REVIEWS

E. EDGAR & H.E. CONNOR: **Flora of New Zealand. Volume V. Grasses.** Manaaka Whenua Press, Lincoln, New Zealand, 2000. lxxxii + 650 pp, illus. ISBN 0-478-09331-4. Price: USD 55.00.

This long-awaited volume is the last of the new Flora of New Zealand and treats 121 genera in 21 tribes with 460 species, of which 226 are introduced and 46 'transient', i.e. introduced but not persisting, against 188 native ones of which not less than 157 are endemics. Most of the latter belong to the Poeae (49 + 41 others), Agrostideae (45 + 58) and Danthonieae (43 + 15) showing the present temperate nature of the grass flora. This structure of the grass flora is briefly discussed, but its origin is considered 'unsuited to a flora'. It is a pity that no reference is given to a place where this is done, instead.

Of general interest to the New Zealand Flora is the extensive literature list ('annals') completing the ones given in previous volumes with indices on families and additional scientific subjects. Curiously, they run up to 1996, while elsewhere (p. xxix) references as late as 1999 are indexed. M.I. Dawson contributed a survey of the chromosome numbers of indigenous species. It may be noted that for *Lachnagrostis filiformis* 2n = 28 and 56 have been reported, although Edgar & Connor say no chromosome numbers are known for the genus (p. xxiv).

The subfamilies and tribes are arranged more or less to Clayton & Renvoize's system, but within them the genera and again the species are placed alphabetically facilitating fairly easy retrieval. I have not been able to find the place of publication of the Cortaderiinae. The correct name for the Chlorideae Trin. is Cynodonteae Dumort., older by a month or so. The taxa are extensively described and where applicable provided with various notes on variability, reproductive biology (as could be expected with Connor as co-author), time of introduction, etc.

For native species a full synonymy is given, for introduced ones only as far as names have been used in local literature. For the former the types are given and the lectotypifier where applicable. It is incorrect, however, that Chase & Niles' Index to grass species (1962) implicitly referred to (p. xxxiv, 'Miles') would contain valid lectotypifications (or combinations). It certainly is a goldmine of information, but its basis is a file system intended for internal use at the Smithsonian, which was later photocopied, distributed, but must be considered as ineffectively published under the ICBN.

Going over the treatment was a pleasure, and I am sure that agrostology is well served by it, and it may be exemplary to others. I would wish for more plates, though. Some minor notes: *Diplachne* now generally is included in *Leptochloa*. *Paspalum tenax* Trin. (p. 571) from Trinius' descriptions (1826; 1834) and microfiche (IDC BT-16/1, t. 538.1) appears to be *P. orbiculare*, suggesting that it was a very early introduction, or perhaps native after all.

J.F. VELDKAMP

RUPERT LENZENWEGER: **Desmidiaceen Flora von Österreich. Teil 3.** Bibliotheca Phycologica 104. J. Cramer in der Gebrüder Borntraeger Verlagsbuchhandlung, Berlin-Stuttgart, 1999. v + 218 pp., illus. ISBN 3-443-60031-X. Price: DEM 96.

This third and last part of the Desmid Flora of Austria is as well-illustrated and as user-friendly as the first two volumes. Now the genera *Cosmarium* (193 taxa) and *Closmocladium* (1 species) are treated, together with an addition to *Staurastrum*, where the very beautiful alga *S. arctiscon* is recorded, described and figured. The format of the third part again slightly differs from the other parts; in the present one the species are alphabetically ordered within seven species groups, not just in alphabetical sequence within the genus, as in other genera. The set-up used in the chapters on the different taxa is as in volume 2 and this time, in contrast to the two first parts, I cannot complain about citation of references. The references recorded in connection with the figures are also complete this time, although omissions from the two earlier volumes have not fully been corrected. In the 'Einleitung' still two authors are mentioned for which the references cannot be found in the list ('Bibliographie').

It is a useful small series of books, full of illustrative drawings and it is recommended for libraries of phycologists, limnologists and all authorities on water quality and water quality control.

W.F. PRUD'HOMME VAN REINE

K.A. MENEY & J.S. PATE (eds.): **Australian Rushes. Biology, Identification and Conservation of Restoniaceae and allied Families.** University of Western Australia Press, 1999. x + 486 pp., (colour) illus. ISBN 1-876-26801-8. Price: USD 95.

