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Phebalium calcicola (Rutaceae: Boronieae): a species described as new, restricted to south-eastern South Australia, is proposed as Critically Endangered

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Abstract: *Phebalium calcicola*, a multi-stemmed shrub from south-eastern South Australia, is segregated from the *P. squamulosum* subsp. *squamulosum* assemblage and described here as new, based on phenetic distinctness, habitat preference and geographical disjunction. It is compared with *P. squamulosum* subsp. *squamulosum s.str.* from the Sydney region, as well as the geographically closest populations from Victoria, which are currently referred as *P. squamulosum* subsp. *squamulosum*. A recommendation for the conservation status of this species as Critically Endangered is proposed. An amended key to species of *Phebalium* in South Australia is provided.

Keywords: Critically Endangered, new species, phenetic analysis, Rutaceae, *Phebalium*, plant taxonomy, South Australia, SEM

Introduction

Phebalium Vent. (Rutaceae: Boronieae) is an Australian endemic genus of shrubs and small trees, which is widespread but patchy in distribution across eastern and southern Australia, from the coastal areas to high mountains. Currently, more than 30 species, including 20 from eastern Australia, are recognised (Wilson 2013; Telford *et al.* 2019; Ford & Duretto 2020).

The type species of the genus, *P. squamulosum* Vent., was described from a plant grown in Empress Joséphine's garden at Malmaison, France, which had originally been collected from the east coast of Australia: "originaire de la Nouvelle Galles, et croissant sur les montagnes" (Ventenat 1805; Wilson 1970). Callmander *et al.* (2017) designated a lectotype from the Geneva herbarium (G00340116).

Many species of *Phebalium* exhibit considerable morphological variation. Wilson (1970) noted this variation in the last major revision of the genus; however, he still accommodated much variation within several subspecies. *Phebalium squamulosum* subsp. *squamulosum* is one of the most variable, with highly disjunct elements (see maps in Wilson 1970, 2013). Wilson (1970: 82) discussed this variation and considered recognising more taxa, but decided against that "as some of these forms are known only from single collections".

Specimens collected since Wilson's 1970 treatment and concerted curation of *Phebalium* at BRI and NE has led to reassessment of the status of taxa within the genus. Indeed, classification within *Phebalium* has been confounded by the use of varietal (Bentham 1863; Wilson 1970) and subspecific categories (Wilson 1970, 1998). Forster (2003) questioned Wilson's concept of subspecies and reinstated *P. longifolium* S.T.Blake as a distinct species. Similarly, Telford & Bruhl (2014) raised *P. squamulosum* subsp. *verrucosum* Paul G.Wilson to specific rank.

The dismantling of *Phebalium squamulosum* subsp. *squamulosum* began with segregation of *P. distans* P.I.Forst. (Forster 2003), and continued with the recognition of *P. graniticola* I.Telford & J.J.Bruhl, *P. stellatum* I.Telford & J.J.Bruhl, and *P. sylvaticum* I.Telford & J.J.Bruhl (Telford *et al.* 2019). After the segregation of these species, *P. squamulosum* subsp. *squamulosum* is still highly variable and "forms" observed by Wilson (1970: 82, 2013: 472) are not fully addressed. His morphological description of the type form of *P. squamulosum* is "leaves elliptic, acute to entire, chartaceous or sub-coriaceous, and glabrous above" (Wilson 1970: 82), which is restricted to the Sydney Basin (Telford *et al.* 2019). As per Wilson's (1970, 2013) account of the subspecies, Victoria is the western-most range of occurrence of the subspecies, with at least three forms, differing from the typical subspecies in calyx rim, habit and in presence of trichomes on leaf and style. There is no mention of this subspecies occurring in South Australia in either Wilson (1970, 2013) or the *Flora of South Australia* (Armstrong & Telford 1986), although there are collections from as early as 1975. This taxon is recorded only since the

