

Vasopressin: An Experimental Model

The Brattleboro Rat. Papers from a symposium, Hanover, N.H., Sept. 1981. HILDA WEYL SOKOL and HEINZ VALTIN, Eds. New York Academy of Sciences, New York, 1982. xx, 828 pp., illus. Cloth or paper, \$150. *Annals of the New York Academy of Sciences*, vol. 394.

The discovery of the Brattleboro rat is a wonderful example of scientific serendipity. In 1961 Henry A. Schroeder, a retired associate professor of clinical physiology at Dartmouth Medical School, noticed that among his private colony of Long-Evans rats housed for research purposes in his summer home in West Brattleboro, Vermont, one cage always had an empty drinking bottle. This cage contained a mother and her litter of 17 pups. Schroeder and his assistant first determined that six of the pups were drinking excessive water and subsequently showed that this behavior could be reversed by treatment with the antidiuretic hormone, vasopressin. The Brattleboro rat was thus born, and the pups were then nurtured by Valtin and Sokol to become the Brattleboro strain at Dartmouth Medical School. The discovery of the rat is described by Valtin in the first paper in this volume, a compilation of 43 invited papers and 50 shorter research reports that were presented at an international symposium celebrating the 20th anniversary of the Brattleboro rat. About 120 scientists from four continents gathered to discuss the total biology of this mutant rat strain.

The principal interest in the Brattleboro rat is that it is unable to synthesize vasopressin and hence is valuable as an experimental model for diabetes insipidus. The mode of inheritance of the genetic defect is semirecessive (that is, the heterozygote has a vasopressin content intermediate between the homozygote and normals of the Long-Evans parent strain). Descendants of the original strain developed by Valtin and Sokol are now widely distributed and bred in laboratories all over the world. One of the major issues this book discusses is that these different laboratories have introduced the gene into diverse inbred rat stocks, thereby producing vasopressin-deficient rats with heterogeneous genetic backgrounds. This may be the cause of a number of discrepancies in the findings of different laboratories using the "Brattleboro rat," especially in studies that deal with highly complex phenomena related to vasopressin (such as behavioral studies). Therefore, the first part of

the book, dealing with nomenclature, controls, reproduction, and development, is essential to anyone planning to use the Brattleboro rat for experimentation.

The book covers a wide range of experimental work in which the Brattleboro rat has served as a model and provides a great deal of information about the biochemistry and physiology of oxytocin and vasopressin. The book covers seven general subjects: reproduction and development, cell biology of the hormone-producing neuronal system (which includes anatomy, electrophysiology, and biosynthesis and secretion of the peptide hormones), electrolyte balance, hemodynamic mechanisms and hypertension, water balance and vasopressin receptor, endocrinopathies other than diabetes insipidus (such as interactions with the thyroxine and corticotropin systems), and disorders of behavior and the central nervous system. The papers are generally of high quality. Of particular importance are the paper by Valtin, which discusses the proper controls to use in experiments with the Brattleboro rat, and a panel discussion on reproduction and breeding. Papers by Morris and Dreifuss *et al.* discuss the anatomy and physiology, respectively, of the magnocellular neurons, which secrete vasopressin in normal animals, in the Brattleboro rat. It is intriguing that, except for the absence of hormone, related molecules, and secretory granules and an increased volume, these neurons are basically normal. The papers on electrolyte, water, and hemodynamic regulation are extensive and valuable. Also of interest is a paper by Gash and colleagues that describes an elegant use of the Brattleboro rat in neural transplantation studies. Unfortunately, the sequences of the vasopressin prohormone and the corticotropin-releasing factor (CRF) were published after this book went to press, and therefore the papers about vasopressin biosynthesis and CRF action, although useful, are out of date. In its molecular biological studies this field has lagged behind the other fields of endocrinology. This book simply reflects this fact. It is to be expected that study of the Brattleboro rat will soon employ the tools of molecular genetics to uncover the molecular nature of the genetic defect in this strain.

Perhaps of greatest interest to the general reader is the section of the book that deals with vasopressin and memory. In recent years, extrahypothalamic path-

ways of vasopressin-containing fibers have been described, and electrophysiological responses to vasopressin and oxytocin in the hippocampus and other areas of the brain have been found. Several papers in the book discuss these findings. It is possible that these pathways and receptors may be related to the reported effects of exogenous vasopressin on memory. The behavior of the Brattleboro rat is therefore highly relevant to this issue. The final section of the book contains a paper by Van Wimersma Greidanus that summarizes the experiments in which the Brattleboro rat has been used to show that vasopressin plays an important role in brain processes related to memory function. However, a variety of studies are presented in the book that oppose the thesis that vasopressin plays such a role. A lively discussion on this subject between the participants can be found at the end of the final section, although the reader cannot expect to find a resolution of the debate here. Indeed, the concluding comment in the discussion, "Maybe we didn't solve all the problems about the behavior and the behavioral performance of the Brattleboro rat," puts this field into proper perspective.

