

Two new species from the *Leucopogon distans* group (Ericaceae: Styphelioideae: Styphelioideae) and the reinstatement of *L. penicillatus*

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Abstract

Hislop, M. Two new species from the *Leucopogon distans* group (Ericaceae: Styphelioideae: Styphelioideae) and the reinstatement of *L. penicillatus*. *Nuytsia* 22(1): 1–16 (2012). Two new species, *Leucopogon microcarpus* Hislop and *L. newbeyi* Hislop are described and another, *L. penicillatus* Stschegl., previously reduced by Bentham (1868) to a variety of *L. distans* R.Br., is reinstated. All three are illustrated and their distributions mapped. A key is provided for all Western Australian taxa currently referred to the *L. distans* group (*sensu* Hislop & Chapman 2007). Lectotypes are designated for *L. distans* and *L. reflexus* R.Br. Taxonomic and nomenclatural notes pertaining to *L. atherolepis* Stschegl. and *L. reflexus* are also included.

Introduction

The *Leucopogon distans* R.Br. group (Group B) is one of five informal, infrageneric groups (Groups A–E) delineated by Hislop and Chapman (2007). Earlier papers have provided morphological synopses and keys, published lectotypes where desirable, and described new taxa for Groups A (Hislop & Chapman 2007, Hislop 2008, Hislop 2009a) and E (Hislop 2009b). The current paper similarly updates the taxonomy of Group B. Bentham (1868) placed all of the then recognised species from this well-defined group in his series *Australes* Benth.

Methods

This study was based on an examination of dried specimens housed at PERTH. The details of the methods used to measure plant parts and make other morphological observations are the same as those described previously (Hislop 2009a).

The distribution map was compiled using DIVA-GIS Version 5.2.0.2 and is based on PERTH specimen data.

A synopsis of and key to the *Leucopogon distans* group in Western Australia

Rootstock fire-sensitive; leaves helically arranged, usually from shallowly antrorse to steeply retrorse, occasionally steeply antrorse or retrorse-appressed; upper leaves and lower fertile bracts usually clearly

dimorphic; inner surface of corolla tube glabrous, or occasionally with hairs extending a short way into the top of the tube from the base of the corolla lobes; abaxial surface of corolla lobes usually hairy; ovary glabrous, 3–5-locular; nectary 5-partite; drupes ellipsoid, globose, depressed globose, or sometimes asymmetrically ellipsoid or obovoid (as discussed below under the Affinities heading for *L. newbeyi* Hislop, *sp. nov.*), usually circular in transverse section or transversely elliptic if asymmetric, an obvious mesocarp usually present, the apex smoothly rounded at the shoulders, except in the case of *L. reflexus* R.Br. where it is \pm truncate; endocarp woody.

1. Ovary 3(4)-locular¹

2. Leaves ovate to \pm triangular, rarely narrowly so, length to width ratio of longest leaves < 3:1, longitudinal axis of lamina usually recurved, often strongly so, less often \pm straight
3. Longitudinal axis of lamina strongly recurved or revolute, with (at least on some branchlets) the tips or a portion of the upper adaxial surface touching the branchlet; longest fertile inflorescence internodes < 1.5 mm long (south coast & adjacent hinterland from E of Manjimup–N of Stirling Range–W of Munglinup)..... **L. gibbosus**
- 3: Longitudinal axis of lamina slightly recurved or \pm straight; longest fertile inflorescence internodes > 2.8 mm long (winter-wet areas close to the south coast between D'Entrecasteaux National Park & the Two Peoples Bay area)..... **L. distans**
- 2: Leaves linear, narrowly elliptic or narrowly ovate, length to width ratio of longest leaves > 3:1, longitudinal axis of lamina straight, or gently incurved
4. Abaxial leaf surface deeply grooved between the veins, densely hairy in the grooves or throughout; bracteoles obtuse or subacute, brown (Nyabing area to S of Ongerup)..... **L. newbeyi**
- 4: Abaxial leaf surface smooth, glabrous or sparsely hairy; bracteoles acuminate, greyish-green, sometimes tinged reddish-purple towards the apex and margins (Whicher Range & surrounding area)..... **L. microcarpus**

1: Ovary (4)5-locular¹

5. Leaves ovate to triangular, or narrowly so, appearing sessile because the petiole is concealed by the broad lamina base, adaxial surface smooth or \pm rugose, never scabrous
6. Inflorescence axis prominently flexuose, at least in the upper half, longest fertile internodes > 2.8 mm long (winter-wet areas close to the south coast between D'Entrecasteaux National Park & Two Peoples Bay)..... **L. distans**
- 6: Inflorescence axis not obviously flexuose, longest fertile internodes < 1.5 mm long
7. Drupe depressed-globose, 3 mm or more wide; corolla tube (in natural posture) 2.0–2.9 mm wide, corolla lobes 3.0–4.4 mm long (Stirling Range–Mt Manypeaks–Pallinup River)..... **L. penicillatus**
- 7: Drupe usually ellipsoid, occasionally \pm globose, to 2 mm wide; corolla tube 1.3–2.0 mm wide, corolla lobes 1.7–2.6 mm long (mainly close to the south coast between the Scott River Plain & Mt Manypeaks with apparent outliers in the Capel & Collie areas)..... **L. reflexus**
- 5: Leaves linear or narrowly ovate, manifestly petiolate, adaxial surface scabrous with tubercle-based hairs
8. Leaves linear, occasionally with the base very slightly wider than the apex, length to width ratio of longest leaves (5.5–)7.8–15:1, margins revolute, abaxial surface either completely obscured by margins or with midrib only visible; sepals glabrous or with a variable indumentum, rarely as below (Stirling Range)..... **L. atherolepis**

- 8:** Leaves narrowly ovate or ovate, length to width ratio of longest leaves 2.5–5:1, margins usually strongly recurved but with the abaxial surface clearly visible and 3–5 veins evident; sepals with dense indumentum of shallowly antrorse to shallowly retrorse hairs the longest of which are at least 0.4 mm long (Stirling Range) **L. mollis**²

¹The standard locule number for species in the *L. distans* group is 3 or 5, although in both cases 4-locular ovaries less frequently occur. One species, *L. distans*, is exceptional in having a locule number which varies between 3 and 5. It is recommended that for the purposes of using this key, where the first dissected flower of a specimen has a 4-locular ovary, others should be examined until a 3- or 5-locular status can be confirmed.

²Refer to notes under *L. atherolepis* regarding the taxonomic status of *L. mollis*.

