

BOOK REVIEWS AND ANNOUNCEMENTS

A. KEADT (Ed.): *Ecological Biogeography of Australia*. Monogr. Biol. 41. Dr. W. Junk Publishers, The Hague, Boston, London 1983. XL + 2142 pp, numerous ill. + tables, relief map 1: 5.000.000, three volumes clothbound. US \$ 950.–. ISBN 90-6193-092-8.

This monumental work far exceeds the scope of its predecessor, CROCKER & CHRISTIAN's *Ecology and Biogeography of Australia* (1959). It is a testimony to the boom in biogeographic research in Australia, triggered by Plate Tectonics. This theory sheds new light on the biogeography of the southern hemisphere in which the island continent Australia occupies a key position. It must be borne in mind, however, that in all reconstructions of the world's landsurface in the past there is no consensus on many points of vital detail regarding time and space. The only critical note in this respect is worded by Mc Dowall (chapter 46).

There are 69 chapters divided over eight parts. A complete review would occupy too much space and a selection had to be made.

The first part deals with the development of the Australian environment and logically starts by describing the breakup of Gondwanaland, the development of island arcs in the W. Pacific and the northward movement of Australia, New Zealand and SW Pacific crustal blocks. This is shown in a series of paleogeographic maps. Subsequently the collision of India with Asia (55 m. y. BP) and Australia with the Sunda arcs (15 m. y.). The development of Wallace's and Weber's lines is traced against the background of these tectonic events. In chapter 3 (Kemp) on the evolution of the Australian Tertiary climate of special interest are the tropical conditions in S. Australia in the lower Eocene with *Nypa* at a (paleo)latitude of 60°. A rapid expansion of the Antarctic ice sheet caused a dramatic climatic change in late Miocene which can be traced globally. Late Cainozoic and Quaternary environments in Australia are discussed at length. In Miocene rainforests still covered large parts of the continent. Pliocene climates are less well known but it is likely that in this period a major change from rainforest to the present day xerophytic vegetation took place. A chapter is devoted to fire which plays such a prominent role in the evolution of Australian biota.

Part two treats the flora and vegetation of Australia. Some chapters are of a general nature and deal with major parts of present day vegetation or with fossil floras, some deal with characteristic Australian taxa. Martin discussing the Tertiary flora states that reconstruction of vegetation based on fossil pollen is biased towards that of wetter climates. Thus no evidence is available for the evolution of the modern *Eucalyptus* flora nor of the arid flora. Christophel thinks that widespread pollen of *Nothofagus*, Myrtaceae and Proteaceae, traditionally held to indicate a cool temperate forest, is overrepresented in the fossil record and that megafossils suggest a very diverse assemblage. Also WEBB & TRACEY present a picture of a warm temperate to tropical diversified forest for Australia from the Eocene onwards. The present much restricted Australian rain-forest is a relict of this not just an assemblage of recent Indomalaysian elements. Attention must also be drawn to the contribution by JOHNSON & BRIGGS on three prominent Australian families, Myrtaceae, Proteaceae and Restionaceae, with striking parallels and contrasts in geography and ecology. This is an important study in phylogeny as well as in the development of the sclerophyllous habit, associated with highly infertile soils and not with aridity as traditionally assumed. This topic is also touched upon by other contributors such as Beadle (ch. 14 and 23). See also the paragraph on soils in the paper by Nix (ch. 6). In one of the contributions by Specht (ch. 20) the history of halophytes is reconstructed mainly based on recent distribution patterns. For the mangrove element an early Cretaceous origin along the Australian New Guinean coastline is postulated, but unfortunately recent palynological evidence pointing to a late Cretaceous/Tertiary origin of some taxa is not considered.

Part five on the poikilotherm vertebrates deals only with the amphibians and reptiles since the chapter on fresh water fishes (McDowall) is placed in part four. The frogs are derived from Gond-

wanic sources, relations are strong with S. America. Only *Rana* is of Oriental origin. Of the 17 extant reptile families only the Chelidae support southern terrestrial links with S. America. The Mesozoic fauna (Dinosaurs) is extinct and bears little relation to the modern reptile fauna, which is largely of northern derivation and is assumed to have arrived in Miocene and later.

Part six deals with the homeothermic vertebrates. The origin of the Monotremes and most Marsupial families is still unknown due to the poor fossil record. Most of the modern families seem to have been established prior to the late Oligocene. There are indistinct intercontinental relationships of some families with S. American families. Of the placentals bats are well represented. The oldest fossil record dates from the Miocene. Since no other insectivores ever seem to have existed in Australia it is most probable that bats entered the continent by virtue of their flying power. Apart from bats and (recent) dogs land placentals are represented only by Muridae. The earliest fossil record dates from the Pliocene. The avifauna is very rich with a high endemism at genus and species level. The fossil record shows a gap between lower Cretaceous and Miocene. It is assumed that there is an old southern element obtained when Australia was still part of Gondwana (e.g. Ratites and Megapodes) and a newer (Miocene) element mainly derived from the north, but distinction is not clear.

