

## A new and rare species of *Ptilotus* (Amaranthaceae) from a suburban wetland of the eastern Swan Coastal Plain, Western Australia

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### Abstract

Davis, R.W. & Tauss, C. A new and rare species of *Ptilotus* (Amaranthaceae) from a suburban wetland of the eastern Swan Coastal Plain, Western Australia. *Nuytsia* 21(3): 97–102. *Ptilotus christineae* R.W.Davis & Tauss, currently known from only one small population in the Greater Brixton Street Wetlands, about 14 km from the centre of the city of Perth, is described and illustrated. A key to *Ptilotus* R.Br. of the Swan Coastal Plain Biogeographical Region is provided.

### Introduction

The Eremaean Botanical Province of Western Australia is the centre of diversity for *Ptilotus* R.Br., a large and almost exclusively Australian genus (Townsend 1993; Western Australian Herbarium 1998–). Only thirteen *Ptilotus* taxa (about 10% of those known from Western Australia) occur in the Swan Coastal Plain Biogeographical Region (SCP; Department of Environment, Water, Heritage and the Arts 2008). Two of the SCP taxa, *Ptilotus christineae* R.W.Davis & Tauss, described herein, and *P. sericostachyus* subsp. *roseus* (Moq.) Benl. are endemic to this region; both are helophytes that have only been recorded from the fragmented remnants of the native vegetation on the eastern side of the plain. *Ptilotus sericostachyus* subsp. *roseus* has not been collected since 1906 and is likely to be extinct.

The diminutive *Ptilotus christineae* was first recognized as a new species by the second author in 2010 during a flora and vegetation survey of the Greater Brixton Street Wetlands (GBSW) that was conducted for the V & C Semeniuk Research Group. The GBSW comprise about 120 ha of remnant native vegetation of the lower catchment of the Yule Brook in the Perth suburbs of Kenwick and Wattle Grove; they are part of a gently sloping alluvial fan formation that extends from the foothills of the Darling Range to the Canning River. The complex stratigraphy and hydrology of this area manifests as a very diverse array of fine-scale plant habitats (V & C Semeniuk Research Group 2001). The GBSW are renowned as one of the most floristically-rich areas of the SCP and they have been formally recognized as Bush Forever Site 387 (Government of Western Australia 2000). There are at least five other *Ptilotus* taxa (*P. declinatus* Nees, *P. drummondii* (Moq.) F.Muell., *P. esquamatus* (Benth.) F.Muell., *P. manglesii* (Lindl.) F.Muell. and *P. stirlingii* (Lindl.) F.Muell. subsp. *stirlingii*) that have been previously recorded in the GBSW (Keighery & Keighery 2000).

Apart from the GBSW, most of the alluvial soils of the lower catchment of the Yule Brook were cleared of native vegetation many years ago for farming. Despite the proximity of Kenwick to the city, the seasonal waterlogging or inundation of much of this area previously rendered it uneconomical for urban development. Most of the land surrounding the GBSW is still currently zoned rural but it is under review with regard to re-zoning for industrial purposes. *Ptilotus christineae*, in common with much of the biota of the GBSW, is subject to threats from the surrounding land-uses and catchment management practices.

The discovery of *P. christineae* in the GBSW highlights the remarkable floral biodiversity that continues to persist, albeit precariously and sometimes overlooked, in the Perth Metropolitan Region of the SCP.

### Taxonomy

***Ptilotus christineae* R.W.Davis & Tauss, sp. nov.**

*Ptiloto spathulato* (R.Br.) Poir. affinis sed habitu rhizomato, spica leviter interrupta, et stamina 5 (quae in *P. spathulato* 3) statim dignoscenda.

*Typus*: Kenwick, Western Australia [precise locality withheld for conservation reasons], 23 October 2010, C. Tauss, K.R. Thiele & R. Davis CT 4136 (*holo*: PERTH 08247269, *iso*: CANB).

*Ptilotus* sp. Brixton (C. Tauss 4136), Western Australian Herbarium, in *FloraBase*, <http://florabase.dec.wa.gov.au/> [accessed 4 May 2011].

