NGĀ HOA O TE MĀRA REO

The Friends of Te Māra Reo

Kawerongo / Newsletter #3, Koanga / Spring 2022

"Ngā uaua o te Whitu rāua ko te Ono"[1]

E hoa mā, tēnā rā koutou katoa.

It's not only the seventh and eighth months when plans are disrupted, but nevertheless it is great to be able to get this third issue of the Kawerongo for friends of Te Māra Reo out into the world before yet another year has passed.

Spring is a time of growth and reawakening, but also of disturbance and perturbation, as the newly emerging fronds on the whekī-ponga and the whakatauakī which start off this newsletter respectively illustrate. We farewelled four people who have helped Te Māra Reo, all of them associated in one

[1] *"The troubles of the Seventh and the Eighth" – The seventh and eighth months of the Māori year, roughly November and December, are often times of unsettled weather, disrupting gardening and other planned activities.* [Photograph of the crown of a whekī-ponga, *Dicksonia fibrosa*, with Spring emergence of new fronds, by Alan Benton. Te Māra Reo, 2 December 2022]

way or another with the University of Hawai'i; three as staff members and one, Joseph Bider, having completed his Masters degree in botany there. They have all helped me in different ways to advance important aspects of this project, and are greatly missed.

The pīpīwhārauroa may not yet have made an appearance, but the koekoeā have certainly announced their presence here, staying just long enough presumably to deposit some eggs in the nests of the riroriro, before flying further south. The most exciting sign of spring, from our point of view, however, occured right at the beginning of the season – the flowering for the first time of our rewarewa tree. The old web page for this plant was very basic – one of those prepared for the prototype website in 2009 – so this was a good time to extensively revise and update it, with some of on-the-spot photographs to illustrate the development of the tree's fascinating inflorescence.

This newsletter remembers those who have gone before us, along with thanks to those who have helped advance the project. It has a few notes on how the physical garden is growing and an update on the more extensive developments in the virtual one, as well as a summary of where visitors to the web site have come from over the last two years, and what pages have been visited between January and November 2022. By far the largest section though is occupied by a disquisition on the naming of tree ferns. This was precipitated by my curiosity as to why the ferns we know in Aotearoa as species of *Cyathea* have been reclassified elsewhere as species of *Alsophila* (most) or *Sphaeropteris* (the mamaku), why many overseas publications refer to the ponga, *Cyathea dealbata*, as *Alsophila tricolor*, and what had become of its tropical Pacific relative, *Cyathea affinis*. All of this will be old news to the botanists who glance at my account, but I found the whole topic so fascinating that I decided to write about it anyway, despite the consequent delay to the production of new pages for the web site, along with this newsletter.

In Memoriam

One of my friends wrote to me recently that these days they seem to spend a great deal of their time writing obituaries or reading them. I know the feeling! There are four people whose passing is particularly significant to me in relation to Te Māra Reo.

Two are linguists whom I had known since my student days in Hawai'i in the 1960s. Professor Albert Schutz[2] (1936-2020), was a faculty member of the Department of Linguistics at the University of Hawai'i (Mānoa) when I was a graduate student, and a foremost scholar of Polynesian and Fijian linguistics. Robert Blust[3] (b. 1940) who died on January 5 this year, was a fellow student in the Linguistics Department, and later also became a Professor of Linguistics there and was internationally acclaimed as a scholar of Austronesian languages and historical linguistics. I had remained sporadically in touch with both of them over the years, catching up every time I visited

[2] https://fijiguide.com/2021/06/14/a-tribute-to-al-schutz-scholar-of-fijian-languages-and-friend-of-fiji-part-1/
[3] https://en.wikipedia.org/wiki/Robert.Blust

Hawai'i (which once was every few years, but my last visit was in 2010). Each of them had from time to time provided information very helpful in preparing various pages for the Māra Reo website. Bob had also given me access to his database of the vocabulary of Austronesian languages (which includes many plant names) before it was publicly available.

Thirdly, also belatedly, I learned of the death of my good friend Gregory Trifonovich[4], whom I had first met in Hawai'i while I was at the East West Center and he had just returned from teaching in Micronesia to take up a position there. He died in May 2020, at the age of 84. I stayed with Greg and his family at their home on the Big Island of Hawai'i several times, and he was immensely helpful in taking me to places and sites where I could take photographs of Hawaiian native plants with names that had Māori counterparts, and meet people who could talk with me about them. There is an account of our expedition to the Amy Greenwell Ethnobotanical Garden in the Te Māra Reo news section for August 2018[5]. Greg was indeed, as his obituary states in its opening sentence, "a master storyteller and linguist, known for his big heart, hospitality and cross-cultural expertise".

