

Leionema westonii (Rutaceae), a rare new species from north-eastern New South Wales, Australia

Lachlan M. Copeland^{1,3} and Ian R. H. Telford²

¹ Eco Logical Australia Pty Ltd, Coffs Harbour Jetty, NSW 2450.

² N.C.W. Beadle Herbarium, School of Environmental and Rural Science, University of New England, Armidale, NSW 2351, Australia.

³ author for correspondence: lachlanc@ecoaus.com.au

Abstract

Leionema westonii L.M.Copel. & I.Telford (Rutaceae), a rare species endemic to montane north-eastern New South Wales, is named as new. The species appears to be allied to *L. gracile* (C.T.White) Paul G.Wilson, and a table comparing selected attributes of the two species is presented. A map showing the distributions of both species is also provided and the conservation status, habitat and phenology of the new species are discussed.

Introduction

Leionema (F.Muell.) Paul G.Wilson is an Australasian genus of Rutaceae consisting of 24 currently recognised species, of which a single species, *L. nudum* (Hook.) Paul G.Wilson occurs outside continental Australia on New Zealand's North Island (Wilson 1998, 2013). Most species were originally placed in *Phebalium* by Wilson (1970), with later segregation of *Leionema* based largely on floral morphology and indumentum type (Wilson 1998).

Since Wilson's 1998 treatment, several new and extremely rare taxa have been discovered and given informal phrase names to allow gazetting as threatened flora (Weston & Harden 2002; Weston 2011; Bell & Walsh 2015), with two still remaining unnamed since the publication of Rutaceae in the *Flora of Australia* (Wilson 2013). One such species from north-eastern New South Wales is known from a single population discovered in 2004 on a remote gorge edge south-east of Armidale, and is here described as new.

Taxonomy

Leionema westonii L.M.Copel. & I.Telford *sp. nov.*

Diagnosis: similar to *Leionema gracile* (C.T.White) Paul G.Wilson, differing in the white-papillose and sparsely pilose abaxial leaf surface (vs green, glabrous and glandular punctate), shorter petals 4–4.6 mm long (vs 5–5.8 mm) which are glandular-punctate and hispidulous apically on the abaxial surface (vs glabrous and glandular punctate throughout on both surfaces) and filaments 4–4.5 mm long (vs 3.5–4 mm long).

Type: New South Wales: Northern Tablelands: Oxley Wild Rivers National Park, NE rim of gorge of Spring Creek, c. 30 km E of Walcha, 1.5 km W of Steep Drop Falls, 4 May 2004, L.M. Copeland 3741, J.J. Bruhl & I.R. Telford; holotype: NSW; isotypes: BRI, CANB, K, M, MEL, MO, NE.

Shrub, rhizomatous and much-branched, to 70 cm tall. Stems pilose with spreading white simple hairs. **Leaves:** petiole 1–1.4 mm long, sparsely pilose; lamina narrowly elliptic or linear, 6–16 mm long, 1–1.8 mm wide, obtuse, revolute, adaxially pilose, abaxially minutely white-papillose and sparsely pilose. **Inflorescence** a terminal cyme composed of 4–10 solitary flowers in the upper axils. **Pedicels** 3–5.5 mm long, pilose, bearing a subulate, pilose bracteole 2.4–2.8 mm long just below the calyx. **Calyx** cup-shaped, 1.3–1.6 mm long, sparsely hispidulous, sometimes with minute stellate hairs, 5-toothed, the teeth triangular, c. 1 mm long. **Petals** 5, spreading, narrowly elliptic, 4–4.6 mm long, 1–1.2 mm wide, acute, glabrous adaxially, glandular punctate and sparsely and shortly pilose abaxially, white. **Stamens** 10, exerted, spreading; filaments terete, 4–4.6 mm long, glabrous, white; anthers elliptic, 1–1.5 mm long, pink. **Disc** annular surrounding a gynophore c. 0.5 mm long, dark green. **Ovary** of 5 carpels, fused for most of their length, c. 1 mm long, 0.7 mm diam., papillose, green; style terete, 2.5–2.8 mm long, white; stigma capitate, white. Fruit and seeds not seen. **Figs. 1, 2.**



Fig. 1. Habit of *Leionema westonii*, L.M. Copeland 3741 et al. (type gathering). Image by J. Bruhl.

Additional specimen examined: New South Wales: Northern Tablelands: Oxley Wild Rivers National Park, 1.6 km W of Steep Drop Falls, along NE rim of Spring Creek Gorge, L.M. Copeland 3683 & P.H. Weston, 3 Feb 2004 (BRI, CANB, K, MEL, MO, NE, NSW).

