The past 30 years have seen a huge increase in knowledge about bats, perhaps greater than has occurred in any other field of mammalogy. Wimsatt, who with his students has been in the vanguard of the removal of the "mystery" from bats, conceived the idea of a multivolume work to provide an up-to-date summary of the biology of bats. The first two volumes have now appeared, and the list of contributors and the general excellence of the summaries are impressive.

Volume 1 contains 10 chapters. The first, "Bat origins and evolution" by Glenn L. Jepsen, in addition to summarizing the known fossil record includes an excellent series of stereophotographs of the earliest known bat, *Icaronycteris index*, a 50-million-year-old fossil from the Eocene of Wyoming. Robert J. Baker, in his chapter, tabulates known information concerning chromosome numbers and arrangements and relates this to classical bat taxonomy. Terry A. Vaughan provides a comparative anatomy of the major variations in osteology among the various kinds of bats, with special emphasis on adaptations for flight, and then provides similar information for striated muscles. A third chapter by Vaughan summarizes the functional anatomy of flight. Here again we are impressed by the diversity among bats, with styles of flight ranging from the "slow, highly maneuverable flight" of typical insectivorous bats to the flight of hoverers, fast fliers, and even "fly catcher" bats with "slow, delicate style of flight." The remaining chapters, on prenatal and postnatal development by Robert T. Orr, migration and homing by Donald R. Griffin, the ecology and physiological ecology of hibernation by Wayne H. Davis, thermoregulation and metabolism by Charles P. Lyman, and the urinary system by Robert M. Rosenbaum, all add further documentation of the extensive adaptive radiation in structure and habits evident in this group of mammals.

Volume 2 contains seven chapters. Six of these—"Integument and derivations" by W. B. Quay, "The central nervous system" by O. W. Henson, Jr., "Peripheral nervous system" by Quay, "The ear and audition" by Henson, "Vision, olfaction, taste" by Roderick A. Suthers, and "Pineal organ" by Quay—are summaries of the detailed morphology and function of various organs and organ systems. Chapter 7, "Bats in relation to the health, welfare, and economy of man," by Denny G. Constantine, summarizes the role of bats in diseases, including rabies, as well as their impact on fruit growing in the tropics and insect control and guano production throughout tropical and temperate climates. The terminal portion of the chapter summarizes control measures for vampire, fruit, and insectivorous bats.

From the foregoing summary of contents, it is obvious that these two volumes will be of interest not only to professional chiroptologists but to many others, including vertebrate zoologists, anatomists, physiologists, and public health workers. Each chapter includes an extensive list of references.

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Aerosols

The Dynamics of Aerocolloidal Systems. G. M. HIDY and J. R. BROCK. Pergamon, New York, 1971. xvi, 380 pp., illus. $27. International Reviews in Aerosol Physics and Chemistry.

This book is intended to be the first of a series of International Reviews on Aerosol Physics and Chemistry and so it seems particularly appropriate that it should concentrate on the mechanical properties of aerosols.

In their introduction the authors state that their aim is "to explore the dynamical behaviour of idealized aerosol particles in the light of modern developments in classical mechanics." With this objective in view, they deliberately neglect the detailed microscopic properties of aerosol particles—except insofar as they can be included in macroscopic parameters—and treat the particles as smooth, chemically inert spheres.

Having made this idealization, the authors proceed to a stimulating consideration of aerosols from the point of view of the kinetic theory of gases. As they point out, it is, however, difficult to follow this through to give a rigorous statistical treatment of the general case. Nevertheless, many cases of practical interest can be covered by making the simplifying assumption that the aerosol particles do not interact with each other directly, and so the authors go on to develop a statistical mechanical model for this special case. In this treatment they bring out very clearly the importance of the ratio of the size of the aerosol particles to the mean free path of a molecule in the suspending gas. They distinguish between the continuum regime, where the particles are very large compared to the mean free path of the molecules, and the other extreme, where the particles can simply be regarded as large molecules, and they discuss the difficult intermediate cases.

In the rest of the book, Hidy and Brock consider various special topics, such as heat and mass transport to aerosol particles, the diffusion of aerosols, and collisions between aerosol particles, using the basic framework established in the opening chapters. In each case they begin with a general mathematical formulation and then consider special cases which are of special interest or amenable to mathematical solution.

This approach is perhaps the greatest strength and weakness of the book. Obviously the generalized formulations have the advantage that they can be used by workers in different fields They are, however, necessarily highly mathematical, and considerable effort will often be required to obtain practical results. The authors are clearly aware of this difficulty and have deliberately included more detailed experimental and theoretical results and an extensive bibliography. These features should help to make this book of value, not only to students seeking a general understanding of aerosol mechanics, but also to workers concerned with practical problems involving aerocolloidal systems.

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Books Received

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Advances in Microbial Physiology. Vol. 5. A. H. Rose and J. F. Wilkinson, Eds. Academic Press, New York, 1971. x, 302 pp., illus. $14.50.

Aerodynamic Characteristics of Atmospheric Boundary Layers. Erich P. Plate. U.S. Atomic Energy Commission, Oak Ridge, Tenn., 1971 (available as TID-25465 from the National Technical In-

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