Early in May this year I received news of the sudden and completely unexpected death at the age of 41 of the Rarotongan botanist and director of the Cook Islands National Heritage Trust, Joseph Brider[6]. Thanks to his colleague Gerald McCormack, I had been able to correspond with Joseph about some of the Rarotongan plants I was interested in, and he very obligingly hiked into the mountains to take some photographs of Cycolphyllum barbatum (Oro'e'a in Tahiti) for me to include on the page for ***Soroeka** (counterpart of Māori **Horoeka**) on the web site. I was very much looking forward to continuing our correspondence. Joseph's untimely death is a great loss to his friends, colleagues and family, and to ethnobotanical studies and conservation in the Pacific.

Mā te Ariki e hoatu ki a rātou te okiokinga tonutanga, ā kia whiti ki a rātou te māramatanga mutunga kore.

Ngā Mihi – Thanks

Pictures are worth a great deal more than a thousand words; they provide an extra and often indispensable extra dimension to the text they accompany, bringing what would otherwise be dull narratives to life, and clarifying what unaccompanied would be obscure or convoluted details. I am very grateful to those members of the NZ Plant Conservation Network, along with other people in New Zealand and overseas, who have made their photographs available for use on our web pages, and in some cases have taken pictures especially for this purpose. Most of these people I have never met in person, but through our correspondence with each other I feel that we have become good friends nonetheless. Te Māra Reo would be a much less interesting and informative place without their help.

[4] https://obits.staradvertiser.com/20/05/03/gregory-john-trifonovitch/
[5] http://temarareo.org/TMR-Nga_Rongo.html#AGEBG
[6] https://www.cookislandsnews.com/internal/features/weekend/briders-passion-for-natural-heritage-and-conservation/

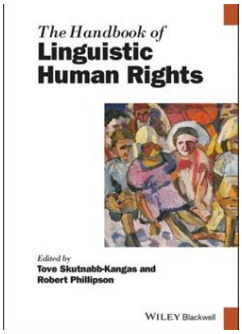
Ko Kōanga i te Māra ~ Spring in the Garden

Spring has been a season of anxiety as well as wonder and delight in recent years, because of the incessant battle with the moso bamboo, described in the last newsletter. The anxiety remains, but there is always something new and, in its own way, spectacular, to push it into the background. A couple of years ago it was the arrival of kererū; this year it was the flowering, for the first time, of our rewarewa. This tree was planted more than twenty years ago, but had been surrounded by bamboo from which, just in time, we were able to liberate it in 2015, along with some kauri trees that were also being overwhelmed. The whole tree was covered with the bright red flowers, which start off as assemblages of sealed tubes emerging from the branches and branchlets (illustrated in the picture on the left), and undergo a series of transformations described on the web page (link below).

As for the moso bamboo, the struggle continues. Despite the felling and poisoning of hundreds of culms over the last six months (several thousand over the last 5 years), and the harvesting of literally thousands of shoots during each peak growing season, the grove continues to fight back, so often it seems that an advance of ten metres in one area is almost wiped out by a resurgence over nine metres in another. The warm, wet weather has not helped stem the tide. However at the same time the tui, rironiro, koeaea and pīwakawaka have been noisily announcing their presence, the tree ferns are flourishing, and in many other respects all is right with the world. I'm still hopeful that we will get the better of the possums, rabbits, rats and moso bamboo, and be able to reestablish a visitor-friendly māra reo walkway despite the difficulties. The major obstacle remains the moso; we have tried to get help from commercial section-clearing enterprises to deal with the worst of it, but when they hear "bamboo" they lose interest and will not even come to give us a quote! Meanwhile there is the website to attend to – at least 50 new pages to prepare for names not yet represented and plenty to revise; a much more pleasant task than battling moso, even though, on occasions, it also has its own irritations.

Additions and Updates to the Web Site

Although only five completely new pages have been added since the last newsletter, many others have been extensively revised and, where necessary, shifted from the old to the new format. (The details are in the box below.) This work proceeded at a reltively rapid pace for about seven months – between March and September, but really slowed down in October when I began investigating apparent conflicts in the botanical names used to denote New Zealand and Pacific tree ferns. I did find answers to many of my questions, but one remains open: why, when so many other name changes have been accepted, have the botanists in Aotearoa stuck with *Cyathea* as the generic name for New Zealand's scaly tree ferns, instead of adopting *Alsophila* for the ponga and its allies, and *Sphaeropteris* for the mamaku? If I find (or am given) an answer to this question, I'll report it in a subsequent newsletter!