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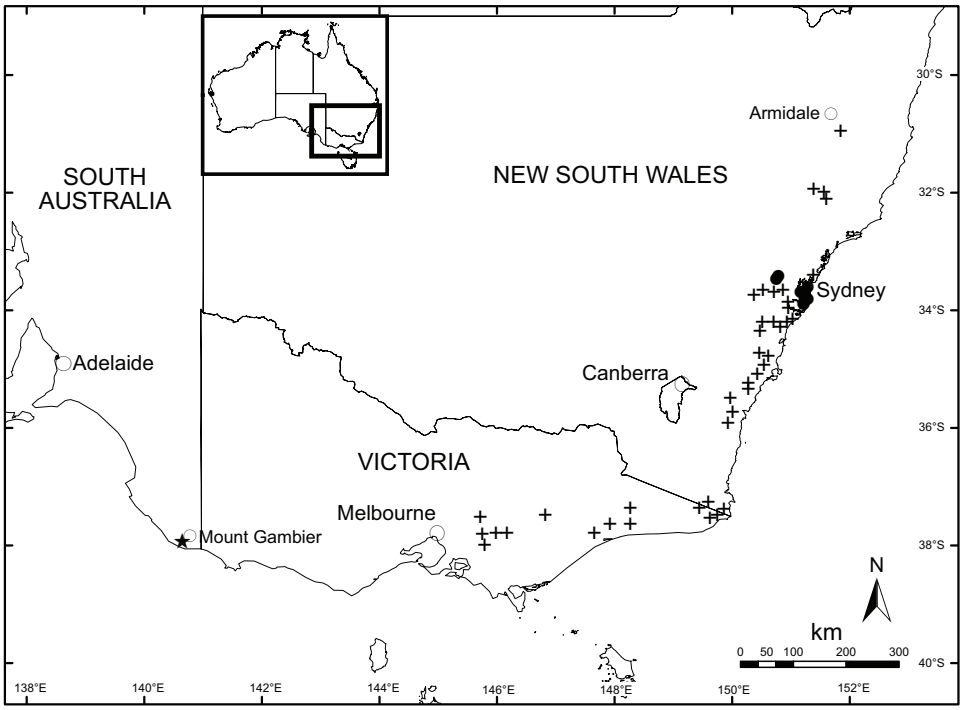

Fig. 1. Distribution of *Phebalium calcicola* (star), *P. squamulosum* subsp. *squamulosum s.str.* (solid circles) and *P. squamulosum* subsp. *squamulosum s.lat.* (crosses).

1989 census of South Australian Vascular Plants as *P. squamulosum* (Jessop 1989; see also Barker *et al.* 2005).

This paper is part of a work in progress aimed at addressing the variation within the remaining populations of *Phebalium squamulosum* subsp. *squamulosum s.lat.* (Fig. 1). Here, we focus on the South Australian occurrence, which comprises a single extant population in the extreme south-east of the state near Mt Gambier. This South Australian population, as *P. squamulosum* subsp. *squamulosum*, has been listed since 1992 as Endangered under the South Australian *National Parks and Wildlife Act 1972*. In the regional species status assessment of the South-Eastern region by Gillam & Urban (2011), this taxon was assessed to be Critically Endangered. In the most recent state-wide assessment workshop in 2016, it was also provisionally assessed as Critically Endangered (DEWNR 2016, unpublished data).

Materials & Methods

In earlier treatments and in the major revision of *Phebalium* by Wilson (1970, 1998), species and infraspecific taxa have been delimited and described largely based on morphological differences. Subsequent taxonomists working on *Phebalium* have continued to apply morphological approaches, with or without phenetic analysis, supplemented by additional lines of evidence from anatomical and phytochemical data (Forster 2003; Weston & Turton 2004; Giles *et al.* 2008; Telford & Bruhl 2014; Telford *et al.* 2019). In this paper, we use morphological distinctness and

Table 1. Morphological characters measured for phenetic analysis.

#	Character (units)
1.	Petiole length (mm)
2.	Midrib length (mm)
3.	Lamina length (mm)
4.	Midrib : lamina length ratio
5.	Lamina width at widest point (mm)
6.	Lamina width : length ratio
7.	Lamina apex to widest point (mm)
8.	Lamina apex to widest point : length ratio
9.	Lamina apex angle (degree)
10.	Highest number of flower clusters per inflorescence
11.	Highest number of flowers per inflorescence
12.	Peduncle length (mm)
13.	Pedicle length (mm)
14.	Calyx height (mm)
15.	Calyx diameter (mm)
16.	Petal length (mm)
17.	Petal width at widest point (mm)
18.	Petal width : length ratio
19.	Petal apex to the widest point (mm)
20.	Petal apex to widest point : length ratio

results of phenetic analysis as the basis for segregating the South Australian population as a separate species.

Morphological characters were scored using ImageJ version 1.53a (https://imagej.net/ImageJ) on the images of the herbarium specimens on loan from AD, CANB and MEL and those held in NE (Appendix 1). A high-resolution image of the lectotype was obtained from G. Herbarium codes follow *Index Herbariorum* (http://sweetgum.nybg.org/science/ih/). We selected 26 specimens representing populations from South Australia, Victoria, and the border between south-eastern New South Wales and Victoria, which are currently referred to *Phebalium squamulosum* subsp. *squamulosum*. We also included specimens from the Sydney Basin, which is the typical form and the site of collection of the lectotype. Twenty vegetative and morphological characters, with 15 direct measurements and five ratios, were chosen based on Wilson (1970, 1998) and observations and experience of the authors (Table 1). All continuous values are an average of the three largest observations for leaves and well-developed parts (floral) for each specimen.

Principal component analysis was performed in R package 'ggplot2' (Wickham 2016) on two data sets, one with both vegetative and floral characters (23 specimens) after removal of specimens with missing data and the second one (26 specimens) with only vegetative characters.

