

## *Leionema paulii* (Rutaceae), a new, range-restricted endemic species from south-eastern New South Wales, Australia

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### Abstract

*Leionema paulii* G.P.Phillips (Rutaceae), a newly recognised species of restricted distribution from montane south-eastern New South Wales is here described. It is compared with the morphologically similar *L. phyllicifolium* (F.Muell.) Paul G.Wilson, *L. ceratogynum* N.G.Walsh and *L. lachnaeoides* (A.Cunn.) Paul G.Wilson. The distribution, habitat and proposed conservation status for the new taxon are presented, and a modified key to the species of *Leionema* found in New South Wales is also included. *Leionema paulii* was previously recorded as a disjunct population of *L. phyllicifolium* that was previously not represented by any herbarium specimens. This highlights the opportunity for further taxonomic discovery through the collection and analysis of specimens from more disjunct and discrete populations in genera that contain large numbers of narrow-range endemics.

### Introduction

*Leionema* (F.Muell.) Paul G.Wilson (Rutaceae) is a widespread genus with many narrow-range endemics, with 28 of the 29 currently described species endemic to eastern Australia, and one species residing in New Zealand (Wilson 2013; Copeland and Telford 2018; Alvarez and Duretto 2019; Telford and Bruhl 2020). New South Wales is a particularly diverse region for *Leionema*, with over 60% of the 18 species known to occur in the state being endemic (Alvarez and Duretto 2019; Telford and Bruhl 2020). *Leionema phyllicifolium* (F.Muell.) Paul G.Wilson is a species distributed across the alpine region of eastern Victoria and south-eastern New South Wales. It is one of only four species of *Leionema* on mainland Australia that can have a white-puberulous indumentum on the leaf abaxial surface, the others being the closely related *L. dentatum* (Sm.) Paul G.Wilson, *L. lachnaeoides* (A.Cunn.) Paul G.Wilson and *L. ceratogynum* N.G.Walsh (Wilson 1970; Walsh 2004). *Leionema phyllicifolium* shows significant variation across its discontinuous range, with distinct forms that can be distinguished by characters such as indumentum of the leaf abaxial surface and ovary, and this morphological variation was previously highlighted by Wilson (1970) as possibly sufficient to warrant further taxonomic distinction.

A number of narrow-range taxa within *Leionema* that are new to science have been formally described in recent times. This has mostly come about through the recognition of distinct, morphologically differentiated populations either observed in the field, or through examination of existing herbarium specimens (Walsh 2004; Bell and Walsh 2015; Copeland

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and Telford 2018; Telford and Bruhl 2020). This has resulted in several new subspecies being recognised within existing species where disjunct populations with fine morphological differences occur, as is the case with *L. bilobum* (Lindl.) Paul G. Wilson (4 subspecies, Duretto *et al.* 2006) and *L. lamprophyllum* (F. Muell.) Paul G. Wilson (4 subspecies, Anderson 1999; Bell and Walsh 2015). It is also the case where different species have been raised where morphological differences are more pronounced among populations, such as the separation of *L. ceratogynum* from *L. phyllicifolium* (Walsh 2004).

In October 2019, whilst conducting fieldwork in the ranges of the eastern Monaro region between Bombala and Bega in south-eastern New South Wales, a population of what initially appeared to be *Leionema phyllicifolium* was noted by the author. It was found growing on the edge of a montane swamp, growing only in sphagnum moss at approximately 930 m elevation. Despite several existing observational records from the same location, no specimens from the site have ever been lodged at herbaria. Voucher specimens were subsequently taken and compared with collections at the National Herbarium of New South Wales. This examination provided evidence that these plants differed morphologically from all other collections of *L. phyllicifolium*. Most notable was the distinctive glandular-verrucose adaxial surface of the foliage (*cf.* smooth upper surface), bullate-verrucose cocci (*cf.* smooth cocci), the sphagnum bog habitat (*cf.* stream bank or ridgetop habitat), and the minutely tuberculate seed coat (*cf.* smooth). Thus, the hypothesis was formed that this newly sampled population represented a distinct and undescribed taxon which is reproductively and geographically isolated, with the nearest known *Leionema* populations being stands of *L. phyllicifolium* *s. str.* and *L. ceratogynum*, both approximately 45 km to the north. This newly discovered species is here described as *Leionema paulii* G.P. Phillips.

