## Lucknow Symposium on Palynology: 1964

**Advances in Palynology**. P. K. K. Nair, Ed. National Botanic Gardens, Lucknow, India, 1964. viii + 438 pp. Illus.

Symposium publications on palynology had a good year in 1964 with the appearance of *Ancient Pacific Floras: The Pollen Story* (University of Hawaii Press), *Palynology in Oil Exploration* (*Spec. Publ. Soc. Econ. Paleontol. and Mineral. No. 11*), and the volume reviewed here, *Advances in Palynology*. Publication of the latter volume was planned to coincide with the Symposium on Palynology held at the National Botanic Gardens, Lucknow, on 8 October 1964.

*Advances* contains 18 chapters contributed by different authors; it is devoted to botanical review of the morphology and functions of spores and pollen for all groups of plants, its varying significance, and its applications. In range and orientation, this work differs from the other two volumes and is likely to be useful. Palynology has become most popular in its empirical geohistorical applications, but only two chapters in *Advances* (A. K. Ghosh, pp. 352–366; C. P. Varma, pp. 378–402) deal with stratigraphic palynology.

Good botanical treatments of fungus spore morphology, physiology, and biochemistry are presented by M. M. Payak (pp. 27–55) and by P. S. Krishnan and others (pp. 56–78). The list of 17 asexual and seven sexual fungus spore types implies a broader horizon for sporology. Algal spore forms and morphology are discussed by G. S. Venkataraman and S. K. Goyal. Spore morphology of mosses and liverworts is reviewed by Ram Udar (pp. 79–100); a similar review of spores of ferns and fern allies is presented by B. K. Nayar (pp. 100–141, with 71 photographic illustrations). The authors give a coherent survey, according to plant groups of systematic botany.

Chapters of more general interest include one by P. D. Dogra on pollination mechanisms in gymnosperms (pp. 142–175) and one by Bahadur Singh on male gametophytes (pp. 224–275). The various mechanisms whereby pollen reaches the nucellus in cycads, *Ginkgo*, conifers, and gnetales may not be known to many paleopalynologists, although the diversity of gymnospermous pollen has generally been noted. The functional homologies of male gametophytes, from green algae to flowering plants, has a general significance in phyletic comparison. Additional information about the male gametophytes of angiosperms is presented by Y. S. Murty in reviewing mother-cell division and microspore formation (pp. 176–202); eight types of tetrad configuration are discussed and tabulated and full references are given. P. K. K. Nair, who was also responsible for editing this volume, presents a discussion of pollen morphology and applications to taxonomy and plant evolution (pp. 201–224).

Applications of particular interest to agricultural science are discussed in chapters on pollen sterility, pollen physiology, and horticulture and plant breeding and on the relationship of pollen to beekeeping. The last chapter is concerned with relations of pollen and other airborne allergens to problems of health. Thus, an exceptionally broad range of topics has been considered.

Breadth of perspective and broad systematic coverage, with ample reference to recent literature, characterize the articles in this volume. Necessarily, breadth of attack has required condensation and use of technical terms that will not be familiar to all palynologists. To make use of this volume, some supplemental reading may be necessary, but the needed references are given. These treatments differ from those of elementary viewpoint which discuss a too limited range of organisms for palynologic reference, and they should lead to a better understanding of the range of palynologic diversity in plants.

The articles are illustrated mostly by line drawings; a few authors use halftone illustrations. The paper is smooth and the legibility of the type is good, but the binding of the book is poor. In my copy, one signature (8 pp.) was bound upside down. Each chapter has a fairly detailed table of contents to supplement the general table provided at the front of the book. In view of the book's encyclopedic coverage and the specialized terminology employed in many articles, lack of an adequate general index is the most serious deficiency. The language is generally correct and clear, and there are relatively few typographical errors. A good job has been done in editing.

"First edition, 1964," on the back of the title page, suggests that a later edition may be contemplated. Such an undertaking after a suitable period of use will probably be desirable. At that time, with only a little updating, and with addition of a glossary, a comprehensive index, and a sturdy binding, this book can be made indispensable. The present volume will be useful for advanced palynology classes and reference.

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## Current Research in Ecology

**Advances in Ecological Research**. vol. 2. J. B. Cragg, Ed. Academic Press, New York, 1964. xii + 264 pp. Illus. $9.50

The second volume of *Advances in Ecological Research* follows the pattern set in the first by providing comprehensive reviews of four areas of ecology. In an essay entitled "Analysis of processes involved in the natural control of insects," M. E. Solomon gives a very good presentation of one point of view in a very controversial field of study. He deals largely with the results of practical studies of population dynamics and with the sort of data needed for the study of natural control. A number of problems that occur in analyzing the dynamics of populations are discussed and methods of attacking them are illustrated, primarily with data collected in the field. In "The use of statistics in phytosociology" J. M. Lambert and M. B. Dale examine critically current concepts used to place the study of vegetation on an objective basis. Assumptions with regard to the type of data to be collected for the classification of plant communities and to statistical methods for their analyses are considered in some detail.

In contrast to the first two papers, the aim of "Litter production in forests of the world," by J. R. Bray and E. Gorham, is primarily the collation of data on litter produced by forests in different parts of the world and the assessment of the influence of environment upon litter fall under different forest communities. This review provides a great deal of basic data for workers in this field. In "Forty years of genecology," J. Heslop-Harri-

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.

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## 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.

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