Scanning electron microscope (SEM) micrographs of trichomes on lamina surfaces were taken using a JEOL JSM-6010LA Analytical SEM (JEOL Ltd., Tokyo). Images of seed were taken using a Nikon SMZ25. At least five specimens per taxon were examined for trichome variation. We had access to only a single seed from one specimen of South Australian population, however, we also examined the images of the seeds of this taxon available via the *Plants of South Australia* website (http://www.syzygium.xyz/saplants/Rutaceae/Phebalium/Phebalium_squamulosum_ssp._squamulosum.html). For the typical subspecies, we examined seeds from at least two specimens per population and for Victorian populations, seeds from more than five specimens were imaged and looked at.

The overall distribution of the new species is described using the Interim Biogeographic Regionalisation for Australia, version 7 (IBRA 7). Specimens from South Australia are cited following botanical regions of the state to facilitate their curation. The distribution of other specimens cited follow IBRA 7.

Results and discussion

We consider multiple lines of evidence to be generally desirable in delimiting species boundaries and describing it, but unnecessary when there is clear-cut morphological differences. Our phenetic analysis (Fig. 2) supports segregation of the South Australian taxon from the typical subspecies of the Sydney Basin (i.e. *Phebalium squamulosum* subsp. *squamulosum s.str.*) and the Victorian, Victoria-New South Wales border populations (hereafter referred as *P. squamulosum* subsp. *squamulosum s.lat.*). The principal component analysis of morphological data consistently retrieved three clusters, with South Australian specimens forming a tighter cluster compared with those of *P. squamulosum* subsp. *squamulosum s.lat.* and *P. squamulosum* subsp. *squamulosum s.str.* With c. 67% cumulative variations explained by the first three Principal Components (PC) (Fig. 2), we are confident that the clusters identified in this ordination reflect natural groups. The result from only vegetative data, with c. 83% cumulative variance explained by first three PCs, was very similar (ordinations result not presented).

Fig. 2. Results of Principal Component Analysis: *Phebalium calcicola* (black circles), *P. squamulosum* subsp. *squamulosum s.str.* (blue squares), populations of *P. squamulosum* subsp. *squamulosum s.lat.* from Victoria and the Victoria-New South Wales border region (brown triangles). **A** PC1 vs PC2; **B** PC1 vs PC3, based on morphological characters.

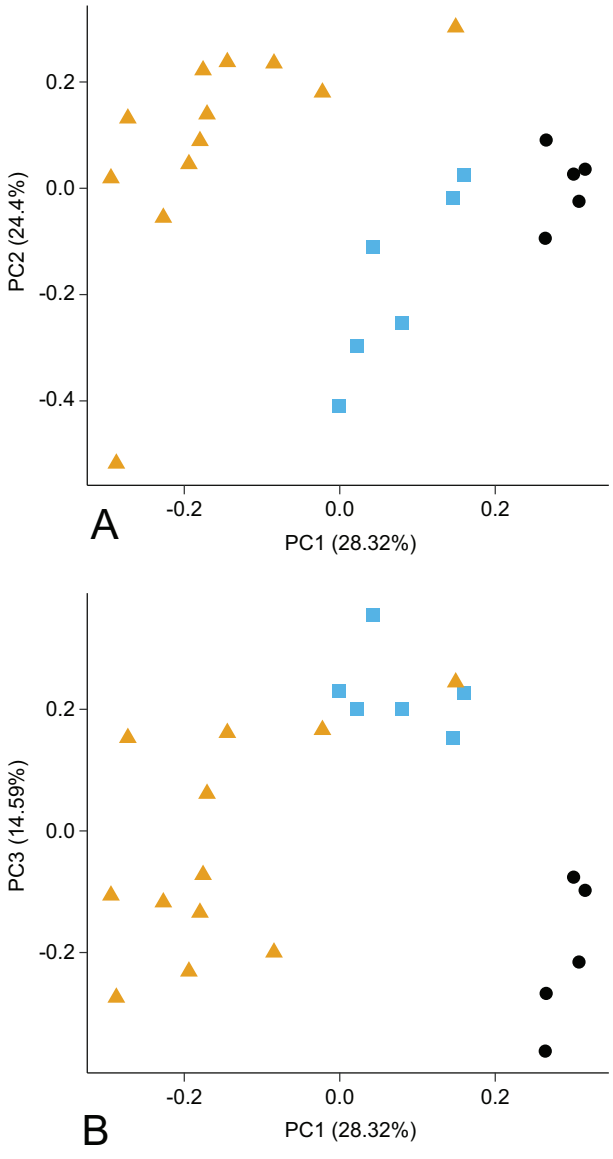

Table 2. Comparison of selected morphological attributes of *Phebalium calcicola* with *P. squamulosum* subsp. *squamulosum s.str.*

