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1990 SYMPOSIA

NINTH MEETING OF THE WILLI HENNIG SOCIETY and ASBS SYMPOSIUM

Hennig IX: Systematics and Biogeography of the Austral Biota

The Ninth Meeting of the Willi Hennig Society was held in Canberra on 23-27 August 1990. Willi Hennig, for those who have somehow escaped hearing of him until now, is credited with founding the science of cladistics (although he never used that word), and the international society of cladists has adopted his name. Never before has this society met outside North America or Europe, so it was an exciting event for local cladists (and systematists generally). About 250 people attended, many of them Australian, of course, but most of the leading northern hemisphere cladists came too. For me, it was great to 'rub shoulders' with so many outstanding systematists who until now have been only names on papers or personalities in biographies!

There was a full program divided into six symposia spread over four days and an evening. With dinners and tandem meetings, it was a heavy schedule, but at least we were spared the confusion of concurrent sessions.

Cladistics has progessed well beyond the point where its proponents were pressed hard into justifying using the methodology at all, and parsimony has become orthodoxy. The frontier now is where taxon cladograms are used to test hypotheses in the broader biological sphere. Thus, the sessions covered topics such as the use of phylogenetic information in ecological and evolutionary studies, biogeography and geology, and biodiversity and cladistics.

The biogeography session was a real curate's egg. Perhaps the most interesting aspect was two or three studies (one by Peter Weston and myself) reporting the first of Rod Page's new vicariance biogeography program COMPONENT. Much more will be heard about this package in the next few years. There was some lively debate about the nature of areas of endemism.

A long session on molecular biology and systematics was a fair indication of the recent boom in this field. Some papers were very good, such as Moritz's study of the origin of parthogenesis in Australian geckoes. It seems that at last a dialogue is being established between systematists and molecular biologists. The rapid expansion of molecular phylogenetics can also be judged by the list of projects on plant groups later in this *'Newsletter'* issue.

It was pleasing to see the number and quality of studies by young researchers, for example in the Austral flora and fauna session. Congratulations to Kevin Thiele, who won the student prize for his presentation of a cladistic analysis of *Banksia*.

The session on parsimony analysis and character weighting promised fireworks but few eventuated. Nevertheless, it produced some interesting papers on the major current issue in methodology: that of testing the robustness of cladograms using statistical analysis. The merits of different measures of homoplasy also came under the microscope.

In a session on phylogenetic computing software, Farris and Swofford, the authors of the two best and most used parsimony computer packages available, both demonstrated their wares (respectively HENNIG86 and PAUP), as well as later conducting tutorials and 'hands-on sessions'. Both promised new MS-DOS versions

of their programs within the next year. HENNIG86 is lean and efficient, while PAUP has all the bells and whistles you could possibly want. According to the benchmark comparisons presented by Platnick, both are equally good overall at finding most parsimonious trees, although on a large data set either might find shorter trees, or more trees at the same minimum length. Platnick recommended using both programs for large data sets, but when one is gaining one step among hundreds, the difference seems trivial to me.

Overall, I found the meeting tremendously stimulating, although the formal discussion was perhaps genteel by comparison with some legendary earlier Hennig meetings. The best of it took place in the bars afterwards, lubricated by Coopers beer, and over those place mats specially designed (by Judy West and staff) at the banquet. Congratulations to Ebbe Nielsen, Judy West and others for organising an excellent meeting.

Mike Crisp ☺

ASBS Symposium
Indo-Pacific Biogeography: At The Crossroads

Our own ASBS symposium was held 'back-to-back' with the Hennig meeting, on 29-30 August. Naturally, the majority of papers were presented by our own members, but we attracted some leading overseas contributors as well. Many stayed on from the Hennig meeting, as we hoped. Abstracts of all the papers are published here. Many of these papers will appear in full in a special issue of *'Australian Systematic Botany'* next year, together with papers from the biogeography session in the Hennig meeting. ☺

ABSTRACTS

Cladistic biogeography of marine water striders (Insecta, Hemiptera) in the Indo-Pacific

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More than 120 species of marine water striders (Hemiptera, Gerromorpha), representing three families and eight genera, are distributed throughout the Indo-Pacific region. They live in marine habitats such as mangroves, intertidal coral reef flats, and the sea surface near coral and rocky coasts. Five species of sea skaters, *Halobates*, have colonized the surface of the open ocean. Adult marine water striders are wingless but may disperse along coasts, chains of islands, and possibly across wider stretches of open sea. Although some species of coral bugs, *Halovelia*, and *Halobates* are widespread, most species of marine water striders have rather restricted distributions.

Cladistic information is now available for the genera *Halovelia*, *Xenobates* (Veliidae) and *Halobates* (Gerridae). Based upon distributional data for about 110 species, a number of areas of endemism can be delimited within the Indo-Pacific region. The results of component analyses of taxon-area cladograms for several monophyletic species-groups of marine water striders are presented. The number of species is highest in tropical Australia, northern New Guinea, the Solomon Islands, Maluku, Sulawesi and the Philippines. The faunas of northern New Guinea, the Bismarck and Solomon Islands (Papuasia) are closely related and show much greater affinity with Maluku, Sulawesi and the Philippines (Wallacea) than with the fauna of northern Australia. Relationships between the faunas of Papuasia + Wallacea and those of Borneo + Java + Malaya (Sundaland) are relatively weak. Marine water striders endemic

to islands of the West Pacific show relationships among themselves and to Papuasia - Wallacea. Most marine water striders from the Indian Ocean (East Africa, Madagascar, Mauritius, Seychelles, and Maldives) can be derived from the Indian - Southeast Asian fauna. Composite faunas of marine water striders (either of different age or origin) are found in New Guinea, New Caledonia, Fiji Islands, the Philippines, tropical Australia and in East Africa.

The biogeography of marine water striders does not support the traditional division of the Indo-Pacific into the Ethiopian, Oriental and Australian regions. The distributional patterns are more compatible with a set of hierarchical relationships between more restricted areas of endemism in the Indo-Pacific. ☺

Pollination and seed dispersal in Euphrasia disperma Hook.f. (Scrophulariaceae) of New Zealand and their evolutionary significance

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Euphrasia disperma of current concepts comprises an additional species *E. wettsteiniana* Du Rietz. Both have remarkably long slender corolla tubes belying the coloration patterns of the limb which relate more to short tongued pollinators such as bees or syrphids. Both species have been observed to be visited by syrphids. It is proposed that the long tube does not function directly in pollination, but raises the corolla mouth well above the fluctuating water levels of their bog habitats, while at the same time enabling seed to be positioned by the downturned pedicels amongst the creeping branches of the parent plant. Floral similarities in these two species to the section *Trifidae* of South America are considered to be the result of homoplasies. The two long-tubed species fall within a New Zealand group including two other bog-inhabiting annuals, *E. dyeri* Wettst. and *E. repens* Hook.f. Pollination and dispersal biology in these short-tubed allies are compared. ☺

Loranthaceae: reunion of an old Gondwanan family at Wallace's line

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The Mistletoe family Loranthaceae has the potential to make substantial contributions to historical biogeography. There is good evidence that the family is of Gondwanan origin. Following early differentiation in Gondwanaland, independent lines of evolutionary diversification and specialisation were associated with the separating Gondwanan fragments. When Wallace's line was established, stocks of Loranthaceae made contact and interacted from both sides of this boundary. Genera with $x = 12$ have reached the Australo-Papuasian area from the west and have undergone significant diversification. Stocks with $x = 9$ have crossed to Sundaland and have undergone limited diversification.

Current species distributions in Malesia are in harmony with the notion of dispersal of lowland species at times of lowered sea level. Most of the species which have wide distributions in Malesia across several islands occur in lowland habitats. Most of the narrow endemics are found at high elevations. The strongest track for exchange of Loranthaceae across Wallace's line appears to be one linking the Vogelkop of New Guinea with the Philippines. ☺

Chips off the old block: Paleogeographic development of SE Asia by rifting, drifting and collision

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The relative movement and interaction of small continental and oceanic blocks with distinctive tectonic and stratigraphic histories (terranes) is now realised to have been critically important in the construction of the Asian and Pacific tectonic collages from at least 600 Ma. It is clear that the Australian sector of Gondwana may even have

contributed terranes now embedded in the western cordilleras of the Americas.

The rift-drift-collision history of the major Asia-Pacific terranes may be reconstructed with varying degrees of certainty, based on paleomagnetism, ocean-floor magnetic anomalies, timing of major deformations, break-up unconformities and paleobiogeographic data.

The geological evolution of South-East Asia, though, remains controversial. This is in part due to (often) low-quality field data but is also due to paleomagnetic overprinting and very real geological complexity. For instance, the geology of the Sulu Spur and Buton terranes indicates rifting from the northern margin of the Australian craton in the early Jurassic but their post-rifting history is very poorly constrained.

The timing of volcanism along the Sunda and Banda arcs is obviously important from a biogeographic viewpoint and recent radiometric dates reveal important constraints on Neogene biotic migrations.

The recognition that many small terranes have split off from Australia, coalesced with other Gondwana-derived terranes and are now again converging and reuniting with the parent craton (Australia), makes simplistic biogeographic scenarios obsolete. A realisation of this kinematic complexity is especially important in assessing the biogeographic distribution of taxa that may have originated in the Mesozoic and Paleogene. ☺

Macrofossil evidence for Gondwanan elements in the Indo-Pacific flora

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Numerous extant Indo-Pacific elements which are not now found in Australia have been recovered as macrofossils from south-eastern Australia. Biogeographic evidence that the coniferous element in Malesia is largely Gondwanic in origin is supported by fossil evidence. For instance, macrofossils of all the Papua New Guinean conifer genera have been found in Tasmanian Late Eocene and Oligocene sediments. These are *Phyllocladus*, *Dacrydium*, *Falcatifolium*, *Dacrycarpus*, *Prumnopitys*, *Nageia*, *Podocarpus* (Podocarpaceae), *Papuacedrus* (Cupressaceae), *Agathis* and *Araucaria* (Araucariaceae). It is significant that fossils of other conifer genera have also been identified which have extant affinities exclusive of the Australia/New Guinea region. Biogeographic methods which do not consider fossil evidence would be unlikely to predict a past Australian distribution for these taxa. Specific examples are *Acmopyl* (Podocarpaceae), now found only in New Caledonia and Fiji and *Libocedrus* (Cupressaceae), now restricted to New Caledonia and New Zealand. All of these conifers are now largely restricted to tropical montane regions of the Indo-Pacific. Angiosperm taxa which are now common in the same forests, some of which are also extinct from Australia, have been recovered as macrofossils from the same deposits. This provides evidence for the hypothesis that elements in some communities migrate together, presumably in response to similar environmental requirements. Examples include *Nothofagus* subgenus *Brassospora* (Fagaceae), *Schizomeria* and *Weinmannia/Cunonia* (Cunoniaceae), *Gymnostoma* (Casuarinaceae), Lauraceae and microphyllous Myrtaceae. Apart from its importance for evolutionary and palaeoclimatic research, the fossil record offers unequivocal evidence of past distributions for biogeographic interpretations of the Indo-Pacific flora. ☺

The biogeography of Dendrobiinae (Orchidaceae)

Mark A. Clements
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The preliminary results of a phylogenetic and biogeographic study of the Dendrobiinae Lindley, where the majority of taxa have been traditionally placed in two very large 'genera' *Dendrobium* Sw. and *Eria* Lindley, are reported here. This research shows that these 'genera' are polyphyletic assemblages consisting of

perhaps as many as 60 taxa. There is strong evidence that the Australian Plate was the centre of origin for a large number of these taxa. ☺

Biogeography of Elaeocarpaceae

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The approximate distribution of each of the nine genera of Elaeocarpaceae will be described and discussed in relation to a preliminary cladistic survey (using members of the Tiliaceae, Sterculiaceae, Flacourtiaceae and Euphorbiaceae as outgroups). This highlights our lack of knowledge of basic comparative morphology and anatomy of these groups - the Flacourtiaceae being particularly critical in this respect. The monophyly of the Elaeocarpaceae is still questionable, although *Muntingia* cannot be included.