Part seven treats origin and ecology of the Aborigines. Arrival of these hunter-gatherers dates back to about 60,000 years BP and perhaps to more than 100,000 years (Thorne, ch. 62). The aboriginal impact on flora and fauna is discussed by Tindale: extinction of large mammals and use of fire. Fire probably played a role before the arrival of man. See also chapter 7.

Part eight is essentially a major effort on the part of the general editor towards a general synthesis, no mean task in view of the wide array of topics.

References are given at the end of each chapter and the book is concluded with a subject index and a systematic index.

In a work of this kind, written by authors representing so many disciplines, repetition, overlap, inconsistencies and to some degree contradiction is inevitable. It must have been a problem for the editor to arrange the chapters in a logical sequence. A different grouping of chapters into the eight parts is feasible. There are also a number of disturbing printing errors. Despite our criticism we are convinced that this work is bound to become the most consulted source of information for students of southern hemisphere biogeography. The price will be the main obstacle to many a potential buyer.

M. M. J. VAN BALGOOY AND J. MULLER

D. HESS: *Die Blüte*. Verlag Eugen Ulmer, Stuttgart 1983. 458 pp., 157 colour photographs, 152 drawings, 28 tables. Cloth. DM 68.—

The sub-title is: Eine Einführung in Struktur und Funktion, Ökologie und Evolution der Blüten. This is a book on Flower Biology outstanding by its superb presentation and by the constant interweaving of its subject with Genetics. The author holds the "Lehrstuhl für botanische Entwicklungsphysiologie" at Stuttgart. The concept of a strive toward genetic recombination and pluriformity in evolution runs like a thread through the book. The necessary information on Systematics and Morphology is given beforehand, the second one rather poorly. There is also a short introduction to Genetics. The evolution of the sexual systems in plants, that is of the diploid-haploid phase alternation, is explained, which is new in a book on Flower Biology. Much attention is paid to the role of cross-pollination with its mechanisms of heteromorphy and incompatibility. A clear distinction is made between the constructional schemes, the physiognomic, and ecological types of flowers. The book concludes with discussions on the coevolution of flowers and pollinators, also on the species and genus level.

At the beginning of each chapter the reader is informed on what is going to be discussed next, and at the end of each there is an 'evaluation'. The main theme is never abandoned. Each chapter is completed by some pages – tinged grey – offering suggestions for easy experiments or demonstrations. The photographs are splendid. I miss some pages – tinged green – on the consequences for nature protection. The more so since in his preface the author tells us that in a dream he saw a politician reading his book. For educational purposes this is the best book on Flower Biology to date.

W. A. VAN HEEL

J. L. GRESSITT (Ed.): *Biogeography and ecology of New Guinea* (Monographiae Biologicae, vol. 42). Dr. W. Junk Publishers, The Hague, Boston, London 1982. VII + 983 pp. in 2 vols, 251 figs., 54 tables, 84 maps. Cloth Df 450.—. ISBN 90 6193 094 4.

New Guinea is the largest tropical island, with an extreme richness in habitats ranging from mangroves to ice-capped mountains. It has a complex geological history and geomorphology. The highly interesting flora and fauna are relatively little disturbed by the thin human population. These characteristics make New Guinea an eldorado for biologists. Although much research has been carried out in the past century, far more has to be done. It was a good idea of the late Dr. Gressitt to bring together a number of specialists to review the state of knowledge in their fields of research.

The book is divided into two handy-sized volumes. The first volume has three parts. Under "General and physical background" the climate, geology, glaciation, landforms, and soils are reviewed to give the general background. The second part "Man and his impact on the environment" starts with a comprehensive history of the biological exploration of New Guinea by Frodin & Gressitt. Other contributions on anthropology, archeology, man's impact on the vegetation, and on insect pests of staple crops are also of interest to biologists to understand the importance of the factor "man" in the environment. Archeology has revealed the extinction of some mammals, including the Tasmanian Wolf. The third part "Vegetation and flora" covers a wide array of topics on phytogeography and ecology. Of the 13 contributions most provide very interesting reading. I may mention the 'ecological monographs' of *Nothofagus* and of *Araucaria* especially, but many others are thorough and thought-provoking.

The second volume begins with the parts "Invertebrate fauna" and "Vertebrate fauna", 19 contributions in all. They are not only of importance for botanists interested in biogeography, but they give also some information on e.g. relations between drosophilid flies and flowers, mimicry between spiders and beetles, vegetations on the back of weevils, and on fig wasps. Pratt says that most of the bird fauna is Asian in origin, with subsequent evolution of, and radiation in, endemic families.

Part 6 gives a zoogeographical and a botanical summary. In the first the conclusion is drawn that the fauna of New Guinea is primarily Oriental (SE Asian) and that the idea, that New Guinea forms part of the Australian Region, is mainly based on the distribution of marsupials, which are only 1/4500 of the land fauna. The botanical summary is a beautiful synthesis between geological history and phytogeography. Part 7 is devoted to conservation; it concludes that although the situation is not quite as desperate as elsewhere, international financial and technical assistance is a necessity.