Character	***P. calcicola***	***P. squamulosum* subsp. *squamulosum s.str.***
Leaf lamina shape	oblong	elliptic
Leaf apex	truncate to emarginate, rarely rounded	obtuse, rarely rounded
Mucro on leaf apex	absent	present
Petiole length (mm)	0.5–1.5	0.5–4
Trichomes on adaxial lamina surface of immature leaf	stellate to lepidote	absent
Number of flowers on terminal inflorescence	up to 9 in single cluster, rarely in 2 clusters	12–15 (–22) in 3–5 clusters
Corolla colour	bright yellow	cream–light yellow
Seed coat ornamentation	discontinuous, longitudinal ridges	continuous longitudinal ridges

The difference in leaf lamina shape, reflected by ratio of lamina length to width and distance from apex to the widest point to lamina length, contributed the most in separating the South Australian population from the rest in our phenetic analysis. Comparative data on leaf apex (scored as apex angle in phenetic analysis), leaf trichome, corolla colour and seed ornamentations provided additional morphological evidence to recognise this South Australian population of *Phebalium*, currently treated as *P. squamulosum* subsp. *squamulosum*, as a distinct taxon (Table 2, Figs 3, 4 & 5).

The South Australian entity also differs from the geographically closest Victorian population of *Phebalium squamulosum* subsp. *squamulosum* in life form, vegetative and reproductive morphologies (S. Dema *et al.*, unpublished data), consistent with Wilson's (1970) observation of variation in Victorian populations. Three other subspecies of *P. squamulosum* occur in Victoria: subsp. *alpinum* (Benth.) Paul G.Wilson, subsp. *argenteum* Paul G.Wilson and subsp. *ozothamnoides* (F.Muell.) Paul G.Wilson (Duretto 1999; Wilson 2013). They also differ from *P. calcicola* in both morphology and habitat preference (S. Dema *et al.*, unpublished data).

We recognize the South Australian entity at species rank rather than as a subspecies of *P. squamulosum*, as our concept of species aligns with that of the unified species concept proposed by de Queiroz (2005: 205), where species are "separately evolving segments of population level lineages" and properties such as "phenetic distinguishability" and "ecological differences" are evidences of a lineage separation. Furthermore, this South Australian taxon differs from the typical subspecies and *P. squamulosum* subsp. *squamulosum s.lat.* in more than "two persistent good characters" and there are no "intermediate population[s]" to "demonstrate continuity of character states" to be assigned a subspecies rank (cf. Forster 2003: 437; Bruyns 2002).

Currently, there are only four other species of *Phebalium* known from South Australia, and they are morphologically very distinct from the new species described here. We provide a modified key to all taxa of *Phebalium* in South Australia.

Taxonomy

Phebalium calcicola S.Dema & I.Telford, ***sp. nov.***

Holotypus: South Australia, South-Eastern: [precise locality withheld for conservation reasons] E of Kongorong, 6 Nov. 2019, *S. Dema 422, D.J. Duval, D.E. Murfet & T.S. Te* (AD). **Isotypi:** BRI, CANB, K, MEL, MO, NE109849, NSW [*distribuendi*]. Fig. 6.

The type gathering is from two plants. The population is very small and morphologically homogeneous.

Key to *Phebalium* in South Australia

1. Leaf closely revolute
- **2.** Calyx truncate to undulate; pedicels slender . . . . . *P. stenophyllum*
- **2:** Calyx definitely 5-toothed; pedicels thick . . . . . *P. lowanense*

1: Leaf not closely revolute, though margin may be recurved
- **3.** Leaf upper surface and margin smooth . . . . . ***P. calcicola***
- **3:** Leaf upper surface and/or margin glandular-warty
  - **4.** Leaf margin only glandular-warty, upper leaf surface smooth; midrib sunken on the upper surface . . . . . *P. bullatum*
  - **4:** Leaf upper surface, incl. margin glandular-warty; midrib not sunken . . *P. glandulosum* subsp. *macrocalyx*

