

**Few and far between: *Philotheca richardsoniana* (Rutaceae),
a new rarity from Western Australia's Avon Wheatbelt**

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SHORT COMMUNICATION

Although widespread in Australia, *Philotheca* Rudge (Rutaceae) is most diverse in Western Australia's Avon Wheatbelt, with 17 of the 55 documented species occurring in this bioregion (Western Australian Herbarium 1998–; Wilson 2013). Among them are some of the rarest taxa in the genus, including three Threatened species (*P. basistyla* Mollemans, *P. falcata* (Paul G. Wilson) Paul G. Wilson and *P. wonganensis* (Paul G. Wilson) Paul G. Wilson), and two undescribed species that may also warrant listing as Threatened, namely *P.* sp. Latham (F. Keast L4B 043) and *P.* sp. Mukinbudin (M. Hancock s.n. 08/09/1999). Both of these undescribed taxa are currently known only from small patches of remnant bushland surrounded by farmland. Such fragments have significant conservation value in the Avon Wheatbelt—the vegetation of this bioregion has not only been heavily impacted by land clearing for agriculture, but is subject to multiple additional threats (see Prober & Smith 2009).

Philotheca sp. Latham, which is known from a single collection made more than 20 years ago, requires field research to relocate the population and collect more material and associated data to confirm its distinctness. *Philotheca* sp. Mukinbudin, which was researched during the 2017 field season, is formally described below.

Philotheca richardsoniana* Wege & Hislop, *sp. nov.

Type: near Mukinbudin, Western Australia [precise locality withheld for conservation reasons], 14 September 2017, *J.A. Wege* 2033 (*holo:* PERTH 08984697; *iso:* CANB, MEL, NSW).

Philotheca sp. Mukinbudin (M. Hancock s.n. 08/09/1999), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 31 January 2018].

Erect to spreading, single-stemmed *shrub* 40–150 × 30–100 cm, usually sparsely branched toward the base. *Branchlets* glandular-verrucose, puberulous, without decurrent leaf bases. *Leaves* dull grey-green, shortly petiolate, slender-clavate, 4–12 mm long, obtuse, rarely with a black apiculus, ± flat and channelled adaxially, rounded abaxially, glandular-verrucose, puberulous, without obvious stipular excrescences. *Flowers* terminal, solitary or in clusters of 2–4; pedicels 1–3 mm long, puberulous. *Sepals* broadly ovate, 1–1.3 mm long, apex subacute (lacking a black apiculus), margin ciliolate, surface

puberulous and usually slightly glandular-verrucose. *Petals* free, narrowly ovate, $4-6 \times 1.8-2.8$ mm, white with a pale pink central abaxial stripe, puberulous on both sides. *Stamen* filaments free, densely pilose; anthers 0.8–1 mm long, white-apiculate. *Carpels* pilose; style terete, pilose on basal 1/2–3/4. *Cocci* 2.2–2.5 mm high, truncate, acutely rostrate on outer angle. (Figure 1)

Diagnostic features. *Philotheca richardsoniana* can be differentiated from its congeners by the following combination of characters: a dense covering of very short, soft hairs on the stems, leaves, calyces and petals; glandular-verrucose leaves that are flattened and prominently grooved on the upper surface; and sepals that lack a black apiculum.

Selected specimens. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 23 Sep. 2013, *L. Canackle* LCH 006 (PERTH); 21 Nov. 2013, *A. Crawford* ADC 2425 (PERTH); 8 Sep. 1999, *M. Hancock s.n.* (PERTH); 10 Sep. 2009, *B.R. Lullfitz* 116 & *J. & M. Squire* (PERTH); 23 June 2007, *R. McInnes* 1 (PERTH); 20 May 2015, *N. McQuoid* NM 225 (PERTH); 20 May 2015, *N. McQuoid* NM 226 (PERTH); 1 Sep. 1977, *B.G. Muir* 172(3.5) (PERTH); 13 Sep. 2017, *J.A. Wege* 2032 (CANB, MEL, NSW, PERTH).

