Three chapters of more strictly biochemical interest are those of T. Akazawa on Fraction I Protein, of Wallwork and Crane on Prenyl Phytoquinones and by L. Fowden on Non-Protein Amino Acids. The latter is a masterly and timely account of this continually expanding research area—according to the latest count, there are no less than 200 such substances known in plants. The author compares the time in the 1950's when he had to start with 250 kg of *Litchi* fruits in order to isolate 1·5 g of a new amino acid with the present-day much reduced scale of operation. After discussing the chemistry and biosynthetic origins of these amino acids, he then reviews in depth their comparative phytochemistry and antimetabolite actions. A chapter which caters mostly for the organic chemist is that of Connolly, Overton and Polonsky on the Limonoids and Quassinoids, complex terpenoid constituents occurring mainly in the plant families Meliaceae, Rutaceae and Simaroubaceae. These authors also provide a valuable set of tables listing the structures, melting points and optical rotations of all known substances of this type.

Finally, there are two chapters which will interest all phytochemists and which I found particularly fascinating to read. The first by M. Barbier, on the chemistry and biochemistry of plant pollens, touches on pollenins, allergens, pigments, vitamins, lipids, carbohydrates and steroids. The second, by V. Herout, discusses the role of isoprenoids in plant-insect interactions. In this last chapter, I was a little taken aback to see the potato alkaloids solanine and demissine written (on p. 178) with 'tri- and tetraxyloses' as their sugar moieties, but I suppose some errors are inevitable in a volume with several formulae on almost every page. To my mind, the role of these teroidal alkaloids in deterring the Colorado beetle from feeding on potato plants is still to some extent controversial. However, there are many more convincing associations discussed by V. Herout—for example the very elegant series of experiments carried out by Parsons, Reichstein, Rothschild and their collaborators linking the cardiac glycosides of the Asclepiadaceae with the toxins which the Monarch Butterfly accumulates in order to preserve itself from predation by the Blue Jay. Herout's article covers a wide range of similar topics from sex attractants to defensive secretions and concludes with a useful account of the ecdysone moulting hormones.

University of Reading J. B. HARBORNE

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THE QUALITY of this volume ranks it at the top of the field. Individual chapters represent full and critical treatments of a series of subjects that have been explored in some depth prior to the review dates. The authors seem to have been selected with care and with a sense of cosmopolitan awareness. This is a no-nonsense volume for the specialist, and it makes good reading for the natural product chemist, the biochemist and the plant physiologist.

M. Barbier (Gif-sur-Yvette) describes the chemistry and biochemistry of pollens. Pollen collection, germination, biological properties including allergenesis, insect attraction and chemical composition are covered. M. D. Hatch and C. R. Slack (Queensland) present a

lengthy discussion of the C_4-dicarboxylic acid pathway of photosynthesis. The topical coverage is unusually complete and informative. T. Akazawa (Nagoya) describes the identification of Sam Wildman's Fraction-I protein of green leaves with ribulosediphosphate carboxylase. The structure, function, intracellular localization, enzymic associations and relationships to protochlorophyll-holochrome are discussed. V. Herout (Prague) discusses some relations between plants, insects and their isoprenoids. One seldom encounters so interesting a discourse upon the interactions of plants and of animals from the chemical standpoint. Mono-, di-, tri- and sesquiterpenoids as well as steroids are treated. L. Fowden (London) described non-protein amino acids of plants in terms of chemistry, occurrence, biosynthesis, antimetabolite activity and comparative biochemistry. One gathers the feeling that the field is ripe for exploitation by the biochemically inclined plant physiologist who is concerned with questions of functionality. J. C. Wallwork and F. L. Crane (Lafayette) detail the nature, distribution, functions and biosynthesis of prenyl phytoquinones and related compounds. Defined as quinones containing isoprenoid sidechains, this class of plant constituents includes benzo- and naphthoquinones, plastoquinones and ubiquinone. They serve as redox carriers in respiration and in photosynthesis. L. W. Mapson and A. C. Hulme (Norwich) describe the biosynthesis, physiological effects and mode of action of ethylene in plant growth and development, auxin transport, fruit ripening and abscission. The hypothesis that ethylene may interact with a zinc-containing enzyme (e.g. carbonic anhydrase) in some fashion is of interest. One wonders whether the early work of Otto Beeck on the catalytic hydrogenation of ethylene on various crystalline metallic surfaces may not be re-read with profit in this connection.

Princeton, N.J. R. F. DAWSON