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The use of the $M\bar{a}$ ori language in species nomenclature

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KEYWORDS

Māori; New Zealand; Taxonomy; Linnaean; Culturally-sensitive approach Abstract The Linnaean system has a set of rules governing botanical nomenclature, zoological nomenclature and bacteriological nomenclature for the scientific naming of species. These set the principles, rules and standards with which authors should comply with when naming new species. In Aotearoa/New Zealand (ANZ), the knowledge and taxonomic systems of Māori (the indigenous people) have largely been the preserve of Western anthropologists, linguistics and ethnographers. As such, the Linnaean classification system has been superimposed over the pre-existing classifications of Māori since European settlement approximately 200 years ago. A range of strategies have been applied to the naming of new species within a scientific context when using the Māori language (an east-Polynesian language), which do not adhere to the Linnaean system including arbitrary practices, hybridisation, incorrect linguistic context, a lack of full understanding of the meanings of the words and names and questionable naming practices of taxonomists. This paper discusses these issues, including examples, to illustrate the breadth of issues that we encountered. Although no code of practice or set of rules can anticipate or resolve the problem, there is an advantage to developing a set of possible recommendations as to the use of Māori words in the names of new species.

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Introduction

The Western scientific view of classification and taxonomy has traditionally been associated with the identification and categorisation of life forms into a hierarchical taxonomy of Kingdoms, Order, Class and group based on their morphological

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features. Humans have always classified life; we have a natural disposition to want to organise and systematise knowledge, concepts, and things of importance to us, including living organisms (Gordon, 2012). The Greek philosopher Aristotle (384–322 B.C.), organized five hundred types of animals according to habitat and body form (Blits, 1999), but Swedish botanist Carl Linnaeus (1707–1778 B.C.), provided what is considered the basis of scientific classification grouping species according to shared physical characteristics and presumed natural relationships.

Linnaeus proposed a taxonomic system where all living things are classified in categories of successively more inclusive rank – kingdom, phylum, class, order, family, genus and species – and endowed each organism with a unique two-part

2212-6821 © 2013 Production and hosting by Elsevier B.V. on behalf of Institution for Marine and Island Cultures, Mokpo National University. http://dx.doi.org/10.1016/j.imic.2013.11.007 binomial Latin name indicating its genus and species (Linnaeus, 1758). Prior to Linnaeus, taxonomic names were not standardised and biological taxonomy was regarded as a chaotic discipline marked by miscommunication and misunderstandings. Biologists disagreed on the categories of classification, how to assign taxa to those categories, and even how to name taxa (Ereshefsky, 2001).

A century after Linnaeus, Charles Darwin revolutionised to the concept of evolution by natural selection where he demonstrated that the origin of species could be explained by descent with modification. Darwin's theory of evolution by natural selection provided a mechanism that could explain the diversity and complexity of nature without requiring divine influence. Biologists, like linguists, became interested in common ancestry, descent with modification, and family trees (Atkinson and Gray, 2005). Developments in the 20th Century of the synthetic theory of evolution (or synthetic Darwinism) in the 1950s, numerical taxonomy, which deals with the grouping using numerical methods of taxonomic units based on their character states in the 1960s, as well as protein sequencing and cladistics in the 1980s, have not only illuminated some of the problems within taxonomic classification, but it has also unearthed a range of others (Wilkins, 2009; Yoon, 2010). Traditional taxonomic systems associated with the identification and classification of species have come under intense pressure from cladistics (phylogenetic) approaches (Philip, 2004). Two main rival schools (cladistics and taxonomy) emerged with different conceptual frameworks, different organizing principles, criteria, terminology, and types of evidence which lead to partially different or incongruent results. Thus, it is not surprisingly that these two schools hold very different views regarding the value and role of their own field and that of the alternative school (Grant, 2003). This disagreement continues to be waged throughout the literature on taxonomy (Ereshefsky, 2001; Gao and Sun, 2003; Lee, 2003; Nixon et al., 2003; Schuh, 2003; Haber, 2005; Kwok, 2011).

