A reappraisal of *Ptilotus aristatus* and *P. blackii* (Amaranthaceae)

D.E. Albrecht\(^a\) & T.R. Lally\(^b\)

\(^a\) Northern Territory Herbarium, Department of Natural Resources, Environment, the Arts and Sport, P.O. Box 1120, Alice Springs, Northern Territory 0871. E-mail: dave.albrecht@nt.gov.au

\(^b\) Australian National Herbarium, Centre for Plant Biodiversity Research, G.P.O. Box 1600, Canberra, Australian Capital Territory 2601. E-mail: Terena.Lally@csiro.au

**Abstract**

The taxonomy of *Ptilotus aristatus* Benl and the related *P. blackii* Benl is revised and their relationship to one another clarified. *Ptilotus aristatus* is here treated as comprising two subspecies, *P. aristatus* subsp. *aristatus* and *P. aristatus* subsp. *micranthus* Albr. & Lally, nom. et stat. nov. *Ptilotus aristatus* var. *eichlerianus* (Benl) Benl is synonymised under *P. aristatus* subsp. *aristatus*, and *P. aristatus* var. *exilis* Benl and *P. aristatus* var. *stenophyllus* Benl are synonymised under *P. aristatus* subsp. *micranthus* Albr. & Lally. The original circumscription of *P. blackii* is shown to be a mixed concept (including *P. aristatus* subsp. *aristatus*), and this taxon is redescribed. Keys to *P. blackii* and *P. aristatus*, and to the subspecies of *P. aristatus* are provided. Distribution maps of all recognised taxa are presented.

**Key word:** Amaranthaceae, *Ptilotus*, taxonomy, nomenclature.

**Introduction**

Recent taxonomic papers by Davis (2004; 2007; 2009), Bean (2008) and Lally (2008; 2009) signify a new era in the classification of *Ptilotus* R.Br. (Amaranthaceae), which up until the mid 1990’s was dominated by the complex taxonomy of Gerhard Benl. Davis’ work has focused on the genus in Western Australia, while Bean has considerably improved the taxonomy of eastern Australian species, relegating many of Benl’s infraspecific taxa to synonymy, and Lally has treated taxa from both Western Australia and South Australia. Preparation of a treatment of *Ptilotus* for the forthcoming new edition of *Flora of South Australia* by the second author has prompted the reassessment of the infraspecific taxa of *Ptilotus* and the related *P. blackii*. Benl (1984) recognised four varieties in *P. aristatus*, a small pink-flowered perennial herb occurring in arid regions of the Northern Territory and South Australia. In this paper we recognise only two of Benl’s infraspecific taxa and treat them at subspecific rather than varietal rank. We also discuss the confusion associated with the typification of *P. blackii* and misapplication of that name to plants in South Australia and the Northern Territory.

**Materials and methods**

This study is based on examination of populations in the field, glasshouse grown material, and herbarium specimens or digital images from AD, CANB, DNA, MEL and PERTH. Measurements were made from fresh specimens and herbarium material (rehydrated where required).

**Terminology used here to describe the hairs follows that of Benl (1971), as translated by Burbidge (1972). The hairs are basically of the same type (simple) but vary in the degree to which lateral projections are produced at the septa between the primary cells.**

The leaves of the taxa described here could be interpreted as petiolate, but are here treated as sessile. The leaf lamina extends and narrows to the leaf base, with no discernible petiole. This feature is also present in other *Ptilotus* species, e.g. *P. erubescens* Schltdl. and *P. seminudus* (J.M.Black) J.M.Black.

**Taxonomy**

**Key to *Ptilotus aristatus* and *P. blackii***

1. Leaves drying dark green to blackish-green; thickened basal portion of tepals (externally, above perianth tube) forming a prominent glabrous keel; hairs on distal margin of keeled portion not distinct from those on remainder of tepal surface; Western Australia ............ *P. blackii*

1. Leaves drying pale green or yellow-green; thickened basal portion of tepals (externally, above perianth tube) convex or keeled, glabrous or hairy; distal margin of thickened portion with a skirt of hairs that are shorter and denser than those on the remainder of tepal surface; Northern Territory, South Australia ............ *P. aristatus*

