

Upon reading this book, however, one gets the impression that there is no plausible alternative to the gene activation model of growth control.

The criticisms notwithstanding, the book is an extremely worthwhile source of data on many important aspects of mammalian cell growth, particularly those having to do with macromolecular synthesis. It neatly disposes of some (but not all) of the most popular myths about the control of growth. It is, therefore, recommended, with the proviso that it be taken along with a healthy dose of skepticism and a subscription to a current journal of cell physiology.

HARRY RUBIN

*Department of Molecular Biology,
University of California, Berkeley*

Myrmecology

Ant Larvae. Review and Synthesis. GEORGE C. WHEELER and JEANETTE WHEELER. Entomological Society of Washington, Washington, D.C., 1976. vi, 108 pp., illus. Paper, \$11. Memoirs of the Entomological Society of Washington, No. 7.

Ant larvae, glimpsed when a nest is exposed by the turning of a stone, appear to be little more than helpless white lumps. A closer examination will reveal that they are anatomically complex and capable of no small amount of behavior. Recent research has shown that those belonging to at least some species provide secretions important to the welfare of the adults.

For nearly 50 years George C. Wheeler, later assisted by Jeanette Wheeler, conducted close studies of the external anatomy of ant larvae. In all, the Wheelers were able to examine 182 genera, representing all of the 10 living subfamilies and 47 of the 60 tribes. In this summary of a life's work they have integrated numerous previously published articles into an account that places the study of ant larvae on a solid foundation. Many species are beautifully illustrated with line drawings, and keys are provided to the level of genus.

As in the past, the authors are modest and cautious in their conclusions. They have redefined the limits of some genera and shifted the phylogenetic assignments of a few others. They make no attempt, however, to draw broader evolutionary conclusions. It is their view that the data of larval anatomy are only part of the total evidence needed for stable taxonomic conclusions, and they have left the final

synthesis to others. In fact, William L. Brown has already made extensive use of the larval data in his important continuing revision of the ant genera of the world.

The Wheelers' synthesis has set the stage for another kind of study. The larvae of many ant species bristle with strangely shaped tubercles and hairs; those of the Leptanillinae have a remarkably complex, wedge-shaped organ that extends from the prothoracic venter toward the lower surface of the head. There also exists extreme variation among species in body form, flexibility of the thoracic region, and shape of the mouthparts. The significance of almost none of this is known, because research has been directed almost entirely toward anatomy, to the neglect of ecology and behavior. When studies are concentrated on these topics, taking advantage of the excellent anatomical information now available, we can expect to gain considerably in our understanding of the evolution of the ants.

EDWARD O. WILSON

*Museum of Comparative Zoology
Laboratories, Harvard University,
Cambridge, Massachusetts*

Atomic Physics

The Physics of Electronic and Atomic Collisions. Papers from a conference, Seattle, July 1975. JOHN S. RISLEY and R. GEBALLE, Eds. University of Washington Press, Seattle, 1976. xiv, 902 pp., illus. \$40.

Electron and Photon Interactions with Atoms. Festschrift for Professor Ugo Fano. Papers from a symposium, Stirling, Scotland, July 1974. H. KLEINPOPPEN and M. R. C. McDOWELL, Eds. Plenum, New York, 1976. xviii, 682 pp., illus. \$45. Physics of Atoms and Molecules.

Every two years an International Conference on the Physics of Electronic and Atomic Collisions (ICPEAC) is held. The conferences usually include a number of invited lectures reviewing progress that has been made in the field. There were 58 such lectures at the most recent (ninth) ICPEAC, and they are published in *The Physics of Electronic and Atomic Collisions*. (Abstracts of the 566 contributed papers are published in two other volumes under the title *Electronic and Atomic Collisions*; University of Washington Press, \$40.) The lectures are generally authoritative and are well written, but at a level that demands a considerable familiarity with the subject matter.

The volume begins with five reviews of special topics. Harrie Massey writes about negative ions and positrons (mostly positrons), Ugo Fano discusses his recent work on electron correlations, and Rudolf Peierls gives a short theoretical description of decaying states. Ernest Henley surveys possible experiments to detect the coherent parity-violating effects in atoms that would result from the existence of neutral weak currents. Eric Herbst and William Klemperer describe ion-molecule reaction schemes for the formation of interstellar molecules. The remaining articles are collected into 13 sections, each dealing with a particular area of research.

The experimental progress reported in the book has generally been in the development of higher energy and angular resolutions of incident and scattered electron and atomic beams, in the use of coincidence techniques for simultaneous detection of electrons and photons, in the production of polarized electrons, and in the use of lasers, both as sources of intense coherent radiation for use in photoabsorption studies and for the production of excited atoms for use in collision experiments.