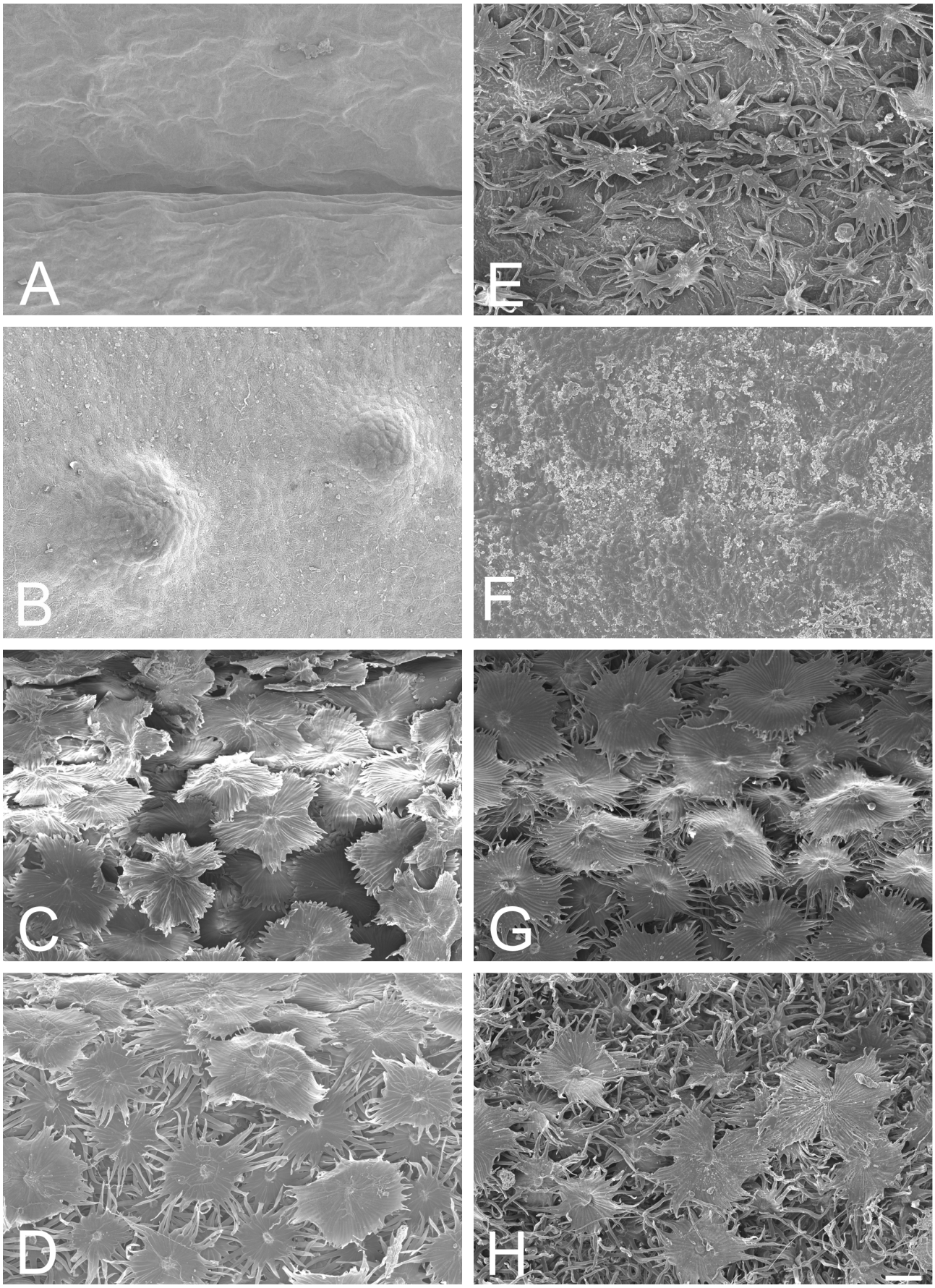

Fig. 3. Lamina surface of *Phebalium squamulosum* subsp. *squamulosum s.str.* (**A–D**) and *P. calcicola* (**E–H**). **A**, **E** Immature adaxial surface; **B**, **F** mature adaxial surface; **C**, **G** immature abaxial surface; **D**, **H** mature abaxial surface. — A–D *S. Dema 367* (NE109511); E–H *D.N. Kraehenbuehl 2787* (AD97839121). Scale bar = 0.1 mm. Images: S. Dema.

Phebalium squamulosum subsp. *squamulosum auct. non.* Vent., *pro parte*, excluding all populations other than that from south-eastern South Australia: Jessop, *J. Adelaide Bot. Gard.* 12: 60 (1989); W.R.Barker *et al.*, *J. Adelaide Bot. Gard. Suppl.* 1: 87 (2005); T.Te *et al.*, *Ex Situ Conservation Threat. S. Austral. Pl.* 105–107 (2009); S.Gillam & R.Urban, *Regional Spp. Conservation Assessm. Proj., Phase 1 Rep.: S.E. Reg.* (2011).