**Ptilotus aristatus** Benl

Perennial or facultative annual herb to 40 cm high with stout taproot; stems striate, with sparse to dense, subverticillate or verticillate hairs to c. 2 mm long, often glabrescent. Leaves sessile, with sparse subverticillate or verticillate hairs to c. 2 mm long, hairs denser on new growth and in leaf axils, often glabrescent, green, drying pale green or yellowish-green; apices acuminate or mucronate, micro to 1.5 mm long; basal leaves spatulate, obolate or rarely narrowly obolate, 12–110 mm long including the long attenuate base which is usually equal to or longer than upper wider portion, 3–30 mm wide; cauline leaves ovate, narrowly ovate, elliptic, obolate or narrowly obolate, 7–52 mm long, 1.3–16 mm wide. Inflorescences hemispherical, ovoid, or rarely obovoid or subcylindrical spikes, finally 12–60 mm long, 9–35 mm wide, up to 80-flowered. Bract 3.5–8.5 mm long including aristate apex to 3 mm long, with moderate to dense, nodule, subverticillate or verticillate hairs over external surface, hyaline or chartaceous, brown all over or midrib and apex only; bracteoles 4–8 mm long, including aristate apex to 3 mm long, with moderate to dense, subverticillate or verticillate hairs mostly confined to the midrib externally, hyaline, midrib brown. Perianth 7.5–17 mm long including a basal tube 1–2 mm long, pink to pinkish-purple. Tepals linear, concave, outer tepals 0.5–2.3 mm longer than inner, apical portion scarious, glabrous, apex erose, obtuse or truncate; outer surface of basal tube with dense, nodose, subverticillate or verticillate hairs to 1 mm long; outer tepal surface with a thickened basal portion immediately above the tube, convex and glabrous, or keeled and with very short simple or verticillate hairs to 0.2 mm long, or rarely glabrescent, the distal margin of the thickened basal portion with dense, subverticillate hairs to 4 mm long, forming an erect skirt, remainder of outer tepal surface (excluding glabrous apical portion) with sparse to moderately dense, nodule, subverticillate or subverticillate hairs to 5 mm long, shorter near apex and on tepal margins adjacent to thickened basal portion, with sparse to dense verticillate hairs to 0.8 mm long beneath; outer tepals glabrous inside; inner tepals with sparse to moderately dense crept nodule hairs inside, attached to the margins near base, hairs extending to a quarter of tepal length. Fertile stamens 2 (rarely 3), filaments 2.5–6.5 mm long, dilated basally; staminodes 3, filaments often shorter than fertile stamens, dilated basally, staminal cup minute to indeterminable; anthers of fertile stamens 0.5–1.3 mm long, usually exerted to side of perianth at anthesis. Ovary stipitate, with sparse, nodose hairs adjacent to style, sometimes on both sides, rarely glabrous; style eccentric, 1.6–4 mm long, straight or sinuate.

Notes. Ptilotus aristatus is morphologically similar to P. blackii; see under the latter species for further discussion. Two subspecies are recognised.

Key to subspecies
1. Perianth > 10 mm long; longest hairs on outer tepals (2.5–) 3–5 mm long; bracts and bracteoles 5–8.5 mm long; style 3–4 mm long ............. P. aristatus subsp. aristatus
1: Perianth 7.5–10 mm long; longest hairs on outer tepals to 2 (–2.5) mm long; bracts and bracteoles 3.5–5 mm long; style 1.6–2.2 mm long . . . . P. aristatus subsp. micranthus

Ptilotus aristatus Benl subsp. aristatus


Basal leaves 12–110 mm long including long attenuate base, 4–25 mm wide; cauline leaves 10–52 mm long, 2–14 mm wide. Inflorescences 10–60 mm long, 20–35 mm wide. Bract 5–8.5 mm long, some with brownish coloration extending beyond midvein; bracteoles 6–8 mm long. Perianth (10–) 12–17.5 mm long; outer tepals longer than inner by 1–2.3 mm, the outer surface with hairs to 5 mm long, thickened basal portion convex and glabrous, distal margin of thickened portion with hairs 2–4 mm long. Fertile staminal filaments 4–6.5 mm long; style (3–) 3.2–4 mm long.

Distribution and habitat. Ptilotus aristatus subsp. aristatus occurs in the Northern Territory near the South Australian border and extends into South Australia as far south as Evelyn Downs station (Fig. 1). Most collections have been made in the Stony Plains bioregion with a few records coming from adjacent areas within the Finke and Simpson-Strzelecki Dunefields bioregions. This subspecies typically occurs in open vegetation on gibber plains or slopes with loam- or clay-textured soils (rarely with sandy surface veneer), sometimes extending into adjacent floodouts. Badman 5887 (AD) was apparently collected from a sandplain, which is considered an atypical habitat for the subspecies.

