The use of binomial Latin-based names in botany

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A past president of this Botanical Society has expressed the idea at several meetings that botanists should choose Māori names for new genera and species of New Zealand plants. *Podocarpus totara* is a good example of this as it is an endemic plant and most people likely to want to learn its name will be New Zealanders and the connection to the tree called "tōtara" in Māori will be meaningful to them, but international researchers will also be studying *Podocarpus* species as they occur overseas. There can be problems with adopting Māori names. Most plants with known Māori names have already been given binomial names, and all new names have to fit with the articles and should preferably agree with the recommendations of the most recently fully published International Code of Botanical Nomenclature (ICBN 2005, second Vienna code, see McNeill et al. 2006). The latest version is not yet completely published (Knapp et al. 2011), and was renamed at the Melbourne 2011 International Botanical Congress "the International Code of Nomenclature for algae, fungi and plants". The first version of the code was accepted in Vienna in 1906. Similar Nomenclature Codes have been written for animals and bacteria.

Traditional binomial names are considered clearest when they are brief, mention some typical feature of the plant in a Latin-based word for which there are cognate words of similar meaning in English and the Romance languages, and follow rules of pronunciation for Latin which are fortunately like Māori ones. The formal naming of a new species is often called its "description" and must include a description of what the new species looks like and/or a "diagnosis" of how it differs from other species, in Latin or English (the requirement for Latin for living plants was dropped at the Melbourne 2011 International Botanical Congress, Knapp et al. 2011). "Undescribed" species are ones that have been mentioned by informal names or codes e.g. "*Cyclotella* sp. form 1" of Reid (2005). The ICBN rules give priority to the first acceptable description from Linnaeus (Linné 1753) onward.

Botanists and naturalists can promote understanding of the value of international names, while acknowledging the place of local names. About

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ten years ago I was surprised to see an old botanical plate of a New Zealand plant in an exhibit at Te Papa museum accompanied by a notice implying that Latin names were part of the settlers' suppression of Māoritanga and that New Zealanders should avoid their use. If the New Zealand government insisted on New Zealand scientists dropping the use of international binomial (i.e., 'scientific') names, it would be akin to Stalin's exclusive support of Lysenko. Lysenko selected agricultural plants based on belief in the inheritance of acquired characteristics which slowed improvement of crops in Russia.

One reason for using international names is that many of our plant genera also occur elsewhere; e.g., *Sophora* (ours is kōwhai) in Asia, *Rhopalostylis* (ours is nīkau) on Norfolk Island, *Hedycarya* (ours is porokaiwhiri or pigeonwood) in New Caledonia. *Coprosma* also occurs in Indonesia and Australia, *Podocarpus* is widespread in the southern hemisphere and *Nothofagus* (beech) is in South America and Australia (Allan 1961). Some species found in New Zealand are globally widespread; e.g., *Azolla filiculoides* (kārerarera). The name *Typha orientalis* for raupō was authored by Karl Presl, a Bohemian botanist, who chose this name because he had received the plant from the 'east', in fact from the Philippines (Moore & Edgar 1976). A colleague recently returned from hiking in Chile, where he saw plants rather like New Zealand ones. When he asked the park rangers for the plants' names, they only knew the local or Spanish names. He found it best to get them to write down the Spanish names so he could look them up on the internet and find out whether the plants were indeed close relatives of ours. He would have liked a leaflet including binomial and local names and plant families.

Scientific journals insist on binomial names which, when properly formed and quoted, are unique to that species and recognised internationally. Māori from different areas can have different names for the same species; e.g., taro-para for *Ptisana salicina* (king fern) in the Bay of Plenty (Best 1908) and para-tawhiti in the southern part of the North Island (Taylor 1855). Nearly a hundred of the Māori names listed in Allan (1961) refer to more than one genus; e.g., puka is both *Griselinia lucida* and *Meryta sinclairii*. Cross-generic names like this occur in other countries; e.g., "horehound" in England is both *Ballota nigra* and *Marrubium vulgare*.

The choice of the Māori word *Manoao* for the new genus of silver pine (*M. colensoi*) was not ideal according to Dawson and Lucas (2011, p. 79), because it leads to confusion with monoao, which is the Maori name for *Halocarpus kirkii*. The Māori name for both *Veronica parviflora* and *V. stenophylla* is kōkōmuka taranga or kōkōmika taranga (Moorefield 2005).

If a new species were split off and given the name "*V. kokomukataranga*" it would be rather long, which does not fit the international recommendation to avoid long names (ICBN, McNeill et al 2006, *23A*). The compilers of the international code also recommend avoiding locality names, as these suggest the organism is restricted to one locality. Such practice can lead to names awkward to pronounce (also not recommended in ICBN), such as a diatom named *Cyclotella choctawhatcheeana* (Prasad et al. 1990). Another species has a better name, *Cyclotella striata*, which is much easier to recall. Its etymology is informative: *Cyclotella* means little cycle or ring; *striata* says it is striated or striped, and the diatom looks like a wheel with wide tyre and spokes. Etymology of many New Zealand vascular plant binomials can be found in in Eagle (2006) and Taylor (2002). For etymology of some Māori names, see "Te Mara Reo" (Benton family 2010), an intriguing internet site.

