

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 Δ^9 -tetrahydrocannabinol 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.

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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, plasmalemma-

ma and plasma membrane, microbodies and peroxisomes, cytoplasm, protoplast, cytoplasm and protoplasm, male, sperm, generative and reproductive nucleus, are used interchangeably. Angstrom units and nanometers are used equally, and no scales are included on the photographs, only a magnification (e.g. $\times 20,000$) in the text.

Word usage is also rather annoying at times; 'locust' is used to refer both to *Taxus canadensis* (pp. 57, 100) and *Robinia pseudocacia* (p. 88), solubilizing is used instead of dissolving (e.g. p. 183) and is there such a thing as 'negative tension' (p. 57) in the xylem?

If one can disregard these largely stylistic deficiencies in the text, then this book offers a collection of photographs which would be invaluable for demonstrations in any course on fine structure of plant cells. It can also be warmly recommended to phytochemists and other non-botanists as a good pictorial introduction to this aspect of plant science.

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D. M. KEITH-LUCAS

The Biochemistry of Fruits and their Products. Vol. I: edited by A. C. HULME, Academic Press, London and New York, 1970. 620 pp. £10.

THE biochemistry of fruit ripening is a topic which is often neglected in general biochemistry books and even in plant biochemistry texts it usually receives scant treatment. The ripening fruit, however, is an important experimental material, since it provides a unique means of studying aspects of ageing and senescence under controlled conditions for long periods. Economically, the subject has many ramifications in horticulture and in food science. This volume, the first of two, is the first attempt to provide a comprehensive account of fruit biochemistry and is therefore most welcome.

The book is divided into four sections: fruit constituents, growth factors, ripening and physiological disorders. The first section is by far the longest and contains a series of chapters by leading authorities on sugars, pectins, organic acids, amino acids, proteins and enzymes, lipids, volatiles, phenolics, terpenoids and vitamins. Of these, I found H. E. Nursten's account of aroma principles particularly interesting. He illustrates the enormous range of compounds that have been detected in the volatile fractions of fruits by a listing of 160 substances in the apple alone. One learns that the characteristic flavour of banana is due to a mixture of isopentenyl acetate and eugenol, that of cucumber to *trans*-2,*cis*-6-nonadienal; and that those of such well-known fruits as the strawberry and blackcurrant have so far defied scientific description.

The other two sections of the book are shorter and have chapters on nutrition (E. G. Bollard), hormonal factors (J. P. Natsch), ethylene (W. B. McGlasson), the climacteric (M. J. C. Rhodes), physiological disorders (B. G. Wilkinson) and apple scald (D. F. Meigh).

This is a successful production and while one might quibble with a few minor faults (e.g. the taxonomic treatment of fruit names is sometimes incorrect and inconsistent), it is nevertheless a considerable achievement of the editor. The book will be a valuable reference not only to those plant scientists working with fruits but to biochemists generally.

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