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PLANT OF THE MONTH, p. 2

Connorochloa tenuis. Photo: Mike Thorsen.

When labels get mixed – lessons to be learned from a study of the Thomas Kirk 'herbarium' and historical *Simplicia* collections

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Introduction

Whilst engaged in the final stages of preparing for scientific publication a paper describing a new species of *Simplicia* (Poaceae), an issue arose as to whether *S. laxa* sens. str. had been collected from the North Island. Currently, there are two *Simplicia* species accepted: *S. buchananii* (a North-West Nelson endemic) and *S. laxa* (the type of the genus and, as currently circumscribed, a species of both the North and South Islands) (Edgar & Connor 2010).

Fig. 1. Thomas Kirk FLS (1828–1898).

However, Smissen et al. (2008) suggested that there might be a third species. Their DNA-based investigation revealed that the majority of North Island specimens (and one South Island specimen from northern Otago) were genetically and (for the most part) morphologically distinct from both *S. buchananii* and *S. laxa*. However, historical *Simplicia* specimens lodged in WELT[1], collected by Thomas Kirk (Fig. 1) in 1880 from 'Dry River Station, Ruamahanga, lower Wairarapa' in the eastern Wairarapa, North Island, were confusing. These specimens seemed to have characters intermediate between *S. laxa* and the new species and for that reason Smissen et al. (2008) elected not to formally describe a third species of *Simplicia*. Instead, Smissen et al. (2008) stated that it was important to rediscover *Simplicia* in the eastern Wairarapa and, if and when this was done, genetically and morphologically investigate such material. Six years later, in February 2014, *Simplicia* was rediscovered in eastern Wairarapa (de Lange et al. 2014) and subsequent DNA analysis and investigation of the morphology of the Wairarapa plants confirmed that were the same as the putative new species inferred by Smissen et al. (2008) (R.D. Smissen, unpubl. data).

The 'sticking point' remained Kirk's historical Wairarapa *Simplicia* collections (Figs. 2, 3, 4). I have re-examined these and, for the most part, they also fitted the postulated new species. So, it seemed, did other herbarium material lodged in the main New Zealand herbaria, until during a review of the new *Simplicia* species manuscript, Kerry Ford of the Allan Herbarium (CHR) Landcare Research Manaaki Whenua, raised a question about a supposed Wairarapa Kirk specimen held in CHR. That specimen (CHR 6279, Fig. 5), though attributed to Thomas Kirk and stated to be from 'Dry

1 Herbarium acronyms follow Thiers (2016)

PLANT OF THE MONTH – *CONNOROCHLOA TENUIS*

Connorochloa tenuis. Photo: Mike Thorsen.

Plant of the month for July is *Connorochloa tenuis*—an endemic grass and genus of the drier parts of the eastern North Island and South Island. Our selection reflects that this grass genus honours the late Henry Connor CNZM, M.Sc.(Hons), D.Sc., FRSNZ who passed away on 26 July 2016, in his 93rd year (a full obituary will appear in the next issue of *Trilepidea*). *Connorochloa* was established by Barkworth et al. (2009) in honour of Henry Connor who devoted a lifetime to studying the reproductive biology and genetics of New Zealand grasses but especially those in the Triticeae and Danthonieae.

Currently rated 'At Risk / Declining' (de Lange et al. 2013), *Connorochloa* is a poorly known grass that may better qualify as 'Data Deficient'. Though once regarded as widespread, this species seems never to have been common and there are now very few recent (i.e., last 30 years or less) records of it (notably all from the South Island). *Connorochloa* is a species inhabiting open short tussock (*Festuca*) dominated grassland, and it has been historically recorded from sea-level to 900 m. *Connorochloa tenuis*, though superficially similar to other Elymoid grasses (indigenous and naturalised) can be distinguished by the easily detached culms which trail (sprawl) across the ground; by the uppermost internode greatly elongating following flowering; and by the spikelets that are typically tightly appressed to the inflorescence stem.

It is possible that this grass is now seriously threatened, especially as large parts of its former range have become increasingly overwhelmed by introduced pasture grasses; herbarium evidence and field observations suggest that *Connorochloa* has indeed declined. However, there have as yet been no serious attempts to quantify this decline making an accurate conservation assessment difficult. It is for this reason that the species will probably be reassessed as 'Data Deficient' at the next indigenous vascular plant threat assessment.

For more information see the factsheet at: http://www.nzpcn.org.nz/flora_details.aspx?ID=744.

References

Barkworth, M.E.; Jacobs, S.W.L.; Zhang, H.Q. 2009: Connorochloa: a new genus in Triticeae. Breeding Science 59: 685-686

de Lange, PJ; Rolfe, JR; Champion, PD; Courtney, SP; Heenan, PB; Barkla, JW; Cameron, EK; Norton, DA; Hitchmough, RA. 2013: Conservation status of New Zealand indigenous vascular plants, 2012. New Zealand Threat Classification Series 3. Department of Conservation, Wellington. 70 p.

River Station, Ruamahanga, lower Wairarapa' is not the new species. It is *Simplicia laxa*. Hitherto, it was thought that the only *Simplicia* found in the North Island was the new species and that *S. laxa* sens. str. was now a South Island endemic (Smissen et al. 2008). So, Kerry asked, based on herbarium evidence is *Simplicia laxa* also in the North Island or had there been a mix up in collection labels?

The label notes on CHR 6279 suggest the second of the above alternatives. That herbarium specimen (Fig. 5), though attributed to Kirk, carries a label written in the hand of Harry H. Allan and Victor D. Zotov. That collection is, as Kerry noted, *S. laxa* sens. str. However, I don't believe it was collected