The two larger genera in the family are widespread - *Sloanea* (c. 150 species) occurs in both Old and New World tropics; *Elaeocarpus* (c. 350 species), while absent from the New World, has a wider distribution in the Old, extending even into some warm-temperate regions. The distribution of infrageneric groupings in *Elaeocarpus* and Old World *Sloanea* will be outlined; these groupings are largely 'classically' conceived. At both the generic and infrageneric level, the area New Guinea-Queensland + Northern Territory-NewCaledonia is of particular interest, while further afield the Malay Peninsula-Sumatra-Borneo area and the Philippines-Sulawesi provide areas of species richness and infrageneric interest, particularly in *Elaeocarpus*. ☺

Vertebrate biogeographic patterns within Australia

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Though scattered, flung far over landscape
Australia they may be,
Tossed back and forth across forest, spinifex,
desert and mallee,
Birds thrown high and mammals skulking low,
mobilise into fragments of history,
Sharing themselves with others wishing to follow.
Could it be that as earths move around them,
they stand transformed, guided by waking
songlines,
Born from listening to cataclysmic Eyrean,
Torresian, and Carpentarian rhymes? ☺

Morphology and geography in Indo-Pacific non-aurantioid Rutaceae

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Forty-six genera of non-aurantioid Rutaceae are recognized in the Indo-Pacific region. All but seven or eight of them appear to have originated in Gondwanan land areas and the majority (33) are restricted to Australasia. Recent revisions in the classification of these Rutaceae, and their phytogeographic implications, are discussed, and the morphology and geography of *Melicope* (about 250 species; Madagascar to India, Australasia and Pacific) and *Acronychia* (47 species; India to Australasia) is described in detail. ☺

Systematics, biogeography, and photosynthetic pathway variation in Indo-Malayan/African Alloteropsis Presl (Poaceae)

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The grass genus *Alloteropsis* Presl is one of only four genera in the Poaceae to contain both C_3 and C_4 taxa, making it of great evolutionary and biogeographical interest with respect to the origin of C_4 photosynthesis. Although the most

recent taxonomic treatment recognises only five taxa, up to ten have been described in the past and are accepted here. C_3 photosynthesis is confined to *A. semialata* (R. Br.) Hitch. subsp. *eckloniana* (Nees) Gibbs Russell; all other taxa are C_4, but show variation in the XyMS character [XyMS- : *A. semialata* subsp. *semialata*, *A. angusta* Stapf, *A. gwebiensis* Stent & Rattray, *A. homblei* Robyns; or XyMS+ : *A. papillosa* W.D. Clayton, *A. cimicina* (L.) Stapf, *A. paniculata* (Benth.) Stapf, *A. quintasii* (Mez) Pilger, *A. latifolia* (Peter) Pilger]. Only *A. semialata* subsp. *semialata* (C_4,XyMS-) and *A. cimicina* (C_4,XyMS+) occur in the Indo-Pacific region (the remaining taxa being confined to Africa). It is unknown whether these two species are relatively recent immigrants to northern Australia, or are 'Old World Tropics' elements enduring since the Gondwanan break-up. Indo-Pacific *A. semialata* is solidly C_4, unlike this taxon in southern Africa. Extensive, directed searches have revealed several likely C_3-C_4 intermediate populations in Africa (but not in the Indo-Pacific), based on leaf structure and *delta*^{13}C values. As the XyMS+ taxa of *Alloteropsis* possess centripetal PCR cell chloroplasts, they are probably of the NAD-ME C_4 type. The C_4 type of the XyMS- taxa is speculative; Australian C_4 *A. semialata* is PCK type, whereas South African *A. semialata* is NADP-ME type, suggesting interesting intraspecific C_4 type variation (as well as the C_3/C_4 variation) worthy of detailed study, and perhaps reflecting ancient disjunction. ☺

The origin and biogeography of Angiosperms

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We have published inferred nucleotide differences (from partial amino acid sequences of rubisco-SSU) between pairs of species (*Nothofagus*, *Solanum*, Proteaceae, Winteraceae) putatively separated by continental drift to remnants of Gondwanaland. These were in three sets, Australia-Africa, Australia-New Zealand and Australia-South America. We now give similar data for two or more sets, New Zealand-South America (*Nothofagus*, Winteraceae) and across Wallace's line (species drawn from northern and southern groups of Magnoliiflorae). These comparisons are discussed in relation to the time and place of angiosperm origins, Hooker's South Temperate Flora and the value and weaknesses of published attempts to date angiosperm origins using the molecular clock principle. ☺

Distributional patterns and tectonic development in Indonesia: Wallace reinterpreted

B. Michaux
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A.R. Wallace's name will always be linked with what was known as the Malay Archipelago, and thus it seems appropriate at a meeting such as this to reassess his contribution to Indonesian biogeography. Wallace is often regarded as the founder of 'dispersalist' biogeography. However, this simplified view seriously misrepresents Wallace's position which was that animal and plant distributions in Indonesia could be understood in terms of the region's geological history. This view is contrasted with that of dispersalist biogeography which is that present distributions are the result of chance events, that the present is a consequence of past accidents. The results of Wallace's work are outlined and are reinterpreted in the light of modern evidence about the tectonic development of this region. It is concluded that Wallace's observations are broadly intelligible in the light of what is known about Indonesia's geological history. There is much to gain by biogeographers and geologists working together more closely in Indonesia, for there are many outstanding problems that require resolution. This then is one future direction that may be taken as we stand at the crossroads. ☺

The origins of the Melanesian and Polynesian Eucnemidae (Coleoptera)

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Eucnemidae is a family of lignicolous beetles with some 200 genera and 1800 species, most of them tropical. The larvae develop in wood infested with fungi. A few mostly primitive species attack conifers, but the majority of the species utilise white rot wood of angiosperms.

A study of the phylogenetic relationships of the Australian eucnemids showed that there was little evidence of Asian elements invading the continent. The relationships of the Australian genera agreed completely with the traditional view of the tectonic history of the globe. The few forms of continental Asian origins were clearly recent immigrants - usually identical on species level. Frequently the sister group of the Australian-New Guinea group was found in the Indomalesian archipelago and these two clades had their sister group in the tropical Americas. This suggested an old east to west migration, probably from a source in NE Australia, prior to the emergence of present day New Guinea.

There are 55 genera/250 species of eucnemids in New Guinea, 31/170 in Solomon Islands, 10/41 in Fiji, 7/19 in Samoa, 4/5 in Tonga and 6/19 in New Zealand. The faunas of New Caledonia (5/12) and Vanuatu (6/9) are poorly known.

Superficially these numbers suggest that selective drift is the main force behind the present distributions but phylogenetic analysis of the groups does not support this. Five genera were left out of the analysis as they contained hundreds of species occurring in all parts of the world. The majority of the remaining genera, 42 out of 51, did not show any relationships with the continental Asian forms. They could be divided into two groups: (1) genera with sister group patterns coinciding completely with the traditional Laurasia-Gondwana break up model - some of these having Laurasian elements, others not, 13 genera; (2) same as group 1, but the most derived group (some combination of the New Guinea - Australia - Melanesia - Polynesia area), with a sister group in the Indomalesian archipelago and this combined clade with its sister group in the tropical America, 29 genera, species with limited distribution. The remaining genera form a distinct group as well; (3) both the most primitive members of these genera and their sister groups were found in continental Asia, the derived species usually enjoying a wide distribution from Vietnam to New Guinea, 9 genera with some speciation in the Melanesian area. The analysis indicates that the majority of the eucnemid genera have not reached Melanesia from Asia. They are of old age and belong to the fauna of the fragmented southern continent. These genera have not been able to invade continental Asia. A group of Asian genera has penetrated through the area, but as most of the species are widespread, this invasion appears to be recent.

All the Samoan species are derived members of within genus clades found in Fiji and this pattern holds between Tonga and Samoa as well. As the relationships show no pattern it appears clear that both Samoa and Tonga obtained their species by drift. In addition to the Samoan connection, the clades within Fijian genera show sister group relationships with Vanuatu, New Guinea, Jawa and New Caledonia. One feature is predominant: the everpresent clade Fiji-New Guinea often has a New Guinea-Solomon Islands clade as its sister group. This suggests that the Fijian fauna is of considerable age. However, as the faunas of Vanuatu and New Caledonia are poorly known, nothing definite can be said. The New Zealand eucnemids form a mixed lot. One genus forms a monophyletic group with a clade in Australia and the sister group of this combined clade is a huge world-wide tribe with one derived genus in New Zealand as well. Two genera have their sister groups in Australia; the sister groups of this combined clade are South American. One species appears to be an offshoot of an Australian-derived clade of a world-wide genus. The relationships of the sixth genus are not resolved yet, but it is surely an ancient form. The New Zealand fauna clearly indicates that the origin of the area is complex. ☺

The restriction of Nothofagus subgenus Brassospora to tropical latitudes: some interpretations from ecophysiological studies

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Pollen of *Nothofagus* subgenus *Brassospora* has been recorded from Tertiary deposits in southeastern Australia and New Zealand and cupules (and possible leaves) have been recovered from Tasmanian Tertiary deposits. By the late Tertiary this group was apparently extinct in these regions and today it occurs only in New Guinea and New Caledonia. In this paper aspects of the biology of the living species of this group are compared with those of the *Nothofagus* species which currently occur at high latitudes in Australia and New Zealand. Species from high latitudes show little difference from tropical species in temperature optima, but typically have a greater tolerance of temperature extremes. They also have a lower water-use efficiency as estimated by measurements of leaf carbon isotope ratios. These results are discussed with reference to existing hypotheses of the climatic determinants of the migration/restriction of subgenus *Brassospora* to tropical latitudes. ☺

Morphological study of fossil and modern Elaeocarpus (Elaeocarpaceae) fruits in Australia and New Zealand

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1. Queensland Museum, PO Box 300, South Brisbane QLD 4101
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The endocarp morphology of extant *Elaeocarpus* species in Australia and New Zealand is described in detail. Based upon analysis of endocarp morphology a modified infrageneric classification of extant species is proposed. A provisional key to the endocarps of extant species is also provided.

Fossil *Elaeocarpus* endocarps are described from mid-Tertiary localities in southern and eastern Australia. The different morphotypes demonstrate that the genus was morphologically diverse during the mid-Tertiary. A number of fossil species are closely comparable to extant taxa. Other species appear to represent evolutionary novelties with no close affinities to extant species in the Australian flora. The evolutionary and biogeographical significance of fossil *Elaeocarpus* in Australia is discussed. ☺

A family rent by rifting: a short history of the phytogeography of the Solanaceae

David E. Symon
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Taxonomic problems at almost all levels have previously obscured the patterns of distribution in the cosmopolitan family Solanaceae. The history of the clarification of these problems in recent years will be recounted. The results now strongly support a Gondwanan origin for the family. Several tribes of the family and sections within the large genus *Solanum* and its close relatives show clear continental divisions.

The distribution of some of these taxa on both sides of the tectonic divide in the region of Wallace's Line will be discussed. ☺

Forum/Posters

Introduced strandplants; a progress report

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Artotheca populifolia, *Cakile edentula*, *C. maritima*, *Euphorbia paralias* and *Hydrocotyle bonariensis* are naturalized strandplants which have been accidentally introduced to temperate Australian shores. Given the reliance on sea currents for dispersal of strandplant propagules, one would expect to find a correlation between the current systems of the waters around southern Australia and the spread of these

introduced species.

The poster presents an analysis of data available for *A. populifolia* and *E. paralias* as an example of the research I am presently engaged in. Records of herbarium collections are used as the principal source of information about location of arrival and subsequent spread.

A. populifolia is native to southern Africa, *E. paralias* to Europe and northern Africa. Both species were introduced into Western Australia in the late 1920's. While dispersal in an easterly direction under the influence of the West Wind Drift can be clearly demonstrated, a closer look at inshore current patterns is expected to be of help in unravelling some of the complexities at the local scale.

To enhance my data-base on introduced strandplants I would be grateful for information which either extends presently known distribution limits or narrows existing gaps in distributions. ☺

Hybridization in five alpine species of Ranunculus

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Extensive morphological work by Dr B.G. Briggs indicated that natural hybrids occur between alpine species of *Ranunculus* in the section *Chrysanthe*, rarely in the section *Epirotes* and not at all between the two sections.

To confirm whether inter- and intra-section crosses between the species in section *Epirotes* (*R. anemoneus*, and *R. gunnianus*), and in the section *Chrysanthe* (*R. muelleri*, *R. dissectifolius*, *R. graniticola*, *R. millanii*, and *R. niphophilus*), would set seed, a series of crosses were performed over three field seasons to establish whether the alpine *Ranunculus* could set hybrid seed, and if they could, whether they were fully or only partly compatible.

Because of the highly variable nature of the data, the percentage seed sets obtained were not considered to be very precise measures of compatibility and so they were interpreted only as indicating incompatibility, (seeds sets <5%), partial compatibility (>5% but < than the within species crosses) and fully compatible (equivalent to the the within species seed sets).