Phenology. Mostly flowering in August and September, with one record from late June. Fruit have been collected in late November.

Distribution and habitat. *Philotheca richardsoniana* is mostly known from private property near Mukinbudin in Western Australia's Avon Wheatbelt, where it grows in sandy loam in tall shrubland with *Allocasuarina campestris*, *Acacia*, *Melaleuca*, mallee eucalypts, and *Calothamnus* (Figure 1A). A recently identified population from north of Tammin (nearly 100 km south-west of the Mukinbudin populations) occurs in open mallee shrubland with *Acacia*, *Grevillea* and *Allocasuarina* over *Melaleuca*.

Conservation status. This species was previously listed as Priority One under Conservation Codes for Western Australian flora (Smith & Jones 2018, as *P. sp.* Mukinbudin) but has recently been downgraded to Priority Two following its discovery in a small nature reserve. It is a high priority for on-ground conservation assessment and targeted surveys since fewer than 200 individuals are currently known. Future survey efforts should include survey of bushland fragments between the two population centres.

Etymology. This species is named for Ben Richardson (1971–), whose work managing *FloraBase* (Western Australian Herbarium 1998–) underpins the research and conservation activities of an enormous number of scientists, both nationally and internationally. Since commencing work at the Western Australian Herbarium in May 1999, Ben has been instrumental in the ongoing development of *FloraBase* and the maintenance of its underlying databases, including a bespoke image database (*ImageBank*) that comprises more than 70,000 Western Australian plant images. He manages a team of volunteers who help to grow and improve the image collection, plays an active role in the *Herbarium Information Systems Committee* (HISCOM), manages data standards and the flow of information from *FloraBase* to the *Australasian Virtual Herbarium*, and has contributed to the digital platform *Flora of Australia* (ABRS 2017–) during a secondment to the *Atlas of Living Australia*.

Vernacular name. Richardson's Philotheca.

Affinities. This species was added to Western Australia's vascular plant census in 2006 by Paul G. Wilson as *P. sp.* Mukinbudin (*M. Hancock s.n.* 08/09/1999); however, he did not formally describe

