Acta Bot. Neerl. 44(1), March 1995, p. 87–90

Book Reviews

The Origin of Land Plants

Linda E. Graham
Wiley, New York, 1993, xvi+287 pp.
Hardback, UK £74.00. ISBN 0-471-61527-7.

In 1908, a similarly titled book, *The Origin of a Land Flora*, was published by F.O. Bower. This well-documented work primarily used data obtained from major studies on comparative plant morphology (e.g. Hofmeister, Strasburger, Celakovsky) combined with available palaeobotanical information. Bower emphasized that explanations for the origin of land plants must necessarily include the question of the origin of alternation of plant generations. Bower's classical treatment has greatly influenced the approaches to the study of land plant origins in the first half of the twentieth century.

The purpose of Graham's book, *The Origin of Land Plants*, is to bring together the very impressive amount of intriguing information (especially of diverse research fields origin), which has become available since Bower's time and to reconsider theories related to plant origin in the light of recent evidence.

Tremendous progress has been made toward the understanding of the evolution of plants, especially during the last 25 years. This was made possible through the use of electron and fluorescence microscopy, the application of advanced physiological, biochemical and molecular methods, the revelation of new ecological and palaeontological data and, finally, through the integrative application of modern phylogenetic analysis. It is stressed that the book discusses the problem of the early origin of plants primarily from actual data obtained from the study of extant organisms (with intensive focus on charophycean green algae), but where possible palaeobotanical evidence relevant to early plant evolution has also been incorporated. In addition, recent data concerning palaeogeography, palaeochemistry of aquatic environments and the atmosphere, and palaeoclimatology are considered in an attempt to improve the understanding of early plant evolution within an appropriate environmental context. All these different aspects are conveniently arranged in different chapters. The book ends with a section focused on the past and possible future use of model systems among algal protists and seedless plants to help bring closer the solution to significant questions regarding fundamental aspects of higher plant processes (e.g. reproductive development, evolution of plant meristems, origin and role of microtubular systems, graviperception and signal transduction mechanisms by plants).

Considering the author's scientific background, it is not surprising that the book often refers to her interesting and often fascinating results obtained from extensive (ultrastructural) studies on the charophycean algal genus *Coleochaete*. It is used in particular to strengthen evidence that land plants evolved from ancestors which would probably be classified as charophycean green algae. This is done in a well-written and concise way. Furthermore, it is praiseworthy that this book, dealing with a wide scope of subjects, remains readable. As a consequence, the aim of a critical assessment of the different topics dealt with in the book is only partly fulfilled. Not withstanding this, the multi-disciplinary approach of the book is expected to stimulate botanists to take (even) more notice of related fields concerned with the exciting research theme the 'origin of land plants'. The extensive reference list will help the reader find the primary literature for further in-depth studies. Finally, I would also like to recommend this book to those involved in advanced biology teaching as well as to writers of botany textbooks. The up-dated information concerning early plant history should definitely be included in present day teaching programmes.

G.M. LOKHORST

Reproduction in Fungi

Charles G. Elliott.
Chapman & Hall, London, x+309 pp.
Hardback, UK £35.00. ISBN 0-412-49640-2.

Probably every field in science is to some extent confronted with the danger that valuable observations and ideas published more than a generation ago may escape the attention of the present-day scientific community. Of course, with sufficient continuity in methodology and the type of research questions asked, older results will be assimilated in on-going research, and the chances on overlooking valuable information from, e.g. before 1970 will not be high. But when the introduction of new methodology or shifts in general interests occur, this danger is real. Such is, for example, the case in the field of genetics. The discovery of restriction enzymes and the subsequent development of recombinant DNA methodology has revolutionized the field, and indeed is permeating other biological disciplines as well. As a result, many geneticists are now fascinated by the, often great, opportunities offered by these methods, and tend to disregard possible research strategies involving more classical genetic methodology. As an immediate

consequence, older publications based on classical genetic analysis will become less and less accessible and understandable. This is unfortunate, since many important developments testify to the importance and power of a *combination* of both approaches. A good example is the construction of genetic maps in the various 'genome projects' (such as in man, yeast, and *Arabidopsis*), where the classical analysis and mapping of mutants provides the basis for incorporating genomic data obtained with modern techniques.

For precisely this reason I very much welcome the book by Elliott. Here is an author, active in the field of fungal research since 1960, who has the necessary overview to bring together the old and the new. The book is on genetic and physiological aspects of fungal reproduction, which is a wide field. The book is not (meant to be) exhaustive, and highlights a few topics in a number of relatively well investigated species. Introductory chapters explain the basic genetic system in the main fungal groups, the Ascomycetes and the Basidiomycetes. Subsequent chapters deal with mating type genes, development of reproductive structures, and environmental effects on reproduction. Also, attention is paid to reproduction in Zygomycetes and in Oomycetes. Throughout the book, the author is successful in combining information from the (often so elegant) classical fungal research and from biochemical and molecular work.