Another contributing factor to the delays in getting out the newsletter and producing new or revised webpages has been my involvement in a project, "Pārekareka te Panui" [reading is fun] working with some old (and also some much younger) colleagues to update the guidelines for a highly effective program designed to enable children to become fluent speakers and readers in both Māori and English, and to train teachers in their use. A long overdue chapter on language rights as human rights in Aotearoa/New Zealand for the *Handbook of Linguistic Human Rights*[7] also took priority over web pages and was completed just in time to meet the extraordinarily patient editors' and publisher's deadlines. The book is now out, with a 2023 publication date. Just as things were settling down, I was asked to represent Ngā Kaiwhakapūmau i te Reo at the Māori language awards event on December 9th, and accept on their behalf an award for work to ensure that te reo Māori was given legal status (an activity in which I had been directly involved along with other members of that group). I was then told that an award would also be given to the NZ Council for Educational Research for the sociolinguistic survey which I had directed in the 1970s and its aftermath, and that I would also be receiving an award personally. The tree ferns started receeding into the background, but I was able to include a line from the last paragraph of my language rights chapter in the concluding section of my speech on behalf of Ngā Kaiwhakapūmau:

> Ināianei tonu, kei Aotearoa kotahi anō te reo whai mana i raro i te ture i ngā wā katoa – ko te reo Ingarihi.[8]

We have yet to secure effective and comprehensive official status for te reo Māori, even though we have indeed come a long way down that road since the 1960s and 70s.

Although the web pages are written mostly in English, Te Māra Reo is also a contributor to the efforts to revitalize the Māori language. It focuses on Māori plant names and their origins, some of the building-blocks of the language which encapsulate a lot more than a simple reference to a particular object. They open the door to poetry, proverbs, narratives, metaphors and idioms; on occasions, via mātauranga Māori, to scientific ideas, like the classification of tree ferns – see the page for Hāpuku (link in the chart below).

In addition to the five new pages, 32 pages have been revised and updated during the year, 18 of them transferred from the original to the newer format, and Biblical references have been added to four more pages, which completes the coverage of the indigenous Māori plant names included in *Te Paipera Tapu*. A page linking these names together thematically has yet to be prepared, but will come ā te wā! Some further amendments were also made to the "Genealogy of names" page, to take account of the findings of some of the recent archaeological and other research throwing light on the settlement of East Polynesia. Right now this seems to be a "growth area", so there will be more o come. Additions have also been made to the on-line Bibliography, another ongoing process.

[7] (Edited by Tove Skutnabb-Kagas and Robert Phillipson. Hoboken, NJ: Wiley Blackwell).
[8] These days, in New Zealand only one language can be used as of right at any time: English.

Pages added or revised March-November 2022

Change made	*Pages*
New pages	**tauhinu / *tausinu; horoeka / *soroeka;** *kolopuka / **koropuka** (including a moral fable); + **wī, wīwī**; + **manoao.**
Substantial revisions	*aute; **kahikātoa** (noting a new species of mānuka, *Leptospermum repo*); ***futu; hutu; *pōfutukava; pōhutukawa; *naupata; *palatao; paretao**; + **nīkau;** + **pua**, puapua, **puāwai**. The Nuclear Polynesian to East Polynesian section of the "Genealogy of Names" page[9] was also extensively revised.
Revised and reformatted	***piu; piupiu; kawariki;** *mako; mako / makomako; *tī (tii); *toa; toatoa;* *toi; tōī; *milo; miro; *toromiro; rewa / rewarewa; whekī; *fekī;** whēkī ponga; ***fāpuku.**
Biblical references added	**raupō; *kākaso** / kāhaho; plus the pages above marked with "+".

Collecting ferns – and classifying them.

When I was checking the current validity of the names of the tree fern species in the list of cognate terms and reflexes of the Proto-Polynesian words, I came across several conflicts which greatly delayed the production of the page I was working on but enabled me to learn a lot more about the evolution and classification of these plants than what I knew when I started.

There was a sense of deja-vu about this journey. When I was a 15 year-old and the School Certificate examination, on which a lot hung in those days, was just a few weeks off, my father advised me to spend a lot less time on "those ferns", and concentrate on passing the exam. There were no photocopiers then, and at the time I was copying by hand the section of Thomas Cheeseman's *Manual of the New Zealand Flora* (which I had borrowed from the library) dealing with these plants, which I was assiduously collecting from the local bush and growing in a shade-house I had built using ponga trunks and mānuka brush, and a fern garden under a macrocarpa tree through which I had diverted the effluent from the septic tank to keep the inhabitants moist. I duly sat the SC exam, and was delighted to be able to report on my return home that one of the essay topics (which carried 30 marks) in the English paper was "Collecting Ferns". I'm sure my dissertation on this topic contributed greatly to a creditable result which helped me get over the finishing line.

As I dug deeper into the classification of tree ferns in the course of preparing material for the web pages and this newsletter, I seemed to be following another distraction from the tasks at hand, including completing the page for the whekī-ponga, *Dicksonia fibrosa*, which I was working on. I added further taxonomic and some supporting information as I found it, but as the paragraphs grew

[9] http://temarareo.org/TMR-Language_Intro.html#Stages [8] and [9]

into whole pages I decided a brief summary on the web page would be sufficient, and the rest (if I ever managed to finish writing it) could be transferred to the long-delayed Newsletter.