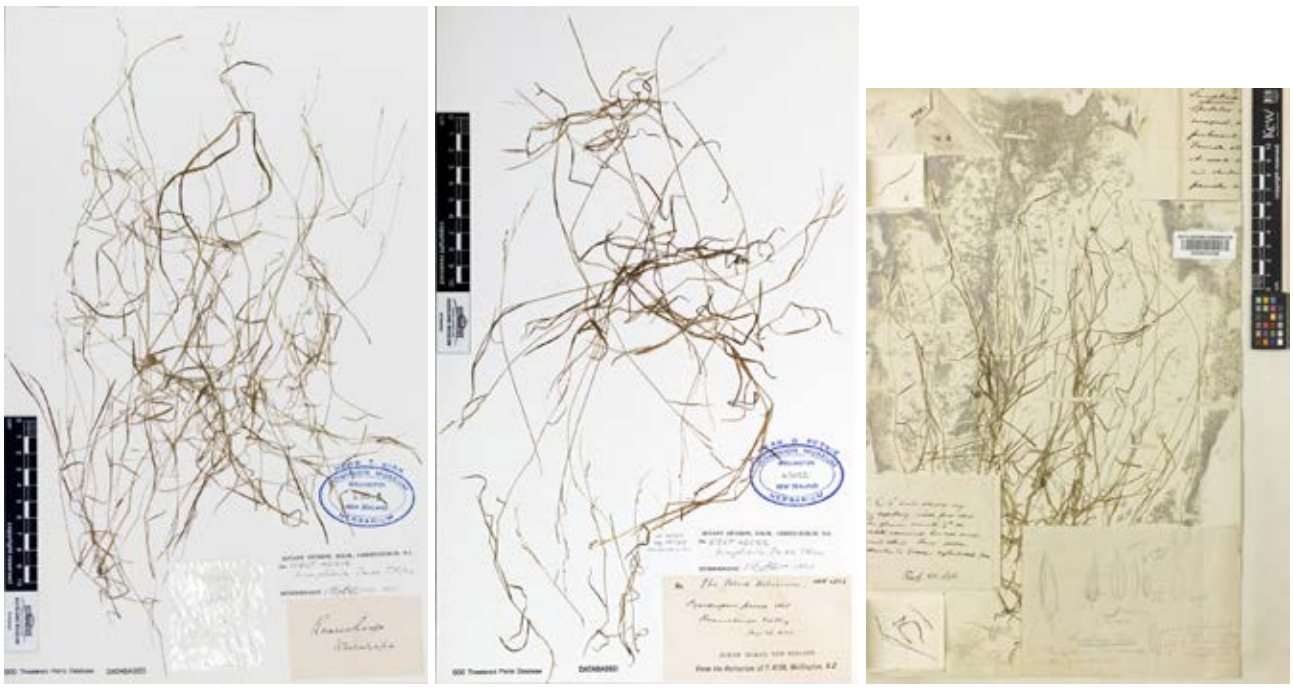

Fig. 2 (left). WELT SP043016, a mixed collection of mostly *Simplicia* aff. *laxa* with *S. laxa* sens. str. entangled amongst it. This herbarium sheet is attributed to Thomas Kirk and most of it morphologically matches his other North Island, 'Ruamahanga' *Simplicia* collections. Note the "HERB. T. KIRK" stamp and Thomas Cheeseman handwritten label reading 'Ruamahanga, Wairarapa'.
Fig. 3 (centre). WELT SP043022. This collection of *Simplicia* aff. *laxa* held within the Petrie Herbarium at WELT is the only one of Kirk's 'Ruamahanga' gatherings held in New Zealand Herbaria to carry an original Kirk handwritten label. Note Kirk's manuscript name "Pyxidiopsis prona MS" and the location and collection details 'Ruamahanga Valley, Jan 26 1880'. All of the material mounted on this sheet is *Simplicia* aff. *laxa*.
Fig. 4 (right). K000913498. This collection of *Simplicia* aff. *laxa* held at Kew is a duplicate sent by Thomas Kirk to Kew Herbarium (received by them in August 1896) for their comment (Kirk 1897). As is typical of the plant specimens Kirk sent overseas the specimen is accompanied by a detailed description and set of collection notes written in Indian ink by Kirk. The pencil annotations and drawings are by another researcher and were presumably prepared after Kirk had described the genus and species.

from the North Island, or that it was collected by Thomas Kirk. My suggestion is that this collection is actually a part of the Donald Petrie, North Otago, Waikouaiti *Simplicia laxa* collections that were used by Kirk to erect the genus and establish the species (Kirk 1897).

Similarly, I suggest that one of the original Kirk-collected *Simplicia* from the eastern Wairarapa, 'Dry River Station, Ruamahanga, lower Wairarapa' (Fig. 2), is a mix of Kirk and Petrie *Simplicia*. My conclusion provides yet another example of the risks herbarium users face when using some historical New Zealand herbarium collections, most especially those attributed to Thomas Kirk. To understand this, one first needs to know something about the working practices and herbarium collections of Thomas Kirk.

The Thomas Kirk 'Herbarium'

Thomas Kirk (1828–1898, Fig. 1) is arguably the least acknowledged and under-appreciated of New Zealand's pioneering botanists. Though there have been a number of biographies offered for Kirk (Brown 1968; Moore 1973; McKelvey 1991), these say little of the manner in which he stored and dispersed his herbarium or of how he annotated and labelled his collections. Especially significant is that very little is said of how Kirk's herbarium was curated by others who received parts of it following his death on 8 March 1898. This is especially important because it was the way that Kirk stored his specimens, how his collections were used by others following his death, and the way that the Kirk collections held in WELT were eventually curated that is critical to explaining the apparent occurrence (based on herbarium specimens) of *Simplicia laxa* sens. str. in the North Island.

Obviously, understanding how Kirk's plant collections were stored, used and then eventually curated is important information. Yet, 118 years after Kirk's death, piecing together what actually happened to his collections is difficult. It requires not only a good understanding of Kirk's collecting habitats and writing styles but it is also necessary to bring to light comments made by people intimately associated with the Kirk collections at the time of their curation. For that information I have had to rely on comments made to me by the late Nancy Adams (1926–2007) and Fiona Pitt (1934–2003), herbarium staff who worked with Kirk's collections during the critical time that these were formally curated into WELT.

In modern terms, Kirk was a consultant botanist who worked on various projects for the government of that time. Toward the end of his life, he was paid by the New Zealand Government to publish a flora. This became '*The Students' Flora of New Zealand*', which was also the first flora to be written by a New Zealand based botanist. For this project, Kirk worked from the then Colonial Museum (now The Museum of New Zealand Te Papa Tongarewa) and, in the process, he took to the museum large parts of his personal herbarium because these collections formed the basis of the treatment he was preparing for the Flora.

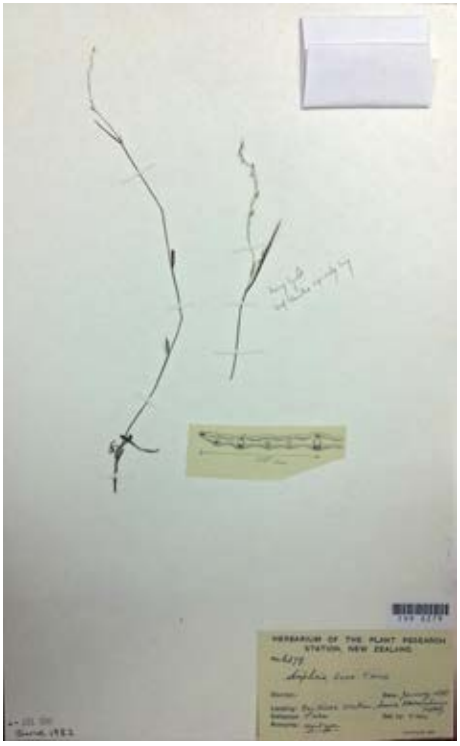

Fig. 5. *Simplicia laxa* sens. str. CHR 6279 collection with erroneous label details. This collection attributed to Kirk is almost certainly one of Donald Petrie's South Island *Simplicia laxa* collections which he had sent to Thomas Kirk to examine and which was subsequently subsampled by Thomas Cheeseman and lodged in AK. The herbarium label written in the hand of Harry H. Allan and Victor D. Zotov (for the most part by Zotov), states the specimen was collected by Kirk from the 'Dry River station, lower Ruamahanga Valley' but my research suggests that this collection is a duplicate taken from AK 1307, a Petrie specimen from Waikouaiti, North Otago, South Island.

Kirk died before his flora was completed. Despite this, the most complete parts of his unpublished work were uplifted and published posthumously by the then New Zealand Department of Education as '*The Students' Flora of New Zealand*' (Moore 1973; de Lange et al. 2013; de Lange 2014). Following Kirk's death, portions of his personal herbarium were gifted to WELT. Initially, this comprised the specimens Kirk had left in WELT on his death (these were eventually labelled by the Museum 'The Kirk Herbarium'), and then later in the 1930s his children gifted to the museum the specimens they still held. To distinguish these from the initial 'Kirk Herbarium', they have been stamped and/or annotated as 'The Kirk Private Herbarium'. Elsewhere, it has been argued that despite these herbarium stamps, the 'Kirk herbarium' is more a name of convenience than a fact because Kirk's plant collections are found throughout the world (see comments in de Lange et al. 2013; de Lange 2014). This is because, during his life, Kirk routinely corresponded with, traded and/or gifted specimens to a range of plant collectors, botanists, herbaria and museums. Though it is true that the greatest concentration of Kirk material can be found at WELT, for researchers working with Kirk plant names, and especially for those engaged in the typification of these, it is wise to check as many of the world's herbaria holding Kirk material as possible rather than simply assume that Kirk's Herbarium is found only in WELT and that all his types will be there (de Lange et al. 2013; de Lange 2014). It is also important to note that, during Kirk's day and for at least 50 years after his death, few of his collections were mounted, most were held loose within folders and sometimes newspapers until the 1960s when the formal mounting and incorporation of Kirk specimens into WELT began.