*Perennial herb* to 8 cm high. *Rhizome* glabrous, 1–1.8 mm in diam., branched. *Shoots* annual, well-spaced. *Flowering stems* erect, one per shoot, with indistinct, pink ribs, glabrous or with sparse, white, sub-verticillate hairs. *Basal leaves* glossy, spatulate, 8–35 mm long, 2–10 mm wide, glabrous or with very sparse hairs. *Cauline leaves* alternate, oblanceolate to spatulate, 8–15 mm long, 2–5 mm wide, glabrous or with very sparse hairs. *Inflorescence* spiciform, terminal, ovate, maturing to loosely cylindrical, 30–45(–50) mm long, 18–25 mm diam. *Bracts* broadly obovate, 4.2–5 mm long, translucent; midrib pink-maroon with sparse, white, sub-verticillate hairs abaxially, becoming glabrous toward margins. *Bracteoles* similar to bracts, 5–6 mm long, apices slightly recurved. *Flowers* shortly pedicellate. *Outer tepals*, lanceolate, concave, 9–9.4 mm long; adaxially white with pink margins, glabrous except for proximal, long, white, contorted, nodose hairs; abaxially pink, densely hairy, the hairs long, white and sub-verticillate. *Inner tepals*, similar to outer tepals but narrower, 8.5–8.7 mm long; margins narrowly involute; apices glabrous, translucent. *Staminal cup* symmetrical, 0.8–1 mm long, glabrous. *Stamens* 5; filaments and anthers white, ageing to pinkish. *Style* ± straight, central to sub-central, white, 1.8–2 mm long. *Ovary* stipitate, glabrous, green. *Seed* not seen. (Figure 1)

*Other specimens examined*. WESTERN AUSTRALIA: [precise locality withheld for conservation reasons], Kenwick, 16 Oct. 2010, C. Tauss 4102 (PERTH 08273065).

*Phenology*. In 2010, the annual shoots of *Ptilotus christineae* and *P. manglesii*, which grow in the same habitat, became evident in late June. By the time the flowers of *P. christineae* reached anthesis in early October, most of the other annual and geophytic herbs at the site were desiccated and the soil

