to virologists, immunologists, biochemists, and cell biologists. Immunologists and cell biologists should be particularly interested in the expanding new aspects of interferon research on immune reactions and other cell function.

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Effects of Light-Dark Cycles

Photoperiodism in Plants. DAPHNE VINCE-PRUE. McGraw-Hill, New York, 1975. xiv, 444 pp., illus. $30. European Plant Biology Series.

In many plants the onset of important developmental events such as flowering, dormancy, and tuber formation is regulated by the length of the day, or, more accurately, by the relative length of the periods of light and uninterrupted dark. Changes in photoperiod length serve as the most reliable indicator of the progression of the seasons. The ability to measure light-dark cycles, therefore, enables plants to mature and reproduce when environmental conditions are most likely to be favorable and to prepare in advance for seasonal changes in temperature and rainfall that might otherwise be hazardous.

Plants vary considerably in their responses to light-dark cycles. Floral initiation may be promoted by short days, long days, an appropriate sequence of long and short days, or low temperature (vernalization) followed by an appropriate photoperiod. Some plants remain vegetative indefinitely unless they are exposed to one favorable photoperiod, which permits flowering ever after; others flower more profusely if the photoperiod is appropriate, but the effect is quantitative rather than qualitative. The literature on these phenomena is extensive, complex, and often contradictory, and synthesis of the data to yield accurate generalizations is a formidable challenge. Vince-Prue has not only succeeded in this task but has also provided incisive, original interpretations of much of the material.

Time measurement in plants is regulated by the interaction of light absorbed by the pigment phytochrome with an internal oscillator, also called the biological clock. Although the molecular mechanisms of clock and phytochrome action have not been elucidated, Vince-Prue brings the reader up to date with good summaries of current knowledge about both and their relationship to photoperiodism. Other topics covered in detail include the relationships between temperature and photoperiod, with special emphasis on vernalization, and the role of plant hormones and other growth regulators. Whether a unique floral hormone "florigen" exists or whether floral evocation depends upon an appropriate ratio or temporal sequence of several different hormones and inhibitors has been debated by numerous investigators. Vince-Prue brings new insight to this problem by comparing biochemical control of floral initiation with control of other photoperiod-sensitive events.

Current knowledge of photoperiodism is based primarily on studies of the induction and development of reproductive structures, and three-quarters of the book is devoted to these topics. The many other developmental processes regulated by photoperiod are not excluded, however. Induction of dormancy, the development of bulbs, tubers, and other storage organs, leaf and stem growth, root and bud production, branching patterns, vegetative reproduction, and seed germination—all are fully discussed. Such depth and breadth of coverage combined with clarity of writing style and an extensive bibliography should make this book an invaluable resource for developmental biologists investigating regulatory mechanisms. Horticulturists attempting to increase productivity by manipulating photoperiod will find the tabular data on photoperiodic requirements of specific plants particularly useful. The book should also appeal to nonspecialists interested in the numerous ways in which plant development is coordinated with latitudinal variations in habitat, and its usefulness for all readers is enhanced by its attractive layout, typography, and illustrations.

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Plant Phylogenesis

Palaeobiology of Angiosperm Origins. Problems of Mesozoic Seed-Plant Evolution. NORMAN F. HUGHES. Cambridge University Press, New York, 1976. viii, 242 pp., illus. $21.50. Cambridge Earth Science Series.

This book takes a thought-provoking approach to the problems of the origin of angiosperms and their early evolution. Hughes provides excellent background discussions of such matters as preservation, stratigraphy, and Cretaceous faunas (and their possible relation to the early evolution of the angiosperms). These discussions can be recommended highly to neobotanists, who may have little understanding of the problems inherent in paleobotanical work. Neither the neobotanist nor the geologist need be deterred from reading the book by unfamiliar vocabulary; Hughes has appended an excellent glossary of geological and botanical terms.

One of the major contributions of the book is the analysis (accompanied by excellent illustrations) of known Mesozoic gymnospermous groups, particularly their possible relations to the ancestry of the angiosperms. To have in one place such a wide range of information is invaluable. Hughes also examines in detail the earliest known fossils that have angiospermous characters, as well as even earlier fossils of putative angiosperm affinity. Such analyses more than justify the publication of the book.

The reader may be occasionally misled by some oversights in the documentation of statements made. For example, on p. 138 Hughes states that certain genera and species of angiosperms from the Patuxent Formation were named by Fontaine (1889) and proceeds to list the binomials; in fact, the binomials listed are those recognized by Berry (1911; a paper cited elsewhere by Hughes), and Berry's nomenclatorial treatment of the Patuxent flora differs considerably from Fontaine's. This passage is also inconsistent with figure 5.6, in which we are informed that the Patuxent Formation lacks angiosperms. Such lapses are fortunately rare, and the analyses of early angiosperm floras are generally well documented and internally consistent.

Hughes proceeds to denounce traditional methods of analysis of morphological attributes of plants, living and fossil. He would disregard hypotheses derived from comparative morphologic studies of extant plants in developing a theory of angiosperm origin and early diversification. At the same time, he champions comparative morphologic studies based only on fossils. Nowhere does he acknowledge that studies of early angiospermous fossils offer strong support for the "ranalean" theory of angiosperm origin, which was based solely on studies of extant plants. Although Hughes is right that many attempts to explain angiosperm origin and early diversification—whether based on paleobotanical or on neobotanical evidence—have produced little information of value, these attempts have been based on misapplication of traditional methods and their fail-