Vignette: Intellectuality

The question is often asked: What do we mean by an intellectual? Is an intellectual anyone who has an advanced education and is interested in activities of the mind? Is everyone in the so-called intellectual professions an intellectual? Are our Nobel scientists intellectuals? . . . A distinction must be made between power of mind and intellectual power; they are not always the same thing. To be a success in business requires power of mind but not power of intellect. For an intellectual, the mind is primarily an instrument of speculation. It operates in a sphere where the consequences of thought are not necessarily put to the test of reality, as they would be, say, in a scientific laboratory or in politics.

—*Diana Trilling*, in *The Beginning of the Journey: The Marriage of Diana and Lionel Trilling* (Harcourt Brace)

Pumping Ions

V-ATPases. W. R. HARVEY and N. NELSON, Eds. Company of Biologists, Cambridge, U.K., 1992. x, 489 pp., illus. $49 or £29. From a symposium, Telluride, CO, June 1992. Also published as *Journal of Experimental Biology*, vol. 172.

Vacuolar-type, or V-type, adenosine triphosphatases are a relatively recently discovered member of the family of ion-motive ATPases. These essential enzymes are responsible for the synthesis of adenosine triphosphate and for the establishment and maintenance of ionic gradients across plasma and intracellular membranes. The importance of the former process is obvious. The importance of the latter also becomes evident when we realize that phenomena such as the regulation of cell volume and cell pH and the control of cell metabolism through the modulation of calcium fluxes are dependent on these gradients. The family of ion-motive ATPases (also called ion pumps) also includes the F-type and P-type ATPases. F-ATPases comprise a large number of subunits and operate in vivo exclusively in ATP synthesis, which they perform by dissipating the H^+ gradient established across energy-transducing membranes (mitochondria, chloroplasts, bacteria) by the respiratory chain. P-ATPases, as a rule, consist of a single polypeptide chain, function as true ATPases, and establish gradients of a number of ions, among them K^+, Na^+, H^+, Ca^{2+}, and Mg^{2+}. The H^+-transporting V-ATPases share a number of properties with F-ATPases (for example, their large number of subunits) but invariably operate in vivo as true ATPases rather than ATP synthetases, acidifying the contents of cytoplasmic vesicles and vacuoles.

Although research on ion-motive ATPases has traditionally concentrated on the F- and P-type enzymes, the amount of information that has accumulated on V-ATPases in the last few years has been nothing short of amazing. Initial work focused on the vacuolar membranes of plants and fungi, but recently investigations have extended to the plasma membrane of a number of animal cells. *V-ATPases*, a collection of 39 papers reflecting the work of more than 30 laboratories around the world, offers a panoramic view of current research on V-type ion pumps. In a useful side excursion five papers, grouped at the end of the book, deal with F-type pumps. The book reflects the fact that, owing to the relative youth of the field, our understanding of V-type pumps (especially their structural aspects) is not as advanced as that of the other types. Yet it presents a reasonably balanced overview of what is known today (or rather, what was known about a year ago) about their genetics, primary structure, subunit composition and function, and physiology.

The material is organized according to species or tissue of origin, with chapters on fungal vacuoles, plant tonoplasts, mammalian endomembranes, phagocytic and bone cells, kidney vacuoles, and insect plasma membranes. Although this structure permits thorough coverage of each area, it has led to some repetition, a problem that could have been avoided by dividing the material along different lines (for example, gene structure and analysis, subunit composition, and so on). Although the chapters on ion channels are good, I found them out of place in this volume. On the other hand, the extensive coverage of the more recent work emphasizing V-ATPases as inhabitants of plasma membranes rather than intracellular membrane systems, including an excellent contribution by Brown, Sabolic, and Gluck on the polarized targeting of V-ATPases in kidney epithelia, is especially welcome. The time was evidently not yet ripe for discussion of the type of work that has become so popular for the other two classes of ion-motive ATPases: domain characterization and directed mutagenesis to identify sites of binding and of transport. However, the book does include coverage of subunit membrane architecture, on which work has progressed nicely. The fact that the V-type pumps function in vivo as true ATPases, unlike the F-type pumps, perhaps deserves more emphasis than it is given.

