

Pultenaea williamsii (Fabaceae: Mirbelieae), a new species endemic to the New England Tableland Bioregion of New South Wales

Ian R.H. Telford^{1,4} , James A.R. Clugston²  & Russell L. Barrett^{2,3} 

¹Botany and N.C.W. Beadle Herbarium, School of Environmental and Rural Science,
University of New England, Armidale, NSW 2351, Australia

²National Herbarium of New South Wales, Australian Institute of Botanical Science, Australian Botanic Garden,
Locked Bag 6002, Mount Annan, New South Wales 2567, Australia

³School of Biological Sciences, The University of Western Australia, Crawley, Western Australia 6009, Australia

⁴Corresponding author: itelford@une.edu.au

Abstract

Pultenaea williamsii I.Telford, Clugston & R.L.Barrett (Fabaceae, Faboideae, Mirbelieae), endemic to the New England Bioregion, New South Wales, Australia, is described as new, segregated from the *P. flexilis*–*P. juniperina*–*P. blakelyi* species assemblage. Its distribution is mapped and habitat and conservation status are discussed.

Introduction

Pultenaea Sm. as currently circumscribed is a relatively large genus of over 150 species (Barrett *et al.* 2021; Renner *et al.* 2022) with most species found in south-eastern Australia. Orthia *et al.* (2005) suggested that generic circumscriptions in tribe Mirbelieae may need major revision. Barrett *et al.* (2021) analysed available data for the plastid *trnL*-F region and concluded that additional data would likely resolve relationships among members of the genus sufficiently to allow the core of *Pultenaea* to be maintained, and this new species belongs to the core of *Pultenaea*.

John Williams, a former lecturer in Botany, University of New England, collected in 1961 what he considered to be a new species of *Pultenaea* Sm. near Yarrowyck, which is located on the western fall of the New England Tableland, west of Armidale, New South Wales. The specimen has been subsequently identified variously as *P. juniperina* var. *planifolia* H.B.Will. and *P. juniperina* var. *mucronata* (Benth.) Corrick. Application of these names is much confused as demonstrated by the following usage. Thompson (1961) accepted *P. juniperina* var. *planifolia*, including *P. flexilis* var. *mucronata* Benth. as a synonym. Corrick (1993) included both varieties under *P. forsythiana* Blakely (1941), while de Kok and West (2003) included them under *P. blakelyi* Joy Thomps. and Weston & de Kok (2002) included var. *mucronata* under *P. juniperina*. A more recent collection of the Yarrowyck entity (*Copeland 3245* & Croft) was identified as *P. flexilis* Sm. during a recent revision of the genus (de Kok and West 2002).

Herbarium collections of both *P. juniperina* and *P. flexilis* (both which are considered to be morphologically variable) were examined in this study to investigate the status of Williams' collections and their putative relationships. Since a closer morphological correlation was found with *P. flexilis*, a discussion is here included about how these specimens differ from *P. flexilis*, followed by a description of the new species *P. williamsii* I.Telford, Clugston & R.L.Barrett.

As *P. flexilis* is a sister lineage to the *P. glabra* complex, the new species described here is also likely related to the broader *P. glabra* complex. However, that group has recently been revised and the taxon we describe here is morphologically distinct (Renner *et al.* 2022).

Materials and Methods

The following description is based on examination of herbarium specimens at NE and NSW. The first author has also studied this species in the field. Type specimens of related species have been studied first-hand at MEL and NSW.

Results and discussion

The Yarrowyck specimens first identified by John Williams differ from *Pultenaea blakelyi* and *P. flexilis* based on multiple morphological characters (Table 1). In the key by Weston and de Kok (2022), specimens collected at high altitudes in the Northern Tablelands bioregion of NSW (e.g. Mount Kaputar, Torrington, Mount Yarrowyck (now Bulagaranda)) that possess incurved, \pm concolorous leaves that taper to a pungent apex key out as either *P. flexilis* if one considers the leaves flat (this species includes coastal plants bearing flat, strongly discoloured leaves with rounded, mucronate apices), or *P. glabra* Benth. if one considers the leaf margin strongly incurved. However, the latter interpretation would probably only occur with immature leaves or when only considering the apical area of the leaf.

