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 Dfl.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