To deal with both the different approaches and the proliferation in the naming of species, a number of codes and commissions have been established. These codes establish a set of principles, rules and standards with which authors should comply with when naming new species for botanical, zoological and bacteriological nomenclature. For example, the international commission on zoological nomenclature (ICZN) is responsible for producing the international code of zoological nomenclature, a set of rules for the naming of animals and the resolution of nomenclatural problems, the international code of nomenclature for algae, fungi, and plants (ICN - formally known as the international code of botanical nomenclature, ICBN) is the set of rules and recommendations dealing with the formal botanical names that are given to plants, fungi and a few other groups of organisms, the international code of nomenclature of bacteria (ICNB) or Bacteriological Code (BC) governs the scientific names for bacteria, including Archaea, and the PhyloCode for regulating the naming of phylogenetic nomenclature is being drafted in association with the international society for phylogenetic nomenclature (ISPN). An index of the world's known species is also available online. The index, known the 'Catalogue of Life', is a quality-assured checklist of more than 1.3 million species of plants, animals, fungi and micro-organisms, about 70% of all those known to science (Species 2000, 2012). A priority of the Global Taxonomy initiative of the United Nations Convention on Biodiversity (Gordon, 2009), the digital catalogue provides information through a widely accessible checklist of known species worldwide. More than three thousand taxonomists worldwide contribute and maintain 115 databases with information on 1315754 species, 113716 infraspecific taxa, 870920 synonyms and 351941 common names. The catalogue provides information for the comparison of species for global bio security purposes (Bisby et al., 2000). Nonetheless many invertebrates and most bacteria, viruses and other microorganisms are poorly known and described.

Māori classification

Classifications of plants and animals have been extensively documented among many different groups of indigenous peoples and languages ranging from purely descriptive inventories of culturally salient species to broadly theoretical and comparative analyses (see Brown, 1982, 1984, 1986; Berlin, 1992; Medin and Atran, 1999; Medin et al., 2007; Atran and Medin, 2008). The Maori classificatory system is founded on a whakapapa (genealogy) relationship that incorporates, amongst other things, many deities within Maori cosmology and the natural world as well as relationship between species (Walker, 1996). When the Māori ancestors reached ANZ from their Polynesian origins circa 1250 B.C., they brought with them an extensive knowledge of nomenclature that they quickly adapted to the new surroundings (Biggs, 1991). Many of the new locations and species discovered by our ancestors were named after those that closely resembled locations and species from far off homelands (Riley, 2001). Biggs (1991) estimates that there are more than 200 Polynesian plant names have etymologies and rather less than half of them have reflexes in Māori. Vocabulary adapted by a combination of neologism and semantic shift in order to describe this novel environment containing flora and fauna not previously encountered in their migration from tropical island Polynesian (Harlow, 2007). Rapid population growth occurred, and Māori and the Māori language changed, evolved and spread with a number of linguistic differences, regional and tribal names developing for plant and animal species (Biggs, 1989; Harlow, 1994). The uniqueness, richness and diversity of the Māori classificatory system was captured in oral sources such as whakapapa, moteatea (laments) and whakatauki (ancestral sayings) (Ngata et al., 1945; Ngata and Jones, 1961, 1980; Mead and Grove, 2001). It provides knowledge of a Māori world view in terms of relationships (relationships within and between species and relationships among phenomena of different kinds).

Early Māori contact with Europeans in the 1780s was limited to interactions with whalers, sealers and early missionaries and by the time of the signing of the Treaty of Waitangi in 1840 (Orange, 2011), the Māori population outnumbered the permanent European settlers by approximately 80 000–2000 (Pool, 1991). These demographics quickly changed with a massive influx of European migrants, diseases and land wars which decimated the Māori population in the latter half of the 1800s. The Māori people, language, culture and systems of knowledge came under threat from intermarriage, individualisation, modernisation and assimilation (Walker, 2004). The knowledge and taxonomic systems of the Māori became the preserve of Western anthropologists, linguistics and ethnographers such as Best (1924, 1925, 1942), Buller (1872–1873), Smith (1913), and Tregear (1891).

