Nuytsia The journal of the Western Australian Herbarium

29: 145–149 Published online 17 May 2018

SHORT COMMUNICATION

Ptilotus actinocladus (Amaranthaceae), a new and rare species from the Gascoyne bioregion, Western Australia

Ptilotus R.Br. (Amaranthaceae) is a genus of approximately 110 species, all of which are native to continental Australia and with most of the diversity occurring in Western Australia (Bean 2008; Hammer *et al.* 2015). During the construction of a comprehensive identification key to the genus for *KeyBase* (available at http://keybase.rbg.vic.gov.au/keys/show/6609), specimens identified as *P. pseudohelipteroides* Benl in Western Australia were found to be inconsistent with the morphology of *P. pseudohelipteroides* from eastern Australia, leading to the erection of the phrase name *P.* sp. Doolgunna (D. Edinger 4419). This short communication presents the result of an investigation into the taxonomic status of that phrase name, the new species *P. actinocladus* T.Hammer & R.W.Davis.

Ptilotus actinocladus T.Hammer & R.W.Davis, *sp. nov.*

Type: Doolgunna Station, Western Australia [precise locality withheld for conservation reasons], 5 August 2003, *G. Byrne* 307 (*holo*: PERTH 06592813).

Ptilotus sp. Doolgunna (D. Edinger 4419), Western Australian Herbarium, in *FloraBase*, https://florabase.dpaw.wa.gov.au/ [accessed 25 October 2017].

Prostrate *annual herbs* to 10 cm high, 25 cm wide. *Stems* terete, ribbed, glabrescent, with a persistent tuft of nodose hairs at the base of leaves and buds; a central stem ascending to *c.* 2(–10) cm long, particularly when young, with radiating prostrate lateral stems to 18 cm long, becoming numerous with age. *Basal leaves* not seen. *Cauline leaves* linear-lanceolate to oblanceolate, 4–22 mm long, 0.5–3 mm wide, glabrescent or with sparse nodose hairs; apex mucronate, mucro 0.25–0.50 mm long. *Inflorescences* terminal, spiciform, globular to cylindrical, 5–15 mm long, 11–14 mm wide, pink. *Bracts* ovate, 3.0–3.3 mm long, 1.4–1.8 mm wide, transparent, glabrous; apex mucronate, mucro 0.2–0.3 mm long. *Bracteoles* broadly ovate, 3.0–3.5 mm long, 1.9–2.0 mm wide, transparent, glabrous; apex mucronate, mucro 0.1–0.2 mm long. *Outer tepals* narrowly lanceolate, 4.5–4.9 mm long, 0.9–1.2 mm wide; apex margins in-rolled, truncate to shortly tapering, serrated; outer surface with long, silky, nodose hairs to 1.5 mm long, apex glabrous. *Inner tepals* narrowly lanceolate, 4.1–4.7 mm long, 0.5–0.8 mm wide; apex margins in-rolled, acute, not serrated; outer surface with long, silky, nodose hairs to 1.5 mm long, apex glabrous. *Fertile stamens* 4; *filaments* 1.4–1.6 mm long, uneven, dilated towards the base; *anthers* 0.4–0.5 mm long, 0.15–0.20 mm wide, pink. *Staminode* 2.3–2.5 mm long, sinuate. *Staminal cup* 0.3–0.5 mm long, oblique, lobed. *Staminal cup appendages* alternating with staminal filaments, 0.5–0.6 mm long, 0.2–0.3 mm wide, transparent, with sparse hairs on both surfaces; apex truncate, serrate; those appendages adjacent to the staminode are basally adnate to it, with acute apices. *Ovary* obconical, 1.2–1.5 mm long, 0.8–1.0 mm wide, apically villous; stipe 0.1–0.2 mm long. *Style* slightly curved, 1.1–1.3 mm long, slightly excentric on the ovary apex. *Stigma* capitate. *Seed* round, light brown, *c.* 1.5 mm long, *c.* 0.9 mm wide. (Figures 1A, 2A)

https://florabase.dpaw.wa.gov.au/nuytsia/
ISSN 2200-2790 (Online)
ISSN 0085-4417 (Print)

Figure 1. Comparative morphology of plants *in situ*, highlighting differences in habit and leaf form. A – *Ptilotus actinocladus* (*G. Byrne* 2759); B – *P. pseudohelipteroides* (*T. Hammer & K. Thiele* TH 91); C – *P. helipteroides* (*R. Davis, T. Hammer & B. Anderson* RD 12266). Photographs by G. Byrne (A) and T. Hammer (B, C).