Shrub erect, multi-stemmed, to 2 m tall. *Bark* ± smooth, grey to reddish brown with paler horizontal lenticels. *Branchlets* greyish green, rarely sparsely glandular, covered with silvery lepidote hairs when young, branchlets becoming reddish brown and glabrescent with age. *Leaves* alternate, exstipulate, simple; petiole 0.5–1.5 mm long, with silvery lepidote hairs; lamina oblong, slightly broader towards base, 8.6–14 mm

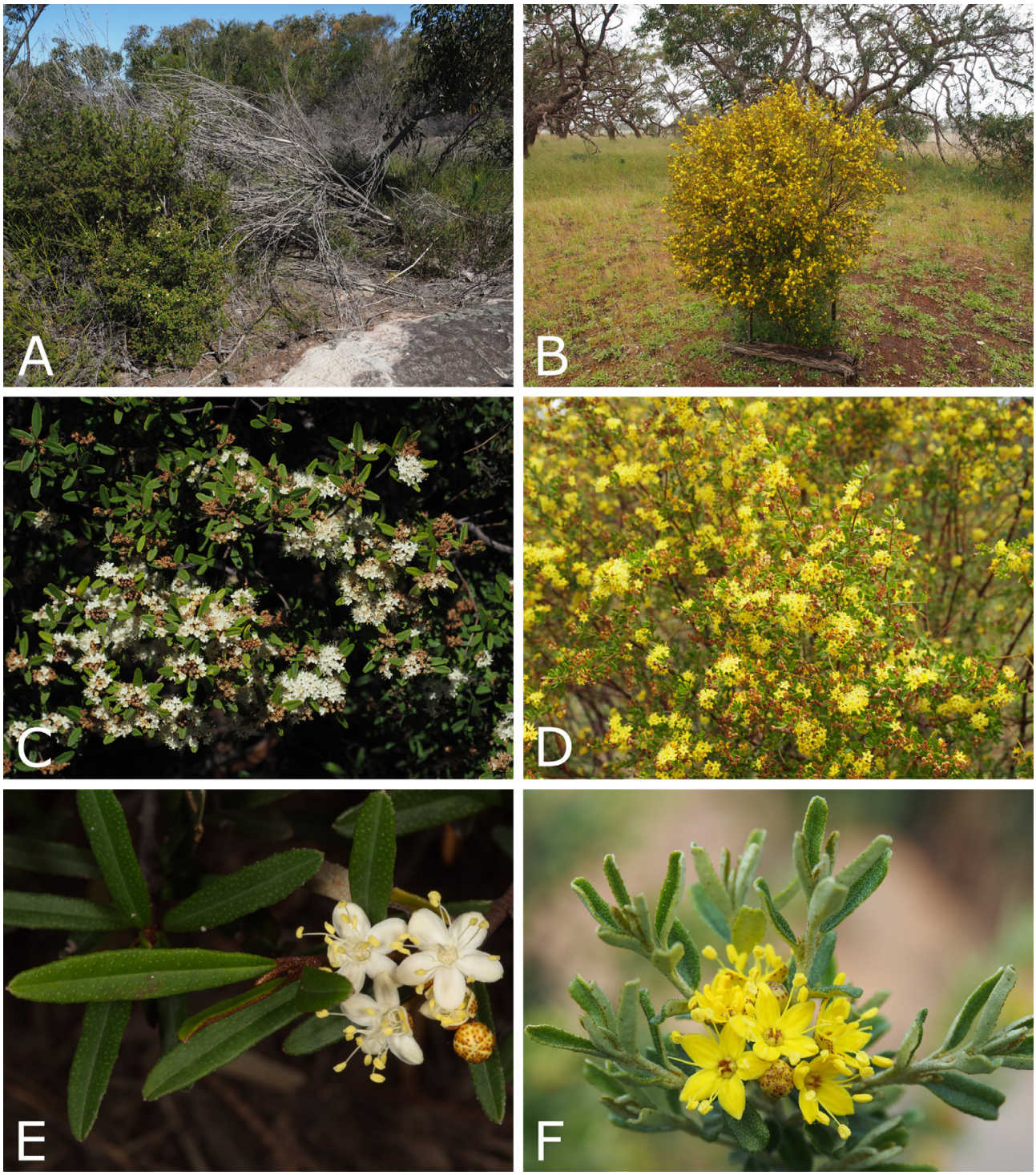

Fig. 4. Comparison of *Phebalium squamulosum* subsp. *squamulosum s.str.* (**A**, **C**, **E**) and *P. calcicola* (**B**, **D**, **F**). **A**, **B** Habitat and habit; **C**, **D** flowering branches; **E**, **F** flowering shoot. — A, C Ku-ring-gai Chase National Park, *S. Dema 367* (NE); E Ku-ring-gai Chase National Park, *J.J. Bruhl 3527* (NE); B, D, F type locality, *S. Dema et al. 422*. Photos: A, C, E: J.J. Bruhl; B, D, F: D.J. Duval.