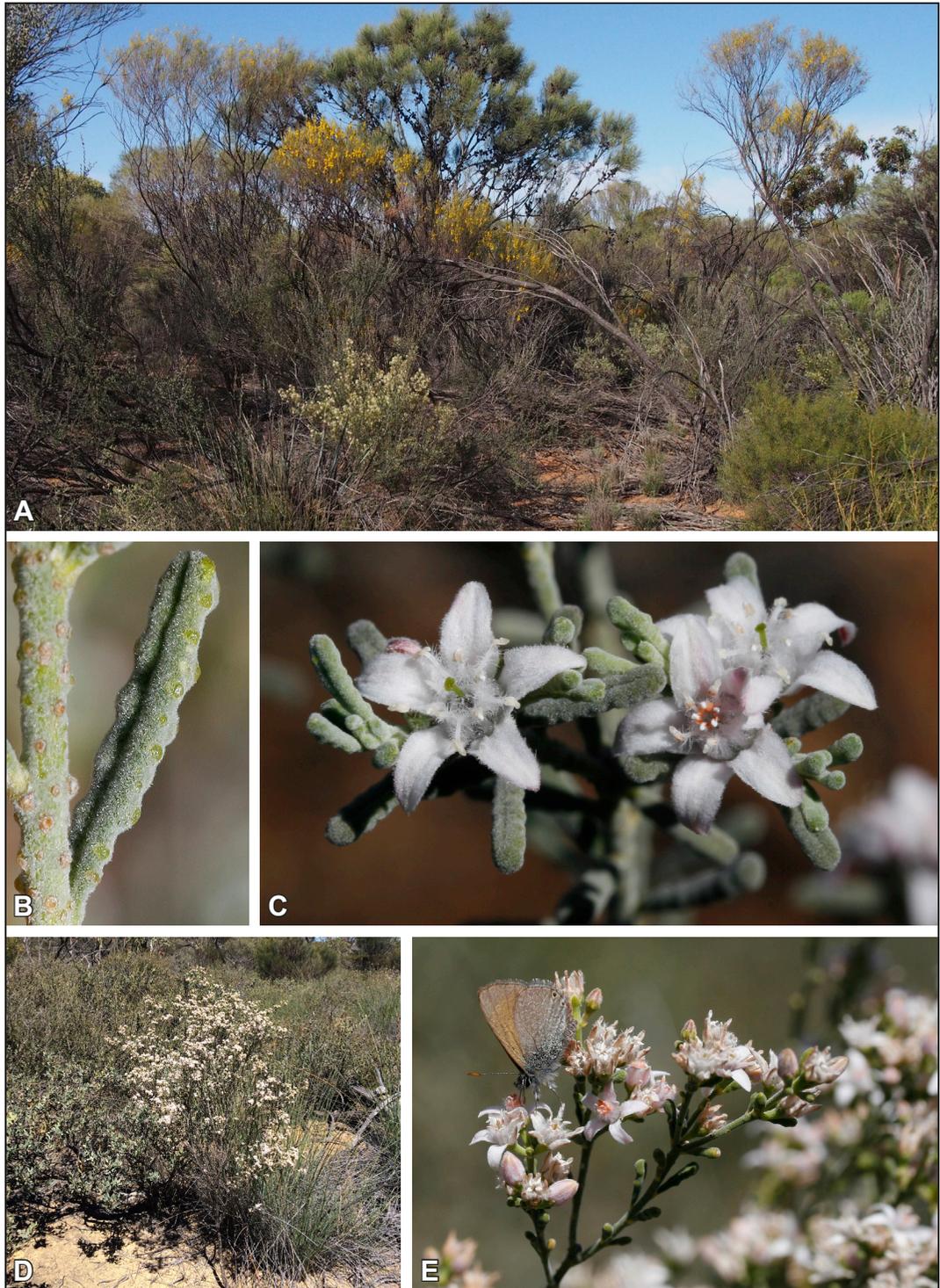


Figure 1. *Philotheca richardsoniana*. A – dense shrubland habitat at the type locality; B – puberulous and glandular-verrucose leaf and stem portion, showing the prominent groove on the upper leaf surface; C – terminal flowers with puberulous petals and densely pilose filaments; D – single-stemmed habit; E – a two-spotted Line-Blue (*Nacaduba biocellata*) visiting flowers. Photographs © J. Wege from J.A. Wege 2033 (A–C) and 2032 (D, E).

it in *Flora of Australia*, instead noting it as a variant of *P. tomentella* (Diels) Paul G. Wilson that may warrant recognition as a distinct taxon on account of its longer leaves (Wilson 2013: 386). *Philothea tomentella* is a widespread species with numerous records from the Avon Wheatbelt (Western Australian Herbarium 1998–). It has puberulous stems, leaves, pedicels and sepals like *P. richardsoniana* and, contrary to Wilson's (2013) description, usually has a hairy style. It differs from *P. richardsoniana* in having mostly shorter leaves (1.5–4(–6) mm long *cf.* 4–12 mm) that lack a channel on the upper surface, black apicula on the sepals and leaves (rarely present on the latter in *P. richardsoniana*; see *Notes* below), and sparsely (rather than densely) pilose filaments. *Philothea tomentella* often has fewer hairs on the undersurface of the petals than *P. richardsoniana* (i.e. they are puberulous toward the margins *cf.* puberulous throughout) although this feature is variable, with some populations having an evenly distributed indumentum like that of *P. richardsoniana*.