Notes on the morphology and distribution of the *Leucopogon distans* group

Several distinctive features combine to make members of the *Leucopogon distans* group easily distinguished from those of any of the other groups delineated by Hislop and Chapman (2007). The presence of an indumentum on the external surface of the corolla lobes is a synapomorphy for the group. It occurs in all member species most of the time, although in a few the hairs are sometimes absent. Outside the group the character is otherwise only known in some variants of *L. oldfieldii* Benth. Although the 5-partite nectary is shared with the *L. carinatus* R.Br. group (Group D), members of the latter are easily separated by the always 2-locular ovary and narrow, more or less dry drupes, in addition to the glabrous surface of the external corolla lobes. Species of the *L. distans* group also have some foliar characters in common. All have a leaf curvature which is adaxially concave, with the margins either recurved or revolute. Most also have widely spreading or retrorse leaves, varying in orientation between shallowly antrorse and steeply retrorse. Consistently retrorse leaves are otherwise uncommon in the genus. An interesting aspect of the floral morphology of member species, which is also at least uncommon elsewhere, is that the filament insertion is often well below the sinus in the corolla tube.

Species belonging to the *L. distans* group are mostly distributed in south coastal districts and adjacent parts of the southern forests and southern wheatbelt from the Whicher Range to east of Hopetoun with an outlying population of *L. reflexus* as far north as the Collie area. *Leucopogon newbeyi* has the most inland distribution, and in the northern part of its range is at least 130 km from the south coast.

Taxonomy

***Leucopogon microcarpus* Hislop, sp. nov.**

L. reflexo R.Br. affinis sed ovario 3-loculari, fructu parviore, et sepalis acuminatis differt.

Typus: St John Rd, 200 m north of Mowen Rd, west of Nannup, Western Australia, 20 August 2004, M. Hislop 3298A (*holo:* PERTH 07090781; *iso:* CANB, MEL, NSW).

Leucopogon sp. Whicher Range (G.J. Keighery 11763), in G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.*: 240 (2000); in J. Wheeler, N. Marchant, & M. Lewington, *Fl. South West* 2: 601 (2002).

Low, compact *shrubs* mostly to c. 40 cm high and 40 cm wide, occasionally larger, single-stemmed at ground level with a fire-sensitive rootstock. Young *branchlets* with a moderately dense to dense, usually clearly dimorphic indumentum of patent, straight hairs, the shorter layer 0.05–0.20 mm long, and a sparser, longer layer 0.4–1.4 mm long. *Leaves* helically arranged, variously orientated, but mostly

from shallowly antrorse to shallowly retrorse, narrowly elliptic, narrowly ovate or linear, 3.8–8.5 mm long, 0.7–2.3 mm wide; apex obtuse or acute and then with a short recurved callus; base rounded or cuneate; petiole well-defined, steeply antrorse, yellowish or pale brown, 0.4–1.2 mm long, usually sparsely hairy on both surfaces and margins, sometimes \pm glabrous throughout; lamina 0.25–0.35 mm thick, curvature variable, the margins usually strongly recurved or revolute, with the abaxial surface partially or fully concealed, occasionally \pm flat, the longitudinal axis straight or gently incurved; surfaces discolorous; adaxial surface shiny, usually sparsely or moderately densely hairy with antrorse or patent hairs of mixed lengths, occasionally \pm glabrous, venation indistinct; abaxial surface paler, with 3–5 flat or slightly sunken, primary veins, the midrib no more prominent than the others, sparsely hairy to \pm glabrous; margins usually ciliate with conspicuous hairs 0.4–1.0 mm long, occasionally glabrous. *Inflorescences* erect, terminal and upper-axillary, usually aggregated into compact confluences; axis 2–8 mm long with 3–9 flowers, usually markedly flexuose, terminating in a bud-like rudiment or an acute point; axis indumentum of dense, patent hairs 0.1–0.2 mm long; flowers erect and sessile. *Fertile bracts* ovate, 1.0–2.4 mm long, 0.7–1.2 mm wide, acute or acuminate. *Bracteoles* ovate or broadly ovate, 1.7–2.1 mm long, 1.0–1.2 mm wide, acuminate, sharply keeled; abaxial surface greyish-green, tinged reddish-purple towards the apex and the upper keel, with a sparse or moderately dense indumentum of patent or shallowly antrorse hairs of mixed lengths, scarious towards the margins; adaxial surface sparsely appressed-hairy towards the apex; margins ciliate. *Sepals* ovate or narrowly ovate, 2.4–3.5 mm long, 0.9–1.2 mm wide, acuminate or acute; abaxial surface with a sparse to dense indumentum of variously orientated hairs of mixed lengths, at least some of which are usually \pm patent and recurved, the central portion greyish-green, tinged reddish-purple towards the apex and in a submarginal band, becoming scarious towards the margins, the venation obscure with only the midrib evident towards the apex; adaxial surface with appressed hairs towards the apex; margins ciliate with hairs to 0.4 mm long. *Corolla tube* white, campanulate or broadly campanulate, shorter than sepals, 1.1–1.7 mm long, 1.2–1.5 mm wide, glabrous externally, or occasionally the exterior lobe hairs extending onto the top of the tube, glabrous internally or with hairs extending a short way (to a point *c.* level with the filament insertion) into the top of the tube from the base of the corolla lobes. *Corolla lobes* white, usually much longer than the tube (ratio = 1.2–2.1:1), widely spreading from the base and recurved, 1.8–2.9 mm long, 0.5–0.8 mm wide at base, sparsely to moderately hairy externally, densely bearded internally; indumentum white, 0.4–0.6 mm long near apex; glabrous tip 0.1–0.2 mm long. *Anthers* partially exerted from the tube (by 1/2–3/4 of length), 1.1–1.6 mm long, slightly recurved at apex, sterile tips rather inconspicuous, 0.2–0.4 mm long. *Filaments* terete, 0.5–0.7 mm long, attached 2/3–3/4 above anther base, adnate to tube either just below sinus, or up to 0.4 mm below it. *Ovary* globose or ellipsoid, 0.40–0.50 mm long, 0.45–0.55 mm wide, glabrous, (2)3(4)-locular. *Style* 0.35–0.50 mm long, well-differentiated from the ovary apex, included within the corolla tube; *stigma* not or scarcely expanded; *nectary* 5-partite, the scales 0.20–0.30 mm long, 0.25–0.35 mm wide, glabrous. *Fruit* globose or depressed-globose, 0.8–1.0 mm long, 0.9–1.1 mm wide, glabrous, with rounded shoulders, much shorter than the calyx, with a sparse, irregular reticulum, the endocarp smooth; style persistent. (Figures 1 & 2)

