

proved to be of wide commercial application. Nevertheless, the metabolism and mode of action of juvenoids have been extensively studied and a timely review by B. D. Hammock and G. B. Quistad outlines recent developments here. The mode of action of the plant anti-juvenile hormone substances, the precocenes, is also described. The remaining two chapters in this wide ranging review volume are concerned entirely with the activities of pesticides in animals. In an

important general review, C. H. Walker considers how far it is possible to employ *in vitro* studies as a reliable guide to the *in vivo* metabolism of pesticides in vertebrates. Finally, J. Seifert and J. E. Casada consider the teratogenic effects induced mainly in birds by organophosphorus and methylcarbamate insecticides.

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Chloroplast Metabolism: by BARRY HALLIWELL. Clarendon Press, Oxford, 1981. 257 pp. £20.

As the author points out, standard biochemistry textbooks give a cursory treatment of photosynthesis and, although books exist which deal with the light reactions, there is relatively little coverage of chloroplast metabolism in text books (but there are a large number of reviews). Dr. Halliwell briefly covers the light reactions and then discusses in more detail questions concerning the isolation and purification of chloroplasts, the Calvin cycle and its regulation, transport across the envelope membrane, C-4 and CAM metabolism, photorespiration, oxygen toxicity, synthesis of fatty acids, phenols, chlorophyll, and nitrogen and sulphur metabolism. I personally found the treatment of oxygen toxicity and photorespiration particularly interesting, and it is very useful to have a clear account of the sometimes neglected aspects of chloroplast metabolism, like nitrogen, sulphur, phenol, chlorophyll and fat metabolism, in a form that comes readily to hand. There is a timely emphasis on

the need to consider the quality and purity of chloroplast preparations which are being used to study chloroplast metabolism. The discussion of carbohydrate metabolism is clear and deals with questions which are still controversial, but is perhaps already suffering in details (especially concerning enzyme regulation) from the 'induction lag' associated with publishing; nevertheless it should provide a good basis from which excursions into the most recent literature can be made. The book is well indexed and contains a rich supply of references to the original literature. It provides a useful and concise introduction for readers who are new to chloroplast research, while for those already occupied in some corner of chloroplast metabolism, it could be a stimulating way to look about the room without having to search out and plough through numerous review articles.

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The Biochemists' Songbook: by HAROLD BAUM. Pergamon Press, Oxford, 1982. 62 pp. Flexicover £2.45.

Biochemists, like most scientists, tend to take themselves and their discipline rather too seriously; also biochemistry textbooks sometimes overwhelm the uninitiated student with their welter of complex and apparently unrelated metabolic pathways. Any attempt to lighten the burden of memorizing these pathways and to throw some humour into the learning of basic biochemical facts must be warmly applauded. These are the dual purposes of this little booklet by Professor Baum of Chelsea College, who confesses to having composed this collection of songs entirely on the upper decks of London transport buses plying between Putney Bridge and Manresa Road.

Each song is set to a well known, usually folk, tune and deals either with a common metabolic pathway or important biochemical concept. Thus we have the TCA cycle set to Waltzing Matilda and beginning 'Once a jolly pyruvate enters the matrix—of a mitochondrion, so they say'. There is a song on photosynthesis set to Auld Lang Syne beginning 'When sunlight bathes the chloroplast and photons are absorbed—the energy's transduced so fast that food is

quickly stored'. My favourite among the set of 13 is undoubtedly the Battle Hymn of the Aerobes, which opens with 'Mine eyes have seen the glory of respiratory chains—in every mitochondrion, intrinsic to membranes', but I suspect this is due more to the fact that I can still remember how the tune goes than to my desire to memorize once more the order of the cytochromes *a-c* along the chain.

Undoubtedly this book will be a must for any biochemistry departmental party. Its use could well be extended to liven up the proceedings of biochemical society symposia. What discussion session on lipid metabolism would not proceed better after a spirited rendering of 'If you gobble tagliatelli, chicken soup with vermicelli, you'll acquire a sagging belly—what's the use of that?' to the tune of Men of Harlech? This delightful little book deserves to be wildly popular and one can hardly wait to enjoy the fruits of further cogitations on the upper decks of the No. 22 bus. Let us hope that there will be a second series of songs from this fertile source before too long.

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