Tree Fern Families (and Families with Tree Ferns)

Loxsoma cunninghamii, a trunkless member of the tree fern order, unique to Aotearoa. (Photo by the late John Smith-Dodsworth, taken in Kennedy Bay, Coromandel. NZPCN)

The families of ferns which generally have trunk-like stems all probably had a common origin and are grouped in the order Cyatheales. Over the last 20 years several extensive molecular and genomic studies have recognized eight families under this heading, three of which are found in New Zealand (Cyatheaceae, the scaly tree ferns, represented by the mamaku, ponga, pūnui, kātote and related species; Dicksoniaceae, represented by the whekī and whekī-ponga; and the Loxsomataceae, with the unique *Loxsoma cunninghamii*) and a fourth (Cibotiaceae, with the Hapu'u ferns) in Hawai'i. The *Loxsoma* is worth mentioning here as both the species and the genus are unique to Aotearoa, and although it is part of the true tree-fern group this fern does not have a trunk. It is a small fern with fronds up to a metre or so long, associated with mānuka and kānuka. It is found from Kaitaia to Thames, but is particularly abundant around Kennedy Bay. Unfortunately it is rather hard to grow in cultivation. It does not seem to have a Māori name (or an English one, for that matter).

Other families of ferns, some of whose members develop trunk-like stems, are the Blechnaceae and Thelypteridaceae, with one member each with a mini-trunk in Aotearoa: *Lomaria discolor* and *Pakau pennigera* (see the page for **Piupiu**[10] on Te Māra Reo); the Osmundiaceae, represented in Aotearoa by *Leptopteris superba* (the heruheru or Prince of Wales' feathers) and *Todea barbara*, an anonymous fern of the scrub and gumlands; the Marattiaceae, which has trunked members in tropical Polynesia, and the Athyriaceae, with a Hawaiian member, *Athyrium microphyllum*, the 'ākōlea, with trunk about a foot tall. The Hawaiian ma'uma'u, *Saddleria* spp., are also trunked members of the Blechnum family.

New Zealand tree ferns were first given botanical names at the end of the eighteenth century – the whekī as *Dicksonia squarrosa* by the French botanist C. L. l'Heritier de Brutelle in 1788, followed by the scaly tree ferns the mamaku, *Cyathea medullaris* and the ponga, *Cyathea dealbata* (both originally placed in *Polypodium* by the German botanist Georg Forster in 1786, but reassigned by the Swedish botanist Olof Swartz in 1800). Although the plants have remained the same, there have been some important changes in accepted or suggested names and how their relationships have been viewed by botanists in the ensuing decades. Some of the changes, like the recognition of new genera in the *Blechnum* family, have affected Aotearoa directly (in that they have been initiated or accepted by local botanists), and others are still waiting in the wings. The classification of tree ferns belongs in the latter category, but it affects Te Māra Reo because we try to take account of recent scholarship

[10] http://www.temarareo.org/TMR-Piupiu.html

in identifying the Polynesian and other tropical species that are namesakes of New Zealand native plants.

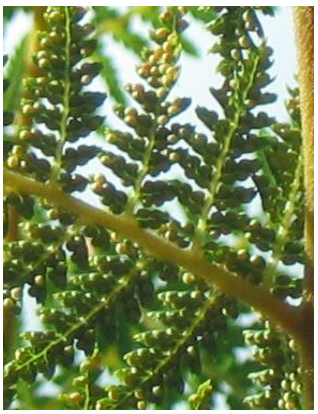
The unfurling tips of a newly emerged whekī (*Dicksonia squarrosa*) frond (above) and a ponga (*Cyathea dealbata*) .frond (below). Note how the whekī frond has a hairy covering, whereas the ponga, one of the scaly tree ferns, has a scaly surface.

Untangling the (Scientific) Names

The first puzzle in the tree fern saga unleashed by the revision of the pages for the Māori name **whekī** and its Proto-Polynesian counterpart ***feki** was determining the status of *Cyathea affinis*, a species found natively in Fiji and throughout tropical Polynesia except Hawai'i. My first ports of call for checking names whenever I revise a page or write a new one are the NZPCN database for local plants, and the Royal Botanical Gardens, Kew "Plants of the World Online" database, along with the “World Flora Online” database, run by a consortium of 51 botanical gardens and institutes, for the tropical species. The overseas databases don't always agree, which leads to some extra research to solve the problem. In this case it began with the name of the Pan-Polynesian fern *Cyathea affinis* (named *Polypodium affine* by Georg Forster in 1786, from specimens collected by James Cook on his second voyage, and, like the mamaku and ponga, re-classified by Olof Swartz in 1800). This is thought to be the original "Ponga", and possibly the first tree fern to later have been called a "Feki".