Although a few (11 out of 65 flowers, forming 42 seed in total) crosses within the section *Epirotes*, and between the two sections produced seed in general, *R. anemoneus* and *R. gunnianus* were unable to cross, or were only rarely compatible with each other and with the species in the section *Chrysanthe*.

Nearly all the crosses within the section *Chrysanthe* produced seed and the seed sets obtained were compatible to the within species crosses. *R. muelleri* was fully compatible with *R. dissectifolius*, *R. graniticola* and *R. niphophilus*, although for the last two species there was considerable variation in the results between seasons. *R. muelleri* appeared to be only partly compatible with *R. millanii*, and in most seasons and populations their flowering seasons were temporally separated and so they would be unable to cross. *R. dissectifolius* was fully compatible with *R. muelleri*, and either partly or fully compatible with *R. graniticola*, *R. millanii* and *R. niphophilus*. *R. graniticola* was fully compatible with *R. dissectifolius*, and *R. millanii*. It appeared to be incompatible with *R. muelleri* and to be only partly compatible with *R. niphophilus*, with none, or only low amounts of seed set when *R. graniticola* was a pollen recipient, but quite high seed set when it was a pollen donor. *R. millanii* was partly or fully compatible with *R. dissectifolius*, *R. graniticola* and *R. niphophilus*. It is either incompatible or only slightly compatible with *R. muelleri*. *R. niphophilus* was fully compatible or partly compatible with all the species, but was very variable in its success between seasons, particularly as a pollen donor.

These results indicated that for most species there was no complete barrier to gene flow via incompatibility. Some crosses did set lower levels of seed indicating partial incompatibility, but usually only in one season. In general these results support Dr Brigg's conclusions that there was fairly high levels of compatibility between the alpine species in the section *Chrysanthe* and that natural hybrids can occur in the field. ☺

The biogeography of Indo-Pacific grasses

Bryan K. Simon[1] and M. Lazarides[2]
1. Queensland Herbarium, Meiers Road, Indooroopilly QLD 4068
2. Australian National Herbarium, Division of Plant Industry, CSIRO, GPO Box 1600, Canberra ACT 2601.

The grasses native to the Indo-Pacific region are examined biogeographically using several different methods of analysis. Phenetic analyses of broad floristic regions from Africa to Hawaii, in terms of their genera are shown. The relationship of a number of biogeographical regions from the Indian continent to New Zealand, in terms of their species, is reviewed. The floristic richness and the taxonomic breakdown of each biogeographical region are discussed. The distribution and taxonomy of endemic and widespread taxa is assessed and anomalous distributions of a number of taxa are mentioned. Suggestions are given of the possible evolutionary history of grasses in the region and comments are made concerning the influence of naturalised species on possible future trends. ☺

Changes in relative mobility of pancreatic amylase variants in isoelectric focusing

Jurgen Tomiuk[1,2] and Lars Sommer Jermiin[1,3]
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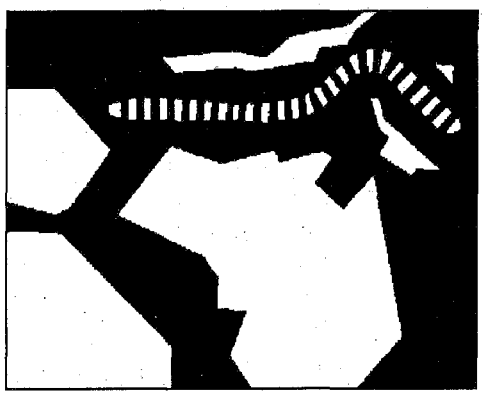
2. Abteilung fur Klinische Genetik, Institut fur Anthropologie and Humangenetik, D-7400 Tubingen, Federal Republic of Germany (present & corresponding address).
3. Department of Genetics and Human Variation, La Trobe University, VIC 3083, Australia (present address).

In the past 20 years starch gel electrophoresis has been used extensively in studying population genetics and evolution. The often used electrophoretic analysis of proteins has unfortunately always been hampered by two related problems of resolution: (1) the existence of hidden genetic variation, and therefore: (2) the non-necessary genetic equivalence of the same electrophoretic patterns obtained from different specimens. Based on both theoretical and empirical grounds, isoelectric focusing (**IEF**) (in which proteins are separated according to their isoelectric point in an electrically induced pH gradient) is expected to yield consistently better results than ordinary starch gel electrophoresis. **IEF** has therefore become an important tool in the analysis of the structure, dynamics and evolution of populations.

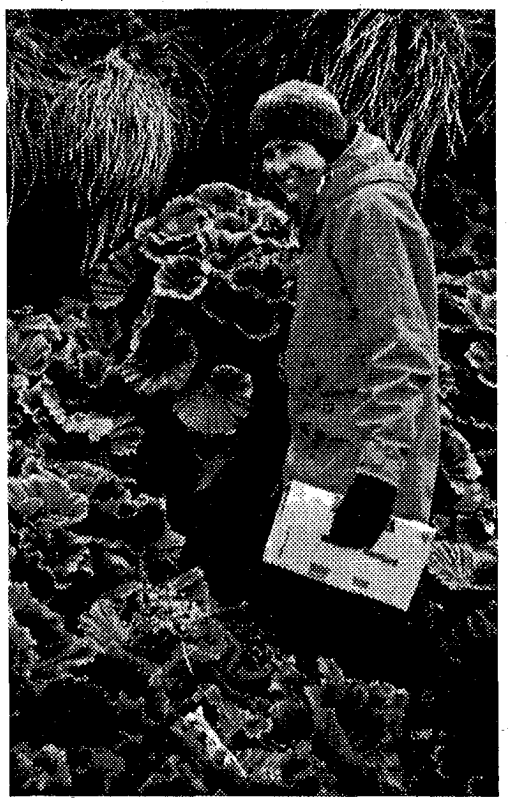
The present study questions the value of **IEF**. Recent application of **IEF** with one ampholyte solution has revealed the existence of single- and double-banded amylase phenotypes in the rhesus monkey, *Macaca mulatta*. When applying different ampholyte solutions, single- and double-banded amylase phenotypes were shown to change their position relative to each other. Replications and family studies excluded cathodal drift and the artifacts that sometimes occur in polyacrylamide gels as explanations of the observed mobility variation of the phenotypes. These results reveal a potentially serious problem in interpreting **IEF** data: Consistently reproducible position differences between bands may not necessarily represent genetic differences. Application of **IEF** may thus ultimately lead to misinterpretation of the genetic structure, dynamics and evolution of a population. ☺



ARTICLES

Macquarie Island - A Report on a Short Visit

J.R. Croft & M.M. Richardson
Australian National Botanic Gardens



Dr Patricia Selkirk surrounded by large plants of *Stilbocarpa polaris*, one of the most striking plants of Macquarie Island, south of the ANARE station.

In mid November 1989, JRC visited Macquarie Island for four days during the turn-around of the summer resupply voyage and collected living plant material and herbarium voucher specimens from the northern quarter of the island.

The project, proposed and planned by MMR, was to collect live material of subantarctic plants from Macquarie Island, ship them back to Australia as quickly as possible, and attempt to establish them in cultivation. The driving reasons for this project were to make this material, which is not commonly seen by the botanical community, readily available for research, both taxonomic and horticultural, for education in the form of public displays and formal education programs, and to investigate the possibilities of *ex situ* cultivation and conservation of the species.

In particular we hoped to collect and establish material of the most striking plants on the island, *Stilbocarpa polaris*, *Pleurophyllum hookeri* and the dominant tussock grass, *Poa foliosa*. We were particularly anxious to collect the world's southernmost orchid, a *Corybas* previously known as *C. macranthus*, but believed by David L. Jones to be an undescribed species.

That most of the species collected are still alive, and actively growing, in Canberra indicates that the exercise was successful.

Background

Macquarie Island is a subantarctic island lying just outside the antarctic convergence (c. 54.5 ° S, 159 ° E), almost 1500 km SE of Hobart. It is an approximately N-S strip of land 34 km long and 5 km wide and 250-350 m high, vainly trying to interrupt the onslaught of the 'furious fifties'. It is a tectonically active area, the island rising at a rate of c. 5 mm per year.

The island was discovered in 1810 and its natural resources were intensively exploited by seekers of abundant animal fur and oil until well into second decade of this century. Tragically, the original populations of the fur seal were

exterminated within 5 years of the discovery of the island. The introduction of vermin such as rats, cats and rabbits also had disastrous effects on the biota. Intensive scientific activity took place on the island with the Australasian Antarctic expedition of 1911-1914 led by Sir Douglas Mawson. Australian National Antarctic Research Expeditions (ANARE) have maintained a research and meteorological station on the island since 1948.

Politically and administratively the island is part of the state of Tasmania. The island itself is a Tasmanian Nature Reserve with Tasmanian park management and Tasmanian Rangers but the research station on a narrow isthmus at the northern end is maintained and run by the Commonwealth Antarctic Division. It is a successful example of Commonwealth-State co-operation.

The weather on Macquarie Island is both uniform and unpredicable, or uniform in its unpredictability. Rain can be expected on more than 300 days of the year (c. 900 mm/y) and the wind blows strongly and constantly from the west; the air temperature oscillates only a few degrees from 5 °C from day to day and throughout the year. While it is quite true to describe it as very windy, cold and wet, it is a common occurrence to experience all four seasons in one day.

As a geologically new island, and a subantarctic one at that, Macquarie Island does not have a particularly diverse flora. All vascular plants are herbs or prostrate sub-shrubs, 5 are pteridophytes and c. 45 are phanerogams; there are 5 introduced species and 2 endemics (the *Azorella* and the *Corybas*), both of which have very closely related sibling taxa on other southern islands. There are three times as many bryophyte species and over twice as many lichen species.

The vegetation cover on the island is rarely over 1 m tall and consists of tussock grasslands, herbfields, exposed feldmark, and wet and peaty fens and bogs.

The most striking feature of the island is, of course, its abundant bird and mammal fauna. Although exciting, walking and collecting near elephant seals has its problems.

Preparation

Collecting plants on Macquarie is not a trivial exercise; one does not simply get on a boat or 'plane and drop down for the week end. First you need permission to go there and do things and then logistic support from ANARE. To gain this you have to submit a plausible research project at least 10 months in advance and have it examined by a series of committees. If it is approved, participants are subjected to a variety of medical examinations to ensure they are not likely to die on the island. Then you have to get your equipment together and ship it to the Antarctic Division in Hobart.

The Antarctic Division has stringent requirements on training. Five days in October were spent being kitted out with quality cold weather gear and being trained in techniques of survival, rope work, search and rescue, first aid and induction to the administrative and management arrangements of the Macquarie Island station. The Antarctic Division maintains a well appointed training centre at Bernacchi in the central highlands of Tasmania for this purpose, complete with appropriately cold, wet and windy weather. This may seem a bit excessive for a four-day excursion, but it was a valuable and productive learning exercise that enabled participants to start productive and safe work almost immediately after landing on the island.

To the Island

After a day of training in lifeboat procedures, polar survival suits and survival at sea, the expedition left on the 'Polar Queen', a Norwegian ice-strengthened research vessel chartered by ANARE, on November 21, 1989. On board were the replacement winter party for the 1990 season, the summer research and logistic personnel, a handful of 'round-trippers', and an army team responsible for the LARCs (Light Amphibious Resupply Craft), the only means of getting people, equipment and supplies between the ship and the shore. The passage was fairly calm with tail winds and we arrived at Macquarie Island within three days, on the morning of Friday, November 24.

On the Island

Because of limited time on the island Pat Selkirk willingly offered her assistance to seek out and collect plant material. We were exempted from the usual duties associated with loading and unloading and were able to make collections from the afternoon of first day on the island.

The base is situated at the northern tip of the island and the limited time meant that our collecting was restricted to the northern quarter of the island (10 km). The main areas collected were Wireless Hill, Hasselborough Bay to the northern end of the 'Featherbed', Gadget Gully and onto the plateau, Nuggets Point and Sandy Bay through to Bauer Bay and from Bauer Bay overland back to the station.

The 'Featherbed' was a deep spongy peat bog of low herbs and grasses and pockets of free water. Juvenile plants of *Stilbocarpa* and *Pleurophyllum* were collected here. It was easy, but not pleasant, to extract the plants from the cold soft wet peat. The silky-silver-leaved *Pleurophyllum* had a large swollen carrot-like tuber and long roots that descended deep into the peat.

The cryptic *Corybas* orchid was found in full flower in similarly wet peat conditions on the north side of Bauer Bay. It was difficult to find due to its size and the fact that the leaves looked not unlike a very young *Pleurophyllum*.

