

## Chloroplasts, new and improved

R.P.F. Gregory

### Chloroplasts.

By J. Kenneth Hooper.

Plenum: 1984. Pp.280. Hbk \$42.50, £40.38; pbk \$19.95, £19.

### Chloroplast Metabolism: The Structure and Function of Chloroplasts in Green Leaf Cells, revised edn.

By Barry Halliwell.

Oxford University Press: 1984. Pp. 259. Hbk \$50; pbk £9.95, \$15.95.

IN THESE difficult times, when there is pressure to deliver courses that get to the point and stick to it, what usually gets left out is the sense of historical development of the present-day ideas, and all except the most sketchy treatment of comparative biology. It is a delight to find Hooper's text affirming at the very start his historical perspectives in a survey of the early stages of microscopy, chemistry and physics, and offering a challenging overview of the diversity of chloroplasts in algae as well as in higher plants. The work is well illustrated, with well-produced electron micrographs and line drawings. Equally welcome is the reappearance in paperback form of Halliwell's monograph; the reduced price will make this a more realistic prospect for the undergraduate.

The two books start off covering much the same ground, and present competent accounts of the structures, components and processes that make up the "light" and "dark" parts of photosynthesis. They also include practical details on such matters as chloroplast isolation which are likely to be found valuable by researchers and teachers.

From then on each author follows his personal interests. Halliwell is very strong on the interrelationships of photosynthetic metabolism, discussing at length (and with his practical interest) the pathways of C<sub>3</sub>, C<sub>4</sub> and CAM photosynthesis and their control, the roles of the chloroplast envelope and of its shuttle systems, and providing discussions of oxygen toxicity and polyphenol production. Hooper on the other hand presents a major coverage of his speciality of chloroplast genetics and protein synthesis, including the difficult

### Spring books

The next review supplement to appear in *Nature* is Spring books on 25 April.

The books to be reviewed include *Kapitza, Rutherford, and the Kremlin* (by Lawrence Badash); *The Problems of Evolution* (by Mark Ridley); *Time's Arrows* (by Richard Morris); *The Beginnings of the Nobel Institution* (by Elizabeth Crawford); *State of the World 1985* (by Lester R. Brown *et al.*); *The Broken Brain* (by Nancy Andreason); *Nuclear Winter* (by Mark Harwell); and "Surely You're Joking Mr Feynman!" (by Richard Feynman).

questions of the cooperation between the genomes and protein synthesis of nucleus and chloroplast (topics which Halliwell chooses to leave out except for a very brief note as an appendix). It is of course traditional to distinguish genetics and protein synthesis from metabolism, but this tradition is rapidly dissolving as the DNA workers prove themselves increasingly able to solve metabolic questions. Hooper concludes with a discussion of the evolutionary relationships of organelles and bacteria, and describes in some detail (and with further challenging questions) the work in progress on relating common sequences in proteins and in DNA, and so he returns to his initial theme of unity and diversity in this microcosm of Nature.

Halliwell's publisher is perhaps taking some licence in terming this a revised edition: there is in fact virtually no change of any substance (the pagination nowhere differs by more than one page from the original edition), and indeed Halliwell claims only to have made corrections and a few updates. He has provided some additional references to the literature, chiefly in the sections describing the Calvin

cycle and photorespiration, but he has not incorporated the recent advances in (for example) the oxygen-evolving system, nor in the chloroplast genome. Nevertheless within its terms of reference Halliwell's book still stands up well to comparison: for example, on the question of the transport of metabolites across membranes, he indexes both the C<sub>3</sub> translocator and the dicarboxylate translocator, and discusses their roles in the export of NADPH and ATP. By contrast Hooper is very brief here, referring only to the phosphate translocator in connection with triose phosphate export. Such key terms, including also transketolase and the names of important metabolites and enzymes, are printed in Hooper's text in bold type, but surprisingly do not always appear in the index.

Both books clearly have their strengths, and will be needed by the teacher of biology, biochemistry and botany. The student who is unwilling to purchase both will have to judge carefully where his interests lie. □

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## Green workings

J.D. Ross

### The Physiology of Flowering Plants: Their Growth and Development, 3rd Edn.

By H.E. Street and Helgi Öpik.

Edward Arnold: 1984. Pp.279. Pbk £9.95.

### Advanced Plant Physiology.

Edited by Malcolm B. Wilkins.

Pitman: 1984. Pp.514. Hbk £17.50, \$17.50; pbk £14.95, \$14.95.

### Class Experiments in Plant Physiology.

By Hans Meidner.

George Allen & Unwin: 1984. Pp.169. Hbk £20, \$35; pbk £9.95, \$15.95.

WHEN they come to buy or use a book, the novice, the advanced student and the teacher have very different requirements. The beginner needs a broad coherent text which also brings out the excitement of the subject. The advanced student needs a detailed, balanced exposition and a lead into the current literature; whilst the teacher needs reassurance, a stimulus, and often a little help from his friends.

Perhaps the most difficult book to write well is the first, the "easy" one for the student. In this third edition of *The Physiology of Flowering Plants* Helgi Öpik has based her text closely on successful earlier editions and concepts developed with her co-author, the late Professor Street. With minor flaws, she has succeeded admirably. The book flows through the subject with a nice style and conveys enthusiasm without avoiding uncertainties and controversies. Starting logically with seed imbibition and

germination we are quickly introduced to the interrelations of axis and storage tissues. The accepted dogma is outlined and then the criticisms are aired, for which the author must be given credit and respect for her feeling that the initiate should be exposed to problem areas. With emphasis on whole-plant physiology, we are led through photosynthesis, water relations and nutritional aspects in clearly written chapters.

An interesting account of stress physiology is then followed by discussion of the various aspects of growth and development. Again difficulties are not ignored; for example on page 184 there is a section headed "The problem of the mode of hormone action" (other texts do not even admit to a problem). This is exactly the treatment needed by the new undergraduate; it will inform and interest. Sadly, the diagrams and figures are small and mean, a major fault in many British publications.

In the preface to *Advanced Plant Physiology*, Professor Wilkins gives his opinion that a cooperative effort is necessary in compiling a text for the advanced student. This approach indeed gives strength in one sense. Unfortunately it is also the root of many of the book's weaknesses and the 20 contributions vary widely in treatment and usefulness. From my differing degree of enjoyment in reading the various parts I suspect that Wilkins with, perhaps, his colleague John Hillman could have written a more acceptable book on their own. Chapters such as theirs, on gravitropism and apical dominance, successfully put across ideas and experimental approaches in a manner suitable for their intended audience. It is at