A rose by any other name ... the changing names of plants

"What's in a name? That which we call a rose
By any other name would smell as sweet."

Juliet, in William Shakespeare, Romeo and Juliet (Act II, Sc.2)

This is a revised version of an article by WR (Bill) Barker published in the Friends of Botanic Gardens of Adelaide Gazette *in 1995. Bill is a taxonomist (those who classify plant groups) in the State Herbarium of South Australia. Taxonomists are responsible for describing and naming many new species and varieties, and introducing many other name changes in Australian plants, both as specialists in plant groups and in applying the world's scientific literature to our flora.*

The general public often asks why there are so many changes to the scientific names applied to our garden and bushland plants. When, they may ask, will the botanists who impose these changes meet the demands of users for a stable nomenclature of plants? Common names seem to work without changing very much. So why not use them instead?

In this article I will attempt to explain why the attainment of a stable system of plant names often can only take place through a series of name changes, that the system of scientific names provides a superior system compared with one using common names, and that while, with qualifications, there may be only one correct scientific name for a plant, we can get by using common names or alternative names provided by science.

So you think plant names should not change? Names change as knowledge increases

Names of organisms are the invention of humans and are only applied on the basis of the knowledge available to the biologist providing them at that point in time. As knowledge changes, so names may change.

For example, the number of Australian species of vascular plants (flowering plants, conifers and their allies and ferns) known to western science has increased rapidly in the last 250 years. This knowledge has been based on the plant collections deposited in herbaria (plant museums) at the time. In the mid 1700s Linnaeus listed and described the flora of the whole world in a small book which included species extending to Australia. By 1810 Robert Brown, the botanist on Flinders's voyage, covered half of Australia's flora in one small volume (lack of sales prevented him from producing the final second volume). In the mid 1800s a Londoner George Bentham produced the first comprehensive account of Australia's plants, his *Flora Australensis* encompassing 8 volumes. Now over a century later its new equivalent will encompass 50 volumes, with treatments mainly written by resident taxonomists.

This increase in known species of plants is continuing unabated. This is true, for example, despite decades of research, in the case of our own South Australian vascular plants, with the discovery of new species from the bush (even in prominent groups such as *Eucalyptus* and *Acacia*) and introductions both from overseas (e.g. the recent discovery of two members of broomrape or *Orobanche*, one particularly noxious fortunately eradicated) and from other Australian states, like *Grevillea rosmarinifolia* and *Acacia baileyana*, which have spread from our gardens.

The discovery of these new species by taxonomists sometimes comes with the first observations and collections of the plant while it is still not known by either a scientific name or local common name (as in various species of the foxglove family Scrophulariaceae recently named and two new *Spyridium* species from northern Eyre Peninsula).

However, more often a new species is found by the taxonomist after examination of a large range of herbarium specimens of existing species. The existence of the new species may have

remained unrecognised by scientists and the general populace alike for even as long as a century. For example, just two species of the showy-flowered genus *Peplidium* of arid mud pans were understood to occur in Australia; studies over the last 15 years have increased this to 14 species.
It is desirable that those who knew the new species under an earlier name change their application of this name to take into account the discovery and the new limits of variation of the original species. As a consequence, the expansion of knowledge based on larger and larger samples of herbarium collections enables a better understanding of the species which constitute the flora of a region such as our own continent and the relationships between them.

New collections from most parts of the world continue to throw up new species or indicate the need to redefine the limits of variation of existing species. Clearly, no system of classification and names for a plant group, if geared to keeping up to date with advances in knowledge and providing communication on a global basis, can be assured of being stable in terms of the number of different species and varieties within it and their circumscription of their variation.

Why have scientific plant names? Common names get me by

Common names have an advantage over scientific names in that their users do not need a grounding in botany or a knowledge of how names are applied elsewhere to use them. If there's a plant at the bottom of the paddock or in the garden that promotes sufficient interest, it is likely that in the absence of a known or appropriate common name one will be devised for that time and that situation and take on a local currency. The application of *Salvation Jane* and *Patterson's Curse* to *Echium plantagineum* in different Australian states based on different regional perceptions of it being a fancy or foe is one such case. Just scan the most recent edition of the *Flora of South Australia* and you will see the high frequency of more than one common name applying to a plant species. These common names came from a Committee of users and from publications in different States.

