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A new fern record for Victoria, *Hymenophyllum marginatum* (Hymenophyllaceae)

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Introduction

Indigenous vascular plant species previously known only from states other than Victoria have been steadily added to the Victorian flora as new records, with 12 species added in the past decade (Table 1) and 13 species in the decade before that (Ross 2000; Ross & Walsh 2003; Walsh & Stajsic 2007; VicFlora 2020). In the last decade, most new records have been found towards the peripheries of the state, including in the far northwest (e.g. Moxham *et al*. 2019), far southwest, far northeast, and East Gippsland (Table 1). The most recent new Victorian plant record, discussed here, is a fern in the family Hymenophyllaceae, *Hymenophyllum marginatum* Hook. & Grev. (Figure 1). Prior to this discovery, the most recent new fern record for Victoria was *Cyclosorus interruptus* (Willd.) H.Ito (Thelypteridaceae), which was found near Portland in the far southwest of the state in 2008 (Sinclair *et al*. 2012).

Hymenophyllum marginatum was found on the Sealers Cove Walking Track, Wilsons Promontory National Park, in December 2019. There, it forms a dense, mat-like colony on a single, shaded, granite rock in wet sclerophyll forest with a canopy of *Eucalyptus viminalis* Labill. and typical wet forest understorey species such as *Cyathea australis* (R.Br.) Domin, *Lepidosperma elatius* Labill., *Olearia argophylla* (Labill.) Benth., and

Abstract

The fern *Hymenophyllum marginatum* Hook. & Grev. (Hymenophyllaceae) was recently discovered in Wilsons Promontory National Park, Victoria, representing a new record for a native vascular plant in Victoria previously known only from other states of Australia. The Victorian plants closely match populations found interstate in terms of both morphology and chloroplast *rbcL* sequences. A description of the species, its habitat and distribution are provided. The species' conservation status in Victoria and across its entire range is discussed.

Keywords: Taxonomy, filmy ferns

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Pomaderris aspera Sieber ex DC. (Figure 1A, 1B). Searches along the entire length of the track in similar habitat failed to locate any additional colonies. The Sealers Cove Walking Track is rich in other Hymenophyllaceae, including *Trichomanes caudatum Brack.*, *Hymenophyllum australe* Willd., *H. cupressiforme* Labill., *H. flabellatum* Labill., *H. rarum* R.Br. and *Trichomanes venosum R.Br.*, which comprise all of the Victorian representatives of the family except for *H. peltatum* (Poir.) Desv. *Hymenophyllum marginatum* has also been recorded in Queensland, New South Wales and Tasmania (Bostock & Spokes 1998).

Hymenophyllum marginatum is easily distinguished from other Hymenophyllaceae in Australia by its fronds, which have black margins. The fronds are usually simple or forked (Figure 1C, 1D), typically only once but rarely up to three times (Wilson 1990; Bostock & Spokes 1998). Simple or forked fronds with black margins are features shared with the New Zealand species, *H. armstrongii* (Baker) Kirk. *Hymenophyllum armstrongii* is also resolved as the closest relative of *H. marginatum* in phylogenies based on the chloroplast DNA regions *rbcL*, *rbcL-accD* and *rps4-trnS* (Hennequin *et al*. 2006). These two species form the subgenus *Craspedophyllum* C.Presl; however, recognising subgenus *Craspedophyllum* renders other subgeneric taxa polyphyletic and its retention has not been supported (Hennequin *et al*. 2006). *Hymenophyllum armstrongii* can be distinguished from *H. marginatum* by its toothed margins and glabrous midribs. The margins of *H. marginatum* are entire and the midribs, particularly immediately below the involucre, bear reddish or golden brown flattened or tubular hairs (Andrews 1990; Bostock & Stokes 1998; Figure 1C, 1D). Despite its distinctiveness from other Victorian ferns, its small size and superficial resemblance to a thallose liverwort when not fertile allow it to be easily overlooked (Garrett 1996). This, combined with its rarity in Victoria, explains why it has only recently been detected in Victoria.

The chloroplast *rbcL* (GenBank MT127786) DNA sequence was obtained for Victorian *H. marginatum* following the protocols outlined in Ohlsen *et al*. (2020), but using the reverse primer 1379R for *rbcL* (Pryer *et al*. 2001). The *rbcL* sequence in the Victorian collection was identical to *rbcL* of *H. marginatum* from southern Queensland (*Perrie L.R. & Ohlsen D.J. BB142*, Springbrook National Park, 28 Aug. 2011, MELU; GenBank MT127787) and the Blue Mountains in New South Wales (*Ebihara 010915-03*, TI; GenBank AB162692). This *rbcL* sequence differs from *rbcL* of its closest known relative, *H. armstrongii* (GenBank AY095109), by nine base pairs,

Table 1. New Victorian records of vascular plant species detected in the past decade.