Restoniaceae is a family of grass- or sedge-like plants that is almost completely confined to the Southern Hemisphere with centres in Australia and South Africa. This book treats the Australian representatives of this and some small related families (Anarthriaceae, Ecdriacoleaceae). The book consists of three parts: Part 1 deals with biology and taxonomy. It describes morphological and anatomical features, classification, ecology, etc. Part 2 deals with identification and descriptions. Keys to the genera and species are given, those to the species are illustrated by copies (of parts) of the drawings of the species. Each species gets two pages: one with the description and micrographs of transverse sections of root, rhizome and culm, the other with drawings of the plant, including details of rhizome and flowers. A curious fact is that several species are given provisional names indicated by quotation marks and the indication 'unpubl.' (as in: *Desmocladus 'elongatus' B.G. Briggs & L.A.S. Johnson, unpubl.*), nomenclaturally an undesired procedure. Part 3 deals with the conservation of Australian Restoniaceae.

Australian Rushes is a thorough study of the Australian representatives of this group. The book is well produced and beautifully illustrated by drawings of Ellen Hickman. The authors and the artist are congratulated with this impressive book.

FRITS ADEMA

ROBERT J. MORLEY: **Origin and Evolution of Tropical Rain Forests.** John Wiley & Sons, Ltd, Chichester, 2000. 362 pp., illus. ISBN 0-471-98326-8. Price: GBP 95.

This tremendously important book on the history of Angiosperm vegetation of the world, and especially the tropical rain forest, is based on micro- and macrofossil evidence, the latest results of plate tectonics, climatic evidence from ice cores, and other sources. The author worked as palynologist for oil companies and, apparently, had access to palynological data in the archives of those companies. This book gives an unsurpassed state of the art and should be used and read by all students of tropical

rain forest, vegetation history, and history of Angiosperms. I found few mistakes. One of them is *Macaranga diepenhorstii*, the leaves of which are given as an example of peltate, palmately veined leaves which are common in lianas. This species, however, is a shrub. Further, with modern printing techniques, the many vegetation and plant photographs could have been printed in colour for the same price. The book is very expensive!

After the introduction, Chapter 1, an overview of present-day tropical rain forest is given in Chapter 2 with all the different vegetation types in the rain forests areas, with emphasis on the types where sedimentation and thus fossilisation occurs. The chapter gives in a nutshell the contents of the more important books on the rain forest worldwide. Chapter 3 gives an overview of the geological time framework and palaeoecological and palaeoclimate definitions. It gives a thorough discussion of the climates of the past and how they can be determined. Much emphasis is given to changing sea-levels. Periods of maximum sea-level tended to be the wettest with most widespread rain forests. Difference in sedimentation during different phases of sea-level change gives a good indication for palaeoclimates. Chapter 4 discusses the geological evidence for rain forests, especially the characters of plant macrofossils. Several characters of leaves and wood are related to climate. For pollen and spores the relation to modern families is more important as climatological evidence. Lithological evidence is also used, so coal points to a wet climate. Chapter 5 is called 'Early Angiosperm History and the first megathermal Rain Forest'. The origin of Angiosperms is discussed. The palynological evidence strongly supports a tropical origin, possibly in response to a warm subhumid climate. Western Gondwanaland is the likely centre of radiation although another possible origin is an isolated 'shard' (terrane) of Gondwanaland which now occupies parts of SE Asia. Both events are placed in Late Triassic.

The history of Angiosperms is extensively discussed, not only those of the tropical rain forest. A true everwet climate developed, during angiosperm evolution, for the first time during Campanian and Maastrichtian. At the same time groups developed that became ultimately important rain forest components. The impact of a giant meteorite 66 MA ago is discussed. Palynomorph diversities exhibited a dramatic decline of up to 40% all over the world. This left many open places for rapid evolution of plants, especially because all the herbivore dinosaurs had become extinct through the same event. The first closed canopy multistoried North American rain forest appeared. Chapters 6 through 11 discuss South and Middle America, Africa, India, Southeast Asia and the Eastern Pacific, Australasia, and the Northern Hemisphere Megathermal Rain Forest. The chapters describe the events in the mentioned regions which were for most of the time during the Tertiary separated from other land masses. In all described areas rain forest occurrence fluctuations were linked to the world climate, so they fluctuated simultaneously. The terminal Eocene cooling event, however, had a less deleterious effect on the diversity of South American vegetation than in other tropical regions. Hence the greater number of (primitive) palms in South America. The Indian plate was clothed with floristically diverse dense tropical rain forest when it straddled the equator during the Eocene. There is no evidence for a land connection between Australia and Sunda during that time. Rain forests are one of the original vegetation types of Australia and New Zealand. In New Zealand the megatherm elements died out in the Pliocene and early Pleistocene as a result of global cooling,

while they became restricted to the extreme North-East in Australia. In Chapter 12 Interplate Dispersal Paths and Land Bridges are discussed, while Chapter 13 gives a synthesis of the whole book. The last chapter is devoted to the future of rain forests which looks bleak.

