Phytochemistry, 1971, Vol. 10, pp. 2855 to 2859. Pergamon Press. Printed in England.

# BOOK REVIEWS

**The Chemical Constituents of Citrus Fruits, Supplement 2 to Advances in Food Research:** J. F. KEFFORD and B. V. CHANDLER, Academic Press, London and New York, 1970. 246 pp. $11.50.

THIS is an unusual volume in terms of the evident quality of scholarship and scope of treatment of a subject that otherwise would have interested only those who produce and process citrus fruits. There is much for the general reader of science as well as for the horticulturist, the biochemist, the plant physiologist and the food scientist. The chemist concerned with natural products is seldon treated to such a complete array of background information. For example, the limonoids (limonin is the bitter principle of Navel oranges) are discussed from the standpoints of structure, biogenetic relationships and of biodegradation with molecular structural analogies drawn from other sections of the botanical family, the Rutaceae, to which citrus belong. There is afforded a fascinating insight into possibilities for further biochemical research, although, as the authors note, efficient biosynthesizing systems remain to be developed for use by the experimentalist.

The treatment of flavonoids is also exemplary. Identities and structures of all known citrus flavonoids are provided; the isomeric rhamnoglucosides (one bitter, the other tasteless) are employed to illustrate relationships between organoleptic properties and molecular structure. In addition, methods of isolation and analysis are evaluated; the components of different citrus fruits representing different species and types are listed; and plant physiological and biochemical aspects of flavonoid production are detailed. In another section, the casual reader may receive something of a start when he reads that his morning glass of orange juice contains small amounts of natural sympathomimetic and vasopressor amines, synephrine and octopamine, relatives of ephedrine.

Matters of interest to the horticulturist who grows these plants of such unusual ecological preferences, to the food technologist who processes the fruits and to the product development chemist are abundant. In each chapter the authors have tabulated chemical constituents for the sake of clear presentation. The chapters are arranged in logical groups and sequences, and the material in the test is fully documented. The authors state that the period 1958–1967 has been reviewed in full and that about 1000 references have been included in the bibliography.

*Richmond, Virginia*

RAY F. DAWSON
and
ROBERT M. IKEDA

---

**The Botany and Chemistry of Cannabis:** edited by C. R. B. JOYCE and S. H. CURRY, J. & A. Churchill, London, 1970. 217 pp. £3.00.

THIS book, which contains the proceedings of a conference held at the CIBA foundation in April 1969, begins with some splendid stereoscan pictures of cannabis leaf hairs from

W. T. Stearn and concludes with a note on the nomenclature of cannabis constituents by L. Crombie. In between there is a record of the twelve papers given at the meeting on *Cannabis sativa* which, together with edited discussions, present a rounded account of the phytochemistry of this fascinating plant.

What a remarkable plant it is! So plastic is its morphology that it presents a continuing problem to taxonomists trying to pigeonhole all the various forms in which it manifests itself. As Schultes points out in his contribution, it is economically important as the classic source of hemp fibre and historically is one of the oldest known non-food plants, knowledge of it going back some 6000 years. The seed oil has also been put to many uses, as an ingredient of cattle cake and so on. These are of course not the reasons for a whole book on this one plant; it is the isoprenoid resorcinols in the resin, the hallucinogenic principles, which have led this plant to be widely used all over the world as an opiate. It is surprising that of some dozen related constituents only one $\Delta^9$-tetrahydrocannibinol has yet been shown to have hashish-like activity. Although not mentioned in the title, there are three short chapters at the end of the book on pharmacological aspects; it is clear from these that much remains to be learnt about the physiological properties of these potent substances.

Altogether, this book is a model of its kind and it should be read widely.

*University of Reading* J. B. HARBORNE

---

**Introduction to the Fine Structure of Plant Cells:** M. C. LEDBETTER and K. R. PORTER, Springer–Verlag, Berlin, 1971. 188 pp. $14.8.

THIS book is not at all what the title suggests. First of all, it assumes too much basic knowledge of the structure and functioning of plant cells to serve as an introduction to the subject. Secondly, the price excludes it from being a book which one could recommend to students for an undergraduate course, and thirdly, apart from one figure illustrating a Chlorophycean chloroplast, it discusses only higher plants. It is in fact an atlas of the fine structure of higher plant cells. The book is well constructed and attractively bound, and it is regrettable that no author or subject index has been included.

It represents a collection of excellently reproduced electron photomicrographs covering a wide range of organelles and cell types. Some organelles are notably lacking, for instance the storage plastids, etioplasts, lysosomes and lomasomes receive little or no attention. However, the main criticisms must be levelled at the text. The writing is rather verbose and tends at times to be vague and imprecise. For instance, (pp. 16, 53) both the intercisternal tubules and desmotubules are described as possibly being derived from compressed cytoplasmic ground substance. The wording also suggests, though probably not purposefully, (p. 123) that all stomata are composed of four cells, (p. 95) that tracheids lose their end walls when mature, (p. 173) that the columella (of which the plural is incidentally columellae) is a layer in the wall of the pollen grain, rather than one of the individual columns beneath the tectum, (p. 155) that idioblasts are isolated tannin cells, not just any isolated cell type, and (p. 167) that colpi can be included within the term germinative pores. There are numerous instances of changes in terminology for no apparent reason—for instance, plasmalem-