

# The Mosses of Te Haupa (Saddle Island), Mahurangi, Hauraki Gulf

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## Introduction

A survey was made of the mosses of the small inner Hauraki Gulf island, Te Haupa (Saddle I.), during a day trip of Auckland Botanical Society, on 15 Feb 2014. Two subsequent trips with Ewen Cameron, in late winter (29 Sep 2014) and early spring (4 Nov 2014), allowed more certain identification of taxa which had been in poor condition on the earlier visit at the end of summer, and resulted in five additional records. A small island, composed of Waitemata mudstone, Te Haupa is 6.0 ha in area and rises to only c. 35 m. An account of the vegetation, vascular flora, and algae of the island are provided by Cameron (2014), together with interesting notes on its history, geology, archaeology, invertebrates, birds and mammals. Further details may be found in an earlier paper by Tennyson and Taylor (1999).

## Moss flora

Twenty-two species of moss were recorded on Te Haupa in 2014 (see Appendix). Five of these were not seen in February, but as none is ephemeral it seems likely they were overlooked on that occasion.

A short list of mosses for the island was published by Tennyson and Taylor (1999). All 8 taxa were refound in 2014. One 1999 specimen (AK 234795) is now re-identified as *Didymodon weymouthii*, and the earlier record of *Desmatodon lingulatus* (current name *Didymodon tophaceus*) is thus excluded from the list of mosses for Te Haupa. An unvouchered *Bryum* sp. in the 1999 list is likely to be one of the three *Bryum* spp. recorded in 2014, and a sterile member of the family Brachytheciaceae (AK 234791) remains unidentified.

Of the 22 species recorded, the greatest number belong to the family Pottiaceae (nine species), followed by Bryaceae (three species).

## Discussion

The preponderance of pottiaceous mosses on Te Haupa was striking. Informally known as “mosses of harsh environments” (Zander 1993), their presence is in keeping with the dry nature of a low-lying island lacking permanent fresh water, and with vegetation still recovering from being burnt some 70 years ago (Tennyson & Taylor 1999).

By far the most abundant moss on Te Haupa was *Tortella flavovirens*. The author has never seen such spectacular swards of this species. The moss was common along the western side of the island especially on the lip of soil overhanging the eroding



Fig. 1. *Tortella flavovirens* on the lip of soil overhanging the eroding coastal cliff. JEB, 24 Sep. 2014.



Fig. 2. *Tortella flavovirens* on midden material on coastal cliff. With flowering karo (*Pittosporum crassifolium*) on left and wīwī (*Ficinia nodosus*) on right. JEB, 24 Sep. 2014.

cliffs (Fig. 1), and sometimes in association with calcareous midden material (Fig. 2). Often in pure swards, *T. flavovirens* also grew mixed with two other pottiaceous mosses: *Didymodon torquatus* and *D. australasiae*.



**Fig. 3. Sward of *Tortella flavovirens* stabilising a small dune, under light canopy of pōhutukawa, with wīwī (*Ficinia nodosa*) encroached by dune at rear, and *Phormium tenax* beyond. JEB, 24 Sep. 2014.**



**Fig. 4. Coastal cliff, showing bryophyte sward (arrowed) on silt-covered ledge, shaded to north by pōhutukawa. Typical site for *Didymodon weymouthii*. JEB, 24 Sep. 2014.**

G.O.K. Sainsbury, mid-20<sup>th</sup> century authority on New Zealand mosses, noted that *Tortella flavovirens* (as *T. rubripes*) "seems to be exclusively a maritime plant, and can properly be described as a halophyte, its station being practically the edge of the sea" (Sainsbury 1955). The only moss that is routinely

closer to the sea on our northern coasts, is, in my experience, another species of *Tortella*, *T. cirrhata* (not recorded on Te Haupa). I associate *T. flavovirens* mostly with stabilized shell banks or sandy rock crevices close to the shore e.g., on Waiheke I. (AK 221201), or Taranga/Hen I. (AK 293180). The holotype specimen (in Herbarium NY-Mitten) of our earlier name for this moss, *T. rubripes*, has habitat and locality given only as "New Zealand", but the specimen has sand grains and shell fragments in its substrate, indicating a similar coastal habitat. On Te Haupa its sites tally nicely with a description of the preferred habitat of *T. flavovirens* on the Pembrokeshire coast in Wales, U.K.: "it is commonest on soil, rather than rock, especially on flat, salt-sprayed areas at the top of low cliffs" (Bosanquet 2010, p.209).

