is included. The text (as was the original) is beautifully illustrated by Keith Roberts, who has either redrawn (often with great improvement) original scientific illustrations or invented lucid graphic means to illustrate particular points. There are also a number of striking electron micrographs which confirm the ancient wisdom that in molecular biology, as elsewhere, seeing is believing.

This book accomplishes all the author set out to do: it is so simply written that it can be used as an elementary biology text, but it is sufficiently wise that professional scientists will find it very stimulating. Moreover, it is a definitive statement of the present world view of molecular biology.

The book is a reminder of the power and beauty of a successful intellectual endeavor. Perhaps it can serve an important function in combating the anti-intellectualism that seems to be currently popular in academic circles.

GORDON M. TOMKINS
Department of Biochemistry and Biophysics, University of California School of Medicine, San Francisco

Calculating Wave Functions

Methods of Molecular Quantum Mechanics. R. MCWEENY and B. T. SUTCLIFFE. Academic Press, New York, 1969. x, 310 pp. $13.50. Theoretical Chemistry, vol. 2.

McWeeny and Sutcliffe's aim in their monograph is to present a compendium of available methods for finding approximate electronic wave functions for isolated molecules in the Born-Oppenheimer approximation. It is intended for an advanced graduate level course and does require a basic working knowledge of quantum mechanics.

Except for a short "digression" (chapter 4, on the nature of the electron distribution), the book emphasizes mathematical methods rather than physical concepts, and consequently it loses some of its educational value. For the well initiated, however, it does present a current, well-organized summary of the methods and approaches used.

After a brief but basic introduction the problems associated with many-electron wave functions, including configuration interaction and correlation, are outlined. On this foundation molecular orbital and valence bond theories are developed with a distinct emphasis on density matrix formalism. The monograph includes a chapter surveying solutions of Schrödinger's equation in the presence of magnetic and electric fields from a relativistic approach and concludes with an unsatisfactory attempt to compare the advantages and disadvantages of a few of the methods developed in the main body of the book.

In such a condensed treatment it is difficult to be comprehensive, and indeed the authors readily admit the deficiency of the book in this respect. As a survey the book is good and does an excellent job of bridging the chasm that developed historically between valence bond and molecular orbital theory, thereby giving a clear perspective to the importance of configuration interaction. It is not, however, the type of book one reads lightly with the expectation of gaining much insight into the physical implications of quantum mechanics; one gains insight only into the mathematical formalism that forms its basis. In short, the book is written for the theorist, not the experimentalist.

C. B. HARRIS

Department of Chemistry,
University of California,
Berkeley

Heterogeneous Catalysis

Catalysis by Nonmetals. Rules for Catalyst Selection. OLEG V. KRYLOV. Translated from the Russian by Michael F. Delleo, Jr., George Dembinski, John Happel, and Alvin H. Weiss. Academic Press, New York, 1970, xii, 284 pp., illus. $14. Physical Chemistry, vol. 17.

Heterogeneous catalysis is an old and difficult subject but it is of wide application. Thus the publication of a short account of a good half of this huge area should be of interest to the chemist looking for a solid state introduction to the field, the physicist searching for a reaction to be catalyzed by an interesting solid, and the molecular biologist interested in possible enzymatic analogies. The translation of this book, which was first published in Russian in 1967, is the result of a cooperative effort by four distinguished American catalytic scientists.

In spite of a large number of uncommon usages (duplet instead of doublet, for example) and the usual misspelling of names that have been transliterated twice (Pirson instead of Pearson, for example), the book is a readable introduction to the more theoretical aspects of heterogeneous catalysis by nonmetals. In fact, it is a guided tour of almost 700 references. If this were a guide to restaurants, it would resemble more a listing in the yellow pages of the telephone directory than a red Michelin guide. But maybe this is just a reflection of the author's stark realism: if he had been very critical, maybe he would never have written the book.