Selected specimens examined. WESTERN AUSTRALIA: Gregory Rd, 32.7 km N of Lens Rd, near Callows Rd junction [SW of Bridgetown], 22 Sep. 1996, *A.R. Annels* ARA 5774 (CANB, MEL, NSW, PERTH); Site SR3, 2.6 km W of Raynor Rd on Stewart Rd [SW of Nannup], 3 Oct. 2001, *R.J. Cranfield* 17363 (PERTH); Plot FC44, 300 m N of Regalia Rd, 2 km E of junction with St John East Rd, Barrabup Forest Block, 14 Sep. 2005, *R.J. Cranfield & B.G. Ward* FC 1014 (CANB, MEL, PERTH); Treeton Forest Block, E of Jacka Rd and N of Stuart Rd, Whicher Range, 5 Nov. 2005, *H. Dempster s.n.* (PERTH); Elwin Rd, Bridgetown, 10 Aug. 1996, *J. Dewing* 783 (PERTH); 5.4 km W of junction of Crouch and Jalbarragup roads, 30 m S of road [Whicher Range], 17 Jan. 1997, *P. Ellery & T. Annels* B 54.9 (PERTH); Whicher Range, W side of Vasse Highway, 5.9 km SE of Ludlow-Hithergreen Rd, 3

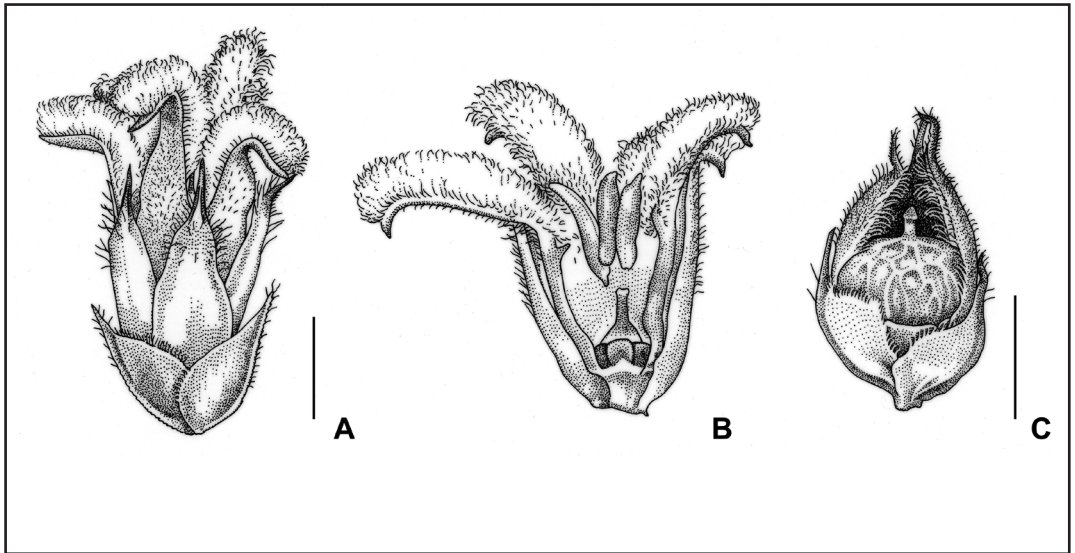


Figure 1. *Leucopogon microcarpus*. A – flower; B – flower, longitudinal section; C – fruit. Scale bars = 1 mm. Drawn by Ellen Hickman from M. Hislop 3298 (A–B), C. McChesney CM 180 (C).



Figure 2. *Leucopogon microcarpus*. Scan of flowering branchlet from M. Hislop 3298. Scale bar = 2 cm.

Oct. 1999, *M. Hislop* 1702 (PERTH); corner of Baker & Jalbarragup roads, Whicher Range, 20 Aug. 2004, *M. Hislop* 3297 (PERTH); Quilergup Rd, c. 300 m E of junction with Sabina Rd, Whicher Range, 21 Aug. 2004, *M. Hislop* 3302 (CANB, PERTH); St John Rd 200 m N of Mowen Rd, W of Nannup, 26 Nov. 2006, *M. Hislop* 3682 (CANB, PERTH); Site 90, 21 km W of Nannup, 4 Sep. 1997, *P.A. Jurjevich* 1270 (PERTH); Rosa Forest Block, (between Nannup and Margaret River), 2 Nov. 1995, *C. McChesney* CM 180 (PERTH); Yanmah [NW of Manjimup], 29 June 1976, *G.S. McCutcheon* GSM 770 (PERTH); Yoongarillup, Busselton district, 29 Sep. 1953, *R.D. Royce* 4519 (PERTH); Lawson Rd, 5.6 km S of Mowen Rd [Whicher Range], 17 Oct. 1996, *R.S. Smith* RSS 304 (PERTH); Claymore Rd, Kirup, 24 Aug. 2005, *A. Webb* BNC 1028 (PERTH).

Distribution and habitat. Occurs on and in the vicinity of the Whicher Range (Figure 3) in the far south-west corner of Western Australia. This places it mostly in the Jarrah Forest IBRA bioregion (Department of the Environment, Water, Heritage and the Arts 2008) with a few occurrences in the far south of the Swan Coastal Plain bioregion and in the north of the Warren bioregion. The species grows in sandy, gravelly loam soils over laterite, usually quite high in the landscape and almost always in Jarrah forest. Common associated species include *Banksia grandis*, *Taxandria parviceps*, *Xanthorrhoea preissii* and *Bossiaea ornata*.

Phenology. Peak flowering is between August and October. Fruiting specimens have been collected from the second half of October through to January.