Cyathea affinis was listed in the Kew database as a synonym for three species of tree fern: *Alsophila tahitensis*, *Spaeropteris propinqua* (both from Polynesia), and *Cyathea retanae* (endemic to Panama and Colombia), but not as a valid name in its own right. The WFO database listed *Cyathea affinis* (Forst) Sw as a valid name, which aligned with the Kew's *Alsophila tahitensis*. Further investigation revealed that the American botanist W.D. Brackenridge had named two ferns collected on a US Naval expedition in 1854 as *Cyathea tahitensis* and *C. affinis* respectively. *C. tahitensis* turned out to be the same fern as Forster's *Polypodium affine*, re-named *C. affinis* in 1800; Brackenridge's *C. affinis* was renamed *C. propinqua* in 1863. This discovery illustrates why in scientific papers and other formal contexts botanists are careful to cite the authorities for the names they use by standard abbreviations, for well-known authors, or the author’s full name and occasionally the date of publication, after the Latin name of the plant: *Cyathea affinis* (Forst)Sw and *C. affinis* Brack are quite different species.

Underside of sterile leaflets of the Ponga, *Cyathea dealbata*.



Undersides of fertile fronds of the Whekī-ponga (above) and Ponga (below) showing the differing arrangements of the sori (clusters of spore-bearing cases).

Another puzzle was finding that the long-accepted scientific name for the iconic ponga (silver fern), *Cyathea dealbata*, was absent from lists of New Zealand species of tree fern in some overseas publications and databases. This is the result of another mix-up. This fern was described as *Polypodium dealbatum* by Georg Forster, and re-named along with others by Olaf Swartz in 1800. In 1882 William Colenso thought he had discovered a new species of tree fern in the Wairarapa. He named this in a paper published in 1883 as *Cyathea tricolor*. The Czech botanist Karel Domin re-classified this plant as a variety of *C. dealbata* in 1915. The material gathered to represent this species seemed to be identical to that typifying *C. dealbata*, and by 1925 Thomas Cheeseman had omitted mention of it from his *Manual*. Probably unaware of its status in New Zealand (despite the discussion of it in H.H. Allan's *Flora of New Zealand*[11]), Rolla Tryon combined both *C. dealbata* and *C. tricolor* under the name *Alsophila tricolor* in his revision of the Cyatheaceae[12] in 1970. This re-naming has been accepted by some botanists internationally, hence the disappearance of *Cyathea* – or *Alsophila* (more about that later) – *dealbata* from some lists of recognized species.

The Development and Evolution of Ferns

Ferns reproduce sexually by first shedding ripe spores from structures on their leaves; the spores germinate in favourable conditions and produce a mini plant known as a "prothallus". This contains the male and female sex organs, known as gametes. The sperms from male gametes swim to the female gametes (and require the presence of water to do this, hence the association of ferns with damp places). Also, generally, but not invariably, the male sperm needs to find a female gamete on a different prothallus. Some male and female gametes on a given prothallus ripen at different times to ensure that this happens, and some ferns have spores which will produce only functioning male or female gametes. The fertilized female gamete will give rise to the sporophyte, that is, the fern as we know it. Some ferns (including some species of tree ferns) are not too fussy about which particular species provides the sperm to fertilize the fermale gametes, hence the development of hybrids and sometimes, eventually, new species. As the eminent Hawaiian botanist Herb (Warren L.) Wagner is said to have observed: "some ferns are bastards, and some ferns are real bastards"[13]. The American botanist David Conant considered this to have been an important element in the development of new species of *Alsophila* in the Americas. Ferns can also reproduce vegetatively, by producing stolons (runners) which give rise to new plants (the whekī has this ability), or by producing buds that can develop into independent plants, like those

[11] Vol 1, 1961, pp. 40-41.
[12] The Classification of the Cyatheaceae, *Contributions from the Gray Herbarium of Harvard University*, No. 200, p. 37.
[13] David Palmer, *Hawaii's Ferns and Fern Allies*, University of Hawai'i Press (2003), p.9.

on the whekī's trunk that start growing if the trunk falls to the ground or is damaged, and the mini plants (manehau) on the leaves of the mouku and some other species of *Asplenium*.

A way to bypass the prothallus stage of reproduction. Bulbills on the fronds of the mouku, *Asplenium bulbiferum*

Ferns have been classified on the basis of the structure of the prothallus and the ways in which the sporagnia (spore-bearing structures) are arranged, as well as the structure of the stipe (frond stalk), the presence or absence of scales or hairs, and the form which these and other features take. A great deal about the evolutionary history and relationships of ferns can be inferred from careful observation of such characteristics and how they are organized or manifested in particular plants and among groups of plants.