## Materials and methods

All collections of *Leionema phyllicifolium*, as well as the closely related species *L. ceratogynum* and *L. lachnaeoides* held at the National Herbarium of New South Wales, along with the field collections of the new entity were examined, as well as descriptive data pertaining to *L. phyllicifolium* (Wilson 1970). The lectotype and paralectotypes of *L. phyllicifolium* held by the National Herbarium of Victoria (MEL0004888A, MEL0040887A and MEL0004886A) were observed using images available through the Australian Virtual Herbarium (AVH 2024). Comparisons were made of the morphological features between specimens and populations across all the related species' ranges, and distinguishing features were measured and detailed to compile the description for *L. paulii*. Measurements and terminology follow Wilson (1970, 1998) and Walsh (2004). Material was collected under NSW Scientific Licence SL100569 (issued to the Botanic Gardens Trust, Royal Botanic Gardens, Sydney).

There have recently been efforts to standardise the application of subspecies and species rank within Rutaceae tribe Boroniae, with the phenetic species concept having been traditionally applied in Australian Rutaceae (Forster 2003, 2005; Telford and Bruhl 2020). Species have been recognised in this system when populations show discontinuities in the variation of two or more independent morphological characters, with subspecies rank applied when populations differ in few, minor characters, and

intermediate morphologies exist (Forster 2005). These criteria are followed here in assessing the taxonomic rank of *Leionema paulii*, consistent with previous studies (Forster 2003, 2005; Telford and Bruhl 2020).

Assessment of the conservation status of *Leionema paulii* was undertaken using criteria, terms and definitions outlined in IUCN (2022).

## Taxonomy

*Leionema paulii* G.P. Phillips, *sp. nov.*

**Type:** AUSTRALIA: New South Wales: Southern Tablelands: South East Forest National Park, Nunnock Swamp, c. 35 km NE of Bombala, 26 Oct 2019, G.P. Phillips 944 & D. Whitton (holotype: NSW 1059870; isotypes: MEL, CANB).

*Shrub*, dense, low and much branched to c. 1 m high and wide; branchlets angled by leaf decurrencies when young, bearing prominent, wart-like leaf scars when older, sparsely to densely stellate-puberulous; hairs with rays to c. 0.1 mm long. *Leaves* simple, alternate; petiole flattened, erect, c. 1–1.5 mm long; lamina lanceolate to oblong-elliptic to oblanceolate, (4–)8–12(–14) mm long, 1–2 mm wide; adaxial surface distinctly glandular-verrucose with glands c. 0.5 mm across, with scattered stellate hairs; abaxial surface glandular-verrucose often with scattered oil glands protruding through a dense indumentum of white stellate hairs, sparsely to densely stellate-puberulous on raised midrib; margin revolute, often appearing somewhat crenate due to the raised oil glands; apex obtuse; base tapering to petiole. *Inflorescences* 3-flowered, axillary along distal 5–10 cm of branch. *Peduncles* (1–)2–4(–5) mm long, glabrous to glabrescent with scattered stellate hairs, flattened, with 2 terminal, ovate, stellate-puberulous bracts c. 1 mm long. *Pedicels* (1–)2–3 mm long, glabrous, terete and fleshy, becoming strongly ridged when dry, glandular-verrucose, with 2–3 decussate pairs of narrowly ovate bracteoles that are c. 0.5 mm long in the proximal half. *Calyx* obturbinate, c. 1 mm long, glandular-verrucose, lobes deltoid and imbricate with a tuft of stellate hairs at the apex. *Petals* 5, valvate in bud, narrow-elliptic to narrow-oblanceolate, 4–5 mm long, pale yellow, glabrous, glandular-verrucose with oil glands on abaxial surface often notably darker than petal lamina in colour, not persistent in fruit. *Stamens* 10, 4–6 mm long, exerted beyond the petals; anthers cordate-orbicular, c. 1 mm long. *Gynophore* terete, to c. 0.5 mm long. *Ovary* subglobose, c. 1.5 mm long, white stellate-puberulous; carpels 5, fused for most of length, apex with a sterile knob-like process; style slightly shorter to slightly longer than stamens, 4–6 mm long, terete, glabrous; stigma minute. *Cocci* 5 or less due to abortion, spreading about the central axis; dehiscent, ellipsoidal, c. 3–4 mm long, 1.5–2 mm wide, distinctly bullate-verrucose, densely stellate-puberulous, hairs with rays to c. 0.1 mm long, wearing down with age; sterile apical process 1–2 mm long, obtuse conical. *Seed* D-shaped to subreniform, 2–3 mm long, dorsal edge rounded, testa glossy dark brown, minutely tuberculate; raphe circular to ovate, sub-basal, c. 1.5 mm long and wide, held obliquely away from the testa by the hilum at point of attachment. (Figs 1–3).