There are estimated to be at least 1260 undescribed species of algae living in New Zealand and its waters (Harper et al. 2012). Very few of these have Māori names and these often refer to groups of related organisms, and sometimes unrelated organisms. A Māori dictionary (Moorfield 2005) only contains rimu (seaweed, moss or the tree), rimurapa (*Durvillea antarctica*, bull kelp) and karengo (*Porphyra,* edible red seaweed). We could avoid using "rimu" and name a new algal species something like "*X. aotearoanus*" (ending based on the ICBN recommendation that geographical names should preferably be an adjective ending in -ensis, -(a)nus, -inus, or -icus if the genus name is masculine, with appropriate changes if feminine or neuter). However, the Māori Language Commission has objected to the Latinisation of Māori words including place names used as part of plant and animal binomial names (see Webb et al. 1999). To accommodate this we would need to disregard this recommendation and treat Māori words as nouns in apposition (Webb et al. 1999). Unfortunately overseas workers moving species to a new genus might not realise the words should be treated as indeclinable. So researchers working with widespread organisms must be sure to explain this when setting up a new species; alternatively they may prefer to avoid Māori words. There are special endings for names derived from people's surnames (e.g., -i, -ii, -ae, -orum, etc.), also recommended by the ICBN. These endings indicate that the epithet is unlikely to be a descriptive adjective that reminds you of a feature of the organism worth looking up in a Latin to English dictionary. The second half of a binomial name (i.e., the specific epithet) is no longer capitalised even if it is derived from a surname.

It is recommended not to give the same specific epithet to related species. This is because phylogeneticists may subsequently find evidence from

DNA or RNA to unite genera (e.g., *Hebe* being returned to *Veronica*). In the case of identical names this would require someone designating a totally new name, which makes it harder to locate previous records of the taxa. This would also be true of the non-Māori geographical terms "australe" (southern) or "pacifica" (pacific) which would be likely geographical ranges for undescribed diatoms. Using names of botanists could similarly cause problems if closely related genera are re-united; e.g., Sterrenburg's naming of *Gyrosigma stidolphii* and *Pleurosigma stidolphii*, and Stidolph's naming of *Gyrosigma sterrenburgii* and *Pleurosigma sterrenburgii*. There is a case for a recommendation to avoid names of living botanists, which would limit such mutual naming.

HISTORY OF BOTANICAL NAMES

European explorers and settlers included naturalists who came to New Zealand. They described our flora and sent specimens back to specialists, mainly in Europe who used the Linnean system to describe them. The Linnean system worked well and was adopted by scientists throughout the world. Indian, Egyptian and Chinese herbalists all had opportunities to develop an earlier international system of classification. Some of their botanical work has left marks on international names; for instance, the generic name for ginger, *Zingiber*, comes from Sanskrit. Sanskrit was the language of the first known classification of plants in the Hindu "Atharva", the fourth Veda, (Morton 1981 cited by Wikipedia's "History of Botany") which dates from at least four thousand years ago. The Veda divides plants into eight classes based on branching patterns.

The next known classification of the natural world is a Greek one from nearly 2500 years ago. Aristotle made his own natural history observations, checking folk traditions. He developed his classification through discussion with fellow philosophers in the Lyceum. Open exchange of ideas resulted in a rapid increase in Greek understanding of the world. His student Theophrastus of Eresus wrote the oldest surviving botany textbooks; in his Historia Plantarum (On the History of Plants) he separated the monocotyledons from dicotyledons, and studied flowers and fruit alongside vegetative parts. Some of our plant names come from Greek, including *Libocedrus* from "libanos", the tree that produces frankincense, and "cedrus" from cedar.

We do not know just what happened to the library at Alexandria set up by Ptolemy Soter in about 300 BCE. The scholars there copied all the texts they could lay their hands on, presumably including Theophrastus. The city was sacked by Julius Caesar in 47 BCE and most of its contents were scattered.

In about 600 CE the then sultan was asked what should be done with its remnants. He said Arab scholars could keep what they wanted but anything contrary to the Koran should be burned to heat the public baths. The scholars prized the medical works of Dioscorides and the botanical work of Theophrastus; they continued to study these while medieval Christians neglected Greek scholarship. The name *Sophora* comes from the Arabic "sophera" the name of a tree with a pea-like flower.

The Swedish botanist Carl Linné (pen name Linnaeus) is usually credited with initiating binomial names, but about a hundred years earlier Gaspard Bauhin first suggested the use of binary names with a generic name like a surname shared by several similar plants and one specific name like our first names (Pavord 2004). Names had tended to get longer and longer; e.g., Gerard's Herbal first published in 1633 (Gerard 1975) has "Anemone tenuifolia flore coccineo", the small leaved scarlet anemone, "Chelidonium majus folio magis diffecto", great celandine with more dissected leaves. Māori has some long names (e.g., huruhuru ō nga waewae ō Paoa for *Leptopteris superba*), as does English (e.g., small-flowered sticky eyebright). Linnaeus, classifying so much of the natural world in his books, made it easier for scientists throughout Europe to incorporate into his system the many new plants and animals being collected by explorers on other continents and being brought to them. This resulted in the Linnean system being internationally accepted in the 19th century for both plants (see International Code of Botanical Nomenclature) and animals (see International Code for Zoological Nomenclature) and it continues to be the best approach for most organisms. Some people have tried to replace names with short computer codes (e.g., MERSIN for *Meryta sinclairii*) but most of us find these pretty meaningless and so less memorable. The Linnean system recognises that the biotas of different countries overlap. For instance it allows naturalists from other countries with no background in Māori to realize that *Taraxacum magellanicum* of New Zealand and South America is a close relative of *Taraxacum officinale* of the Northern Hemisphere.

Botanists need to be aware of the unique value of binomial names for international science, while respecting use of local cultural names. Both should be given on labels for plants in most educational situations.

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