Pleurophyllum also occured high on the plateau in well drained sandy gravel. With this wide tolerance of altitude, exposure, soils and water levels it was anticipated that this species would be extremely hardy and easy to establish in cultivation. This was not to be the case.

Throughout the island, the *Pleurophyllum* especially and other species generally, were copiously in flower and there was no trouble finding fertile voucher specimens. Regular visitors to the island stated that often the flowering is poor or non-existant, so we were fortunate in this regard.

We were also fortunate in the weather, which was mild by Macquarie standards allowing four days collecting with virtually no rain, moderate winds and hardly any mist or low cloud. Another advantage of summer field work on Macquarie Island are the very long daylight hours; you can work from 4 am to 9 pm in full daylight.

Herbarium voucher specimens were collected for each of the live samples. As there is no woody vegetation on Macquarie Island to speak of, most plants were collected as whole plants, clumps, or juvenile plants of the larger species. To satisfy quarantine regulations, soil was removed from the specimens and they were wrapped in moist newspaper and placed in plastic bags. Some specimens were potted directly in moist vermiculite, but this was a very time consuming process and was abandoned in the later stages.

Return to the Mainland

Departing Macquarie Island on Wednesday 29 November, the return voyage was not quite so halcyon as the arrival, strong winds and 10-15 metre waves out of Macquarie Island making the dining roon an interesting experience for a couple of days. The return voyage took three days and we arrived in Hobart on the aftrnoon of Saturday 2 December. The ten boxes of specimens were inspected by Quarantine officials to minimize the risk of introducing pathogens from the island. The boxes were rushed by air-freight to Canberra; some specimens, especially the *Pleurophyllum*, were already showing signs of stress.

Back in the Gardens

When the specimens arrived in Canberra they were unpacked in the nursery of the Australian National Botanic Gardens and potted into a mixture of 6 parts composted pine-bark, four parts sharp quartz sand with slow release fertilizer. The collection was divided. Part was placed in an artificially illuminated cool room in the nursery and part was sent to the Australian National University where it was placed in two environmentally controlled growth cabinets.

The environmental control at the ANBG was by means of two evaporative coolers and maintained minimum air temperatures of 13.6-15.1 °C and maximum air temperatures of 20.6-22.7 °C over the summer months. The environmental cabinets at the ANU were set at 8 °C by day and 5 °C by night with a

photoperiod of 16 hours. All watering was done by hand.

It was interesting to note that for those species in both the ANBG and the ANU a given regime did not favour all taxa, some doing better in the warmer conditions of the ANBG and others in the harsher conditions of the growth cabinets; subjectively, 6 taxa did better in warmer conditions, 6 in the cooler and 7 showed no differences.

The following species are currently being cultivated at the ANBG nursery:

BLECHNACEAE
Blechnum penna-marina
ASPIDIACEAE
Polystichum vestitum

APIACEAE
Azorella macquariensis
Hydrocotyle novae-zealandiae
ARALIACEAE
Stilbocarpa polaris
ASTERACEAE
Cotula plumosa
Pleurophyllum hookeri
CARYOPHYLLACEAE
Colobanthus muscoides
Colobanthus sp
ONAGRACEAE
Epilobium pedunculare
Epilobium brunnescens
PORTULACACEAE
Montia fontana
RANUNCULACEAE
Ranunculus biternatus
ROSACEAE
Acaena magellanica
RUBIACEAE
Coprosma perpusilla ssp. *antarctica*

CYPERACEAE
Isolepis aucklandica
JUNCACEAE
Luzula crinita var. *crinita*
ORCHIDACEAE
Corybas sp. nov.
POACEAE
Poa foliosa
Poa cookii
Puccinellia macquariensis

Clumps of the minute fern *Grammitis poeppigeana* were also brought back but did not survive. This genus is renowned for its difficulty of cultivation. Plants of *Poa annua* were also collected from the island but were culled due their potential problem as a weed in the collection; they are now stored as seed collections.

At the time of writing the *Stilbocarpa polaris* was growing extremely well in Canberra and had even flowered. Unfortunately the *Pleurophyllum hookeri* did not take kindly to being moved and nearly all plants have regressed and died; it is unlikely that the collections of this species will survive in captivity.

As many of the species are mat-forming, some plants will be grown in trays rather than in pots, both for cultivation and display purposes.

Summary

In spite of near perfect weather (by Macquarie standards), four days proved to be insufficient time for one person to adequately cover the area and process the material collected. Two weeks would have been ideal, but it was either 4 days or six weeks.

Many of the Macquarie Island plants had not previously been brought into cultivation; they are now available for study and display. By varying the cultivation regimes, we have shown that the plants can survive in conditions milder than those experienced in their native habitat.

A facility is to be constructed in the nursery to provide cool conditions for the collections over the summer months and a permanent display of the Macquarie Island flora. Attempts will be made to have those taxa that did not establish well recollected by future expeditions to Maccquarie Island. The ANBG will be distributing those species that have been established and repropagated to other Australian and international botanic gardens with facilities to maintain alpine and subpolar plants.

Acknowledgements

This project would not have been possible without the support and endorsement of the Tasmanian Department of Parks, Wildlife and Heritage (DPWH) and the logistic support of Australian National Antarctic Research Expeditions (ANARE). In the field, Dr Patricia Selkirk of Macquarie University provided willing and daylong assistance; without her detailed knowledge of the island and its flora and vegetation, the field trip would not have been nearly as successful. ☺

AMBIGUOUS GENDER IN LATIN DIAGNOSES

George A.M. Scott
Master, Queen's College
University of Melbourne

Most of us are familiar with the sudden accession of unfamiliarity to something hitherto well-known and unquestioned, seeing it with new eyes as if for the first time. This happened to me recently while turning into Latin a diagnosis of '*X-um y-um* var. *z-um*, similar to .....' The word for similar is *simile*, neuter, of course, in agreement with the gender of *x-um*; or, suddenly, should it perhaps be *similis*, feminine, in agreement with var. (varietas)? On further consideration I think there is no generally applicable answer. Latin is a very condensed language and condensation inevitably creates ambiguities. The verbless argot that passes for a botanical description is itself condensed syntactically (although usually prolix verbally, so where's the gain?) and the Latin is condensed still further. The choice of gender depends on what the uncondensed English would have been, and possibly on whether the categorising phrase *sp. nov.* or *var. nov.* is included.

1. *X-um y-um* var. *z-um* is a variety which is similar..... Clearly here 'variety' is the subject to which the following adjectives have to relate. The choice is *similis*. If this is what is intended it would be better emphasised in the description or diagnosis as: *X-um y-um* var. *z-um*, *var.nov.* (*varietas nova*) or better still (and in this case, I think, nearly unambiguous) *Var. nov.*, the capital implying a new sentence and hence clarifying the syntax. Exactly the same principle will apply with *subspecies*, which is also feminine.

2. *X-um y-um*, in the variety here described as *z-um*, neuter, so the right form is *simile*.

On balance I think that, when *var.nov.* or *ssp. nov.* is used as a part of the diagnosis and not just in the title, the dependent adjectives should be feminine in agreement with *varietas* or *subspecies*. Where these phrases are omitted the adjectives should agree in gender with the generic name.

Perhaps the safest way is to get rid of the cause of it all and specify the subject clearly: '*X-um y-um* var. *z-um* est varietas similis.....'

The problem is commonest in infra-specific diagnoses but can also occur in specific diagnoses, or in descriptions, where the text begins with an adjective rather than a noun, but in this case , if the phrase *sp. nov.* is omitted, the subject is unambiguously the specific name: only if *sp. nov.* follows the name is there room for debate, but I would again incline to the view that *species*(f) is a noun in apposition to the name, and is the subject to which subsequent adjectives should agree, regardless of the gender of the generic name. ☺

CREW ARCHIVES IN THE QUEENSLAND HERBARIUM: JOHN CARNE BIDWILL (1815-1853)

R.J.F. Henderson
Queensland Herbarium

At the ASBS Botanical History Symposium in Melbourne in May 1988, Margaret Simpson (Bulfin) of DSIR, Christchurch, New Zealand, gave a paper on the botanical collections of John Carne Bidwill from near Nelson, NZ in 1840. Bidwill is the man after whom our Bunya Pine (*Araucaria bidwillii*) is named, and who briefly was, in 1847/8, the Government Botanist and Director of the Botanic Gardens in Sydney (before Charles Moore arrived from England to take up the post on 14 January 1848).

In private discussions with Margaret Bulfin she informed me that she had been in contact with a Mr Vernon Crew of Boondall in Brisbane several years before about his biographical studies on John Bidwill. She was aware that Mr Crew had died before finishing his project to wrote up, in book form, a biographical account of Bidwill, and was interested to know what had happened to his papers etc. She understood that five chapters had been drafted by Mr Crew for his book at the time of his death.

On my return to Brisbane, I was wondering how I could find out about Mr Crew. My first impulse was to look in the telephone directory. This was rewarded by an entry for V. Crew, Boondall.

On ringing the number listed I found myself talking with Mrs Veronica Crew who was very interested when I said what I was looking for. As it turned out I had the right address and indeed she did have a pile of her deceased husband Vernon's papers relating to his project on J.C. Bidwill bundled up and put aside waiting to send somewhere, but she did not know where would be appropriate.

As I assured her that information contained in these papers could be of use to botanists in their future studies, Vonnie Crew agreed to lodge them in the archives of the Queensland Herbarium, where they are now housed.

The papers contain copies of correspondence with various people in Australia, New Zealand and England together with their replies, photocopies of published papers relevant to John C. Bidwill, a partial 'family tree', handwritten drafts of the outline and five chapters of a projected ten for Vernon Crew's book, and typed up copies of these chapters prepared by Vonnie Crew's niece who looked after Vernon from when he fell ill till the time of his death. There are also a couple of photographs from 1952 of Bidwill's grave and headstone inscription in the Tinana cemetery in Maryborough, Queensland. There are apparently no photographs known of Bidwill himself.

Vernon Crew's interest in Bidwill apparently resulted from the time he was with the Queensland Department of Adult Education in Maryborough. He later filled a post in the Department of Adult Education (now Centre for Continuing Education), in the Australian National University in Canberra where he had little time for his research on Bidwill. Following his retirement, he moved to Brisbane and again indulged his interest in Bidwill in earnest. He was preparing to journey to Exeter in England to follow up some promising leads when he was overtaken by cancer and died after a short illness on 12 April 1983, aged 69.

His Bidwill materials at BRI are available for study and perhaps will form the basis for someone else to carry the biography of John Carne Bidwill on to published completion. From what I've read, Bidwill was a very interesting person. We in BRI thank Mrs Crew for donating these valuable papers to our care. ☺

Rod Henderson

Mr Rod J.F. Henderson M.Sc., Principal Botanist, Queensland Herbarium, Department of Primary Industries, Brisbane, was born on 15 January 1938 at Mackay, Queensland. He has been botanist with the Queensland Herbarium since 1964, after graduating with a B.Sc. from the University of Queensland. Rod has, between 1975 and 1988, filled for varying lengths of time ASBS positions of Vice President, Councillor and *'Newsletter'* Editor. He was Australian Botanical Liaison Officer at Kew, UK, in 1978/79. He has contributed to *'Flora of Australia'*, mainly to the account of Liliaceae in Volume 45 (1987). Currently he is revising genera of Bentham's Stenolobeae of Euphorbiaceae for eventual publication in the *'Flora of Australia'*. His interests are mainly in angiosperm taxonomy, botanical nomenclature and botanical history. ☺

AUSTRALIAN SYSTEMATIC BOTANY SOCIETY INC. - BUSINESS

ASBS RESEARCH FUND

At the 1989 and 1990 ASBS General Meetings, it was agreed in principle to proceed with establishing an ASBS RESEARCH FUND.

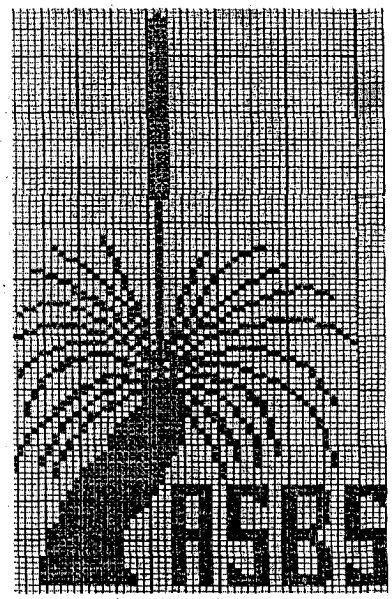
A Subcommittee [Helen Hewson (Convener), Gordon Guymer, David Morrison, Jocelyn Powell and Molly Whalen] will work towards setting up the Fund.

