The greatest attraction of *The Evolution of Reef Communities* is the synthesis of data and opinions from numerous disciplines into a very readable dissertation on virtually all aspects of the reef phenomenon. The long list of bibliographic references includes nearly 400 published during the 1980s and several published as recently as 1986. Unfortunately, however, the book has numerous spelling errors, and some of the photographic reproductions are not of sufficient quality to warrant their inclusion. The placement of all the photographic figures at the end of the book is awkward. Necessary locality and geological information is not in captions but rather in a separate register (requiring an extra inserted finger for the curious). These editorial shortcomings detract from a useful book.

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Functional Neuroanatomy

Arthropod Brain. Its Evolution, Development, Structure, and Functions. AYODHYA P. GUPTA, Ed. Wiley-Interscience, New York, 1987. xiv, 588 pp., illus. $64.95.

The wonder of the cellular architecture of the insect brain was first pointed out by Ramon y Cajal, after he had examined his silver preparations of the honeybee. Since that time brains of arthropods, especially of insects, have been subjected to the collective scrutiny of comparative neurobiologists and anatomists. This is due as much to the endlessly fascinating behaviors of these creatures as to the considerable impact of insects upon the health and economies of human societies. It is noteworthy when a book on the arthropod brain appears, because there have been so few. The modern standards start with Bullock and Horridge's 1966 classic, *Structure and Function in the Nervous System of Invertebrates*, which provided taxonomic breadth, a ground plan of the arthropod brain, and a lexicon. Nine years later, N. J. Strausfeld published his brilliant and somewhat idiosyncratic *Atlas of an Insect Brain*, which focused on the brain of the housefly. Of course, review chapters in the various generic *Advances in* . . . volumes have appeared over the years and filled some gaps in coverage, but nothing approaching Bullock and Horridge in comprehensiveness or Strausfeld in detail is available (at least in English). This is all the more unfortunate now that the widespread application of technical advances permitting visualization of single neurons has given rise to the standard of the "identified neuron" in physiologically and anatomically interconnected networks. If Bullock and Horridge gave us the layout of the "forest" of the arthropod brain, modern techniques allow us to map it out tree by tree, and it is fair to state that modern insect neuroanatomy is functional neuroanatomy. How successfully does *Arthropod Brain* convey this state of affairs?

Insects get about two-thirds of the coverage, but there are chapters on crustaceans, spiders, millipedes, mites, and ticks, as well as the evolutionarily central onychophorans—the annelid-arthropod "link." Since the time of Cajal's studies, the optic projections in the insect brain have been the subject of enormous efforts by anatomists, and this book is remarkably restrained in its single-chapter discussion of this important topic—perhaps too restrained. The mushroom bodies (MBs) get three chapters, which should please behavioral neurobiologists, because this region of the brain certainly appears to be an important integrative center in the control of behavior. In particular, Gupta advances the argument that large, well-elaborated MBs represent a relatively advanced evolutionary condition among arthropods. It is interesting that over the years honeybees, crickets, and cockroaches—all of which have large MBs—have served as the mainstays for physiological investigations of brain in relation to behavior. In this volume, Erber and co-workers contribute a cogent review of the functional role of the MBs in insects, pointing out that MB neurons receive multimodal inputs and presenting evidence for the role of the MBs in complex olfactory learning. Olfaction and vision have always been favorite subjects for entomological physiologists and anatomists. The olfactory pathways in the lepidopteran brain are capably reviewed by Christensen and Hildebrand, who draw upon their own pacesetting work in *Manduca*. Vision, as noted earlier, is treated lightly in this volume, but this is certainly forgivable given the many books and review articles already available on this subject.

Neurobiology at all levels is being driven by new techniques, and we live in a New Age of neuroanatomy. This book reflects its time. Immunocytochemical markers, especially for neurotransmitters (or biosynthetic enzymes leading to their production), have been applied to produce chemical maps of the arthropod brain, although with less spectacular effect than has been accomplished in the mammalian brain. Nonetheless, the ability to correlate structure and function at the level of identified neurons makes the immunocytochemical maps that are reported in this book, for the bee brain for example, an undeniably important advance in functional neuroanatomy. Several chapters on the ultrastructure of the arthropod brain are included, and here I sadly report that the quality of the electron micrographs is very uneven, and sometimes poor. The book does not dwell on techniques per se, nor should it; two chapters at the end deal briefly with techniques, but they are redundant; their inclusion is puzzling in light of the availability of two excellent books on insect neuroanatomical techniques, edited by Strausfeld and published by Springer-Verlag.

