

SHORT COMMUNICATION

**Typification and reinstatement of *Isopogon spathulatus*
(Proteaceae: Leucadendreae)**

Isopogon spathulatus R.Br. was named by Brown (1830) who recognised two varieties, var. *linearis* R.Br. and var. *obovatus* R.Br. Under Article 26.2 of the International Code of Nomenclature (McNeill *et al.* 2012), one of these varieties is required to be the typical one, i.e. to be known as var. *spathulatus*. A lectotype is needed to resolve this issue.

Bentham (1870) subsequently transferred Brown's two varieties of *I. spathulatus* to *I. buxifolius* R.Br., effectively reducing *I. spathulatus* to synonymy under that species, and further confusing the subject by recognising var. *spathulatus* (R.Br.) Benth. as a fourth variety of *I. buxifolius*. The four varieties were distinguished by Bentham primarily by their leaf shapes: *I. buxifolius* var. *buxifolius* [as var. *typicus* Benth., *nom. inval.*] with ovate leaves, *I. buxifolius* var. *linearis* (R.Br.) Benth. with narrow, oblong or linear leaves, *I. buxifolius* var. *obovatus* (R.Br.) Benth. with broad, obovate or oblong leaves, and *I. buxifolius* var. *spathulatus* with leaves more or less intermediate between var. *linearis* and var. *obovatus*.

Foreman (1995) retained Bentham's infraspecific taxonomy for *I. buxifolius* but expanded the circumscription of var. *spathulatus* so as to include populations with longer leaves and a larger, differently shaped pollen presenter. These populations constitute a distinct taxon more recently known (Western Australian Herbarium 1998–) as *I. sp.* Fitzgerald River (D.B. Foreman 813) which we will describe in a later paper; its affinities appear to be closer to the recently described *I. panduratus* Hislop & Rye and *I. pruinosus* Hislop & Rye (Hislop & Rye 2010) than to *I. buxifolius*.

The main purpose of this paper is to designate a lectotype for *I. spathulatus* and reinstate the species. A lectotype is also selected for *I. buxifolius*.

Distribution and characteristics of the *I. spathulatus* group

Isopogon spathulatus and other members of the genus that have a similar type of pollen presenter are referred to here as the *I. spathulatus* group. The species group comprises all of the taxa that Bentham treated as *I. buxifolius s. lat.* and also a new species, currently known as *I. sp.* Canning Reservoir (M.D. Tindale 121 & B.R. Maslin), which will be described in a later paper. It excludes related species with a larger pollen presenter, such as *I. panduratus*, which were included by Hislop and Rye (2010: 170) in the group they loosely referred to as the '*I. buxifolius* group'.

The *I. spathulatus* group extends from the Darling Range near Canning River south to Collie and from there south-east to Cape Riche. The northern-most specimens from the Darling Range belong to *I. sp.* Canning Reservoir.

All members of the group have simple, entire leaves and few involucre bracts. Their tepals have a more or less glabrous claw and a pink or pinkish grey limb with marginal hairs and a terminal tuft of hairs. They have a simple pollen presenter, usually 1–1.8 mm long, consisting of a densely papillate bulge at the base and a more slender section above (referred to here as the receptor as it is where the pollen is mostly deposited). The pollen presenter is densely papillate for some distance above the bulge and usually completely smooth below, but occasionally it is much less obviously papillate for a short distance below the bulge, in which case its length may be up to 2.3 mm. Most *Isopogon* species have larger pollen presenters, 2–6.5 mm long, with a more complex morphology that includes a constriction as well as a bulge.