Current thinking is that grants from it should be available to students working in the field of botanical systematics.

The main task in the short term is to establish a core capital. A proportion of the interest from this will service any grants awarded in the future.

To start with, Council have agreed to set aside the profits from the sale of ASBS sweaters, T-shirts, mugs and scarves. These all feature *Xanthorrhoea* designs; scarves also feature ANBG and ABRS logos. They were marketed for the first time at the August 1990 meeting. Additional fund-raising exercises are encouraged within each Chapter. As an example I donated a bottle of wine as a lucky door prize at the General Meeting, asked for a coin, and made $35.

A voluntary levy on ASBS membership is being encouraged [see your enclosed membership renewal form - Ed.]. Indeed any initiative will be appreciated. Please be active and cooperative. Recall your own student days - - recall the difficulty paying for field work ... obscure literature ... specialised equipment ...



Xanthorrhoea design for a scarf

etc. Assisting students to gain a better outcome in their education process must be of advantage to the future of our discipline.

Purchase your Sweater/ T-Shirt/ Mug /Scarf through your Chapter Convener or from me or Helen Thompson c/o ABRS, Box 1383, Canberra ACT 2601.

Sweater: black with white design.....$25.00
T-Shirt: black with white design or
white with black design.....$15.00
Mug: white with black design.....$8.00
6-pack special.....$42.00
Scarf.....$20.00

NB: Winners of the book-voucher raffle were:
Lyn Randall, ERIN.....$100.00
Keith Houston, ABRS.....$50.00

This initiative earned $216.00 - the vouchers having been donated by myself.

Helen Hewson ☺

Newsletter Editor(s) Needed

At the 1990 ASBS General Meeting, your *'Newsletter'* editors announced, regretfully, that they wish to stand down at the end of the year. We will produce the December 1990 issue as usual, but a new editor(s) will be needed from the March 1991 issue onwards. It has been an enjoyable and rewarding experience for us, but we feel that after three years, it is time for somebody else to have a turn. It is also time that the *'Newletter'* editorial office moved from Canberra to another city.

So, if there is a budding journalist out there who wants to try out his/her talents, please contact a Councillor.

Barbara Barnsley and Mike Crisp ☺

Answer to Last Issue's Riddle

The Councillors were Mike Crisp (in the flares, at right), and Judy West, at left. The occasion was a field trip to Western Australia in 1975. ☺

1991 ASBS SUBSCRIPTIONS

The new subscription rate for 1991 will be $22 standard, $12 for students.

There will be no discount for early payment.

Subscriptions must be paid in advance i.e. they become overdue for the current year from January 1st. To assist members in paying on time, Council has established the following procedure:

1. A reminder notice about the next year's subscriptions, plus a proforma bill, appears in the 'Newsletter' *each September and December.*

2. Each March, the 'Newsletter' *contains a warning to unfinancial members.*

3. In June and September, unfinancial members are sent a 'Newsletter' *envelope containing an explanatory letter but no* 'Newsletter'.

4. No further 'Newsletters' *are sent to these members until they become fully financial again.*

Heard at the 1990 Symposia in Canberra

'Botanists use characters that a zoologist wouldn't spit on..

David Morrison, paraphrasing Norman Platnick *...this says something about the personal habits of zoologists'*

David Morrison

'I'm not really trying to be negative...actually I'm doing it without effort'

Steve Farris

'Some of the papers we have heard were sublime...others, subliminal'

Norman Platnick

☺

PERSONAL NEWS

Dr Mason Ellsworth Hale, Jr. (1928-1990)

Mason was a Senior Scientist and a former Chairman of the Department of Botany, Smithsonian Institution. He died 23 April 1990 at his home of renal cell cancer after a long illness.

Mason was internationally known for his lichen research. He joined the staff in 1957 and built the third largest lichen collection in the world. His 1967 (revised 1974, 1983) *'Biology of Lichens'* was the first comprehensive introductory treatment of lichens in English. His 1969 (second edition 1979) *'How to Know the Lichens'* became the standard guide for North American lichens. His baseline research on growth-rate and lead content of lichens, begun almost forty years ago, provided some of the first documentation of the impact of pollution on our environment. His research focused on large and widespread lichen families, Parmeliaceae (foliose) and Thelotremataceae (crustose), using new chemical and scanning electron microscope techniques. His most recent work, a revision of *Xanthoparmelia* with > 400 species (in press), utilizes pioneering computer techniques, including the use of data bases to analyse relationships, make identifications and automate descriptions.

Mason was a respected colleague and friend to us and to many all over the world. We will miss him.

L.E. Skog
Chairman, Department of Botany, NHB 166
National Museum of Natural History
Smithsonian Institution
Washington DC 20560 USA

☺

REPORTS

FLORA OF AUSTRALIA

As of 1 July 1990, the former Natural History Branch of the Department of the Arts, Sport, the Environment, Tourism and Territories has been merged with the Australian National Parks and Wildlife Service (ANPWS). This organisation, directed by Dr Peter Bridgewater, is a statutory body.

The name Bureau of Flora and Fauna has been dispensed with, this time for good. The Bureau's two sections - The Australian Biological Resources Study (ABRS) and the Environmental Resources and Information Network (ERIN) - now form the Australian Biological and Environmental Survey (ABES) as a branch of ANPWS. Dr Barry Richardson heads ABES with the title Survey Director. Within ABRS there are two subsections, the Flora of Australia and the Fauna Publication Unit. Both subsections will concentrate on their respective publications programs. For the present, both are also still involved with the administration of the ABRS grants program, and the Flora subsection assists in administering the Australian Botanical Liaison Officer program.

Cheryl Grgurinovic and Paul Hattersley have now joined the Flora staff, but the Science 5 position of Associate Director Flora remains unfilled pending a further review of the duties of this and the Fauna Science 5 positions. Alex George is acting in this position.

Volume 18 of the *'Flora of Australia'* was

published on 8 June. With it the number of species covered comes to 3116 in 539 genera and 88 families.

The *'Census of Australian Vascular Plants'* is with the printer and should be published shortly. Meanwhile, the *'Australian Plant Name Index'* is rapidly approaching completion. All four volumes are scheduled to go to the Australian Government Publishing Service by the end of December for publication early in 1991.

The ABRS Advisory Committee met on 23-24 August. The major item on the agenda was the applications for grants in 1991. Recommendations will go to the Minister shortly, and applicants should be advised of the outcome by the end of September.

Three staff members attended the IXth meeting of the Willi Hennig Society in Canberra. All scientific staff attended the ASBS Symposium on *'Indo-Pacific Biogeography: At the Crossroads'*, also in Canberra.

The next meeting of the Flora Editorial Committee will be held at the National Herbarium of Victoria on 18 October.

Alex George
Acting Associate Director, Flora of Australia ☺

AUSTRALIAN BOTANICAL LIAISON OFFICER

This is my final note from Kew as ABLO. The new ABLO, Dr Greg Leach from Darwin, has arrived and will take over from 3 September. I will spend the next two months at Paris Herbarium and then some additional time on leave before returning to Perth. I have enjoyed my time here very much and have learnt a lot.

Herbarium visits

My two most recent visits were to Lund, Sweden and Prague (PR), Czechoslovakia. Both were successful and enjoyable, although my time was very limited in Prague. I will be writing a separate article for a future *'Newsletter'* on some aspects of the Domin collections in PR.

Borrowing of Kew Specimens

My experience with the Australian collections at Kew has led me to conclude that too few Australian taxonomists borrow the Kew material for their revisions, or they concentrate on selected types only. The result is that the Kew collections do not receive modern determinations, and the researcher does not see the full set of Kew specimens seen by Bentham (which are not always cited individually) or other material not duplicated in Australia.

I believe that Kew particularly should be treated like an Australian herbarium from the point of view of seeing the holdings and ensuring that we have brought the identifications up to date. This is not only because of the overall quantity of the holdings and the quantity of types and unduplicated specimens, but the fact that Kew is for many scientists the first or only herbarium containing Australian specimens which will be consulted for their various researches. It is true that there are at Kew many duplicates of collections held in Australian institutions but many of them are not recorded on the sheets in the originating institution. Whilst there is expense involved in processing and posting the specimens, there is a saving on the need to make a selection and subsequent curation is made much easier by the presence of determinations on the returned specimens. In these days when publications often do not contain full specimen listings that can be used for curating, this may be the only way that curation can be carried out. A partial alternative that will help with duplicates is for authors who produce unpublished specimen listings to ensure that they send a copy to Kew.

Kew personalities

The new appointee as Editor of *'Kew Bulletin'* and associated publications is Dr Mike Lock, who has been associated with Kew particularly in his involvement with ILDIS (International Legume

Terry Macfarlane

Dr Terry Macfarlane is a native of Western Australia, having been born in Perth in 1953 and grown up in Pemberton. He is not exactly an endemic, however, for after taking an honours degree at the University of Western Australia 1972-75 (Honours topics: *Wurmbea*, mycology), he moved to the Research School of Biological Sciences, ANU, 1976-79 for his Ph.D. (Classification of the Pooid Grasses with Leslie Watson). Dispersal to Southampton University, UK, 1979-81 was next, where attention shifted to Legumes (The Vicieae Database Project). In 1981 after meeting his wife Hilary he persuaded her to go with him to Perth where a job was waiting at the Western Australian Herbarium. Among various activities there were three years, 1986-88, in which he spent some of his time teaching taxonomy courses at the University of Western Australia. The main groups on which he has published include Poaceae, Fabaceae, *Lomandra*, *Wurmbea*, *Haemodorum*, and is currently working on *Pultenaea* and related genera. From September 1989 to August 1990 he has been Australian Botanical Liaison Officer at Kew.

Database and Information Service), and author of the ILDIS publication *'Legumes in Africa'*.

Dr Charles Stirton has been appointed to a position at Kew in ECOS (Economic and Conservation Section) as coordinator for the Arid and Semi-arid Lands initiative in Brazil.

The Gulf crisis has touched even Kew in a direct way. Prof. Loutfy Boulos, University of Kuwait, who is visiting Kew, had been here for less than a fortnight when Kuwait was invaded. Fortunately all his family were also outside the country.

Where now for taxonomy?

An article with this title by H.T. Clifford, R.W. Rogers and M.E. Dettmann recently appeared in *'Nature'* 346: 602, 16 August 1990. It argues that there may be a case for pulping most of the specimens in herbaria and perhaps moving to an 'entirely literature-based taxonomic system.' This has caused a stir at Kew, being seen as very damaging, although happily I am still allowed in. Replies will be forthcoming if *'Nature'* prints them.

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Australian Botanical Liaison Officers

C.A. Gardner	PERTH	1937-39
C.T. White	BRI	1939
M.D. Tindale	NSW	1949-51
N.T. Burbidge	CANB	1952-54
P.F. Morris	MEL	1956-57
J.H. Willis	MEL	1958-59
Hj. Eichler	AD	1961-62
L.A.S. Johnson	NSW	1962-63
S.T. Blake	BRI	1964-65
M. Lazarides	CANB	1965-66
A.B. Court	MEL	1966-67
A.S. George	PERTH	1967-68
D.J. McGillivray	NSW	1969-70
J. Carrick	AD	1970-71
L. Pedley	BRI	1971-72
G.M. Chippendale	FRI [CANB]	1972-73
H.I. Aston	MEL	1973-74
D.F. Blaxell	NSW	1974-75
A. Kanis	CANB	1975-76
J.R. Maconochie	NT	1976-77
B.R. Maslin	PERTH	1977-78
R.J.F. Henderson	BRI	1978-79
A.A. Munir	AD	1979-80
M.I.H. Brooker	CANB	1980-81
M.D. Crisp	CBG	1981-82
R.B. Filson	MEL	1982-83
S.W.L. Jacobs	NSW	1983-84
N.S. Lander	PERTH	1984-85
C.R. Dunlop	DNA	1985-86
G.P. Guymer	BRI	1986-87
J.G. West	CANB	1987-88
K.L. Wilson	NSW	1988-89
T.D. Macfarlane	PERTH	1989-90
G. Leach	DNA	1990-91

☺

REVIEWS

Science as a Process: An Evolutionary Account of the Social and Conceptual Development of Science. By David L. Hull. *University of Chicago Press, Chicago, 1988. xiii+586 pp. ISBN 0-226-36050-4. $62.30*

It's always seemed to me that it would be useful to know something about the person writing any particular book review, as this helps to put their review into some sort of perspective, in much the same way that their review should put the book itself into a wider perspective or the reader. After all, the reviewer is likely to find books in their own area of interest extremely fascinating, while the rest of us think they're fit only for propping up broken table legs. With this idea in mind, the following data may be helpful.