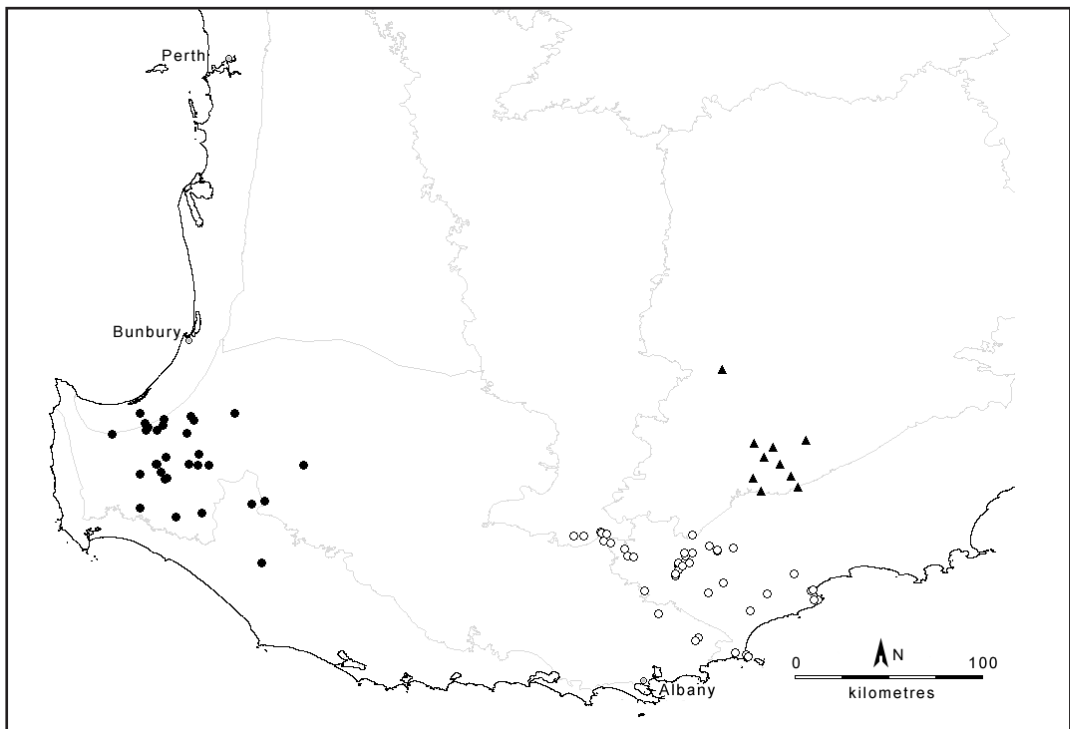


Figure 3. Distribution of *Leucopogon microcarpus* (●) *L. newbeyi* (▲) and *L. penicillatus* (○) in southern Western Australia.

Etymology. The epithet is derived from the Greek (*micros* – small, and *carpos* – fruit), a reference to the particularly small drupes of this species.

Conservation status. *Leucopogon microcarpus* has a fairly wide regional distribution and is often locally common. It appears well-conserved in several Nature Reserves and Conservation Parks, with the other populations mostly in State Forest. No conservation coding is recommended here.

Affinities. The hairy aspect, dense, contracted conflorescences, acuminate sepals and very small fruit should readily separate this species from the other members of the *L. distans* group, as well as all other *Leucopogon* spp. occurring in the far south-west corner of Western Australia.

Leucopogon newbeyi* Hislop, *sp. nov.

L. reflexo R.Br. affinis sed ovario 3-loculari, bracteolis brunneis grandioribus, fructu plerumque zygomorphico ad apicem lobato differt.

Typus: east of Ongerup, Western Australia [precise locality withheld for conservation reasons], 23 August 2011, *M. Hislop* 4135 (*holo:* PERTH 08318069; *iso:* CANB, K, MEL, NSW).

Leucopogon sp. Toompup (M. Hislop 2271), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au> [accessed 6 October 2011].

Erect *shrubs* to *c.* 90 cm high and 70 cm wide, but usually smaller, single-stemmed at ground level with a fire-sensitive rootstock. Young *branchlets* with a moderately dense to dense, often ± dimorphic indumentum of patent, straight or curved hairs, 0.05–0.40 mm long, ± persistent on older stems. *Leaves* helically arranged, usually patent, shallowly antrorse or shallowly retrorse, less often more steeply so, ± linear to very narrowly elliptic or very narrowly ovate, 3.2–8.4 mm long, 0.8–1.5 mm wide; apex obtuse; base rounded or cuneate; petiole well-defined, antrorse-appressed, yellowish-cream, 0.3–0.6 mm long, hairy on the abaxial surface and margins, ± glabrous on adaxial surface; lamina 0.4–0.5 mm thick with the margins strongly recurved or revolute, partially or wholly concealing the abaxial surface, the longitudinal axis straight or gently incurved; surfaces slightly discolourous; adaxial surface shiny, glabrous or sparsely hairy, smooth to rugose, venation not evident; abaxial surface slightly paler with 3–5 raised primary veins and deep furrows between, the midrib somewhat thicker than the others, moderately to densely hairy in the furrows, rather less so on the exposed surface of the veins or these sometimes glabrous; margins sparsely and irregularly ciliate when young, with hairs to 1.0 mm long, these often abraded at maturity. *Inflorescences* erect, terminal, with usually limited upper-axillary development; axis 3–10 mm long with 7–17 densely arranged flowers, terminating in a bud-like rudiment; axis indumentum of dense, patent hairs, 0.1–0.2 mm long; flowers erect and sessile. *Fertile bracts* ovate, 1.3–1.9 mm long, 1.2–1.4 mm wide, acute or subacute. *Bracteoles* ovate or broadly ovate, 1.6–2.5 mm long, 1.2–1.7 mm wide, obtuse, subacute or acute, keeled, although sometimes rather obscurely so; abaxial surface various shades of brown, usually with a sparse or moderately dense, mixed indumentum of mostly very short hairs and scattered longer ones, especially about the keel, sometimes ± glabrous, adaxial surface shortly appressed-hairy in the upper half; margins ciliate. *Sepals* narrowly ovate or ovate, 2.0–3.1 mm long, 1.3–1.7 mm wide, usually acute or subacute, sometimes obtuse; abaxial surface with a very similar mixed indumentum to that of the bracteoles but with a higher proportion of longer hairs, occasionally ± glabrous in the lower half, the central portion greyish or greyish-green becoming reddish-purple towards the apex and in a submarginal band and then scarious towards the margins, the venation very obscure, only the midrib sometimes evident;