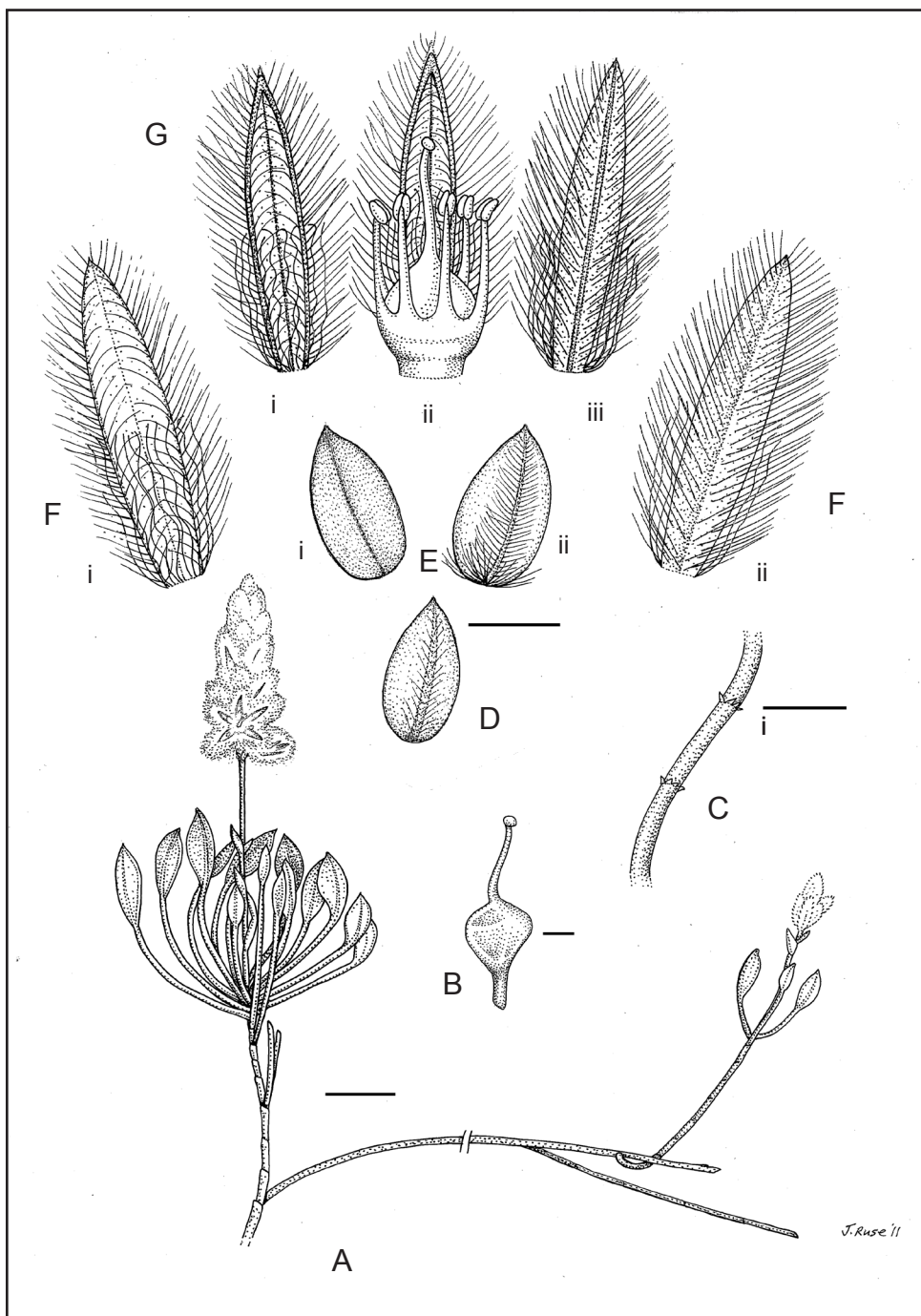


Figure 1. *Ptilotus christineae* (C. Tauss, K.R. Thiele & R. Davis CT4136). A—habit; B—gynoecium; C—subverticillate hairs; D—bract; E—bracteole, i) adaxial surface, ii) abaxial surface; F—outer tepals, i) adaxial surface, ii) abaxial surface; G. inner tepals, i) adaxial surface, ii) adaxial surface with stamens and ovary *in situ*, iii) abaxial surface. Scale bars: A = 20 mm; B = 1 mm; C = 0.05 mm; D–G = 2.5 mm.

surface was dry. *Ptilotus manglesii* commenced flowering at the end of October and for a short period, both *Ptilotus* were observed in full flower together.

*Etymology.* The specific epithet honours the contribution of Dr Christine A. Semeniuk to wetland science; her work also illuminates the study of wetland plant habitats.

*Distribution and habitat.* *Ptilotus christineae* is currently known from only one small population at the type location. The total area of occupancy of this species is estimated to be less than 0.2 ha.

*Ptilotus christineae* inhabits a seasonally inundated flat (floodplain) at an elevation of about 6.5 m above sea level. The site is underlain by pale grey, muddy-sand to sandy-mud alluvium (Guildford Formation) of the Pinjarra Plain (V & C Semeniuk Research Group 2001). The regional, unconfined, groundwater in most of this area of the GBSW is generally at about ground level in late winter. At a local scale, the hydrology and stratigraphy of the wetlands is complex with small, confined (artesian) aquifers and shallow aquitard layers of ferricrete or calcareous muds or clays that perch rainwater for varying lengths of time (V & C Semeniuk Research Group 2001). In 2010, despite record-breaking low rainfall in the region, the site inhabited by *P. christineae* was shallowly inundated for a short period in winter.

*Ptilotus christineae* was recorded in patchy *Melaleuca acutifolia* open scrub over *Verticordia plumosa* var. *brachyphylla* and *Hypocalymma angustifolium* sens. lat. open heath over *Meeboldina cana*–*Chorizandra enodis* open rushes and sedges and mid-dense, species-rich native annual herbs and geophytes. Common associates of this vegetation included *Acacia lasiocarpa* var. *lasiocarpa* sens. strict., *Borya scirpoidea*, *Bulbine semibarbata*, *Burchardia multiflora*, *Centrolepis aristata*, *Diuris* aff. *laxiflora*, *Drosera heterophylla*, *D. menziesii* subsp. *menziesii*, *D. tubaestylis*, *Gahnia trifida*, *Hyalosperma cotula*, *Pheladenia deformis*, *Podolepis gracilis*, *Pogonolepis stricta*, *Ptilotus manglesii*, *Sowerbaea laxiflora*, *Stylidium divaricatum* and *Tribonanthes australis*. Naturalized alien taxa in this assemblage included *Heliophila pusilla*, *Romulea rosea* var. *communis* and *Sparaxis bulbifera*.

*Threats.* *Ptilotus christineae* is threatened by off-road vehicles, hydrological and climatic change, nutrient enrichment of groundwater, invasive naturalized alien plants (particularly *Sparaxis bulbifera*, *Morea flaccida* and *Hyparrhenia hirta*, which are prevalent in the area), rabbits and frequent fires.