In sum, this book should be of great use to those working on the biochemistry, molecular biology, and physiology of membrane transport. There are no significant omissions, and it seems likely that it will become the standard reference on V-ATPases. Given the rate at which research on these pumps is progressing, however, the volume will probably not remain up-to-date for long. The editors should begin planning a sequel.

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Divisions

Molecular and Cell Biology of the Plant Cell Cycle. J. C. ORMROD and D. FRANCIS, Eds. Kluwer, Norwell, MA, 1993. viii, 222 pp., illus. $118 or £78 or Df1.190. From a symposium, April 1992.

In the billion or so years since plants and animals went their separate evolutionary ways, much has changed, yet much has stayed the same. Plants offer ample proof that successful ascension to complex multicellularity on this planet required neither synapses, sarcomeres, nor immunoglobulins. Yet like their distant sentient cousins, both unicellular and multicellular plants go forth and multiply by meiosis and mitosis. In the wake of the recent findings of striking evolutionary conservation in mitotic regulatory mechanisms from yeast to mammals, plant biologists have been scrambling to ask, with regard to plants, "What's the same?" and, perhaps more interestingly, "What's different?"

But it didn't take the discovery of the *cdc2* gene for cell biologists to learn that plant and animal cells march to different drummers when it comes time to divide. Rather than pinching off daughter cells via a contractile cleavage furrow, plant cells divide by constructing new—yet heavily perforated—walls

from within, suggesting to some that mitosis in plants serves less to generate cellular building blocks than to subdivide space within an expanding organism. Unique to its kingdom is the dividing plant cell's habit of anticipating, and no doubt determining, the orientation of the new wall by positioning a "pre-prophase band" of microtubules that disappears before metaphase. How this structure forms, disappears, and determines the site where the new wall meets the old are unresolved problems. Finally, plant cells lack discrete centrosomes, centrioles, and asters, raising vexing questions about the locus and mechanism of mitotic spindle microtubule nucleation.

The 1992 symposium on which *Molecular and Cell Biology of the Plant Cell Cycle* is based, coming on the heels of the grand synthesis in mitosis research that capped the previous decade, provided a forum in which to assess the state of plant cell cycle studies. Thus from this volume one might hope to learn whether plants fall within or outside the continuum of variations in mitotic regulatory detail that is now known to separate yeast and animal cells. Alas, what we learn is that, although plant cells do indeed have *cdc2* and cyclin genes, the leading players on the eukaryotic mitotic stage, the identities of the supporting cast members are largely unknown. Described in the book is much interesting work in progress such as that aimed at identifying plant homologues of *cdc25*, *suc1*, and *cdc7*, genes that link upstream elements to the central regulators. But the curious reader may be left unfulfilled owing to the dearth of substantive analyses of cause-and-effect relationships linking plant hormone reception to cell division, the withdrawal of differentiating plant cells from the proliferative state, or the roles of the conserved regulators with respect to the aforementioned structural idiosyncrasies in plant mitosis.

Yet one cannot help being inspired by the bounty of phenomenology under investigation here. Experimental systems representing no fewer than 23 species are discussed by a dozen research groups. (Perhaps a consolidation of effort by somewhat more than 0.5 laboratories per species might promote more rapid vertical progress in the future.) Tobacco, alfalfa, and *Catharanthus* cell cultures all appear to grow vigorously and respond well to mitotic synchronization protocols. A treasure trove of mutants in maize meiosis is described, revealing a largely untapped resource for cloners and cell biologists. The *Zea mays* root tip is presented as an exquisite developmental system in which quiescent, mitotic, and differentiating cell populations are distributed in predictable, dynamic patterns and can be cleanly isolated from one another for biochemical and molecular analyses. Naturally synchronous mitotic systems such as regenerating tobacco leaf protoplasts, in vitro cultured Jerusalem artichoke tubers, and shoot apical meristems undergoing the floral transition invite potentially rewarding inquiries as to their underlying biochemical controls.