On Te Haupa, *Tortella flavovirens* was also seen a little further inland, but again in somewhat exposed situations, amongst grasses such as *Lagurus ovatus*. In addition, a large pure sward (Fig. 3), more than 2 m x 1 m in extent, has established on a small dune under a light pōhutukawa canopy, a few metres above the Department of Conservation sign on the western beach. Unfortunately this colony is being damaged by foot traffic through it, the site being the most obvious place for access to the island's interior. On this informal track disturbed shoots of moss lay scattered about, but on either side the dune was stabilized with a 1.5 cm depth of tightly packed moss shoots, their interweaving rhizoids penetrating between sand grains, thus forming a protective crust on the otherwise mobile sand. Further into the denser shade and shelter of the forest (but no doubt still subject to salt spray) *T. flavovirens* was seen once, on the soil of the forest floor. The name "*flavovirens*", literally "yellowish green", I had not thought to be a particularly appropriate epithet in the past. However, on Te Haupa, in September when fresh growth was seen in the moist condition, it lived up to its name.

Along the coast, in slightly damper sites on silt-covered ledges on the mudstone cliffs (Fig. 4), another pottiaceous moss was common: the New Zealand endemic *Didymodon weymouthii*. I had earlier (for the Tennyson & Taylor list of 1999) misidentified Te Haupa material (AK234795) as *Desmatodon lingulatus*, but these species seem to differ in the dried leaf stance (less contorted in *D. weymouthii*), the shape of the leaf base (not broadened in *D. weymouthii*), and the peristome teeth (more or less rudimentary in *D. weymouthii*) (Fig. 5). Te Haupa material of *Didymodon weymouthii* differs from the holotype (CHR 335698), however, in having leaf apices more markedly cucullate, and papillae on the lamina cells more prominent.

In February some pottiaceous species (e.g. *Didymodon weymouthii*, AK 355275; and *Gymnostomum calcareum*, AK 355247) bore withered young capsules, which appeared to have dehydrated during maturation, suggesting that conditions in summer had been too harsh for successful sexual reproduction.

In contrast to extensive colonies on the coast, the mosses of the interior of the island, in the forest, were mostly rather depauperate. The only moss epiphytes seen on Te Haupa were on exposed roots of pōhutukawa: *Bryum billardierei* var. *platyloma*, *Rhaphidorrhynchium amoenum*, *Syntrichia antarctica* (in sand-filled notches), very meagre *Thuidium furfurosum*, and two species in the Orthotrichaceae: *Codonoblepharon minutum* (formerly *Zygodon minutus*) and *Z. intermedius*. In more open sites a few ground mosses formed luxuriant patches: *Hypnum cupressiforme* var. *cupressiforme*, *Ptychomnion aciculare*, and *Thuidium furfurosum*. These may be relict populations from earlier in the succession. A blackbird had made good use of local moss for its nest (pers. comm. E.K. Cameron 29 Sep. 2014), some 20% of the construction materials comprising *Ptychomnion aciculare* (AK 355241).

Also in open sites were small colonies of *Bryum campylothecium*, *Racopilum* sp., *Rhynchostegium tenuifolium*, *Weissia controversa* (with incurved leaf margins), and several troublesome (to identify) colonies in the plane-margined *Weissia/Trichostomum* complex. In more shaded sites no ground mosses at all were seen on the forest floor, except on the site of a disused fireplace, where a dense sward of *Didymodon australasiae* had established.

Thus, although the vegetation of Te Haupa has been greatly modified by human interventions, a very interesting moss flora is extant around the

coastal fringe, where disturbance continues to occur naturally, as it will always have done, by erosion of the mudstone cliffs.

### Acknowledgements

My thanks, for contributions to the moss collections, to Peter Bellingham, Ewen Cameron and to David Lourie (the latter when I was vertically challenged). I am grateful to Peter Bellingham and Ewen Cameron for vascular plant identifications, and to the Auckland Botanical Society for good company in the field, with special thanks to the several strong blokes who assisted my embarkations and disembarkations. Thanks are also due to Matt Williams (Auckland Council, skipper for September and November visits) and his nifty craft. Many thanks to Dhahara Ranatunga for accessioning of specimens into Herbarium AK and facilitating loans, to Teresa Lebel for bringing me up to speed with Photoshop, and to Ewen Cameron, Mei Nee Lee and Joshua Salter for their editorial skills.



**Fig. 5. Peristome of Te Haupa material of *Didymodon weymouthii* (AK 234795), showing rudimentary, malformed teeth. JEB, 10 Mar 2014.**

### References

- Bosenquet, S.D.S. 2010: *The Mosses and Liverworts of Pembrokeshire*. Self-published, Brechfa, Carmarthenshire, Wales.  
 Cameron, E.K. 2014: Updated flora and vegetation of Te Haupa (Saddle) Island, Mahurangi, Hauraki Gulf. *Auckland Botanical Society Journal* 69: 127–142.  
 Sainsbury, G.O.K. 1955: A handbook of the New Zealand mosses. *Royal Society of New Zealand Bulletin* 5: 1–490.  
 Tennyson, A.J.D.; Taylor, G.A. 1999: History, fauna and flora of Te Haupa (Saddle) Island, Hauraki Gulf. *Tane* 37: 69–89.  
 Zander, R.H. 1993: Genera of the Pottiaceae: mosses of harsh environments. *Bulletin of the Buffalo Society of Natural Sciences* 32: 1–378.

