Plant Pigments

The Flavonoids. J. B. HARBORNE, T. J. MABRY, and HELGA MABRY, Eds. Academic Press, New York, 1975. Two volumes. Part 1. xvi pp. + pp. 1–632, illus. Part 2. xvi pp. + pp. 633–1204, illus. $33.50 each.

This two-volume work is a welcome and long-needed replacement for my 1962 Geissman volume, much thumbed and still used but in need of updating.

After four chapters on isolation techniques, analytical techniques, including ultraviolet, nuclear magnetic resonance, and mass spectroscopy, and synthetic methods, there are 11 chapters dealing systematically with major classes of flavonoids. The last five chapters are concerned mainly with the more rapidly changing and speculative aspects of the subject, not dealt with in the Geissman volume: the recent developments in enzymology, physiology, biochemical systematics, and evolutionary trends.

These last chapters are the most readable, but those concerned with the synthetic and degradative enzymology and the review of physiological functions will suffer most from outdatedness, a problem that has been aggravated by slowness in publication. The references indicate that the articles were completed by late 1972 and early 1973; the volumes were issued in October 1975. The most outdated chapter is that on biosynthesis, by Hahlbrock and Grisebach. Although the exciting initial report in 1972 of the demonstration of flavanone (chalcone) synthetase in cell extracts by the Freiburg group is cited, later references are not included. But Hahlbrock and Grisebach do describe the early status of C_{15} enzymology, mainly the work of their own laboratory. The editors correctly note the importance of these enzymological demonstrations in their preface, but I find their statement that some of the enzymes involved in C_{15} biosynthesis have been "fully characterised" misleading. None of the enzymes peculiar to flavonoid biosynthesis have been well described, and most of the evidence still comes from the Freiburg laboratories. While the chapter by Barz and Hösel headed "Metabolism" is misnamed, as the authors indicate, it deals effectively with the interesting but generally ignored degradative pathway of C_{15} metabolism.

McClure's chapter on the physiology and function of flavonoids is less affected than some of the others by the delay in publication, possibly because of elusiveness of the primary function (or functions) of flavonoids, at least in vegetative tissue. The chapter contains a wealth of physiological information, some of which I had missed in the older literature. It is a pleasure to have someone seriously consider flavonoids as functional products, rather than as mere metabolic by-products. In addition to the importance of flavonoids in flowers as visual indicators to pollinating insects, the author emphasizes their possible role as absorption devices that mask and protect vulnerable compounds in organisms that cannot hide from the sun. He reviews both older and recent literature indicating relationships between chloroplasts and flavonoids and between endoplasmic-reticulum–derived vesicles (vacuoles?) and the large central vacuole of plant cells. The functions mentioned here and the involvement of flavonoids in the control of plant growth and development effectively illustrate their importance.

The lack of a chapter directly concerned with biochemical genetics is surprising, but the chapter by Harborne on biochemical systematics is a partial substitute. Swain ends the book with a useful phylogenetic overview and speculations concerning an evolutionary sequence of flavonoid forms; this chapter is particularly useful for the many references to flavonoidlike compounds in nonvascular plants.

The chapter on isolation techniques will lead the reader to literature on methodology. The description of analytical techniques by Markham and Mabry appears to be a summary of their 1970 volume *The Systematic Identification of Flavonoids*, a worthwhile treatise in itself but one marred, as is their chapter in this book, by a lack of information concerning anthocyanins. Useful tables of ultraviolet absorption peaks are presented for flavones, flavonols, and isoflavones, but there are only a few generalizations concerning anthocyanins made in the text. The same bias is found in the chapters on nuclear magnetic resonance and mass spectroscopy.

All in all, these two volumes are well worth possessing in spite of the price, a limited subject index, and the delay in publication.

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Books Received

Acoustical Holography. Vol. 6. Proceedings of a symposium, San Diego, Calif., Feb. 1975. Newell Booth, Ed. Plenum, New York, 1975. xii, 760 pp., illus. $37.50.

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