adaxial surface appressed-hairy in the upper half; margins conspicuously ciliate with \pm crinkled hairs to 0.6 mm long. *Corolla tube* white, campanulate or broadly campanulate, shorter than the sepals, 1.1–1.8 mm long, 1.4–2.0 mm wide, glabrous externally and internally. *Corolla lobes* white, longer than the tube (ratio = 1.3–1.8:1), widely spreading from the base and recurved, 1.7–2.5 mm long, 0.8–1.3 mm wide at base; usually sparsely hairy externally towards the base, occasionally glabrous, densely bearded internally; indumentum white, 0.3–0.6 mm long near apex; glabrous tip < 0.1 mm long. *Anthers* partially exerted from tube (by 2/3–3/4 of length), 0.8–1.3 mm long, slightly recurved at apex, sterile tips quite conspicuous, white, 0.15–0.30 mm long. *Filaments* terete, 0.6–0.9 mm long, attached *c.* 2/3 above anther base, usually adnate to tube 0.2–0.4 mm below sinus, occasionally immediately below the sinus. *Ovary* broadly ellipsoid, broadly obovoid or \pm globose, 0.4–0.6 mm long, 0.4–0.7 mm wide, glabrous, 3(4)-locular. *Style* 0.45–0.80 mm long, well-differentiated from ovary apex, included within the corolla tube; *stigma* not or scarcely expanded; *nectary* (3)5-partite, the scales 0.3–0.4 mm long, 0.2–0.5 mm wide, glabrous. *Fruit* asymmetrically ellipsoid or obovoid, 2.0–2.4 mm long, 1.0–1.6 mm wide, glabrous, *c.* the same length as the calyx, or slightly shorter, the apex produced into a lobe or lobes well beyond the style base, the surface faintly rugulose; endocarp smooth; style persistent. (Figures 4, 5)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 1 Sep. 1986, A.R. Chapman & J.M. Powell ARC 502 (MEL, NSW, NY, PERTH); 1 Sep. 1986, A.R. Chapman & J.M. Powell ARC 503 (BRI, CANB, NSW, PERTH); 12 Aug. 2001, M. Hislop 2271 (CANB, MEL, PERTH); 23 Aug. 2003, M. Hislop 2987 (CANB, NSW, PERTH); 23 Aug. 2003, M. Hislop 2995 (CANB, NSW, PERTH); 10 Oct. 2006, M. Hislop 3672 (CANB, MEL, PERTH); 11 Sep. 2001, L. Polomka & J. Schmidberger LP 221 (PERTH); 2 Aug. 1969, K.R. Newbey 2834 (PERTH); 16 June 1974, K.R. Newbey 4209 (PERTH); 16 June 1974, K.R. Newbey 4216 (PERTH); 12 Nov. 2003, L. Strahan 198 (PERTH).

Distribution and habitat. Apparently restricted to a narrow north-south band from the Nyabing area to south of Ongerup (Figure 3) in the southern part of the Mallee IBRA bioregion (Department of the Environment, Water, Heritage and the Arts 2008). Occurs low in the landscape as a component of the understorey of mallee woodland, commonly in association with various *Melaleuca* species, and in sandy loam soils, probably with clay at depth.

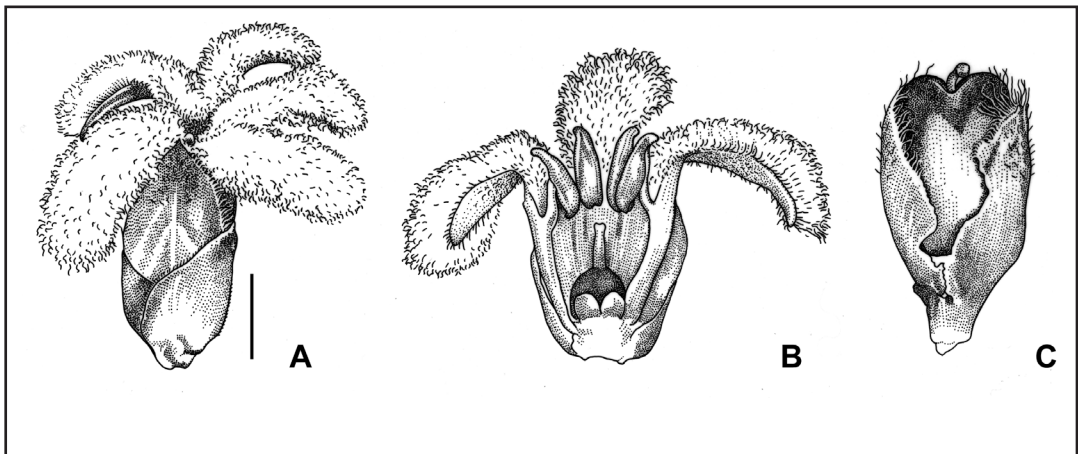


Figure 4. *Leucopogon newbeyi*. A – flower; B – flower, longitudinal section; C – fruit. Scale bar = 1 mm. Drawn by Ellen Hickman from M. Hislop 2995 (A–B), M. Hislop 3672 (C).



Figure 5. *Leucopogon newbeyi*. Scan of flowering branchlet from M. Hislop 4135. Scale bar = 2cm.

Phenology. Flowering specimens of this species have been collected between June and September, with peak flowering in July and August. Fruiting collections have been made in September and October.

Etymology. The species epithet honours the late Kenneth Raymond Newbey (1936–1988), one of the most important Western Australian plant collectors of the second half of the twentieth century. Ken's collecting trips were notable for their frequent incursions into remote, and in botanical terms, poorly known country, especially in southern inland, south and south-eastern coastal parts of the state. He seems to have paid particular attention to those plant groups which he knew to be poorly understood taxonomically and this probably led to his apparent interest in the epacrids. Among the many significant finds that he made across the family are collections of at least three taxa that are still known only from his specimens. It is particularly appropriate that this plant be named after Ken, because not only was he the first to collect it, but the centre of the species' range is the Ongerup district, where the Newbey family farm was located.

Conservation status. Recently listed as Priority Three under the Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora, under the name *Leucopogon* sp. Toompup (M. Hislop 2271). The distribution of this species is poorly known, especially in the north

of its range. Most collections are from a relatively small area around Ongerup. Of the 11 specimens currently housed at the Western Australian Herbarium only one appears likely to have been collected from a Nature Reserve.

Affinities. *Leucopogon newbeyi* is a distinctive species which is readily distinguished from the other members of the *L. distans* group by the combination of narrow, revolute leaves, brown bracts and bracteoles and a 3(4)-locular ovary. It apparently shares a remarkable fruiting character with another 3-locular species, *L. gibbosus* Stscheegl. In the latter it is unusual for more than one of the three ovules to develop. The resultant fruit is zygomorphic, because in effect only one third of the ovary develops, and at maturity no remains of the unfertilized loculi are evident. The fruit apex extends vertically above the style base to a point level with or higher than the stigma which therefore makes the style appear to be fixed laterally on the fruit margin. It is of course common for the flowers of other species from Group B and elsewhere in the genus to have ovaries in which not all ovules develop. However where this occurs the drupe retains its essential shape at maturity and usually looks little different from those in which all ovules have developed. *Leucopogon gibbosus* is widespread and well-collected so there is little doubt that the unusual fruit type described above is the norm for that species. In the case of *L. newbeyi* however fruit is known only from two collections and so comparisons must be treated with some caution. Nevertheless the similarities between the two are strong. The fruiting collections of *L. newbeyi* also have asymmetrical drupes with one or two ovules (Figure 4C) only developing and in which the apex is produced into a lobe/s that extends well above the style base.

Leucopogon penicellatus Stschegl., *Bull. Soc. Imp. Naturalistes Moscou* 32: 12 (1859).

‘*Leucopogon penicellatus*’ Stschegl. *Type:* Western Australia, J. Drummond 5th coll. no. 314 (*holo:* KW *n.v.*; *iso:* BM 000929093!, MEL 75872!, PERTH 04161807!, PERTH 08244227!).