Sclerolaena cuneata (Chenopodiaceae)	*N.G. Walsh 7297*, 10 July 2011 (MEL 2346330A)	Northern Victoria, Korrak Korrak Nature Conservation Reserve near Kerang
Lythrum wilsonii (Lythraceae)	*N.G. Walsh 7306*, 10 July 2011 (MEL 2346339A)	Northern Victoria, Kerang area
Lythrum paradoxum (Lythraceae)	*E. Obrien s.n.*, 15 Dec. 2011 (MEL 2379882A)	Northern Victoria, Kerang area
Pterostylis acuminata (Orchidaceae)	*W. Probert s.n.*, 17 Apr. 2011 (MEL 2346323A–2346325A)	Far east Victoria, near Genoa Peak
Vittadinia pustulata (Orchidaceae)	*A.R.G. McMahon s.n.*, 4 Oct. 2011 (MEL 2360676A)	Willis, East Victoria and Pira Bushland Reserve, northern Victoria
Brachyscome dichromosomatica (Asteraceae)	*V. Stajsic 6320*, 11 Sep. 2012 (MEL 2363300A)	Neds Corner Station, far northwest Victoria
Acacia linearifolia (Fabaceae)	*K. Goyne s.n.*, 28 Feb. 2014 (CANB 825276.1)	Mount Lawson State Park, far northeast Victoria
Caladenia bicalliata (Orchidaceae)	*D. Pitts s.n.*, 15 Sep. 2015 (MEL 2394759A)	Discovery Bay Coastal Park, far southwest Victoria
Pluchea rubelliflora (Asteraceae)	*C. Moxham s.n.*, 19 Apr. 2018 (MEL 2439613A)	Hattah Lakes National Park, far northwest Victoria
Pterocaulon sphacelatum (Asteraceae)	*K. Bennetts s.n.*, 14 May 2018 (MEL 2439614A)	Kulkyne Station and Lindsay Island, far northwest Victoria
Pomaderris viridis (Rhamnaceae)	*G. Sutter s.n.*, 24 July 2018 (MEL 2434546A)	Near Bellbird Creek, east Gippsland
Hymenophyllum marginatum (Hymenophyllaceae)	*D.J. Ohlsen 1060 et al.*, 22 Dec. 2019 (MEL 2476868A)	Wilsons Promontory National Park, southern Victoria

providing a reliable DNA barcode identification in this instance.

The taxonomy section provides a comprehensive description of *Hymenophyllum marginatum*, compiled using descriptions from several past treatments (Andrews 1990; Wilson 1990; Bostock & Spokes 1998) and incorporating the Victorian collection. Known chromosome numbers, habitat and distribution information, and an assessment of the species' conservation status in Victoria and across its range are also provided.

Taxonomy

Hymenophyllum marginatum Hook. & Grev., *Icon. Filic.* 1: t. 34 (1827); *Pachyloma marginatum* (Hook. & Grev.) Bosch, *Verslagen Meded. Afd. Natuurk. Kon. Akad. Wetensch.* 2: 318 (1861); *Craspedophyllum marginatum* (Hook. & Grev.) Copel., *Philipp. J. Sci.* 67: 27 (1938).

Type: New Holland [Australia], among mosses, *C. Fraser s.n*; lecto: K 001090350!; isolecto: E 00413902!, L 0061092!, NSW 673723!, selected by M.D.Tindale, *Contr. New South Wales Natl. Herb., Fl. Ser.* 201: 21 (1963).