The type of *P. flexilis* is from Port Jackson (Smith 1805), and numerous near-coastal and Blue Mountains specimens match the type concept. The appropriate circumscription of *P. flexilis* remains in need of clarification, and the application of several synonymous names required rigorous assessment, but the northern tableland specimens appear to be misplaced in *P. flexilis*. Within the specimens at variance from the typical form of *P. flexilis*, specimens from Mount Yarrowyck Nature Reserve north to Mount Tingha (Fig. 1) represent a distinctive entity which we assessed against the full range of variation recognised in *P. flexilis s. lat.* and *P. blakelyi*, with data for *P. flexilis s. str.* presented in Table 1 to encourage further comparison of populations that do not match this concept.

Table 1. Comparison of selected morphological attributes that differentiate *Pultenaea williamsii* from *P. blakelyi* and *P. flexilis s. str.*

Attribute	<i>P. flexilis s. str.</i>	<i>P. blakelyi</i>	<i>P. williamsii</i>
Stipule length (mm)	1.5–2.1	0.8–1.5	2.8–4
Leaf length (mm)	12–19	8.5–18	14.5–24
Leaf margin	flat	incurved	incurved
Leaf apex	rounded, mucronate	pungent	pungent
Calyx length (mm)	3.8–5.3	4–5.2	5.8–6.8
Standard length (mm)	6.0–8.2	5.4–7.6	8.6–10.5

Pultenaea blakelyi grows in forests east of the Great Divide, wetter than those in the Yarrowyck region, with the populations occurring near Dorrigo geographically closest to the Yarrowyck entity. The *P. juniperina* and *P. flexilis* complexes remain poorly resolved with other names, including *P. blakelyi*, variously misapplied, as indicated by numerous isolated or disjunct occurrence of each species on AVH (CHAH 2022; <http://avh.ala.org.au/occurrences/search?taxa>, accessed 3 May, 2022) and by Weston & de Kok (2022). New England populations may constitute several new species, of which the following is the most distinctive, and is named here as *P. williamsii*.

