

## Book Reviews

### The Carnivorous Plants

B.E. Juniper, R.J. Robins and D.M. Joel.  
Academic Press, London, 1989. xii + 353 pp.,  
illustrated, cloth £75.00. ISBN 0-12 392170-8.

Carnivorous plants have fascinated professional and amateur botanists alike for many years and are the subject of earlier scholarly works by Charles Darwin (1875) and F. E. Lloyd (1942). These authors would be impressed by the progress in our understanding of the biology of carnivorous plants today and presented in this very attractively produced volume.

In six parts and 19 chapters the carnivorous syndrome in plants is broken down into its separate elements and the overall biology and evolution of carnivorous plants is approached from all conceivable angles.

Part I reviews the carnivorous syndrome, its occurrence in the plant kingdom, the history of research on carnivorous plants, and the ecology and distribution patterns of these plants.

Part II deals with the attraction and trapping of insects: from the macromorphological down to the ultrastructural level the attributes and development of adhesive traps (e.g. in *Drosera* and *Drosophyllum*), snap traps (e.g. *Dionaea*) and pitcher traps (e.g. *Nepenthes* and the tanks of the bromeliad *Brocchinia*) are described. The suction trap of the bladders in *Utricularia* is in a class of its own. Attracting devices include visual stimuli, ultraviolet patterns and olfactory stimuli. The trapping mechanisms in adhesive traps and snap traps have come much closer to complete elucidation by modern studies on mucilage secretion, and on movement mechanisms following mechanical stimuli. The more passive stumbling and retaining devices of pitcher traps are impressive by their morphological cunning. The mechanism of the suction trap of *Utricularia* defies one's imagination, and it cannot be coincidence that the authors resort to an old Alice-in-Wonderland-like analogy by E. F. Lloyd to explain its complexity.

Part III deals with nutrition and digestion. The nutritional value and zoological diversity of the prey is reviewed, and the carnivorous habit in nutrient-poor habitats is analysed in a cost-benefit model. The processes of secretion of digestive fluids are described with detail on the ultrastructural changes in the cytoplasm and at the interface of cell walls of the digestive glands. The hydrolytic environment and enzymatic processes of digestion, often assisted by resident micro- and macro-organisms in the traps, followed by an account of the absorption of the products of digestion, conclude this part. The same glands responsible for secretion of digestive fluids, also appear to be active in absorption.

Part IV reviews phytochemical compounds found in carnivorous plants and briefly discusses the possible role of some of them in carnivory. Attention is also given to herbal and medicinal uses; many of them mystical.

In part V the aspects of exploitation and mutualism of the carnivorous plants, their prey, commensals, and pollinators are discussed with a number of interesting case histories.

Part VI finally addresses the evolution of carnivory among higher plants. In the absence of a substantial fossil record this part is, as could be expected, the most speculative of the book. Yet the authors have succeeded admirably in reviewing ideas from all the different schools, and adding some sensible ones of their own, without falling into the trap of certain evolutionary dogmas. Carnivory seems to be an ancient phenomenon, because for *Drosera* a Cretaceous origin is cited. In this part, as in some others, full attention is also given to plant groups that have evolved mechanisms and structures which recall parts of the carnivorous syndrome, without having led to carnivory.

*The Carnivorous Plants* is an excellent book, and deserves a wide audience including the entire botanical community. It integrates biochemical, physiological, ultrastructural, anatomical, morphological, ecological and systematic information to produce a modern 'Complete Natural History' of a fascinating class of plants. As such it will be a source of inspiration for studies on less exciting creatures.

P. BAAS

### Plant Sperm Cells as Tools for Biotechnology

H.J. Wilms and C.J. Keijzer (eds).  
Pudoc, Wageningen, 1988. x + 177 pp. Illustrated,  
hard cover, hfl 90.00. ISBN 90-220-0958-0.

