many as yet uncommitted workers in thinking about the field. As is often the case in fields where the impetus for study comes from such diverse groups as pharmacologists, physicians, physiologists, general biochemists, and physical protein chemists, many of the participants do not understand one another. Thus there is a great need for reviews. This has been especially so since the reviews available are now quite old.

The present book is a translation of a somewhat smaller review published in German in 1966. In the process of translation the book was updated to include references to mid-1968. The strongest feature of the book is an unusually thorough coverage of the literature. It includes over a thousand references, some of them picked out from rather rare sources, such as Chinese journals, short abstracts, and Ph.D. dissertations. Hardly anything of which I was aware has been missed, and a great deal of which I was not aware has been included. An additional bonus is the inclusion of a good deal of otherwise unpublished information from the authors' prolific laboratory. There are many good tables summarizing comparative properties, such as amino acid compositions and specificities of interaction of various inhibitors with various proteases. The bias is on the biological side, with emphasis on the physiological action and possible therapeutic importance of the inhibitors. Physicochemical data are not slighted, but one is aware that they are written about by biologists, not chemists.

On the minus side, the book is not pleasant to read. There is essentially no general section, and the description of one inhibitor is followed by a description of another and yet another, the descriptions being organized solely according to biological source. Within each description fact follows fact with relatively little attempt (except in the tables) to summarize or to stress the most salient ones. Many of these flaws are due to a graceless translation and to the difficulty of grafting in the 1966–1968 papers in the revision.

In summary, the book is of great value to investigators of protease inhibitors as a source of much important information and as an unusually complete list of references. A novice, on the other hand, will not find it easy or exciting.

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Organelles

Microbodies and Related Particles. Morphology, Biochemistry, and Physiology. Z. HRUBAN and M. RECHCIGL, JR. Academic Press, New York, 1969. xii + 300 pp., illus. $14.50. International Review of Cytology, Supplement 1.

In the past few years it has become clear that the cells of some tissues in many organisms possess enzyme-containing bodies that can reasonably be considered as representatives of a widely distributed class of organelles, the microbodies. This book reviews the abundant relevant literature that already has accumulated. Appropriately, one of the authors is a microscopist and the other a biochemist. Electron microscopists identify microbodies as structures usually less than 1 micron in diameter, delimited by a single membrane and containing a moderately dense matrix in which a crystal-like core and other inclusions are sometimes present. Such structures have been isolated from several sources and shown to contain catalase and oxidative enzymes such as uricase, alpha-hydroxy acid oxidases, and D-amino acid oxidase; the fact that many of these enzymes can produce or decompose hydrogen peroxide has led to an alternative name, *peroxisomes*, proposed by DeDuve, who has pioneered in the biochemical study of the organelles. Recently developed cytochemical methods for light and electron microscopy are supplementing isolation procedures in establishing the coincidence of morphological and enzymatic characteristics.

In constructing their review, the authors of this book confronted difficulties arising from three major sources in addition to the uneven quality of the literature: (i) Microbody-like organelles have been found in many organisms, unicellular and multicellular, plant and animal, but it is not known whether they are essentially ubiquitous as are more familiar organelles such as mitochondria or the plastids of plants. Within a given organism their presence is demonstrable only in a few tissues (for example, in those green tissues that are capable of photorespiration and in vertebrate liver and kidney). (ii) The morphology and enzymatic capabilities of organelles presumed to be microbodies are quite varied in different tissues and organisms, although it is plausible to think of the resulting differences as variations on a theme. The variability is reflected, in part, in the several names that have been applied; for example, the *glyoxysomes* of castor bean endosperm contain enzymes of the glyoxylate cycle along with catalase and other enzymes. (iii) While key functions of microbodies in plant glycolate and glyoxylate metabolism (related to photorespiration or the transformation of fat into carbohydrate) seem increasingly firmly established, roles in animal cells are largely speculative, although there is no dearth of possibilities (for example, they may play a role in protection against peroxides, gluconeogenesis, control of reduced coenzyme levels, or uric acid metabolism).

For such reasons, the literature on several central topics is fragmentary, and much of it is descriptive, concerns details of unknown generality, or reports initial exploratory experiments. These difficulties are compounded by the fact that some of the morphological work and many of the interesting enzyme studies were done before it was recognized that a chemically and structurally distinctive type of organelle was involved. The authors thus had to choose between synthetic and cataloguing approaches. By and large they have taken the latter. The book surveys the literature up to mid-1968, taking up morphological questions first and then enzymological ones, and concentrating on animal material. The structure of microbodies in many organisms and tissues (mainly of vertebrates) is described and illustrated with numerous reasonably well reproduced electron micrographs. Information on several key enzymes is extensively reviewed, with catalase receiving somewhat more attention than the others. Changes observed during development, disease, and exposure to many experimental manipulations are outlined.