Notes. As defined here, P. aristatus subsp. aristatus includes specimens previously referred to P. aristatus var. aristatus and P. aristatus var. eichlerianus, and specimens from South Australia and the Northern Territory (but not Western Australia) previously referred to P. blackii. The principal numeric characters used by Benl to distinguish P. aristatus var. aristatus and P. aristatus var. eichlerianus, i.e. inflorescence width and perianth length, are unreliable due to continuous variation. Furthermore, inflorescence shape appears to be strongly influenced by developmental stage. In
Reducing P. eichlerianus to P. aristatus var. eichlerianus Benl (1984) himself acknowledged intermediate forms between it and var. aristatus.

*Ptilotus aristatus* subsp. *aristatus* differs from subsp. *micranthus* by its longer perianths, bracts, bracteoles and styles. It also has a glabrous, convex, thickened basal portion on the outer tepals, whereas in subsp. *micranthus* the thickened basal portion is usually hairy and keeled.

Conservation status. Placing *P. aristatus* var. *aristatus* and var. *eichlerianus* in synonymy under *P. aristatus* subsp. *aristatus* does not impact on the conservation status of the taxon in the Northern Territory. The Near Threatened coding (sensu IUCN 2001) for the varieties (Albrecht et al. 2007) under the *Territory Parks and Wildlife Conservation Act 2000* is also appropriate for *P. aristatus* subsp. *aristatus*. In South Australia, however, where *P. aristatus* var. *aristatus* is given Rare status and *P. aristatus* var. *eichlerianus* Vulnerable status (National Parks and Wildlife Council 2003), Rare would seem to be the appropriate code in South Australia for the redefined *P. aristatus* subsp. *aristatus*.

Selected specimens examined

**Northern Territory.** Mt Grundy, 12 Nov. 1993, D.E.Albrecht 5654 (AD, DNA, NT); Eastern boundary of Finke River flood plain, near western boundary of Simpson Desert, 24 Apr. 1977, G.C.Cornwall 316 (AD); Mt Wilynupa, 20 Aug. 1992, H.Coulson 39 & P.K.Latz (NT); c. 3.5 km from NT-SA border on Finke-Mt Dare Rd, 4 Sept. 1997, P.Horsfall 409 (NT); Andado Sm, 18 Apr. 1977, P.K.Latz 6852 (AD, CANB, MEL, NT, PERTH); 2 km SE of 10 mile Dam, New Crown Station, 3 Feb. 1983, P.K.Latz 9443 (NT); Andado Sm, 16 Aug. 1974, A.S.Mitchell 101 (CANB, NT).

**South Australia.** Abminga Creek, 14 May 2001, R.Bates 585924 (AD, CANB); Pedirka, c. 65 km S of NT border on railway to Alice Springs, 29 Aug. 1932, E.H.Ising 2966 (AD); 12 km W of Dalhousie Springs, 29 Aug. 2004, P.K.Latz 20562 (MEL, NT); c. 10 km N of Hamilton Homestead, 8 Sept. 1987, G.Leach 1404 (AD, NSW, NT); 1 mile [1.6 km] S of Mt Sarah, c. 60 km NNW of Oodnadatta, 8 Aug. 1963, T.R.N.Lothian 1385 (AD, NT); Headwaters of Arrabunda Creek, 23 Sept. 1974, D.E.Symon 9235 (AD, CANB, NT); Dalhousie – near Oodnadatta, 21 July 1971, S.A.White s.n. (AD).

*Ptilotus aristatus* subsp. *micranthus* Albr. & Lally, nom. et stat. nov.

**Based on:** *Ptilotus aristatus* var. *exilis* Benl, Muellera 5(4): 258 (1984). — **Holotype:** Northern Territory: 54 miles [86.4 km] NW of Alice Springs, 3 May 1962, G.Chippendale 8799 (M n.v.). — **Isotypes:** AD 96349063, CANB 126984, DNA A8799, NSW n.v.


Basal leaves 12–95 (–110) mm long including long attenuate base, 3–25 (–30) mm wide; cauline leaves 9–50 mm long, 1.3–16 mm wide. Inflorescences 10–36 (–50) mm long, 9–22 mm wide. Bract 3.5–5 mm long, with brownish coloration confined to midvein; bracteoles 3.5–5 mm long. Perianth 7.5–10 mm long; outer tepals longer than inner by 0.5–1 mm, the outer surface with hairs to (2–2.5) mm long, thickened basal portion keeled, hairy or rarely glabrescent, distal margin of thickened portion with hairs 1–1.7 mm long. Fertile staminal filaments 2.5–4 mm long; style 1.6–2.2 mm long.