Taken as a whole, the volume is a well-balanced presentation of the subject and should be a useful resource book for anyone interested in neurohypophyseal peptide biology.

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Cell Biology for Students

Molecular Biology of the Cell. BRUCE ALBERTS, DENNIS BRAY, JULIAN LEWIS, MARTIN RAFF, KEITH ROBERTS and JAMES D. WATSON. Garland, New York, 1983. xl, 1146 pp., illus., + index. \$33.95.

Few fields of biomedical research have expanded as rapidly and as widely as cell biology. There can be little doubt that many of the very newest and hottest subjects of research, whether they involve immunology, genetics, or biotechnology, will be incorporated into this field. The expansion of subjects covered by cell biology and the vigorous production of knowledge create several major problems for anyone attempting to write a comprehensive and timely textbook in the field. The six authors of this stunning

book have successfully met the challenge by pooling their research and teaching experience with the acknowledged advice from many colleagues and other experts to produce a modern and extensive treatment. The authors' aim of creating a textbook that can be used by students taking their first course in cell biology, whether at the undergraduate, graduate, or medical school level, largely is fulfilled by the book; throughout, there are many examples and discussions drawn from molecular and cellular research on viruses, prokaryotes, lower eukaryotes, and plants, as well as from human biology and pathology.

The book contains 19 chapters grouped into three sections. The first section, *Introduction to the Cell*, covers fundamental aspects of evolution, biochemistry, and genetics; it includes a chapter dealing with experimental methods and research instrumentation. This portion of the book is intended mostly to serve as background or for review purposes. The second section, *The Molecular Organization of Cells*, includes the subjects found in most other textbooks on cell biology, although with emphasis on genetics and molecular mechanisms. The attention of the student is often explicitly directed to subjects about which significant knowledge is yet to be acquired. In the third section, *From Cells to Multicellular Organisms*, more extensive attention is given to the complex dynamics of cell interactions in fertilization and early development, during differentiation and tissue renewal, in the nervous system, and in the immune system; a final chapter points out many special and fascinating features of the cells and tissues in plants. The way the book is organized permits a thorough consideration both of the molecular basis of cell structure and function and of the cellular basis of tissue biology.

Although there are six authors, the text is stylistically unified for the most part and easy to follow. Key words are emphasized with boldface or italics; many terms and specific topics are cross-referenced. Each of the carefully organized chapters begins with a brief introduction of the main topics to be considered, and a separate summary is provided for each topic. The topics in turn are divided into subtopics; the treatment of each of the latter is headed by a statement of fact or a conclusion. The headings usually include citations of relevant review articles, research reports, or books; the works cited, which extend into 1982, are listed at the end of each chapter. Different large assemblages of

related facts or current concepts (such as the stages of mitosis and the properties of different types of collagen) are summarized efficiently in tables, charts, and diagrams. The myriad figures are of outstanding quality and will be a great aid to students. The index is quite complete, largely justifying the absence of a glossary.

There are rather few factual errors in the book. Although no reasonable person would want to suggest adding more pages to a book that is already very long, it must be pointed out that a few topics having general interest and current importance are not dealt with—for example, GERL (Golgi-associated endoplasmic reticulum from which lysosomes form), the number of mitochondria per cell, and differences between ciliary and cytoplasmic microtubules. One of the few features of the book that strikes me as unfortunate is the use of only one label for a given structure without listing of alternatives or historical synonyms (although the subjects are indeed fully described and discussed, there is no mention of such widely used terms as "plasmalemma," "micropinocytosis," "microbodies," "nuclear annuli," or "zonula occludens"); one can hope that teachers will point out these other terms in their classes, particularly for the benefit of graduate students. Teachers also might want to bring forth the names and circumstances of scientists who are responsible for particularly important research discoveries, since experiments and concepts are totally depersonalized in the book.

Most students and teachers will initially be overwhelmed by the weight of the volume, which has a large page size and nearly double the number of pages in many other cell biology textbooks. One can hope that the lengthening arms of students lugging this hefty book around campus will be regretted less by virtue of its reasonable price and the realization that it could be used as a supplemental textbook for other courses (such as developmental biology, histology, and biochemistry).

