Acta Bot. Neerl. **42**(4), December 1993, p. 523–525

Book Reviews

Conservation for the Twenty-first Century

D. Western & M. Pearl (eds).
Oxford University Press, Oxford. 1992.
xxv+365 pp. Paperback, £14.95. ISBN
0-19-507719-9.

The conference *Conservation 2100: A Fairfield Osborn Symposium*, brought together 32 distinguished conservationists from eight countries and different continents in 1986. It had been organized by Wildlife Conservation International and the New York Zoological Society to take stock of the problems and possibilities of nature conservation beyond the turn of the century. This book is a paperback reprint of the proceedings which first appeared in 1989. The number of years separating us from the turn of the century has been halved since 1986 and the 'World Conservation Strategy' has been succeeded by 'Caring for the Earth', but the work has lost little of its actuality.

The papers are arranged in five groups: (1) Tomorrow's World, (2) Conservation Biology, (3) Conservation Management, (4) Conservation Realities, and (5) An Agenda for the Future. Of these, the first and fourth are mainly concerned with societal, political and economic factors affecting conservation. Parts 2 and 3 deal with the biological aspects. Part 5 contains a summary chapter on Conservation Biology by Michael E. Soulé, one of the founding fathers of the discipline, and an Agenda for Conservation Action by the editors and a number of other contributors to the conference. Some will wonder whether the designation 'Conservation' will still be justified under the intensive management regimes and the technological innovations predicted by Soulé.

Parts 2 and 3 each start with a very readable overview written by David Western. Part 2 is concerned with causes and consequences of extinction, with the conservation of genetic variability, and with the conservation of communities and ecosystems. Part 3 takes a closer look at management of protected areas and at the possibilities for conservation outside these, integrated with other forms of land use. The conclusion on the conservation of genetic variability that 'the best way of taking care of genes is to take care of the species that carry them' is mirrored by the conclusion in another chapter that the most efficient way of conserving species is to preserve the ecosystems in which they have evolved. However, it is also made clear that 'no national park will ever be large enough to maintain the evolutionary and ecological processes' which shaped these ecosystems. This highlights the dilemma between separation and integration of nature and human civilization. Integration is impossible under present socio-economic circumstances, but it is the only way to create areas large enough for evolutionary and ecological processes to continue. The final papers in part 3 are concerned with *ex situ* conservation, which can at best be a last-resort solution for a handful of large or otherwise impressive species.

In spelling out this and other questions the book is stimulating reading. The editors have succeeded in producing a volume in which many different approaches are represented. Fruitful differences of opinion have not been suppressed. None of the contributions is exclusively concerned with a botanical subject, but the interaction of plants and animals in ecosystems is evident in most of them. The volume represents a concise introduction to conservation biology and forms an excellent guide to the papers on the subject published before 1988. It is claimed that the conference brought 'together voices from around the world', but it is biased towards the Anglo-Saxon nations and almost all the references are in English. This does not detract from the value of the work, which boldly looks ahead towards the next 100 years. Although the problems are nowhere taken lightly, the conference was not pessimistic about one of the greatest challenges of the next century: making sure that double the numbers of people are not condemned to live in a world utterly bare of wild nature.

J. WATTEL

Biosynthesis of the Major Crop Products

Philip John.
John Wiley & Sons, Chichester. 1992. 154 pp.
Paperback, £65.00. ISBN 0471-93816-5.

This book is based on a course of lectures given to undergraduates in their Final Year of Crop Science, and to postgraduates studying for a MSc in Crop Physiology. The book describes the biosynthesis, storage, chemical and physical properties, food and non-food applications of sucrose, starch, fructan, cellulose, oils, rubber and protein. In addition, for each product the author has indicated where current biochemical knowledge provides a basis for future biotechnological developments. The chapters are complemented with a bibliography of books and review articles and a reference list for further reading. The book concludes with a glossary of plant names and a comprehensive subject index.

The Introduction (chapter 1) briefly discusses the economy and the physiology of the major crop plants and products. Chapter 2 describes the biosynthesis and accumulation of sucrose with emphasis on the regulation of sucrose biosynthesis and the processes involved in the transport of sucrose across the plasma membrane and tonoplast. The mechanism of sucrose uptake has been exemplified with the help of the 'model systems' sugar beet and sugarcane. The

metabolism, compartmentation and accumulation of sucrose, including the role of invertase versus sucrose synthase, the driving force of membrane transport, the osmotic regulation of sucrose uptake and even the recent confusion concerning the putative role of group translocation in sucrose transport across the tonoplast are briefly but adequately treated. The section on biotechnological developments would be more up-to-date if recent work of Stitt and Willmitzer on the regulation of sucrose metabolism had been included.