## Appendix. Moss list for Te Haupa (Saddle I.)

Moss names follow updated versions of the Checklist of the Mosses of New Zealand (Fife 1995). These may be obtained on request from Allan Fife at Manaaki Whenua Landcare Research ([FifeA@landcareresearch.co.nz](mailto:FifeA@landcareresearch.co.nz)).

### Key:

1 = recorded also by Tennyson & Taylor (1999) (all collected 30 Aug. 1997 by A.J.D. Tennyson and identified by J.E. Beever Sep. 1997)

Taxon	Family	AK Voucher Number
<i>Bryum billardierei</i> var. <i>platyloma</i>	Bryaceae	AK 355242
<i>Bryum campylothecium</i>	Bryaceae	AK 355237
<i>Bryum clavatum</i>	Bryaceae	AK 355238; AK 355254
<i>Codonoblepharon minutum</i>	Orthotrichaceae	AK 355246
<i>Didymodon australasiae</i>	Pottiaceae	AK 355240
<i>Didymodon torquatus</i> 1	Pottiaceae	AK 234796; AK 355256
<i>Didymodon weymouthii</i> 1	Pottiaceae	AK 234795 (as <i>Desmatodon lingulatus</i> ); AK 355260; AK 355275
<i>Fissidens leptocladus</i>	Fissidentaceae	AK 355255
<i>Gymnostomum calcareum</i>	Pottiaceae	AK 355247
<i>Hypnum cupressiforme</i> var. <i>cupressiforme</i> 1	Hypnaceae	AK 234790; AK 355251
<i>Ptychomnion aciculare</i> 1	Ptychomniaceae	AK 233756; AK 234792; AK 355241; AK 355257
<i>Racopilum</i> sp.	Racopilaceae	AK 355248
<i>Racopilum robustum</i>	Racopilaceae	AK 355370
<i>Rhaphidorrhynchium amoenum</i>	Sematophyllaceae	AK 355259
<i>Rhynchostegium tenuifolium</i>	Brachytheciaceae	AK 355243
<i>Syntrichia antarctica</i> 1	Pottiaceae	AK 234794 (as <i>Tortula princeps</i> ); AK 355239
<i>Thuidiopsis furfurosa</i>	Thuidiaceae	AK 355252
<i>Tortella flavovirens</i> 1	Pottiaceae	AK 234793 (as <i>Tortella rubripes</i> ); AK 355236; AK 355244; AK 355253
<i>Tortella knightii</i>	Pottiaceae	AK 355250
<i>Weissia controversa</i>	Pottiaceae	AK 355141
<i>Weissia/Trichostomum</i>	Pottiaceae	AK 355249; AK 355261
<i>Zygodon intermedius</i>	Orthotrichaceae	AK 355245

## The Roy Thornton Fernery, Mt Smart (Rarotonga) Domain, Auckland

Nick Goldwater and Bec Stanley

We (NG and RS) decided to write this article after both becoming interested in the origins of the vegetation of Mt Smart at different times. Nick is an ecologist at Wildland Consultants Ltd, which was commissioned by Auckland Council to undertake a threatened plant survey of 14 volcanic cones (maunga) in June 2014 (Wildland Consultants Ltd 2014). Bec, as botanist at Auckland Regional Council, was responsible for advising on vegetation management for regional parks (2007-2010).

### History

Mt Smart was named by early European settlers after Henry Daltan Smart, a lieutenant in the New Zealand Mounted Police in the 1840s. It has at least two

Maori names – Te Ipu kura a Maki, meaning the 'red bowl of Maki', a warrior, and Rarotonga, meaning 'the lower south' (a name brought from the ancestral homeland, Hawaiki, and placed on the mountain as a reminder). Mt Smart erupted through the south-east edge of the One Tree Hill lava flow field. Lava flowed out from the base of the cone and spread east and south forming a small lava flow field covering 300 ha. The toe of some of the flows now forms the foreshore of the Mangere arm of the Manukau Harbour (Hayward *et al.* 2011). There is no reliable eruption date for Mt Smart, but it is likely to be younger than One Tree Hill/Maungakiekie and Mangere Mountain, but older than Mt Wellington/Maungarei (Lindsay *et al.* 2011).