Measurements of elastic and inelastic scattering of electrons by neutral atoms, which have traditionally occupied the central role in these conferences, continue to be important, and with the increasing sophistication in experimental techniques, they now provide deeper insight into the detailed nature of the interactions between electrons and atoms. Photon interactions were also discussed at the conference, and reports were presented on absorption of synchrotron radiation, photodetachment of negative ions, photodissociation of positive molecular ions, and multiphoton processes.

Electron and photon interactions with atoms were also the topic of a symposium held in honor of Ugo Fano, whose theoretical studies during the past 40 years have had a major, enduring impact on theoretical and experimental research in atomic and molecular physics. *Electron and Photon Interactions with Atoms*, the proceedings of that conference, contains 57 contributions, both theoretical and experimental. The papers are mostly straightforward reports of current work on electron and photon interactions, emphasizing research on angular distributions, correlations, and orientation and alignment effects. The collection is a testimony to the versatility of Fano's research; almost every paper makes reference to his work. There is considerable overlap, both in subject

matter and in authorship, with the ICPEAC invited lectures.

The ICPEAC volume also addresses atom-atom and ion-atom interactions, and it contains a substantial account of recent studies of the inner shell phenomena that occur in ion-atom collisions. In such collisions, inner shell vacancies are formed that are accompanied by the multiple ionization of the electrons in other shells and a great many unusual atomic states are created that decay with different lifetimes, different energies, and different fluorescent yields. Continuous emission in the x-ray region of the spectrum also occurs during ion-atom collisions; it can be attributed to transitions between different molecular orbitals formed by the temporary molecules, to bremsstrahlung, and to radiative capture of the target electrons in vacancies produced in the ion projectiles. The last few years have seen vigorous activity in the investigation of ion-atom collision phenomena, and such activity will surely be maintained. The development of experiments involving the collisions of atomic systems that have very large nuclear charges and the formation of super-heavy molecules holds exciting possibilities, engaging new phenomena in quantum electrodynamics.

Theoretical research has made important contributions to the study of ion-atom collisions, particularly with the recognition that many of the phenomena can be attributed to the temporary formation of a quasimolecule for which a molecular orbital description is appropriate. Elsewhere, theoretical progress appears to have occurred mainly through the extension of existing methods, both to achieve greater accuracy and to deal with more complex atomic systems. It is hard work, made more demanding by the ubiquity and importance of resonances in scattering phenomena. Some interesting attempts have been made to employ a discrete basis representation for use in scattering problems, and some success has been achieved in the description of elastic scattering in simple systems. The problems confronting the generalization of such descriptions to include inelastic scattering and many-electron systems are severe.

The material of atomic physics is significant to many areas of physics, chemistry, and astronomy, and the ICPEAC conferences usually include several presentations that apply the concepts of atomic physics to related fields. In this volume, atomic collisions and fission technology are discussed by Sheldon Datz and atomic physics in the controlled thermonuclear research program

is dealt with by C. F. Barnett. The articles are interesting and valuable in that they draw attention to the relevance of atomic and molecular physics to possible methods of isotope separation and to high-temperature plasma diagnostics. A more comprehensive examination of the relation of atomic physics to the energy program would have been timely.

Despite the fragmentation caused by the large number of articles in the ICPEAC volume, the collection provides a fair description of recent work in electronic and atomic collisions for those prepared to read their way through 900 pages.

ALEXANDER DALGARNO

*Department of Astronomy,
Harvard University,
Cambridge, Massachusetts*

Books Received and Book Order Service

Books Received and the Book Order Service will be combined in issues in which there is a Readers' Service Card. To order any of the Book Order Service books, circle the corresponding number on the Readers' Service Card (pages 934A and 1036A); the participating publisher(s) will ship the title(s) ordered and send you a bill.

Aboriginal and Spanish Colonial Trinidad. A Study in Culture Contact. Linda A. Newson. Academic Press, New York, 1976. x, 344 pp., illus. \$24.75.

Advances in Biomedical Engineering. Vol. 6. J. H. U. Brown and James F. Dickson, III, Eds. Academic Press, New York, 1976. xiv, 270 pp., illus. \$28.

Alimentation et Travail. Papers from a symposium, Vittel, France, May 1974. G. Debry and R. Bleyer, Eds. Published for the Société de Nutrition et de Diététique de Langue Française by Vagner Publishing Company, Nancy, 1976. xii, 550 pp., illus. 250 F.

Analysis of Petroleum for Trace Metals. Papers from a symposium, Philadelphia, Apr. 1975. Robert A. Hofstadter, Oscar I. Milner, and John H. Runnels, Eds. American Chemical Society, Washington, D.C., 1976. x, 190 pp., illus. \$21.50. *Advances in Chemistry Series, 156. To order this book circle No. 350 on Readers' Service Card.*

Applied Spectroscopy Reviews. Vol. 11. Edward G. Brame, Jr., Ed. Dekker, New York, 1976. xvi, 338 pp., illus. Paper, \$34.50.

