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Synonymisation of taxa, correction of a misapplied name and an updated key for the Western Australian *Leptospermum erubescens* species group (Myrtaceae: Leptospermeae)

Rachel M. Binks[1], Michael Hislop and Margaret Byrne

Biodiversity and Conservation Science,
Department of Biodiversity, Conservation and Attractions,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[1]Corresponding author, email: rachel.binks@dbca.wa.gov.au

SHORT COMMUNICATION

Leptospermum J.R.Forst. & G.Forst. is a large genus of Australian Myrtaceae. The last major revision of the genus was undertaken by Thompson (1989) who recognised 79 species, including 27 that were newly described in that paper. Since that time, the taxonomy has remained relatively stable with just a few new species added (Bean 1992; Lyne 1993; Lyne & Crisp 1996; Bean 2004). In her revision, Thompson (1989) recognised that the group might consist of multiple genera and indeed, molecular work has since revealed the genus to be polyphyletic (O'Brien *et al*. 2000; Binks *et al*. 2022). A major reclassification of the genus is currently underway that will resolve this polyphyly through the recognition of four additional genera. However, because that work is still ongoing, we continue to treat the focal species in this paper as *Leptospermum*.

One of the proposed new genera (Subclade B4 of Binks *et al.* 2022, also referred to here as the *L. erubescens* species group) consists of a small complex of ten morphologically similar Western Australian species that were poorly resolved in the broad phylogenomic datasets of Binks *et al*. (2022). Subsequently, this group was investigated using a more targeted, population genomic approach (Binks & Byrne 2022) that delimited six to eight species. These data confirmed the molecular distinctiveness of four species currently recognised as *L. fastigiatum* S.Moore, *L. inelegans* Joy Thomps. (now understood to be *L. roei* Benth. *s. str.*, refer below), *L. maxwellii* S.Moore and *L. sericeum* Labill. The genomic data did not support the retention of two other taxa: *L.* sp. Peak Charles/Norseman (K.R. Newbey 5243) as distinct from *L. incanum* Turcz., or *L. roei sensu* Thompson (1989) as distinct from *L. nitens* Turcz. There is also little morphological distinction within each of these pairs, such that their continued recognition as separate species is unwarranted. The final two species in this group, *L. erubescens* Schauer and *L. oligandrum* Turcz., presented a significantly more complex picture that is detailed in Binks and Byrne (2022) and is not dealt with here because it requires extensive morphological evaluation before taxonomic decisions can be made. Thus, at this time, these two species are retained as currently circumscribed.

Here, our original intention was to update the taxonomy of this group to synonymise *L.* sp. Peak Charles/Norseman under *L. incanum* and *L. roei sensu* Thompson (1989) under *L. nitens.* In the process of reviewing the relevant type specimens (specimens viewed on Global Plants, https://plants.

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jstor.org/, are indicated below as image!), we discovered that the name *L. roei* had been misapplied by Thompson (1989) and should be applied to what is currently known as *L. inelegans*. Thus, in addition to formalising these synonymies, we also resolve the misapplication, as detailed in the following treatment notes. Finally, we present an updated key to the eight species of the *L. erubescens* group.

Leptospermum incanum Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 10: 335 (1852). *Type*: Nova Hollandia [Western Australia], 1847–1849, *J. Drummond* 5: 130 (*holo*: KW 001001311 image!; *iso*: G 00223273 image!; K 000843063 image!; MEL 615728 image!, NSW 510664 image!, PERTH 01638262!).

Leptospermum erubescens var. *strictum* Benth., *Fl. Austral.* 3: 109 (1867) *p.p.* with respect to the following syntypes. *Type*: S.W. Australia, 1850 [1847–1849], *J. Drummond* 5: 130 (*syn*: K 000843063 image!; *isosyn*: G 00223273 image!; KW 001001311 image!; MEL 615728 image!, NSW 510664 image!, PERTH 01638262!); Phillips and Oldfield R[ivers], *Maxwell s.n.*, *s. dat.* (*syn*: MEL 103701 image!).

Leptospermum sp. Peak Charles/Norseman (K.R. Newbey 5243), Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [accessed 18 May 2022].

Notes. Since its installation, the status of *L.* sp. Peak Charles/Norseman has been problematic with no clear morphological differences evident between it and *L. incanum*. There are specimens of both taxa in the Western Australian Herbarium labelled as '*L.* sp. nov. *c*' by Joy Thompson from the early 1980s. Although this taxon was later recognised as *L. incanum* in Thompson (1989), not all of the specimens were redetermined accordingly, and the phrase name, *L.* sp. Peak Charles/Norseman, was raised much later in the mid-1990s for the overlooked specimens. Genomic confirmation of their conspecific status by Binks and Byrne (2022) has provided the impetus to resolve this outstanding taxonomic oversight and reduce *L.* sp. Peak Charles/Norseman to synonymy.