The curation of Kirk's collections was complex. Initially, this was done under the supervision of the then herbarium curator Bruce Hamlin (1929–1976) (J.E. Braggins, pers. comm. 2016), and it was eventually completed by Nancy Adams (N.A. Adams, pers. comm. 1991). Although mounting was

overseen by Hamlin and completed by Adams, much of the actual work was done using Victoria University of Wellington students. One of those who helped mount these historical plant collections was Dr John Braggins (pers. comm. 2016) who was at that time an undergraduate at Victoria University of Wellington. John recollects that Kirk's (and also Cockayne's and Colenso's) collections were then held in boxes as unmounted specimens with loose labels all of which had been filed within newspaper and folders. These were often in no particular order and sometimes with the locations and specimens mixed up. John also noted that some folders were in considerable disarray due to the way past researchers had 'riffled' through them and, in some cases, subsampled them for duplicate material (see below). This meant that, even with the very best supervision possible, those mounting the collections were not always certain of the relationship between specimens and labels, or whether all of the specimens in a particular folder were part of the same collection or even the same species. Under these conditions, and especially for those less easily identified species, such as grasses, it's easy to see how labelling and mounting errors can arise.

Though it is evident that during his life Kirk traded his collections with his contemporaries—in New Zealand most notably Donald Petrie, Thomas Cheeseman and Bernard Aston, and that he also sent specimens around the world, following his death samples continued to be taken from his collections in WELT. One of the key people to obtain Kirk plant specimens in this manner was Thomas Cheeseman who, following Kirk's death, was appointed in 1900 by the Government to complete the New Zealand Flora project Kirk had started. For that work, Cheeseman started afresh and, in the process, he obtained numerous duplicates from Kirk's collections that had been sent to him from WELT (Cheeseman 1906). However, in the 1930s and 1940s, Kirk material was also obtained by Harry H. Allan (who was then engaged in writing yet another Flora treatment—part of which became the first volume of the *Flora of New Zealand Series* (Allan 1961)) and probably other botanists. Indeed, a perusal of the herbaria of other historic New Zealand-based collectors of that time suggests that duplicates of Kirk's plant collections following his death were frequently taken. While the degree to which Kirk's 'herbarium' was sampled following his death is now difficult to gauge, the fact that specimens were taken from it remains a major problem for those working with his collections today. This is especially because the label details on Kirk duplicates is often at variance to the parent collection and, perversely, it is sometimes the case that the specimen held by WELT in the 'Kirk Herbarium' is actually not the parent specimen at all, rather that resides in another herbarium altogether (see de Lange et al. 2007; de Lange 2014, and below). Under these circumstances, those researchers working with Kirk specimens are now often faced with the difficult task of reassembling his collections (now spread worldwide over numerous herbaria including AD, AK, BM, CANB, CANU, CHR, F, FI, G, K, LCN, LPL, NY, NSW, MEL, OTA, OXF, P, SD, SS, WELT—and probably others (Stafleu & Cowan 1979; P.J. de Lange, unpubl. data)) especially when engaged in typifications (see de Lange, 2014).

These then are the critical points. First, at the time of his death, Kirk's collections were not mounted; instead they were held loose leaf within folders and newspaper and kept that way for at least 50 years. Secondly, during that time his collections were being used (and subsampled) by other botanists. Thirdly, some of these botanists (e.g., Bernard Aston, Thomas Cheeseman, and Leonard Cockayne) were careless with their copying of Kirk's original label details (either omitting key information, or changing it). Finally, Kirk's collections were formally curated by university students under supervision by herbarium staff in various stages between the 1960s and 1970s. This long digression is necessary because it helps when trying to unravel what happened to Kirk's *Simplicia* collections.

The Kirk and Petrie *Simplicia* collections

The grass genus *Simplicia* was established by Kirk (1897) on the basis of three sets of collections: the material Kirk collected in January 1880 from the North Island, at the 'Dry River Station, Ruamahanga, Lower Wairarapa', and plants forwarded to Kirk by Donald Petrie from two South Island, Otago sites, 'Waikouaiti' and 'Deep Stream'. The Kirk and Petrie collections, even without labels, are easily recognised. Kirk's specimens are much finer, the culms are numerous, not separated out, intertwined,

often with the rootstock attached, and bearing numerous, short, pale green to grey-green leaves (Figs. 2–4). The leaf-sheaths are glabrous and the inflorescences are in poor order, with their spikelets often dehisced. Kirk's material also seems to be poorly pressed, with the leaves often slightly shrivelled. It also seems that his material was collected from a site subjected to frequent flooding or dust blow, since the culms and leaves are often covered in a thin film of silt. Petrie's material is more robust, 'cleaner' and much better pressed (Figs. 6, 7). The specimens are typically separated into single fertile (rarely with rootstock attached) culms, with distinctly hairy leaf-sheaths, and much broader, very dark green (almost black), longer leaves. The inflorescences are longer and more of the spikelets intact. The condition of Kirk's *Simplicia* collections was noted in his protologue where he stated that his North Island plants were much 'weaker and have narrower leaves than those from Otago' (Kirk 1897).

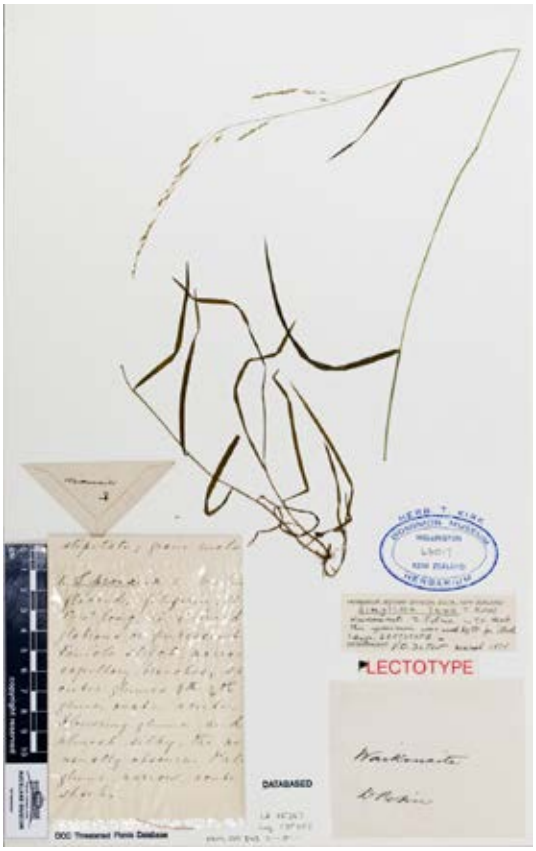

Fig. 6. Lecotype of *Simplicia laxa* as designated by Zotov (1971). This specimen, collected by Donald Petrie from Waikouaiti is typical of Petrie's South Island collections which when compared with Kirk's North Island plants are more robust, with broader, darker green leaves and larger inflorescences, and the individual culms usually careful teased out. This enables easy recognition of Petrie's *Simplicia* collections from images, though morphologically they are also easily distinguished from Kirk's North Island material on account of their hairy leaf sheaths, ligules and lemma. Note the packeted detailed diagnosis, and specimen labels all written in Kirk's hand.