Leucopogon distans R.Br. var. *contractus* Benth. *Fl. Austral.* 4: 189 (1868). *Type:* Stirling Range [Western Australia], F. Mueller *s.n.* (*holo:* K 000348405, image seen).

Leucopogon distans R.Br. subsp. *contractus* (Benth.) J.M.Powell ms., in G.Paczkowska & A.R.Chapman, *West. Austral. Fl.: Descr. Cat.:* 237 (2000), *nom. inval.*

Erect *shrubs* to c. 90 cm high and 70 cm wide, single-stemmed at ground level with a fire-sensitive rootstock. Young *branchlets* with a dense, often \pm dimorphic indumentum of straight or curved, variously orientated hairs, 0.05–0.6 mm long, \pm persistent on older stems. *Leaves* helically arranged, mostly patent to shallowly retrorse, less often shallowly antrorse or steeply retrorse, ovate, narrowly ovate or narrowly triangular, 2.0–4.6 mm long, 1.0–2.3 mm wide; apex obtuse, subacute or acute; base cordate or rounded; petiole well-defined but usually concealed by the broad lamina base, antrorse-appressed, yellowish or pale brown, 0.2–0.6 mm long, hairy on both surfaces and margins; lamina 0.25–0.35 mm thick, with margins strongly recurved or revolute, partially concealing the abaxial surface, the longitudinal axis straight or gently recurved; surfaces discolourous; adaxial surface shiny, finely verrucose, glabrous apart sometimes from a few hairs towards the base, slightly to strongly rugose, with 5–7 sunken veins evident; abaxial surface paler, with 5–7 raised primary veins and deep furrows between, the midrib rather thicker than the others, densely hairy throughout; margins ciliate but the cilia not easily observed as they are projected inwards (i.e. towards the midrib) from the revolute margins. *Inflorescences* erect, terminal and upper-axillary; axis 3–12 mm long with 3–13 flowers, terminating in a bud-like rudiment; axis indumentum of dense, patent hairs 0.2–0.5 mm long; flowers erect and sessile. *Fertile bracts* ovate to depressed-ovate, 0.9–1.6 mm long, 1.0–1.7 mm wide, obtuse or subacute. *Bracteoles* ovate or broadly ovate, 1.7–2.5 mm long, 1.5–2.0 mm wide, subacute or acute, keeled; abaxial surface greyish-green or straw-coloured, usually with a sparse or moderately dense

indumentum of patent or antrorse hairs, occasionally \pm glabrous, broadly scarious towards the margins; adaxial surface densely hairy in the upper half; margins densely ciliate. *Sepals* ovate, 2.8–3.8 mm long, 1.6–2.4 mm wide, usually obtuse or subacute occasionally acute; abaxial surface with a sparse or moderately dense indumentum of mostly antrorse hairs, the central portion greyish-green often tinged reddish-purple towards the apex and in a submarginal band, becoming scarious towards the margins, the venation obscure with only the midrib sometimes evident; adaxial surface densely hairy in the upper half; margins densely ciliate with hairs to 0.5 mm long. *Corolla tube* white, campanulate, usually broadly so, shorter than the sepals, 1.5–2.0 mm long, 2.0–2.9 mm wide, glabrous externally and internally. *Corolla lobes* white, much longer than the tube (ratio = 1.6–2.5:1), widely spreading from the base and recurved, 3.0–4.4 mm long, 1.3–1.7 mm wide at base, usually sparsely or moderately densely hairy externally (occasionally the hairs mostly marginal), less often glabrous, densely bearded internally; indumentum white, 1.2–1.5 mm long near apex; glabrous tip 0.1–0.2 mm long. *Anthers* partially exerted from the tube (by 1/2–2/3 of length), (1.4–)1.8–2.5 mm long, recurved at apex, sterile tips rather inconspicuous, 0.4–0.6 mm long. *Filaments* terete, 0.8–1.1 mm long, attached *c.* 2/3 above anther base, adnate to tube 0.4–1.0 mm below the sinus. *Ovary* depressed-globose to globose 0.5–0.8 mm long, 0.7–0.9 mm wide, glabrous (or very occasionally with a few hairs about the apex), 5-locular. *Style* 0.35–0.60 mm long, well-differentiated from ovary apex, included within the corolla tube; *stigma* scarcely to distinctly expanded; *nectary* 5-partite, the scales 0.3–0.4 mm long, 0.4–0.6 mm wide, glabrous. *Fruit* depressed-globose, 1.8–2.1 mm long, 3.0–3.5 mm wide, glabrous, with smoothly rounded shoulders, *c.* the same length or a little shorter than the calyx, the surface with an irregular reticulum of transverse and longitudinal ridges; the endocarp with prominent longitudinal ridges; style persistent. (Figures 6 & 7)

Selected specimens examined. WESTERN AUSTRALIA: Takalarup Rd *c.* 1.5 km E of Albany-Chester Pass Rd, E of Porongurups, 28 Sep. 1977, *A.S. George* 14944 (PERTH); Stirling Range National Park. 500 m along track to Mount Toolbrunup carpark from Chester Pass Rd, 20 Oct. 2002, *M. Hislop* 2835 (PERTH); South Sister Nature Reserve, NE of Albany, along eastern boundary of southern block,

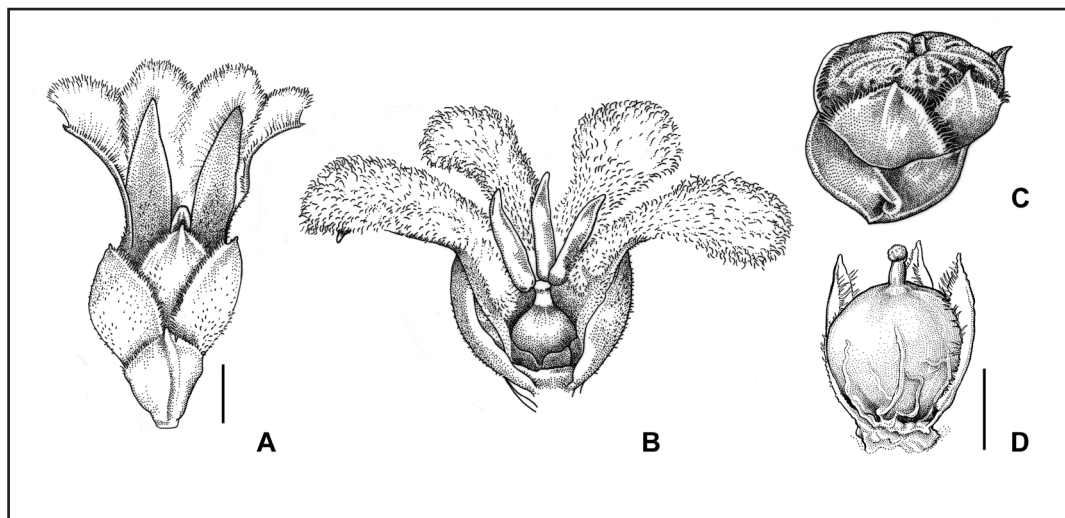


Figure 6. *Leucopogon penicillatus*. A – flower; B – flower, longitudinal section; C – fruit. *L. distans*. D – fruit. Scale bars = 1 mm. Drawn by Ellen Hickman from *J.M. Powell* 1257 (A–B), *M. Hislop* 2835 (C) and by Margaret Wilson from *S.W. Jackson s.n.* NSW 153474 (D).