Affinities: The new species is similar to *Leionema gracile*, which is narrowly endemic to trachyte volcanic plugs in the Boonah area of south-eastern Queensland, approximately 250 km to the north. Morphological differences (Table 1) appear small but discontinuities convince us that the southern population should be treated as a species distinct from *L. gracile*.

Etymology: The specific epithet honours Peter Henry Weston (1956–), formerly a Senior Principal Research Scientist at the New South Wales National Herbarium, and co-discoverer of the species in 2004. Peter has contributed greatly to our knowledge of the Australian flora and its biogeography, particularly of the Proteaceae and Rutaceae.



Fig. 2. Inflorescence of *Leionema westonii*; from *L.M.Copeland 3741 et al.* (type gathering). Image by J.J. Bruhl. Scale bar = 2 mm.

Distribution: *Leionema westonii* occurs in the New England Bioregion (Department of the Environment 2013) where the species is known only from Oxley Wild Rivers National Park (Fig. 3). This area includes much of the Macleay Gorges system on the eastern fall from the New England Tableland, New South Wales. The single known population of *L. westonii* occurs towards the southern end of the park near Steep Drop Falls approximately 40 km ENE of Walcha.

Habitat and ecology: *Leionema westonii* grows in a *Eucalyptus campanulata* layered woodland with *Allocasuarina littoralis* and *Poa sieberiana*. The population is very close to the rocky gorge rim but occurs in a relatively flat area in shallow, loamy soil on metasediments at an altitude of 1080 m a.s.l. Examination of all known plants has failed to find any fruits and the rhizomatous nature of this species suggests that it may well be clonal and limited to vegetative reproduction below the ground. Further research is required to confirm this hypothesis, however.

Phenology: Flowering has only been observed in early February and early May but is likely to span from at least January to late May.

Conservation Status: *Leionema westonii* is currently known from a single population of fewer than 50 individuals, all of which occur in an area of no more than 20×20 m. The population may be much smaller as limited excavation indicated several apparent individuals were linked by rhizomes. This species may be threatened from occasional browsing by feral goats and is vulnerable to damage or destruction associated with stochastic events given its very small population size and extremely restricted distribution. The species meets the IUCN (2016) criteria to be considered ‘Critically Endangered’ due to its population numbering fewer than 50 plants and its limited distribution, and should be listed as such on the New South Wales *Biodiversity Conservation Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Fortunately all known plants are conserved in a remote area of Oxley Wild Rivers National Park with no easy public access.