HANS P. NOOTEBOOM

H.J. NOLTIE: **Flora of Bhutan, including a record of plants from Sikkim and Darjeeling. Volume 3, Part 2: The grasses of Bhutan**. Royal Botanic Garden Edinburgh/Royal Government of Bhutan, 2000. vii + 376 pp., illus. ISBN 1-872291-63-5. Price unknown.

A floristic treatment of the 126 genera and 389 species make the grasses the second largest family for Bhutan (after the Orchidaceae). The *Bambuseae* have been done by C.M.A. Stapleton, some *Aveneae* and *Bromus* together with A.C. Broome. A brief account is given on the grass communities and habitats. Roughly 7 types of grassland related to altitude and influences of man and his cattle are distinguished but a more detailed ecological account is still needed.

It would have been useful for an outsider if the geographic position of 'Terai' had been better defined. On p. 460 it is regarded as a vegetation type along the Indian border, but under the species it is regarded as an area equivalent to Sikkim and Bhutan. Useful and noxious species are discussed, and notes are given on uses, religion, collecting history, phytogeography. A remarkable disjunction is that of *Neyraudia curvipes* known only from Bhutan and Mt Kinabalu in Sabah (Borneo). I have not seen Bhutan material, but Dr. Noltie has assured me that it is the same species as the Malesian one. I know of no other similar distribution.

The only works available to identify the Indian grasses are the monumental treatment by Bor for the subcontinent [Grasses of Burma, etc. (1960)] and Shukla's Flora of the grasses of NE India (1996). The latter and the present work are very useful additions to Bor's where descriptions and figures are generally absent. Noltie notes that for the identification of grasses one usually needs a binocular microscope provided with a build-in scale, but fortunately in most of his keys he was able to use characters that can be seen by the naked eye or hand lens; a millimetre grid on the cover would have come in handy! For dissection he suggests use of a microscopic slide or tile and a drop of water; better is a Petri dish with a bottom of water with a drop of detergent added to drive off the air in the tissue. On a slide the water dries out quickly, especially under a strong lamp. He might have suggested that the dissected spikelet ought to be retained in a satchel for future reference.

For identification one has to go through the key to the tribes where fairly 'easy' characters have been selected, made more easy in use by the inclusion of the variable ones more than once with the pertinent taxa added in brackets. One has to add the pages where they are by hand. Many species are depicted by their inflorescence and a spikelet. The plates are pleasingly composed, but the subjects are so scattered over the page that one cannot immediately match the corresponding parts.

I was very pleased to see that the reduction of *Hierochloë* to *Anthoxanthum* was accepted here. All in all this is a very useful contribution to SE Asian agrostology. I would like to make some nomenclatural comments: 1. Because Buse's treatment of the Junghuhn grasses appeared before part of Steudel's Synopsis *Coelachne simpliciuscula* (Steud.) Benth. must be called *Coelachne infirma* Buse, *Helictotrichon virescens*

(Steud.) Henr. is *H. junghuhnii*, and *Hemarthria protensa* Nees ex Steud. is *Hemarthria vaginata* Buse; 2. *Axonopus affinis* Chase has been shown to be identical with the older *A. fissifolius* (Raddi) Kuhlm.; 3. *Chloris dolichostachya* Lag. is commonly known as *Enteropogon dolichostachyus* (Lag.) Keng ex Lazarides, which name is not even mentioned; 4. *Eragrostis tenella* (L.) Roem. & Schult. is *E. amabilis* (L.) Nees. The choice among the equally old epithets was made by Munro in 1862; 5. *Microstegium ciliatum* (Trin.) A. Camus is *M. fasciculatum* (L.) Henr.; 6. *Panicum walense* Mez is *Panicum humile* Nees ex Steud. as the supposed older combination *Panicum humile* Thunb. ex Trin. (1826) was not validly published; 7. *Phragmites karka* is *P. vallatoria*, the plate by Rumphius on which this was based is unmistakable; 8. It is *Eleusine coracana*, not *corocana*, and *Coix lacryma-jobi*, not '*lachryma*'.

J.F. VELDKAMP

E. SOEPADMO & L.G. SAW (eds.): **Tree Flora of Sabah and Sarawak. Volume Three.** Sabah Forestry Department, Malaysia, Forest Research Institute Malaysia, Sarawak Forestry Department, Malaysia, 2000. ISBN 983-2181-06-2 (vol. 3). Price: USD 140.