By latter half of the 20th century, Maori, like other indigenous peoples, became very concerned with the loss of language, culture, land, natural resources, and the neglect, misuse and erosion of their knowledge systems, traditional ecological knowledge (TEK) and knowledge of traditional Māori classificatory systems (Williams, 2001; Waitangi Tribunal, 2011a,b). Recent collaborations between scientists, conservationists and Maori have resulted in an increased awareness of TEK and the need for shared common goals in the strategic restoration and preservation of sustainable ecosystem (Berkes, 2009; Moller et al., 2009). However, the consequent on-going loss of links to language, culture, land and natural resources, has resulted in the once kincentric relationship that Māori had with nature becoming increasingly disconnected and fragmented causing a breakdown of naming traditions and practices (Salmón, 2000; Roberts et al., 2004).

As Western anthropologists, linguistics and ethnographers became aware of Maori culture in the new land, they began a process of naming species superimposing the Linnaean system over the pre-existing classifications of Maori. In response to this and as part of a transformative Maori language revitalisation movement in late 20th century, Maori have begun to examine naming traditions and practices in ANZ (Smith, 2012). Tipa and Nelson (2007) and Papa, Roa and Karapu (2009) investigated the processes of using Māori names in the naming flora and fauna in ANZ. The first focused on the issues of using Maori in the naming of flora and fauna and the second discussed the establishment of a Tainui Māori Reference Group to work with NIWA (National Institute of Water and Atmospheric Research) taxonomists and scientists to name new species of flora and fauna. The aim of this paper is examine the issues associated with developing a culturallysensitive approach to the use of indigenous languages in naming new species. The research reported on here forms part a larger project that (i) investigated the relationship between indigenous taxonomy systems of Tainui-waka (a tribal group in the western Waikato region in the central northern North Island of ANZ) and the current Linnaean classification system in the appropriate naming of flora and flora; and (ii) explored and recorded traditional classification systems of naming flora and fauna in archival and oral Māori resources.

Methods

Ethics was granted by the University of Waikato because human participants were involved in the research. Three strands of data were collated:

- (i) Data sourced from oral Māori resources, such as mōteatea, whakataukī, interviews and focus groups, etc;
- (ii) Data relating to naming protocols; and
- (iii) Data relating to scientific practices and practices of indigenous naming methodology.

We reviewed a range of journals from the Royal Society of New Zealand (including *The New Zealand Journal of Zoology*: Vol 1, 1974-Vol 40, 2013, *Journal of the Royal Society of New Zealand*: Vol 1, 1971-Vol 43, 2013, *New Zealand Journal of Botany*: Vol 1, 1963-Vol 51, 2013, *New Zealand Journal of Marine and Freshwater Research*: Vol 1, 1967-Vol 47, 2013, *The Transactions and Proceedings of the Royal Society of* *New Zealand*: Vol 1, 1868 to Vol 88, 1960, and *New Zealand Journal of Geology and Geophysics*: Vol 1, 1958-Vol 56, 2013), to extrapolate examples in which the Māori langauge was used in the naming of a new species. The journals of the Royal Society of New Zealand have an important function in disseminating information regarding new species, and the biodiversity of ANZ more generally to researchers, universities, research institutes, and other centres around the world. We then selected a small number of international journals to provide global comparisons.

Results and discussion

Three broad themes emerged from the data collected. The Māori language continues to be used in many cases of newly identified species from early 19 century ethnographers and naturalists through to modern botanists. Furthermore, the most common uses of Māori language in scientific naming are recognition of the local Māori people, recognition of the discovery location, or to describe a physical attribute of the species. Finally, there has and continues to be a lack of integrity of naming species in a scientific context in ANZ. In the following discussion, we are going to focus on the integrity of naming species in a scientific context in ANZ.

The integrity of naming species in a scientific context in ANZ

Although the Linnaean system has a set of rules governing botanical nomenclature, zoological nomenclature and bacteriological nomenclature for the scientific naming of species, there has been a lack of consistency when using the Māori language within a scientific context in ANZ. To date, the practice of using Māori in the naming of newly discovered species is arbitrary in nature, hybridisation is prevalent, there are many cases of incorrect linguistic context, there is a lack of full understanding of the meanings of the words and names and the naming practices of many taxonomists has been questionable.

Many plant species have been named in an arbitrary nature without adhering to the principles of the ICN. For example, between 1882 and 1997, twenty-two names published for flowering plants have as their second epithets Māori place-names in the nominative case, counter to the relevant ICN recommendations (Gardner, 1998). Table 1 following shows in chronological order of publication date, the name, author and year.