This book, containing papers presented at the Second Sperm Cell Meeting (held at Wageningen, The Netherlands, August 1987) describes the current state of the multitude of aspects of plant sperm cell research. It includes structural and ultrastructural studies on male gametogenesis and the male germ unit, in which the nuclear and cytoplasmic DNAs of sperm cell and vegetative cell are functionally linked. Further, several techniques are described for sperm cell isolation and culture, which open the way for a variety of applications in plant breeding and plant biotechnology, such as test-tube fertilization, somatic hybridization with haploid cells, micro-injection, etc.

In addition, attention has been given to new technologies, such as confocal scanning laser microscopy

and computer-generated three-dimensional reconstructions which will greatly enhance the possibilities for cytological studies.

The eighteen chapters give several relevant and recent references making the book also useful as a reference source. The book is a valuable contribution to stimulate cell biological approaches for genetic manipulation and biotechnology.

L.J.W. GILISSEN

### Nutrition of the Angiosperm Embryo

D.R. Murray.

Research Studies Press, Taunton/John Wiley & Sons, New York, 1988. x + 246 pp. Illustrated hard cover. £32.60. ISBN 0-86380.077.7.

This fourth book in the series 'Research Studies in Botany and Related Applied Fields' (series editor P.S. Nutman) treats angiosperm embryo nutrition in a very broad sense. A large part is devoted to the ways in which leaves, roots and stems contribute to the provision of nutrients to the embryos developing in seeds attached to maternal plants.

The book starts with a brief formal account of plant nutrition, covering definition of nutrients, functions of mineral nutrients, specificity versus adaptability of cation requirements, and mobilization of nutrients via phloem. Chapter three focusses on the functioning of leaves, stems and roots as supply organs. Carbon assimilation in C3 and C4 plant species is treated, and special emphasis is given to the complexities of nitrogen nutrition. In chapter four the topics are still not directly related to the embryo *per se* and concern translocation mechanisms such as the physiology of phloem, the analysis of vascular liquids, the role of chelates in translocation of minerals, and the importance of stems versus leaves as the immediate source of sucrose directed to fruits. Patterns of fruit development, contribution of xylem and phloem to the nutritional requirements of fruits, effects of illumination on fruit and seed development, accumulation of sugars in fruits and redistribution of nutrients from plant tissues to seeds is treated in chapter five. Chapter six comes to the heart of the matter by dealing with the nutritive function of seed coats, hypotheses on transfer of nutrients to the embryo, growth parameters and enzyme activities of seed coats and transformation and secretion of metabolites by seed coats. Attention is given to the possible roles of the suspensor, the endosperm and the embryo sac liquid in embryo nutrition, and of the seed coat in the supply of growth substances inwardly to the embryo sac.

After a chapter on phloem unloading in seed coats the available data culminate in guidelines for preparing media for embryo growth *in vitro*, framed according to what happens in the intact plant. Emphasis is

placed on the importance of *in-vivo* studies of embryo development for the preparation of adequate media for *in-vitro* culture. Media would need to be varied not only for different species but also changed as embryo development proceeds, I fully agree with this. But, even with this book on nutrition of the angiosperm embryo at hand, it will still not be easy to formulate media objectively, matching as nearly as possible the nutrition received by embryos developing *in vivo* because data on plant embryo nutrition are still too scarce.

However, the ability to regenerate whole plants from somatic cells grown *in-vitro* is a prerequisite for any strategy to obtain plants transformed with genes encoding desirable properties and for the rapid clonal propagation of plants, and, up till now, many crop plants remain recalcitrant to regeneration in the empirical approach. A fundamental approach to the regeneration problem is therefore necessary. The strength of Murray's book lies exactly in this translation of available knowledge from the *in-vivo* situation into guidelines for the composition of media for somatic embryo development. This makes it a valuable book for the growing research groups of biochemists, physiologists, agronomists, horticulturists and geneticists working with *in-vitro* plant systems.

