

Photosynthesis: some light relief

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C₃, C₄: Mechanisms, and Cellular and Environmental Regulation, of Photosynthesis.

By Gerry Edwards and David Walker.
Blackwell Scientific/University of California Press: 1983. Pp.542. £32, \$65.

Photosynthetic Systems: Structure, Function and Assembly.

By Susan M. Danks, E. Hilary Evans and Peter A. Whittaker.
Wiley: 1983. Pp.162. Hbk £13.95, \$26.25; pbk £5.95, \$11.50.

AS ANY purveyor of academic materials can tell you, one of the most important components of a good lesson or lecture is an element of humour. It can turn an adequate and accurate presentation of information into a memorable one. It is surprising, therefore, that so few scientific textbook writers are prepared to inject humour into the printed page. The joke or pun which is cheerfully delivered from the rostrum is usually omitted from the written version, which often loses vitality as a result. Gerry Edwards and David Walker have thrown caution to the winds and have included jokes, even cartoons, in their book *C₃, C₄*, and the result is not only amusing, it is memorable.

The subject in this case is photosynthesis and the treatment it receives here will prove both informative and stimulating to the novice and the research worker alike. It begins with a lucid account of thermodynamics and energetics (where we are told, among other things, that Joules are a girl's best friend) and develops, through the biochemistry of pigments, to a consideration of the "Z" scheme and ATP formation. Carbon fixation pathways are then described and explained, with the help of intermittent light relief, such as "Up the Carbon Path" — a story of cellular espionage. It may not add much to the science, but it contributes greatly to the readability of the book.

Much space, as the title indicates, is given over to a description of the *C₄* pathway and its comparison with the conventional *C₃* and CAM strategies. This is not an easy task but the authors conduct it in a clear and flowing fashion. Wherever a simple statement can be made in an unambiguous manner, it is done so. Where questions remain unresolved, at least they are set out clearly, and periodic summary statements provide useful milestones in the development of their theme.

The only areas in which the book deserves criticism are its length, which makes it an unlikely candidate for the undergraduate market to which it is otherwise so admirably suited, and its type-

setting, which has left such extensive, naked lacunae at the top of each page that the text often pushes the page numbers off the bottom.

The second book reviewed here, *Photosynthetic Systems*, is more compact than *C₃, C₄* but covers much of the same ground. There is a greater emphasis on structure and a more liberal use of electron micrographs. There is also more stress on the evolution of photosynthetic systems, but less information about the historical aspects of the formulation of current theories, and less evidence of humour.

Again, the approach is simple and clear. Even fairly complex areas such as ATP synthesis have the questions which need answering framed in a simple yet logical fashion. *C₄* and CAM mechanisms are dealt with rather briefly, but a major section is included on plastid development

and chloroplast genetics.

Comparing the two books, there is a clear difference in emphasis, Edwards and Walker concentrating more upon *C₄* and CAM and their relative physiological and ecological advantages, Danks, Evans and Whittaker taking more excursions into related subjects, such as nitrogen fixation, biosynthesis of pigments and chloroplast DNA. *Photosynthetic Systems* is also more precisely aimed at the undergraduate, whereas *C₃, C₄* starts at a lower level and proceeds to a higher one. Which is the preferable book will therefore depend very strongly upon the nature of its proposed use. Personally, I would go for *C₃, C₄* — and not just for the laughs. □

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Working plants

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Plant Physiology, 4th Edn.

By Robert M. Devlin and Francis H. Witham.

Willard Grant Press/Wadsworth: 1983. Pp.577. \$27.

Introductory Plant Physiology, 2nd Edn.

By G. Ray Noggle and George J. Fritz.

Prentice-Hall: 1983. Pp.627.

\$45.85, £32.25.

Biophysical Plant Physiology and Ecology.

By Park S. Nobel.

W.H. Freeman: 1983. Pp.608.

\$36.95, £34.95.

Plant Physiology in Relation to Horticulture, 2nd Edn.

By J.K.A. Bleasdale.

Macmillan Press, London: 1984. Pp.143.

Pbk £5.95.

PLANT function increasingly is being understood in formal chemical and physical terms. Biochemists continue to elucidate aspects of plant metabolism that were hitherto poorly understood, molecular biologists are beginning to provide some understanding of the control of differentiation and morphogenesis, and some aspects of ecophysiology are amenable to analysis in physical terms. Plant physiology is also a subject of great practical importance: manipulation of the growth and metabolism of plant cells, tissues and organs in culture is being exploited, and together with the application of molecular biological techniques carries great promise for agriculture and biochemical engineering. A textbook of plant physiology should, of course, reflect these trends. To varying degrees, each of these four books meets the requirement.

Devlin and Witham's *Plant Physiology* (now in its fourth edition) and Noggle and Fritz's *Introductory Plant Physiology* (in

its second) concentrate on higher plants and cover essentially the same ground, at a comparable level, but with slight differences in emphasis. Both start with concise accounts of cell structure and physiology, but then diverge — *Introductory Plant Physiology* into metabolic physiology and then diffusion, transport phenomena and mineral nutrition, with *Plant Physiology* reversing the order of treatment. Both books offer highly readable and competent reviews of these subjects but each with some advantages over the other. Devlin and Witham, for example, include separate chapters on proteins and nucleic acids, enzymes and carbohydrate metabolism, whereas these topics are compressed into one chapter by Noggle and Fritz. In *Plant Physiology* carbon dioxide fixation is separated from electron transport and photophosphorylation, but these are all covered together in *Introductory Plant Physiology*. The former treatment is likely to be clearer for students. On the other hand, photorespiration receives special consideration by Noggle and Fritz, who give a good, comprehensive account of the phenomenon. And to their credit, both books nicely set this topic, together with *C₃* and *C₄* photosynthesis, in the context of plant productivity and agriculture.

The last third of each book is devoted to the physiology of growth and development, plant growth substances occupying a prominent role. The treatments are generally good, but conventional, for neither transmits much of the growing debate in this field (for example over long-cherished concepts such as the Cholodny-Went theory of tropic movements). Slight deficiencies can be found in other respects too. The discussion of phytochrome is consigned by Noggle and Fritz to an early chapter on photophysiology, where it joins the photochemistry of chlorophyll, carotenoids etc., and the authors are unsuccessful in bringing the topic back to where it really belongs — with the control of extension growth, flowering, germin-