long, 2.5–4.5 mm wide; apex truncate to emarginate, rarely rounded, muticous; base rounded; margin entire, recurved; midrib on adaxial (upper) surface deeply impressed towards base only; abaxial (lower) surface with silvery (rufous) stellate to lepidote trichomes; adaxial surface with stellate to lepidote trichomes on immature leaves, with age glabrescent to sparsely scabridulous with remnant base of trichomes; *oil glands* on adaxial lamina surface not prominently raised. *Inflorescence* terminal, of a single (double) (4–) 6–9 flowered umbel, ± sessile, densely silvery and rufous lepidote. *Calyx* shallowly cup-shaped, 0.5–1.2 mm long, 1.9–2.8 mm wide; abaxial surface with silvery to rufous lepidote trichomes; margin truncate. *Corolla* of 5 (6) free petals; petals ovate, 2.3–3.2 mm long, 1.4–2.3 mm wide, shortly acuminate; abaxial surface densely silvery towards base, rufous-lepidote towards apex; adaxial surface glabrous, bright yellow. *Stamens* 10; filaments filiform, 2.4–4.5 mm long, glabrous; anthers oblong to elliptic, 0.6–1.4 mm long; apical gland minute, subglobose. *Ovary* subglobose, silvery-lepidote; style 3.5–4 mm long, terete, glabrous; stigma minutely capitate. *Fruit* a capsular schizocarp of up to 5 erect cocci; cocci ovoid; seed oblong to ovoid, c. 2 mm long, c. 1.2 mm wide, with up to nine discontinuous longitudinal ridges, dark grey to black. **Figs 3E–H, 4B, D, F, 5A, 6.**

Distribution and habitat. *Phebalium calcicola* is restricted to the Naracoorte Coastal Plain Bioregion of south-eastern South Australia, south-west of the regional city Mount Gambier, in the vicinity of Mount Schank and Kongorong (Fig. 1). It grows on shallow, reddish sandy loam over limestone pavements (calcrete) in *Eucalyptus baxteri* low open woodland. Associated species recorded include **Scabiosa atropurpurea*, *Swainsona lessertiifolia*, *Clematis microphylla*, *Dianella brevicaulis*, *Austrostipa* sp. and *Poa poiformis* subsp. *poiformis*.

Phenology. Flowers late Sep.–Nov.; fruits Dec.–Feb.

Diagnostic characters. The species differs from *P. squamulosum* subsp. *squamulosum s.str.* in its leaf lamina shape (oblong in *P. calcicola* vs elliptic in subsp. *squamulosum s.str.*), leaf apex (without a mucro vs with a mucro), indumentum of adaxial lamina surface of immature leaves (with stellate to lepidote trichomes vs glabrous), corolla colour (bright yellow vs cream, rarely light yellow) and seed coat ornamentation (discontinuous longitudinal ridges vs continuous longitudinal ridges) (Table 2, Figs 3–6).

Phebalium calcicola can be distinguished from the geographically closest populations of *P. squamulosum* Vent. subsp. *squamulosum s.lat.* in Victoria in life form (always shrub in *P. calcicola* vs shrub to small tree), leaf shape (oblong vs narrowly elliptic or broadly linear or narrowly obovate), mid rib on abaxial surface (prominently raised towards leaf base only vs prominently raised throughout) and calyx margin (truncate vs broadly and shallowly toothed) (S. Dema *et al.*, unpublished data).

Conservation Status. Extremely rare, currently known from a single locality with only three extant wild plants and c. 25 individuals propagated from the three original plants, which have been planted in the past ten years (Drew Laslett, pers. comm., 17 Dec. 2020). Listed as Endangered under the *National Parks and Wildlife Act 1972* (South Australia).

Phebalium calcicola qualifies as a 'wild' population to be assessed following International Union for Conservation of Nature (IUCN) guidelines (IUCN 2019): it is a distinct species with only one known population and currently 'lightly managed' to protect it from herbivory and encourage natural recruitment. With the observed threat from weed and herbivory, exacerbated by extremely few wild plants, population size of <50 individuals and an area of occupancy <1 km, *P. calcicola* meets the criteria for listing as Critically Endangered based on IUCN criteria B2 (a, b) and C2 (a: ii) and our assessment supports that of Gillam & Urban (2011) and DEWNR (2016). We recommend nomination of this taxon for listing under the *Environment Protection and Biodiversity Conservation Act 1999*.

Fig. 5. Seeds of *Phebalium calcicola* (**A**) and *P. squamulosum* subsp. *squamulosum s.str.* (**B**). Left: side view; right: hilum view. — A *D.J. Duval 1709* (AD232323); B *A.E. Orme 671* (NE108649). Scale bar = 200 µm. Images: S. Dema.

Fig. 6. Isotype of *Phebalium calcicola*: *S. Dema et al. 422* (NE109849). Precise location withheld for conservation reasons.

The South Australian Seed Conservation Centre at the Adelaide Botanic Gardens has initiated management and monitoring of this taxon by establishment of exclusion fences, propagation and planting. This taxon is also conserved ex-situ with seeds banked at the Seed Conservation Centre. However, further efforts are required to explore for additional populations to reduce the risk of extinction of the species in the wild.

Etymology. From the Latin *calx* (limestone) and *-cola* (-dweller), referring to the habitat of this species. The epithet is treated as a noun in apposition; it has the same ending regardless of the gender of the genus name (Stearn 2004).