Botanical Classification of Tree Ferns

Work on the classification of tree ferns had been quite extensive at the end of the eighteenth century, as most of them had previously been lumped together as species of *Polypodium*, which as more were studied became increasingly unsatisfactory. The genus *Cyathea* was proposed for the scaly tree ferns by the Scottish botanist J.E. Smith in 1793. The German J.J. Berhhardi proposed in 1800 that those which had scales on their petioles (leaf-stalks) without distinct margins, although they might have marginal spines, should be included in a separate genus, *Sphaeropteris*. The mamaku was a prime candidate for this change of name, and became the "type" (reference) plant for the genus. Another Scotsman, R. Brown, proposed in 1810 that the remaining *Cyathea* be divided into three genera according to the characteristics of the sori (sporagnia clusters): *Alsophila*, with no indusia (protective cases around the sori), *Hemitelia*, with hooded indusia, and *Cyathea*, with cup-shaped indusia. This classification eventually proved unsatisfactory, as some of the ferns placed within each grouping were obviously more closely related to those in one of the others when other attributes were taken into account. The genus *Hemitelia* was still accepted up to the mid-1920s, but its members along with some from the other genera, were redistributed by the Czech botanist Karol Domin in 1929. *Hemitelia smithii* (which had still been referred to by that name in the third edition of Leonard Cockayne's *New Zealand Plants and their Story*, 1927) became *Cyathea smithii*, and *Alsophila colensoi* became *Cyathea colensoi*. With different criteria defining them, the names *Alsophila* and *Sphaeropteris* remained in circulation along with *Cyathea* as sections or "clades" of *Cyathea* sensu lato, if not as genera in their own right. *Cyathea* was retained as the generic name for all these species.

The mamaku (*Cyathea medullaris*, a.k.a. *Sphaeropteris medullaris*), Wellington Botanical Gardens.

Eventually, after a considerable amount of work by other botanists, came the publication in 1970 of *The Classification of the Cyatheaceae* by the American botanist Rolla Tryon, already mentioned in reference to the ephemeral *C. tricolor*. This thorough revision of the taxonomy of the family divided the Cyatheaceae into eight genera: *Lophosoria* and *Metaxya* (each at that time with 1 species found in Central and South America); *Sphaeropteris* (about 120 species found in the Americas, Southeast Asia, Australasia and the Pacific, including one in Aotearoa); *Alsophila* (widely dispersed, with species endemic or native to the Americas, Africa, Madagascar, Southeast Asia, India, Ceylon, Australasia and the Pacific to southern Japan, including six in Aotearoa); *Nephelea* (a new genus accommodating those species with scaly spines on the frond stalks, geographically confined to the Americas and West Indies); *Trichipteris* (found only in the Americas); *Cyathea* (which, in this assignment of species, becomes an American genus); and *Cnemidaria* (again confined to the Americas). He limited the Cyatheaceae to the scaly tree ferns, thus excluding the genus *Dicksonia*, which had been included in the extended family in some earlier revisions by other botanists.

The fossil record and geological data suggest that the distribution of *Cyathea* (s.s.) and *Sphaeropteris* species occurred while South America, and Australasia were still connected, but the African and Indian landmasses and Madagascar had already separated from Gondwanaland. The expansion of species grouped under *Alsophila* beyond their regions of origin would have been after the breakup (as the fossil recored indicates that they developed later) and were trans-oceanic (for example from Australasia or America to Africa for some species of *Alsophila*, then Africa to Madagascar) as *Alsophila* did not develop until at the earliest about 80 million years ago - 50 million years after the split with Africa (about 135 million years ago). The *Dicksonia*s, and the related hāpu'u ferns of Hawai'i, *Cibotium* spp., belong to older evolutionary lines which later gave rise to the Cyatheaceae.

DNA Upsets Some Applecarts

A Hapu'u tree fern (*Cibotium* sp.) Volcanos National Park, Hawai'i. These tree ferns and the Whekī (*Dicksonia* spp.) belong to two ancient lineages, pre-dating the scaly tree ferns (Cyatheaceae).

From the 1990s, however, DNA analysis has added new understandings, and further disrupted the status quo, especially as morphology (the physical characteristics) of ferns must still be taken into account, and DNA analyses will vary according to the components selected for study. Even when the DNA and morphological characteristics are in broad agreement, there is still plenty of room for argument about where the cut-off points – between species and families, families and orders, and so on – should be placed. Hence the currently varying classifications of New Zealand ferns and ferns in general.

