ciples of virology to enable the student to understand the current and rapid advances in the field. However, professional virologists may object to the lack of depth in the treatment of some topics. The author tried to avoid controversial topics by mentioning the various viewpoints offered.

The price of the book is reasonable, the references at the end of each chapter are adequate, and the organization is excellent.

HUNEIN F. MAASSAB
Department of Epidemiology, University of Michigan

Plant Viruses

During the last two decades virology has emerged from a covering of fuzzy concepts and cumbersome methodology to become a distinct discipline and to assume a central position on the stage of modern biology. In **The Biology of Viruses** (Oxford University Press, New York, 1965. 152 pp., $2), the author, Kenneth M. Smith, portrays this awakening by describing the "life history" or "biographies" of selected plant, bacterial, and animal viruses whose study led to significant discoveries, hoping thus "to preserve some of the romance of scientific research." To accomplish his ends, the author relies heavily on descriptions of plant viruses, devoting 72 of the book's 137 pages to these agents. In contrast, the "biography" of bacteriophages is presented in a mere seven pages. The emphasis on plant viruses seems disproportionate in view of the fact that the ferment generated by studies of T-even bacteriophages laid the foundation for much of modern virology.

Five concise chapters are devoted to descriptions of the viruses that affect man and other vertebrates. These include poliovirus, vaccinia virus, herpesviruses, myxoviruses (chiefly influenza viruses), and some tumor viruses (human warts, mouse mammary tumor, polyoma, and Rous sarcoma). The chapters concerned with animal viruses are brief; the viruses discussed were wisely chosen, and the descriptions are clear although not complete.

There are a number of minor errors of fact which as a whole do not detract greatly from the descriptions presented. However, some major discoveries that contributed to the advancement and to the excitement of virology were omitted, thereby diminishing the success of the author in fully meeting his objectives. For example, no mention is made of the discovery, by Wyatt and Cohen, that the DNAs of T-even bacteriophages contain 5-hydroxymethylcytosine in place of cytosine, nor is there a description of the subsequent findings that the viral genome can code for the synthesis of a number of new enzymes ("early proteins") as distinct from the viral structural ("late") proteins. No recognition is given to the finding that wound tumor virus of sweet clovers contains a unique double-stranded RNA, nor that double-stranded RNA occurs in only one other group of viruses, the ubiquitous reoviruses which morphologically resemble the wound tumor virus. No consideration is given to Rubin's important discovery that some strains of Rous sarcoma virus are defective and can "transform" cells but cannot replicate to produce infectious virus without the assistance of a helper virus (an avian leukosis virus).

Kenneth M. Smith is an eminent plant virologist, the former director of the Virus Research Unit, Agricultural Research Council, Cambridge, England; it is therefore understandable why he emphasized plant viruses more than all others. It is regrettable that he did not give some formal recognition to the concept that the general principles of virology pertain to all viruses regardless of their host. Hence, the lessons of comparative virology are lost. Nevertheless, he has written a very readable summary of many important discoveries that advanced virology to its present position. *The Biology of Viruses* is not a reference book for the serious student of virology, but it should satisfy the needs of one from another discipline who wishes to be introduced to an important area of modern biology.

HAROLD S. GINSBERG
Department of Microbiology, University of Pennsylvania School of Medicine, Philadelphia

A Botanical and Ecological Survey of the Outer Leeward Islands

David R. Harris's **Plants, Animals, and Man in the Outer Leeward Islands, West Indies** (University of California Press, Berkeley, 1965. 194 pp., $5), which is subtitled "An ecological study of Antigua, Barbuda and Anguilla," is a treatment of the past, the present, and the future role of man and other introduced animals and plants in the biological populations on three of the limestone Caribbees. The work is based on 5 months of field study plus investigations in museums and archives in England and the United States and consultations with many specialists in the West Indies. Fourteen figures portray vegetation types, land uses, or geologic characterizations of the three islands. Six tables list rainfall records, compare systems of vegetation classifications of the authors, Beard and Loveless, and present the composition of floristic areas in alphabetically arranged species lists. Two large appendices summarize the botanical content, citing the species mentioned in the text in systematic arrangement by family and by the common names in alphabetical order, each with cross references. An excellent bibliography cites published and unpublished reference materials. The plates with one exception illustrate the types of vegetation or specific plants.

The author's bold premise is that in the outer Leeward Islands climatic contrasts are insufficient to explain the distribution and diversity of the present vegetation. This he maintains has been profoundly modified by man and cannot be understood without a knowledge of his occupation and use of the islands. Thus, in describing the existing vegetation, Harris indicates its current use and attempts to assign either a native or an alien origin to each species. A special category of alien plants is also recognized, and food crops, other useful plants, ornamentals, grasses, and herbaceous weeds are listed in tabular form, with their suggested areas of origin. For historical perspective, the past is presented as three eras: aboriginal times, the period of the explorers and buccaneers, and early (1632 to 1700), mid (1700 to 1850), and late colonial (1850 to 1960) times; for each period there is a discussion of plants and animals introduced and of the associated land use and misuse. The information is well documented, extremely interesting, and not available in any other single source. The author is encouraging with respect to the future but unconvincing in his conclusion that "with increased understanding of ecological processes, it is now possible to reverse the downward trend of centuries and restore to the islands some of the or-

ganic diversity and stability they have lost."

It will require time for this real contribution to be "discovered" and removed from the literature of geography to its proper position in the botanical and ecological literature of the Caribbean, because it is published in the University of California Publications in Geography.

