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A taxonomic update of *Stenanthera* (Ericaceae: Epacridoideae: Styphelieae), including description of a third species from Western Australia, an updated description of *S. pungens* and an Australia-wide key to species

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Abstract: A new Western Australian species, *Stenanthera lacsalaria* A.J.G.Wilson & Hislop is described and illustrated. An updated description of *S. pungens* (Keighery) Hislop and a key to all members of the genus are also provided.

Keywords: Ericaceae, Epacridaceae, *Stenanthera*, Western Australia, new species

Introduction

Stenanthera R.Br. was originally described by Robert Brown (1810) to accommodate *S. pinifolia* R.Br. Of the five species that were added to the genus between 1810 and Bentham's *Flora Australiensis* (1868), only *S. conostephioides* Sond. has proven to be congeneric with *S. pinifolia*. The others are now recognised as belonging either to *Brachyloma* Sond. (current names: *B. baxteri* (DC.) Puente-Lel., *B. ericoides* (Schltdl.) Sond., *B. geissoloma* (F.Muell.) Cranfield) or *Styphelia* Sm. (current name: *S. discolor* (Sond.) Hislop, Crayn & Puente-Lel.). Bentham himself did not accept *Stenanthera* at the generic level, instead treating it as a section under *Astroloma* R.Br. Because *S. pinifolia* lacks corolla tube appendages, while they are present in *S. conostephioides*, they were not even placed in the same section by Bentham.

Stenanthera was eventually reinstated as one of the findings of a recent study into the molecular phylogeny of the tribe Styphelieae Bartl. (Puente-Lelièvre *et al.* 2016). The relevant topology in the published phylogenetic tree showed a well-supported sister relationship between *Stenanthera* and *Conostephium* Benth. A morphological comparison between these two genera is given in an earlier paper (Hislop 2016).

The south-eastern and south-western Australian species of *Stenanthera* present an interesting contrast in terms of the extent and pattern of their distributions. While *S. pinifolia* and *S. conostephioides* are both common and widespread over large areas of south-eastern Australia (including Tasmania in the case of the former), the three western species have very much more restricted distributions. At this stage, *S. pungens* (Keighery) Hislop and the recently described *S. localis* Hislop (Hislop 2020) are only known from single populations, while *S. lacsalaria* A.J.G. Wilson & Hislop, described below, is currently known from six.

Although it is the last Western Australian member of the genus to be formally described, *Stenanthera lacsalaria* was the first to be recognised as an unnamed taxon when the phrase-name *Astroloma* sp. Grass Patch (*A.J.G. Wilson 110*) was added to the Western Australian Plant Census in 1992. The first to be described, *S. pungens* (Keighery) Hislop was published as a species of *Conostephium* in Keighery (2002) before being transferred to *Stenanthera* (Hislop 2016). However, the protologue for that species was rather scant and an updated description is included here to allow a full morphological comparison of the three western species.

Methods

This study was based on an examination of dried specimens housed at the Western Australian Herbarium, together with field observations of the species described.

Foliar measurements and observations were taken from dried specimens in natural posture. Care was taken to confine observations to mature leaves. Leaf lamina length is inclusive of the mucro. A separate measurement for the mucro is also given. Floral measurements were taken from rehydrated flowers in natural posture, with the exception of the corolla lobes, which were uncurled to their fullest length before measuring. The width of floral bracts, bracteoles and sepals was also obtained from rehydrated flowers in

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natural posture, i.e. they were not flattened out before measurement. This method was preferred because their curvature is so extreme that they are inclined to split or become pleated when attempts are made to flatten them. However, it should be noted that measurements obtained by this method are inherently imprecise.

Bioregions referred to in the text follow *Interim Biogeographic Regionalisation for Australia* (IBRA) v. 7 (Department of the Environment 2013).

Taxonomy

1. *Stenanthera lacsalaria* A.J.G.Wilson & Hislop, ***sp. nov.***

Holotypus: Scaddan area [precise locality withheld for conservation reasons], Western Australia, 9 May 2012, *M. Hislop 4190* (PERTH08366330). **Isotypi:** CANB, K, MEL, NSW.

Astroloma sp. Grass Patch (*A.J.G. Wilson 110*) Western Australian Herbarium in *FloraBase*, https://florabase.dpaw.wa.gov.au/ [accessed 3 May 2022].