Is the book authoritative? Certainly some important contributors to the field are among the authors, but some of the major names are conspicuously missing. But this is perhaps compensated by the inclusion of the younger generation of functional neuroanatomists, who combine physiological and anatomical approaches to the problem of sensory-motor integration.

Overall, this is a valuable addition to the literature of comparative neuroanatomy. The emphasis on insects is not misplaced; this group has always served as important research material for investigations of the development of the nervous system, and with the infusion of molecular biology techniques, especially applied to *Drosophila*, it is all the more important to have reference volumes on the insect brain. This book, with its focus on the use of new technologies to probe the structure of one of life's marvelous "living crystals," is surely welcome, for, as Floyd Bloom said in another context, "the gain in the brain is mainly in the stain."

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Complex Dynamical Objects

Structure and Dynamics of Elliptical Galaxies. TIM DE ZEEUW, Ed. Reidel, Dordrecht, 1987 (U.S. distributor, Kluwer, Norwell, MA). xvi, 579 pp., illus. $89. International Astronomical Union Symposium no. 127. From a symposium, Princeton, NJ, May 1986.

Elliptical galaxies were once thought to be among the simplest dynamical objects held together by self-gravitation. They have a bright center that appears nearly stellar. Luminosity fades away smoothly in all directions with no detectable outer boundary. Contours of equal brightness (isophotal contours) are very nearly elliptical in shape, circular in some objects, flattened as much as 3:1 in others. Apart from the bright center

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and rapid dropoff of brightness, these galaxies are featureless. They show none of the spectacular gas, dust, and spiral features of their better-known cousins, the spiral galaxies. The simple appearance is deceptive; while they are tantalizing objects of theoretical study, they have stubbornly resisted attack by that means. Nearly all of the mass resides in stars, which move about something like the molecules of a gas except that they never collide. Each galaxy is kept from flying apart by the gravitational force generated by the mass of its stars, and it is kept from collapsing by the "pressure" exerted by the motions of the stars. The two forces are balanced in a steady-state galaxy, and this delicate balance fairly shouts the likelihood of instabilities. Strong radio sources (usually double-lobed, extending far beyond the visible galaxy) lurk in some, x-ray sources in others. A crescendo of beautiful observational results continues, showing elliptical galaxies to be much richer and more complex than we had imagined.

The conference from which this book derives was organized principally because of some equally beautiful theoretical results: the exploitation of a particular class of separable potentials by de Zeeuw to build steady-state equilibrium models. The book has a good balance of observational and theoretical reviews that cover most current topics. Observations of x-rays indicating lots of very hot gas (10 percent of the galaxy's mass, around 10 million degrees) demonstrate properties no one dreamed that elliptical galaxies possessed just a few years ago. Like most volumes of conference proceedings, this one presents a good picture of what people were thinking about at the time. Like most, it will soon be dated. There are some omissions or blind spots. Elliptical galaxies are assumed throughout to be static. They might instead be oscillating about an equilibrium state, a likely circumstance that is not even mentioned. A second surprise is the comment in one review that the discovery of instabilities came as a shock; they should have been expected.

Translations of several Soviet contributions on self-consistent theoretical models and on stability studies are included. This is a nice feature that will have lasting value. Some are classics that have not been generally available in the West. There are also one or two really good surveys, such as that of de Zeeuw, which gives a very complete overview of methods available for constructing self-consistent equilibrium models. The book will be useful to experts who want to be reminded of what is known observationally and what problems are attracting theoretical attention. It will also be useful to graduate students wondering what research possibilities elliptical galaxies present.

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Reprints of Books Previously Reviewed

The Darwinian Heritage. David Kohn, Ed. Princeton University Press, Princeton, NJ, and Nova Pacifica, 1988. Paper, $25. *Reviewed* **235**, 224 (1987).

On Aesthetics in Science. Judith Wechsler, Ed. Birkhäuser Boston, Cambridge, MA, 1988. $19.50. *Reviewed* **205**, 295 (1979).