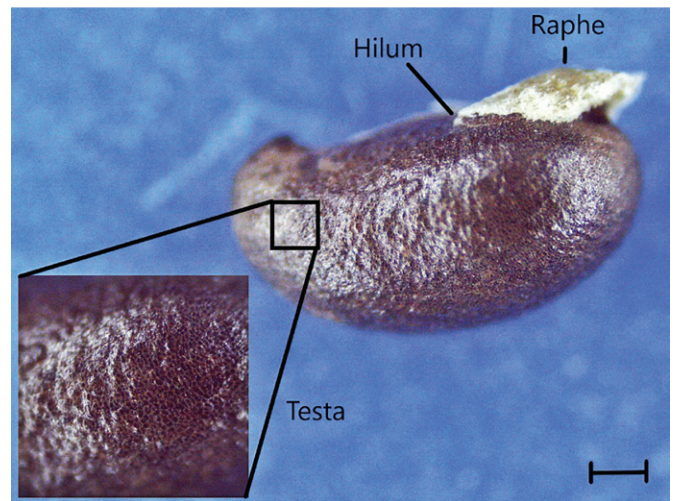
**Fig. 1.** *Leionema paulii*. A. Typical flowering branch. B. Leaf adaxial surface showing the distinctive glandular-verrucose surface. C. Leaf abaxial surface. Voucher: G.P. Phillips 944 (NSW). Scale bars: A, 12 mm; B, 2 mm; C, 3.5 mm.



**Fig. 2.** *Leionema paulii* at the type location, South East Forest National Park near Bombala, New South Wales.

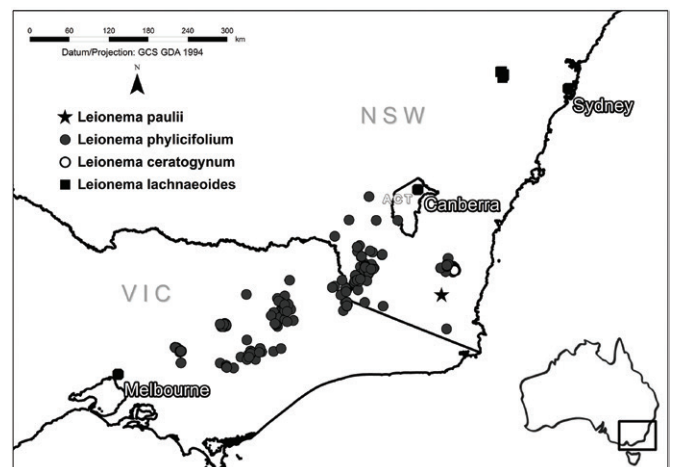
**Additional Specimens Examined:** AUSTRALIA: New South Wales: Southern Tablelands: South East Forest National Park, Nunnock Swamp, on isthmus on western side, 20 Dec 2020, G.P. Phillips 1349 & J.M. Cohen (NSW, MEL, CANB, BRI, AD).

**Diagnostic characters:** *Leionema paulii* is morphologically most similar to *L. phyllicifolium*, *L. ceratogynum* and *L. lachnaeoides*. However, the vegetative, flower and fruit differences are great enough that it is easily distinguishable from all three species in the field (Table 1).