Each contribution is accompanied by a list of references. An index to genera and a general index conclude the second volume.

The execution of this work is of a very high standard and its contents are a must for every biologist with interests in the Australasian area. Therefore it is regrettable that the price will be an obstacle for many individuals.

W. VINK

E. KLAPP: *Taschenbuch der Gräser*. 11th ed. by P. BOEKER. Verlag Paul Parey, Berlin and Hamburg 1983. 259 pp., 470 figs. Cloth. DM 36.—.

The present edition of Klapp's well-known pocketbook of grasses is literally unchanged compared to the former 1973 edition, except for the chapter on lawn seeds. Although citing Oberdorfer's 1979 flora as a reference only the 1962 edition of that flora has been mentioned in the introduction and obviously the 1979 edition has not been used at all. Part 5 of *Flora Europaea* (1980) has been completely neglected. The new editor excuses himself briefly by lack of time to incorporate new names (and ideas). As it is, the present edition is outdated strongly. Klapp's book should deserve a better fate.

R. VAN DER MEIJDEN

K. A. JOSEY and A. E. FRIDAY (Eds.): *Problems of Phylogenetic Reconstruction*. The Systematics Association special vol. 21. Academic Press, London and New York 1982. X + 442 pp. US \$ 58.50. ISBN 0-12-391250-4.

This book contains part of the papers read at the Cambridge 1980 Symposium on Problems of Phylogenetic Reconstruction. Although the book is published with much delay it nevertheless contains much interesting opinions regarding phylogenetics, at present still one of the most discussed items in comparative biology. The book illustrates the controversies between so-called cladists and evolutionary systematists. Apart from two papers dealing with animals all others are concerned with angiosperms, which is noteworthy in itself.

CAIN: On Homology and Convergence. The author discusses homology and convergence indicating that the possibilities for parallel or convergent evolution have never been fully explored. He correctly rejects Hennig's heuristic approach towards convergence.

PATTERSON: Morphological Characters and Homology. This is a fundamental paper; part of it was already published by Eiley (*Phylogenetic Systematics*, 1981) before the present book appeared. It covers the definitions of homology as well as the testing of homology by conjunction, similarity, and congruence. A probabilistic rather than parsimony-based resolution on incongruent sets of homologies is suggested.

PAUL: The adequacy of the Fossil Record. The author indicates that the fossil record can be used as an independent test of phylogenies defined on morphology or as a contributing source of information on phylogenetic reconstruction. He further deals with tests of the completeness of the fossil record, and the probability of preservation of fossils in the wrong stratigraphic order.

FOREY: Neontological Analysis versus Palaeontological Stories. Forey illustrates the differences between trees and cladograms. He favours the modern cladistic method, i.e. searching for patterns independent of any consideration of the process that caused that pattern. His opinion that ancestors are very difficult to indicate should be very informative to paleo-biologists.

HALSTEAD: Evolutionary Trends and the Phylogeny of the Agnata. It is concluded that the construction of family trees is a more valuable method of portraying suggested relationships than cladograms.

FORTEY and JEFFERIES: Fossils and Phylogeny – A Compromise approach. Extreme cladists deny that fossils can ever be useful, while extreme stratopheneticists deny that primitiveness can ever be recognized without consulting stratigraphy. The authors give good arguments for the possibilities and limitations of both views though they misunderstand the difference in information content between cladogram and phylogenetic trees.

BUTLER: Directions of Evolution in the Mammalian Dentition. Butler gives a stratopheneticist's approach and uses the wealth of mammalian teeth as an object for phylogenetic reconstructions.

CROWSON: Computers versus Imagination in the Reconstruction of Phylogeny. It includes (too) much imagination and (too) less theory for being really successful. The author criticizes the way protein sequence data are interpreted.

MEEUSE: Ecological Aspects of Phylogenetic Approaches to Taxonomic Classification. An intuitive – and therefore unproblematical – approach towards a scenario of the genesis of the Magnoliophyta using ecological and paleobotanical data.

HILL and CRANE: Evolutionary Cladistics and the Origin of Angiosperms. This is a fundamental paper on the monophyly and possible sister group relationships of the angiosperms, discussing also the applicability of the theory of cladistics to trace the origin of the angiosperms.

CHARIG: Systematics in Biology: A Fundamental Comparison of Some Major Schools of Thought. A nice survey of the present methodological approaches to systematics including transformed cladistics (= natural order systematics) which CHARIG regards an undesirable complication, an opinion which is inadequately based. He deals explicitly with advantages and disadvantages of Hennigian and Simpsonian classifications defending the recognition of paraphyletic groups. His definitions (and illustrations) of paraphyly and polyphyly are most informative.

In December 1983 Dutch systematists had their first informal meeting on phylogenetic systematics showing the growing interest in the methodology of historical evolutionary biology. For these and for the biologists interested in the new developments in comparative biology this book will be of great use!

E. HENNIPMAN