

development, it is vital for it to be linked to the cell cycle and also to be seen in evolutionary terms. Reviewing work from the 1870s to the present day, Gunning's contribution on the cytokinetic apparatus is a *tour de force*. First rate diagrams, light and electron micrographs together with a logical approach to each stage of plant cell division make these 63 pages alone good reasons for buying this book. The quality is not over yet, for the next (and most ambitious) section on cell and tissue morphology contains some excellent work. Marchant's chapter on cell shape examines the myriad morphologies of the algae and attempts—with some success—to explain them in terms of the cytoskeleton, concentrating not only on simple morphogenesis, but also on the establishment of shape by directed division.

While there is no doubt that the contribution on morphogenesis in moss protonemata by Schnepf is distilled from a vast body of data, it probably does not fit in this volume as comfortably as most of the other contributions. There is some mention of the cytoskeleton, but the diagrams and micrographs are sometimes difficult to interpret, and the bulk of the work is concerned with the effect of a number of inhibitors for cell morphology. The rôle of the cytoskeleton in the organisation of the cells of the stomatal complex is next examined by Palevitz in a chapter that ranks with that of Gunning. Using techniques ranging from simple measurement, via about every type of light microscopy, to very high quality electron microscopy (for once some very convincing microtubule

bridges), this author leads the reader through all aspects of the development of these cells, finally convincing him/her that, in the stomatal complex, we have a plant system through which we can gain real understanding of the way the cytoskeleton operates.

Finally, in a particularly brave chapter, Hardham attempts to draw the threads together and discuss regulation and polarity in tissues and organs. Refreshingly bereft of generalizations this contribution is really first-class. In a stylish interplay between electron micrographs, line diagrams and micromorphometric data Hardham reveals that events within a single cell really can be related to the tissue within which it is developing.

A full set of references completes this well-produced book. In summary, Clive Lloyd has managed (through deft footwork in some cases) to avoid the pitfalls mentioned earlier, and edited a most relevant and useful book. In retrospect a little more on microtubule action, the 'nuclear skeleton' and techniques might have been welcome, but these are only minor criticisms. Quite simply this book is essential reading for anyone, phytochemist or otherwise, who will want to hold an intelligent conversation on plant cell development and division in five years time. £32 might seem expensive, but when compared with 0.5 mCi of ^3H thymidine, it begins to look like quite a bargain.

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Alkaloids—Chemical and Biological Perspectives, Vol. 1: edited by S. W. PELLETIER. John Wiley, 1983. 398 pp. £53.40.

This volume is the first in a new series which aims at an interdisciplinary approach to the chemical and biological properties of the important class of natural products known as the alkaloids. A new volume is scheduled for publication every 12–18 months and will contain some 350–400 pages. Information given in the series will include chapters on structure elucidation, chemical properties, synthesis, biogenesis, pharmacology, physiology, taxonomy, spectroscopy and X-ray crystallography. The series is aimed at a wide range of scientists, including those engaged in medicinal and natural product chemistry, pharmacognosy, pharmacology, biochemistry, phytochemistry, plant taxonomy, oncology, forensic science and medicine. What then of volume 1, the first runner from this new stable?

There are five chapters in this first volume and they deal with the nature and definition of an alkaloid (33 pages), arthropod alkaloids (52 pages), biosynthesis and metabolism of tobacco alkaloids (70 pages), toxicology and pharmacology of diterpene alkaloids (58 pages) and the chemotaxonomy of indole alkaloids obtained from the three families Apocynaceae, Loganiaceae and Rubiaceae (166 pages). In the introductory chapter, written by the editor, the definition of an alkaloid is discussed and it is stated that "An alkaloid is like my wife. I can recognise her when I see her, but I can't define her." In this context the field of alkaloids is reviewed concisely, illustrating the

diversity of chemical structures which make up some 5000 natural products occurring in organisms ranging from moulds to ladybirds. The former definition of 'an alkaloid' excludes so many 'alkaloid-like' compounds that the author proposes a new definition as "a cyclic organic compound containing nitrogen in a negative oxidation state which is of limited distribution among living organisms".