**Fig. 3.** *Leionema paulii*. A. Fruits showing the bullate-verrucose cocci. Voucher: G.P. Phillips 1349 (NSW). Scale bar: 2 mm. B. Seed showing the minutely tuberculate surface (inset) and raphe suspended at an oblique angle away from the testa. Scale bar: 400  $\mu$ m; inset magnification  $\times 250$ .

**Distribution:** *Leionema paulii* occurs in the South Eastern Highlands Bioregion (DAWE 2012) where it is currently known only from a single population within South East Forest National Park, north-east of Bombala on the Southern Tablelands of New South Wales (Fig. 4).



**Fig. 4.** Distribution of *Leionema paulii*, *L. phyllicifolium*, *L. ceratogynum* and *L. lachnaeoides* in south-eastern Australia. Map generated in ArcGIS (ESRI 2015).

**Table 1.** Comparison of key diagnostic features of *Leionema paulii*, *L. phyllicifolium* (sensu Wilson 1970), *L. ceratogynum* (sensu Walsh 2004) and *L. lachnaeoides* (sensu Wilson 1970 and Walsh 2004).

Character	<i>L. paulii</i>	<i>L. phyllicifolium</i>	<i>L. ceratogynum</i>	<i>L. lachnaeoides</i>
<b>Leaf adaxial surface</b>	distinctly glandular-verrucose	smooth	minutely scabridulous	minutely scabridulous
<b>Leaf abaxial surface</b>	glandular-verrucose	smooth	smooth	smooth
<b>Peduncles</b>	(1–)2–4(–5) mm long, glabrous to glabrescent with stellate hairs	1–3 mm long, glabrous	0–1 mm long, glabrous to glabrescent with stellate hairs	1.5 mm long, sparsely stellate-puberulous
<b>Petal shape</b>	narrow-elliptic to narrow-ob lanceolate	narrow-elliptic	narrow-elliptic	narrow-elliptic
<b>Bracteoles</b>	2 or 3 decussate pairs, narrowly ovate, 0.5 mm long	1 pair, minute	1 pair, narrowly triangular, 0.4–0.7 mm long	1 pair, minute
<b>Ovary</b>	sub-globose; stellate-puberulous	obovoid to sub-globose; stellate-puberulous or rarely glabrous	rostrate; glabrous, pilose or rarely villous	narrow-ovoid to rostrate, pilose or rarely villous
<b>Carpels</b>	rounded with blunt knob-like process	rounded	prominently beaked	narrow, elongated
<b>Cocci</b>	3–4 mm long, bullate-verrucose, obtuse conical process 1–2 mm long	to 3 mm long, smooth, shortly apiculate with process <1 mm long	3.5–4 mm long, process 3–4 mm long	3–4 mm long, process 3–4 mm long
<b>Seed</b>	minutely tuberculate, raphe obliquely suspended	smooth, raphe appressed to testa	smooth or with obscure, low tubercles, raphe appressed to testa	not seen
<b>Habitat</b>	sphagnum bog in montane freshwater wetland	margin of watercourses and valleys in open forest, sometimes alpine ridgetops	dry ridgetop in heath and open forest	cliff-top heath

**Habitat and Ecology:** *Leionema paulii* is restricted to a biogeographically unique, subalpine upland swamp system in an area of impeded drainage at c. 930 m elevation. It grows in sphagnum mounds of a bog on the immediate edge of a shallow basin which typically retains high levels of surface water and is underlain with a deep peat layer (Ferguson 2012). Associated vegetation is a mix of predominantly swampland heath with occasional subalpine woodland eucalypts, with abundant *Baeckea utilis*, *Hakea microcarpa*, *Epacris paludosa* and *Empodisma minus*, and *Eucalyptus pauciflora*, *Acacia melanoxylon* and *Tasmannia lanceolata* scattered throughout. This community falls within the montane bog and fen formation of the freshwater wetland vegetation class (Keith 2004) and the population is within the plant community type (PCT) Southeast Subalpine Bog (PCT 3948; DPE 2022a). It is also included within the 'Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions' Threatened Ecological Community listed on the New South Wales *Biodiversity Conservation Act 2016* (DPIE 2017).