This timely volume will interest all cell biologists in search of fertile ground for a foray into plant development and cell division regulation. Given the ease of manipulation of plants, the accessibility of diverse genetic stocks, the absence of constraints imposed by "plant rights" activists (so far!), and the importance of this kingdom for the survival of our own, the book should serve to catalyze the migration of experimental biologists over to the green side of life.

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Books Received

Advance Directives and the Pursuit of Death with Dignity. Norman L. Cantor. Indiana University Press, Bloomington, 1993. xii, 209 pp. $24.95. Medical Ethics Series.

Advances in Bacterial Paracrystalline Surface Layers. Terry J. Beveridge and Susan F. Koval, Eds. Plenum, New York, 1993. x, 344 pp., illus. $105. NATO Advanced Science Institutes Series A, vol. 252. From a workshop, London, Ontario, Canada, Sept. 1992.

Advances in Biomedical Alcohol Research. P. V. Taberner and A. A. Badawy, Eds. Pergamon, Tarrytown, NY, 1993. xiv, 512 pp., illus. P65. From a congress, Bristol, U.K., June 1992. Supplement No. 2 to *Alcohol and Alcoholism.*

Aging in Good Health. A Quality Lifestyle for the Later Years. Florence Lieberman and Morris F. Collen, Eds. Plenum, New York, 1993. xvi, 337 pp., illus. $26.95.

The Almanac of Renewable Energy. Richard Golob and Eric Brus. Holt, New York, 1993. xvi, 348 pp., illus. $50.

Asymmetric Synthesis of Natural Products. Ari Koskinen. Wiley, New York, 1993. xiv, 234 pp., illus. Paper, $39.95.

An Atlas of *Drosophila* Genes. Sequences and Molecular Features. Gustavo Maroni. Oxford University Press, New York, 1993. xii, 415 pp., illus. $80.

Biogeography. An Ecological and Evolutionary Approach. C. Barry Cox and Peter D. Moore. 5th ed. Blackwell Scientific, Cambridge, MA, 1993. x, 326 pp., illus. Paper, $34.95.

Biological Basis of Substance Abuse. Stanley G. Korenman and Jack D. Barchas, Eds. Oxford University Press, New York, 1993. xviii, 516 pp., illus. $75.

Biotechnology Applied to the Diagnosis of Animal Diseases. Office International des Epizooties, Paris, 1993. 376 pp., illus. Paper, $40 or F 200. Published as *OIE Scientific and Technical Review*, vol. 12, no. 2. Based on a symposium, Lyons, France, June 1992.

Biotechnology From A to Z. William Bains. Oxford University Press, New York, 1993. x, 358 pp., illus. Paper, $19.95.

Biotechnology in Plant Disease Control. Ilan Chet, Ed. Wiley-Liss, New York, 1993. xvi, 373 pp., illus. $99.95. Wiley Series in Ecological and Applied Microbiology.

Bring Out Your Dead. The Great Plague of Yellow Fever in Philadelphia in 1793. J. H. Powell. University of Pennsylvania Press, Philadelphia, 1993. xxvi, 304 pp. + plates. $29.95; paper, $12.95. Studies in Health, Illness, and Caregiving. Augmented reprint, 1949 ed.

Building a New Science by Quantizing the Universe. James C. Sung. Scientific, Woburn, MA, 1993. 2 vols. Vol. 1, Pixels of Space-Time, iv + pp. 1–404, illus. Paper, $25. Vol. 2, Evolution of the Universe, iv + pp. 405–812, illus. Paper, $25. The set, $39.

Cellular Communication in Reproduction. F. Facchinetti *et al.*, Eds. Society for Endocrinology, Bristol, U.K., 1993 (distributor, Turpin, Elmont, NY). x, 228 pp., illus. $54.50 or P30. Endocrine Updates. From a symposium, Camerino, Marche, Italy, Sept. 1992.

