Little is known about how most bacterial toxins cause damage to host cells, and in many cases their role in bacterial metabolism is unknown. Advances made in biochemistry in the isolation and purification of proteins during the last three decades have provided tools for the study of microbial protein toxins. In many instances isolation and purification have revealed the existence of more than one toxin. For example, in the case of staphylococcal toxins, there are leukocidins with an F and with an S component, enterotoxins A, B, and C (and possibly D), and alpha and delta toxins.

Purified microbial toxins are antigenic, and serological and immunological tests have been developed for identifying and assaying them. With purified microbial antigens the pharmacologist or toxicologist can study the mode of action of the toxin, the microbial physiologist can determine the role of the toxin in the metabolism of the microorganism producing it, and the geneticist and cell biologist can elucidate the role of the gene and other cellular components in toxin production. Many microbial diseases were not recognized as being caused by toxin, and years elapsed between the discovery of the causative microorganism and the demonstration of toxin. Examples are plague (*Pasteurella pestis*), anthrax (*Bacillus anthracis*), and cholera (*Vibrio cholerae*).

Volume 1 of this work deals with general problems and approaches in the study of bacterial protein toxins. The authors of several chapters in volume 1 call attention to the lack of agreement concerning what constitutes a "toxin," the meaning of the term having been fixed in such a way that it has ceased to be of much practical value. One author suggests that "toxin" be replaced with "soluble bacterial antigen." It was the editors' intent to include in volume 2 a chapter on diphtheria toxin, which has been extensively investigated, and well-understood (with respect to site and mode of action) proteins that are liberated by bacteria. Masahiko Yonedo, who was to prepare this chapter, became ill and could not continue, and to avoid delay in publication the topic is omitted from volume 2A. A supplemental volume, 2B, devoted exclusively to diphtheria toxin and authored by Alwin M. Pappenheimer, Jr., is scheduled to appear in the near future. Volumes 2A and 3 contain a comprehensive description and analysis of what is known about each specific toxin as well as guidelines and directions for future work.

Bacterial protein toxins provide an exciting field of research, and these three volumes can be highly recommended to scientists in microbiology, immunology, biochemistry, pharmacology, and related fields.

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Widely Used Drug

Actions of Alcohol. HENRIK WALLGREN and HERBERT BARRY, III. Elsevier, New York, 1970. In 2 vols. Vol. 1, Biochemical, Physiological and Psychological Aspects. Vol. 2, Chronic and Clinical Aspects. xxviii, 872 pp. $64.

Alcohol is the drug most widely used for nonmedicinal purposes and is the drug associated with the most serious social and economic consequences. These facts have led hundreds of scientists throughout the world to study various aspects of alcohol action in an effort to understand the factors leading to, the consequences of, and methods of reducing excessive consumption of alcohol. The result has been a literature so vast and multilingual that no one investigator has even a superficial acquaintance with it all. A critical analytic review of the scientific literature within a systematic framework has been very badly needed. *Actions of Alcohol* has come closest to filling the gap. The authors, whose respective expertise—Wallgren's being in physiology and biochemistry and Barry's in experimental psychology—represents the diversity of scientific disciplines involved in the study of alcohol use, have reviewed some 3641 sources in seven languages to provide the most detailed, comprehensive, and scholarly review of the literature to date. Effects of alcohol at the subcellular, the cellular, the organ, and the behavioral level are described.

Since many investigators working in this field entered it because of an interest in alcoholism, there is a tendency among them to view alcohol use as unique rather than as a special case of a more general set of drug-related phenomena. That is, rather than inquiring into the variables controlling alcohol self-administration, many investigators have designed their research around experimental models of alcoholism. Wallgren and Barry's review reflects this fundamental deficit in the literature.

When drugs are viewed as maintaining consequences for the behavior that has led to their use, families of experimental questions arise. These questions emerge from research with related behaviors and self-administration of other drugs. Many of these questions have not been asked concerning alcohol and only recently have been investigated as they relate to drugs in general. This difficulty is most apparent in those sections of *Actions of Alcohol* that deal with the behavioral effects of the drug. Little systematic framework within which to approach the behavioral literature dealing with alcohol is provided. This is an opportunity missed. The field needs conceptual guidance. In their concluding recommendations Wallgren and Barry plead for multivariate research at multiple levels of analysis. It is a pity that science seeks solutions in complexity when it lacks a conceptual framework within which to understand even the most basic phenomena.

All things considered, *Actions of Alcohol* is an important book. Its strengths at the biochemical, physiological, and cellular levels outweigh weaknesses in the treatment of behavior. It is a welcome and long overdue addition to the scientific literature.

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The Chiroptera

Biology of Bats. WILLIAM A. WIMSATT, Ed. Vol. 1, 406 pp. + plates, $25; vol. 2, xvi, 478 pp., illus. $26. Academic Press, New York, 1970.

In 1939, when G. M. Allen published his classic *Bats* (Harvard University Press), bats were little understood, even by biologists. For example, at that time the utilization of ultrasonic vocalizations for echolocation and communication was unknown. The best guess then available as to how bats managed to avoid obstacles in the total darkness of caves was that they were able to detect the echo of vibrations set in motion by the air currents generated by flight.