*Leionema paulii* has been seen to reshoot vigorously from the base following drought, though the species is likely to be fire sensitive as in other *Leionema* which recruit from seed following fire and require fire and smoke to germinate (Auld 2001). Pollinators have not been observed on *L. paulii*, but the species is most likely to be primarily insect pollinated as in other species in the genus (Armstrong 1979).

**Phenology:** The main flowering period has been recorded in late October but is likely to be at least from September to November given the presence of both spent and fresh flowers and flower buds on the type specimen, with other sporadic flowering events recorded in January and February. Ripe fruit with seed dispersing has been observed in late December.

**Conservation Status:** The sole confirmed population of *Leionema paulii* has been documented by the author as having c. 50–60 mature individuals and appears to be highly localised, only occupying an area of c. 1500 m<sup>2</sup>. Limited searches were conducted in the surrounding swamps between 2016 and 2021 with no other plants seen, with the known habitat seemingly similarly restricted. The author has also performed extensive fieldwork around other swamps in the wider region but has not located *L. paulii* or related species in those areas. Other studies have also failed to locate *Leionema* species in sphagnum in similar habitat across New South Wales (Whinam and Chilcott 2002). An examination of relevant herbarium collections did not uncover any other specimens from other locations attributable to *L. paulii*. However, photographic evidence from the same swamp system c. 1 km south of the type locality (currently attributed to *L. phyllicifolium*) may prove to be *L. paulii* also (Wood 2022; Atlas of Living Australia 2024). The subalpine bog habitat of *L. paulii*, is known to have a species composition unlike other true alpine bogs and upland swamps in the region (Ferguson 2012). Therefore, there is a likelihood that if other populations do exist, they are also likely to be highly localised.

Threats to the known population include desiccation of the swamp through drought (with death of c. 10–20% of mature individuals from those observed in 2019 and 2020) and habitat degradation by feral animals, including pigs and deer. Other potential threats include changes in hydrology, especially increased drying of the wetlands due to climate change, and adverse fire regimes including higher frequency and/or severity fires that can impede recruitment. Given the highly restricted extent of occurrence and area of occupancy, a single threat-defined location when considering the most serious threats of drought and pest animals, observations of continuing decline in mature individuals following the 2017–2019 drought, and habitat decline due to feral animal disturbance, *L. paulii* meets the criteria to be listed as Critically Endangered under Criteria B and C of IUCN (2022), Clause 4.3 and 4.4 of the New South Wales *Biodiversity Conservation Act 2016*, and Criterion 2 and 3 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

**Etymology:** The epithet commemorates Paul Ronald Phillips (1956–2012), the father of the author who did much to promote a love of the outdoors and exploration of natural environments from a young age in the tablelands of NSW and beyond, and whose final words included those of encouragement to finish studies in Conservation and Land Management, leading to such discoveries as *Leionema paulii*.

**Notes:** *Leionema paulii* is morphologically distinct from all populations of *L. phyllicifolium*, particularly due to the verrucose leaf surfaces, the 2 or 3 pairs of bracteoles on the flower pedicels, and the bullate-verrucose cocci. In some herbarium specimens of *L. phyllicifolium*, the oil glands in the leaves appear to be raised giving a slightly verrucose appearance, but this is an artefact of the drying process. In such specimens, the glands are clearly smaller in size and less prominent than in *L. paulii*, allowing positive identification from vegetative material alone. However, future collections of fertile material will aid identification in some populations of *L. phyllicifolium*, especially if further variation is found in new populations. In fresh material, however, the leaf surfaces of *L. paulii* are very distinctly glandular-verrucose when compared to any *L. phyllicifolium* observed during field surveys, so field identification is straightforward. The bullate-verrucose surface of the fruit is also reliable when compared to fruiting specimens of *L. phyllicifolium* from across its range where such material is available for identification (Fig 3).