Kirk (1897) was initially unsure of what to do with his new grass, such that he had passed material by Joseph Hooker in Kew who had them examined by 'Dr Stapf'(this would be the Kirk specimen from 'Dry River Station, Ruamahanga, Lower Wairarapa' received by Kew during August 1896 (K000913498!, Fig. 4)). Interestingly, Donald Petrie also sent a duplicate of his South Island *Simplicia* to Kew (K000913497!, Fig. 7), noting in his covering letter (sent on 26 June 1889) to then director William Turner Thistleton-Dyer that the grass was something 'I am quite unable to make anything of'. It is a matter of conjecture as to why Petrie, already a very capable agrostologist, did not name his grass for he was certainly aware it was rather unusual matching nothing then known from New Zealand. Perhaps he was beginning that process, as his correspondence with Thistleton-Dyer (K000913471!) asks if Kew staff could check to see if the grass matched some other genus found outside New Zealand. Petrie evidently then thought that his specimens may have been an exotic species starting to naturalise in New Zealand. It was possibly for the same reasons that at about this time Petrie forwarded specimens to Thomas Kirk, who recognising them as similar to his 'Dry River Station, Ruamahanga' collections established the genus *Simplicia* and species *S. laxa*, using for the most part Petrie's material for his description and illustrations. This is why, when Zotov (1971) lectotypified the name he chose a specimen (WELT SP043017! Fig. 6) from Petrie's South Island, Waikouaiti, collections rather than Kirk's North Island material as lectotype.

Following Kirk's death, Thomas Cheeseman was sent those Kirk collections held in WELT from which he took duplicates (Cheeseman 1906). This sampling included *Simplicia* specimens (which at that time were unmounted and comprised Kirk's North Island, Wairarapa specimens and Petrie's South Island, Otago collections). These Cheeseman divided into two lots; one lot he sent to Eduard Hackel in Vienna (W), and the other he kept in AK. The three AK *Simplicia* specimens Cheeseman retained (AK 1370!, AK1371!, AK 1372!) are all labelled in his hand. These are duplicates of Petrie's material—two are from Waikouaiti (AK 1370, AK1371) (Fig. 8) but AK 1372, (Fig. 9) has a confused Cheeseman

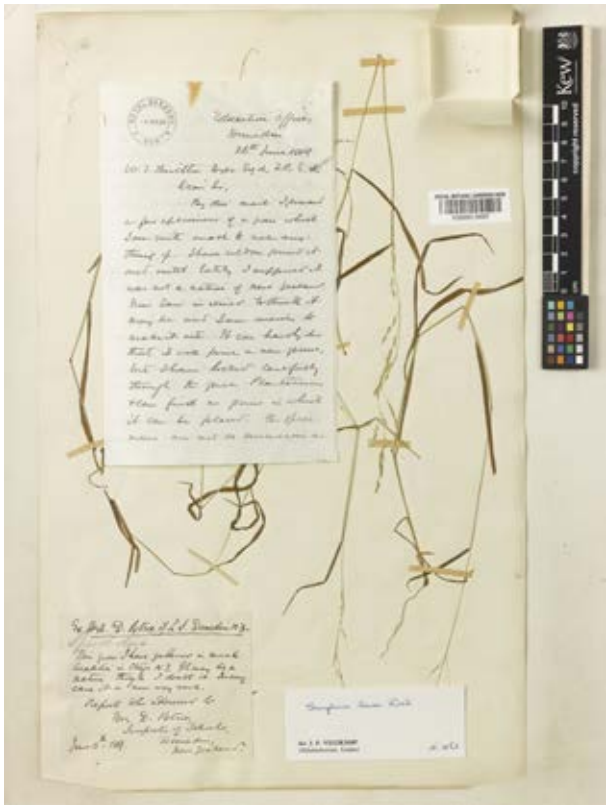

Fig. 7. Petrie specimen of *Simplicia laxa* lodged in Kew (K000913497). The letter reads (with my notes in []):

Education Office
Dunedin
26th June 1889

W.J. Thistleton Dyer FLS [This is illegible 'FLS' is my best guess], FRS [followed by illegible – text possibly 'etc']

Dear Sir,

By this mail I forward a few specimens of a grass which I am quite unable to make anything of. I have seldom found it, and until lately I supposed it was not a native of New Zealand. Now I am inclined to think it may be, and I am anxious to make it not. It can hardly be that it will prove a new genus, but I have looked carefully through the Genus Plantarium and can find no genus in which it can be placed. The specimens are not so numerous as I could wish but they will I trust supply plenty of material for a correct determination of its position. The stamens are two and so are the styles which are rather long (but not exserted) and plumose. The structure of the palea [sic – Petrie confused the lemma of *Simplicia* with the palea] is most remarkable as it is quite like a flowering glume, and it is not two nerved. I shall feel very greatly obliged if you could get an expert on grasses to look with the plant and report what he thinks of it. Should it prove of interest I expect it to be overseas. I will gather further supplies and forward more specimens.

Accept my best thanks for your kind services in Mr Goyen's case [Goyen 1845–1927, was a friend of Petrie's and is commemorated with a number of New Zealand plants including *Carex goyenii*, *Leptinella goyenii* and *Myosotis goyenii*]. I have for some time past been going over my herbarium marking up sets of valuable plants for transmission to Kew and saving my correspondents. These are not as yet quite complete but in two months or so I should send you a parcel containing a number of types of new plants, and specimens of other rare ones from New Zealand.

I have read with great interest your address at the British Association of [illegible] and the controversy with Mr Romanes. I am not a Huxleyite, and I thought your address very opportune treatment.

With best wishes I remain,

Yours Sincerely

D. Petrie

This letter makes clear that Petrie was aware that his grass was distinct, that it may represent a new genus but that it needed to be compared with other grass genera from around the world. Donald Petrie (1846–1925) was a very careful and methodical taxonomist and this letter is an excellent example of his working style. It remains a mystery why he did not describe *Simplicia* himself, as he was obviously fully aware that it was distinct, and seemingly unmatched to any other grass genus then known from the world. Petrie eventually went on to be one of New Zealand's first taxonomists to specialise in sedges and grasses.

label, reading 'Deep Stream, Waikouaiti'—two different geographic localities. The Vienna *Simplicia* duplicates comprise two specimens bearing Cheeseman's labels and handwriting; one label reads 'Ruamahanga, Wellington Province, T. Kirk' (W 1916-0029698!, Fig. 10) and the other, 'Wairarapa, Wellington province, T. Kirk' (W 1916-0029697!, Fig. 11). These specimens are problematic. The first (Fig. 10), attributed by Cheeseman to Kirk and from the 'Ruamahanga', does indeed appear to be part of Kirk's original 'Dry Station, Ruamahanga, Lower Wairarapa' collection. In particular, it is a more copious gathering of a smaller-leaved 'wispy' plants with seemingly glabrous leaf sheaths, but the other (W 1916-0029697! (Fig. 11)), despite Cheeseman's label, is, based on the size, leaf width, and hairy leaf sheaths, part of Petrie's North Otago, South Island, collections although I cannot say whether it came from Deep Stream or Waikouaiti.

