ville, Weir, and Lazarus describing the chemical nature of hystricomorph insulins presents findings that could be of considerable biomedical importance.

The final chapter, on the origin of the domestic guinea pig, by Weir, will be of interest to guinea pig enthusiasts, although it does not resolve the problem.

This book presents important information on hystricomorph rodent biology and deserves to be widely read. It should stimulate discussion of and further work on this group.

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A Spectroscopic Atlas

Higher Excited States of Polyatomic Molecules. MELVIN B. ROBIN. Academic Press, New York, 1974–75. Two volumes. Vol. 1. xvi, 374 pp., illus. $31. Vol. 2. xii, 418 pp., illus. $39.50.

For many years the spectroscopy of the higher excited states of polyatomic molecules was considered by many to be too complicated for fruitful research. The term "too complicated" means that available technology did not permit sufficiently detailed experiments or sufficiently accurate calculations to make unique assignments of spectral bands and unique explanations of band shapes and intensities possible. Consequently, the field was marked by some controversy and by the designation in the literature of spectral bands as "the mystery bands." This situation is changing because of recent theoretical and experimental advances. Ab initio calculations with sufficiently small and well-defined error limits now can assist in understanding spectra, and more detailed experimental information now can be obtained through the use of photoelectron spectroscopy, electron scattering spectroscopy, and the multiphoton techniques possible with tunable, high-power lasers. Consequently, Robin's book is timely and will serve as a useful reference, not only as a companion to Herzberg's books for those wishing to obtain accurate information quickly, but also as a guide for those seeking to answer long-standing questions by using new techniques.

The higher excited states are defined by Robin as lying approximately between 50,000 and 100,000 cm^{-1}. Our knowledge of these states is covered in eight chapters. Volume 1 contains "Theoretical aspects" (62 pp.), "Experimental techniques" (35 pp.), and "Saturated absorbers" (211 pp.), the last including the alkanes, alkyl halides, and compounds of boron, nitrogen, phosphorus, arsenic, antimony, oxygen, sulfur, selenium, tellurium, silicon, germanium, and tin. Volume 2 contains "Two-center unsaturates" (120 pp.), "Non-aromatic unsaturates" (88 pp.), "Aromatic compounds" (60 pp.), "Inorganic systems" (17 pp.), and "Biological systems" (4 pp.). An addendum in volume 2 corrects some errors and omissions of volume 1 and brings the research coverage for both volumes to January 1974. Each volume has its own reference list and index; 73 pages of references, including titles, is provided.

Robin's stated purpose in writing these volumes was to compile and classify spectra in order to bring out relationships and thereby assist in developing and testing explanations of the spectra. This "spectroscopic atlas," as he calls it, appears to be thorough, accurate, and objective. The passages describing spectra are interesting to read and are interspersed with qualitative explanations, including different points of view where appropriate. The discussion of Rydberg states in the theoretical chapter is especially good. Since basic material common to many other books is properly omitted (hence the short theoretical chapter), a good knowledge of "what molecular spectroscopy is about" is necessary in order to appreciate the contribution of these two volumes.

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Thermodynamics of Plants

Membrane Transport in Plants. Proceedings of a workshop, Jülich, Germany, Feb. 1974. ULRICH ZIMMERMAN and JACK DAINTY, Eds. Springer-Verlag, New York, 1974. xvi, 476 pp., illus. $30.

This volume contains the texts of the 64 contributed papers presented at an international workshop. It covers topics ranging from electrochemistry of membrane transport to transport in organs of higher plants and provides broad coverage of the field, with an emphasis on ion transport.

Several interesting points emerge. For example, a fairly rigorous thermodynamic basis for the subject is now widely accepted, and the contributions of the physical chemists no longer appear to be of immediate relevance. It is apparent that active transport, which depends on the presence of highly specific carriers in the membrane, is not readily described by the methods of irreversible thermodynamics. Since the membranes of plants living in dilute media have low passive permeabilities, the active fluxes predominate. Thus plants represent a case of extreme difficulty. It is also becoming widely accepted that at least one active flux, probably due to a hydrogen ion pump, is electrogenic and controls the electrical properties of the membranes. Since the electrogenic effects in plant cells are much greater than those in animal cells, it is not surprising that Mitchell's chemiosmotic hypothesis is gaining in influence. Slayman documents this in a short review article that includes a description of the electrogenic cotransport systems for sugars and amino acids observed by him in *Neurospora* and by Etherton in higher plants. This system is driven by the proton-motive force set up by the hydrogen ion pump. Its discovery adds a strong element to the unifying effect of the chemiosmotic hypothesis, and this is further reinforced by Smith and Raven's discussion of the relationship between cytoplasmic *p*H, organic acid metabolism, and ion accumulation. The chemiosmotic hypothesis also dominates the section on transport in chloroplasts, though Avron expresses some reservations about its adequacy.

There is a useful section on adenosine triphosphatases and several interesting articles on transport within tissues, with an emphasis on roots. In the section on kinetics it is reassuring to learn that the controversy about the interpretation of absorption isotherms continues unabated, though at an ever more sophisticated level. The section on hormonal regulation of ion transport suffers from the absence of a paper dealing directly with the effect of hormones on the hydrogen ion efflux, which has been postulated to cause cell wall extension.

The amount of space devoted to water transport is rather limited, but the section contains details of some new techniques that promise to add momentum to a field long hampered by technical limitations. Particularly interesting are Zimmermann's device for measuring turgor pressure in giant algal cells and the use of the pressure bomb to measure the kinetics of water movement in shoots (Tyree *et al.*).

This volume will be valuable both for specialists in the field and for students who have grasped the fundamentals of the subject and need a summary of the state of the art before commencing their research. The editors are to be commended for their concise summaries of the discussion sessions, the relative absence of errors in the text, and the speed with which the volume was produced.

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