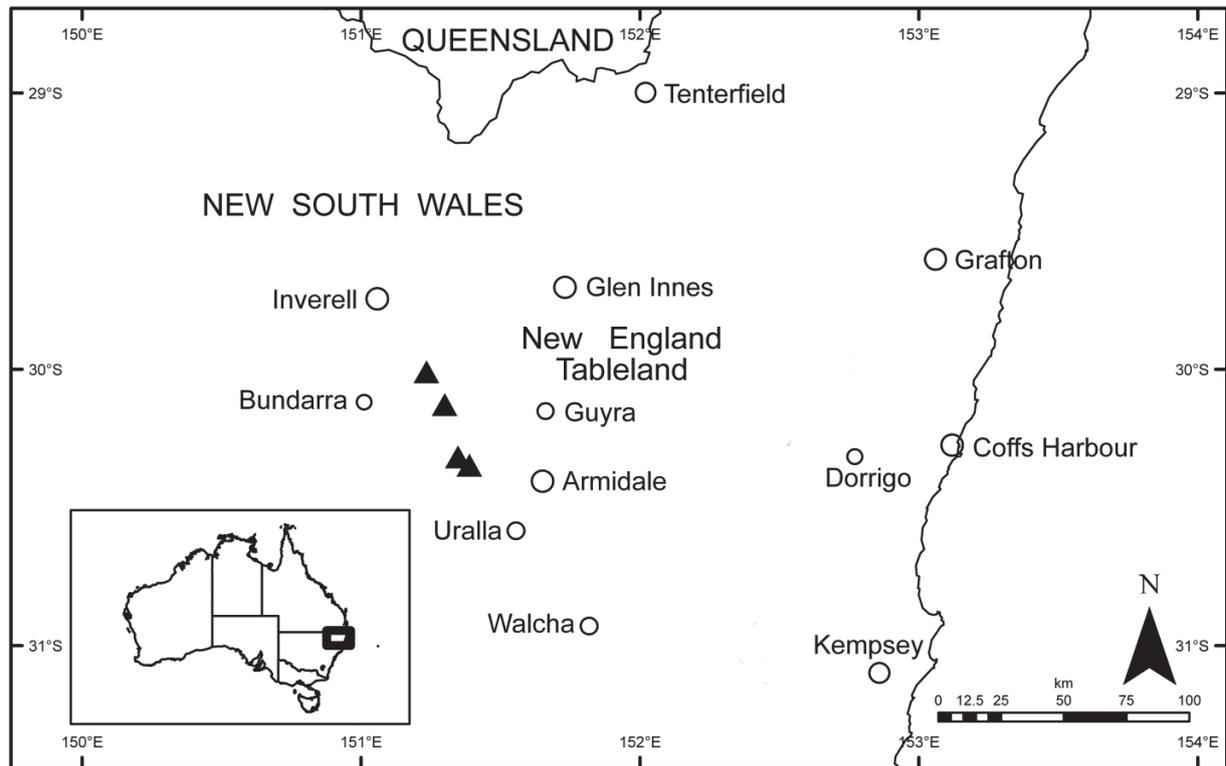


Fig. 1. Distributions of *Pultenaea williamsii* (▲).

Taxonomy

Pultenaea williamsii I.Telford, Clugston & R.L.Barrett, *sp. nov.*

Type: NEW SOUTH WALES: Northern Tablelands: private property adjoining Indwarra Nature Reserve, c. 18 km NE of Bundarra, 2.1 km SW of Mt Tingha, 1 Nov. 2001, *L.M. Copeland 3245 & P. Croft* (holo: NE 76899; iso: CANB, *n.v.*, NSW 599837).

Erect *shrub* 0.5–3 m high, spreading to 4 m wide. *Branchlets* erect to spreading, stiff, sparsely to moderately pubescent with spreading, straight or crisped hairs to 0.6 mm long; ribbed below petioles. *Stipules* lanceolate, fused for c. half their length, 2.3–4.5 mm long, very strongly keeled, margin minutely dentate, apex spreading, acuminate, dark red-brown with paler margins. *Leaves*: petiole 0.6–1.5 mm long; lamina narrowly elliptic, discolorous, green with dense, conical or mamilliose papillae on adaxial surface; brownish with scattered shortly conical papillae on abaxial surface (papillae formed by single epidermal cells); lamina 13.2–24 mm long, 1.8–3.8 mm wide, margin incurved, apex acute, rigidly and sharply mucronate, mucro 0.7–1.4 mm long. *Inflorescence* of solitary flowers borne in upper axils, appearing loosely clustered. *Flowers* with pedicels 2.2–4.6 mm long, with scattered, spreading, straight or crisped hairs to 0.4 mm long; bracteoles inserted c. 1 mm above base of calyx tube, appressed at base, lanceolate, 1.8–2.7 mm long, 0.7–0.8 mm wide, mucronate, sparsely pubescent along keeled midvein, dark red-brown with paler margins; floral stipules absent; calyx tube broadly obconic, 3.0–3.8 mm long, sparsely pubescent in upper half outside; lobes 5, subequal, the upper pair fused for c. half their length, broadly triangular, 1.8–3.5 mm long, acuminate, minutely white-fimbriate; standard petal ±circular in appearance, or obcordate when flattened and claw is visible, emarginate, 8.6–10.5 mm long including 3.0–3.8 mm claw, 7.8–10.1 mm wide, yellow; wing petals narrow-oblong, 7.1–10.5 mm long including 2.5–3.1 mm claw, 2.1–2.4 mm wide, yellow; keel petals naviculate, ±narrow-oblong in outline, 9.4–9.9 mm long including claw 2.8–3.2 mm long, 3.2–3.5 mm wide (folded), exceeding wings, mostly red, grading to yellow at the claw; stamens free, ±equal in length; filaments 7.9–8.4 mm long; anthers 0.6–0.7 mm long; ovary glabrous, 1.3–1.5 mm long; style curving almost 90° at mid-point, with long, semi-appressed hairs from lower 1/5 to upper 1/3 its length, 7.2–7.9 mm long; stigma inconspicuous, very slightly capitate. *Fruit* ovoid, compressed, asymmetrically beaked, 8.0–8.6 mm long including stylar remnant, c. 2.8 mm diam., glabrous, brown. *Seeds* compressed ovoid, c. 3 mm long, c. 1.8 mm wide, smooth, dark brown. (Figs 2, 3)



NE Digital Image
10 Mar. 2021 J.J.B.

