

could be supplemented by more emphasis on chemical races, chemotaxonomic methods, spot tests, general group reagents for separation of compound types, and procedures for quantitative estimation of the more important groups of compounds.

The book, comprising 278 pages, is excellently equipped with numerous formulae, R_f and spectral tables, chromatographic schemes and spectra. This book fulfils a genuine need in the field of natural products analysis and should be found in all laboratories engaged in research and teaching connected with the chemistry of plant constituents.

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Chemistry and Biochemistry of Herbage: edited by G. W. BUTLER and R. W. BAILEY, Vol. 1, Academic Press, London, 1973. ix + 639 pp. £12.80.

THE AIM of this book, the first of a three volume set, is to bring the latest information on the chemistry and biochemistry of herbage to the attention of the wide range of agricultural scientists who may neither have the 'time, training, or possibly the inclination to keep abreast' of the rapid developments in these disciplines. The book is concerned with the components in the herbage plants utilized by grazing animals and also with the biochemical production of herbage. Even if agricultural scientists were willing to delve into the original literature, or to read the specialized texts, they might find it difficult to discriminate between what is trivial and transient and what is significant. Biological facts are often more temporal than are facts in certain other scientific disciplines. There is a detritus of doubtful or discredited facts, speculations and terminology. The agricultural literature is bespeckled with myths given a degree of respectability by the frequency of their repetition. Some terms still in use are as relevant to science as is the once rightly respected term phlogiston. This book provides an excellent opportunity for the potential readers not only to refurbish, and add to, their knowledge but, and this is very important, to abandon or view more sceptically once useful but now increasingly meaningless terminology.

The editors have assembled an excellent team of contributors to guide the reader along the herbage trail. As good guides they have kept to the track while making concise, interesting and relevant comments on the way. There is abundant information on herbage on which to graze and ruminate. The book is neither an elementary text nor a general text on chemistry and biochemistry; it is, and this is a rare thing, what it sets out to be namely a book designed to assist specialists by those in other disciplines. The various chapters deal selectively, clearly and in considerable depth with amino acids, amines, ureides, proteins, nucleic acids, soluble and insoluble carbohydrates, lignin, plant phenolics, lipids, pigments, alkaloids, sterols, saponins, cyanogenic glycosides, glucosinolates and minerals, and the present volume concludes with a chapter on nutritional aspects of soil ingestion by grazing animals. There is a helpful appendix giving the common and systematic names of herbage plants. The structures of lignins, polysaccharides and proteins in herbage plants are not as simple as commonly assumed and often, but not invariably, the convention of dismissing protein as "crude protein" or "insoluble nitrogen" is inadequate in nutritional studies and the term "insoluble nitrogen" is a rag-bag term for a complex collection of amino acids, peptides, nucleotides, chlorophylls and other classes of compound. Lignin is one of the most complex, and still not fully understood, classes of compound in plants.

All is not gold that glitters and so in the polysaccharide field all is not arabinan that yields arabinose on hydrolysis. Animals cannot metabolise compounds that only exist on the printed page.

The book has numerous tables, a clear presentation, and a sense of purpose and relevance that must derive from the fact that many of the contributors carry out research in institutes and departments with interests clearly relevant to herbage. There are a number of minor errors but these should not be viewed as detracting from the deserved praise. The book is much needed, timely, and has no rival. It provides a critical appraisal of new and old methods of analysis. Not only the target readership but many others could benefit from reading or consulting it; while the applied scientist in agriculture will benefit from this book, so will the pure scientist dabbling in the constituents and growth of herbage plants.

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K. C. B. WILKIE

Progress in the Chemistry of Organic Natural Products: edited by W. HERZ, H. GRISEBACH and G. W. KIRBY. Springer Verlag, Vienna, 1973. Vol. 30, VIII + 666 pp. \$92.30.

THIS volume of six review articles maintains and sustains the high standard we have come to expect from this distinguished series which was founded by L. Zechmeister in 1938. To the phytochemist, it is worth having just for the masterly and timely comprehensive account of the chemistry and biology of the saponins by R. Tschesche and G. Wulff. These authors describe 452 structures, quote 617 references and provide a wealth of useful tables. A remarkable range of oligosaccharides conjugated with sapogenins are listed; many are branched chain and have as many as 6–8 monosaccharide units. Two other reviews in this book also cover higher plant constituents: J. Polonsky writes on the quassinoid bitter principles and H. D. Locksley on the biflavanoid compounds. Both are excellent articles but written essentially for the pure organic chemist; as a phytochemist, I would have welcomed more information in these accounts on methods of detection in plants and on taxonomic distribution.

The microbial chemist is catered for in this volume by accounts of the macrolide antibiotics by W. Keller-Schierlein and of ergochrome by B. Franck and H. Flasch. The remaining two articles will command a wider audience, since they cover chemical aspects of bioluminescence, by M. J. Cormier and co-workers, and sexual hormones of lower plants and hydroids, by L. Jaenicke and D. G. Müller. The book is impeccably edited and extremely well produced.

University of Reading

J. B. HARBORNE

Metal Ions in Biological Systems: Volume 3, edited by HELMUT SIGEL. \$22.75.

THIS book contains seven chapters on the role of metal ions in enzymes and enzyme-catalyzed reactions, and with the interactions of ions with other proteins and nucleic acids. Although the chapters are mainly oriented towards animal systems, they are of interest to plant biochemists, especially those dealing with The Role of Copper in Cytochrome