our present generation of young scientists will have the opportunity for the kind of wandering that has been so fruitful in Lipmann's case. Are not the pressures of goal orientation and relevance factors that prevent the luxury of wandering? Do not medical school admission boards take precautions to exclude those who have a tendency to wander? Does not the urgency of grant requirements hinder deviation? What will be the consequences for scientific wandering of the developing anti-research trend in our universities? Will all these factors preclude studies such as Lipmann's on *Lactobacillus delbruckii*, which laid the foundation of much of modern biochemistry, or Mary Shorb's on *Lactobacillus lactis*, which made possible the isolation of vitamin B_{12}, or McElroy's esoteric studies on firefly luminescence, which have become the basis of important new tools in clinical medicine and industry? Lipmann has clearly demonstrated the need of society for scientific wanderers, and his presentation should become a factor in refuting those who would deny that need.

This book should become a contribution equal to Lipmann's scientific accomplishments. It should serve as an inspiration to students at all levels as well as to mature investigators and can be of value not only to those interested in biological sciences but also to physical scientists, for it is a volume that should encourage a new generation of scientific wanderers.

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Arboreal Ontogeny

Growth and Development of Trees. Vol. 1, Seed Germination, Ontogeny, and Shoot Growth. T. T. KOZLOWSKI. Academic Press, New York, 1971. xvi, 444 pp., illus. $23. Physiological Ecology series.

As author, coauthor, or editor, Kozlowski has been responsible for a number of authoritative texts dealing with tree growth. The present work, the first part of a two-volume treatise, again bears witness to his energy and dedication.

It is no easy task to produce a comprehensive yet readable account of a subject like tree growth, on which there is an enormous and widely scattered literature, ranging on the one hand from the electron micrography of leaf surfaces to the gross morphology of tree crowns and on the other from basic biochemical and physiological processes to innumerable empirical observations on growth in the field. The inclusion of too many observations and opinions makes for very dull and confused reading, and lengthy arguments, welcomed mostly by the more critical reader, take up a great deal of space. To serve the needs of both pure and applied scientists, as the book intends, also means striking a reasonable balance between academic and practical aspects.

The author, clearly recognizing these difficulties, has sought a new approach. Instead of the usual treatment of this subject, organ by organ and process by process, he has concentrated on a developmental theme. After a conventional opening chapter summarizing morphological and anatomical features of crowns, leaves, stems, and roots, he devotes the next three chapters to a description of the significant changes that occur in vegetative and reproductive growth during the progression from the seed and seedling to the adult and senescent stage.

In many respects this is an attractive and stimulating approach. We begin to look at the growing tree not as a collection of seemingly independent organs but as a single organism proceeding from juvenility to adulthood and, finally, old age. There are, however, difficulties in maintaining this ontogenetic theme. Differences between species, the need for physiological explanations, and the increasing complexity of the organization of a tree as it matures entail constant side excursions which confuse continuity. Furthermore, there are physiological phenomena that influence growth and development at many different stages; for example, photoperiodism is involved in seed germination, bud dormancy, shoot growth, and flowering. This means frequent repetition.

The author has tried to deal with these problems by emphasizing general morphological development in the earlier chapters and continuing this emphasis in separate chapters on bud, shoot, and leaf development. A chapter on "within tree variations" allows him to deal with phenology and geographic factors, leaving most of the physiology of shoot growth, including environmental relations and internal hormonal control, to the final chapter. This scheme is not altogether unsuccessful, though it entails a considerable amount of cross-referencing.

The text is profusely illustrated and contains a wealth of information. The inclusion of almost 1000 references gives some idea of the extent of the reading involved in its preparation. We look forward to the second volume, which is to deal with cambial activity.

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Books Received

Adaptive Aspects of Insular Evolution. A symposium, Mayagüez, P.R., June 1969. Washington State University Press, Pullman, 1971. vi, 86 pp., illus. Paper, $4.

Adena: The Seeking of an Identity. A symposium, Muncie, Ind., March 1970. B. K. Swartz, Jr., Ed. Ball State University, Muncie, 1971. vi, 182 pp. Paper.

Adolescent Rorschach Responses. Developmental Trends from Ten to Sixteen Years. Louise Bates Ames, Ruth W. Métraux, and Richard N. Walker. Butterworths, London, and Brunner/Mazel, ed. 2, New York, 1971. xvi, 320 pp., illus. $10.

Advances in Electrochemistry and Electrochemical Engineering. Vol. 8, Electrochemical Engineering. Charles W. Tobias, Ed. Wiley-Interscience, New York, 1971. xiv, 406 pp., illus. $24.95.

Advances in Nuclear Physics. Vol. 4. Michel Baranger and Erich Vogt, Eds. Plenum, New York, 1971. xvi, 448 pp., illus. $20.

African Swine Fever Virus. W. R. Hess. **Blue Tongue Virus.** P. G. Howell and D. W. Verwoerd. Springer-Verlag, New York, 1971. iv, 74 pp., illus. $7.20. Virology Monographs, vol. 9.

The Aim and Progress of Psychology and Other Sciences. A Selection of Papers. J. R. Kantor. Principia, Chicago, 1971. x, 614 pp. $12.

Analytic Number Theory. Larry Joel Goldstein. Prentice-Hall, Englewood Cliffs, N.J., 1971. xviii, 282 pp. $12.95.

Analytical Geochemistry. Lord Energlyn and L. Brealey. Elsevier, New York, 1971. xvi, 426 pp., illus. $25.75. Methods in Geochemistry and Geophysics, vol. 5.

An Anatomical Outline of the Spinal Cord of the Pigeon. L. M. van den Akker. Van Gorcum, Assen, Netherlands, 1971 (U.S. distributor, Davis, Philadelphia). viii, 112 pp., illus. $10.50. Studies in Neuro-Anatomy.

An Annotated Bibliography on Diving and Submarine Medicine. Charles W. Shilling and Margaret F. Werts. Gordon and Breach, New York, 1971. viii, 622 pp. $24.95; to libraries, $40.

Annual Review of Biochemistry. Vol. 40. Esmond E. Snell, Paul D. Boyer, Alton Meister, and R. L. Sinsheimer, Eds. Annual Reviews, Palo Alto, Calif., 1971. viii, 1206 pp., illus. $13.

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