N.C.W. Beadle Herbarium (NE)
University of New England
HOLOTYPE
Pultenaea williamsii I. Telford,
Clugston & R.L. Barrett
Det.: J.L.H. Telford 9 Mar. 2022

N.C.W. Beadle Herbarium (NE)
University of New England
Pultenaea sp. Yarrawoyck (J.B. Williams
NE 10326)
Det.: J.L.H. Telford Jan. 2010

N.C.W. Beadle Herbarium (NE)
The University of New England
Armidale NSW 2351 Australia
Notification of change of determination would be appreciated by NE

NE 76899

Fabaceae subfam. Faboideae

Pultenaea

Australia. New South Wales: Northern Tablelands:
Private property adjoining Indwarra Nature Reserve,
c. 18 km NE of Bundarra, 2.1 km SW of Mt Tingha.

30° 5' 40" S 151° 15' 25" E 1120 m

Gentle slope; E aspect. Loamy soil over metasediments.
Eucalyptus laevopinea, *E. andrewsii* shrubby open forest.

Common, localised. Erect shrub 3 m tall.

Coll.: L.M. Copeland 3245 1 Nov. 2001
& P. Croft

Det.:

Rep(s) to: CANB, NSW.

Fig. 2. Holotype of *Pultenaea williamsii* I.Telford, Clugston & R.L.Barrett (NE 76899). Photo by J.J. Bruhl.

