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 Inevitably, there are a few errors, strange interpretations, omissions, and outdated sections; no pair of authors could be so fully familiar with all tissues and organisms as to avoid this.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

groups they review. When the magnitude of such phases of environmental instability in the temperate and tropical zones is compared over long periods of time, however, then evidently the tropics are more stable.

Three further comments about this volume are: First, the book is replete with spelling and typographic errors, Second, several of the more specialized contributions could advantageously have been replaced by more general reviews of evolutionary phenomena at the species level. The state of our knowledge of such topics as the significance of polymorphism or the effects of natural selection in the tropics is more advanced than a nonspecialist reader would suspect from perusing the book. The third is that, with a couple of notable exceptions, the contributors to this symposium have dealt only with the forested wet tropics, which constitute only a portion of the environments to be found under tropical latitudes. In conclusion, I am tempted to disagree with Cain's concluding remark that this symposium "will enable us to see what the basic problems are, and something of how to start work on them." Instead, I would say that the book enables us to see how ill-defined the basic problems are in the minds of several biologists working on speciation in tropical environments.

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