Before we turn to New Zealand herbaria, one further *Simplicia* specimen, held at US (US 2044071!), is of interest. This specimen, a collection of *S. laxa* sens. str., bears a label in an unknown hand which states 'ex herb. T.F. Cheeseman' then in type script 'PLANTS OF NEW ZEALAND' followed by the same unknown hand 'Simplicia laxa T.Kirk, South Island, Waikouaiti, Otago, D. Petrie'. The handwriting is superficially similar to the less 'tidy' examples of Donald Petrie's that I have seen but I cannot be sure if this is correct. Though it may seem unusual that Petrie would have sent overseas material from the 'Cheeseman Herbarium' of a plant he had originally collected and not gifted himself to Cheeseman, this is possible. Towards the end of Petrie's life he resided in Onehunga, Auckland (de Lange 1996), and he did trade specimens with Cheeseman. So it is possible he acquired some of his original *Simplicia laxa* material back as a gift from Thomas Cheeseman.

Fig. 8. AK 1370, an isolectotype of *Simplicia laxa* collected by Donald Petrie from Waikouaiti, North Otago, South Island. This collection was subsampled by Thomas Cheeseman from Kirk's collections which were sent to Cheeseman from WELT following Kirk's death. It was *Simplicia* from this herbarium sheet which were used for the illustration of *S. laxa* prepared by Matilda Smith at Kew that appears in Cheeseman (1914). Note the typed blue-paper label which reads 'Duplicate to H.H. Allan: 1942', and above the red type label, the staining silhouette left from a culm of *Simplicia laxa* that was removed and sent to CHR. That duplicate is I believe the source for CHR 6279.

It seems that Harry H. Allan also examined *Simplicia* specimens, certainly when he visited Kew but possibly also in AK and WELT. There is one collection in CHR (CHR 236595!) labelled in Ted Rawson's handwriting, which states that it is a 'Fragment ex specimen at Herb. Kew pers. H.H. Allan' taken from a collection made by Kirk from 'Ruamahanga'. Interestingly, at the base of this label Victor Zotov wrote the comment 'same as 6279' (i.e. CHR 6279). However, CHR 236595, comprising a tiny piece of leaf, leaf-sheath and spikelets, though undoubtedly part of the material Kirk sent to Kew (K000913497! (Fig. 4), which did come from the Ruamahanga, is not the same as CHR 6279 (Fig. 5). The source material for CHR 6279, Zotov's claim notwithstanding, is most likely Petrie's South Island *Simplicia* material from AK or WELT. This is because CHR 6279 (Fig. 5), although attributed to Kirk and stated to have been collected from 'Dry River Station, lower Ruamahanga Valley', is a more robust plant with broader leaves, hairy leaf sheaths, and copiously hairy lemma, features not seen in North Island *Simplicia* aff. *laxa*. It is not a duplicate of CHR 236595 (which is also *S.* aff. *laxa*). Instead, I believe that CHR 6279 is duplicate of AK 1370 (Fig. 8), which is one of Petrie's Waikouaiti, South Island *Simplicia laxa* sens. str. collections, held in the Cheeseman Herbarium. So how did it end up being confused with Kirk's North Island collections?

Of those Petrie *Simplicia* specimens held in AK and WELT, only one, AK 1370 (Fig. 8), carries evidence that links it to CHR 6279 (Fig. 5). Associated with the labels on AK 1370 is mounted a strip of blue paper on which is typed the comment 'Duplicate to H. H. Allan 1942'. While, CHR 6279 carries no annotations to show that it is the duplicate sent to Allan from AK, the *Simplicia* specimens on that sheet match (in reverse) the pigmentation staining silhouette left in the position on AK 1370 (Fig. 8) from where a mounted specimen had been before its removal. The label of CHR 6279 is also notable in that it is mostly written in Zotov's handwriting (the only portions of it that I can attribute to Allan are the accession number and name '*Simplicia*'). So, on the basis of available evidence, it would seem that Allan had been sent from AK a duplicate of Petrie's Waikouaiti *Simplicia laxa* (AK 1370), the exact label details of which (for reasons unknown) were not recorded by Allan or later lost and that Zotov, working much later on *Simplicia,* uncritically assumed that CHR 6279 was part of Allan's duplicate

material from Kew (i.e. CHR 236595). I can think of no other explanation.

Fig. 9. AK 1372, a Petrie *Simplicia laxa* herbarium specimen held in AK. The label written in Thomas Cheeseman's hand 'Deep Stream, Waikouaiti Otago' is actually two geographically distinct localities from where Petrie collected specimens. Despite being *Simplicia laxa* sens. str. based on the specimens and label details I cannot determine from which of the two localities mentioned the specimens actually came from.

While this resolves the likely origin of CHR 6279 we are left with the final problem of why Kirk's WELT collections of *Simplicia* appeared intermediate when I examined them during our genetic study of *Simplicia* (Smissen et al 2008). WELT is critical to any investigation of *Simplicia* because with the exclusion of the two *Simplicia* collections that Kirk and Petrie sent to Kew, all other New Zealand Kirk and Petrie herbarium specimens were ultimately sourced from WELT. As noted, the WELT *Simplicia* specimens comprise Kirk's North Island, eastern Wairarapa, Ruamahanga, collections and Petrie's South Island, North Otago, Waikouaiti and Deep Stream, collections. The Petrie collections, which include the lectotype designated by Zotov (Zotov 1971), are clearly labelled and, as noted above, easily recognised by their morphology (e.g., Fig. 6). However, Kirk's Ruamahanga specimens are another matter. There are two collections; WELT SP043016 (Fig. 2), stamped 'HERB. T. Kirk', which bears a handwritten label in Thomas Cheeseman's hand that reads 'Ruamahanga, Wairarapa'; the second specimen, WELT SP043022 (Fig. 3), is stamped 'HERB. D. PETRIE'. Significantly, that sample bears a Kirk label with two handwritings, the first reading 'The Petrie Herbarium' is in Donald Petrie's hand and the second, in Kirk's handwriting, states 'Pyxidiopsis prona M.S. Ruamahanga Valley Jan 26 1880'. This ironically, is the only one of Kirk's original Ruamahanga *Simplicia* collections held in a New Zealand Herbarium to bear his own label (the only other is held at K (K000913498!, Fig. 4). The name "Pyxidiopsis prona" is a manuscript name that Kirk was considering using for what he later described as *Simplicia laxa*. As is shown by de Lange &Gardner (2002), de Lange et al. (2013) and de Lange (2014), Kirk routinely bestowed a plethora of manuscript names on his potentially new taxa, only changing these once he had finally made his mind up and formally described them. In the case of *Simplicia*, this is borne out by the fact that even the lectotype of *Simplicia laxa* bears a packet containing a detailed diagnosis using the manuscript name "Simplicia prona" (Fig. 6).