At surprisingly few places in the book do the authors undertake extensive integration of information; nor, in treating work by others, do they usually go much beyond reporting. For the relatively sophisticated reader this may be desirable, since enough details are presented to permit him to establish his own coherence in the mass of facts. For those unfamiliar with the limitations of cytochemistry, organelle isolation, or microscopy, however, the absence or underplaying of critical discussion at important points may be disconcerting or misleading. This is true also of the organization of the book; for example, terms like "1:12 polytubular crystalloid" or "marginal plate" are introduced and used for some time before they are adequately defined or

illustrated. There is little emphasis on the properties of isolated microbodies, and the discussion of catalase is complicated by the intermingling of information from erythrocytes with findings on tissues known to contain microbodies. When the authors do present their own analysis it sometimes is too briefly stated or not thoroughly enough documented to be fully useful. For example the introductory sections on lysosomes contain much contentious material and will be difficult for the nonexpert, and a number of important morphological interpretations need further discussion (for example, the basis of the implied conclusion that some plate-containing cisternae of endoplasmic reticulum are not attached to fully formed microbodies is not made clear).

Despite such flaws in organization and style, careful reading of the book does provide most of the facts needed for adequate introduction to microbodies. Inevitably, there are a few errors, strange interpretations, omissions, and outdated sections; no pair of authors could be so fully familiar with all tissues and organisms as to avoid this. However, Hruban and Rechcigl have brought together in one book a large and diffuse body of information, and this is one of the first wide-ranging reviews of the subject. Thus their contribution will be useful, especially as an annotated introduction to the literature.

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Biotic Diversity and Environmental Stability

Speciation in Tropical Environments. Papers from a symposium, London, Oct.–Nov. 1968. R. H. LOWE-MCCONNELL, Ed. Published for the Linnean Society of London by Academic Press, New York, 1969. viii + 248 pp., illus. $11.50. Biological Journal of the Linnean Society, Vol. 1, Nos. 1 and 2.

The tropics extend across the equator to 23½ degrees of latitude north and south (tropics of Cancer and Capricorn) and bound an area more diverse environmentally than the temperate and boreal regions of the globe. The most unusual tropical environment is without doubt the rain forest, but there are many other tropical vegetation formations, including savannas, deserts, and high mountain steppes. Seasonality is peculiar in the tropics in that rainfall is more important than temperature. High tropical mountains do have large temperature fluctuations, but these follow a daily, instead of seasonal, cycle. Tropical environments thus provide living things with sets of parameters differing from those existing elsewhere. Clearly, organisms have had to evolve distinct adaptive strategies depending on whether their habitat was tropical or not. The question whether speciation phenomena in the tropics are different from those in the temperate zone is therefore of great biological importance, the more so when one recalls that organic diversity is much greater in the tropics. Speciation, then, can be viewed as a historical component of tropical species diversity, and as such can conveniently be simplified into the following two postulates: first, that more species evolve per unit time (the rate of speciation is greater) in the tropics, tropical environments somehow permitting evolutionary change to proceed at an accelerated pace; and second, that there is less extinction in the tropics because of the greater stability of the environment over long periods. Should both postulates be rejected by available evidence, then one can conclude that there is no unique historical component to tropical species diversity. If, however, either postulate is shown to be valid, then historical factors must be included in a theory of tropical species diversity.

The publication of a book on speciation in tropical environments is therefore of interest. The 15 papers in this volume are the contributions of invited speakers, all of whom have had extensive experience in the tropics, to a symposium organized by the Linnean Society of London and the Tropical Group of the British Ecological Society. The articles range in approach and scope from specialized treatments of speciation patterns within narrow taxa to broad literature reviews.

Although the diversity of the book reflects the diversity of life in the tropics, I am sorry to say that it also detracts considerably from the value of the volume. There is no common denominator among the papers, and much material irrelevant to the major unsolved problems of speciation in the tropics is presented. None of the contributors investigates the vexing question of extinction, and few of them touch upon rates of speciation in the tropics compared with the temperate zone. MacArthur, for example, maintains that speciation rates are greater in the tropics (this even appears to be an important part of his hypothesis of diversity; see his fig. 4, p. 27), but he gives not a shred of evidence to back up his view. Clarke and Murray, studying speciation in *Partula* on Moorea, conclude that "an accelerated rate (or an increased quantity) of speciation may be characteristic of tropical oceanic islands" (p. 41), but I do not find evidence in the body of their paper actually supporting that position. In his essay on bird speciation, Mayr rejects the possibility of greater rates, and turns his attention mostly to ecological factors of speciation, especially geographical isolation.

Actual evidence about evolutionary rates can be found, however, in Lowe-McConnell's review of speciation in freshwater fishes, and especially in Ashton's provocative paper on rainforest trees. The data these authors present strongly suggest that the evolutionary mechanisms themselves, and especially their modes of action, are not significantly different in the tropics from those in temperate regions, so the rates of evolutionary change leading to speciation should not be different either. Both authors also emphasize that there is greater packing of species in the tropics, as was already known, and attribute this mainly to different ecological strategies (in terms of niche) among tropical species. The greater diversity in the tropics may nevertheless be influenced by a historical component, not so much in terms of evolutionary rates (although the importance of extinction remains largely unknown), but of greater environmental, especially climatic, stability over a longer period in the tropics than in the temperate zone. The meaning of stability here must not be misinterpreted. The tropics have had their share of unstable periods, not the least of which was during the Pleistocene glaciations, which had effects on speciation, in temperate and tropical zones alike. Mayr (birds), Lowe–McConnell (fishes), Hedberg (African high mountain flora), and Ashton (dipterocarps) all mention the influence of Pleistocene glaciations on speciation patterns in the