

BOOK REVIEWS

Perspectives in Phytochemistry: Edited by J. B. HARBORNE and T. SWAIN.

THIS volume of contributions to the April 1968 Symposium of the Phytochemical Society, held on the tenth anniversary of the Society, presents a view—necessarily restricted in scope—of the present position and future of a field of investigation, the development of much of which finds a parallel in that of the Society. The theme of the Symposium, and the spirit of many of the present-day developments in phytochemistry, are best expressed in the chapters by H. Erdtman and R. Hegnauer, which deal principally with the integration and interpretation of phytochemical findings in terms of their contributions to problems in the realm of biology, from biosynthesis to phylogenesis. Erdtman re-emphasizes the importance of the careful definition and description of the biological materials brought under study, and the importance of comparing biosynthetic pathways rather than structures only, and quotes Sørensen's caution that phytochemistry is still so young and burgeoning a field that the tendency should be resisted to apply its results to too sweeping conclusions. Hegnauer's discussion of the application of chemical data to plant classification reflects this caution, but does present persuasive arguments for the validity of certain taxonomic conclusions that stem from phytochemical data.

The results of phytochemical studies must, of course, be expressed in terms of precise description of the chemical constitution and biosynthetic origins of plant constituents. The elegance and detail with which studies in biosynthesis are leading to this precision of understanding of secondary plant metabolism are revealed in the papers by Conn (cyanogenetic glucosides), Goodwin (carotenoids and triterpenes), James (fatty acids) and Towers (cinnamic acids). Herout and Šorm (sesquiterpenoids of the Compositae) and Bate-Smith (flavonoids in Monocotyledons) show how useful chemical information can be revealing the taxonomic and phylogenetic relationships within large groups (class, family) of plants, and bring within a more closely defined context what Hegnauer has dealt with in broader terms.

A perennial question in the chemistry of secondary metabolites has been that of the function of these compounds, many of which are of unique or sharply restricted occurrence in nature, in the biological economy of the organisms in which they are found. Galston (flavonoids and morphogenesis) presents an account of investigations into the role of flavonoids in the control of plant growth and offers the suggestion that the compounds may be more than metabolically inert end-products. There is no doubt that the area of the metabolic and ecologic role of the products of secondary metabolism remains one in which knowledge is still fragmentary and in which there is much scope for future study.

Fundamental to all studies of the secondary metabolites of plants is the establishment of their structures. It is here that the last 10 years has witnessed some of the most rewarding developments, for the development of instrumental methods of structure analysis has led not only to greater assurance in the establishment of structure but to enormously enhanced ease and rapidity with which such work can be performed. Mabry (ultraviolet and nuclear magnetic resonance spectroscopy) presents a summary of the application of physical techniques to the structure determination of flavonoid compounds and provides a useful and

practical description of the use of these methods in the study of this structurally diverse and biologically important class.

Despite the fact that a single Symposium and a volume of but some 200-odd pages, can offer only a glimpse of what is now a large, active and flourishing area of inquiry, this book presents a well-chosen view of a number of high points of the field. It shows not only how great has been the level of accomplishment to the present time, but provides an inspiring preview of what can be anticipated in the years ahead.

T. A. GEISSMAN

The Transport of Plant Hormones: Edited by Y. VARDAR. North Holland Publishing Co., Amsterdam, 1968. pp. 457. Price 8 gns.

THIS book contains the proceedings of a Summer Institute meeting at Ege University, Izmir, in October 1967, sponsored by NATO and the Turkish Research Council. A glance at the contents page reveals that about two-thirds of the twenty-five papers are concerned with auxins. On closer inspection, one becomes aware that the subject matter is even more heavily weighted in this direction. Plant physiologists will not be surprised; the book reflects the heritage of an early discovery of auxins and a sustained interest in their transport. By contrast, information on transport of other naturally occurring growth regulators is seen to be fragmentary. One paper reports on the diffusible gibberellins of sugar cane (Most and Vlitos). Further references to growth regulators other than auxin is confined to an approach which is receiving increasing attention in transport studies, namely the interaction of growth regulators in relation to their own transport and that of other solutes. This approach is particularly evident in the paper of Osborne, Horton and Black on auxin-kinin interaction in relation to leaf senescence, in Moorby's review on the effect of growth substances on phloem translocation and in Sargent's work on the effect of growth regulators on penetration of 2,4-D into *Phaseolus* leaf discs. However, it may have been useful if the, albeit limited, information on transport of cytokinins and gibberellins could have been summarized in short, discrete papers. A consequence of this omission is that the status of these growth regulators as hormones in the classical sense is not discussed.

The transport of auxin *per se* is considered comprehensively by means of both research and review papers. Kaldewey provides a service in discussing terminology and in analysing the relationship between the parameters of intensity, velocity and density. Differences of opinion on the nature of polarity of auxin transport are clearly expressed. The amplification theory of dela Fuente and Leopold requires that acropetal movement of auxin is not purely passive. The contributions of McCready and Keitt represent opposing viewpoints on the latter topic. Polarity of auxin transport in sections of *Phaseolus* hypocotyl appears to be related to growth potential (Smith and Jacobs). Osborne makes use of this principle in presenting an interesting model for the polar transport system, which invokes the existence of an auxin permease, bound to the endoplasmic reticulum and rendered ineffective at cell maturity. Displacement of the endoplasmic reticulum by movement of amyloplasts under the influence of gravity could explain geotropic responses. This is a speculative model, but it provides a starting point for investigation of the transport pathway at a cellular level. Review topics include synthesis and destruction of hormones (Bastin), physical and chemical agents which modify longitudinal transport of auxin (Vardar), interactions between hormones and macromolecules (Bara) and the role of auxin in flowering and in bud dormancy of woody plants (both by Alleweldt). Research papers on auxin transport in relation to physiological processes are