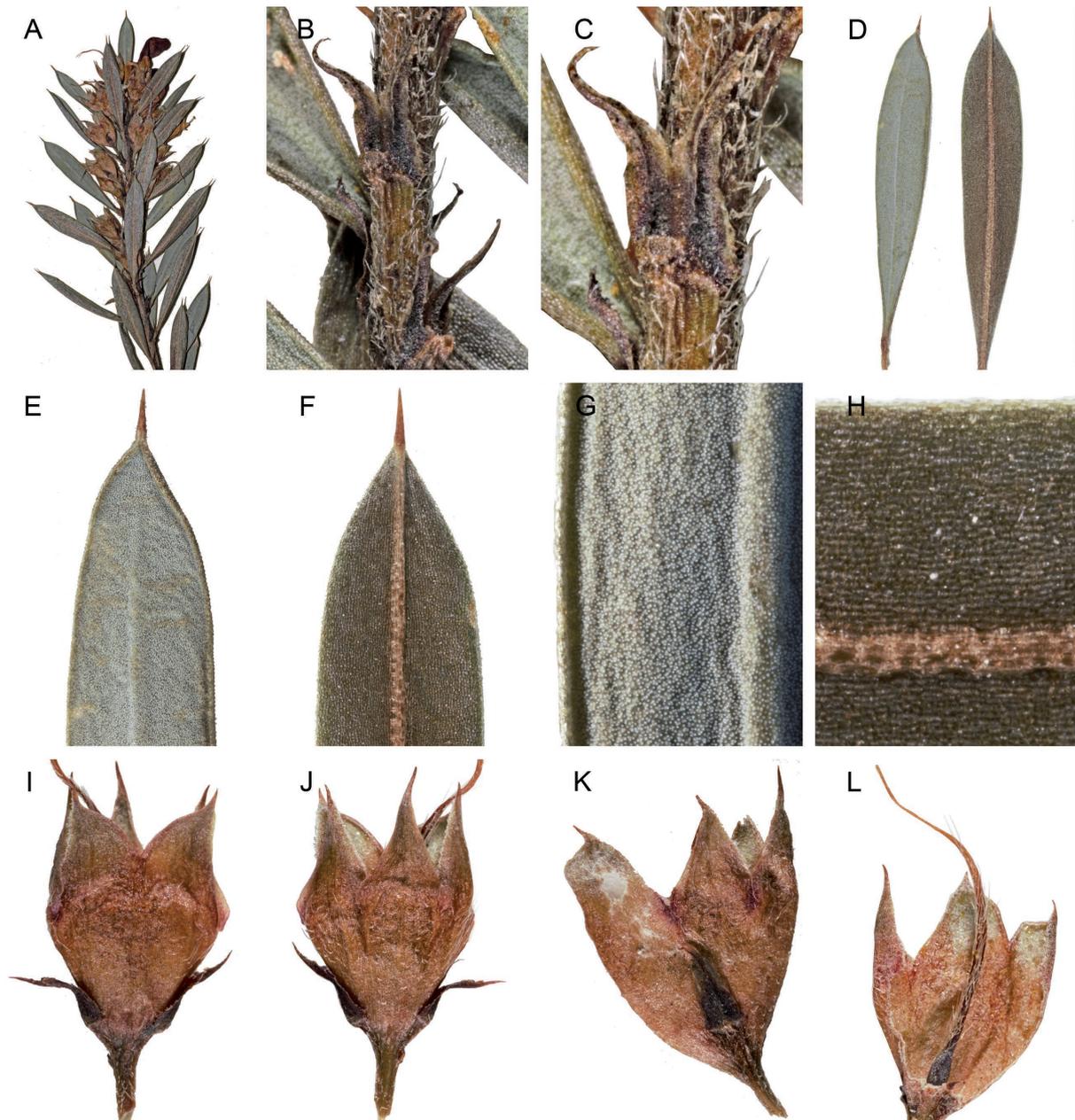


Fig. 3. Isotype of *Pultenaea williamsii* I.Telford, Clugston & R.L.Barrett (NSW 599837). A. Flowering branchlet. B, C. Stipules. D. Leaves. E. Leaf tip (adaxial surface). F. Leaf tip (abaxial surface). G. Adaxial leaf surface. H. Abaxial leaf surface. I. Adaxial calyx lobes, calyx and bracteoles. J. Abaxial calyx lobes, calyx and bracteoles. K. Lateral view of calyx and bracteole. L. Calyx partially removed to show glabrous ovary and hairy style. Photos by R.L. Barrett.

Diagnostic characters: With affinities to *Pultenaea blakelyi* and *P. flexilis*, differing in larger (14.5–24 vs 8.5–19 mm long), more rigidly pungent, discolorous (vs usually concolorous) leaves with incurved (vs plane to slightly incurved) margins, dense, conical papillae above and scattered shortly conical papillae below (vs usually not papillate), longer stipules (2.8–3.2 mm long vs 0.8–1.5 in *P. blakelyi*; 1.5–2.1 in *P. flexilis*), larger calyx (5.8–6.8 mm long vs 4–5.2 in *P. blakelyi*; 3.8–5.3 in *P. flexilis*) and larger standard (8.5–9.2 mm long vs 5.4–7.6 in *P. blakelyi*; 6.0–8.2 in *P. flexilis*).

Somewhat similar in appearance to *Pultenaea* sp. Genowlan Point (NSW 417813), but *P. williamsii* differs in its non-glaucous (vs ± glaucous), narrowly elliptic (vs oblanceolate) leaves, 1.8–3.8 mm wide (vs 0.6–2.1 mm wide), hairy (vs glabrous) pedicels and stipules attached near the base (vs close to the middle) of the calyx tube.

Distribution and habitat: *Pultenaea williamsii* is endemic to the New England Tableland Bioregion (Department of Agriculture, Water and the Environment 2022) on the western fall of the New England Tableland from near Tingha, NW of Guyra, to Yarrowyck, W of Armidale (Fig. 1). The species grows in *Eucalyptus andrewsii* woodland on rocky sites on granite, granodiorite and metasediments at 1100–1200 m altitude at two disjunct

locations about 75 km apart. Other associated species recorded include *Acacia buxifolia*, *Acacia lanigera*, *Acacia* sp. New England (J.B. Williams 97011), *Boronia algida*, *Boronia microphylla*, *Brachyloma daphnoides*, *Chiloglottis formicifera*, *Eucalyptus laevopinea*, *Eucalyptus malacoxylon*, *Hakea eriantha*, *Hovea graniticola*, *Leucopogon affinis*, *Lomatia silaifolia*, *Olearia ramossissima*, *Orianthera pusilla*, *Persoonia cornifolia*, *Polystichum fallax*, *Pultenaea campbellii*, *P. spinosa* and *Rytidosperma pallidum*.