There are a number of examples of hybridisation in the literature such as early examples like Taniwhasaurus oweni and Mauisaurus that were named by Sir James Hector. Taniwhasaurus oweni was a species of the extinct genus of mosasaur, a carnivorous, marine reptile which inhabited ANZ, Japan and Antarctica. The name is derived from the Maori term tan*iwha*, a supernatural aquatic creature, the Greek $\sigma \alpha \nu \rho o \zeta / sau$ ros, meaning lizard, and oweni in recognition of his colleague Professor Richard Owen, Mauisaurus, a genus of plesiosaur from ANZ named after Maui, a demi-god of Maori mythology (Hector, 1873). Similar examples also exist in the literature for other indigenous languages including Pelea sandwicensis, an endemic plant of Hawai'i from the Rutaceae family, which was named by Asa Gray, one of the most important American botanists of the 19th century. The name Pelea is derived from Pele, the goddess of Hawaiian volcanoes and sandwicensis

Table 1	Examples	of second	epithets	Māori	place-names	in
the nomin	native case	(Gardner,	1998).			

Name	Author/date
Carex rekohu	Petrie (1926)
Carex wakatipu	Petrie (1882)
Celmearia ruawahia	Heenan (1993)
Chionochloa flavicans f. temata	Connor (1991)
Convolvulus verecundus subsp.	Sykes (1987b)
waitaha	
Coprosma waima	Druce (1989)
Cotula maniototo	Petrie (1882)
Crassula hunua	Druce (1987)
Crassula manaia	Druce and Sykes (1988)
Crassula mataikona	Druce (1987)
Crassula ruamahanga	Druce (1987)
Hebe pareora	GarnJones and Molloy (1982)
Hebe tairawhiti	Clarkson and GarnJones (1996)
Lepidium kawarau	Petrie (1885)
Lepidium matau	Petrie (1887)
Leucogenes tarahaoa	Molloy (1995)
Myosotis rakiura	Moore (1961)
Poa maniototo	Petrie (1890)
Senecio hauwai	Sykes (1987a)
Senecio marotiri	Webb (1988)
Wahlenbergia akaroa	Petterson (1997)
Wahlenbergia pygmaea	Petterson (1997)
subsp. tararua	

from the Sandwich Islands (the name given to the Hawaiian Islands by James Cook in the 1770s – named after First Lord of the Admiralty John Montagu, 4th Earl of Sandwich) (Gray, 1854). *Tupilakosaurus* (fossil amphibian) named after an Inuit water spirit (Nielsen, 1954), *Woolungasaurus glendowerensis* (plesiosaur from Australia) after the Woolunga, a reptile-like beast from Aborigine mythology (Persson, 1960), and *Pseudio-nella akuaku* (isopod (Crustacea: Isopoda: Bopyroidea) parasitic on hermit crabs) derived from the Rapa nui word for supernatural beings who sometimes assumed animal shapes (Boyko and Williams, 2001).

There are also examples where translation of Māori names has resulted in an incorrect rendering of the meaning. One current example is *Kopua nuimata* (Hardy, 1984) which refers to a big-eyed clingfish, where 'kopua' meaning deep, 'nui' meaning big and 'mata' eyes. However, the use of the Māori words 'nui' and 'mata' is not a correct representation of the description, in that the modifier generally appears after the noun 'eye big' and as a result it should read 'matanui' meaning big eyed.

There are also many cases of species in which there is a lack of full understanding of the meanings of the words, names and their cultural implications. For example, *Microspio maori*, a small spionid polychaete described by an American James Blake in which the etymology states "The epithet is selected in honor of the native Māori people of New Zealand" (Blake, 1984). This example highlights a lack of cultural awareness and its wider implication when the term like 'Māori' is used to honor of the Māori people of ANZ. Other similar examples also occur with Carabidae (ground beetle) (e.g., *Maoriharpalus sutherlandi, Kupeharpalus johnsi*, and *Hakaharpalus maddisoni*) named by a Canadian born husband and wife team of André Larochelle and Marie-Claude Larivière (2013). The explanations for each genus notes *Maoriharpalus* is the generic name is derived from Māori (the Polynesian people who colonised New Zealand), *Kupeharpalus* is from Kupe (the legendary Polynesian navigator to whom is attributed the discovery of New Zealand), and *Hakaharpalus* is from haka (traditional Māori chant of defiance accompanied by stylised movements of hands and feet). This confusion also occurs with the use of geographical names. For example, local names have often been trivialised as in *Palaega kakatahi* whose etymology statement reads "the trivial name, *kakatahi*, refers to the village of Kakatahi c. 1.5 km south from the fossil locality. The name derives from two Maori words, *kaka* = a native parrot and *tahi* = single; hence one parrot" (Feldmann and Seabourne, 2006).