A DNA study by Petra Korall and associates in 2007 produced a family tree which rearranged Rolla Tryon's schema[14], as had a number of its forerunners. It grouped Tryon's *Cnemidaria* species with *Cyathea*, shifted *Lophosoria* to the Dicksoniaceae (completely out of the "scaly tree-fern" family), and placed some species that

[14] Petra Korall, David S. Conant, Jordan S. Metzgar, Harald Schneider, and Kathleen M. Pryer, A molecular phylogeny of scaly tree ferns (Cyatheaceae), *American Journal of Botany* 94:5, 2007, pp. 873-886.

had been classified with *Alsophila* in a separate group, *Gymnosphaera*. Previously Tryon's *Trichipteris* (a.k.a. *Trichopteris*) had been disposed of[15] by reuniting its species with the genus Cyathea, *Metaxya* put in a family of its own, and *Nephelea* merged with *Alsophila*. Korall et al. also included *Dicksonia* and *Cibotium* in their study, and found that they did indeed form a cluster separate from the Cyatheaceae, but were not quite as closely related to each other as had been assumed and could probably be regarded as belonging to separate families.

Where We Are Now

The upshot of all this research has been summarized with broad agreement in papers by Alan Smith and associates[16], Martin Christenhutz and Mark Chase[17], and the Pteridophyte Phylogeny Group (which included two New Zealand-based botanists among its 26 lead authors)[18] respectively, and reflected in the World Flora on Line database[19]. This divides the true Tree Ferns into eight families, including the Cyatheaceae, Dicksoniaceae, Cibotaceae and Loxsomataceae, and the Cyatheaceae in turn into four genera (with some slight disagreements)[20]: (1) *Sphaeropteris* (for which the mamaku is the type species), (2) *Cyathea*, (3) *Alsophila* (including all the other NZ species currently grouped under *Cyathea* in this country), and (4) *Gymnosphaera*. Within the *Alsophila* grouping, the ponga (currently *Cyathea dealbata* in NZ parlance) belongs to a section with closely related species in Southeast Asia, and the others are in a set whose members are mostly Australasian in distribution.[21]

In Aotearoa, the scaly tree ferns are all grouped under the generic name *Cyathea* in the NZPCN database. The difficulties surrounding the classification of these ferns are discussed in Mark Large and John Braggins' book *Tree Ferns*[22]; they also retained Cyathea as the generic name for most species of scaly tree fern elsewhere placed in *Alsophila* and *Sphaeropteris* (and *C. dealbata* as the name for the ponga). The same procedure was adopted by Patrick Brownsey and John Smith-Dodsworth in their *New Zealand Ferns and Allied Plants*.[23]

The American botanist Edwin Copeland, who earlier had founded the University of the Philippines College of Agriculture in Los Baños, noted in his *Genera Filicum* (1947) that valid taxa (names for

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[15] David B. Lellinger, The disposition of *Tricopteris* (Cyatheaceae), *American Fern Journal*, 77:3, 1987, pp. 90-94

[16] Alan R. Smith, Kathleen M. Pryer, Eric Schuettpelz, Petra Korall, Harald Schneider and Paul G. Wolf, A Classification for Extant Ferns, *Taxon*, 55:3, 2006, pp. 705-731.

[17] Trends and concepts in fern classification, *Annals of Botany*, 113, 2014, pp. 571-594.

[18] The Pteridophyte Phylogeny Group, A community-derived classification for extant lycophytes and ferns, *Journal of Systematics and Evolution,* 54:6, 2016, pp. 563-603.

[19] http://www.worldfloraonline.org Interestingly, on this database you will find *Alsophila tricolor* listed as an accepted name, with *Cyathea dealbata* (the ponga) as a synonym, and, separately, *Cyathea dealbata* as an accepted name in its own right. There is no listing for *Alsophila dealbata*, and the name *A. tricolor* is also used for the ponga in the results of DNA sequencing of a large sample of species within the Cyatheaceae reported by Shi-Yong Dong and Zheng-Yu Zuo in their paper On the recognition of Gymnosphaera as a distinct genus in Cyatheaceae, *Annals of the Missouri Botanical Garden*, 103:1, 2018, pp. 1-23.

[20] Christenhutz and Chase include the *Gymnosphaera* species in *Alsophila*, and Smith et al. Include *Hymenophyllopsis* as a genus within the Cyatheaceae; the others merge it with Cyathea.

[21] Petra Korall and KathleenM Pryer, Global biogeography of scaly tree ferns (Cyatheaceae): evidence for Gondwanan vicariance and limited transoceanic dispersal, Journal of Biogeography, 41, 2014, pp. 407-8 – the ponga is listed as *Alsophila tricolor* in this article).

[22] Melbourne: CSIRO Publishing, 2004, pp. 50-52.

[23] Auckland: David Bateman, 2000, p. 85.

species) should reflect both "naturalness" (evolutionary relationships) and "convenience" – straightforward methods for identification. The debates and disagreements still current, however, reflect that this principle, while a worthy ideal, is hard to realise in practice.