RICHARD A. HOWARD
Arnold Arboretum,
Harvard University

Handbook of Physiology

Respiration (Williams and Wilkins, Baltimore, Md., 1965. 778 pp., $28), volume 2 of section 3 of the American Physiological Society's **Handbook of Physiology**, is perhaps less organized than is desirable from the reader's standpoint, but to integrate the various facets of the more applied subjects would have delayed publication of these résumés and thus must be relegated to some future synthesist. Although several chapters in which the contribution is essentially a presentation of "concepts" of our knowledge might more properly have been included in volume 1, that already lengthy volume (900 odd pages) would thereby have become even more unwieldy. Thus the juxtaposition of applied research and more closely related concepts was carried into the 778 pages of volume 2.

There are 39 chapers, of which one is subdivided into distinct parts that constitute several more treatises, each with its own list of references. As the editors point out, the literature references are highly selective and thus represent only illustrative bases for the support of fundamental concepts, but by-and-large they also present the most sophisticated work in the field, and they are cited for continued reading as well. Approximately 4000 references are cited, although it must be assumed that many refer to the same paper or review.

The 39 chapters of this volume were contributed by 42 authors; six chapters have dual authorship, while three authors undertook two chapters each. In general the authors are recognized major contributors to the field, and it is important to note that an international representation has thus resulted, drawing from young and old where most appropriate. The contributors are Erling Asmussen, John E. Affeldt, J. Howland Auchincloss, Jr., Albert R. Behnke, Jr., William A. Briscoe, D. V. Bates, John Butler, Margaret R. Becklake, Hans G. Clamann, K. W. Cross, R. M. Cherniack, John A. Clements, Helen Conrad Davies, R. E. Davies, G. S. Dawes, Arthur B. DuBois, James O. Elam, Robert E. Forster, David G. Greene, Edward A. Gaensler, Robert E. Hyatt, Max Kleiber, T. W. Lamb, Christian J. Lambertsen, Ulrich C. Luft, Edward H. Lanphier, C. P. Larson, Jr., John C. Mithoefer, Robert Marshall, M. B. McIlroy, Johannes Piiper, S. Permutt, W. S. Root, R. L. Riley, D. W. Richards, H. E. Stokinger, J. W. Severinghaus, J. A. Schilling, S. M. Tenney, D. F. Tierney, J. B. West, and G. W. Wright.

The volume is roughly separated into three units: the first 18 chapters being devoted to evaluation of the effects of environment, including the fetal, and dealing with basic concepts; the next ten dealing with principles of methodology regarding measurement of pulmonary function and constitute critiques rather than expositions (although they are specific enough in the jargon of the field to be well worth studying by newcomers to the discipline); the third group (11 chapters) comprising clinical aspects of pulmonary function viewed in the light of these multifarious concepts.

It must be pointed out that this whole presentation summarizes a honing of traditional methods of study and analysis of pulmonary physiology, which has engaged the postwar generation of physiologists, partly through the stimulus of the many questions developed during that hectic period in which adaptation to, and protection from, hostile environments became a national necessity. It was, of course, made possible by the phenomenal advances in measurement techniques and ultrasensitive devices for the measurement of nearly all parameters previously only crudely appraisable. A few new concepts, such as surface effects and those of inert gases, have been rediscovered, but to date analyses of these concepts, are hardly comparable to those of the more traditional ventilatory and circulatory measurements. Despite the tremendous refinements in technique and reliability, application of the gamut of measurements is still on a statistical basis and the concept of specific ability for gas transfer is still a three-factor term of which functional area and thickness are as yet inseparable. It is also apparent that anatomists and pathologists are about the only ones who have acknowledged the function of the lymphatic system in the lung.

Inasmuch as the volume is not a compendium of research in the field (although some 14 chapters have extensive reference sections), the absence of an author index may be justified. The index would, however, have aided the teaching functions alluded to on the dust jacket.

This volume with its companion and the other parts of the *Handbook* will certainly be a practical guide to the field for some years to come. Although few students can afford to have copies of the *Handbook* on their desks, school and laboratory libraries should make it freely available to "students, young and old—who need to increase their understanding and sophistication to a level adequate for predoctoral study, for teaching, and for preliminary orientation in preparation for research."

HEINZ SPECHT
National Institutes of Health,
Bethesda, Maryland

Fluorine Chemistry

Kaj Roholm's monograph *Fluorine Intoxication* (1937) has long been a classic in its field, and we have a volume dedicated to the memory of Roholm (1902–1948)—**Fluorine Chemistry**, vol. 4 (Academic Press, New York, 1965. 804 pp., $28), by Harold C. Hodge and Frank A. Smith.

The book contains two chapters: "Biological properties of inorganic fluorides" (375 pp.) and "Effects of fluorides on bones and teeth" (306 pp.). The material in each chapter is arranged under main subject headings, most of which also contain subheadings. Appended to each chapter is a list of supplementary reference material, 11 pages for chapter 1 and 9 pages for chapter 2. Listed under pertinent titles are names of authors whose papers are not cited in the chapter, with dates of publication, so that the citation can be found in the full bibliography. Papers are cited by name of the authors, and by the use of "*et al.*" and date of publication in the text but with the names of all authors and the first and last pages of the paper in the bibliography. Titles of the papers are omitted. It is stated that "The complete bibliography with titles upon which this volume is based has been deposited as