Careful inspection of the Petrie Herbarium specimen of *Simplicia* (WELT SP043022 (Fig.3) reveals that it is all one collection, corresponding to *S.* aff. *laxa*, the unnamed segregate recognised by Smissen et al. (2008). The second collection (WELT SP043016!, Fig. 2), despite its stamping 'HERB. T. KIRK', bears only a Cheeseman label and this collection I now believe is a mix of North Island *S.* aff. *laxa* and South Island *S. laxa* sens. str. Based on what we now know of how the 'Kirk herbarium' was stored and then curated some 50 years after his death, especially the fact that specimens and their labels were held loosely within folders and newspapers and that researchers like Cheeseman had unrestricted access to it, is telling. It is also significant that North Island *Simplicia* specimens Kirk sent to Kew (Fig. 4) and the one residing in the 'Petrie Herbarium' (Fig. 3) are not mixed collections – they are *S.* aff. *laxa*. Most importantly, the two Vienna *Simplicia* specimens sent by Cheeseman to Hackel (Figs. 10, 11) bear only Cheeseman labels with North Island locations 'Ruamahanga' and 'Wairarapa' and yet include Petrie's South Island *S. laxa* sens. str. and Kirk's North Island *S.* aff. *laxa* (both recognisable by the condition of the pressed material). Lastly, of the original Kirk's 'Ruamahanga' *Simplicia* material held in WELT, the only one to be stamped 'Kirk Herbarium' is mixed (Fig. 2), and this too bears evidence that it was handled by Cheeseman after Kirk's death (i.e., it is labelled in Cheeseman's hand rather than Kirk's).

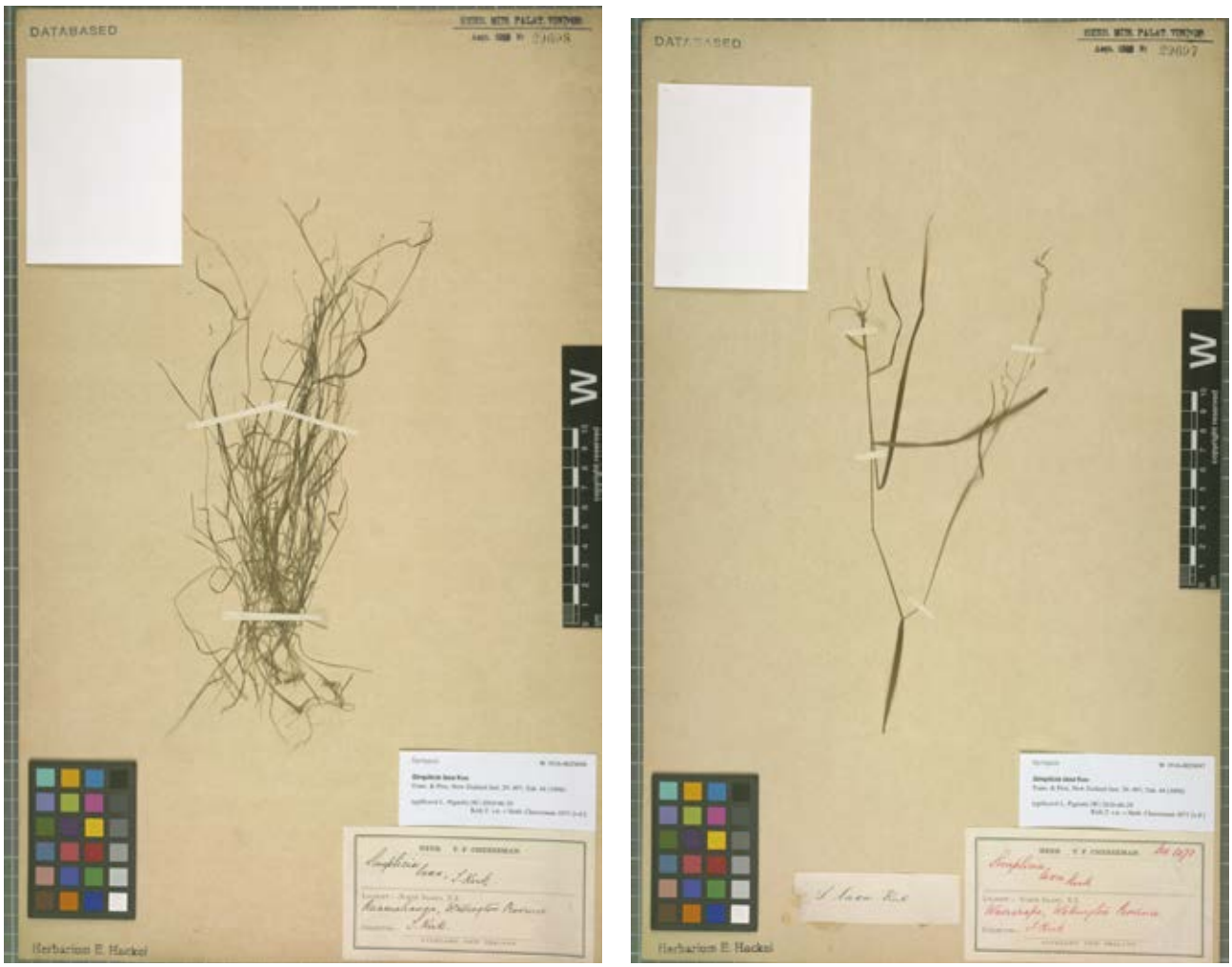

Fig. 10 (left). *Simplicia* collection held in Vienna (W 1916-0029698) with handwritten label by Thomas Cheeseman. The morphology and condition of the *Simplicia* on this sheet matches those North Island, 'Ruamahanga' collections made by Thomas Kirk (see Fig. 2–4) and are I believe *Simplicia* aff. *laxa*.
Fig. 11 (right). *Simplicia* collection held at Vienna (W 1916-0029697) with handwritten label by Thomas Cheeseman. Despite Cheeseman's label stating this collection was made by Thomas Kirk from the 'Wairarapa', the condition of the specimen, especially the fact it is a solitary fertile culm, which has broad darkly pigmented leaves, hairy leaf-sheaths, and a large inflorescence indicate that this is actually a South Island Petrie collection of *S. laxa* sens. str.

Conclusions

- It would seem that Thomas Cheeseman accidentally mixed up Kirk and Petrie specimens and specimen labels while working through those *Simplicia* collections held within the as yet unmounted 'Kirk Herbarium'. This seems more likely than the alternative that Kirk collected both *Simplicia laxa* and *S.* aff. *laxa* growing together at the 'Dry River Station, Ruamahanga, Lower Wairarapa'. I also believe that CHR 6279 was wrongly labelled as to location by Zotov, and that this collection is part of Petrie's Waikouaiti suite of *S. laxa* specimens, rather than a genuine North Island occurrence of *S. laxa*. The accidental mislabelling and mixing up of specimens seems more likely than arguing for a case of sympatry.
- In this regard, my story has other precedents, for example, the accidental mixing of cultivated *Veronica* (*Hebe*) *armstrongii* with a wild-collected (Kurow) specimen of *Veronica* (*Hebe*) *annulata* has long confused people (e.g., Wagstaff & Wardle 1999 c.f. Bayly & Kellow 2006). Or, consider the mysterious *Olearia buchananii* Kirk, an enigmatic species known only from the type collection, which 102 years after it was described by Kirk (1899) as a New Zealand endemic was shown to be the same as the Australian *Olearia viscosa* Labill. (Gardner et al. 2001). The type had probably been collected in New Zealand by John Buchanan from a *Olearia viscosa* plant growing in the Wellington Botanic Gardens (Gardner et al. 2001). I don't doubt that there are other examples lurking in New

Zealand herbaria. Either way, as far as *Simplicia* is concerned, the take home message from this story is that considerable caution needs to be exercised when using Kirk's historical collections, in isolation, in New Zealand.

