

listed and may include *N. burbridgeae* which was published in 1984. Three more species published since then for Australia are not included amongst the photographs. However *N. wuttkei* Clarkson & Symon (1991) is the last of the list of doubtful or insufficiently known species.

May one beg for a second edition, including our few new species, and one that is not so expensive and hence more readily available to the botanical community.

## References

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## Postscript

Japan Tobacco Inc., now known as JT, is a Japanese tobacco and cigarette manufacturer, the third largest in the world, also with interests in plant biotechnology, pharmaceuticals and the food and beverage market. The company is listed on the Tokyo Stock Exchange and until 1994 was totally government owned. Now it is 67% owned by the government. The Japanese Tobacco Business Law apparently requires that the government owns more than 50% of the company in perpetuity and that it “promote the healthy development of the tobacco industry and ensure stable revenue in the interest of a sound national economy”.

Since writing this review, David has received a complimentary copy of the publication and I have been given permission to reproduce the illustrations of Australian *Nicotiana* species in the interactive identification tool to Australian Solanaceae. Voucher information is still being sought.

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# Flora of Australia

## Volume 43, Poaceae 1: Introduction and Atlas.

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In my student days, the first lead in the key to the grasses of the *Flora of the Sydney Region* divided the group into corn versus everything else. What I always liked about this was not its obvious truth as to the natural arrangement of the world, but that it neatly summarized my entire knowledge of grasses. Fortunately, a small amount has changed since then, both in the *Flora* and in my knowledge.

The main problem with grasses is not that they have modified flowers and leaves (the paleas, lemmas and glumes), although this situation alone is bad enough. No, the major problem with grasses is that very few of the species ever seem to have a standard number of all of these parts. More to the point, the particular pattern of

absence (how many paleas, lemmas or glumes are missing) is always a crucial feature for identification. The keys keep telling you that this or that particular group of species has lost one or more of these bits, and you are therefore supposed to work out which ones are missing on the specimen in front of you. This is difficult enough to do when you know what the parts are supposed to look like, and where they are supposed to be, but if you have never seen this particular group before then you are in an impossible situation. If the parts are all there, then you can see what they look like; but if some of them are not there, then how are you supposed to work out what they would have looked like if they were there, so you can tell that they aren't? [Note that this mutual impossibility is not a case of catch-22, as many people seem to claim, or at least not as described in the book of that name. Catch number 22 in the book occurs when the goalposts keep moving further away every time you get near them. I do not have this problem with grasses, because I never get anywhere near the goalposts in the first place.]

So, my particular interest in reviewing this new book on grasses was whether it would help me deal with my problem. Especially, would it also help my students? After all, if I can't help them, then they desperately need a book that can. The only alternative is to turn out as ignorant as their teacher, which, come to think of it, is probably the fate of all students anyway.

Sadly, things did not start out too well in the book. I am sure that sweat broke out on my brow while Alison McCusker ('Structure and Variation in the Grass Plant') quietly assured me that all of my worst fears were going to come true: "when combined with the very large number of taxa contained in the family, their structural simplicity makes [grasses] very difficult to identify". Oh dear — I had hoped that it was only my own ignorance that made them that. Still, I was right about the next bit: "Variations in the form and arrangement of spikelets and their component parts dominate the keys for identification of grass taxa ... These are the most useful and important key characters, and are employed from the highest taxa down to the species level." A haunted look now entered my eyes, while the words re-echoed on the pages: "it is impossible to work through a key to identify a grass without interpreting the internal structure of its spikelets"; "for most of the spikelets ... it is not immediately obvious how many florets they contain"; "the presence, number and nature of incomplete florets are important taxonomic characters"; "the possibility of empty lemmas that look like glumes should not be dismissed lightly". But much worse was yet to come: "It may not be possible to identify your material unless samples at different stages of maturity have been included in the collection". It began to sound like it might not be possible to identify my material *at all*. How long was I being asked to stand out in the field waiting for these different stages of maturity? Most of the plant specimens collected by me don't last very long — they tend to ripen and then rot if I don't identify them pretty quickly (presumably this is due to some faulty learning on my part a quarter of a century ago). I discovered this characteristic when I used to try to simultaneously collect buds, flowers and fruits of acacias, because that's what the keys insisted you also needed to identify *them* — I'm sure that the same masochist is being paid to write all of these keys, because I am beginning to recognize their trademarks. But apparently grasses are even worse than acacias: "For some grasses it is important to determine, while in the field, whether the species is annual or perennial". This could take months, waiting to see whether the plant dies off over winter. Or is it the summer when they die? Presumably this is what the other volumes of the *Flora* are for — to give you

something to read while waiting for the right season for identification in your current volume.