This book is totally modern in approach. Thus, the coverage of membrane structure starts with fluidity rather than leads up to it in a historical sequence; similarly, muscle is covered within a consideration of the cytoskeleton rather than separately. The authors have had the fortitude to change some of the traditional approaches used by many other textbooks in cell biology. For example, it is refreshing to see that meiosis is covered in its natural context of gametogen-

esis, instead of automatically being made the subject of the second half of a chapter on mitosis and cell division.

Molecular Biology of the Cell is a particularly modern and masterly treatment of one of the most exciting fields in biological science. I heartily recommend it for classroom use.

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Books Received

Analyse Multivariée. Hubert Laforge. Editions Etudes Vivantes, Saint-Laurent, Quebec, 1981. xiv, 318 pp., illus. Paper, C\$27.95.

Analytical Techniques in Environmental Chemistry 2. Proceedings of a congress, Barcelona, Nov. 1981. J. Albaiges, Ed. Pergamon, New York, 1982. x, 474 pp., illus. \$75. Pergamon Series on Environmental Science, vol. 7.

The Anatomy of Biomagnetism. Albert Roy Davis. Vantage, New York, 1982. xxvi, 108 pp., illus. \$7.95.

Anger and Aggression. An Essay on Emotion. James R. Averill. Springer-Verlag, New York, 1982. xiv, 402 pp. \$29.90. Springer Series in Social Psychology.

Angiography of the Upper Extremity. Blagoja K. Janevski. Nijhoff, The Hague, 1982 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xiv, 226 pp., illus. \$43.50. Series in Radiology, vol. 7.

Animal Production in the Tropics. Papers from a symposium, Wad Medani, Sudan, Feb. 1981. Mohamed K. Yousef, Ed. Praeger, New York, 1982. xviii, 376 pp., illus. \$35.

Annual Review of Genetics. Vol. 16. Herschel L. Roman, Allan Campbell, and Laurence M. Sandler, Eds. Annual Reviews, Palo Alto, Calif., 1982. xii, 540 pp., illus. \$22.

Annual Review of Nuclear and Particle Science. Vol. 32. J. D. Jackson, Harry E. Gove, and Roy F. Schwitters, Eds. Annual Reviews, Palo Alto, Calif., 1982. viii, 596 pp., illus. \$25.

Antibiotics, Chemotherapeutics, and Antibacterial Agents for Disease Control. Martin Grayson, Ed. Wiley-Interscience, New York, 1982. xxvi, 514 pp., illus. \$49.50. Encyclopedia Reprint Series. Reprinted from the Kirk-Othmer *Encyclopedia of Chemical Technology*.

Comprehensive Cardiac Rehabilitation. Papers from a congress, Jerusalem, Nov. 1981. J. J. Kellermann, Ed. Karger, Basel, 1982. x, 246 pp., illus. \$72. Advances in Cardiology, vol. 31.

Computer Network Architectures. Anton Meijer and Paul Peeters. Computer Science Press, Rockville, Md., 1983. xii, 396 pp., \$27.95. Electrical Engineering Communications and Signal Processing Series.

Contemporary Research Topics in Nuclear Physics. Proceedings of a workshop, Philadelphia, Sept. 1980. Da Hsuan Feng, Michel Vallières, Michael W. Guidry, and Lee L. Riedinger, Eds. Plenum, New York, 1982. x, 592 pp., illus. \$75.

Contrast Echocardiography. Richard S. Meltzer and Jos Roelandt, Eds. Nijhoff, The Hague, 1982 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xvi, 336 pp., illus. \$69.50. Developments in Cardiovascular Medicine, vol. 15.

Controversies in Neurology. Papers from a symposium. Richard A. Thompson and John R. Green, Eds. Raven, New York, 1982. xii, 162 pp., illus. \$39.50.

Conversations with the Captain. A Fable on Economics. Raynal Hammelton. Philosophical Library, New York, 1982. 150 pp. \$10.

Cosmology and Astrophysics. Essays in Honor of Thomas Gold. Papers from a symposium, Ithaca, N.Y., Oct. 1980. Yervant Terzian and Elizabeth M. Bilson, Eds. Cornell University Press, Ithaca, N.Y., 1983. 168 pp., illus. \$22.50.

Co-Transmission. Proceedings of a symposium, Oxford, England. A. C. Cuello, Ed. Macmillan, London, 1982. xii, 264 pp., illus. £30.

Deformation-Mechanism Maps. The Plasticity and Creep of Metals and Ceramics. H. J. Frost and M. F.

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