son emphasizes the synthetic nature of genecology as a discipline combining ideas and methods from genetics, taxonomy, and plant physiology. In this rather long essay on population genetics, Heslop-Harrison discusses some general principles that have emerged in the study of population differentiation and adaptation in plants, and deplores attempts to assimilate genecology into taxonomy. Useful subject and author indexes are provided at the end of the volume.

Although specialists will be interested in each of the four papers, the volume merits the attention of the general biologist because it indicates a number of significant aspects of current ecological research. Observations, usually quantitative, of natural events need to be recorded for long periods of time before significant processes can be identified.

The collection and treatment of data either have a conceptual basis or are designed to differentiate between concepts. Analyses, often by means of computers, are becoming increasingly more comprehensive and intricate. Emphasis on processes governing complex interactions indicates a trend toward integration of ecological research. However, it is apparent that the analyses of complex interactions will become matters of considerable controversy.

T. BURNETT
Entomology Research Institute for Biological Control, Belleville, Ontario, Canada

Handbook of Physiology

Adaptation to the Environment. D. B. Dill, E. F. Adolph, and C. G. Wilber, Eds. Published for the American Physiological Society by Williams and Wilkins, Baltimore, 1964. 1056 pp. $32.

This 1056-page book is a companion volume to the other sections in the American Physiological Society's *Handbook of Physiology*, which are sections on *Neurophysiology*, *Respiration*, *Circulation*, and *Adipose Tissue*. But owing to the very nature of its subject, *Adaptation to the Environment* represents the most difficult and ambitious undertaking in the series to date.

There are 68 contributors to the volume. The offerings include an introductory chapter, by Chauncey Leake, on historical perspectives of adaptation; chapters on theoretical and general aspects of adaptation by C. Ladd Prosser and E. F. Adolph; a chapter on the cellular level of adaptation; 11 chapters on adaptation of various organ systems; general chapters on the influence of weather and climate and geography and season; chapters that list existing laboratory facilities for low-pressure and extreme-temperature research; 20 chapters on terrestrial animals in cold, dry heat, and humid heat; 8 on adaptation in aquatic environments; 4 on toxic environments; 6 on high altitude adaptation; 1 on high pressure; 3 on radiant energy; 1 on motion; and 1 on noise.

For the most part the contributors are acknowledged leaders in research on the subject about which they comment, albeit there are several notable exceptions. From the latter there are disturbing perpetuations of currently unacceptable concepts—for instance, "hibernation" by reptiles and amphibians. The quality of the individual contributions varies widely—most authors have obviously made an earnest attempt to provide a synthetic review of the literature and present the meat of their subject, and they have done so in exemplary manner; but some have presented merely an abbreviated review of their own work, and a few present what appear to be hasty, poorly documented, last-minute commentaries. In general, the subject is treated in less detail and less extensively than has been the case in the previously published sections of the *Handbook of Physiology*. The chapters are, for the most part, topical surveys, not comprehensive compendia.

Major emphasis in the volume is on the higher vertebrates and man. The treatment could have profited greatly by a more truly comparative approach and by including, particularly, a wealth of available information on adaptations of marine invertebrates.

Topical emphasis is on classical considerations of temperature adaptation, osmoregulation and metabolic rate, although two chapters on toxicology are oriented to the molecular level. Serious omissions with respect to the understanding of basic phenomena of adaptation are chapters on enzyme induction and repression, the role of free amino acids in osmoregulation, open-system thermodynamics, and cybernetic control. Coverage is much more superficial than is desirable on neurophysiological and endocrine mechanisms of homeostasis, even as they relate to subjects that are particularly emphasized, such as cold adaptation. Other desirable inclusions would have been summaries of current work on morphogenic adaptation, weightlessness, photo- and thermoperiod, parasitism and symbiosis, modern engineering principles of heat exchange and hydrodynamics as applied to biology, metabolic pathway integration and control, sensory deprivation, prenatal and early postnatal influences, and adaptive control at the population level of organization.

The utility of the volume as a reference source would have been greatly enhanced by a more complete subject index and by the inclusion of an author index.

In spite of Chauncey Leake's cosmopolitian introduction, and certain other notable exceptions, one is forced to the conclusion that this courageous attempt to provide a "critical, comprehensive presentation of physiological knowledge and concepts" has been largely dominated by a school of thought that emphasizes the organ system, the classical, the applied, and higher animals and humans. I sincerely hope that this volume will serve not only as a valuable reference source to the categorical material which it now covers but, more importantly, that it may serve as a stimulus and starting point for a truly synthetic and comprehensive phenomenological and comparative approach to the subject of organic adaptation to the environment.

Whatever its shortcomings, many of which were unavoidable, this is without question the most authoritative volume on adaptation that has yet been compiled. As such, it is a highly significant landmark in our understanding of the phenomena of adaptation to the environment, a subject that is difficult because it includes, in fact, the whole of biology. This volume will be a worthwhile addition to the bookshelf of most professional biologists.

BRUCE L. WELCH
Department of Biology, College of William and Mary