Figure 7. *Leucopogon penicillatus*. Scan of flowering branchlet from *M. Hislop* 3648. Scale bar = 2cm.

17 Nov. 2003, *M. Hislop* 3096 (PERTH); Hamilla Hill Nature Reserve, *c.* halfway along the eastern boundary track, 30 Aug. 2005, *M. Hislop* 3485 (CANB, PERTH); Waychinicup National Park, *c.* 1 km SW of Cheyne Beach settlement, 27 Aug. 2006, *M. Hislop* 3638 (CANB, PERTH); Waychinicup National Park, track to Waychinicup Inlet, 1.4 km W of Cheyne Beach Rd, 28 Aug. 2006, *M. Hislop* 3648 (CANB, NSW, PERTH); Washpool Rd, 200 m E from intersection of Knights Rd, 6 km S of intersection of Knights Rd and Woogenilup Rd, 22 Oct. 1985, *N. Hoyle* 1100 (CANB, PERTH); Toolyelup Peak, W Stirling Range, 9 Aug. 1986, *G.J. Keighery* 8341 (CANB, PERTH); Sukey's Peak [Sukey Hill], 5 km E of Cranbrook, Sep. 1986, *G.J. Keighery & J.J. Alford* 1799 (PERTH); South Stirlings, 7 Aug. 1962, *N. Marchant* 6283 (PERTH); Mount Groper, Reserve 13240, Cheyne Bay, N of Cape Riche, 24 Oct. 1996, *J.W. Mercer* 93 (PERTH); 8 miles [*c.* 12.9 km] W of Wellstead, 23 July 1971, *K.R. Newbey* 3404 (PERTH); Gold Holes, Stirling Range National Park, *c.* 75 km NNE of Albany, 19 Aug. 1979, *J.M. Powell* 1228 (AK, CANB, HO, K, L, NSW, PERTH); Bluff Knoll Rd, *c.* 5 km SE of Chester Pass road junction, Stirling Range National Park, 19 Aug. 1979, *J.M. Powell* 1246 (BISH, CANB, HO, K, L, NSW, PERTH); 0.2 km W of Chester Pass Rd on Stirling Range Drive, Stirling Range National Park, 19 Aug 1979, *J.M. Powell* 1257 (CANB, CBG, HO, K, L, NSW, PERTH); track up Mondurup Peak, from carpark on Stirling Range Drive, Stirling Range National Park, 22 July 1982, *J.M. Powell* 1926 (CANB, K, L, MEL, NSW, PERTH); *c.* 21 km S of Bluff Knoll turnoff, on Chester Pass Rd, Stirling Range National Park, 23 July 1982, *J.M. Powell* 1947 (CANB, HO, K, L, MEL, NSW, PERTH).

Distribution and habitat. Occurs from just north of the Stirling Range south to the coast in the Mt Manypeaks area and from there east to the Pallinup River (Figure 3). This places it mostly in the Esperance Plains and far south of the Avon Wheatbelt IBRA bioregions (Department of the Environment, Water, Heritage and the Arts 2008) with a few records in the far east of the Jarrah Forest bioregion. Grows in either deep sand or sandy loam soils over quartzite or laterite, and in association with mallee woodland or heath.

Conservation status. *Leucopogon penicillatus* is often locally common and appears to be well-conserved in a number of National Parks and Nature Reserves. No conservation coding is recommended here.

Affinities. Bentham (1868) did not consider this taxon worthy of retention as a separate species and reduced it to a variety of *Leucopogon distans*. J.M. Powell, who researched the genus during the 1980s and 1990s, apparently agreed that it was best treated at the infraspecific level and referred to it by the name *L. distans* subsp. *contractus*, but that combination was never published. While the two taxa certainly share a very similar vegetative morphology, there are consistent and important differences in their fruiting and inflorescence characters which justify the reinstatement of *L. penicillatus*. The differences in fruiting morphology in particular are striking. Whereas *L. distans* has a globose drupe (Figure 6D) with a smooth endocarp, in *L. penicillatus* it is strongly depressed-globose and the endocarp distinctly ribbed (Figure 6C). It seems likely that Bentham had seen little fruiting material of either taxon and possibly none at all of *L. distans*. While he makes no mention of the fruit of var. *contractus* he certainly appears to be describing the distinctive drupe of that taxon ('broad and flat') in his species description for *L. distans*. It may well be significant in this regard that the holotype of *L. distans* var. *contractus* used by Bentham, has mature fruit as well as flowers present. The most obvious difference between the two however is also taxonomically significant. The inflorescence axis of *L. distans* is prominently flexuose, at least in the upper part, and the floral internodes are conspicuously longer than those of *L. penicillatus* or any other members of Group B.

The species has also long been confused with *L. reflexus* R.Br. and Bentham described it as 'intermediate, as it were' between that species and *L. distans*. These similarities however, as between *L. distans* and *L. penicillatus*, are mainly foliar. In contrast to the depressed-globose drupes of *L. penicillatus*, those of *L. reflexus* are ellipsoid or rarely globose. The flowers of the latter are also distinctly smaller in most of their parts. Most recently the two were confused in *Flora of the South West* (Wheeler *et al.* 2002). Wheeler included *L. distans* subsp. *contractus* in her treatment of the genus, however specimens assigned by her to that taxon have subsequently been redetermined to *L. reflexus*. It is very unlikely that *L. penicillatus* occurs within the geographical area covered by that *Flora*.

Notes. In the original publication (StscheGLEEW 1859), the specific epithet was spelt '*penicellatus*' with an 'e' rather than an 'i' in the third syllable. It seems clear that this is an orthographic error. The context in which the word is used (i.e. to describe hairs on the corolla lobes) leaves little doubt that it was the author's intention to convey the idea of a tuft of hairs (Latin *penicillatus* – shaped like an artist's camel-hair brush).