Compact and sometimes spreading *shrubs* to c. 1 m high and 1.2 m wide, multi-stemmed at ground and probably with a fire-tolerant rootstock. Young *branchlets* with a dense, often rather matted indumentum of mostly incurved hairs, shallowly retrorse to steeply antrorse, to c. 1.2 mm long. *Leaves* antrorse, usually steeply so; apex long-mucronate, pungent, the mucro ± straight to slightly inflexed, 0.8–1.6 mm long; base attenuate; petiole well-defined, 1–1.6 mm long, hairy on all surfaces, or the abaxial surface glabrescent, often with a white excrescence on young growth; lamina linear, 9–22 mm long, 0.8–1.7 mm wide, 3-veined (the midvein broader than the two laterals), adaxially convex, the margins revolute usually concealing the entire abaxial surface apart from the midvein (or sometimes also concealing the midvein), longitudinal axis gently incurved to gently recurved; surfaces markedly discolorous; adaxial surface and revolute margins of the abaxial surface shiny, rugulose, with a moderately dense indumentum of short, coarse, antrorse hairs; remainder of abaxial surface (i.e. excluding the recurved margins) much paler, usually only the glabrous or sparsely hairy outer surface of the midvein evident, with 2 deep grooves between the recurved margins and the midvein; where the grooves are not tightly closed the shortly hairy, lateral surfaces of the veins are exposed. *Inflorescence* axillary, erect, sessile. *Floral bracts* 7–10, ovate to broadly ovate, 1–10 mm long, 1–5.0 mm wide, obtuse to subacute, at least the upper ones mucronulate, pink to red. *Bracteoles* narrowly ovate, 8.2–12 mm long, 3–5 mm wide, acute, mucronate; abaxial surface usually hairy in the upper ½–⅔, glabrous below, or occasionally ± glabrous throughout, pink to red, multi-veined but ± smooth (not striate); adaxial surface glabrous; margins ciliate in the upper half with hairs to 0.4 mm long. *Sepals* narrowly ovate to narrowly elliptic, 11–15 mm long, 2.5–4 mm wide, acute and mucronate; abaxial surface usually hairy in the upper ½–⅔, glabrous below, or occasionally ± glabrous throughout, pink to red, multi-veined but ± smooth (not striate); adaxial surface glabrous; margins ± glabrous or irregularly ciliate towards the apex, with hairs to 0.4 mm long. *Corolla tube* narrowly obovoid to narrowly ellipsoid, red or orange-red, becoming paler in the lower half, shorter than the sepals, 8.5–11.5 mm long, 4.5–6 mm wide; outer surface glabrous in basal ⅔–¾, sparsely hairy above, or ± glabrous throughout; inner surface with 5 decurrent, transversely aligned appendages close to the base; the free portion of the appendages 0.6–1 mm long, ± flat, variously orientated from retrorse to antrorse, densely hairy on the upper surface, with hairs to c. 0.8 mm long, more sparsely hairy on the lower surface; the remainder of the inner tube surface with scattered hairs. *Corolla lobes* red to orange-red, erect basally,

Key to species of *Stenanthera*

1. Inflorescence erect
- **2.** Corolla tube various shades of yellow, red and green, the lobes green; appendages absent from inner surface of the corolla tube (N.S.W., Tas., Vic.) . . . . . ***S. pinifolia***
- **2:** Corolla red or orange-red throughout; 5 hairy appendages present towards the base of the inner surface of corolla tube (W.A.: N and NE of Esperance) . . . . . 1. ***S. lacsalaria***

1: Inflorescence pendulous
- **3.** Mature leaves with 5–7 (9) veins (several veins usually visible in situ), the mid-vein 0.08–0.2 mm wide, not or scarcely wider than the others, raised or not; basal corolla tube appendages longitudinally aligned, ridge-like (S.A., Vic.) . . . . . ***S. conostephioides***
- **3:** Mature leaves with 3 veins (only 1 visible in situ, the other two completely concealed within the revolute margins), the mid-vein 0.3–0.4 mm wide, manifestly wider than the two laterals, always strongly raised; basal corolla tube appendages transversely aligned
  - **4.** Anthers 3–3.5 mm long; style 18.8–22 mm long; sepals long-ciliate, the hairs 0.5–1 mm long; petiole 0.5–1 mm long, hairy (W.A.: restricted distribution, E of Pingrup) . . . . . 2. ***S. pungens***
  - **4:** Anthers 1.7–2.2 mm long; style 13–15.5 mm long; sepals ciliolate, the hairs to c. 0.1 mm long; petioles 1.2–1.6 mm long, glabrous (W.A.: restricted distribution, Cascade area) . . . . . ***S. localis***