The third volume of the Tree Flora of Sabah and Sarawak is finally published, as no additional international funding was available between 1996 and 1999. It contains four plant families only, Fagaceae, Caesalpiniaceae (here treated as Leguminosae–Caesalpinioideae), Moraceae and Myristicaceae and is dedicated to the late K.M. Kochummen, better known to his friends as Koch. In total 431 tree species are covered, and most of them (c. 250) have been treated in a Flora Malesiana account. Personally I had a strong interest in the Moraceae as *Ficus* is, due to its high diversity, one of the difficult genera in Borneo. Kochummen's account is very useful as it covers 143 species, including the epiphytes, climbers, stranglers, or creepers. This floristic revision is long awaited by the forester and biologist as well, as *Ficus* is one of the important sources of fruits for either mammals or birds and very well collected and documented in herbaria. With the present key at hand, which is not always easy to use (one still often needs correctly identified herbarium specimens for reference), one will be able to identify most of the Bornean material. This still is a time-consuming process as the key heavily depends in the first lead on several categories of growth forms. When trying to identify our own collections from East Kalimantan it seems that the information on growth form on the labels is in contrast to the respective description of the species. Therefore one has to try more than one possibility as with regard to habit. It is a pity that the number of drawings which would make the identification a little bit easier is relatively low (6 only), of which one, *Ficus deltoidea*, cannot be mistaken. Less than 10% of the species considered to be treelets or trees is illustrated and the (local) user would certainly appreciate a much higher number of drawings.

The other three families are treated by the Malesian experts of the groups who also already contributed to Flora Malesiana. The identification of Caesalpinioideae (Ding Hou, NHN/L) should pose no problem to the even inexperienced user, as all genera are relatively small and therefore the keys straightforward. Unfortunately some of the drawings (*Crudia ornata, Sindora wallichii*) are in sharp stylistic contrast to the rest of the drawings. This should certainly be avoided in future volumes. The Fagaceae have been treated by one of the editors (Soepadmo, with assistance of S. Julia and Rusea Go). Identification of sterile plants with the help of vegetative and field charac-

ters, often necessary for ecological aims and during forest inventories, seems almost impossible in the large genera *Lithocarpus* (61 sp.) and *Castanopsis* (21 sp.). The account shows that collecting and inventory work in Borneo is still needed as 11 species have been described as new after the Flora Malesiana treatment has been published in 1972. This is more than 10% of the formerly known number of species. One of the most diverse families are the Myristicaceae represented by 5 genera in Borneo. This account has been written by De Wilde (NHN/L) and is based on his larger contribution to Flora Malesiana, which happened to be published when I received this copy for review. The identification, especially of the largest genus *Knema* (44 sp.), is hampered considerably as one needs to have flower buds, flowers, and fruits at the same time (example: lead 5: Flowers wholly or largely glabrescent ... 6; 6: Fruits glabrescent ... 7; 7: Flower buds more or less mitriform). Unfortunately, the chance to collect all these stages within one specimen is very low. Within *Horsfieldia* (39 species) De Wilde at least provides two keys, one for male flowering specimens and one for female flowering and fruiting specimens) which may be easier to use. Comparing the number of species in Borneo with those species only occurring in Sabah and Sarawak, it can be concluded that the latter group represents almost 90% of the total number. This makes the Tree Flora of Sabah and Sarawak a very useful tool for all who need to know about the floristic composition of the island of Borneo. Additional information on vernacular names, distribution, ecology, and uses is given. It is a pity that so far no funding could be found to combine efforts in Brunei, Kalimantan, Sabah, and Sarawak to write a Flora of Borneo as this would have a synergetic effect on the faster progress of the Tree Flora.

This volume, as are the other two, is a very fine example of a much needed regional flora and everybody interested in the botanical diversity of Borneo is strongly advised to buy a copy. The book is very well printed, hardbound and costs USD 140 for more than 500 printed pages. In my opinion this money is very well spent, although university libraries or students in the region may have a different view.

PAUL J.A. KEßLER

H.A.M. VAN DER VOSSEN & M. WESSEL (eds.): **Plant Resources of South-East Asia 16. Stimulants.** Backhuys Publishers, Leiden, The Netherlands, 2000. 201 pp., illus. ISBN 90-5782-053-6. Price: NLG 130 (hardcover). [A paperback edition will be available in 2000 (NLG 50). For developing countries a paperback edition (ISBN 979-8316-35-5. Price: c. USD 7) will be available in May 2000 from the PROSEA Network Office at Bogor, Indonesia.]

This new volume of PROSEA deals with the interesting group of stimulant producing plants. The introduction, which treats the general aspects of stimulants and the plants that produce these substances, is followed by three chapters on the individual species. The first of these treats the major stimulants such as coffee, tea, tobacco, and especially for Asia the various plants used in bettle chewing. The second one treats the minor stimulants which are often locally used as substitutes for species of the major group. The third chapter merely lists species used as stimulants that are treated in other commodity groups. All chapters include a list of references. A literature list with more general references forms one of the closing chapters.

The book is produced in the high quality way of the other PROSEA volumes.

FRITS ADEMA