Key and descriptions

1. Largest leaves mostly \pm ovate, 8–14 \times 6–9 mm. Involucre bracts 1–1.5 mm wide, about 1.5–2.5 \times as wide as the floral bracts.
(Denmark–West Cape Howe) **I. buxifolius** var. **buxifolius**
- 1: Largest leaves linear to obovate, 10–52 \times 1.5–16 mm, usually either longer than or narrower than the above choice. Involucre bracts 1–4 mm wide, 2–6 \times as wide as the floral bracts, if as narrow as above choice then at least 3 \times as wide as the floral bracts **2**
2. Stems directly below each inflorescence moderately to very densely hairy with spreading hairs as well as appressed ones. Largest leaves 1.5–7 mm wide. (Ruabon–Collie–Stirling Ra. area) **I. spathulatus**
- 2: Stems directly below each inflorescence glabrous or with a matted, appressed indumentum, without spreading hairs. Largest leaves 8–16 mm wide **3**
3. Largest leaves 20–52 mm long, greatly narrowed to a petiole-like base. Involucre bracts 3–4 mm wide. Floral bracts 1.3–1.5 mm wide. Longest hairs at the apex of the tepals 0.5–0.8 mm long.
(Canning River–Boddington) **I. sp. Canning River**
- 3: Largest leaves 12–33 mm long, broad-based. Involucre bracts 1.4–2 mm wide. Floral bracts *c.* 0.4 mm wide. Longest hairs at the apex of the tepals 1.3–2 mm long. (Manypeaks area–Cape Riche area) **I. buxifolius** var. **obovatus**

Isopogon buxifolius R.Br., *Trans. Linn. Soc. London* 10: 73 (1810). *Isopogon buxifolius* var. *typicus* Benth., *Fl. Austral.* 5: 341 (1870), *nom. illeg.*, *nom. superfl.* *Atylus buxifolius* (R.Br.) Kuntze, *Revis. Gen. Pl.* 2: 577 (1891). *Type citation*: ‘in Novae Australiae ora australi, Lewin’s Land’. *Type specimens*: between Princess Royal Harbour and Cape How [West Cape Howe, Western Australia], 24 December 1801, *R. Brown s.n.*, Bennett No. 3254 (*lecto*: BM 000759015, here selected; *isolecto*: BM 000759011, 000759014 & 000759016).

Lectotypification. The type material at BM comprises four similar pieces mounted on two sheets. The piece selected here as the lectotype (BM 000759015) is the only one giving the location as ‘Inter Princess Royal Harbour & Cape How’ and other details on a label hand-written by Robert Brown.

Notes. With the removal of the varieties treated here as *I. spathulatus*, there remain two named varieties housed under *I. buxifolius*, var. *buxifolius* and var. *obovatus*. A full description is given below for the former, i.e. *I. buxifolius s. str.*, but only a diagnostic description of the poorly known var. *obovatus* is provided. Variety *obovatus* has been recognised since 1867 as a variety of *I. buxifolius* and is retained

as such for now to avoid taxonomic instability, although we do not consider it to be conspecific. It appears to show greater morphological similarity to *I. spathulatus* than to *I. buxifolius*, and may warrant recognition as a distinct species.

Isopogon buxifolius var. **buxifolius**

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 1: 145 (1988); J.R. Wheeler, N.G. Marchant & M. Lewington, *Fl. South West* 2: 837 (2002) [both as *I. buxifolius* var. *buxifolius*].