Visitors to the Website

In 2022 people from 104 countries visited the website, but the distribution geographically remained about the same as usual – around 70% from Aotearoa, 10% from the U.S.A., 5% from Australia, 1% each from the U.K. and China, and the rest spread out through Asia, the Pacific, Europe, and the Americas, but only a very few African countries represented. This year the top ten geographical locations were New Zealand (73%), the U.S.A. (10%), Australia (5%), the U.K. (1%), China (0.94%), India (0.69%), Canda (0.52%), Philippines (0.44%), Germany (0.43%), and Brazil (0.36%). Fiji, in 11th place (0.32%), was the leading Pacific Island.

What plants people were interested in seemed to undergo a few radical shifts during the course of the year. I had first prepared the "hit parade" chart in August, as I had hoped to get the Newsletter out at the beginning of Spring rather than after Spring had already sprung. When updating it, I found a few very interesting changes – **Poroporo**, which for years has been (inexplicably) in either first or second place seemed at last to be on a downward trajectory, and in the second half of the year, **Kawariki**, which had been in 50th place or lower, popped up into fifth place (although because it had started so far behind it was only 15th for the year). This shrub is mentioned in an often-quoted saying of King Tawhiao, so its surge in popularity may be linked to increasing interest in the Kīngitanga (the Māori King movement). The other newcomers to the top 10 were **Puka** and **Hīnau**. **Rengarenga** moved up from tenth place last year to second overall, while **Aute** and **Tawa**, in 8th and 6th place respectively last year, dropped out of the top 10 (ending in 11th and 12th place for 2022).

Front-Runners in the Hit Parade, *in order of frequency:*

2018 Jan-Dec	2019 Jan-Dec	2020 Jan-Dec	2021 Jan-Dec	2022 Jan-June	2022 July-Dec
Kauri	**Kauri**	**Mānuka**	**Poroporo**	Hue	Rengarenga
				Hue	
Poroporo	**Poroporo**	**Poroporo**	Hue	Rengarenga	Hue
				Rengarenga	
Tawa	**Mānuka**	**Kauri**	**Mānuka**	**Poroporo**	Pūriri
				Poroporo	
Nikau	Nikau	**Kōwhai**	**Kōwhai**	**Mānuka**	**Poroporo**
				Pūriri	
Pohutukawa	**Kōwhai** / Whara	Whara	Raupō	Raupō	**Kawariki**
				Puka	

6th to 10th place: *Jan-June*: Pūriri, Kōwhai, Tawa, Hinau, Puka.
July-Dec: Kauri, Puka, Aute, Kōwhai, Mahoe
Overall: Kōwhai, Raupō, Hinau, Kauri, Mānuka
Last year: Tawa, Pūriri, Aute, Kauri, Rengarenga

What Next?

There is still the hope that the on-going struggle with the moso bamboo will enable a more compact garden to spring phoenix-like from the mulch, if not the ashes: one that you can walk through to trace the sequence of the migration from Taiwan to Aotearoa through the names of plants that can be traced back to major stages of the journey.

Foliage of the Tītoki (*Alectryon excelsus*)

As mentioned in the "Additions and updates" section, apart from felling and poisoning moso, much of the last year's effort was focused on shifting pages still in the original (2009-10) format to the current one, and to revising other pages which contained only the most basic information. There are still 20 of the old-style pages yet to be revised and replaced. At several points in the development of the site I have tried to operate on the principle that "some information is better than none", so some pages do indeed have the bare minimum of information, and some of the older pages have been left untouched while new ones have been given priority for the same reason. I will try to speed up the migration of the latter during the coming year. Many of the 34 pairs of Māori and Polynesian words without pages are for rather obscure plant names, but there are still a few serious gaps nonetheless. One is the tītoki (*Alectryon excelsus*); I discussed this important tree with Robert Vennell a few years ago, and he has included some highly informative pages on it in his book *The Meaning of Trees*. A page for this name and its Polynesian correlates at least will be added shortly – there are two quarter-century-old tītoki reproaching me with their lustrous light-green foliage in line of sight from where I am writing this paragraph! Other gaps will also be plugged as time permits.

And, lastly, there is this newsletter. My past forecasts have not proved very reliable: the first one took ten years to produce, the second was scheduled for "te raumati" – which should have been the summer of 2020-21; it appeared in the summer of 2021-22. This one was scheduled for "Matariki", i.e. Matariki 2022 – it's six months late, but that at least is an improvement! However, mā te waimarie, and perhaps better management, the next issue (probably somewhat slimmer than this one) should be out by Matariki this year (2023).

Heoi anō mō te wā nei – ko te tūmanako kia puta atu anō tēnei kawerongo ā Matariki 2023

This newsletter was prepared for Te Māra Reo, http://www.temarareo.org, by Richard Benton.
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