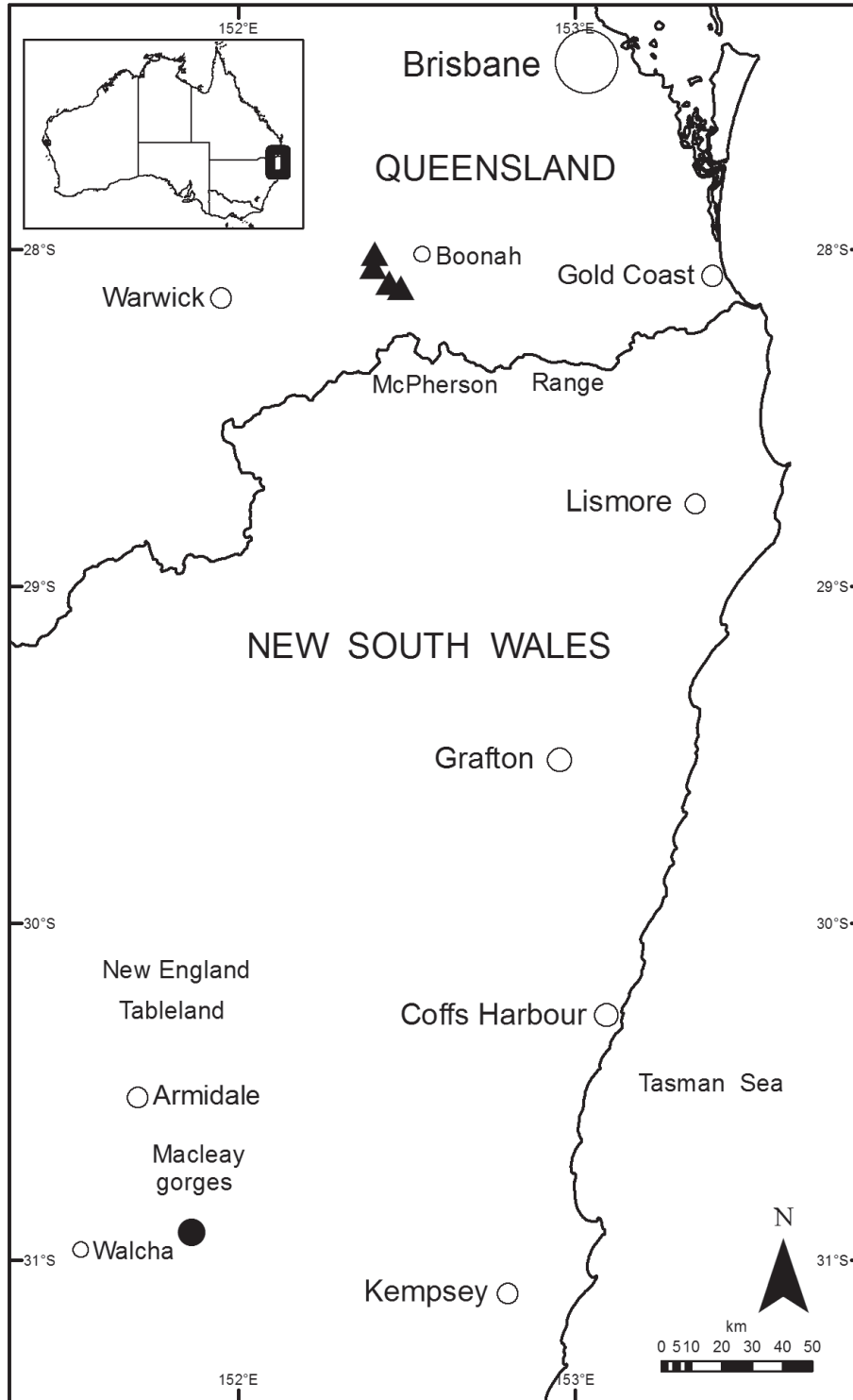


Fig. 3. Distributions of *Leionema westonii* (●), and *L. gracile* (▲).

Modified key for NSW FloraOnline (adapted from Weston 2011)

- 1 Petals <6 mm long, ±spreading; stamens ±equal to or slightly longer than petals..... 2
 - Petals >7 mm long, erect; stamens considerably exceeding petals 14
- 2 Leaves 2.5–4 cm wide, base stem-clasping..... *Leionema ambiens*
 - Leaves <2 cm wide, base not stem-clasping..... 3
- 3 Leaves hairy (including minutely papillose) on lower surface..... 4
 - Leaves glabrous on lower surface..... 9

4	Inflorescence terminal.....	5
	Inflorescence axillary.....	6
5	Petals yellow, pale red outside towards apex; leaves pilose or coarsely stellate on lower surface; pedicels 1–2 mm long	<i>Leionema diosmeum</i>
	Petals white; leaves pilose on lower surface; pedicels 3–5.5 mm long	<i>Leionema westonii</i>
6	Apex of leaves 2-toothed, leaves 2–8 cm long, margins recurved to revolute, entire to finely toothed; inflorescences >10 mm long, c. 10-flowered.....	<i>Leionema dentatum</i>
	Apex of leaves entire, leaves 0.8–2(–3) cm long, margins entire; inflorescences usually <10 mm long, 1–3-flowered	7
7	Ovary globose, white stellate-pubescent or rarely glabrous; ripe follicles obtuse or apiculate, to 3.5 mm long; leaves smooth on adaxial surface	<i>Leionema phyllicifolium</i>
	Ovary rostrate, glabrous, pilose or rarely villous; ripe follicles 6 mm long or more; leaves minutely scabridulous on adaxial surface.....	8
8	Inflorescences 3-flowered, rarely some (never all) 1-flowered; leaves straight, mostly 12–21 mm long, undersurfaces apparent	<i>Leionema ceratogynum</i>
	Inflorescences 1-flowered; leaves slightly up-curved, mostly 7–15 mm long, undersurfaces mostly obscured by revolute margins	<i>Leionema lachnaeoides</i>
9	Stems strongly angled, glabrous; leaves 3–7 cm long, narrow-elliptic to oblanceolate, margins finely and regularly toothed, apex acute	<i>Leionema coxii</i>
	Stems terete to slightly angled, glabrous or hairy; leaves 0.6–5 cm long, margins usually entire or sometimes minutely erose or crenate, variously shaped	10
10	Inflorescences axillary, terminal peduncles absent; leaves linear to narrow-oblong or narrow-elliptic, with recurved to revolute margins	<i>Leionema phyllicifolium</i>
	Inflorescences mostly terminal, terminal peduncles present; leaves linear- to broad-spathulate or ± circular, obovate or elliptic, with flat to recurved margins	11
11	Leaves >13 mm long	12
	Leaves <13 mm long	13
12	Leaves spatulate, oblanceolate, obovate or narrowly oblong, 3–10 mm wide	<i>Leionema elatius</i>
	Leaves linear-oblanceolate, 2–3 mm wide	<i>Leionema</i> sp. Colo River (P.H. Weston 2423)
13	Stems warty, minutely hairy in longitudinal lines or all over; leaves erect to spreading, not imbricate, 2–4 mm wide.....	<i>Leionema lamprophyllum</i>
	Stems not warty, minutely stellate-hairy all over; leaves erect and ± imbricate, 4–6 mm wide	<i>Leionema rotundifolium</i>
14	Petals fused.....	<i>Leionema sympetalum</i>
	Petals free	15
14	Stems ± terete.....	16
	Stems strongly angled.....	17
16	Stems pilose; leaves c. 10 mm long.....	<i>Leionema carruthersii</i>
	Stems stellate-tomentose; leaves 20–40 mm long	<i>Leionema viridiflorum</i>
17	Leaf margins entire; inflorescence nutant.....	<i>Leionema ralstonii</i>
	Leaf margins frequently serrulate; inflorescence erect.....	<i>Leionema scopulinum</i>