I didn't start out with the intention of becoming a scientist - I always wanted to be an architect; but I eventually realised that this career would require me to use a certain amount of artistic flair, which I just don't have. So I drifted into scientific research, more because of a lack of anywhere else to go than because of any deep-seated drive to increase our knowledge of the universe in which we live. Furthermore, I became a biological scientist because I realised that I'd never be able to handle the mathematics necessary to contribute anything new to physics (which was my first choice).

This is not meant to imply that biology is, for me, a last resort - I've genuinely enjoyed my time as a botanist. However, it is meant to suggest that I'm not a botanist because of any burning desire to study plants. The consequence of this background is that I often seem to take a more detached view of science and botany than do those of my colleagues who study plants for the love of it. In particular, I have always been interested in the history of science, particularly with regard to how science is actually carried out by its practitioners, as opposed to how people think it should be carried out. Thus, my interest is in science as a process. This is often referred to as the sociology of science.

Science

An interest in the sociology of science is not, of course, unique to myself; but it does seem to be overlooked (or at least undervalued) by many (if not most) of the people who actually carry out scientific research. They seem to be too involved in the doing of science to concern themselves with how they are doing it. Somewhere early in their career they adopt a particular scientific method (either by trial and error, or by emulating someone else, or both), and they simply use this method for the rest of their life, without much further conscious thought about how to be scientist. I should emphasise here that I'm talking about their actual activities, not the philosophical methodology that they consciously claim to adhere to. Claiming to be a Popperian falsificationist is one thing; putting it into practice is another.

Interest in science as a process, rather than science as a philosophy, has increased in the last two decades or so. Historically, modern philosophers of science such as Karl Popper, Thomas Kuhn, Imre Lakatos, and Paul Feyerabend have concentrated largely on fairly simplistic views of science as an abstract philosophical discipline, although Kuhn and Feyerabend have also emphasised the importance of the history and sociology of science (see Chalmers, 1982, for a very readable introduction). This simplistic attitude is all very well, but such studies largely ignore the practicalities that each of us must deal with every day in actually trying to be scientists. It seems to me that the philosophy of science should take this into account as well; and, indeed, many other people have advocated that it should take a much more prominent place in studies of the philosophy of science. There is even now an Australasian Association for the History Philosophy and Social Studies of Science.

From this point of view, I was looking forward to reading David Hull's book, as he has had a long-standing interest as a philosopher in precisely this area - how science is actually

done by scientists, and how this activity contributes to what we usually think of as scientific progress. This book is the end-product of fifteen years of studying scientists, and as such it is a valuable contribution to an understanding of the sociology of science. In particular, it integrates the philosophy and sociology of science, rather more in the line of Medawar (1979) than the essentially sociological works of Sinderman (1982, 1987).

Systematics and Philosophy

However, I was equally interested in this book for another reason. Most discussions of the philosophy of science are made with reference to physics as the exemplar, particularly celestial mechanics. Indeed, to many people physics is science, the opinions of chemists, mathematicians, biologists, and geologists notwithstanding. A perusal of theoretical books such as those of Popper (1957, 1959, 1962), Kuhn (1962), Lakatos and Musgrave (1970), and Feyerabend (1975) reveals very little in the way of references to biology. Indeed, Popper's major early contribution to the philosophy of biological science was to claim that evolutionary theory is not falsifiable and is therefore not scientific - a position that he later retracted (Popper 1980), although still claiming that the study of evolution is best viewed as a metaphysical research programme. A perusal of books on the history and sociology of science, such as that of Friedlander (1972), reveals exactly the same bias towards physics.

However, when David Hull started his study of scientists, he had already become personally involved in an area of scientific research, so that he could view it from both the outside (as a philosopher) and the inside (as a participant). The area he had chosen was biological systematics. So, Hull has chosen taxonomy as his exemplar, and his book is thus also a detailed study of the last thirty years of the science of systematics. As such it is a valuable contribution to an understanding of the changes that have taken place during that time. In particular, the rise of numerical phenetics and cladistics as scientific research programmes is documented and analysed, as is the response of the traditional evolutionary phylogeneticists to these new programmes.

The number of books dealing (at least indirectly) with the philosophy of biology as a science has increased rapidly since the works of Peter Medawar (1967, 1969). Introductory works range from earlier (but still relevant) books such as those of Ruse (1973), Hull (1974) and Medawar and Medawar (1977) to more recent ones such as those by Rosenberg (1985) and Ruse (1988). Also included in this category are collections of essays such as Rose (1982a,b) and Saarinen (1982), particular points of view such as those of Levins and Lewontin (1985) and Mayr (1988), and also more historical works such as Mayr (1982), Kingsland (1985) and McIntosh (1985). Since 1986, there has even been a journal called *'Biology and Philosophy'*, in direct competition with the much older *'Philosophy of Science'*.

However, what most of these works lack is a useful discussion of the science of systematics. This is one major discipline in which biology differs dramatically from other types of science, because it relies heavily on statements about particular unique circumstances in history. All of the fundamental aspects of phylogeny (speciation, extinction, character transformation, etc) refer to events that are unique in history and unique for each group of organisms. This historical aspect of the science of systematics is problematical from a philosophical point of view, because it usually prevents systematists from making universal statements - we are virtually restricted to making statements that are local to any one set of circumstances. This limitation of systematics therefore deserves a good deal more attention than it has received. Consequently, David Hull's book is to be welcomed as a major contribution to this topic (however unintentional this may have been from the author's point of view).

The Author

Hull's stated motivation for writing this book (p. xi) is that he "had become increasingly dissatisfied through the years with the logical empiricist analysis of science that had been so popular for over a generation. [He] did not find

the 'received view' so much mistaken as too far removed from the ongoing process of science. Too much of science was being left out ... Something had to exist, other than the rarefied abstractions of logical empiricist philosophers of science and the wild-eyed proclamations of the more radical critics". With this idea in mind, he decided to investigate 'the relative importance in science of reason, argument, and evidence on the one hand, and power, prestige, and influence on the other ... Answers couched totally in terms of one sort of influence or the other were sure to be wrong and ... the interplay between the two was likely to be fascinating'. He is right.

David Hull is uniquely qualified to author this book. He has been a professional philosopher of science for thirty years or so, specialising in biological science. He has contributed publications on taxonomic philosophy, evolutionary theory, and the history of biology, as well as being president of the Philosophy of Science Association. However, in commenting on the philosophy of biology, he has done more than be just another 'unmarried marriage counsellor'. He has become an active participant, mainly in zoological systematics. In particular, he has been active in the Society of Systematic Zoology, being a contributing editor of their journal (*'Systematic Zoology'*) from 1974-76 and president of the society from 1984-85. It is a refreshing change to have a philosopher of science actually having a fairly detailed knowledge about an area of science as well as a knowledge of philosophy.

The Book

The book itself is basically about the way in which science develops from one time period to the next. At the philosophical level, Hull's thesis is that biological evolution provides an analogy (or model) for the way in which science changes. This is often called 'evolutionary epistemology', for those of you who wish to impress your friends with your erudition (although I should emphasise that Hull has a clearly-stated aversion to such terminology as being counter-productive - an opinion I entirely share - and he does try to avoid it in his book). So, Hull perceives that in science there are a wide variety of competing research programmes some of which, through adaptation and selection, are successful in being the ancestors of future research programmes and some of which are not. This thesis is not entirely original (see Ruse 1989), but Hull takes this analogy seriously, and follows it to its logical conclusions.

At the sociological level, Hull's work is more original. He argues that scientific change is largely a product of the interaction between scientists, rather than between ideas. Scientists both compete and co-operate with each other (as do organisms in the biological world), allowing a selection process to operate, leading to differences in the successful continuation and diversification of some ideas and not others. In particular, Hull concludes that the prime motivation for a scientist is not making money or the thrill of discovery (although he certainly doesn't deny the existence of these motivations), but rather it is having other scientists use and acknowledge their work. His discussions on these themes are wide-ranging and completely absorbing, and the evidence he provides is quite convincing. I, for one, found Hull to be continually striking familiar chords in my own mind.

Hull provides two types of evidence for his theses, using primary source materials in both cases. The first is a view at a distance of the rise of Darwinism, and the changes that evolutionary theory has undergone since then. The second is a much more detailed, and much more fascinating, study of the rise of phenetics and cladistics in systematics. In particular, the personalities and behaviour of the chief participants in these movements are subject to close scrutiny, with very little in the way of concessions to their finer feelings.

It is this latter part of the book that will probably be of most interest to systematists, although the reader should be warned that many of the participants display behaviour that may be (and indeed has been) considered offensive by those who were brought up in an earlier generation. However, it is part of Hull's thesis that it is precisely these sorts of people who are most influential in scientific progress. He also concludes (p. 32) that 'the behaviour of the scientists whose careers I chronicle may not

look very good when compared to some Platonic ideal scientist, but it looks very good indeed when compared to the behaviour of doctors, politicians or bankers'.

As far as systematics as a research programme is concerned, Hull is quite optimistic. He suggests (p. 465) that "claims about the progressive nature of science are usually made with respect to the more 'mature' areas of science; to be frank, physics. Genetics, evolutionary biology, and systematics are rarely presented as paradigm examples of progress in science, but I think that progress in these areas is just as apparent as in physics. ... Although progress in a science such as systematics is more difficult to document, I think that it can be discerned in the controversies detailed in the first half of this book. If nothing else, the issues are clearer". I entirely agree.

Criticisms

By and large, I think that this is a very successful book, but it is also quite definitely a flawed one. Firstly, the analogy between biological evolution and scientific change is very revealing, but it is not necessarily completely convincing. In taking the analogy to its logical conclusions Hull gets onto very tricky ground, and he is not always successful in dealing with this. In particular, he doesn't appear to effectively discuss theories that have been selected against in history - he concentrates very much on the successful research programmes. However, his detailed analysis does highlight a number of very pertinent points that have been consistently undervalued by past philosophers of science. In particular, the idea that scientific research programmes are easily circumscribed and internally consistent is shown to be very naive - the potential for interaction between research groups and for disputes within groups is too large.

Secondly, there is often very little integration between the theses presented in the book and the evidence provided for them. The book often resembles a stream-of-consciousness novel, unexpectedly chopping back and forth. Quite often, it is not until the Summary or Conclusion section of each chapter that the reader finds out what the preceding pages were intended to demonstrate, either in the way of thesis or evidence. This is annoying to say the least. However, this is one of the most readable books on the philosophy of science that I've ever come across, so perhaps there is a trade-off between formal presentation and readability.

Thirdly, the chapters are not clearly integrated. The first half of the book (Chapters 2-7) is mainly a discussion of the sociology of science, along with Hull's evidence from the science of biology. The second half (Chapters 8-13) is a more detailed discussion of Hull's version of evolutionary epistemology. These groups of chapters could quite easily have been separated into two distinct books, and the second half of the book is much less readable than the first half.

I also suspect that sometimes the simplification necessary to wield a broad brush in discussing the progress of evolutionary theory has lead to slight distortions of history. For example, in discussing the rather intolerant personality of Ronald Fisher, Hull comments (p. 58) that 'at last his wife decided that twenty-five years of abuse were enough and left him', using Box (1978) as his reference. However, Joan Box makes it perfectly clear in her book that Fisher's family (of which she was one) finally discovered religion and concluded that God's will was more important than Fisher's. Unable to accept this idea, Fisher left them. Farris and Platnick (1989) and Farris (1990) claim that there are similar distortions in Hull's presentation of the progress of phenetics and cladistics, although theirs is certainly not an unbiased opinion.

There are quite a few typographical errors, although probably no more than is to be expected in a large book. However, several of them are dangerous in the sense that they are misleading in their context. A particularly notable example is the small table on p. 295, which should actually look like this:-

Monophyly	
Holophyly	Monophyly
	Non-monophyly
Paraphyly	Paraphyly
Polyphyly	Polyphyly
(a) Ashlock (1971)	(b) Nelson (1971b)

Finally, as a minor quibble, Hull refers to himself in the third person whenever he appears as a participant in the events he is describing. This is presumably an attempt to be objective, but it is very disconcerting when it happens.

Responses

While philosophers of science have responded positively to this book (eg. Ruse 1989), needless to say the response to this book by some of the people discussed in it has been less than enthusiastic. However, the response of Farris and Platnick (1989) has only deepened my conviction that much of what Hull says is perfectly correct. Their review (or critique, rather) is an almost copy-book example of most of the points that Hull makes about the behaviour of scientists, an irony that I'm sure has completely escaped the notice of these two authors. Furthermore, the polemical (disputaceous) style of their writing has certainly not abated with the years - you'd think that all that success would have made them a lot sweeter. They risk becoming archetypal 'cranky old men'.