Distribution and habitat. *Ptilotus aristatus* subsp. *micranthus* is endemic to the Northern Territory where it is restricted to a relatively small area within the Burt Plain bioregion about 100 km NW of Alice Springs (Fig. 1). It has a patchy distribution over approximately 65 km² of cracking clay plain, principally on Amburla station, with a small proportion on Hamilton Downs station (Dobbie & O’Malley 2000). Populations occur within the Undippa land system (Perry et al. 1962), characterised by red coarse structured clay soils (sometimes with surface gravel) supporting grassland dominated by *Astrebla pectinata*, *Eragrostis xerophila* and *E. setifolia*.

Notes. Leaf width appears to be the primary character on which Benl (1984) based his separation of *P. aristatus* var. *stenophyllus* and var. *exilis*. Field observations have shown leaf width to be a highly variable character, with ranges of 4–27 mm being recorded for flowering plants in several populations. Furthermore, cultivated plants exhibit variation in leaf width that appears to be...
has a usually hairy, keeled, thickened basal portion of the tepals, and shorter (to 2 (–2.5) mm long) hairs on the remainder of the tepal (to 5 mm long in subsp. aristatus).

Conservation status. Placing *P. aristatus* var. *stenophyllus* and var. *exilis* in synonymy under *P. aristatus* subsp. *micranthus* does not impact on the conservation status of the taxon. The Near Threatened coding (sensu IUCN 2001) for the varieties (Albrecht *et al.* 2007) under the Territory Parks and Wildlife Conservation Act 2000 is also appropriate for *P. aristatus* subsp. *micranthus*.

Etymology. The Greek epithet *micranthus* refers to its smaller flowers (perianths).

Selected specimens examined

Northern Territory. 7 km W of Mt Hay trig, 10 June 2000, D.E. Albrecht 9345 (NT); Amburla Creek, W of Alice Springs, 23 Feb. 1978, G. Benl 48, J. Macoubbie & L. Ulyatt (CANB, M); 3 km E of Amburla Creek, Tanami Road, 19 Mar. 2002, T.L. Collins 124 (NT); c. 67 km W of Stuart Highway on road to Yuendumu, 27 Feb. 1991, H. Coulson & L. Todd s.n. (NT); c. 5 km S of Amburla Homestead, between Valley Bore and Mt Hay Bore, 31 Aug. 2006, I.D. Fox 4054 (NT); Tanami Highway, 57.6 km W of Stuart Hwy, 25 Apr. 1988, G. Leach 1851 & M.J. Barritt (CANB, NT); Milton Park, 12 Dec. 1973, C. Lendon s.n. (NT); 95 km NW of Alice Springs, Tanami Hwy, 29 Mar. 1993, D.J. Nelson 2867 (NT); 14 km NW of Hamilton Downs Homestead, CSIRO exclosure plot, 10 Mar. 1997, M. White 51 (NT).