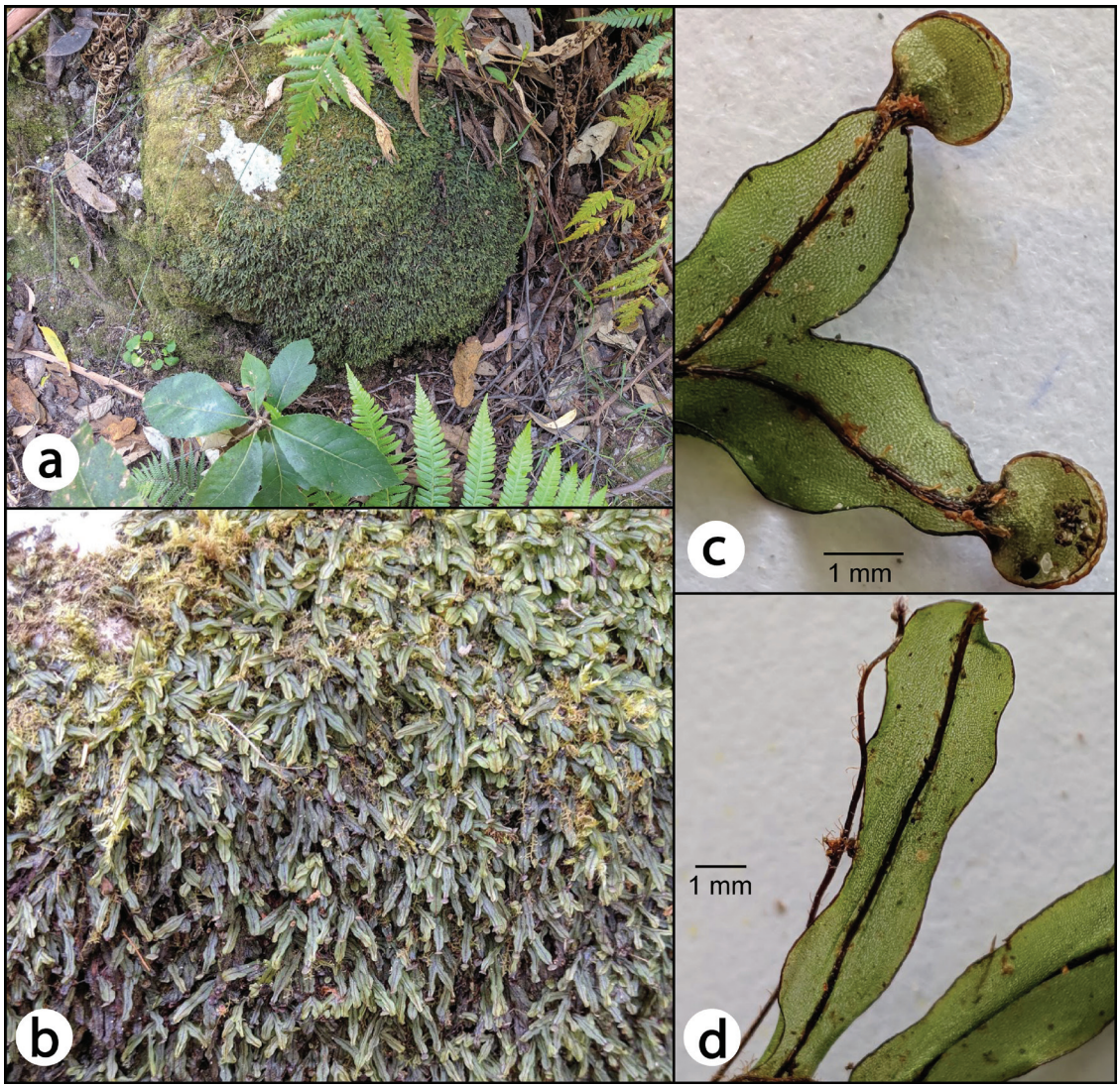

Figure 1. Victorian *Hymenophyllum marginatum* vouchered by *D.J. Ohlsen 1060 et al.* (MEL 2476868A). A. The single rock that bears the Victorian colony of *H. marginatum*; B. Mat of *H. marginatum*; C. A reproductive forking frond; D. A non-reproductive frond and rhizome. All photographs taken by D.J. Ohlsen.

Description

Rhizome long-creeping, filiform, branched, black or dark brown, glossy, with sparse reddish or golden brown hairs (Figure 1D). Fronds 0.35–4.5 cm long (Figure 1B, 1C, 1D). Stipes slender, widely spaced on the rhizome, 0.25–8 mm long, narrowly winged at the apex, usually with a tuft of reddish or golden brown hairs near the base. Lamina simple or 1 (–3)-forked, linear, narrowly oblong to elliptic, 2.5–35 mm, light or dark green, glabrous except for scattered tubular or flattened reddish or golden brown hairs along midrib and at the base of the involucre; simple fronds and lobes 0.7–3(–3.5) mm wide; margins entire, undulate, composed of 1–2 rows of glossy, black cells; apex of non-reproductive lobes rounded, obtuse, rarely acute (Figure 1B, 1C, 1D). Reproductive lobes rounded, truncate or notched; base tapering into the stipe; midrib black, glossy (Figure 1C). Sori borne singly, at the apex of the lamina and/or its lobes; involucre round to ovate, bilabiate to the base or with a very short tube, 0.8–2 mm long; margins entire, composed of a glossy black band 2–3 cells thick; receptacle included (Figure 1C).