Books Received

Bereavement and Health. The Psychological and Physical Consequences of Partner Loss. Wolfgang Stroebe and Margaret S. Stroebe. Cambridge University Press, New York, 1987. xii, 288 pp., illus. $44.50; paper, $15.95.

Collider Physics. Vernon Barger and Roger Phillips. Addison-Wesley, Redwood City, CA, 1987. xxiv, 592 pp., illus. $44.95. Frontiers in Physics, vol. 71.

Colonization, Succession and Stability. A. J. Gray, M. J. Crawley, and P. J. Edwards, Eds. Blackwell Scientific, Palo Alto, CA 1987. xii, 482 pp., illus. $70. From a symposium, Southampton, U.K., 1984.

Comparative Aspects of Extracellular Acid-Base Balance. Jean-Paul Truchot. Springer-Verlag, New York, 1987. xiv, 248 pp., illus. $124.60. Zoophysiology, vol. 20.

Computers and Telecommunications Networks. Michael Purser. Blackwell Scientific, Palo Alto, CA, 1987. viii, 323 pp., illus. $70; paper, $38. Professional and Industrial Computing Series.

Drugs in Adolescent Worlds. Burnouts to Straights. Barry Glassner and Julia Coughlin. St. Martin's, New York, 1987. x, 301 pp. $29.95.

The Expert Witness Survival Manual. Frank J. MacHovec. Thomas, Springfield, IL, 1987. xiv, 171 pp. $29.75.

Francis Bacon's Philosophy of Science. An Account and a Reappraisal. Peter Urbach. Open Court, La Salle, IL, 1987. x, 209 pp. Paper, $9.95.

Genetic Takeover and the Mineral Origins of Life. A. G. Cairns-Smith. Cambridge University Press, New York, 1987. x, 477 pp., illus. Paper, $24.95. Reprint, 1982 ed.

Geomorphology and Reclamation of Disturbed Lands. Terence J. Toy and Richard F. Hadley. Academic Press, Orlando, FL, 1987. xvi, 480 pp., illus. $59.

Individual Differences in Hemispheric Specialization. A. Glass, Ed. Plenum, New York, 1987. x, 406 pp., illus. $75. NATO Advanced Science Institutes Series A, vol. 130. From a workshop, Maratea, Italy, Oct. 1984.

Intention, Plans, and Practical Reason. Michael E. Bratman. Harvard University Press, Cambridge, MA, 1987. xii, 200 pp. $25.

The Intentional Stance. Daniel C. Dennett. MIT Press, Cambridge, MA, 1987. xii, 388 pp. $25. A Bradford Book.

Introduction to Remote Sensing. James B. Campbell. Guilford, New York, 1987. xxiv, 551 pp., illus. $49.95.

The Medics' War. Albert E. Cowdrey. U.S. Army Center of Military History, Washington, DC, 1987 (available from the Superintendent of Documents, Washington, DC). xviii, 391 pp., illus., + foldout charts. Paper, $21. United States Army in the Korean War, vol. 4.

Megagauss Technology and Pulsed Power Applications. C. M. Fowler, R. S. Caird, and D. J. Erickson, Eds. Plenum, New York, 1987. xvi, 879 pp., illus. $115. From a conference, Santa Fe, NM, July 1986.

Metamorphosis. Stages in a Life. David Suzuki. Stoddart, Toronto, 1987. 302 pp. + plates. $24.95. An autobiographical work by the geneticist and CBC broadcaster.

New Trends in Colloid Science. H. Hoffmann, Ed. Steinkopff, Darmstadt, and Springer-Verlag, New York, 1987. viii, 203 pp., illus. $63. Progress in Colloid and Polymer Science, vol. 73. Based on a workshop, Como, Italy, Oct. 1986.

The Nobel Population, 1901–1937. A Census of the Nominators and Nominees for the Prizes of Physics and Chemistry. Office for History of Science and Technology, University of California, Berkeley, CA, and Office for History of Science, Uppsala University, Uppsala, Sweden, 1987. 337 pp. Paper, $20. Berkeley Papers in History of Science, 11; Uppsala Studies in History of Science, 4.

Nondestructive Characterization of Materials II. Jean F. Bussière *et al.*, Eds. Plenum, New York, 1987. xiv, 790 pp., illus. $115. From a symposium, Montreal, Quebec, July 1986.

The Overview Effect. Space Exploration and Human Evolution. Frank White. Houghton Mifflin, Boston, 1987. xviii, 318 pp. $18.95.