Shrubs 0.3–1 m high, single-stemmed at base. *Young stems* red-brown, with glabrous strips below each leaf but densely hairy elsewhere at first, becoming glabrous, usually with a dense, appressed indumentum and spreading hairs up to 0.8 mm long directly below each inflorescence. *Leaves* usually broadly ovate or ovate, occasionally elliptic, 8–14 mm long, 6–9 mm wide, broad-based or with a narrow base up to 1 mm long, acute to broadly obtuse at apex, glabrous; mucro triangular, 0.12–0.2 mm long, dark, pungent. *Inflorescence* axillary, sessile, broadly ovoid, 12–20 mm diam. *Involucral bracts* narrowly ovate to narrowly elliptic, 6–6.6 mm long, 1–1.5 mm wide, acute, margins ciliate to villous; outer surface glabrous with scattered hairs in the lower 1/3, glabrous above; inner surface glabrous. *Floral bracts* narrowly ovate, 5–5.5 mm long, 0.45–0.9 mm wide, acute, margins ciliate to villous; outer surface with a moderately dense indumentum on the basal 1/2, glabrous or less densely hairy above, the hairs 0.8–0.9 mm long; inner surface glabrous. *Tepals* 13–16 mm long; claw glabrous, paler than the limb; limb 1.9–2.2 mm long, pink, with a dense terminal tuft of hairs 0.4–0.5 mm long and with hairs extending down the margins but glabrous elsewhere. *Anthers* 1.3–1.5 mm long. *Pollen presenter* 1–1.5 mm long, without any clear constriction and pedestal, densely papillate on the bulge and with papillae extending in 8 rows up the receptor except for a short, glabrous, apical tip, the largest papillae shortly finger-like and 0.05–0.15 mm long; bulge 0.2–0.3 mm wide; receptor 0.8–1.3 mm long. *Cones* depressed-ovoid, 6–8 mm long, 6–13 mm wide; scales similar to floral bracts. *Diaspores* ovoid, *c.* 2.3 mm long, *c.* 1.45 mm diam.; largest hairs of coma widely spreading (with some directed downwards), *c.* 4 mm long; seed *c.* 1.6 mm long, *c.* 1.3 mm diam.

Diagnostic features. *Leaves* broadly ovate or ovate, occasionally elliptic, 8–14 × 6–9 mm. *Involucral bracts* 6–6.6 × 1–1.5 mm. *Tepals* 13–16 mm long; limb 1.9–2.2 mm long, with apical hairs 0.4–0.5 mm long. *Anthers* 1.3–1.5 mm long. *Pollen presenter* 1–1.5 mm long; receptor 0.8–1.3 mm long.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 21 Aug. 1994, *E.J. Croxford* 7293 (PERTH); 18 Sep. 1964, *A.R. Fairall* 1536 (PERTH); 25 km W Albany, 5 Nov. 1986, *G.J. Keighery* 8583 (PERTH); 20 Aug. 1994, *K.F. Kenneally* 11534 (NSW, PERTH); 31 July 1953, *R. Melville* 4452 & *R.D. Royce* (PERTH); 26 Aug. 1994, *J. Raudino* 7 (CANB, MEL, PERTH); 31 July 1953, *R.D. Royce* 4282 (PERTH); 23 Sep. 1982, *A. Strid* 20419 (PERTH).

Distribution and habitat. Extends from near Denmark to near West Cape Howe on the south coast of Western Australia. Occurs on grey loamy clay in swampy heath, associated with *Melaleuca* and sedges.

Phenology. Flowers from July to December.

Conservation status. Recently listed as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). This taxon has a very restricted distribution extending along the south coast for *c.* 25 km. It occurs in West Cape Howe National Park.

Notes. Apart from the differences noted in the introduction and key above, this taxon appears to have shorter anthers (1.3–1.5 mm long) than var. *obovatus* and *I. spathulatus* (both 1.5–1.8 mm long) and shorter hairs (0.5–0.6 mm long) on the tepals than in *I. spathulatus* (0.6–1.1 mm long) and var. *obovatus* (1.3–2 mm long). The little fruiting material available for var. *obovatus* suggests that its diaspores are longer, although they have not been seen with a mature seed enclosed. More extensive mature fruiting material is needed for all three taxa. *Isopogon buxifolius* var. *buxifolius* and *I. spathulatus* may also differ from var. *obovatus* in having a greater preference for damp habitats.

Isopogon buxifolius var. **obovatus** (R.Br.) Benth., *Fl. Austral.* 5: 341 (1870). *Isopogon spathulatus* var. *obovatus* R.Br., *Suppl. Prod. Fl. Nov. Holl.* 9 (1830). *Type:* south-west coast of New Holland [Stirling Range to south coast, Western Australia], 1828–1829, *W. Baxter s.n.* (*holo:* BM 000759009).

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 1: 145 (1988); D.B. Foreman, *Fl. Australia* 16: 211, Figure 101C (1995a) [both as *I. buxifolius* var. *obovatus*].