Perhaps the weakest point of the book is a lack of integration of the information. Each chapter ends with a summary, but the chapter 'Concluding Remarks' at the end of the book fails to bring the diverse aspects of fungal reproduction, treated in the preceding chapters, into a common perspective. Just because there is such a bewildering diversity in fungal reproductive systems, a unifying overview including a discussion of directions into which the field should move would have made the book more complete. Nevertheless, the book will be very useful, and I warmly recommend it, not only to mycologists, but to all biologists interested in research on reproduction. The latter may discover what the former already know; namely, that fungi are very suitable and fascinating organisms for experimental research on fundamental biological questions.

ROLF HOEKSTRA

Die Pflanzengesellschaften Österreichs Teil I: Anthropogene Vegetation

Ladislav Mucina, Georg Grabherr and Thomas Ellmauer (eds).
Gustav Fischer Verlag, Jena/Stuttgart, 1994,
578 pp.

Teil II: Natürliche waldfreie Vegetation

Georg Grabherr and Ladislav Mucina (eds).
Gustav Fischer Verlag, Jena/Stuttgart, 1994,
523 pp.

Teil III: Wälder und Gebüsche

Ladislav Mucina, Georg Grabherr und Susanne Wallnöfer (eds).
Gustav Fischer Verlag, Jena/Stuttgart, 1994,
353 pp. Hardback, total Dfl. 250.00
ISBN 3-334-60452-7

These three volumes about the plant communities of Austria, written in German, can be qualified as an excellent work by 21 contributors. The volumes have in common a special introduction to nomenclature, syntaxonomical definitions, concepts and methods. Therefore, each volume can be used independently for the topic in which one is interested, e.g. the anthropogeneous vegetation (Vol. I), the natural herbaceous vegetation (Vol. II) and the woodland and shrub vegetations (Vol. III). Each chapter is followed by an extended up-to-date literature list concerning the special topic. Several reasons are given why the syntaxa are not illustrated by either vegetation tables or synoptic tables. Inadequate relevées, too few relevées or too unequally distributed relevées are some of the realistic reasons. Other more practical reasons are a possible delay of the publication by about 10 years and a substantially higher price per volume. The third argument is a practical scientific one: the addition of full literature lists serves later monographic work on syntaxa, identification and verification. However, the absence of tables is a disadvantage, of which the authors and editors are aware. Volume I contains two chapters of general importance for all the volumes. The first deals with the geographic classification of landscapes. The main types are discussed in detail: the Alps, the forelands and the circumalpine basin, and the granite/gneiss mountains. The climatic characteristics of the various regions are pointed out, as they are of phytosociological interest for the distribution of syntaxa. Plant geography cannot be neglected in phytosociology, and a second chapter of general information is devoted to this issue. The plant geographical attention is centered around altitude and species distribution: planar-colline, sub-montane, montane, sub-alpine, alpine and sub-nivale altitudinal stages. Also plant geographical regions are considered, such as the Pannonical area, the northern forelands, south-eastern lowland area, the granite/gneiss mountains and the Alps.

The description of the syntaxa in the phytosociological classification starts with a hierarchical

summary of all the syntaxa from classes to associations. Regardless of their rank-order, each syntaxon is treated systematically: nomenclature (in accordance with the international code), synonymes, diagnostic species combinations, including characteristic species ('Kenntaxa'), and differential species ('Trennarten'). Furthermore, attention is paid to synecological aspects and syntaxonomical distribution. In this respect the structure of the descriptions is comparable with that used in *Plant Communities of the Netherlands* (*Plantengemeenschappen in Nederland*) by Westhoff and den Held (1969) 1975. It is clear that these volumes are written with devotion and accuracy. This work is of special interest for phytosociologists, not only in Austria, but also for users in the surrounding countries in Central Europe. It can be warmly recommended to libraries and practising phytosociologists.

M.C. GROENHART

Photosynthesis, 5th edn

D.O. Hall and K.K. Rao.
Cambridge University Press, Cambridge (UK), 1994, x+211 pp.
Hardback, UK £24.95; US $39.95.
ISBN 0-521-43036-4.
Paperback, UK £9.95; US $14.95.
ISBN 0-521-43622-2.

This is an introduction to the basic ideas of photosynthesis, an historical outline as to how these ideas developed, the current status in our understanding of photosynthesis, and an overview as to where future research will be oriented. Much attention is given to bacterial photosynthesis with a comparison of bacterial and plant-type photosynthesis. This edition also has a number of colour plates illustrating chloroplasts, chloroplast membrane components, the X-ray structure of RuBisCO, and electron transport through the photosynthetic bacterial reaction centre. The book is written for use in undergraduate courses in photosynthesis or photobiology. What distinguishes this book from many others on this topic is a number of additional, interesting chapters. There is a chapter on apparatus and techniques used in photosynthetic research with a brief description and illustrations of the equipment employed. Another chapter summarizes current research in photosynthesis, describing recent advances in chloroplast genetics, Photosystem I and II structure, oxygen evolution, photoinhibition, fluorescence and RuBisCO structure. The last chapter contains many valuable suggestions for laboratory experiments. In this way, the student is given a wide view of what is going on in photosynthesis research, while the book remains modest in size and price. It may also be of advantage to teachers who have to develop practical courses. It is very well written and larded with numerous clear illustrations, tables and schemes. In my opinion it is one of the best introductory textbooks on photosynthesis published in recent times.