One collection (*A.S. George* 14944) has flowers in which the ovary is very sparsely hairy about the apex. The presence of hairs on the ovary often has taxonomic significance in *Leucopogon* but in this case there are no other correlated morphological differences to suggest that this is anything other than an isolated anomaly. At the time of writing this is the only known instance of ovarian hairs in the *L. distans* group as a whole.

Lectotypifications and notes on other members of the *Leucopogon distans* group

Leucopogon atherolepis Stschegl., *Bull. Soc. Imp. Naturalistes Moscou* 32 (1): 13 (1859). *Type*: Nova Hollandia, [Western Australia,] *J. Drummond* 5th coll. no. 305 (*holo*: KW n.v.; *iso*: BM 000929075!, MEL 75663!, MEL 1510199! PERTH 02413930! PERTH 08244219!).

Leucopogon atherolepis Stschegl. var. *densiflorus* Benth., *Fl. Austral.* 4: 188 (1868). *Type*: Stirling Range, [Western Australia,] *F. Mueller s.n.* (*holo*: K 000348385!, *iso*: MEL 75664!).

Styphelia grandiuscula F.Muell., *Fragm.* 6: 47 (1867). *Type*: In parte austro-occidentali continentis, *J. Drummond* 5th coll. no. 306 (*syn*: MEL 75665!, MEL 75666!).

Notes. Bentham (1868) recognised var. *densiflorus* on the basis of having ‘rather smaller and more crowded’ flowers, but no measurements were given. While these observations may have appeared to represent significant difference in the context of the relatively few collections available to Bentham, with the far larger sample available now, it is clear that the flower size and density seen in the type of var. *densiflorus* are within the normal range for the species. Flower size in particular varies considerably in *L. atherolepis* (e.g. sepal length from 3.3–5.6 mm long and corolla lobes from 3.5–5.6 mm) but without any disjunction in the measurements.

It seems unlikely when Mueller (1867) published the name *Styphelia grandiuscula*, that he was aware that the species had already been described as *L. atherolepis*. This view is supported by the fact that no mention was made of the latter in his protologue. Whereas elsewhere in that publication, where Mueller formally transfers numerous species from several genera (including many *Leucopogon*) to a much expanded *Styphelia*, he invariably uses the same specific epithet (if available) and gives the basionym in parenthesis. Bentham apparently believed that some sets of Drummond number 305 (Fifth Collection) were erroneously given the number 306. This view is supported by the fact that 306 is the type number for a very different species, *L. unilateralis* Stschegl., and also because the specimens of *L. atherolepis*, whether referred to 305 or 306, appear identical in the detail of their morphology and stage of floral development.

Leucopogon mollis E.Pritz. is very similar to *L. atherolepis* and may prove to be conspecific. The differences given in the key break down in one or two specimens (e.g. *E. Wittwer* 289). Both species are restricted to the Stirling Range although the latter is apparently considerably more common. Field observations are needed to get a better understanding of the pattern of variation within and between populations of the two species, especially at localities where they apparently co-occur.

Leucopogon distans R.Br., *Prodr. Fl. Nov. Holland.* 544 (1810). *Styphelia distans* (R.Br.) Spreng., *Syst. Veg.* 1: 655 (1824). *Type*: King George Sound [Western Australia], September–October 1791, *Archibald Menzies s.n.* (*lecto*, here designated: BM 000929080!; *isolecto*: BM 000929086!).

Notes. The lectotypes selected for this species and *Leucopogon reflexus* R.Br. follow the intentions of J.M. Powell who annotated specimens to that effect in October 1993 but never subsequently published the lectotypifications.

Leucopogon reflexus R.Br., *Prodr. Fl. Nov. Holland.* 544 (1810). *Styphelia reflexa* (R.Br.) Spreng., *Syst. Veg.* 1: 655 (1824). *Type*: King George Sound [Western Australia], 11 December 1801–5 January 1802, *R. Brown s.n.* (*lecto*: BM 000929103!).

Leucopogon corifolius Endl., in S.F.L. Endlicher, & E. Fenzl, *Nov. Stirp. Dec.* 2: 15 (1839). *Styphelia corifolia* (Endl.) F. Muell., *Syst. Census Austral. Pl.* Suppl. 1: 105 (1884). *Type*: Coliter in horto Hügeliano, e semimibus ad Swan-River collectis enata (*n.v.*).

Notes. Efforts to locate type material of *L. corifolius* at W, K and BM have not been successful, and it seems doubtful whether, in fact, there is an extant type for this species. The name was apparently based on a specimen that was grown from propagating material collected by Hügel. Bentham did not see a type either and expressed doubt that the species was distinct from *L. reflexus*. A duplicate of Preiss 399 (MEL 75822) examined by the author, was found to be a narrow-leaved variant of *L. reflexus*. This collection was the only one cited by Sonder (1845) and Bentham (1868) in their respective treatments of *L. corifolius*. The provenance (given as Swan River) of the propagating material collected by Hügel is also problematic. During his time in Western Australia, Hügel was known to have visited Perth ('Swan River') and Albany ('King George Sound'). However, no members of the *L. distans* group occur in the Perth region and it seems likely that the material was in fact collected at Albany. Among Hügel's type specimens there is at least one other example of a probable mix-up involving these two collecting localities. One of the two syntypes of *Conostephium pendulum* Benth. is purportedly from King George Sound, but this is almost certainly an error as no species of *Conostephium* are known to occur anywhere near Albany, whereas *C. pendulum* is a common plant in the Perth area. There is another reason to believe that *L. corifolius* is a probable synonym of *L. reflexus*, or less likely, of *L. distans*. Assuming that Sonder and Bentham are correct in believing that *L. corifolius* and *L. reflexus* are at least morphologically similar, and the Endlicher protologue (1839) certainly supports this view, it is significant that the only two members of the *L. distans* group known to occur in the immediate vicinity of Albany are *L. reflexus* and *L. distans*. Neither are there any other species outside of that group in the Albany area which have a similar morphology.

The fruit of *L. reflexus* is unusually variable in its size and, to a lesser extent, shape. Although generally ellipsoid with rather straight sides, in some specimens (e.g. Powell 3236) the drupes are globose. This variability however is not clearly correlated with differences in other morphological characters. In their typical form the drupes of *L. reflexus* have a more or less truncate apex and bear a resemblance to those of the members of the *L. pulchellus* group (Group C). This is likely to be the result of convergence as no other critical features of its morphology suggest a close relationship.

Leucopogon reflexus is perhaps the most variable species in Group B. In particular collections from south-east of Capel, one of the two disjunct populations given in the key, have longer leaves and significantly larger floral parts than is usual for the species. Further investigation into the morphological variation exhibited by this species is warranted.

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