Bedsore Biomechanics. Proceedings of a seminar, Glasgow, Aug. 1975. R. M. Kenedi, J. M. Cowden, and J. T. Scales, Eds. University Park Press, Baltimore, 1976. xxvi, 358 pp., illus. \$39.50. Strathclyde Bioengineering Seminars.

Biological Macromolecules and Polyelectrolytes in Solution. Henryk Eisenberg. Clarendon (Oxford University Press), New York, 1976. xviii, 272 pp., illus. \$33.75.

Biological Signals. Proceedings of a symposium, Lund, Dec. 1972. Gerhard Regnéll, Ed. Royal Physiographical Society of Lund, Lund, Sweden, 1975 (distributor, Törnqvists

Bokhandel, Rådhusorget 6, Landskrona, Sweden). 138 pp., illus. \$10.

Biology and Disease of the Hair. Proceedings of a symposium, Tokyo, Oct. 1975. Tatsuji Kobori, William Montagna, Kiyoshi Toda, Yasumasa Ishibashi, Yoshiaki Hori, and Fujio Morikawa, Eds. University Park Press, Baltimore, 1976. xxxii, 668 pp., illus. \$72.50.

Biology of the Kinetoplastida. Vol. 1. W. H. R. Lumsden and D. A. Evans, Eds. Academic Press, New York, 1976. xxvi, 564 pp., illus. \$45.50.

Biology of the Reptilia. Carl Gans, Ed. Vol. 5, Physiology A. William R. Dawson, Ed. Academic Press, New York, 1976. xvi, 556 pp., illus. \$42.50.

Biomechanics and Energetics of Muscular Exercise. Rodolfo Margaria. Clarendon (Oxford University Press), New York, 1976. x, 146 pp., illus. \$15.75.

Botanical Systematics. An Occasional Series of Monographs. Vol. 1. V. H. Heywood, Ed. Academic Press, New York, 1976. vi, 368 pp., illus. + index. \$60.75.

British Opisthobranch Molluscs. Mollusca: Gastropoda. Keys and Notes for the Identification of the Species. T. E. Thompson and Gregory H. Brown. Published for the Linnean Society of London by Academic Press, New York, 1976. viii, 204 pp., illus. Paper, \$7.65.

Le Cadre d'une Recherche Ecologique Interdisciplinaire. Pierre Dansereau. Les Presses de l'Université de Montréal, Montréal, 1976. xviii, 344 pp., illus. Paper, \$12. *Ecologie de la Zone de l'Aéroport International de Montréal.*

Chromatography of Steroids. Erich Heftmann. Elsevier, New York, 1976. xiv, 204 pp., illus. \$34.75. *Journal of Chromatography Library, vol. 8.*

Chronic Childhood Illness. Assessment of Outcome. Proceedings of a conference, Bethesda, Md., May 1974. Gilman D. Grave and I. Barry Pless, Eds. National Institutes of Health, Bethesda, Md., 1976 (available from the Superintendent of Documents, Washington, D.C.). xiv, 238 pp., illus. \$6.10. *Fogarty International Center Series on the Teaching of Preventive Medicine, vol. 3.*

CO₂ Metabolism and Plant Productivity. Proceedings of a symposium, Madison, Wis., June 1975. R. H. Burris and C. C. Black, Eds. University Park Press, Baltimore, 1976. xiv, 432 pp., illus. \$39.50.

Comets. Patrick Moore. Scribner, New York, ed. 2, 1976. x, 150 pp., illus. \$7.95.

Communication for the Hearing Handicapped. An International Perspective. Herbert J. Oyer, Ed. University Park Press, Baltimore, 1976. xviii, 538 pp., illus. \$19.50.

Conditions of Awareness. Subjective Factors in the Social Adaptations of Man and Other Primates. Anthony Shafton. Published by the author, P.O. Box 40068, Portland, Ore. 97240, 1976. 146 pp. Paper, \$10.

A Consumer's Dictionary of Cosmetic Ingredients. Ruth Winter. Crown, New York, ed. 2, 1976. iv, 260 pp. Cloth, \$7.95; paper, \$4.95.

Crows of the World. Derek Goodwin. Illustrations by Robert Gillmor. Published in cooperation with the British Museum (Natural History) by Comstock (Cornell University Press), Ithaca, N.Y., 1976. vi, 354 pp. \$28.50.

The Dark Side of Knowledge. Exploring the Occult. Albert Shadowitz and Peter Walsh. Addison-Wesley, Reading, Mass., 1976. xii, 306 pp. Cloth, \$9.95; paper, \$5.95.

(Continued on page 1039)