Notes. Specimens cited below are from the type locality, except *D.N. Kraehenbuehl 2787*, which appears to be from a different site, which no longer has an extant population. It is likely that the *Phebalium* cultivated and available from plant nurseries under the trade name 'Dulcie's Delight' is *P. calcicola* (Barrie 2005). We will test this hypothesis using molecular data.

Additional specimens examined [precise localities withheld for conservation reasons]

SOUTH AUSTRALIA. **South-Eastern:** W of Mount Schank, SSW of Mount Gambier, 28 Sep. 1978, *P. Copley 333* (AD); Hundred of Port MacDonnell, 20 Sep. 2007, *D.J. Duval 961, T.S. Croft & C. Brodie* (AD); E of Kongorong, 10 Dec. 2009, *D.J. Duval 1709, M.J. Thorpe & D.E. Symon* (AD); Mt Gambier region, 20 Sep. 1975, *M. Kenny s.n.* (AD99133205); Between Yahl and Mount Schank, 25 Aug. 1976, *D.N. Kraehenbuehl 2787* (AD); Hundred of Port MacDonnell, 20 Nov. 1993, *D.N. Kraehenbuehl 6105* (AD); Hundred of MacDonnell, ESE of Kongorong, 1 Oct. 1976, *D. Rowley 77* (AD).

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Appendix 1. List of specimens used in the phenetic analysis.

Voucher	Locality
Phebalium squamulosum* subsp. *squamulosum s.str.	
S. Dema 366 (NE109510)	N.S.W.: Sydney Basin, Terrey Hills, Mona Vale Road
S. Dema 367 (NE109511)	N.S.W.: Sydney Basin, Ku-Ring-Gai Chase National Park, Guringai Land Aboriginal Engraving Site
B.G. Briggs s.n. (NE4203)	N.S.W.: Sydney Basin, Belrose, near Frenchs Forest
E.F. Constable s.n. (NE10882)	N.S.W.: Sydney Basin, Central Colo, N of Windsor
C. Burgess s.n. (NE22625)	N.S.W.: Sydney Basin, Wheeney Creek, near Kurrajong
J.J.H. de Labillardière s.n. (G00340116)	Habitat in N. S. Walles
Phebalium squamulosum* subsp. *squamulosum s.lat.	
D.E. Albrecht 3635 (CBG8906150.1)	Vic.: South East Corner, c. 2 km SE of Mt Carlyle summit
D.E. Albrecht 4830 (CBG9217320.1)	Vic.: South East Corner, Allen Head, Genoa River, Bottom Lake
P. Carmen 342 (CANB764607.1)	N.S.W.: South East Corner, Mogendoura Mountain, off 'K' Ridge Road
S. Dema 416 (NE109574)	Vic.: Eastern Highlands, Croajingolong National Park, Genoa Falls, S bank of Genoa Creek, along the track
S. Dema 417 (NE109575)	Vic.: Eastern Highlands, Croajingolong National Park, along Genoa Peak Walking Track
S.J. Forbes 2938 (MEL1557395)	Vic.: South East Corner, Genoa Creek falls, ca 3 km W of Genoa
J.R. Nevin 165 (NE108084)	Vic.: Eastern Highlands, 9.8 km SE of Healesville, 5.8 km E of Badgers Creek along Donna Buang Rd
S. Dema 414 (NE109572)	Vic.: Eastern Highlands, c. 12 km N of Noojee, Skerry Creek Road, below a plantation clearing
J.J. Bruhl 3576 (NE107627)	Cultivated: Royal Botanic Gardens Melbourne ex "Garden Origin"
N.G. Walsh 3273 (MEL2013532)	Vic.: South Eastern Highlands, East Beenak, Bunyip Valley Road, c. 2 km ESE from Tomahawk Gap
N.G. Walsh 1495 (MEL540264)	Vic.: South Eastern Highlands, Ben Cairn Rd, 300 m W from its crossing of Don River, 7 km due W from Mt Donna Buang
P.R.H. St John s.n. (MEL0005107)	Vic.: South Eastern Highlands, about 4 miles (east) from Yarra Junction Station
P.K. Gullan s.n. (MEL0599641A)	Vic.: South Eastern Highlands, Donna Buang-Healesville Rd, approx. 0.5 km S of Myrtle Crk crossing, 1.5 km due NW of Ben Cairn
S. Dema 415 (NE109573)	Vic.: South East Corner, Tambo River, W side of Moonlight Road
T.S. Hart s.n. (MEL5056A)	Vic.: South East Coastal Plain, Bairnsdale
Phebalium calcicola	
S. Dema 422 (NE109849)	(See *Specimens examined* for details)
D.N. Kraehenbuehl 2787 (AD97839121)	
P. Copley 333 (AD97850350)	
D.N. Kraehenbuehl 6105 (AD99445013)	
D. Rowley 77 (AD99706184)	