Comparison of modern classifications for filmy ferns (Hymenophyllaceae) and a new combination in *Trichomanes* L. for the filmy fern *Macroglena brassii* Croxall, from Queensland, Australia

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Abstract

Contemporary Hymenophyllaceae treatments typically follow one of two classifications that recognise monophyletic genera. One comprises nine genera, while the other recognises two genera, *Hymenophyllum* Sm. and *Trichomanes* L. Combinations exist for all Australian species that allow the former classification to be adopted in Australia. However, genera of the former classification tend to be poorly defined morphologically compared to the latter classification. All Australian species have available combinations in *Hymenophyllum* or *Trichomanes* except for one Queensland species originally described as *Macroglena brassii* Croxall. A new combination in *Trichomanes* is made here for *M. brassii* so that the two genus classification of Hymenophyllaceae can be followed in Australia.

Keywords: Abrodictyum, *Trichomanes brassii*, generic limits.
and Crepidopteris Copel. were illegitimate, which is indeed the case for Crepidopteris. The Flora of Australia treatments by Du Puy & Orchard (1993), Green (1994) and Bostock & Spokes (1998) followed the classification of Iwatsuki (1984), which recognised five genera in Australia.

Genera recognised in these morphologically-based classifications have been shown to be non-monophyletic by recent phylogenetic analyses of chloroplast DNA sequence data (Hennequin et al. 2003, 2006, 2010; Ebihara et al. 2004, 2007). A more recent classification proposed by Ebihara et al. (2006) and followed by PPG I (2016) differed from previous classifications by including some species in Hymenophyllum that were once included in or previously thought to be closely related to Trichomanes (e.g. Cardiomanes C.Presl, Microtrichomanes (Mett.) Copel. in part and Pleuromanes C.Presl), and by recircumscription of some genera in the Trichomanes lineage. This made all Hymenophyllaceae genera monophyletic according to molecular phylogenetic analyses (Pryer et al. 2001; Hennequin et al. 2003, 2006, 2010; Ebihara et al. 2004). The names for all Australian Hymenophyllaceae species under this Ebihara et al. (2006) classification are provided by Field (2020).

While some contemporary treatments follow this classification (e.g. Smith et al. 2006; Jiaxi et al. 2013), assigning some species to these genera using morphological features without an underlying knowledge of their phylogenetic placement is virtually impossible (Brownsey & Perrie 2016). This is because some of these genera lack morphological features that are shared by all species or, when they are unified by a common feature, these features are also present in species of other genera (Ebihara et al. 2007; Brownsey & Perrie 2016). The close morphological resemblance that can exist between some of these narrowly circumscribed genera is epitomised by Trichomanes cupressoides Desv. from the tropical islands of the Indian Ocean. Trichomanes cupressoides was shown by phylogenetic analyses of chloroplast rbcL to harbour two cryptic species that belonged to separate genera (Abrodictyum C.Presl and Trichomanes s.s.) under the Ebihara et al. (2006) classification (Bauret et al. 2015).

The recent practice adopted by PPG I (2016) of segregating several smaller genera from large genera that can be both morphologically defined and monophyletic, as with Trichomanes s.l., has been criticised by Christenhusz & Chase (2018). They discuss the impracticality for identification and the nomenclatural instability such splitting creates, and criticise the inconsistencies in generic concepts adopted by PPG I (2016) in retaining some large genera such as Asplenium L., while splitting other similarly large complex genera into several segregates. PPG I (2016) justified recognising these segregate genera because they were monophyletic and they had been previously recognised with available names. However, in the case of the Hymenophyllaceae the limits of pre-existing genera had been altered drastically to retain monophyly within the family and hardly resembled their original concepts. Consequently, Christenhusz & Chase (2018) stated that “PPG I (2016) should not be viewed automatically as the necessary and logical next step in fern classification”.

For Hymenophyllaceae, an alternative classification that also recognises monophyletic genera but avoids the issues highlighted by Christenhusz & Chase (2018) is to recognise only Hymenophyllum and Trichomanes, which are slightly altered from their traditional circumscription to correspond to the two major lineages in Hymenophyllaceae. This classification is currently used in New Zealand (Brownsey & Perrie 2016). The main limitation to this classification is that it groups together several older lineages in Trichomanes that have divergence times that are more typically observed in ferns between genera or even families (Schuettelpelz & Pryer 2006). However, the genera are much better defined morphologically under this classification, with Trichomanes having densely hairy rhizomes, compared to glabrous or sparsely hairy rhizomes in Hymenophyllum. Some features are also only present in many Trichomanes or Hymenophyllum that instantly allow those species to be placed into one or other genus. These include false-veins and erect rhizomes present in several Trichomanes species but absent in Hymenophyllum (with the exception of New Zealand H. pulcherrimum Colenso that has erect rhizomes) and toothed lamina margins in Hymenophyllum that are absent in Trichomanes (Morton 1968). The author here advocates the use of this two genus classification in Australia in preference to the classification of Ebihara et al. (2006) because of the ease of morphological
Muelleria recognition of its genera compared to some of the genera of the latter classification.

Almost all of the Australian Hymenophyllaceae species have combinations in *Hymenophyllum* and *Trichomanes* because they were described prior to classifications that recognised several genera in addition to *Hymenophyllum* and *Trichomanes*. The one exception is the Queensland endemic *Macroglena brassii* Croxall (Figure 1). This belongs to a group of *Trichomanes* species, recognised as *Abrodictyum* C.Presl by Ebihara et al. (2006), that also includes the Australian species *T. caudatum* Brack. and *T. obscurum* Blume (Ebihara et al. 2007). Among Australian species, *M. brassii* is morphologically most similar to *T. obscurum*, which also has an erect rhizome and highly dissected fronds. *Macroglena brassii* can be distinguished from *T. obscurum* by its linear and bristle-like ultimate segments (Bostock & Spokes 1998). The ultimate segments are also narrow (only one or two rows of cells bordering the axes) and bristle-like in Malesian *T. pluma* Hook. and New Caledonian *T. laetum* Bosch. These species are more closely related to other *Trichomanes* (*Abrodictyum*) species than they are to *M. brassii* (Ebihara et al. 2007) and can be distinguished by fronds with a 3-dimensional arrangement rather than being primarily planar. A new combination in *Trichomanes* is made here for *M. brassii* so that the two genus classification of Hymenophyllaceae can be followed in Australia.

**Figure 1.** *Trichomanes brassii* plant at Herberton Range, northeast Queensland. Photo: Peter Richardson.

**Taxonomy**

*Trichomanes brassii* (Croxall) D.J.Ohlsen, *comb. nov.*

*Macroglena brassii* Croxall, *Austral. J. Bot.* 23: 543 (1975); *Cephalomanes brassii* (Croxall) Bostock, *Fl. Australia* 48: 706 (1998); *Abrodictyum brassii* (Croxall) Ebihara & K.Iwats., *Blumea* 51(2): 243 (2006). Type: Mount Finnegan, west slopes, Qld, 6 Sept. 1948, L.J.Brass 20048; holo: BRI AQ0024748 (image!); iso: CANB 184593 (image!), K 001090238 (image!).

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