spreading slightly in the upper ¼–⅓, (5.5–) 6.2–8 mm long, 2.2–2.8 mm wide, shorter than the tube; outer surface with a moderately dense indumentum of mostly antrorse hairs throughout, or rarely sparse towards the apex; inner surface with scattered hairs in the lower half, a dense zone of straight, ornamented hairs in the central portion and then papillose towards the tips. *Filaments* distinctly flattened, glabrous, 1.5–2.3 mm long, 1–1.4 mm wide, adnate to the tube just below the sinuses, attached ⅔–¾ above anther base. *Anthers* white, 2–2.5 mm long, slightly exserted from the corolla tube, apex shallowly emarginate. *Nectary* annular, 0.4–0.5 mm long, shallowly and irregularly lobed, sparsely and minutely hairy about the rim. *Ovary* globose to depressed-globose, 1.2–1.5 mm long, 1.3–1.6 mm wide, glabrous or with a few hairs at the apex, 5-locular. *Style* 12–17 mm long, minutely scabrous in the upper half, glabrous below, abruptly differentiated from the ovary apex, exserted beyond the corolla tube and the erect corolla lobe bases; stigma expanded. *Fruit* much shorter than the sepals, ovoid to ellipsoid, 6–6.5 mm long and 4–5 mm wide, circular in transverse section; surface glabrous, with shallow longitudinal grooves when dry (a thin mesocarp is apparent upon rehydration); apex obtuse to subacute. **Fig. 1.**

Diagnostic characters. *Stenanthera lacsalaria* is readily distinguished from the other western members of the genus by its erect, sessile inflorescence and white anthers.

Distribution & habitat. *Stenanthera lacsalaria* occurs in the Mallee bioregion of Western Australia with most collections from a restricted area north and north-east of Esperance and one from north-west of the town. It grows in close proximity to salt lakes and saline drainage lines in heath or open woodland. Species that have been recorded growing in association include *Callitris columellaris*, *Melaleuca thyoides*, *M. hnatiukii*, *Kunzea salina*, *Leucopogon canaliculatus* and *Hypolaena fastigiata*.

Phenology. Apparently has an extended flowering period between late autumn and early spring, probably with a peak between May and July. Fruiting collections have been made in October and November.

Etymology. From the Latin *lacus* (lake), *salsus* (salty) and *-arius* (pertaining to), a reference to the preferred habitat of the species.

Conservation status. Conservation Codes for Western Australian Flora: Priority Two (Smith & Jones 2018). Currently known from six populations, two of which are in nature reserves. Because of the myriad salt lakes in remote and inaccessible country to the north-east of Esperance it seems likely that new populations of this species will come to light over time.

Affinities. *Stenanthera lacsalaria* is distinguished most obviously from its Western Australian congeners by its erect (rather than pendulous), sessile (rather than with an obvious axis) inflorescence and in having white rather than yellow anthers. It further differs from *S. localis*, the species to which it is closest geographically, in its hairy (rather than glabrous) petioles, manifestly hairy adaxial leaf surfaces (*cf.* ± glabrous or with a very sparse indumentum of short, antrorse hairs) and relatively long corolla lobes ((5.5–) 6.2–8 mm long *cf.* 4–5.2 mm in *S. localis*).

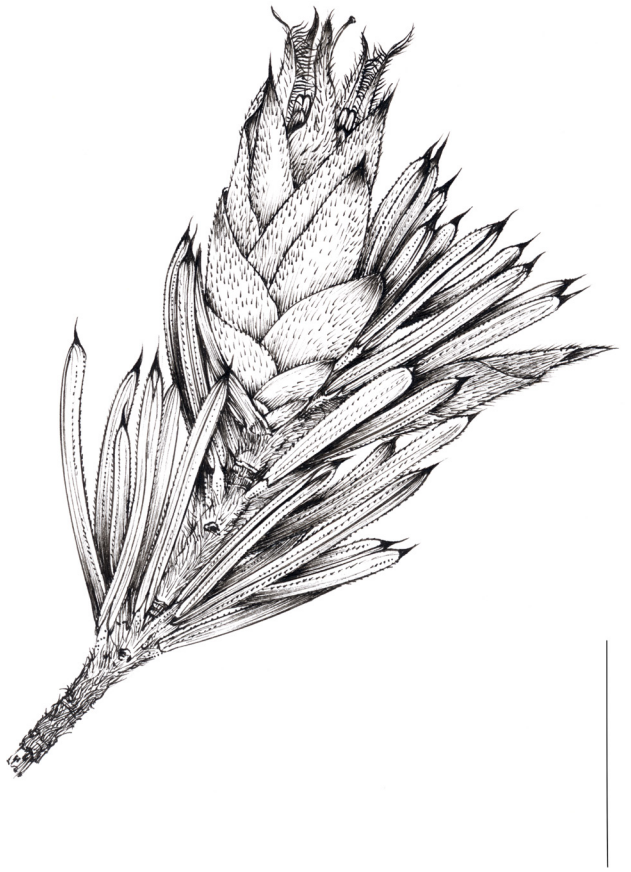

Fig. 1. *Stenanthera lacsalaria*. Flowering branchlet. Scale bar = 1 cm. — Drawing by Hung Ky Nguyen.