*Ptilotus blackii* Benl


Perennial or facultative annual herb to 30 cm high with taproot; stems striate, glabrous or with scattered verticillate hairs to c. 0.6 mm long (denser on younger growth). *Leaves* sessile, with sparse subverticillate or verticillate hairs to c. 1.2 mm long, hairs denser on new growth and in leaf axils, usually glabrescent, green, drying dark green or blackish-green; apices obtuse or acute, ± mucronate, when present mucro to 1.2 mm long; basal leaves obovate or rarely narrowly obovate, 50–70 mm long including the long attenuate base which is usually equal to or longer than upper wider portion, 5–12 mm wide; cauline leaves narrowly oblong to narrowly elliptic 10–33 mm long, 2.2–8 mm wide. *Inflorescences* ovoid or ± hemispherical spikes, finally 12–20 mm long, 10–25 mm wide, up to 25-flowered. *Bract* 7.3–9.5 mm long including aristate apex to 2 mm long, with sparse to moderately dense, subverticillate hairs over external surface, hyaline or chartaceous, brown all over or midrib and apex only; *bracteoles* 7.8–9 mm long, including aristate apex to 2.5 mm long, with moderately dense, subverticillate hairs mostly confined to the midrib externally, hyaline, midrib brown. *Perianth* 11–14 mm long including a basal tube 1–1.5 mm long,
pink or purple. Tepals linear, concave, strongly keeled at base above tube, outer tepals 0.7–1 mm longer than inner, apical portion scarious, glabrous, apex erose, obtuse or acute; outer surface of basal tube with dense, subverticillate or verticillate hairs to 0.7 mm long; keeled portion above tube glabrous, remainder of outer tepal surface (excluding glabrous apical portion) with sparse to moderately dense, nodose or subverticillate hairs to 6 mm long, shortening near apex, with sparse to dense verticillate hairs to 0.8 mm long beneath, and along margins of basal keeled portion; outer tepals glabrous inside; inner tepals with moderately dense wavy nodose hairs inside, attached to the margins near base, hairs extending to a third of tepal length. Fertile stamens 2, filaments 4.5–6.5 mm long, dilated basally; staminodes 3, filaments slightly shorter than fertile stamens, dilated basally; staminal cup minute to indeterminable; anthers of fertile stamens 0.5–1.2 mm long, sometimes exerted to side of perianth at anthesis. Ovary stipitate, with sparse, verticillate hairs adjacent to style, sometimes on both sides; style eccentric, 3–4.1 mm long, straight.

**Distribution and habitat.** *Ptilotus blackii* is endemic to arid Western Australia, where it is currently known from a few localities near the south western edge of the Great Victoria Desert bioregion and a single location in the Coolgardie bioregion (Fig. 2). It occurs approximately 200 km east of Kalgoorlie, north and south of the trans-Australia railway line. It is recorded as growing in brown clayey sand or orange sand on flat plains in association with mallee woodland over spinifex.

**Notes.** Benl (1964) chose a Helms collection from Western Australia as the holotype of *P. blackii*. However, as noted by Benl, this material is immature, and therefore Benl also included a number of paratypes (representing mature plants) from South Australia to supplement his description of *P. blackii*. Unfortunately, the paratypes do not represent *P. blackii* s. str., and are referable to *P. aristatus* subsp. *aristatus*. Benl’s description therefore encompasses elements of both *P. blackii* and (mostly) *P. aristatus* subsp. *aristatus*. Despite the immature nature of the holotype material, this collection is distinguishable from related species (see below) on vegetative characters, and mature collections matching the holotype are known from the same geographical area in Western Australia. The comprehensive description provided here is based on all known collections of *P. blackii*.

The correct application of the name *P. blackii* has been problematic for some time, mainly as a result of Benl’s mixed concept of the taxon. Benl variously determined specimens of *P. aristatus* s.l. from the Northern Territory and South Australia as either *P. aristatus* or *P. blackii*, although the basis for this distinction remains unclear. *Ptilotus blackii* is similar to *P. aristatus* subsp. *aristatus*, particularly with respect to habit, and the indumentum, colour and apex of the bracts and bracteoles. However, it differs in its glabrous mature stems (young stems may have some scattered hairs), leaves which dry dark green or blackish-green and the uniform hairs on the tepals. *Ptilotus blackii* also frequently has divaricate branchlets towards the top of the plant, shorter, narrower leaves, shorter inflorescences, shorter perianths and slightly larger bracts and bracteoles than *P. aristatus* subsp. *aristatus*.

*Ptilotus blackii* may also be confused with *P. nobilis* subsp. *nobilis*, the distribution of which overlaps that of *P. blackii*. However, *P. nobilis* subsp. *nobilis* is easily distinguished by its taller, more robust habit, basal leaves without long attenuate bases, cauleine leaves usually with crenate, undulate margins, usually cylindrical inflorescences that are much longer and wider, and its longer perianths (15–44 mm long).

**Conservation status.** With its more restricted circumscript and few collections, *P. blackii* has recently been listed as Priority Three under the Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (Smith 2010). It is known to occur in the Queen Victoria Spring Nature Reserve, but requires further survey to determine its overall distribution and abundance.

**Specimens examined**

**Western Australia.** c. 127 km N of Ballardina along Zanthus-Balladonia road, *R. Davis* 10596, 23 Sept. 2003 (PERTH); Track from transline, 72.4 km N of Plumridge Lake, *R. Davis* 10605, 24 Sept. 2003 (NT, PERTH); 7 km SW of Nippon Junction, Queen Victoria Springs Nature Reserve, *D. J. Pearson* 92, 26 Nov. 1986 (PERTH).

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**References**