In particular, they critise Hull for not using cladistic methodology in his own philosophical studies. Hull points out that trying to precisely define ('individuate') a research programme (such as phenetics or cladistics) is impossible, as there are usually no broad areas of complete agreement among the scientists who claim to support any one programme - they agree and disagree with each other in all possible permutations. Farris and Platnick argue that if Hull had bothered to use cladistic techniques, he would have discovered that 'clustering by synapomorphy' was itself a synapomorphy for 'cladistics' as a research programme. However, Hull refutes this as a suitable approach, because any one apomorphy in sociology is completely arbitrary and is never congruent with any other apomorphy. However, Farris and Platnick reject this argument out of hand - Hull has not used cladistics and therefore Hull is wrong.

Conclusion

So, in summing up, anyone who is interested in the philosophy and sociology of science will find this book to be a wealth of ideas, particularly concerning the scientific role of the personalities of the scientists concerned, and of the interactions between those personalities . Furthermore, anyone interested in the history of evolution and systematics will find this book an valuable and very readable reference. Finally, anyone interested in learning more about the study of phenetics and cladistics could do a lot worse than starting here. I thoroughly recommend it.

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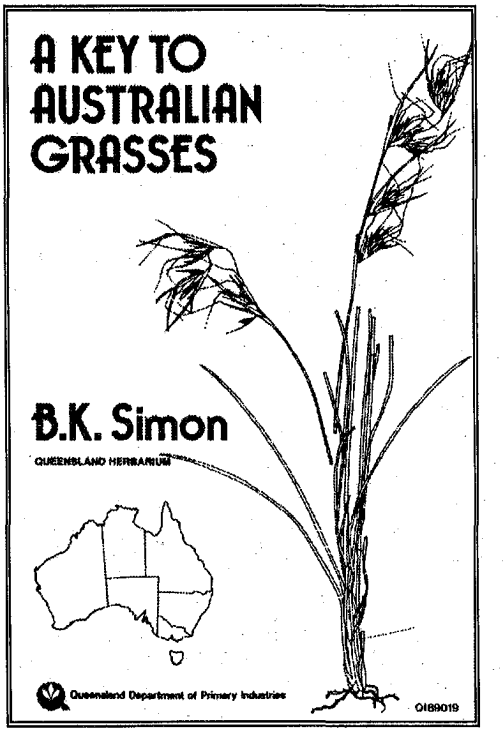
A Key to Australian Grasses. by B.K. Simon. *Queensland Department of Primary Industries, 1990. 160 pp., soft cover, 403g. ISBN 0-7242-3211-7. $35.00*

Essentially, this publication on Australian, native and naturalised grasses (224 genera and 1,319 species) comprises a classification system of four ranks (viz. Subfamily, Supertribe, Tribe and Subtribe), a key to the genera, keys to the taxa in genera, and an extensive bibliography. The Australian State distribution for each species is indicated by an assigned number. A considerable proportion of the information given represents original research by the author; the remainder has been extracted from the literature.



Bryan Simon is to be congratulated on achieving two valuable objectives. In a compact, readily applied publication he has provided the means of identifying all Australian grasses at generic and specific levels, and references to all relevant taxonomic treatments for the benefit of users requiring further data. This is the only comprehensive treatment of the Australian Poaceae since 1878, when Bentham's Volume 7 of *'Flora Australiensis'* was published.

The identification keys are based usually on a single floral feature, though sometimes two or occasionally three characters are used. Generally, the contrasting characters are wisely chosen and definitive. As a result, the keys are brief, conclusive and should appeal to specialist and non-specialist alike. However, sometimes with complex broadly circumscribed taxa, these

qualities are achieved by the over-simplification of infra-specific variation. In these cases, it is necessary to refer to a detailed description or illustration elsewhere in order to verify identification.

It is heartening to know that, as mentioned in the foreword, this work is supported by a computerised database, which is being continually updated. For there is little doubt that, irrespective of the treatments that may be forthcoming in the future, there will be a continuing need for this publication as a field manual and for general usage, especially by a range of researchers in disciplines allied to taxonomy. As a taxonomist with both applied and research interests, I would hope that revised editions of this book are produced regularly in the future.

M. Lazarides

Curator, Australian National Herbarium ☺

RECENT PUBLICATIONS

Ferns of Queensland. By S.B. Andrews. *Queensland Department of Primary Industries, 1990. 448 pp., illustrations, hard cover, 1kg. ISBN 0-7242-3224-9. $45.*

Vegetation Map and Description, Warwick, South-eastern Queensland. By P.A.R. Young and T.J. McDonald. *Queensland Department of Primary Industries, 1989. 56 pp., illustrations, map, card cover, 315g. ISBN 0-7242-3210-9. $30 or $12 map only.*

The Flora of Lamington National Park, (2nd edition). By W.J.F. McDonald and M.B. Thomas. *Queensland Department of Primary Industries, 1989. 28 pp., card cover, 175g. ISBN 0-7242-3218-4. $5.*

Flora of South-Eastern Queensland, Volume 3. By T.D. Stanley and E.M. Ross. *Queensland Department of Primary Industries, 1989. 532 pp., hard cover, 1.35 kg. ISBN 0-7242-2523-4. $40.*

Vegetation of the Sunshine Coast. By G.N. Batianoff and J.A. Elsol. *Queensland Department of Primary Industries, QDPI Publications, GPO Box 46, Brisbane 4001, 1989. 120 pp., illustrations, maps, hard cover, 530g. ISBN 0-7242-3203-8. $30.*

Plant Systematics in the Age of Molecular Biology. Reprinted from *'Australian Systematic Botany'* Volume 3 Number 1 (1990). *CSIRO Publications, PO Box 89, East Melbourne, Victoria 3002, Australia. vi + 164 pp. B5, ISBN 0-643-05098-1. $30 Australia/New Zealand, other countries $US 35 (includes air delivery).*

A wide range of macromolecular approaches to the systematics of plants. In addition, powerful new methods have been developed to analyse the massive amounts of data generated. These new approaches are providing answers to some of the most intractable problems of systematics at all levels.

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Advances in Legume Biology. Edited by C.H. Stirton and J.L. Zarucchi. *Missouri Botanical Garden, PO Box 299, St. Louis, MO 63166-0299, USA, 1990. 842pp., 35pp. illustrations, soft cover. $US 100.*

Proceedings of the Second International Legume Conference held in June 1986.

History of Microbiology in Australia. Edited by Frank Fenner. *The Australian Society for Microbiology, Clunies Ross House, 191 Royal Parade, Parkville, Vic. 3052 and Brolga Press, to be released in November 1990. 624pp., 252 plates. $75.*

A special pre-publication price of $50, including packing and postage, is offered for orders received before 31 October 1990. ☺

NOTICES

Current State of Phylogenetic Gene Sequencing in Plants

Numbers in parentheses after boldface group names indicate the approximate number of sequenced *rbc*L genes in that group. Each entry line indicates a particular phylogenetic sequencing project being carried out in the indicated laboratory (in general, only heads of labs are given; in a few cases senior postdocs about to start their own labs are also given; multi-person listings indicate collaborations between labs or groups). Numbers in parentheses after a project description indicate (i) that the study is already underway (in a few cases completed and even published) and (ii) the *projected* number of taxa that will be sequenced. The word 'underway' in parentheses indicates that the described project is in progress, but that information regarding projected number of taxa to be sequenced is lacking. The word 'planned' in parentheses indicates that the P.I. is reasonably confident-to-certain that the indicated project will be carried out and that it is likely to start within the next year. Within a group, chloroplast studies are indicated first (starting with *rbc*L studies), followed by nuclear studies [starting with nuclear ribosomal RNA gene sequences, which are indicated either as 'rDNA' (for sequences derived by sequencing ribosomal RNA *genes*) or 'rRNA' (for sequences derived by sequencing ribosomal RNA itself)]. I have not included studies where only one or two genes have been sequenced. This list is not claimed to be comprehensive or accurate; additions and corrections are welcome.

ANGIOSPERMS

Asteridae (75)

*rbc*L - whole subclass and its relationship with Rosidae (40) Olmstead/ Palmer

*rbc*L - Asteraceae and relatives (15) Michaels/ Palmer/ Jansen

*rbc*L - Asteraceae (28) Jansen/ Michaels/ Palmer

*rbc*L - tribes of Solanaceae (planned) Olmstead/ Palmer

*ndh*F, *rpo*C2 - Asteraceae (28) Jansen

*ndh*F?- Campanulaceae (planned) Jansen

*ndh*F?- Verbenaceae/ Lamiaceae (planned) Olmstead

*ndh*F?- Gesneriaceae (planned) Sytsma

*orf*K - Polemoniaceae (20) Steele/ Vilgalys

*orf*K? - Scrophulariaceae/ Orobanchaceae (planned) DePamphilis/ Morden/ Palmer

rDNA - whole subclass (15) Zimmer

Caryophyllidae (20)

*rbc*L - subclass monophyly (6) Giannasi/ Clegg

*rbc*L - Caryophyllales (15) Rettig/ Manhart

rDNA - Caryophyllales (8) Boulter/ Gilroy

Dilleniidae (5)

*rbc*L - Ericales (and Dilleniales) (8) Chase

*rbc*L - carnivorous plants (Nepenthales) (6) Chase

*rbc*L - Capparales and glucosinolate families (planned) Rodman/ Sytsma

*rbc*L - Brassicaceae and relatives (planned) Palmer

Rosidae (20)

*rbc*L - Saxifragaceae s. l. (8) Soltis/ Soltis/ Clegg

*rbc*L - Polygalales, Sapindales, Linales, Geraniales, Euphorbiales (28) Chase

*rbc*L - Rosales (planned) D. Soltis

*rbc*L and *rpo*A - Geraniaceae and relatives (planned) Palmer

*rbc*L - Onagraceae (8) and Myrtales (planned) Sytsma

*rbc*L - Fabaceae (planned) Doyle

rRNA - Onagraceae (12) Zimmer

rDNA - Santalales and Rafflesiales (underway) Nickrent

rDNA transcribed spacer - *Epilobium* (underway) Sytsma

PGI - *Clarkia* (8) Gottlieb

Hamamelidae (5)

*rbc*L - basal Hamamelidae (underway)

Golenberg/ Clegg
*rbc*L - Urticales (underway) Giannasi
*rbc*L - Juglandaceae/ Fagaceae (planned) Giannasi/ Doyle
*rbc*L - Betulaceae and relatives (planned) Bousquet

Magnoliidae (15)
*rbc*L - Magnoliaceae (including fossils) (4) Golenberg/ Giannasi/ Clegg
*rbc*L (and perhaps *atp*B also) - Nympheales and relatives(15) Les/ Wimpee
*rbc*L - Ranunculaceae (planned) Jensen
*rbc*L - Berberidaceae (planned) Jansen
*ndh*F?- Ranunculaceae (planned) Johanssen
rRNA - Winterales (15) Thien/ Zimmer
rRNA - Magnoliaceae (underway) Zimmer

Alismatidae (0)
*rbc*L - Potamogetonaceae and relatives (planned) Les

Arecidae (2)

Commelinidae (10)
*rbc*L and *rbc*L-*atp*B spacer - (4) Doebley/ Golenberg/ Clegg
rRNA - Poaceae (15) Zimmer
nuclear 5S rDNA repeat - Triticeae (underway) Baum
ADH-1- archaeological history of maize (planned) Schaal

Zingiberidae (10)
*rbc*L - Bromeliaceae and relatives (20) Clark/ Clegg
*rbc*L and rRNA - Zingiberales (planned) Kress/ Zimmer
rDNA transcribed spacer - *Brokynia* (underway) Sytsma/ Givnish

Liliidae (10)
*rbc*L - Liliales and Orchidales (20) Chase
*rbc*L - Pontederiaceae and relatives (planned) Barrett

ANGIOSPERMS: BASAL QUESTIONS
*rbc*L - origin and major branchings of monocots (underway) Clark/ Clegg
*rbc*L - origin and major branchings of monocots (underway) Chase
*rbc*L - fossil plants and relatives (underway) Golenberg
*rbc*L and rRNA - basal angiosperm relationships (underway) Martin
rRNA - seed plant relationships; angiosperm origins and early evolution (50) Zimmer
rRNA - angiosperm origins and early evolution (15) Antonov
18S rDNA - seed plant relationships (7) Nairn/ Ferl
vascular ATPase - angiosperms and other seed plants (underway?) Gogarten