Despite the collection of the type specimen from South East Forest National Park in 2019, this is clearly not the first time *L. paulii* has been recorded at the site. Observational records attributed to *L. phyllicifolium*, but almost certainly representing *L. paulii*, have been made at the type location during scientific research (Whinam and Chilcott 2002) and floristic surveys (DPE 2022b), but no voucher specimens had been lodged from these projects. Photographic evidence from the site also exists in an identification guide, with plants labelled as *L. phyllicifolium*, but matching *L. paulii* due to the distinct glandular-verrucose foliage (Wood 2022). Voucher collections at these times may have facilitated earlier diagnosis and description of *L. paulii*, given some diagnostic details such as the 2–3 pairs of bracteoles, and fruit and seed morphology, are more readily elicited from plant specimens. The collection of voucher specimens of

seemingly common taxa, especially on the edges of their ranges, can therefore be of great value in taxonomic studies. Many populations are still under-represented or not represented at all in herbaria, and new populations and range extensions are constantly being found in *Leionema* and many other taxa (Bell 2020). Indeed, the variation within *L. phyllicifolium* as identified by Wilson (1970) and Walsh (2004) warrants further investigation in this regard, as do other disjunct populations in the genus (e.g., those found in *L. dentatum* (Sm.) Paul G. Wilson and *L. diosmium* (A. Juss.) Paul G. Wilson; Wilson 1970).

Given the distinct seed and fruit features here noted in *Leionema paulii*, morphology of these characters is a potential avenue of investigation between other populations of *Leionema*, with seed characters highlighted by Wilson (1970, 1998) as being highly diagnostic between genera in Rutaceae tribe Boronieae. In diagnosing genera within this tribe, seed morphology was pointed out to be distinct and uniform within groups (Wilson 1998), and so the discovery of distinctive seed characters in *L. paulii* here (notably the minutely tuberculate testa) and in *L. ceratogynum* previously (low obscure tubercles, Walsh 2004), mean these characters may be useful in diagnosing other taxa within *Leionema* (Fig. 3B). However, these fine details can only be studied under magnification using specimens with ripe fruit, and such fruiting specimens are currently poorly represented in herbaria. Thus, additional collection of fruiting specimens from as many populations as possible is required to further these investigations.

Therefore, an opportunity is identified to engage with those undertaking ecological research and floristic surveys to enable the gathering of further specimen voucher collections in genera of interest given the current acceleration in survey effort across the state, especially related to the development industry (Bell 2020). The legislative requirements for such surveys may represent great opportunities to increase knowledge of biodiversity. As *L. paulii* and other examples (e.g., *Hibbertia fumana* Sieber ex Toelken, Duretto *et al.* 2017; *Homoranthus croftianus* J.T. Hunter, Hunter 1998) demonstrate, early recognition enables planning actions for species of conservation concern to commence sooner. While there remain hurdles to the standardisation of collection of voucher specimens by those undertaking floristic surveys and ecological research, increased knowledge sharing between consultants, researchers and herbaria could result in elevated collection efforts (Bell 2020) and drive further new species discoveries. Indeed, such surveys already typically collect site data detailed enough for herbarium purposes, so the addition of voucher specimens to a workflow is not overly imposing and should be encouraged. Systematic surveys are thus fertile ground for rapidly expanding material available for taxonomic research, as well as engaging more botanists and ecologists in taxonomy. This process may also forge stronger relationships between these fields and help to reveal more about our plant diversity than herbaria collectors alone can manage. Furthermore, the information lodged with the specimens and made available becomes part of the invaluable resources available to the wider community, further promoting flora conservation and the important role taxonomy plays within it.

## Key to the species of *Leionema* of NSW and south-eastern Queensland, modified from Alvarez and Duretto (2019) and Telford and Bruhl (2020).