The current municipal drainage scheme does not consider the environmental water requirements of the vegetation in the GBSW. Subsequent to the extensive vegetation clearing in the Yule Brook catchment and the resulting increase in the volume of runoff, the brook was excavated to mitigate the flooding of adjacent properties and to convey rainwater (part of which previously infiltrated into the groundwater in the GBSW) directly into the Canning River. The GBSW are thus no longer subject to natural, regular flooding and alluvial sediment supply from the Yule Brook. A number of other excavated drains, firebreaks and vehicle tracks in the area intersect some of the local, shallow aquifers and also contribute to the dewatering of the GBSW (V & C Semeniuk Research Group 2001). The adverse impact of these changes on the hydrological regime of the GBSW will be exacerbated by the trend towards a drier climate that is now evident in the SCP.

There is continuing uncertainty of the land tenure of many blocks in the GBSW and currently no overall plan to manage the wetlands, to ameliorate the impacts of the surrounding land uses on the native vegetation and to guide local planning authorities.

*Conservation status.* *Ptilotus christineae* is currently listed as a Priority One species under the Department of Environment and Conservation's Conservation Codes for Western Australian Flora (Smith 2010), as *Ptilotus* sp. Brixton (C. Tauss 4163). It is only known from one small population with a very small area of occupancy that is vulnerable to clearly demonstrable threats.

The Greater Brixton Street Wetlands and about 400 ha of the adjoining rural lands have been searched by the second author in several intensive, multi-season surveys (including Tauss & Weston 2010) and no other occurrences of *Ptilotus christineae* have been found. It is unlikely that other populations will be located in the SCP as the habitat of this species is scarce and has been thoroughly explored (Government of Western Australia 2000) due to its high conservation values.

*Affinities.* In a vegetative state, *Ptilotus christineae* bears a superficial resemblance to *Ptilotus spathulatus* (R.Br.) Poir. as both have fleshy, spathulate, basal leaves. However, there are clear floral, habit and distribution differences between the two species. *Ptilotus spathulatus* has three stamens and two staminodes, a broadly curved or sigmoid style that is eccentrically attached to the ovary and hairs that are mainly verticillate. In addition, *P. spathulatus* has a hard, woody, rootstock that produces several to many prostrate flowering stems on each plant, and a denser inflorescence than *P. christineae*. *Ptilotus spathulatus* is only known from well-drained sites in the semi-arid zone of the South West Botanical Province of Western Australia.

*Ptilotus christineae* is clearly distinguished from all congeners in the SCP by the combination of its slender rhizome, spathulate leaves, erect flowering shoot, five fertile stamens and wetland habitat.

### Key to *Ptilotus* taxa of the Swan Coastal Plain Biogeographical Region

1. Plants with 5 fertile stamens
  2. Branches (or scape, in *P. christineae*) erect or arching
    3. Interstaminal lobes absent, leaves spathulate ..... **P. christineae**
    - 3: Interstaminal lobes present, leaves narrow and linear ..... **P. drummondii**
  - 2: Branches prostrate
    4. Inflorescences ovoid to globose, tepal indumentum sericeous ..... **P. esquamatus**
    - 4: Inflorescences cylindrical, tepal indumentum woolly ..... **P. humilis**
- 1: Plants with 2–4 fertile stamens
  5. Fertile stamens 2
    6. Staminal cup glabrous, style slightly curved ..... **P. stirlingii** subsp. **stirlingii**
    - 6: Staminal cup hairy, style markedly falcate
      7. Bracteoles 5–6.5 mm long ..... **P. sericostachyus** subsp. **sericostachyus**
      - 7: Bracteoles 7.5–8 mm long ..... **P. sericostachyus** subsp. **roseus**
  - 5: Fertile stamens 3–4
    8. Outer tepals with sparse, short, stiff hairs
      9. Tepals 11–14 mm long, style 8–10 mm long ..... **P. gaudichaudii** subsp. **gaudichaudii**
      - 9: Tepals 6–9 mm long, style 2–3 mm long ..... **P. gaudichaudii** subsp. **eremita**

- 8: Outer tepals with dense, long, soft hairs
- 10: Branches erect, inflorescences predominately white-green
- 11: Inflorescences ovoid, hemispherical or orbicular, style 2.5–4.6 mm long..... **P. divaricatus**
- 11: Inflorescences cylindrical, style 7–13 mm long..... **P. polystachyus**
- 10: Branches prostrate, inflorescences predominantly pink-purple
- 12: Basal leaves present, bracts brown, style more or less straight..... **P. manglesii**
- 12: Basal leaves absent, bracts translucent, style markedly falcate ..... **P. declinatus**

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