Stenanthera pinifolia R.Br. from eastern Australia also has an erect inflorescence but lacks the corolla tube appendages of *S. lacsalaria*. And whereas in the new species the corolla is entirely red, or orange-red, in *S. pinifolia* it consists of two or three contrasting colours, apparently with different colour combinations in different parts of the species' range. In Tasmania and central Victoria the corolla tube is yellow and the lobes green, but in New South Wales and eastern Victoria the tube is red grading to yellow towards the base of the lobes and the lobes themselves are green.

Other specimens examined

WESTERN AUSTRALIA. [Localities withheld for conservation reasons] Oct. 1984, *M.A. Burgman 4350* (PERTH); 29 June 2006, *R. Davis 11077* (PERTH); 21 May 2004, *M. Hislop & F. Hort MH 3215* (CANB, CNS, NSW, PERTH); 9 May 2012, *M. Hislop 4191* (CANB, K); 8 Nov. 2009, *O. Massenbauer OM 4* (PERTH); 10 Sep. 1984, *P. van der Moezel 449* (PERTH); 22 June 1990, *P. van der Moezel 506*

(PERTH); 7 Sep. 1995, *D. Papenfus DP 142* (PERTH); 8 Oct. 2007, *J.A. Wege & R. Butcher JAW 1415* (CANB, PERTH); 9 June 1988, *A.J.G. Wilson 110* (PERTH); 9 June 1988, *A.J.G. Wilson 111* (PERTH); 20 Sep. 1988, *A.J.G. Wilson 174* (PERTH).

2. *Stenanthera pungens* (Keighery) Hislop

Nuytsia 27: 285 (2016). — *Conostephium pungens* Keighery, *Nordic J. Bot.* 22: 50–51 (2002). — **Holotype:** East of Nyabing [precise locality withheld for conservation reasons], Western Australia, 4 May 1999, *G.J. Keighery & N. Gibson 4967* (PERTH 06823475). **Isotype:** CANB.