The Challenge for Geography. A Changing World, A Changing Discipline. R. J. Johnston, Ed. Blackwell, Cambridge, MA, 1993. x, 248 pp., illus. $49.95. Institute of British Geographers Special Publications Series, 28. Based on a conference, 1991.

Chaos and Dynamics of Rays in Waveguide Media. S. S. Abdullaev. G. M. Zaslavsky, Ed. Gordon and Breach, Philadelphia, 1993. xvi, 312 pp., illus. $70 or P49; to institutions, $125 or P77. Translated from the Russian by Igor Yastrzhembsky and Anwar Shukurov.

Classics on Fractals. Gerald A. Edgar, Ed. Addison-Wesley, Reading, MA, 1993. xii, 366 pp., illus., + plates. $64.50.

Clifford Numbers and Spinors. With Riesz's Private Lectures to E. Folke Bolinder and a Historical Review by Pertti Lounesto. Marcel Riesz. E. Folke Bolinder and Pertti Lounesto, Eds. Kluwer, Norwell, MA, 1993. x, 241 pp., illus. $98.50 or P67 or Dfl. 165. Fundamental Theories of Physics, vol. 54.

Computer Simulation and Computer Algebra. Lectures for Beginners. D. Stauffer *et al.* 3rd ed. Springer-Verlag, New York, 1993. x, 287 pp., illus. Paper, $29.95.

Conceptions of the Human Mind. Essays in Honor of George A. Miller. Gilbert Harman, Ed. Erlbaum, Hillsdale, NJ, 1993. xiv, 277 pp., illus. $49.95. From a conference, Princeton, NJ, Oct. 1991.

Design of Experiments. A No-Name Approach. Thomas J. Lorenzen and Virgil L. Anderson. Dekker, New York, 1993. xii, 414 pp., illus. $59.75. Statistics, 139.

Development of New Nonlinear Optical Crystals in the Borate Series. C. T. Chen. Harwood, Langhorne, PA, 1993. viii, 74 pp., illus. Paper, $24 or P16; to institutions, $40 or P26. Laser Science and Technology, vol. 15.

Disease, Diagnosis and Decisions. Graham W. Bradley. Wiley, New York, 1993. xviii, 182 pp., illus. Paper, $29.95.

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Drugs of Abuse, Immunity, and AIDS. Herman Friedman, Thomas W. Klein, and Steven Specter, Eds. Plenum, New York, 1993. xiv, 286 pp., illus. $79.50. Advances in Experimental Medicine and Biology, vol. 335. From a conference, Clearwater Beach, FL, June 1992.

Dust and Chemistry in Astronomy. T. J. Millar and D. A. Williams, Eds. Institute of Physics, Philadelphia, 1993. xii, 335 pp., illus. $149 or P79. Graduate Series in Astronomy. From a meeting, Manchester, U.K., Jan. 1992.

Dynamics of Space Tether Systems. Vladimir V. Beletsky and Evgenii M. Levin. Univelt, San Diego, CA, 1993. viii, 499 pp., illus. $120; paper, $90. Advances in the Astronautical Sciences, vol. 83. Translated from the Russian edition (Moscow, 1990) by Evgenii M. Levin.

EMR of Paramagnetic Molecules. Lawrence J. Berliner and Jacques Reuben, Eds. Plenum, New York, 1993. xiv, 400 pp., illus., + diskette. $95. Biological Magnetic Resonance, vol. 13.

The Encyclopedia of Land Invertebrate Behaviour. Rod and Ken Preston-Mafham. MIT Press, Cambridge, MA, 1993. 320 pp., illus. $45.

The Encyclopedia of the Solid Earth Sciences. Philip Kearey *et al.*, Eds. Blackwell Scientific, Cambridge, MA, 1993. xii, 713 pp., illus. $179.95.

The End of the Bronze Age. Changes in Warfare and the Catastrophe Ca. 1200 B.C. Robert Drews. Princeton University Press, Princeton, NJ, 1993. xii, 252 pp., illus. $35 or P30.