Still, in spite of the apparent gloom, I *did* actually find the answers to all of my questions. There is a helpful discussion of all of the potential identification problems, and practical advice is provided to help you overcome them. For example: "If one of the typical components of a spikelet has been completely aborted, e.g. if the upper glume is missing altogether, this can be detected by a gap in the regular alternation of the remaining components on the rachilla. In this example, the basal floret would occur on the same side of the rachilla as the one remaining (technically the lower) glume." This makes perfect sense within its context, and I wish someone had pointed this out to me a long time ago. I felt much better about grasses after reading this chapter than I did before, so it gets the thumbs-up.

Bryan Simon's 'Key to Genera of Australian Grasses' starts by pulling out the bamboos, which makes a nice change from corn. Next comes *Micraira*, on the grounds that it is the only group in Australia with spiral phyllotaxy. Elsewhere (p. 104), we are told that this is a "strange moss-like" group, and Plate 12 certainly makes it look unlike any grass I've ever seen, so I'm sure I'll recognize it if I ever see one of them (or probably fail to recognize it as a grass at all). Clearly, no-one will use these first few leads very often, nor are they intended to. Then we get to the meat of the key, first with details of the spikelets: "bisexual" versus "morphologically or functionally unisexual". After I've collected a plant it's usually not functioning at all, so that "or" is unnecessary in my case. Then both halves of the key proceed to distinguish 2-floreted spikelets from the rest (both 1 and >2), so all of the previous warnings about needing details of the inflorescences just to get started are correct. Most of the leads in the key are kept simple, rarely referring to more than one character. This is good if the character is carefully chosen, and in most cases they seem to be. Sometimes, however, this obviously becomes a bit too difficult, and leads 72 and 163 (for example) have little essays.

I rather suspect that in a group like this, a multi-access key will be used far more often than will a printed binary key like this. *AusGrass* will therefore presumably be a more viable alternative for most people.

The 'Key to Tribes of Australian Grasses' is a bit of an anomaly. We are told that becoming "familiar with morphological features that characterise at least the larger tribes ... is a very

useful and time-saving skill to acquire”, but I am not sure that this key will help anyone to acquire it. For example, the second choice of the first lead has a long spiel that basically translates to “not as above”, which is not an auspicious start. The problem is that very few of the tribes actually come out in any coherent manner in the key, even at lead 1- it takes 55 leads to identify only 29 taxa, so almost every tribe comes out in more than one place. Even distinctive tribes like the Bambuseae and Micraireae are buried away in a mass of flower details that have nothing to do with the features that most people actually use to recognize these groups. So, all in all, I cannot see too many people using this particular key.

Toby Kellogg’s chapter on ‘Classification of the Grass Family’ is an inevitable inclusion in such a volume, but she is sadly fighting an uphill battle all the way. This is the sort of topic that has given systematics a bad name. Such chapters always begin with a review of the history of misclassification of the group, which makes systematists look like they make decisions on a whim and change their minds every few years or so. This is then inevitably followed by a lengthy description of the composition of the various groups of taxa, which, when read by a student, will certainly increase the ranks of physiologists and ecologists at the expense of systematists. I wish that we could find some other way to present this sort of information. I guess that we could start by de-emphasizing our respect for Robert Brown and George Bentham, and starting the history review in the 20th century at least. After all, Albert Einstein didn’t introduce his ideas on relativity by discussing Galileo, and we could usefully follow this lead. Only a historian needs a historical review, while a scientist needs only a summary of the current evidence, preferably presented in some easily digested form. Note that my complaint here is about the topic, *not* the author or information. Toby has done an excellent job — I just wish that this particular job wasn’t seen as necessary in systematics.

Steve Renvoize then provides some useful bedtime reading with his extensive and detailed survey of ‘Grass Anatomy’. Everything you have ever wanted to know is here, with illustrations. Clearly, only the introductory overview is meant actually to be read, with the bulk of the chapter forming a valuable compendium for reference purposes only. There is a lifetime’s work in compiling this encyclopaedia, and another one digesting it all. On top of this, the author is a supreme optimist: “the grass plant is instantly recognizable” — in my experience, most of the things that the general public instantly recognize as “grasses” are actually sedges and restios.

In addition to these ‘background’ chapters, the rest of this volume consists of chapters discussing the general biology of Australian grasses. Most of the chapters are an overview of the chosen topic, presenting an up-to-date synopsis of the information as it applies to Australia. However, some of the chapters are a bit more like catalogues, simply detailing the contents of the various papers that have been published, without necessarily providing a cohesive outline. The chapters have thus been written in different styles and with different purposes. This is to be expected in a compilation volume such as this, but it is a case of ‘reader beware’. Several topics make their appearance in more than one chapter (eg. C4 metabolism, seed biology), thus making them appear somewhat disjoint.

A chapter by Bob Hill has become almost compulsory for volumes such as this. I’m not sure where the man gets the time to keep producing these works. He has clearly found more than 24 hours in each day, which is a trick I’d like him to pass on to me, if he can spare the time. Mike Macphail actually gets the guernsey as the major author this time so maybe Bob is slowing down. The chapter itself, ‘Palaeobotany of the Poaceae’, is a detailed consideration of what little is known about the early history of Australian grasses, written with a sensible restraint in the light of the rather poor data. I just wish that I could remember the names of all of those geological time-periods.