The names *L. incanum* Turcz. and *L. erubescens* var. *strictum* Benth., although independently published, were based on (or in the case of *L. erubescens* var. *strictum* partly based on) the collection *Drummond* 5: 130. Apparently Bentham was unaware of Turczaninow's publication. Similarly *L. nitens* Turcz. (see below) was based on another syntype of *L. erubescens* var. *strictum.*

Leptospermum nitens Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg* 10: 335 (1852).

Type: Nova Hollandia [Western Australia], 1847–1849, *J. Drummond* 5: Suppl. 28 (*holo*: KW 001001312 image!; *iso*: G 00223331 image!, K 000843062 image!, MEL 103709 image!, NSW 510675 image!, PERTH 01831127!).

Leptospermum erubescens var. *strictum* Benth., *Fl. Austral.* 3: 109 (1867) *p.p.* with respect to the following syntype. *Type*: S.W. Australia, 1847–1849, *J. Drummond* 5: Suppl. 28 (*syn*: K 000843062 image!; *isosyn*: G 00223331 image!; KW 001001312 image!; MEL 103709 image!; NSW 510675 image!; PERTH 01831127!).

Leptospermum roei auct. non Benth.: Joy Thomps., *Telopea* 3: 374–376 (1989); G. Paczkowska & A.R. Chapman, *West. Aust. Fl.: Descr. Cat.:* 390 (2000); S.D. Williams, L. Pappalardo, J. Bishop & P.R. Brooks, *J. Agric. Food Chem*. 66: 11133–11140 (2018); R.M. Binks, M. Heslewood, P.G. Wilson & M. Byrne, *Taxon* 71: 348–359 (2022); R.M. Binks & M. Byrne, *Bot. J. Linn. Soc.* 200: 378–394 (2022); Western Australian Herbarium, in *Florabase*, https://florabase.dpaw.wa.gov.au/ [before July 2022].

Notes. While reviewing relevant type images during a late stage of the preparation of this paper it was discovered that Thompson (1989) had misapplied the name *L. roei*. This necessitated a change to the species in need of synonymising. Instead of *L. roei* being sunk into *L. nitens* as was originally thought, it became evident that *L. inelegans* would have to be synonymised under *L. roei*.

It appears that Thompson did not personally view a type for *L. roei* but instead relied on observations of the Kew holotype made in 1938 by Charles Gardner, in which he matched a PERTH specimen (*M. Koch* 2770) with that type. Unfortunately, Gardner erred in making this match. His matched specimen, *M. Koch* 2770, is not referrable to the true *L. roei*, but rather to a morphotype that we now recognise as morphological variation in *L. nitens* with spreading hypanthium hairs. This was an understandable mistake at a time when there were far fewer collections available by which to judge infraspecific variation. The error led to Thompson's acceptance of this variant of *L. nitens* as *L. roei*, and also to her subsequent description of *L. inelegans* to accommodate what then appeared to be an unnamed species. All publications since Thompson, including those of the current authors hitherto, have followed suit in misapplying the name *L. roei*.

In consequence of Thompson's acceptance that *M. Koch* 2770 matched the type of *L. roei*, her descriptions of *L. nitens* and *L. roei* are near identical with only slight differences in measurement ranges (e.g., leaf length ranges 5–12 mm in *L. nitens* and 7–13 mm in *L. roei*). The only substantive morphological difference given was the orientation of the hypanthium hairs: appressed in *L. nitens*, spreading in *L. roei*. The two morphological forms are equally common, often co-occur at the same sites and occupy the same geographical range and habitat (Binks & Byrne 2022). It is maybe surprising that Thompson did not treat the morphotype with spreading hairs as simply morphological variation in *L. nitens*. In her description of *L. inelegans* she notes that although the hypanthium in that species usually has an appressed indumentum it may also, occasionally, be spreading. Numerous collections of the species have been made since Thompson's treatment and they indicate that in fact the form with spreading hypanthium hairs is at least as common as the type form and, similar to that seen in *L. nitens*, the morphological variation regularly co-occurs at the same locations across their shared geographic distribution (Binks & Byrne 2022). Something that might have alerted Thompson to Gardner's mismatch was Bentham's description of the flowers of *L. roei* as 'nearly sessile'. Examination of the Kew holotype of the species via JSTOR Global Plants supports Bentham's observation. While the pedicels of *L. nitens* (including the morphotype with spreading hypanthium hairs) can sometimes be as short as 1.5 mm long they are always clearly discernible, whereas in *L. roei* they are frequently so short as to make the flowers appear more or less sessile.