Diagnostic features. Leaves obovate to elliptic, 12–33 × 9–13.5 mm. *Involucral bracts* 3.5–5.5 × 1.4–2 mm. *Tepals* 10–15 mm long; limb 2–2.5 mm long, with apical hairs 1.3–2 mm long. *Anthers* c. 1.75 mm long. *Pollen presenter* 1.3–2.3 mm long; receptor 1.1–1.25 mm long.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 2 Dec. 1985, *D.B. Foreman* 1424 (PERTH); 25 Oct. 1968, *J.W. Wrigley* WA/68 4953 (PERTH).

Distribution and habitat. Most specimens were collected from coastal heath on ridges, cliffs or dunes in the Cape Riche area. There are also two atypical records to the west (and further inland) in the Manypeaks area. The habitat of the two inland records is unclear but both were recorded in *Eucalyptus*-dominated vegetation.

Phenology. Flowers recorded all or most of the year.

Conservation status. Recently listed as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). This geographically restricted taxon occurs in at least one nature reserve. It has been in cultivation at Mt Annan Botanic Garden nursery, as indicated on the specimen *P.H. Weston* 1983 & *N.P. Barker* (NSW).

Notes. The PERTH specimen showing closest similarity in its leaves to the type specimen of var. *obovatus* is the left piece on *D.B. Foreman* 1424 (PERTH 01901613), collected from Cheyne Inlet. Typical specimens have broad-based, more or less obovate leaves. Specimens from the Manypeaks area (e.g. *E.J. Croxford* 8285) are atypical, having larger papillae on the pollen presenter and leaves that are either narrower or more ovate than usual. Further study is needed to determine their habitat and whether they belong to the same taxon.

Isopogon spathulatus R.Br., *Suppl. Prod. Fl. Nov. Holl.* 8–9 (1830). *Isopogon spathulatus* var. *linearis* R.Br., *Suppl. Prod. Fl. Nov. Holl.* 9 (1830). *Isopogon buxifolius* var. *spathulatus* (R.Br.) Benth., *Fl. Austral.* 5: 341 (1870). *Type citation:* ‘Oraoccid.-merid., King George’s Sound, 1829, *D. Baxter.*’ *Type specimen:* south-west coast of New Holland [Stirling Range to south coast, Western Australia], 1828–1829, *W. Baxter s.n.* (*lecto:* BM 000759010, here selected).

Illustrations. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 1: 145 (1988); D.B. Foreman, *Fl. Australia*. 16: 211, Figure 101A,B (1995a) [as both *Isopogon buxifolius* var. *linearis* and var. *spathulatus*].

Shrubs 0.3–1.6(–2) m high, commonly 0.7–2 m wide, with a single basal stem or sometimes (in old plants) multi-branched at base. *Young stems* moderately to very densely hairy directly below each inflorescence with long, spreading hairs and also appressed hairs. *Leaves* simple, linear to obovate, antrorse, 10–23 mm long, 1.5–7 mm wide, glabrous, broad-based or somewhat narrowed at the base; apex obtuse; mucro triangular, 1–2 mm long, dark. *Inflorescence* terminal, erect, globose, 15–25 mm diam., with white or ferruginous hairs on the axis and bracts. *Involucral bracts* ± narrowly ovate, 5–7 mm long, 1–3.5 mm wide, acute, densely hairy on the margins except for a glabrous apex, outer surface glabrous or with hairs restricted to central lower part, inner surface glabrous. *Floral bracts* usually linear, sometimes very narrowly elliptic to very narrowly spathulate, 5–7 mm long, 0.35–0.6 mm wide, with a glabrous base and sparsely hairy apex, very densely hairy in between on margins and outer surface, the longest hairs 1–2 mm long, inner surface glabrous in basal 2/3, very densely hairy above. *Tepals* 14–20 mm long; claw white or pale pink, glabrous or with a few hairs in the distal part; limb 2–2.5 mm long, pink, with a dense terminal tuft of white or ferruginous hairs and also with hairs extending along the margins below, glabrous elsewhere, the longest hairs 0.6–1.1 mm long. *Anthers* 1.5–1.8 mm long. *Pollen presenter* 1.3–1.8 mm long, without any clear constriction and pedestal, densely papillate on and for some distance above the bulge but smooth or much less obviously papillate for a short distance below, glabrous on distal 1/4–1/3 of receptor, the largest papillae 0.05–0.1(–0.15) mm long; bulge 0.2–0.25 mm wide; receptor 1–1.5 mm long. *Cones* depressed-ovoid, 15–20 mm wide; scales similar to floral bracts. *Diaspores* ovoid, c. 3 mm long, 1.2–1.5 mm wide; largest hairs of coma widely spreading (with some directed downwards), 4.5–7 mm long; seed 1.7–1.8 mm long, 1–1.2 mm diam.