Erect *shrubs* to c. 1.7 m high and 2 m wide, but most mature plants c. 1.5 m high and 1.5 m wide, apparently with a fire-sensitive rootstock. Young *branchlets* with a dense, variable indumentum of curved, variously orientated hairs (from shallowly antrorse to strongly retrorse), to c. 0.4 mm long. *Leaves* spreading, from shallowly retrorse to steeply antrorse; apex long-mucronate, pungent, the mucro ± straight to slightly inflexed, 0.5–1 mm long; base attenuate to cuneate; petiole well-defined, 0.5–1 mm long, hairy on all surfaces, often with a white excrescence on young growth; lamina linear, 9–16 mm long, 0.8–1 mm wide, 3-veined (the midvein broader than the two laterals), adaxially convex, the margins revolute usually concealing the entire abaxial surface apart from the midvein (or sometimes also concealing the midvein), longitudinal axis gently incurved to gently recurved; surfaces markedly discolorous; adaxial surface and revolute margins of the abaxial surface shiny, rugulose, with a sparse to moderately dense indumentum of short, coarse antrorse hairs; remainder of abaxial surface (i.e. excluding the recurved margins) much paler, usually only the ± glabrous outer surface of the midvein evident, with 2 deep grooves between the recurved margins and the midvein; where the grooves are not tightly closed the shortly hairy, lateral surfaces of the veins are exposed. *Inflorescence* axillary, pendulous; axis 2–2.6 mm long, hairy, but surface in part obscured by imbricate bracts. *Axis bracts* 7–10, depressed-ovate to broadly ovate. *Floral bracts* 4–5, ovate to elliptic, 3.2–12 mm long, 2.5–4.5 mm wide, obtuse, not mucronate, red in the upper half. *Bracteoles* narrowly ovate, 10.2–13.0 mm long, 3.5–5 mm wide, obtuse, not or scarcely mucronate; abaxial surface minutely antrorse-hairy towards the apex and glabrous below or ± glabrous throughout, red in the upper half, multi-veined but ± smooth (not striate); adaxial surface glabrous; margins densely ciliate with hairs 0.2–0.5 mm long. *Sepals* narrowly ovate to narrowly elliptic, 16–18 mm long, 3.5–5.5 mm wide, acute, mucronate; abaxial surface shortly antrorse-hairy in the upper half, glabrous below, red in the upper half, multi-veined but ± smooth (not striate); adaxial surface glabrous; margins densely ciliate with hairs 0.5–1 mm long. *Corolla tube* narrowly ellipsoid to narrowly obovoid, exposed portion red, shorter than the sepals, 13–16.8 mm long, 5–7.5 mm wide; outer surface glabrous in basal ⅔–¾, sparsely hairy above; inner surface with 5 decurrent, transversely aligned appendages close to the base; the free portion of the appendages 1.9–2.3 mm long, flat, deflexed, hairy on the margins and upper surfaces with hairs to c. 1.2 mm long; the remainder of the inner tube surface with a few scattered hairs, mostly about the decurrent lines extending above the appendage bases. *Corolla lobes* red, erect basally, spreading to ± recurved in the upper ¼, 5–6.8 mm long, 2.8–3.8 mm wide, much shorter than the tube; outer surface with a dense indumentum of antrorse hairs throughout, the hairs becoming shorter towards the apex; inner surface with scattered hairs in the lower half, a dense zone of straight, ornamented hairs in the central portion and then papillose towards the tips. *Filaments* distinctly flattened, glabrous, 3–3.5 mm long, 1.2–1.4 mm wide, adnate to the tube just below the sinuses, attached ⅔–¾ above anther base. *Anthers* yellow, 3–3.5 mm long, barely exserted from the corolla tube, apex emarginate. *Nectary* annular, c. 0.5 mm long, ± truncate, glabrous. *Ovary* depressed-globose, 1.5–1.6 mm long, 1.8–1.9 mm wide, glabrous, 5-locular. *Style* 18.8–22 mm long, minutely scabrous towards the apex, glabrous below, abruptly differentiated from the ovary apex, exserted beyond the corolla tube and the erect corolla lobe bases; stigma slightly expanded. *Fruit* much shorter than the sepals, ovoid, c. 7 mm long and 5 mm wide (measurements based on very limited material), circular in transverse section; surface glabrous, with shallow longitudinal grooves when dry (a thin mesocarp is apparent upon rehydration); apex subacute.

Illustration: M. Hislop, *Nuytsia* 31: 273, Figure 1: C, D (2020).

Diagnostic characters. *Stenanthera pungens* can be distinguished from the other western members of the genus by the following character combination: growth habit relatively tall and spreading (to about 1.7 m high and 2 m wide); petiole 0.5–1 mm long, hairy on all surfaces; inflorescence pendulous; sepal margins long-ciliate with hairs 0.5–1 mm long; outer surfaces of corolla lobes hairy throughout; anthers yellow, 3–3.5 mm long; style 18.8–22 mm long.

Distribution & habitat. *Stenanthera pungens* is only known from a small area east of Pingrup at the western end of the Mallee bioregion. It occurs on white sand dunes in proximity to a large salt lake, growing in heath or open mallee woodland. Associated species include *Eucalyptus incrassata*, *Eremaea pauciflora*, *Banksia baueri*, *Conostephium roei*, *Leptospermum erubescens* and *Adenanthos cygnorum*.

Phenology. Flowering collections have been made in May and June and the only fruiting specimen was collected in October.

Conservation status. Conservation Codes for Western Australian Flora: Priority Two (Smith & Jones 2018). Known only from one large population within a nature reserve.

Notes. In the protologue (Keighery 2002) *Conostephium pungens* was described as occurring on gypsum dunes, and this information was repeated in the short communication transferring the species to *Stenanthera* (Hislop 2016). However, it is now accepted that the dunes in question are composed mostly of coarse sand rather than gypsum (M. Lyons, pers. comm.).

The first collection of this species was made by Ferdinand von Mueller in 1879. If the locality statement that accompanied this specimen, '100 miles north of the Stirling Range', is accurate it would place it about 60 km to the north of the single known population of the species. After Mueller it was another 120 years before the plant was collected a second time.

Other specimens examined

WESTERN AUSTRALIA. [Localities withheld for conservation reasons] 24 May 2004, *M. Hislop & F. Hort MH 3236* (CANB, NSW, PERTH); 12 June 2017, *M. Hislop 4708* (CANB, MEL, PERTH); 12 June 2017, *M. Hislop 4709* (PERTH); 14 Oct. 1999, *G.J. Keighery & N. Gibson 6786* (PERTH); 1879, *F. Mueller s.n.* (MEL).

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