Not all groups of organisms are well-catered for with common names

The general public is used to employing common names for the plants and animals that they come across in their everyday activities, or for those that excite their interest. Scientific names are not their normal means of communication. Few other than scientists would know that the Tammar Wallaby of South Australia's peninsula region is *Macropus eugenii* or that the cheeky Willie Wagtail is *Rhipidura leucophrys*. These are amongst the conspicuous groups of organisms, the mammals and birds, for which most species have catchy English or Aboriginal names.

However, apart from a large array of such long-used or maligned garden or herbal plants such as the snapdragon (a name often given *Antirrhinum majus*) and the weedy horehound (*Marrubium vulgare*), plants are so numerous and closely allied that a system of common names which caters for the communication needs of the public has not developed into a universal system. Groups such as the lower plants (which include the mosses and lichens), the fungi and the algae have an even more inadequate array of common names for distinguishing species, with even fewer exceptions.

In the absence of an adequate system of common names for plants, scientific names are used by the public for communication. This has led to community disapproval when botanists change the scientific name in the course of reflecting improvements in knowledge. By contrast, in the mammals there seems no such outcry when scientific names change for species with adequate common names. The Tammar Wallaby, for example, was only recently placed in the same genus as the kangaroos. It was at times known not so long before that as *Thylogale eugenii*, *Thylogale flindersii* or *Protemnodon eugenii*, reflecting the advancement of knowledge of classification at the species and genus level amongst the species now placed under the genus *Macropus*.

Problems with common names

Because common names are derived from local needs with no consideration of wider consumption, they are often used inconsistently between regions, either being taken up because of some resemblance to a plant with the same common name or being independent inventions. Take as an example the *mistletoe*. The mistletoe of European tradition is a member of the genus *Viscum* in the family Viscaceae. Our Australian *mistletoes*, sharing a similar way of life parasitising trees, belong to a completely different family, the Loranthaceae. The former has small flowers visited by insects, the latter showy flowers visited by birds. There are many similar examples of common names being applied to disparate plants or plant groups. One is *snotty-gobble* (the parasite *Cassytha* in South Australia, *Persoonia saccata* in Western Australia).

Another is the *red cedar* (*cedar* is applied not only to *Cedrus* species, but also to other unrelated plants, while *red cedar* is used for both the flowering plant *Toona* in Australia and the conifer *Juniperus virginiana* in the Northern Hemisphere). Yet, because the distribution of these like-named but different plants is usually in different parts of the world, communication about them is rarely a problem. South Australian examples are the sharing of native willow by *Acacia salicina* and *Pittosporum phylliraeoides*, *onion weed* by species of *Asphodelus* and *Romulea*, and *native fuchsia* by species of *Correa* and two species of *Eremophila*.

How scientific names are applied consistently around the globe

Scientific names are more consistently applied across the globe than common names. One major reason is the requirement that they conform with rigorous legal standards (the *International Code of Botanical Nomenclature*), which include a prescribed publication process and the permanent linkage of names to plant specimens (types).

The legal process called *Conservation*: a way to avoid changing a scientific name, but no way to preventing changes to classifications

If application of the rules of nomenclature dictates a change in scientific name for a plant, this change may be avoided by a legal process called conservation. This can only occur where much confusion amongst users will be caused through widespread use of the earlier name.

There is an important proviso however. Conservation can only be invoked to prevent a name from otherwise being removed from currency. It cannot prevent the change in circumscription of the group it is applied to. Recently there has been a call from amongst Australian plant lovers for the conservation of the name *Eucalyptus* to prevent the published separation of the bloodwoods as a new genus *Corymbia*. Conservation can not prevent this, for the usage of *Eucalyptus* as name at the genus level is not threatened.

Misapplication of scientific names: a reflection of inadequate knowledge

Nevertheless, the history of botany is peppered with examples of names applied to one plant being misapplied to other plants. As explained in the previous article, the published descriptions to that time may prove to cover only some of the actual variation of the species and differences from its relatives. Access to type specimens could resolve some of these problems, but these often reside in herbaria of the northern hemisphere and cannot readily be dispatched around the globe. And photographs generally divulge just a small proportion of the essential morphological differences between closely allied plants.

Examples of misapplied names include, at the generic level, the initial placement of known Australian members of the family Proteaceae (including *Banksia*, *Hakea*, and *Grevillea*) in *Protea* (following the concepts of Linnaeus), a genus now known to be confined to South Africa. The confusion of introduced weeds with Australian natives of similar appearance provide examples of misapplication of scientific names at the species level. It was some years before it was realised that *Solanum elaeagnifolium*, the noxious silver-leafed nightshade, as delimited in South Australia, included two natives *S. ellipticum* and *S. coactiliferum*. The caltrop *Tribulus*

terrestris and creeping oxalis, *Oxalis corniculata*, both encompass introduced plants and native species still to be defined. Taxonomic clarification is vital in the face of weed eradication and research into biological control.