Modified key for Flora of Australia (Wilson 2013, relevant couplet only)

- 12 Leaves pilose or coarsely stellate abaxially
- 12a Pedicels 1–2 mm long; petals creamy yellow (SE N.S.W.) *L. diosmeum*
- 12a: Pedicels 3–5.5 mm long; petals white (NE N.S.W.) *L. westonii*

Table 1. Comparison of selected morphological attributes of *Leionema westonii* and *L. gracile*.

Species/character	<i>Leionema westonii</i>	<i>L. gracile</i>
Leaf abaxial surface	white papillose and sparsely scabridulous, not glandular punctate	green, glabrous, glandular punctate
Leaf margin	revolute	recurved
Petal length (mm)	4–4.6	5–5.8
Petal abaxial surface	sparsely hispidulous; glandular punctate towards apex	glabrous; glandular punctate throughout
Filament length (mm)	4–4.5	3.5–4
Anther length (mm)	1–1.5	0.6–0.8

Acknowledgements

We would like to thank Peter Weston for assistance in the field and Jeremy Bruhl for the use of his excellent colour photographs. We are also grateful to the New South Wales National Parks and Wildlife Service for permission to collect on land under their administration, and to their Northern Tablelands office for providing information and keys to access Oxley Wild Rivers National Park.

References

- Bell SAJ, Walsh NG (2015) *Leionema lamprophyllum* subsp. *fractum* (Rutaceae); a new and highly restricted taxon from the Hunter Valley of New South Wales. *Telopea* 18, 505–512.
- Department of the Environment (2013) *Australia's bioregions (IBRA)*, IBRA7, Commonwealth of Australia. <http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra#ibra> (accessed Dec. 2016).
- IUCN Standards and Petitions Subcommittee (2016) Guidelines for Using the IUCN Red List Categories and Criteria. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>. (accessed December 2016)
- Weston PH, Harden GJ (2002) Rutaceae, in Harden, GJ (ed.) *Flora of New South Wales* 2 rev. edn: 306–310. (New South Wales University Press, Kensington)
- Weston PH (2011) *Leionema* (Rutaceae), in New South Wales FloraOnline, PlantNET (The NSW Plant Information Network System). Royal Botanic Gardens and Domain Trust, Sydney <http://plantnet.rbgsyd.nsw.gov.au> (accessed December 2016)
- Wilson PG (1970) A taxonomic revision of the genera *Crowea*, *Eriostemon* and *Phebalium* (Rutaceae). *Nuytsia* 1: 3–155.
- Wilson PG (1998) New species and nomenclatural changes in *Phebalium* and related genera (Rutaceae). *Nuytsia* 12: 267–288.
- Wilson PG (2013) *Leionema* (Rutaceae), in Wilson, AJG (ed.) *Flora of Australia* 26: 431–446. (ABRS, Canberra/CSIRO Publishing, Melbourne).

Manuscript received 22 June 2017, accepted 15 December 2017