Acknowledgements

I would like to thank Kerry Ford for drawing to my attention the initial *Simplicia* problem. My colleagues Jeremy Rolfe, Rhys Gardner and Rob Smissen commented on this article and helped image and/or find *Simplicia* specimens needed to piece this story together. John Braggins offered insights into the way the historical Cockayne, Colenso, Kirk and Petrie Herbaria were curated at WELT. I am also indebted to the late Fiona Pitt and Nancy Adams who during my various visits to WELT in the 1990s offered useful advice and imparted critical information on how these herbaria were curated into WELT. This was information that I had asked them to publish but they refused stating it was best left 'unsaid'. For some reason, they felt that publishing what they knew of how these historical collections were curated and used by the experts of the time was something potentially litigious – it's not. Had they written their recollections this would have been of considerable help to future researchers. I would like to thank the curators of the AK, CHR and WELT for allowing access to specimens held in their care; in particular I thank Ewen Cameron, Leon Perrie and Patrick Brownsey for their assistance with this article. I also thank Ines Schönberger for her assistance with obtaining images from Kew (K) and Vienna (W).

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New Zealand Indigenous Flora Seed Bank (NZIFSB) – Seed cleaning at Otari Native Botanic Gardens and Wilton's Bush Reserve

Jessica Schnell (J.L.Schnell@massey.ac.nz), Anthea McClelland (A.McClelland@massey.ac.nz), and Craig McGill (C.R.McGill@massey.ac.nz).

Seed cleaning

A seed cleaning trip was organized by NZIFSB volunteer and Manawatu Branch of Forest and Bird Chair, Anthea McClelland, on Sunday 10 July. Otari Native Botanic Gardens and Wilton's Bush Reserve kindly made a room in their Information Centre available for the seed cleaning. Eleven volunteers from the Wellington Region as far north as Otaki joined to help clean the seed.

Photo 1: Otari seed cleaning team: front table left to right: Bea Hamer, Dee and Tim Armstrong, Johanne McCornish, Belinda McLean; back table anticlockwise: Bev Abbot, Chris Horne, Barbara Mitcalfe, Joanne Buswell, Anrik Drenth and Lyndsay Knowles. Photo: Anthea McClelland.

The morning began at 9.30 a.m. with a short talk on the seed cleaning process, how this fits in with the overall picture of preparing seeds before banking in the seed bank and applying best practice to each step of the process. Each volunteer chose a collection to clean with Anthea there to advise on best cleaning practice for the particular collection they had chosen to clean. The collections ranged from ones that were fairly easy to clean to more challenging collections. As cleaning of each collection was completed, it was logged and another bag of seed needing cleaning was selected to process. The volunteers were sustained with tea, coffee, muffins and some delicious cake brought by Joanna Buswell. During the lunch break, one of the Otari Native Botanic Gardens and Wilton's Bush Reserve volunteers, Bev Abbot, who was helping with the cleaning, showed a number of the volunteers some of the beautiful surrounding bush. The day finished at 2.30 p.m. by which time 13 species had been cleaned and 6 partially cleaned. Fantastic work!

Our thanks go to Anthea and all the volunteers for giving up their Sunday to clean the seed collections and to Otari Native Botanic Gardens and Wilton's Bush Reserve for allowing us to use their space for the cleaning.

Back from the brink?

Debra Wotton, Moa's Ark Research (debra.wotton@moasark.co.nz)

Seedlings of the nationally endangered shrub *Hebe armstrongii* were recently discovered for the first time at Enys Scientific Reserve, Canterbury, by Moa's Ark Research ecologist Dr Debra Wotton and Department of Conservation botanist, Nick Head. *Hebe armstrongii* is a whipcord hebe found at only two sites in Canterbury: Mounds of Misery and Enys Scientific Reserve. The Mounds of Misery population has numerous seedlings and several hundred adult plants, but occurs on private land with no formal protection. The Enys Reserve population was on the brink of extinction when it was discovered in the 1970s, with only six plants remaining.

Hebe armstrongii was first collected in the 1860s in the upper Rangitata and Mackenzie Basin by the Armstrongs (father and son, after whom the species is named), but there are no modern records from these locations. *Hebe armstrongii* was not observed again in the wild until the Enys Reserve population was discovered by Dr Peter Wardle in 1974. At that time, the population consisted of only six adult

plants. Dr Brian Molloy monitored the original six plants and conducted transplant trials during the 1970s and 1980s. Although the land was fenced to exclude stock in 1978 and gazetted as a reserve in 1985, some grazing by cattle and sheep occurred up until 1988, when a hare-resistant fence was erected. Although initial transplanting of seedlings into the reserve to increase the population met with mixed success, several transplants are now thriving and producing seed.

I was recently awarded the David Given Threatened Plant Scholarship by the New Zealand Plant Conservation Network to investigate factors limiting recruitment of *H. armstrongii*. Fittingly, the scholarship is named after the late Dr David Given, who discovered the Mounds of Misery *H. armstrongii* population. Debra previously conducted a seed sowing experiment in collaboration with Prof Richard Duncan (University of Canberra) and Dr Bill Lee (Landcare Research), which found that *H. armstrongii* recruitment at Enys Reserve was limited entirely by the availability of suitable microsites for germination and seedling establishment. Of nearly 2500 seeds sown on bare ground, none established as seedlings three years after sowing. In March 2013, Debra visited Enys Reserve to check the experiment accompanied by Nick Head, where they discovered 12 *H. armstrongii* seedlings had established naturally under the canopy of adult plants.

Trees and shrubs can act as nurse plants by increasing seedling recruitment beneath their canopy, particularly in dry environments. Woody cover provides shade and shelter, which may improve conditions for seedling establishment either by reducing temperature and increasing moisture availability or suppressing light-demanding invasive plants, which can outcompete native plants. Across much of the eastern South Island, human-induced fires and land clearance have replaced forests and shrubland with grasslands dominated by invasive species. The loss of woody vegetation may be a key factor limiting plant recruitment in these dryland ecosystems. My research will test whether *Hebe armstrongii* seedlings need shade or removal of invasive plants to establish.

The discovery of *H. armstrongii* seedlings at Enys Reserve nearly 30 years after the reserve was established suggests this population may now be on the road to recovery. My research will shed light on what conditions are needed to ensure successful recruitment, and thus population persistence, in this nationally endangered species.

Reference

Molloy BPJ 1990. Enrichment of rare plants, Enys and Castle Hill reserves. DSIR Vegetation Report No. 703, Lincoln DSIR, 87 p.

Ecological importance of *Muehlenbeckia australis*

Brian Patrick, Wildland Consultant Christchurch (Brian.Patrick@wildlands.co.nz)

The widespread and locally common liane, pohuehue (Muehlenbeckia australis), is endemic to New Zealand and Norfolk Island. It is one of five indigenous species of the genus in New Zealand amongst 20 species distributed from South America to Australia. They belong to the Polygonaceae—the dock family—a cosmopolitan family of shrubs, herbs and lianes.

Pohuehue, *Muehlenbeckia australis.* Photo: Alice Shanks.

In New Zealand, pohuehue is found from the coast through lowland regions to montane sites in hill-country and shrubland areas. This widespread liane can grow to about 10 metres tall as it winds its way up forest or forest remnants. It is a deciduous species with larger leaves than its New Zealand relatives. Patches of pohuehue can be many square metres in extent, and are typically one to two metres above ground climbing over and completely covering the supporting vegetation.

My long term observations of sites near Dunedin show that

in this way it nurtures the supporting and regenerating vegetation it covers, allowing these species over time to push through the cover of pohuehue and dominate at some later time. I have seen the indigenous trees wineberry, mahoe and fuchsia regenerate within a pohuehue-dominated cover over a period of 15 years.