Diagnostic features. *Ptilotus actinocladus* may be distinguished from all other members of the genus by the following combination of characters: a prostrate annual herb with glabrescent stems and leaves, glabrous and translucent bracts, pink flowers, tepals <10 mm long, 4 fertile stamens, 1 staminode 2.3–2.5 mm long, staminal cup appendages (pseudostaminodes) 0.5–0.6 mm long, an excentric style placed on the ovary summit, and an apically hairy ovary.

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 14 July 2007, *G. Byrne* 2759 (PERTH); 13 July 2004, *D. Edinger* 4419 (PERTH); 15 July 2004, *D. Edinger* 4423 (PERTH); 4 Nov. 1965, *D.W. Goodall* 3267 (PERTH); 24 Aug. 1973, *E. Wittwer* 1137 (PERTH).

Phenology. Flowering collections have been made from July to November.

Distribution and habitat. *Ptilotus actinocladus* has been collected from Doolgunna Station, Woodlands Station and Belele Station in Western Australia (Figure 3), with only a single collection known from each of the latter two locations, from 1973 and 1965, respectively. The habitat has been described as flat, seasonally inundated plains with sparse vegetation.

Figure 2. Longitudinal section of dissected flowers in late bud. A – *Ptilotus actinocladus* (*G. Byrne* 2759); B – *P. pseudohelipteroides* (*T. Hammer & K. Thiele* TH 91); C – *P. helipteroides* (*R. Meissner & Y. Caruso* 561). Scale bar = 1 mm.

Conservation status. *Ptilotus actinocladus* is listed by Smith and Jones (2018) as Priority One under Conservation Codes for Western Australian Flora, under the name *P.* sp. Doolgunna (D. Edinger 4419). Given that this species is only represented in recent specimens from near Doolgunna Station, we consider this species to be rare and of conservation concern.

Etymology. The epithet derives from the Greek *aktis* (a ray or beam) and *klados* (a branch or stem), referring to the radiating, prostrate flowering stems, sometimes becoming numerous, which are characteristic of this species (Figure 1A).

Taxonomic notes. The new species can be easily distinguished from *P. helipteroides* (F.Muell.) F.Muell., with which it overlaps in distribution, by its distinctly radiating, prostrate flowering stems, whereas *P. helipteroides* is erect (rarely decumbent) and can reach >60 cm high (Figure 1). The habit of *P. pseudohelipteroides* is bushy (quite noticeable on many specimens), and it has a persistent indumentum covering the stems and leaves; the flowering stems are often closely clustered. This is quite different from *P. actinocladus*, in which all flowering stems (except the young apical shoot) are prostrate (flush with the ground). *Ptilotus actinocladus* can be further distinguished from *P. pseudohelipteroides* by the shape of the staminal cup appendages, which are basally adnate (rising