Arthropods account for more than 80% of animal species and they produce a wide range of alkaloids, some of which function as pheromones and allomones. The second chapter reviews the present state of knowledge and points out that "when it comes to arthropod alkaloids, the best is yet to come". Tobacco alkaloids are of enormous interest and over 2000 publications are available on this particular topic. Nevertheless the chapter on their biosynthesis and metabolism written by E. Leete is a welcome addition to the literature. Even so, as the author points out, there is still no satisfactory answer to the question "Why is nicotine produced by tobacco?" The toxicology and pharmacology of diterpenoid alkaloids is another fascinating area of alkaloid research, particularly since species of *Aconitum* and *Delphinium* are sources of poisons and medicinal agents and as a pharmacist I found the approach to this particular chapter most interesting.

The final chapter, a monumental one, is written by two organic chemists and a plant taxonomist who can bring together their two specialist areas. The chemotaxonomic ideas are of interest but, in my view, their approach is too complicated and not always accurate. The biogenetic relationships of indole alkaloids with a C_9 or C_{10}

monoterpene moiety are envisaged from a hypothetical precursor and not strictosidine, while one class of alkaloids are referred to as vincosans thus giving rise to the view that perhaps vincoside is still alive and well as a precursor of these alkaloids. Although fairly recent taxonomic papers on the Rubiaceae are included in the references, the older classifications for some of the genera in the Rubiaceae are given when the alkaloids are discussed. There is now good evidence on chemical and botanical grounds for excluding *Cephalanthus*, *Mitragyna* and *Uncaria* from the tribe Naucleaeae, but this is ignored. It is also unfortunate that of the two classifications of the

Rubiaceae, one should be referenced to "a lecture presented in Strasbourg in 1977". Nevertheless the ideas are stimulating and the chapter does contain a wealth of information on indole alkaloids.

There are good indices for organisms and subjects and the whole volume is well presented by the publisher. I look forward to seeing subsequent volumes but I am afraid the price will, yet again, deter many scientists from buying their own individual copies.

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Plants and Microclimate. A Quantitative Approach to Environmental Plant Ecology: by H. G. JONES. Cambridge University Press, 1983. xvii + 323 pp. £27.50 hardback, £12.50 paperback.

This book has been written to provide the advanced undergraduate and research worker with "an introduction to the basic physical and physiological principles necessary for understanding the interactions between vegetation and the aerial environment". The author has placed emphasis on the environment of a plant growing within vegetation, and particularly on a leaf on that plant, and on how changes in the environment may affect the basic physiological reactions of that plant. Chapters concerned mainly with the physical conditions (e.g. Energy Balance and Temperature) are mixed with chapters in which the main concern is how the physical conditions of the leaf are related to physiology and growth (e.g. Plant Water Relations, Stomata, Photosynthesis and Respiration).

The text is based mainly on our understanding of the North Temperate regions and of the higher plants that grow there. The changing physical conditions of the leaf are described in relation to the climate and microclimate but the description of the variability of climate with time and place is not covered. Most emphasis is placed on energy balance, pollution is not considered. The effect of changing conditions around the leaf on the physiology of the leaf is related to changes which take place over minutes or days. The growth of the plant over time is always the concern. A final chapter on Physiology and Yield emphasises this theme.

ises this theme

Throughout the text sizes and amounts are given wherever possible, and when relationships are known or inferred these are reduced to mathematical formulae. These formulae are clearly explained and are often accompanied by worked examples as well as a summary of their physical and/or biological meaning and utility. Because of this approach, the pages of the book appear somewhat formidable with their mathematical formulae, greek letters and sub- and super-scripts. The tenor of the book is, however, physiological and not mathematical and the contents should be accessible to all.

For physiologists, ecologists and crop physiologists this book fills a gap in the field of the interactions between plants and their environment. By treating the plant and its microclimate together it is able to bring together insights into the growth of plants in the field that are not easily available in other textbooks. The emphasis in the book on the reduction of as much as possible of our understanding to mathematical equations will enable the reader to make inferences about plants subjected to specific environmental conditions even though these may not be specifically mentioned. This, though potentially dangerous, is likely to prove a very valuable feature of this book. The book is nicely produced, easy to read, and generally well proof read.

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