Ecologically it is an important native species, if not the most important species in many contexts, since it is able to survive if not thrive when sites are disturbed by felling, clearance or fire. Often, it is the only native species left following gross disturbance of indigenous vegetation. Riparian sites, gullies, hillsides and roadsides across the Canterbury Plains showcase the 'staying power' of this wonderful New Zealand native liane. If left to 'dominate' these sites, it will nurture whatever indigenous species are left on the site as stragglers or seeds, and eventually give way to these taller species. Typically, *M. australis* is a margin species, covering the edge of forest or shrubland patches and protecting forest edges from the ravages of wind damage. Without its survival in these disturbed landscapes, many indigenous insects would not be able to survive there and provide food for indigenous reptiles and birds.

Our single most important hostplant

From and entomological perspective, pohuehue is the single most important host plant with tens of indigenous insects depending on it, many of which also feed on its sister species *M. complexa*. It supports diverse orders of insects such as our sole praying mantis, many stick insects, myriad flies, lacewings, wasps, bugs, moths, butterflies and beetles. Among the butterflies and moths, it is the most eaten New Zealand plant supporting many groups of these insects as follows. The list includes both specialists and species that feed on other indigenous plants in addition to pohuehue:

- Three of our four copper butterflies depend on it with the fourth group, the boulder coppers feeding on its smaller relative *M. axillaris*. With green slug-like larvae feeding on *M. australis* are *Lycaena edna, L. salustius, L. feredayi, L. enysii* and *L. rauparaha* and at least 10 other undescribed species of copper illustrated and recognized in Patrick and Patrick (2012).
- Four noctuid moths—large attractive nocturnal moths—including *Bitlya defigurata*, *B. sericea*, *Meterana coeleno* and *M. stipata* are specialists on this liane. Another three noctuids also feed on it amongst a range of other native plants


Copper butterfly. Photo: Alice Shanks.

- Many geometrid moths are specialists on this host plant including *Chloroclystis sphragitis* on the flowers; *Pseudocoremia indistincta* on the foliage; *Pasiphila muscosata* on foliage; and many others, including *Declana floccosa, D. leptomera, Gellonia dejectaria,* and *Homodotis megaspilata*, regularly feed on the foliage or freshy fallen leaves
- Our sole thyridid moth, *Morova subfasciata*, has larvae that form a swelling on the stems of pohuehue within which the larvae feed on the plant's tissue. The adult moths are attractive orange day-flying moths that are widespread in New Zealand.
- Several crambid moths have larvae that are leafrollers on the foliage including the orange *Udea flavidalis*
- Specialised leafrollers in the family *Tortricidae* include several in the genus *Pyrgotis, Harmologa amplexana* and the polyphagous *Planotortrix excessana, Catameacta gavisana* and *Ctenopseustis obliquana*, are commonly found on this host plant.
- The day-flying moth, *Zapyrasta calliphana* (Family Momphidae), has larvae that form leaf mines in the leaves within which they feed protected.

- The large case moth, *Liothula omnivora*, often feeds on pohuehue foliage where its long larval cases are conspicuous.
- Many leaf litter oecophorid moths feed on the fallen leaves of this deciduous host plant. These moths are in the genera *Tingena*, *Trachypepla* and *Gymnobathra*.

Overall, pohuehue is the most important indigenous New Zealand plant for our indigenous insects, particularly moths and butterflies. Together with its ecological importance in both survival and nurturing, it assumes fundamental importance across our landscapes, both natural and disturbed.

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UPCOMING EVENTS

If you have important events or news that you would like publicised via this newsletter please email the Network (events@nzpcn.org.nz):

11th Australasian Plant Conservation Conference

Melbourne: 14 – 18 November 2016 at the Royal Botanic Gardens Victoria. La Trobe University and the Australian Network for Plant Conservation (ANPC) are pleased to present the 11th Australasian Plant Conservation Conference (APCC11). Early Bird Registrations and the call for Abstracts are now open; the latter closes on Friday 8 July. The organising committee formally invites NZPCN members to attend the APCC11 conference and submit an abstract for a presentation on one of the six following conference themes: • Assisted colonisation as a practical tool for climate change mitigation. • Conservation for people and nature: how do we maximise the benefits for both? • Rethinking landscape restoration: seed production, provenance, conservation planning. • Holistic conservation: the role of mutualisms in ensuring functional ecosystem recovery (eg. pollinators, soils). • Rescuing small populations from extinction. • New challenges, emerging ideas. Following the conference, many conference papers will be published in two issues of Australasian Plant Conservation.	**Registration, download the Abstract Submission Form, more information:** conference website

Auckland Botanical Society

Field trip: Saturday 20 August to Gittos Domain, Blockhouse Bay. Leader: Mike Wilcox and Joseph Kowhai.	**Contact:** Maureen Young, email: youngmaureen@xtra.co.nz.

Rotorua Botanical Society

Field trip: Sunday 7 August – Arahiwi Scenic Reserve, Mamaku. **Meet:** the car park Rotorua at 8.30 a.m. or Mamaku Village Dairy (opp Timber mill) 55 Mamaku St at 9.00 a.m. **Grade:** easy, bring your gumboots.	**Leader:** Paul Cashmore, ph: 07 349 7432 (wk) or 027 650 7264, email: pcashmore@doc.govt.nz.

Whanganui Museum Botanical Group

Field trip: Saturday 3 September to Kitchener Park, Feilding. Meet: at the Whanganui police station 9.15 a.m. or at the reserve entrance at 10.00 a.m.	**Contact:** Robyn Ogle, email: robcol.ogle@xtra.co.nz.

Wellington Botanical Society

Field trip: Saturday 6 August to Silversky Track, Crofton Downs. **Meet:** at 10.00 a.m. at the top end of Silverstream Rd, Crofton Downs.	**Co-leaders:** Chris Moore, ph: 04 479 3924; Chris Horne, ph: 04 475 7025, or 027 474 9300; and Barbara Mitcalfe, ph: 04 475 7149.
Meeting: Monday 15 August at 7.30 p.m. for the Annual General Meeting, followed by the A P Druce Memorial Lecture, to be given by Matt McGlone, titled 'The 'missing plant' problem'.	**Venue:** Victoria University Lecture Theatre M101, ground floor Murphy Building, west side of Kelburn Parade; enter building off Kelburn Parade about 20 m below pedestrian overbridge.

Nelson Botanical Society

Field trip: Sunday 21 August to Eves Valley, Snowdens Bush and Faulkners Bush. **Meet:** at the Church steps at 9.00 a.m.	**Leader:** Uta Purcell, please register with Uta in case of cancellation, ph:. 03 545 0280.
Meeting: Monday 22 August at 7.30 p.m. for a talk by Leigh Marcshall titled 'Nelson Nature'	**Venue:** Jaycee Rooms, Founders Park, Nelson.

Driftwood Retreat and Eco-tours

Five day tours to D'Urville Island: (http://driftwoodecotours.co.nz/durville-island/) and four day tours of alpine flora (http://driftwoodecotours.co.nz/alpine-flora-tour/) are available.	**Further information:** www.driftwoodecotours.co.nz.

Canterbury Botanical Society

Field trip: Saturday 6 August to Bowenvale and Dry Bush.	**Contact:** Alice Shanks, ph: 03 337 1256, email: alice@caverock.net.nz.

Otago Botanical Society

Field trip: Saturday 6 August to Lower Taieri Gorge. Meet: 9.00 a.m. at the Botany Department car park.	**Contact:** John Barkla, ph: 03 476 3686, email: jbarkla@doc.govt.nz