Philothea richardsoniana keys out to *P. sericea* (Paul G. Wilson) Paul G. Wilson at couplet 23 in Wilson's (2013) treatment due to its puberulous vegetative indumentum, lack of obvious stipular excrescences, and the absence of black apicula on the sepals and leaves. This species can be readily distinguished from *P. richardsoniana* by its leaves, which are shorter (1.5–3 mm long *cf.* 4–12 mm), lack a channel on the adaxial surface, and are either glabrous or sparsely hairy adaxially (*cf.* puberulous throughout), as well as its longer, glabrous sepals (*c.* 2.5 mm long *cf.* 1–1.3 mm and puberulous). *Philothea sericea*, which has a widespread distribution centred on the Murchison and Yalgoo bioregions, occurs to the north of *P. richardsoniana*.

Philothea richardsoniana may be confused with *P. langei* Mollemans, a poorly known species that occurs to the east of Mukinbudin. Both species have clavate, adaxially-channelled, glandular-verrucose leaves without obvious stipular excrescences; however, the leaves are usually shorter in *P. langei* (2.5–6 mm long *cf.* 4–12 mm long in *P. richardsoniana*) and glabrous or with very sparse, minute apical or adaxial hairs (*cf.* puberulous). There are a number of additional differences in indumentum between the two species: *P. langei* has sparsely pubescent branchlets, more or less glabrous pedicels, glabrous sepals (except for the ciliolate margins), hairs restricted to near the margins on the undersurface of the petals, and scattered apical hairs on the filaments and carpels whereas *P. richardsoniana* has puberulous branchlets, pedicels, sepals and petals, and a denser, more evenly distributed indumentum on the filaments and carpels.

Notes. A population of *P. richardsoniana* to the north of Tammin (*B.G. Muir* 172; *J.A. Wege* 2032) is atypical in that its leaves often have the black apiculus characteristic of *P. tomentella* (although this feature is present or absent within an individual); its leaves are otherwise akin to those of *P. richardsoniana*. It also has a more slender style (0.2 mm wide *cf.* 0.3 mm) with fewer hairs. It is unclear whether this population warrants subspecific rank and accordingly it may be best to treat it as a separate conservation unit for management purposes.

A range of pollinators were observed visiting flowers at the site north of Tammin including a butterfly (Figure 1E), native bees (Megachilidae) and two species of wasp.

Identification. Two modifications to Wilson's (2013) key to *Philothea* are required to accommodate this new species.

20 Leaves or sepals black-apiculate

21 Leaves minutely tomentose

21a Leaves 1.5–4(–6) mm long, without a channel on the adaxial surface;

sepals black-apiculate..... **P. tomentella**

- 21b** Leaves 4–12 mm long, channelled adaxially; sepals without a black apiculum **P. richardsoniana**
- 23** Petals evenly pubescent all over abaxially (W.A.)
- 23a** Leaves 1.5–3 mm long, without a channel on the adaxial surface, glabrous
or with sparse hairs adaxially; sepals *c.* 2.5 mm long, glabrous **29. P. sericea**
- 23b** Leaves 4–12 mm long, channelled adaxially, puberulous;
sepals 1–1.3 mm long, puberulous **P. richardsoniana**

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References

- Prober, S.M. & Smith, P.F. (2009). Enhancing biodiversity persistence in intensively used agricultural landscapes: A synthesis of 30 years of research in the Western Australian wheatbelt. *Agriculture, Ecosystems & Environment*. 132: 173–191.
- Smith, M.G. & Jones, A. (2018). *Threatened and Priority Flora list 5 December 2018*. Department of Biodiversity, Conservation and Attractions. <https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants> [accessed 18 September 2019].
- Western Australian Herbarium (1998–). *FloraBase—the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/> [accessed 31 January 2018].
- Wilson, P.G. (2013). *Philothea*. In: Wilson, A. (ed.) *Flora of Australia. Volume 26—Meliaceae, Rutaceae, Zygophyllaceae*. pp. 366–415. (Australian Biological Resources Study: Canberra.)