Binks and Byrne (2022) demonstrated a lack of genomic distinction between plants with appressed and spreading hair variation in *L. inelegans* (= *L. roei s. str.*), and similarly, no distinction between *L. nitens* and *L. roei sensu* Thompson. This provides a strong indication that hypanthium hair orientation is not a useful taxonomic character in the *L. erubescens* species group.

Leptospermum roei Benth., *Fl. Austral.* 3: 110 (1867). *Type*: In the interior [of Western Australia], *s. dat.* [but probably 1848–1850], *J.S. Roe s.n.* (*holo*: K 000843061 image!).

Leptospermum inelegans Joy Thomps., *Telopea* 3: 376–377 (1989). *Type*: 40 km E of Lake King, Western Australia, 17 September 1976, *R. Hnatiuk* 760783 (*holo*: PERTH 01638270!).

Key to the *Leptospermum erubescens* species group[1]

[1]This is a natural grouping corresponding to Subclade 4B of Binks *et al.* (2022). It is exclusively Western Australian and constitutes one of four proposed new genera. The key was adapted from earlier keys by Thompson (1989) and Barbara Rye (unpublished).

When negotiating the key presented below users should be aware that aside from the relatively distinctive *L. sericeum*, species within the *L. erubescens* group defy neat morphological circumscription and hence many specimens will not unambiguously key to species. Recent genetic research and associated fieldwork (Binks & Byrne 2022) has highlighted at least one of the probable causes of the difficult taxonomy in this group. One of their key findings was that where more than one species is present in any given area, hybridisation is very likely to occur with the effect of blending morphological features. Apomixis is also suspected to occur widely across this group and may contribute to propagating unusual morphologies resulting from hybridisation.

1. Young stems shallowly tuberculate (but sometimes hidden by hairs). Ovary 3-locular in all or most flowers (S of Tammin–Great Victoria Desert)..... **L. fastigiatum**

1: Young stems not tuberculate. Ovary usually 4- or 5-locular in all or most flowers

2. Largest leaves 6–12 mm wide. Anther cells *c.* 0.6 mm long. Mature fruits 6–8 mm wide (Cape Le Grand NP & W of Recherche Archipelago)..... **L. sericeum**

2: Largest leaves 2–5 mm wide. Anther cells 0.25–0.5 mm long. Mature fruits 2.5–5 mm wide

3. Pedicels 0.5–1.5(2) mm long, flowers often appearing ± sessile. Hypanthium very densely hairy with spreading or appressed hairs; upper part of fruiting hypanthium angled inwards over the top of the fruit (W of Tarin Rock–Frank Hann NP–E of Cascade)..... **L. roei**

3: Pedicel 1.5–7 mm long. Hypanthium variously hairy or glabrous; fruiting hypanthium not as above

4. Mature fruits (including pedicel), usually as broad as long, with a conspicuous rim formed by the erect hypanthium top (Very widespread and variable: Marchagee–Mount Barker–Norseman)..... **L. erubescens**

4: Mature fruits (including pedicel) usually longer than broad, lacking a conspicuous rim

5. Upper surface of fruit raised near the style base into 5 ridges

6. Hypanthium tapering gradually to a narrow pedicel. Placenta high in the loculus, ovules 4–12, in 2 rows (Boxwood Hill–Cape Arid)..... **L. maxwellii**

6: Hypanthium tapering rather abruptly to narrow a narrow pedicel. Placenta not high in the loculus, ovules *c.* 20, in 4 rows (Disjunct: Geraldton area–Wongan Hills; Albany area–Cape Le Grand NP)..... **L. oligandrum**

5: Upper surface of fruit evenly rounded

7. Hypanthium markedly expanded in the upper half (best observed in late flower or fruit); basal portion tapering gradually to a pedicel 3–7 mm long; hypanthium indumentum appressed (S of Hyden–Cape Arid NP)..... **L. incanum**

7: Hypanthium not further expanded in the upper half; basal portion abruptly contracted to a pedicel 1.5–5 mm long; hypanthium indumentum appressed or spreading (Widespread: Wongan Hills–Fitzgerald River NP–Yellowdine, with scattered occurrences further E)..... **L. nitens**

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