A.M.C. EMONS

### A New Key to Wild Flowers

J. Hayward.

Cambridge University Press, Cambridge, 1987. viii + 278 pp. Illustrated £25.00 (hard cover); ISBN 0-521-24268-1; £8.95 (paperback); ISBN 0-521-28566-6.

This key originated during English field centre courses. It consists (only) of a number of synoptic keys of the simple 'straight on, up to the true character combination' type, for identification of British ferns and seed-plants. To that end many different, often 'easy' characters are used, which are circumscribed and illustrated by clear line drawings.

It is a nice, original, useful and instructive book, apart from some printer's errors. For use on the Continent it has, however, some drawbacks: the key considers merely the English flora and its ecology and geography, and students who need this type of identification work often do not understand the (botanical) English.

For these reasons the key is recommended to teachers on the primary and secondary level rather than to their pupils (in a translated and adapted form it could also be very informative to the latter category). A number of amateur botanists too will find it a very useful book.

J. H. IETSWAART

**Führer zur Flora von Mallorca**

H. Straka, H. Haeupler, L.L. Garcia and J. Orell.  
Gustav Fischer Verlag, Stuttgart, 1987. 214 pp.  
Illustrated paperback. DM 38.00. ISBN 3-437-  
20374-6.

Something less than half of the 1282 ferns and seed-plants of Mallorca is depicted in this guide by means of photos, of which nearly two-fifths are in colour. No morphological descriptions and identification keys are given, only the ecology of each species is indicated. Text and index are presented in German, English, Spanish (Castilian) and French. Most of the colour prints are true to nature; a number of black and white pictures, however, are not so easy to recognize.

The booklet most probably fits well with the requirements of the modern tourist in the Mediterranean area.

J.H. IETSWAART

**Paardebloemen: Planten Zonder Vader—  
Variatie, Evolutie en Toepassingen van het  
Geslacht Paardebloem (*Taraxacum*)  
(Dandelions: plants with a father—  
variation, evolution and applications of the  
genus *Taraxacum*, in Dutch)**

A.A. Sterk with contributions by C.H. Hommels,  
M.J.P.J. Jenniskens, J.H. Neuteboom, J.C.M. den  
Nijs, P. Oosterveld and S. Segal.  
Koninklijke Nederlandse Natuurhistorische  
Vereniging, Utrecht, 1987. 348 pp. Illustrated, hard  
cover, Dfl. 66.00 (for members of the KNNV  
Dfl. 42.50). ISBN 90-5011-009-6.

Nearly all aspects of the genus *Taraxacum* are treated in this book: systematics and geography, cytology

(chromosomes), reproduction, (flower) ecology, parasites, evolution and some society relevant topics, including nature protection and dandelions in art. The results of scientific research carried out in the last 15 years by Dutch biologists, notably those connected with the 'Vakgroep Bijzondere Plantkunde' (Hugo de Vries Laboratory, University of Amsterdam) are incorporated. Consequently this work is a fine example of a biosystematical, i.e. multidisciplinary, approach.

All chapters are lavishly illustrated with drawings, maps and photos, for the greater part printed in colour. The fine biotope photos, partly from remote areas of our planet should be mentioned especially. Furthermore, many data are presented in diagrams and tables. The literature survey contains no less than 500 titles, from Theophrastos (c. 325 BC) up to den Nijs & Sterk (1984). Summarizing, a wealth of information is supplied on this intriguing genus.

One general point of criticism should be mentioned: a resumé of the scientific results up to now is missing; the same holds true for a review of those aspects that still need further investigation.

However, Dr Sterk must be congratulated with his magnum opus, and all authors with this most comprehensive and all-round work on *Taraxacum* ever written. Also, the KNNV deserves much praise for another well-produced book that moreover can be called cheap.

It is quite certain that this book will be appreciated by amateur as well as professional biologists of all sorts and conditions, to whom it is also highly recommended. Hopefully an English translation will soon make the book accessible to people not familiar with the Dutch language.

J.H. IETSWAART