H. VAN DEN ENDE

Photoinhibition of Photosynthesis. From Molecular Mechanisms to the Field

N.R. Baker and J.R. Bowyer (eds).
BIOS Scientific Publishers Ltd, Oxford, UK. 1994.
xxi+471 pp.
Hardback, UK £65.00; US $130.00.
ISBN 1-872748-03-1.

The term photoinhibition embraces all those processes which contribute to a lower efficiency of photosynthetic energy utilization in response to excess light absorption or to sink limitation. This volume makes it clear that photoinhibition is an integral part of primary photosynthetic processes and of central importance to the performance of oxygenic autotrophic organisms. During the last decade it has attracted the attention of various groups of biologists, some working on light-induced damage and repair of the PS II reaction centre, others on the mechanisms responsible for quenching of excitation energy, while an increasing number of environmental physiologists are attracted to the characteristics and consequences of photoinhibition for plants under differing stress conditions in non-controlled environments, such as excess of light, drought or low temperature. This multi-author and multi-disciplinary book attempts to cover all these aspects in an integrated fashion. It is the sequel of a conference on 'Photoinhibition of photosynthesis—from molecular mechanisms to the field', organized by the Biochemical Society in 1993. Contributors wrote review articles that would be useful to graduate students and researchers. A proper balance was sought between the different aspects of photoinhibition: molecular, physiological and ecological. A collection of 26 chapters is the result, each covering a specific aspect of photosynthetic regulation, but also, more or less successfully, emphasizing the need to integrate the many different processes involved. Thus, this book deserves a wide readership and, in fact, should be on the desk of every biologist concerned directly with, or just interested in photosynthesis.

H. VAN DEN ENDE

Bibliography of Systematic Wood Anatomy of Dicotyledons

Mary Gregory.
Rijksherbarium/Hortus Botanicus, Leiden. 1994.
266 pp.
Paperback, *IAWA Journal*, Suppl. 1, Dfl. 100.00;
US $60.00. ISBN 90-71236-22-6.

Survey of English Macroscopic Bark Terminology

Leo Junikka.
Rijksherbarium/Hortus Botanicus, Leiden. 1994.
45 pp.
Paperback, *IAWA Journal*, 15(1), Dfl 25.00;
US $15.00; ISBN 0254-3915.

These two recent publications by the International Association of Wood Anatomists (IAWA) are reprints from the *IAWA Journal* and therefore probably in the hands of all specialized wood anatomists. Both publications are of general interest far beyond this group of specialists. The article on bark terminology will help to standardize descriptions starting with field notes. It deals with bark and its component tissues, bark texture, bark patterns, exudation, and bark cutting. The terms are in bold print followed by a definition in italics and comments relating to the use of the terms in the literature. Important aspects are illustrated by photos or drawings. There is a very useful list of rejected terms and a glossary that compiles the definitions of the main text on five pages. This glossary is the key to the usefulness of the article. Of course, there is a list of references.

The *Bibliography* is essentially an annotated reference list of the wood anatomical literature from 1900 to 1993. More than 2400 articles are fully referenced. 'Ibid.' is used occasionally; in general each reference stands on its own, as it should in this age of computerized databases. A measure for the thorough and careful compilation is the proper citation of German titles including capital and small letters and a non-random allotment of umlaut dots. Judging from the scientific literature in general, this is a virtually superhuman task and it proves beyond any doubt that the compilers of this list really studied the original publications. The references run from page 161 to 265, and they are preceded by tables providing access to the literature by family and special topic. In practice, it is arranged thus: 'Myristicacaea' is followed by the note that the frequently cited *Dialyanthera* is a synonym of *Otoba*. Spelling and synonymy of the names follow Brummitt (1992). Articles dealing with the wood anatomy of the Myristicaceae are listed by authors and years in alphabetical order preceded by 'Anon.' as in the full reference list. The genera dealt with in each article are cited unless there are more than 10. Publications considered of special importance for the family are marked with an asterisk. This general list is followed by articles on the family specially dealing with crystals, ecological anatomy, helical thickenings, pits and perforation plates, rays, septate fibres, and tracheary elements. Other families may have different special topic sections.

The *Bibliography* claims to be an indispensable source of information for plant anatomists, taxonomists, forest botanists, palaeobotanists and archaeologists. This is certainly true. Both publications should be directly ordered from the IAWA Executive Secretary, Institute of Systematic Botany, PO Box 80.102, NL-3508 TC Utrecht, The Netherlands. The rounded prices should greatly facilitate payment.

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