struction"; they then systematically evaluate the kinds of incentives and social situations that produce competition in monkeys. Papers by Southwick and co-workers and Bernstein and co-workers fit well with the Nagel and Kummer review. Both papers report on the effects of introduction of unfamiliar individuals into established social groups of macaques. In particular, Bernstein points out that such an introduction is one of the most potent stimuli for eliciting aggression in primates; he then proceeds to test the hypothesis that the most vigorous aggression ought to be elicited by those introduced individuals that pose the greatest threat to the existing social order. This paper is both insightful and critical; it summarizes well thought out research and provides a good review of xenophobia in primates. Similarly, both the report of field observation and experimentation on noctural prosimians by Charles-Dominique and the report by Sussman and Richard on ecological factors influencing aggression in diurnal prosimians also contain some new and valuable information on aggression in primates.

The second section of the book is about physiological bases of aggression and contains a comprehensive review by Rose and co-workers of the effects of androgens on aggressive behavior, as well as several less important papers. Rose's review emphasizes the importance of androgens prenatally and neonatally for expression of aggressive behavior in adulthood, the importance of small amounts of androgens produced by females, and the enhanced effects of androgens at certain stages in the life cycle, for example during puberty. Since the review is based primarily on studies that used laboratory rodents as subjects, many of the conclusions still need to be verified in primates. Papers in this section by Kling and Mass and by Andy and Stephan are disappointing and far from comprehensive. The former demonstrates that aggressive behavior can be affected by a lesion in nearly any area of the midbrain or limbic system; the latter uses a volumetric technique to compare, in a quasiphylogenetic series of extant species, the relative size of the brain areas believed to control aggressive behavior. Many questions can be raised concerning both the research methodology and conclusions of these two articles.

In the comparative section of the book, a brief paper by Scott places primate aggression in the context of aggression in other animals, and a paper by Eibl-Eibesfeldt attempts to show that hunter and gatherer societies are not free of aggression. This latter statement should come as a surprise to no one, and it is difficult to see what, if anything, his pictures of the buttocks and genital displays of African and New Guinean girls have to do with the subject of aggression. Lastly, an overview article by the late C. R. Carpenter, summarizing many years of research, is refreshingly written and in many ways more insightful than any other article in the book. This article also demonstrates that good factual scientific writing can make exciting reading.

In sum, the reader looking either for new information on primate aggression or for a critical appraisal of accepted notions will find this book disappointing. It is the kind of book that one would probably want to have in the university library, but not on one's own bookshelf.

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Guinea Pigs and Their Kind

The Biology of Hystricomorph Rodents. Proceedings of a symposium, London, June 1973. I. W. ROWLANDS and BARBARA J. WEIR, Eds. Published for the Zoological Society of London by Academic Press, New York, 1975. xx, 482 pp., illus. $30.75. Symposia of the Zoological Society of London, No. 34.

In the introductory comments in this work the hystricomorph rodents are referred to in terms such as "extraordinary," "intriguing," and "fascinating," an indication of the enthusiasm with which the subject is approached by the contributors, who represent a variety of disciplines. The book lacks an overview of the general biological importance of hystricomorphs but succeeds in bringing to the attention of scientists a great deal of valuable information (much of it new) on this previously largely neglected group, comprising approximately 180 species, which includes the domestic guinea pig, the largest living rodent, and the mammal with the earliest recorded age at sexual maturity.

The book is divided into sections on taxonomy, ecology and behavior, reproductive physiology, and endocrinology. The origin of the South American and African hystricomorphs has long been a controversial subject, and the two viewpoints concerning it are represented in the section on taxonomy. Lavocat reviews hystricomorph characters (mainly osteological and dental) and concludes that the basic unity of the suborder indicates a common origin from a single stem. He believes that hystricomorphs originated in the African Eocene and that some members migrated across the South Atlantic to South America on rafts. In a stimulating account of hystricomorph evolution Wood points out that hystricomorphy has originated at least eight times among the rodents and expresses the view that the South American hystricomorphs are of remote North American ancestry and that their similarities to Old World forms are due to parallelism.

The section on ecology and behavior includes chapters on tuco-tuco and plains viscacha, mountain viscacha, gundi, and cane rat, which summarize the limited available field data on these species. Excellent comparative accounts of hystricomorph behavior patterns and vocalizations are given by Kleiman and Eisenberg, respectively. Kleiman notes a basic uniformity in hystricomorph behavior and points out several characteristics not found in other rodents, such as the highly specialized male courtship displays, which would be especially suitable for evolutionary analysis. The similarities between hystricomorph and ungulate behavioral adaptations are also of particular interest. The ecology and behavior of most hystricomorphs still await investigation, and long-term studies involving the collection of quantitative data are greatly needed. Most hystricomorphs are colonial, live in family groups, or are pair-bonded. The diversity of their social organization and habitat makes them excellent subjects for comparative studies of socioecology.

The section on reproductive physiology includes a chapter on the African cane rat, which, because of its palatability, large size, and high reproductive rate, has considerable potential for domestication as a cheap source of protein. The chapters on reproductive characteristics (Weir), ovarian anatomy (Rowlands and Weir), and embryology (Roberts and Perry) present important data recently obtained at the Wellcome Institute of Comparative Physiology on unusual reproductive features such as the presence of a subplacenta and accessory corpora lutea and the bizarre ovary of the plains viscacha, which releases up to 800 eggs at each estrus. Hystricomorph rodents are characterized by a long gestation period relative to their body size, and the first two chapters in the endocrinology section explore the hormonal mechanisms by which gestation is maintained. The modifications that enhance the synthesis of progesterone are discussed by Tam, and Heap and Illingworth describe a plasma protein that has a high affinity and capacity for progesterone and reduces the rate at which this hormone is removed from the circulation. The chapter by Ne-

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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