What all these examples highlight is an absence of consistency when complying with the principles, rules and standards when using the Maori language within a scientific context as set out in the Linnaean system. Furthermore, there continues to be a lack of consultation and communication between scientists and Māori in the naming of new species in ANZ. Nonetheless, one recent approach that differed significantly in terms of consultation and communication is the work of Seldon and Leschen (2011) and Seldon et al. (2012) in naming a new species beetle of the Mecodema genus. Communication and consultation were an important factor of this research which provided the researchers an avenue to work with and alongside local indigenous people of the northern tribal area in the development of the names. The result was a set of names with their etymological histories that were provided by the local iwi (see Table 2).

Conclusion: A way forward

What's in a name? The simple answer is 'everything'. The power of a name and its value has long been immortalized in place names, historical events, people's names, song, prose, poetry, religious ceremony and even in naming species. Names evoke memories of the past and they provide a frame of reference to signify the connection of people, culture and language to the environment, to historical, social and political events. Treatises devoted to the theory of names are typically concerned with the semantic properties of names and their origins (cf. Nuessel, 1992; Pulgram, 1955), their grammatical status (Anderson, 2004, 2007), onomastic origins (Pitkänen and Mallat, 1997), and universality (Lévi-Strauss, 1966). The study of place naming, or toponymy, has also recently undergone a critical reformulation as scholars have moved beyond the traditional focus on etymology and taxonomy by examining the politics of place-naming practices (Berg and Vuolteenaho, 2009; Rose-Redwood et al, 2010). Graham (2011) argues that a common concept in history is that knowing the name of something or someone gives one power over that thing or person noting that this occurs in many different forms in numerous cultures including ancient and primitive tribes, e.g., Islam, Judaism, and in Egyptian, Vedic, Hindu, and Christian traditions.

In the naming of species in ANZ a range of strategies have been applied which do not adhere to the Linnaean system including the arbitrary nature of the practice, hybridisation, incorrect linguistic context, a lack of full understanding of the meanings of the words and names and questionable naming practices. Although no code of practice or set of rules can anticipate or resolve the problem, there is a great advan-

Name	Etymology	Author/date
Mecodema manaia	Species name, manaia, was provided by the people of Ngātiwai and is named after the type locality, Mt Manaia, Whangarei	Seldon and Leschen (2011)
Mecodema haunoho	Name of this species was chosen from several names provided by the people of Ngāti Manuhiri. Haunoho is derived from hau, the site (Hauturu) and noho, which means 'dwell, inhabit'	Seldon and Leschen (2011)
Mecodema ponaiti	The Poor Knights Islands are within the Ngātiwai rohe and as Ngātiwai have no collective name for the islands, they requested that the species be named ponaiti (pona-iti), which is a trans-literation of the name of the islands	Seldon and Leschen (2011)
Mecodema tenaki	Named in honour of the first Māori tribe (Te Naki) to settle in the North Cape area. The name was provided by Saana Murray of Ngāti Kuri	Seldon and Leschen (2011)
Mecodema kokoromatua	Haami Piripi, Chairman of Te Rānanga O Te Rarawa, Kaitaia provided the species name kokoromatua, meaning parent or matriarch/patriarch	Seldon et al (2012)

 Table 2
 Names of the newly discovered *Mecodema* that were provided by local iwi

tage in developing a set of possible recommendations as to the use of indigenous, and in particular Māori in the names of new species. 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). Special consideration should be ensured when using sacred names, such as those of Gods, chiefs, ancestors' names, the names of people and places. We recommend that researchers should consult with local iwi, Māori language communities and language experts and pay greater attention to rules of naming within the Linnaean system to avoid confusion and culturally inappropriate names.

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