Chapter 3 is devoted to starch. Some controversy exists whether carbon for starch synthesis enters the plastid as triose or hexose units. The author consciously misleads the reader by initially implying that carbon enters the plastid as triose phosphates (Fig. 3.7)—which provoked me to gather evidence against it—then he shows that the major route of starch synthesis involves the import of hexose units rather than triose phosphates. Although much work has been done on the genetic modification of starch metabolism and composition, the expected section on the biotechnological development of starch is missing. Instead, this chapter is completed with a description of mutants of starch synthesis.

The inclusion of a chapter about fructan (chapter 4) is justified by the recent attention to fructose polymers and fructan-synthesizing crops. Important fructan-storing families are Compositae and Gramineae. In this book fructan synthesis and accumulation are predominantly illustrated on the basis of work on *Helianthus tuberosus* (Compositae). Some controversy exists concerning fructan synthesis in grasses. For that reason fructan synthesis in grasses may deliberately have been omitted from this book.

Cellulose and cellulose fibres are plant products of great commercial importance. In chapter 5, much attention is therefore given to the structure of the cellulose fibre and the deposition and orientation of cellulose in the cell wall. Still no activity for a higher plant cellulose synthase has been identified and enzyme systems capable of synthesizing cellulose *in vitro* have not been prepared. Sets of observations are presented that form the basis for the hypothesis that only one enzyme (glucan synthase II) catalyses the synthesis of cellulose or callose depending on the presence of the appropriate activator.

During the past decade, oilseed crops have become the subject of considerable interest as sources of a large range of non-edible applications. Industrial applications for plant oils depends largely on the structure of fatty acids. Hence, in chapter 6, the focus is on the occurrence, chemistry and synthesis of fatty acids. All these aspects, particularly fatty acid biosynthesis, are outlined in clear diagrams. This chapter concludes with an interesting section on the biotechnological improvement of plant oil composition.

In many respects, rubber is an extraordinary crop product (chapter 7). Although rubber is one of the most important sinks for photosynthetically fixed carbon, there is no obvious function of rubber in plants. Rubber is formed as a suspension of particles in the milky latex of the secondary phloem. Hence, some attention is given to the anatomy and physiology of the latex vessel and the unique role of lutoids in maintaining an optimum cytosolic pH for rubber synthesis in the latex vessel. By treating the biosynthetic pathway of rubber, the author properly discusses the source of acetyl-CoA for rubber synthesis. In view of the maximum annual yield of tuber (9 ton ha^{-1}) only glycolytic breakdown of sucrose (sucrose supplied via the phloem) can be considered as the main route of acetyl-CoA formation and not β-oxidation of fatty acids and degradation of branched chain amino acids as is tentatively suggested by the author.

In the eighth and final chapter, proteins are described according to the solubility classification of Osborne (albumins, globulins, etc.). The biosynthesis section concentrates on the feedback regulation of the biosynthesis of the nutritionally important lysine, threonine and methionine. The biotechnology section deals mainly with the improvement of the nutritional and breadmaking quality of proteins.

The book is a concise, easy-to-read introduction to the biosynthesis, storage and biotechnology of the major plant products. The book is well-illustrated; much attention is given to the comprehensible presentation of complex biochemical processes, such as the fatty acid biosynthesis and feedback control of sucrose synthesis. The book is reasonably priced and will be helpful for advanced students or scientists who wish to be quickly informed on the present state of knowledge in selected fields of plant biochemistry.

A.J. KOOPS

The Vegetation of Egypt

M.A. Zahran and A.J. Willis.
Chapman & Hall, London. 1992. xvi+424 pp.
Paperback, UK£19.95. ISBN 0-412-32510-6.

Egypt is a country of about 1 million km^2. It has very large stretches of land that are totally bare of vegetation. Nevertheless, with about 2400 species, the country is floristically not poor and, lying on the junction of three floristic provinces (the Mediterranean, the Irano-Turanian and the Saharo-Sindian Provinces) with two corridors to tropical Africa (the Nile valley and the Red Sea trough), it is botanically highly interesting.