Illustrations: E.B. Copeland, *The Philippine Journal of Science* 64: t. 89 (1937); M.D. Tindale, *Contributions of the National Herbarium Flora Series* 201: pl. 2, figs 1–2 (1963); B.D. Duncan & G. Isaac, *Ferns and Allied Plants of Victoria, Tasmania and South Australia* 83, Figure 8.6 (1986); S.B. Andrews, *Ferns of Queensland* 183, Figure 16.8B (1990).

Chromosome Number

$2n = 24$ (S.K. Roy in Tindale and Roy 2002). Hennequin *et al*. (2010) note that *H. marginatum* has $n = 13$ chromosomes, while *H. armstrongii* has $2n = 24$. This is a mix up of counts between the two species as *H. armstrongii* has $n = 13$ (Lovis in Dawson *et al*. 2000).

Distribution

Endemic to Australia. In Victoria known only from the Sealers Cove Walking Track, Wilsons Promontory National Park (*D.J. Ohlsen 1060*, *L.R. Perrie, L.D. Shepherd & A.A. Neale*, 22 Dec. 2019 (MEL 2476868)). On the mainland, it is also known from the mountains around the Queensland and New South Wales border, in the north, with sporadic occurrences throughout the Great Dividing Range of New South Wales further south, including Mount Banda Banda, the Blue Mountains, the mountains of the Illawarra region and the Budawangs. It is most common and widespread in Tasmania where it has been recorded throughout high-rainfall areas in the west, south and east, as well as on Flinders Island.

Habitat

Wet sclerophyll forest, subtropical and temperate rainforest and on moist rocky outcrops as a lithophyte on sandstone, granite, dolerite, granophyre or rhyolite (latter two for Queensland collections), as an epiphyte on tree ferns, tree bases or logs, or occasionally as a terrestrial (Garrett 1996; Bostock & Spokes 1998; Bostock pers. comm.).

Conservation Status

The one known population of *Hymenophyllum marginatum* in Victoria is confined to a single rock and measures approximately 50 × 30 cm (Figure 1A). The long-creeping rhizome of this species makes it plausible that the total number of plants in Victoria is fewer than 50, which is a threshold number between threatened categories of the IUCN Red List Categories and Criteria (IUCN 2001). However, searches for this species were confined to the walking track and seemingly suitable habitat exists both upslope and downslope of the Sealers Cove Walking Track, making it possible that further colonies exist in the area. A more thorough exploration of these areas should be a priority for future work.

There are several threatening processes that have the potential to cause ongoing decline in the quality of habitat and number of individuals of *Hymenophyllum marginatum* in Victoria, which can be seen in places along the Sealers Cove Walking Track. Some of the wetter gullies, most notably one labelled by Parks Victoria with a wooden signboard as 'Ferny Glade' that may have provided habitat for this species in the past, were largely destroyed by floods in 2011. While the site where *H. marginatum* currently occurs is to the side of a gully, future floods have the potential to erode away the site given the extent of damage that has occurred at some sites in 2011. The Sealers Cove Walking Track is also one of the most popular bushwalking destinations in Victoria, which introduces the threat that the one known colony of *H. marginatum* in Victoria could be trampled by bushwalkers because of its proximity to the walking

track. This threat could be avoided if the walking track were redirected by a couple of metres downslope in the vicinity of the *H. marginatum* population. Fires have also occurred recently in the area. Fires can directly kill ferns or, as in some places along the Sealers Cove Walking Track, they can remove canopy cover, increasing sunlight in the understorey, leading to higher temperatures and drier conditions in the understorey. This has caused a decline in the number and health of some of the other rare fern species (e.g. *Asplenium flaccidum*) along the track (D.J. Ohlsen pers. obs). Prolonged drought is also a threat to *H. marginatum*. Based on the recent discovery of this species in Victoria, it is unknown whether there has been past decline in the number of mature individuals of *H. marginatum* in the state.

Based on all current knowledge of population size and possible threats, *Hymenophyllum marginatum* is designated critically endangered (CR B1ab(iii, v)+2ab(iii, v); C2a(i,ii); D) in Victoria according to the IUCN (2012) criteria. At a national level, it is best considered not threatened according to IUCN (2012).

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