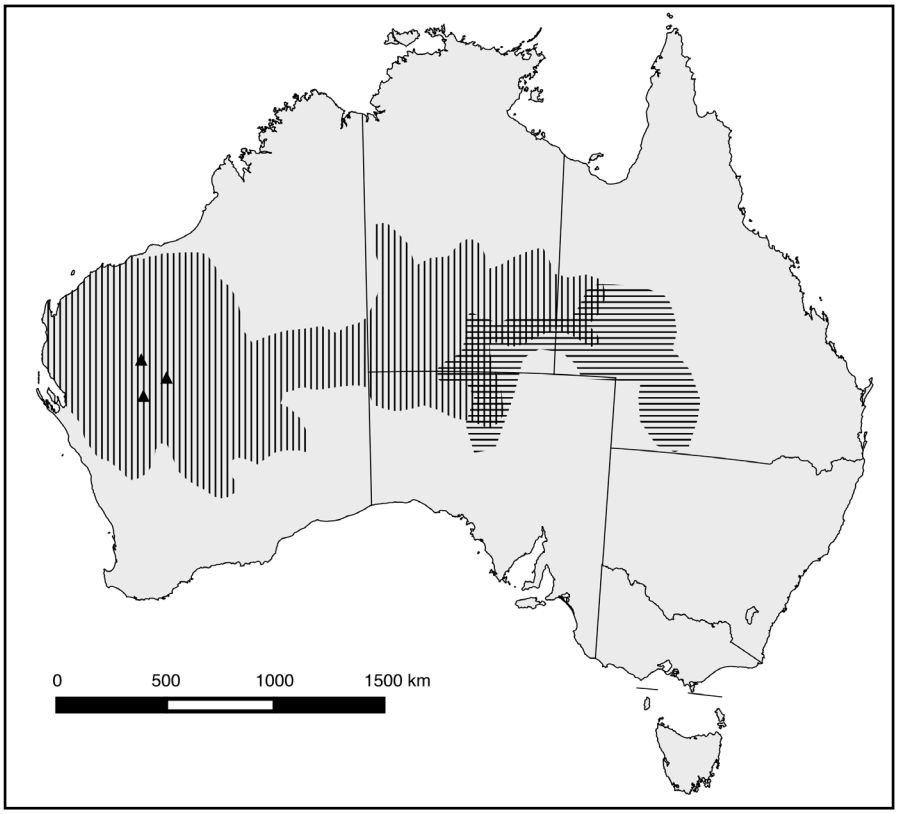

Figure 3. The distributions of *Ptilotus actinocladus* (triangles) and *P. helipteroides* (vertical shading) and *P. pseudohelipteroides* (horizontal shading) as inferred from records retrieved from the Australasian Virtual Herbarium (http://avh.chah.org.au/).

above the rest of the staminal cup) to the staminode and have acute apices in both *P. actinocladus* and *P. helipteroides*. In *P. pseudohelipteroides*, the staminal cup appendages are not adnate to the base of the staminode and have a rounded, or sometimes flattened, shape (see Benl 1959). *Ptilotus helipteroides* can be distinguished from both *P. actinocladus* and *P. pseudohelipteroides* by having larger anthers and longer staminal filaments, staminode, style and tepals than either of the two other species, which are similar in the sizes of the floral parts (Figure 2).

The type of *P. actinocladus* (PERTH 06592813) has been previously sequenced for the phylogeny of the genus as *P. pseudohelipteroides* (GenBank accessions: KP875954 for ITS and KP875857 for *matK*; Hammer *et al.* 2015). In that phylogeny, this species was placed as sister to *P. helipteroides*. The true *P. pseudohelipteroides* (from central and eastern Australia; see Figure 3) was not included, but presumably it would sit with the other two on the molecular phylogeny. These species together with *P. gaudichaudii* (Steud.) J.M.Black, *P. eremita* (S.Moore) T.Hammer & R.W.Davis (previously *P. gaudichaudii* subsp. *eremita* (S.Moore) Lally) and *P. modestus* T.Hammer (previously *P. gaudichaudii* subsp. *parviflorus* (Benth.) Lally) form a highly supported clade (>99% in all analyses; Hammer *et al.* 2015). This clade shares a noteworthy synapomorphy in the development of the fruit. After anthesis, the persistent tepals, enclosing the ovary and seed, harden considerably and pinch inward above the ovary base to form a tight, indurated covering around the fruit, and the tepal apicies flex outward and gape widely. The hardened tepal bases may provide some limited protection for the seed, while the gaping, papery, persistent tepals most likely aid in wind dispersal (see Hammer *et al.* 2018).

Ptilotus gaudichaudii, *P. eremita* and *P. modestus* can be easily distinguished from the new species by lacking staminal cup appendages and having green or yellow tepals with abaxial hairs restricted to the midline.

Acknowledgements

The authors acknowledge the directors and staff of the Western Australian Herbarium (PERTH) and the State Herbarium of South Australia (AD) for providing access to their collections and helpful assistance. We would also like to acknowledge Geoff Byrne for permission to use his photograph of the new species. T.A. Hammer acknowledges the support of a Forrest Research Foundation PhD scholarship and University Postgraduate Award (UWA).

References

Bean, A.R. (2008). A synopsis of *Ptilotus* (Amaranthaceae) in eastern Australia. *Telopea* 12(2): 227–250.

Benl, G. (1959). New species and varieties of *Ptilotus* R.Br. (Amaranthaceae). *Muelleria* 1(2): 102–108.

Hammer, T., Davis, R. & Thiele, K. (2015). A molecular framework phylogeny for *Ptilotus* (Amaranthaceae): Evidence for the rapid diversification of an arid Australian genus. *Taxon* 64(2): 272–285.

Hammer, T.A., Davis, R.W. & Thiele, K.R. (2018). The showy and the shy: Reinstatement of two species from *Ptilotus gaudichaudii* (Amaranthaceae). *Australian Systematic Botany* 31(1): 1–7. https://doi.org/10.1071/SB17026.

Smith M.G. & Jones, A. (2018). *Threatened and Priority Flora list 16 January 2018*. Department of Biodiversity, Conservation and Attractions. https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants [accessed 27 March 2018].

Timothy A. Hammer[1,3] and Robert W. Davis[2]

[1]School of Biological Sciences, Faculty of Science,
The University of Western Australia,
35 Stirling Highway, Crawley, Western Australia 6009
[2]Western Australian Herbarium, Biodiversity and Conservation Science,
Department of Biodiversity, Conservation and Attractions,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[3]Corresponding author, email: timothy.hammer@research.uwa.edu.au