Egypt has received a lot of attention from botanists. In 1775, Forsskaol published a first treatise on its flora; in the nineteenth century Schweinfurth extensively explored Egypt's botanical riches, and Volkens published the first ecophysiological study of

Egyptian plants. For several decades we have had Täckholm's very useful *Students' Flora of Egypt* and, with this book, an easy-to-read, rather detailed and complete account of Egypt's vegetation has become available.

The introductory chapters on the vegetation geography (mainly based on Eig), Egypt: the gift of the Nile (Herodotus), and the physiography, climate and soils, are very short and too scanty. Most of the country is hyperarid where sporadic rains lead to long-term averages of less than 10 mm annually. The Red Sea coast has somewhat more precipitation and the narrow Mediterranean zone has the most rain, though the annual average there is still below 200 mm.

The core of the book lies in chapters 3–6. Each deals with one of the major regions: the Western Desert, the Eastern Desert, the Sinai and the Nile region. Each chapter contains some more details on physiography and climate of the region. The Western Desert (the two-thirds of Egypt lying west of the Nile) is mainly flat and very dry, but also includes the western Mediterranean coastal belt. Apart from that coastal belt, vegetation in this region is almost completely restricted to some inland oases and depressions and to the southern mountains of Uweinat. The Eastern Desert (between the Nile and the Red Sea) is mountainous and has interesting island-wise distributed plant species, including *Dracaena ombet* (reaching its northern limit in Gebel Elba) and *Moringa peregrina* (one of many species that show a remarkably disjunct distribution diagonally across Africa; this is not pointed out by the authors, however). Sinai is rather diverse with its three coastal zones, its northern flats and its southern mountains. Here the clear plant geographical analysis provided by Danin is missing. The account of the vegetation in these three regions is purely non-quantitatively descriptive and floristic, more-or-less according to the classic English approach. There are detailed lists of species, but little attempt to interpret correlations between species occurrences and environmental variables, and no ecophysiological information at all. The chapter on the Nile region shows a largely taxonomic treatment, discussing plant occurrences family by family. The final chapter on the history of the vegetation gives a short survey, also on agricultural activities through the ages, and a surprisingly conservative exploration of possibilities for future studies on Egyptian vegetation ecology.

The book cites many relevant local studies and has good indices. Some chapters have surprisingly few, others many good illustrations, but the maps are often not well-suited to their purpose. Although I find this book too limited to floristic descriptions and would have preferred some more ecology in it, I emphasize that I consider this a very useful and important book. No comparable source of information is available for this area so the book is also handy for the interested traveller. I expect it to be a strong boost for Egyptian botany in general and Egyptian vegetation ecology in particular.

MARINUS J.A. WERGER

CO_2 and Biosphere

J. Rozema, H. Lambers, S.C. van de Geijn and M.L. Cambridge (eds).
Kluwer Academic Publishers, Dordrecht. 1993.
x+484 pp. Hardback, Dfl.450; US$302; UK£180.
ISBN 0-79-232-0441.

The book contains several excellent contributions from top scientists. It provides a firm basis for a better understanding of the effects of increasing CO_2. The book is a conference proceedings (43 contributions), reprinted from *Vegetatio* (vols 104/105) and covers a wide range of subjects, including methodology, ecophysiological responses (growth, production, stress sensitivity, competitive ability) and interactions with biotic (soil organisms, insect herbivores) and abiotic factors (climate, nutrient supply, UV-B, O_3). Much attention is paid to the classification and analysis of species differences in response to elevated CO_2. Generally speaking, the extrapolation of information on CO_2 responses available from fundamental plant physiology and agronomy to the field situation for the next century, has been done carefully. The book contains some gaps as well, probably largely due to the absence of relevant information. Despite its title, the book does not present effects on the *biosphere* but mainly on *terrestrial vegetation*. Responses of trees are rarely discussed, although there is much speculation on the role of forests in the global carbon cycle. The chapters presenting posters and case studies are exceptions in this regard, indicating that in the near future more information on tree responses might be expected. The majority of the contributions focus on a comparison between the current CO_2 concentration (350 ppm) and the concentration expected by the mid-twenty-first century (700 ppm). Responses to intermediate concentrations have rarely been evaluated, although evidence exists for non-linear relations, especially in natural vegetations. Some contributions pay attention to the fact that the current CO_2 concentration has already been substantially elevated and thus analysis of the past (via tree rings, herbarium material and seed banks) can be informative as well. The book does not contain a general discussion or epilogue. However, as it has a subject and species index and about 1500 references, the book is especially useful and can be highly recommended as a background document for experimental research.

L.J. VAN DER EERDEN