Changing names to reflect improved knowledge of the evolutionary history of a group

Scientific names also change through our endeavour to produce classifications which conform with the evolutionary history of a group. The evolutionary (or natural) approach to classification has real advantages over "artificial systems" based on obvious features (e.g. the original "sexual system" of Linnaeus). Evolutionary classifications are "predictive". In other words, they afford the opportunity of predicting that the attributes found in one plant may be found amongst plants in the same taxonomic group because they are their closest relatives. A drug of potential to fight AIDS was found recently in a Western Australian smokebush. Where should money be spent looking for sources of the same or allied chemicals? Surely amongst other species of *Conospermum*, under the assumption that this genus represents a sound evolutionary unit.

An example of a name change reflecting the production of a more natural classification is the removal of the Sturt Pea from *Clianthus* to *Swainsona*. The two genera as previously circumscribed did not represent two separate and complete evolutionary units that evolved from a common ancestor in the same evolutionary episode, even though the flowers of the Sturt Pea resemble the New Zealand *Clianthus*. The Sturt Pea is a bird-pollinated derivative from the otherwise largely insect-pollinated Australasian genus *Swainsona*.

The quest for evolutionary classifications forces us to grapple with name changes which are sometimes extensive. As with the previous example of *Protea*, the South African Acacias appear not to have the same origins as the Australian *Acacias*. Eventually, unless future evidence defies that already assembled, our thousand species of wattles will not be called *Acacia*. In the same way, in the saltbush family Chenopodiaceae our *Bassia* and *Kochia* species were shown to be not closely related to their northern namesakes. Australians have now become familiar with calling the genera *Sclerolaena* and *Maireana*, respectively.

Common names change to suit the users; scientific names change to meet the needs of the scientific community

Common names, through being invented as the need arises in the absence of knowledge of available alternatives, should never be thought of as requiring a uniqueness (one common name for each plant). Scientific names, however, are applied on a legal basis which is based on the principle that there is only one correct name for each plant and plant group. We can aspire to stability in the application of scientific names. The attainment of this stability, however, depends on how surely we can discover the way our plants evolved.

Is there one correct scientific name for each plant and must we use it?

Gaining the necessary evidence for a classification is often not easy! Sometimes there is controversy about the scientific grounds for a name change. Thus, over the last two decades Australian botany has been in turmoil over publication of proposals by specialists to divide *Eucalyptus* into nine genera and *Acacia* (the wattles) into three. While New Zealanders accepted the changes to the latter genus and in good faith changed the names of the introduced wattles in their Naturalised Flora, other Australian authorities in the two genera expressed the need for caution While acknowledging that the current circumscription of these genera did not reflect their evolution, they considered the proposals premature and that there may be other, less disruptive interpretations. Additional evidence indicates that the *Acacia* change may still eventuate.

However, it has since become clear that *Eucalyptus* may either expand to take in *Angophora* or be divided into three genera. A recent publication has taken the latter course, with the

bloodwoods segregated from *Eucalyptus* as a new genus *Corymbia*. The jury is still out in both instances. In these cases, the correct name of a plant depends on which classification is adopted. One could not be criticised for still calling a bloodwood a member of the genus *Eucalyptus*.

Living with different names for the same plant

It is no crime to call a plant by an older scientific name or a common name if it is does not cause confusion. The various State herbaria are the authorities on the accepted names in their State flora and publish periodic regional floras (identification manuals) and censuses (lists) of the constituent vascular plants. Included with these are the names which have been utilised in the past for particular species (such superseded names are called *synonyms*). This provides a course by which an old name can be translated into a new for the sake of both communicating with those unaware of such name changes and reconciling current names with those used in older literature. For the same reason they should, where possible, include common names. Thus I am not perturbed whether someone uses *Cedrela toona* or *Toona australis* or *Toona ciliata* or *Australian red cedar* or *red cedar*, so long as we know that we are talking about the same plant.

Conclusion

Plant names, like all biological names, are not to be cast in stone. We must expect them to change as our knowledge of the biodiversity of the planet improves. A name is the key to all the knowledge that has been associated with it. Name changes reflect advances in this knowledge. We could ignore future name changes made elsewhere, but how then would we communicate with the outside world into the future? How would we interpret the discoveries of the world around us as it progresses in knowledge and we progress independently or, worse, stand still?