Perinatal Medicine. Problems and Controversies. G. C. Di Renzo and D. F. Hawkins, Eds. Cortina, Verona, 1986 (U.S. distributor, Raven, New York). xvi, 221 pp., illus.

Pesticides on Plant Surfaces. Helen J. Cottrell, Ed. Published for the Society of Chemical Industry by Wiley, New York, 1987. xiv, 86 pp., illus. $41.95. Critical Reports on Applied Chemistry, vol. 18.

The Pharmacology and Toxicology of Proteins. John S. Holcenberg and Jeffrey L. Winkelhake, Eds. Liss, New York, 1987. xviii, 381 pp., illus. $70. UCLA Symposia on Molecular and Cellular Biology, vol. 65. From a symposium, Lake Tahoe, CA. Feb. 1987.

Reactions of Acids and Bases in Analytical Chemistry. Adam Hulanicki. Horwood, Chichester, U.K.; PWN, Warsaw; and Halsted (Wiley), New York, 1987. 308 pp., illus. $122.95. Ellis Horwood Series in Analytical Chemistry. Translated from the Polish edition (Warsaw, 1980).

Recent Advances in Leukemia and Lymphoma. Robert Peter Gale and David W. Golde, Eds. Liss, New York, 1987. xxiv, 597 pp., illus. $110. UCLA Symposia on Molecular and Cellular Biology, vol. 61. From a symposium, Keystone, CO, Jan. 1987.

Recent Advances in Mucosal Immunology. Two volumes. Part A, Cellular Interactions. Jiri Mestecky *et al.*, Eds. xl pp. + pp. 1–876, illus., + index. $110. Part B, Effector Functions. Jerry R. McGhee *et al.*, Eds. xxxiv pp. + pp. 877–1897, illus. $135. Plenum, New York, 1987. Advances in Experimental Medicine and Biology, vols. 216A and 216B. From a congress, Niagara Falls, NY, June–July 1986.

Reclaimed Powers. Toward a New Psychology of Men and Women in Later Life. David Gutmann. Basic Books, New York, 1987. xii, 335 pp., illus. $24.95.

Regulated Streams. Advances in Ecology. John F. Craig and J. Bryan Kemper, Eds. Plenum, New York, 1987. xii, 431 pp., illus. $79.50. From a symposium, Edmonton, Alberta, Aug. 1985.

Sediment Transport in Gravel-Bed Rivers. C. R. Thorne, J. C. Bathurst, and R. D. Hey, Eds. Wiley-Interscience, New York, 1987. xvi, 995 pp., illus. $170. From a workshop, Fort Collins, CO, Aug. 1985.

Speed of Information-Processing and Intelligence. Philip A. Vernon, Ed. Ablex, Norwood, NJ, 1987. x, 406 pp., illus. $29.50.

Spermatogenesis. Genetic Aspects. W. Hennig, Ed. Springer-Verlag, New York, 1987. x, 130 pp., illus. $59.50. Results and Problems in Cell Differentiation, vol. 15.

Structure and Dynamics of Surfaces II. Phenomena, Models, and Methods. W. Schommers and P. von Blanckenhagen, Eds. Springer-Verlag, New York, 1987. xiv, 391 pp., illus. $64. Topics in Current Physics, vol. 43.

Symmetries of Maxwell's Equations. W. I. Fushchich and A. G. Nikitin. Reidel, Dordrecht, 1987 (U.S. distributor, Kluwer, Norwell, MA). xiv, 214 pp. $74. Mathematics and Its Applications. Translated from the Russian edition (Kiev, 1983).

Thalidomide Embryopathy in Japan. Mitsuchiro Kida, Ed. Kodansha, Tokyo, 1987. xii, 276 pp., illus. ¥12,000.

The Toxicology of Molluscicides. G. Webbe, Ed. Pergamon, Elmsford, NY, 1987. x, 167 pp., illus. $90. International Encyclopedia of Pharmacology and Therapeutics, section 125.

The Truly Disadvantaged. The Inner City, the Underclass, and Public Policy. William Julius Wilson. University of Chicago Press, Chicago, 1987. xii, 254 pp., illus. $19.95.

The Universe. Byron Preiss, Ed. Spectra (Bantam), New York, 1987. 335 pp., illus. $24.95.