GYMNOSPERMS (21)
*rbc*L - *Pinus* and Pinaceae (15) Strauss
*rbc*L - conifers (planned) Strauss
*rbc*L - gymnosperms (planned) Furnier
*rbc*L - cycads (12) Chase

FERNS AND FERN ALLIES
*rbc*L - fern allies and a few ferns (underway) Manhart
*rbc*L - Ophioglossales (planned) Chase
*rbc*L (and perhaps other genes) - *Asplenium* (planned) Murikami/ Schaal

BRYOPHYTES (1)
*rbc*L - bryophytes (planned) Chase/ Mishler
*rbc*L - bryophytes (planned) Manhart
16S and 23S rRNA (500 bp) - bryophytes (12) Misher/ Vilgalys
rRNA - bryophytes (10) Chapman/ Zimmer

GREEN ALGAE (10)
*rbc*L - Charophyceae and outgroups (20) Manhart
*rbc*L - Volvocales (planned) Chase/ Coleman
*rbc*L - *Coleochaete* (planned) Graham/ Sytsma
*tuf*A - major groups (12) Palmer
rRNA - many groups (60) Chapman/ Zimmer
rDNA - major groups (underway) Floyd/ Wilcox
rDNA - Volvocaceae (underway) Kirk
16S and 23S rDNA - *Chlamydomonas* (16) Lemieux/ Turmel

RED ALGAE AND CHLOROPHYLL A/C ALGAE (5)
*rbc*L and 16S rRNA - plastid origins and relationships (underway) Cattolico
*rbc*L - chlorophyll a/c algae (underway) Alberte
*tuf*A - plastid origins and relationships of major groups (20) Palmer
16S rRNA - plastid origins and relationships (underway) VanderMeer/ Douglas/ Reith
rRNA - plastid origins and relationships of major groups (10) Perasso

rDNA - Dinoflagellates (underway) Powers/ Rowland
rDNA - Dinoflagellates (underway) Trench
rDNA - brown algae (underway) Druehl
rDNA - red algae (17) Ragan
rDNA - red algal hosts and parasites (underway) Goff

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Also heard at the 1990 Symposia

'This was such a subversive thing that I decided not to show it to you.'
Mark Coode, about a cladogram he had generated

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Consejo Superior de Investigaciones Cientificas
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ASC	Association of Systematics Collections
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BMNH	The Natural History Museum (London)
CAL	Conservation Analytical Laboratory (Washington, DC)
CCL	Canadian Conservation Institute
CMN	Canadian Museum of Nature
GCG	Geology Curators' Group
ICOM	International Council of Museums
ICCROM	International Center for Conservation in Rome
IIC	International Institute for Conservation
IIC-CG	International Institute for Conservation - Canadian Group
MNCN	Museo Nacional de Ciencias Naturales (Madrid)
NIC	National Institute for Conservation (Washington, DC)
NMNH	National Museum of Natural History (Washington, DC)
SPNHC	Society for the Preservation of Natural History Collections

For further information, please contact program coordinators:

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AUSTRALIAN SCIENCE ARCHIVES PROJECT: ANNUAL REPORT

If you are not already on the mailing list but would like to receive the *Annual Report* of the Australian Science Archives Project which is distributed with the July edition of the *'History of Australian Science Newsletter'* please contact:

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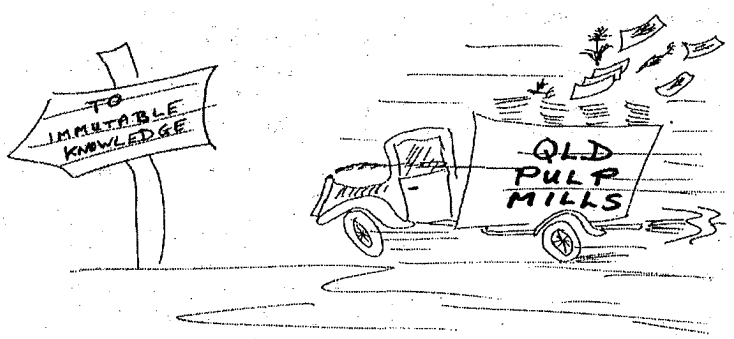

Cartoon by Paul Hattersley

COMMENTARY

SYSTEMATICS OR TAXONOMIC NAMING SERVICE?

The following response to the commentary article in *Nature* 346: 602 (16 August 1990) by Clifford, Rogers and Dettmann has been submitted to *'Nature'* for publication on behalf of the Society.

Clifford, Rogers and Dettmann have highlighted a situation faced by all taxonomic institutes but have exaggerated the problem and misunderstood the role of herbaria. They suggest a solution which displays ignorance and a surprising lack of understanding in professional biologists.

Their solution may appeal to the uninitiated, and could be taken up by busy administrators and politicians seeking quick remedies to immediate ills.

As representatives of the systematic botany community in Australia, we feel obliged to stress the real role of systematics in biology today. A systematist researches to produce a testable hypothesis of the most likely phylogenetic relationships given the data at hand, so providing the improved predictivity that justifies taxonomic research. Systematics assimilates many types of data, including results from e.g., genetics, molecular and population biology, biochemistry, anatomy and morphology. Many of these data are derived from the study of museum or herbarium collections. Systematics aims to present a comprehensible system of classification and is critical to the documentation and maintenance of the world's biological diversity. It is not merely an exercise in stamp collecting or a naming service for other branches of biology.

Briefly, Clifford *et al.* state that herbaria are becoming choked by ever-increasing numbers of specimens most of which, in their opinion, have so little value that we would be better off without them; they should, the authors say, be pulped. The principle can be applied to all taxonomic collections.

With touching optimism, the authors go on to suggest that funds and staff-time so saved would be diverted to 'taxonomic research proper'.

We consider that the authors have made errors of fact and errors of logic. Taking the troubles of the Natural History Museum in London as exemplifying a world-wide problem, the authors point to the increasing costs of maintaining large buildings and the collections housed in them and question the need to continue keeping three classes of specimens - those representing 'well-known floras, such as those of Europe', voucher specimens for 'ecological and other work' and 'all collections from the rest of the world which have been the subject of revisional studies in the past 30 years'.

We have no doubt that European botanists will be formulating their own response to the suggestion that their flora is well-known. Certainly it is better known than Australia's, of which no part is well known *in toto* - but we probably all know of individual species that are so well-represented that some specimens could be pruned without loss. However, even if the current specialist were to prune (and anyone lacking intimate knowledge of the group must be kept well away from this exercise), the saving in curatorial load would be negligible.

Clifford *et al.* suggest that new specimens can be collected for new treatments. However, recollection of whole suites of species covering broad geographical areas is clearly not cost effective, and in many cases not feasible. It is naive to believe that we could re-collect even a fraction of the biodiversity represented in our herbaria now.

What of ecological and other vouchers? All the institutes we represent already practise some pruning and quality control of incoming material; some reserve sterile material apart until after publication of results, and disposal seems appropriate.

However, if cases for such limited disposal can be argued, no case at all can be made for ditching the bulk of the collections that Clifford *et*

al. see no use for. The authors' lack of understanding of the difference between written records and specimens is little short of stupefying. The following quote from their article is perhaps their nadir, and would under normal circumstances be the signal to ignore the rest of the article completely: 'A case can even be made for moving to an entirely literature-based taxonomic system .... If taxa are to be subdivided or combined, the decision is made solely on the basis of published descriptions'.

A description makes accessible a selection, a subset, of the total information that a specimen yields. There is no such thing as a complete description; there will be as many descriptions as there are disciplines studying that specimen, and many of them will not overlap in any way. Furthermore, in these days of expediency in publication we are encouraged to shorten our descriptions. Yesterday we would have described gross morphology, anatomy and palynology. Today, we add electron microscopy and biochemistry in many new and revealing facets. Tomorrow, who knows? No specimens, no information. For most of the specimens Clifford *et al.* advocate throwing out we have only gross morphological descriptions.

Within each discipline, standards of description change with time, as perceptions change. Old descriptions no longer suffice. More importantly, taxonomic concepts change as new taxa are found and new techniques utilised. If descriptions are based on incorrect identification or observation they are a source of confusion and error that, without the material, can never be verified or disproved. To believe, as apparently the authors do, that identifications are forever and never need checking is comparable to the thousand years of blind acceptance of the works of Theophrastus and Dioscorides.

Today, systematic biology is being rejuvenated by new and more disciplined ways of thinking; the computer provides powerful new tools and the predictive power of the resulting classifications - the central aim of the systematist - improved. Without specimens variation cannot be assessed. The amassed collections of ourselves and our forebears now have new potential in the urgent task of discovering, describing, naming and above all understanding the relationships and biology of the riot of life around us while it lasts. It is time to build on the resources of our collections, not to discard them untapped.

In this connection, it is illogical that Clifford *et al.* uphold the need to preserve palaeontological material but not herbarium material of species rendered extinct in our life-time - is stoniness the only criterion of desirability in a specimen?

Finally the authors confuse herbaria (the collection of dried plant specimens) with Herbaria (the Institutes which care for and use them). The value and usefulness of herbaria are judged by a combination of things, among which is the number of specimens, the geographical areas covered, the groups represented, the state of their curation and the proportion of 'classical' material mentioned in the literature, including types. But Herbaria are indeed judged in part by the quality of their research, in part by their attitude and accessibility to visiting researchers. The quality of the research is a much more complex mix of factors than Clifford *et al.* allow - published Floras and Monographs and papers in the scientific press are the most obvious, but accuracy in the identification of collections derives in large part from long familiarity with the collections. In turn, these identifications are the key to the literature and are thus of crucial importance to all those other disciplines that rely on taxonomists' insight and experience.

It is to be hoped that those concerned with support and management of our biological collections are not misled by the simplistic, short-sighted and ill-conceived ideas put forward by Clifford *et al.* Comprehensive and well curated collections are essential for the production of high quality systematic research sought by these authors.

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☺

AUSTRALIAN SYSTEMATIC BOTANY SOCIETY PUBLICATIONS

History of Systematic Botany in Australasia

Edited by P. S. Short. A4, case bound, 326 pp. ASBS, 1990.

For all those interested in the 1988 ASBS symposium in Melbourne, here are the proceedings. It is a very nicely presented volume containing 36 papers on the botanical exploration of our region; the role of horticulturists, collectors and artists in the early documentation of the flora; the renouned (Mueller, Cunningham) and those whose contribution is sometimes overlooked (Buchanan, Wilhelmi).

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Evolution of the Flora and Fauna of Arid Australia

Edited by W.R. Barker & P.M. Greenslade. ASBS & ANZAAS, 1982. Price $20.

This collection of more than 40 papers will interest all concerned with Australia's dry inland or the evolutionary history of its flora and fauna. It is of value to those studying arid lands and evolution in general. Six sections cover: ecological and historical background; ecological and reproductive adaptations in plants; vertebrate animals; invertebrate animals; individual plant groups; concluding remarks.

Flora and Fauna of Alpine Australasia: Ages and Origins

Edited by Bryan A. Barlow. ASBS & CSIRO, 1986. Price $21.

The alpine environments of Australia, New Guinea and New Zealand differ from each other in terms of topography, genesis, climate and biota. They also contrast strongly with alpine habitats in the northern hemisphere. Paleoclimatology, paleobotany, biogeography, ecology and plant and animal systematics have been used here to give an understanding of the biohistorical relationships of these isolated islands of alpine terrain in the southern hemisphere.

Systematic Status of Large Flowering Plant Genera

ASBS Newsletter no. 53, edited by Helen Hewson. December 1987. Price $5.

This *Newsletter* issue includes the Reports from the February 1986 Boden Conference on *The Systematic Status of Large Flowering Plant Genera.* Reports cover the genus concept; the role of cladistics in generic delimitation; geographic range and the genus concept; the value of chemical characters, pollination syndromes, and breeding systems as generic determinants; generic concepts in various taxa: Asteraceae, Chenopodiaceae, Epacridaceae, *Cassia*, *Acacia* and the eucalypts.

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The Newsletter

The *'Newsletter'* appears quarterly and keeps members informed of Society events and news, and provides a vehicle for debate and discussion. In addition original articles, notes and letters (not exceeding ten pages in length) will be considered. Contributions should be sent to the Editor at the address given below, preferably as an unformatted word-processor or ASCII file on an MS-DOS or Macintosh diskette accompanied by a printed copy, or as two typed copies with double-spacing. All items incorporated in the *'Newsletter'* will be duly acknowledged. Authors alone are responsible for the views expressed.

Notes

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