Diagnostic features. *Leaves* linear to obovate, 10–23 × 1.5–7 mm. *Involucral bracts* 5–7 × 1–3.5 mm. *Tepals* 14–20 mm long; limb 2–2.5 mm long, with apical hairs 0.6–1.1 mm long. *Anthers* 1.5–1.8 mm long. *Pollen presenter* 1.3–1.8 mm long; receptor 1–1.5 mm long.

Selected specimens examined. WESTERN AUSTRALIA: beside railway line 1.5 km S of railway crossing on Red Hill Rd [near Woodanilling], 11 June 1980, *D. Davidson* 10 A (PERTH); Duranillin–Bowelling road, 1 km W of Duranillin, 18 Nov. 1997, *R. Davis* 4543 (PERTH); SW outskirts of Cranbrook, 4 June 2001, *M. Hislop* 2221 (PERTH); Mission Rd, 20 km NNE of Kojonup, 14 Aug. 1997, *C.M. Lewis* 250 (PERTH); Arthur River flats, S of Wolwolling Pool along Great Southern Railway, 20 Mar. 1999, *G. Warren* 148 (PERTH).

Distribution and habitat. Extends from Ruabon and Collie south-east to the Stirling Range area, recorded mainly in winter-wet depressions, on river banks and in other seasonally damp locations.

Phenology. Flowers and fruits recorded all year.

Conservation status. Not considered to be at risk.

Lectotypification. The type specimen of var. *linearis* (BM 000759010) is here selected as the lectotype for *I. spathulatus* as it has spathulate leaves, some of which are almost linear, and is labelled as *Isopogon spathulatus* by Brown. Brown labelled the type specimen of var. *obovatus*, which has obovate leaves, as *Isopogon obovatus*, suggesting that he had originally considered it to be a distinct species. Choice

of the type of var. *linearis* as the lectotype means that the name *I. spathulatus* now applies to the bulk of the material that has been placed under *I. buxifolius* var. *spathulatus* since Bentham (1870) reduced *I. spathulatus* to a synonym of *I. buxifolius*.

Notes. The lectotype of *I. spathulatus* has mostly narrow leaves that only slightly expand towards the apex, but also has some broader leaves; it was probably collected in the Cranbrook–Stirling Range area, where similar specimens are common. The narrow-leaved variant extends north-west to Collie. However, most specimens have somewhat broader, more obviously spathulate leaves, i.e. with the base much narrower than the apex, and this was the variant known as *I. buxifolius* var. *spathulatus sensu* Bentham (1870). That variant intergrades completely with the narrow-leaved variant. As some specimens have both types of leaves, for example *B. Bourke* MSG 306 and *R.D. Royce* 1192, it would certainly not be practical to recognise both as formal varieties of *I. spathulatus*.

Isopogon spathulatus is reinstated because it differs in its leaf, bract, tepal and anther morphology from *I. buxifolius* s. str. as indicated under var. *buxifolius* above. It also differs in its geographic distribution, which is further inland. It differs from var. *obovatus* (see key) in its distribution, in its stem and leaf morphology, and in having shorter hairs on its tepals.

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