Russell Sinclair’s chapter on ‘Ecophysiology of Grasses’ is one of the more catalogue-like chapters. This is partly because of the broad nature of the subject matter (almost anything can fit into physiology as a subject), and also because of our relative lack of knowledge about each of the topics (photosynthesis, water relations, soil nutrients, salinity, photoperiodism, pollen, germination). Some pertinent themes emerge from the chapter, nevertheless.

Richard Groves and Wal Whalley cover ‘Grass and Grassland Ecology in Australia’. A diversity of topics is covered (seeds, breeding systems, conservation), but many more have been left out. This may have been the most difficult topic to summarize, probably needing a book of its own. Unfortunately, the various sections feel a bit too much like they were written by two different authors, which does not help the coherence of the subject.

Peter Linder, Bryan Simon and Carolyn Weiller attempt the difficult task of addressing the ‘Biogeography of Australian Grasses’ in the

absence of any detailed phylogeny of the group. This is an impossible ask, but the authors bravely try it nonetheless. They do this by providing an original analysis, rather than an overview, based mainly on pre-existing information. This is quite an interesting chapter, but it suffers from the lack of evolutionary context. It also suffers from the usual problems associated with the use of political rather than biological regions, and from a classification hierarchy that is neither consistent across levels nor particularly stable. The authors freely admit these limitations, so I am not saying anything original, but I would place somewhat more severe caveats on their conclusions than they do. The most "interesting" of their chosen regions is the 'Pacific Subtropical', which extends down the east coast to Green Cape peninsula. Anyone who has stood in Green Cape heathland will know that the wind has not touched land since it left Antarctica — 'subtropical' was therefore *not* the first description that leapt to my mind on the day I was forced to stand there, one winter during an undergraduate ecology fieldtrip.

Mike Lazarides rounds out the biology chapters by discussing 'Economic Attributes of Australian Grasses'. As with the Anatomy chapter, this is largely a compendium, prefaced with an overview. As its title suggests, it is the most anthropocentric of the topics, and as such it stands out from the others — this may be a good thing or it may not. It also exemplifies the problems associated with the length of time taken to produce all of these chapters, as the various contributions were clearly completed at different stages of preparation of the volume. In this case, the summary of endemism of Australian grasses does not agree with the summary in the previous chapter (which is only a minor thing, given the fluidity of the estimates).

In general, there is a consistent look and feel to the volume, in spite of the diversity of authors. There are minor differences in the formatting of the references in different chapters (e.g. capitalization of book titles), but that is about all. Unfortunately, the printing of my copy was not too good in several places.

Speaking as someone with a bit of editorial experience I can assure you that editors hate it when the subject of errors comes up. It is depressing to put an enormous amount of effort into something and then have people only point out the technical faults and not the technical perfection that has been achieved elsewhere. So, I will content myself with noting that, like any book, you can find things here if you have the required knowledge and look in the right place

while concentrating very hard. However, if that is the length you have to go to find anything wrong, then I think that it is far more helpful to note that this book follows the same high standards that we have come to expect from the professional staff at ABRIS.

Figure 11E (p. 47) represents the first glimmer of a deliberate sense of humour that I have detected in the *Flora of Australia*, which is about time too. (You will need to check this out for yourself, as I am not going to describe it for you.) However, the book also contains some nicely dry, but perhaps unintended, humour. After noting that resurrection plants are found sporadically among ferns, dicots and monocots, Russell Sinclair tells us (p. 138) that: "It is probable that the ability to tolerate complete dehydration has evolved on more than one occasion." It is the word "probable" that is so good, because the only alternative to polyphyly for these species is that the phylogeny underlying our botanical classification is rotten all the way to its core.

Also, I'm not sure what the general public will make of some of the names of these grasses. Surely "Walwhalleya" sounds more like a town out back o' Bourke than a genus of grasses, and I'm convinced that "Dallwatsonia" appears as a land somewhere in the *Lord of the Rings*. Perhaps it's just my imagination.

So, should you rush to spend your hard-earned pennies on this volume? If you do, you will certainly learn something. Or, perhaps more accurately, I learned a lot, and if you are semi-clueless like me then you probably will too. But what if you are not clueless? Well, this book is designed to be a stand-alone compendium of our current knowledge of the biology of Australian grasses. There is nothing else like it on the market, which cannot be said for related groups like the Restionaceae, for example, where there is the excellent *Australian Rushes*. So, if you want the information all in one place, in an accessible and concise format, then this is the book you need.

However, if you do actually want to read this book, and think that you might refer to it again, then buy the hardcover version. Soft-cover books of this size do not wear well, and the cover of mine was creased within a very short period of time. Publishers should realize that the natural habitat of a book while being read is in a bed, and therefore they need to be small if they are to have a soft cover (the books, that is, not the publishers).