- 1 Petals >7 mm long, erect or spreading; stamens considerably exceeding petals ..... 6
- 1: Petals <6 mm long, ± spreading; stamens ± equal to or slightly longer than petals ..... 6
- 2 Petals fused ..... ***L. sympetalum***
- 2: Petals free ..... 3
- 3 Stems ± terete ..... 4
- 3: Stems strongly angled ..... 5
- 4 Stems pilose; leaves c. 10 mm long ..... ***L. carruthersii***
- 4: Stems stellate-tomentose; leaves 20–40 mm long ..... ***L. viridiflorum***
- 5 Leaf margins entire; inflorescence pendulous ..... ***L. ralstonii***
- 5: Leaf margins frequently serrulate; inflorescence erect ..... ***L. scopulinum***
- 6 Leaves 2.5–4 cm wide, base stem-clasping ..... ***L. ambiens***
- 6: Leaves <2 cm wide, base not stem-clasping ..... 7
- 7 Leaves hairy (including minutely papillose) on abaxial surface ..... 8
- 7: Leaves glabrous on abaxial surface ..... 14
- 8 Inflorescence terminal ..... 9
- 8: Inflorescence axillary ..... 10
- 9: Petals yellow, pale red towards apex on abaxial surface; leaves pilose or coarsely stellate on lower surface; pedicels 1–2 mm long ..... ***L. diosmium***
- 9: Petals white; leaves pilose on lower surface; pedicels 3–5.5 mm long ..... ***L. westonii***
- 10 Leaves 2–8 cm long, apex 2-toothed, margins entire to finely toothed; inflorescences >10 mm long, 1–3-flowered ..... ***L. dentatum***
- 10: Leaves 0.8–2(–3) cm long, apex entire, margins entire; inflorescences usually <10 mm long, 1–3-flowered ..... 11
- 11 Ovary subglobose, white stellate-pubescent or rarely glabrous; cocci up to 4 mm long ..... 12
- 11: Ovary rostrate, glabrous, pilose with few simple hairs or rarely villous; cocci 6 mm long or more ..... 13
- 12 Leaves smooth on adaxial and abaxial surface; 1 pair of bracteoles; cocci smooth ..... ***L. phyllicifolium***
- 12: Leaves prominently glandular-verrucose on adaxial and abaxial surface; 2–3 pairs of bracteoles; cocci bullate-verrucose ..... ***L. paulii***
- 13 Inflorescences 3-flowered, rarely some (never all) 1-flowered; leaves straight, mostly 12–21 mm long, abaxial surface visible ..... ***L. ceratogynum***
- 13: Inflorescences 1-flowered; leaves slightly up-curved, mostly 7–15 mm long, abaxial surface mostly obscured by revolute margins ..... ***L. lachnaeoides***
- 14 Stems strongly angled, glabrous; leaves 3–7 cm long, narrow-elliptic to oblanceolate, margins finely and regularly toothed, apex acute ..... 15
- 14: Stems terete to slightly angled, glabrous or hairy; leaves 0.6–5 cm long, margins usually entire or sometimes minutely erose or crenate ..... 16
- 15 Leaves 50–70 mm long, 10–15 mm wide ..... ***L. coxii***
- 15: Leaves 25–50 mm long, 3–6 mm wide ..... ***L. obtusifolium***
- 16 Inflorescences axillary; leaves linear to narrow-oblong or narrow-elliptic, Margins recurved to revolute ..... 17
- 16: Inflorescences terminal and often also axillary; leaves linear- to broad-spathulate or ± circular, obovate or elliptic, margins flat to recurved ..... 18
- 17 Flowers solitary; stems pilose ..... ***L. gracile***
- 17: Inflorescence mostly a cluster of 3 or 4 flowers; stems with stellate hairs ..... ***L. phyllicifolium***
- 18 Leaves >13 mm long ..... 19
- 18: Leaves <13 mm long ..... 21
- 19 Leaves 3–11.5 mm wide ..... ***L. beckleri***
- 19: Leaves 2–3(–4) mm wide ..... 20
- 20: Stems densely hairy; leaf apex obtuse–rounded ..... ***L. elatius***
- 20: Stems sparsely hairy; leaf apex acute ..... ***L. praetermissum***
- 21 Stems pilose ..... ***L. gracile***
- 21: Stems with stellate hairs ..... 21
- 22 Stems verrucose; leaves 2–4 mm wide ..... ***L. lamprophyllum***
- 22: Stems not verrucose; leaves 4–6 mm wide ..... 23
- 23 Leaves distally crenulated; apex of midrib with a tuft of stellate hair ..... ***L. beckleri***
- 23: Leaves distally rounded; apex of midrib glabrous ..... ***L. rotundifolium***

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