And that would have been a real loss because of the wealth of information, intuition, and data on catalysis viewed from the side of the solid. The survey of solid state properties from color to band gap in the first half of the book and the description of reactions from hydrogen-deuterium exchange to Ziegler-Natta polymerization is covering a large body of respectable, if inconclusive, research that cannot be ignored by anyone entering the field with the illusions of a neophyte. In fact, the book should be required reading for any mature scientist who looks at catalysis as a means to solve some of our environmental problems.

But this is not a book for the beginning student, who will be utterly lost by formulas without proof, concepts without proper introductions, and a very difficult logic that is best summarized by this paragraph (p. 63): "Nevertheless, in the overwhelming majority of recent works, the two-spiked diagram for change of catalytic activity of metal oxides of the fourth period in oxidation-reduction reactions is verified. The non-occurrence of this relationship in a given concrete case does not justify consideration of arguments against the expedience of applying crystal field theory in catalysis. In each case, it is necessary to seek a concrete explanation of a specific result."

I have checked this statement in the original version I bought two years ago in Moscow for 1 ruble and 20 kopecks. Maybe some words or expressions could be changed as a matter of taste or grammar, but the flavor of the original has not been lost. Whether a reader likes this flavor or not, he will benefit from Krylov's expert review, the completeness of which—up to 1964—should not be judged by the subject index, which is woefully inadequate.

MICHEL BOUDART

Stauffer Laboratories of Chemistry
and Chemical Engineering,
Stanford, California

Books Received

Adult Education and Nation-Building. A Symposium on Adult Education in Developing Countries. John Lowe, Ed. Edinburgh University Press, Edinburgh, Scotland; Aldine, Chicago, 1970. viii, 258 pp., illus. $8.95.

Advances in Atomic and Molecular Physics. Vol. 6. D. R. Bates and Immanuel Esterman, Eds. Academic Press, New York, 1970. x, 342 pp., illus. $18.

The Alliance That Lost Its Way. A Critical Report on the Alliance for Progress. Jerome Levinson and Juan de Onís. Quadrangle Books, Chicago, 1970. xiv, 384 pp. $7.95. A Twentieth Century Fund Study.

Annual Report of the Director of the Pan American Sanitary Bureau, Regional Office of the World Health Organization, 1969. Pan American Health Organization, Washington, D.C., 1970. xviii, 294 pp., illus. Paper. Official Document No. 102.

Annual Review of Microbiology. Vol. 24. Charles E. Clifton, Sidney Raffel, and Mortimer P. Starr, Eds. Annual Reviews, Palo Alto, Calif., 1970. xii, 624 pp., illus. $10.

Annual Review of Phytopathology. Vol. 8. James G. Horsfall and Kenneth F. Baker, Eds. Annual Reviews, Palo Alto, Calif., 1970. xii, 480 pp., illus., $10.

Anthropology. Allan H. Smith and John L. Fischer, Eds. Prentice-Hall, Englewood Cliffs, N.J., 1970. xii, 148 pp., illus. Cloth, $5.95; paper, $1.95.

APL Programming and Computer Techniques. Harry Katzan, Jr. Van Nostrand Reinhold, New York, 1970. xiv, 330 pp., illus. $12. Computer Science Series.

Aquatic Diptera. O. A. Johannsen. Entomological Reprint Specialists, Los Angeles, 1970. vi, 369 pp., illus. Paper, $5. Reprinted from the Cornell University Agricultural Experiment Station Memoirs 164, 177, 205, and 210 (1934–1937).

Astronomy. Donald H. Menzel. Sky maps and illustrations by Ching-Sung Yü. Random House New York, 1970. 320 pp., illus. $17.50.

Biology and Control of Dreissena. A Collection of Papers. B. K. Shtegman, Ed. Translated from the Russian edition (Moscow, 1964). Published for the U.S. Public Health Service, and the National Science Foundation, Washington, D.C., by the Israel Program for Scientific Translations,