Specimens examined: New South Wales: Northern Tablelands: 1 mile E of Yarrowyck, Oct. 1961, *J.B. Williams s.n.* (NE 10386, NSW 929173); Mt Yarrowyck, c. 24 km N of Uralla, 6 Dec. 2009, *D.W. Lawrence 607* (NE, NSW); Mount Yarrowyck, c. 24 km N of Uralla, 10 Jan. 2010, *D.W. Lawrence 622* (NE, NSW); c. 28 km directly WNW of Armidale, central south ridge of Mount Yarrowyck, 29 Aug. 2010, *D.W. Lawrence 725* (NE, NSW); Mt Yarrowyck, summit ridge, c. 26 km WNW of Armidale, 30 Oct. 2010, *I.R.H. Telford 13335* (NE, NSW).

Phenology: Flowering October–November; fruiting October–December.

Etymology: Honouring John Beaumont Williams (1932–2005), former lecturer in Botany, University of New England, whose passion for and knowledge of plants of north-eastern New South Wales contributed so much to our understanding of its flora.

Conservation Status: *Pultenaea williamsii* is currently known from four populations. The population on Mount Yarrowyck numbers several hundred plants along c. 500 m of the summit ridge. The size of other populations is not known, but it is noted as locally common in collection notes. For the present, the species must be regarded as ‘Not Evaluated’ under IUCN (2014) guidelines but a category of ‘Vulnerable’ is suggested following the NSW Threatened Species Conservation Act (1995) based on its restricted distribution. The species is conserved in The Basin (L.M. Copeland pers. comm.) and Balangaranda Aboriginal Area (formerly Mount Yarrowyck Nature Reserve), and probably occurs in Indwarra Nature Reserve, adjacent to a known occurrence in the same habitat, but it is yet to be collected there.

Notes: The species has been recognised at NE for some time under the informal phrase name *Pultenaea* sp. Yarrowyck (J.B. Williams NE 10386) I. Telford and some duplicates have been distributed as such.

Modification to the New South Wales Flora Online key

The key in Weston and de Kok (2022) may be modified to accommodate the new species as follows:

- 44 Leaves with apex straight and aristate 44A
 Leaves with apex recurved and not aristate **Pultenaea alea**
- 44A Leaves ±concolorous, with plane margins, mucro not pungent; lamina without
 conical papillae; stipules 1.5–2.1 mm long; calyx 3.8–5.3 mm long;
 standard 6.0–8.2 mm long **Pultenaea flexilis**
- Leaves discolorous, with incurved margins, mucro rigidly pungent; lamina with dense,
 conical papillae on adaxial surface and scattered shortly conical papillae on abaxial
 surface; stipules 2.8–3.2 mm long; calyx 5.8–6.8 mm long;
 standard 8.5–9.2 mm long **Pultenaea williamsii**

Funding

This project was supported by an Australian Biological Resources Study National Taxonomy Research Grant Program (Postdoctoral Fellowship Grant: NTRGP 4-EHP5TK3).

Acknowledgements

Thanks to David Lawrence, former volunteer at NE, for climbing Mount Yarrowyck several times to collect fruiting specimens. Lachlan Copeland is thanked for observations in the vicinity of the type location. Matt Renner is thanked for fruitful discussions on species concepts in *Pultenaea*, particularly in relation to the *P. glabra* complex. Trevor Wilson and two reviewers made constructive comments on the manuscript.

References

- Barrett RL, Clugston JAR, Cook LG, Crisp MD, Jobson PC, Lepschi BJ, Renner MAM, Weston PH (2021) Understanding diversity and systematics in Australian Fabaceae tribe Mirbelieae. *Diversity* 13(8): 391. <https://doi.org/10.3390/d13080391>
- Blakely WF (1941) Additions to the Australian Flora. *Contributions from the New South Wales National Herbarium* 1: 120–124.
- Council of Heads of Australasian Herbaria (2021) Australia's Virtual Herbarium. <http://avh.chah.org.au> (accessed 21 Dec. 2021)
- de Kok, RPJ, West JG (2002). A revision of *Pultenaea* (Fabaceae). 1. Species with ovaries glabrous and/or with tufted hairs. *Australian Systematic Botany* 15(1): 81–113. <https://doi.org/10.1071/SB00035>
- de Kok, RPJ, West JG (2003) A revision of the genus *Pultenaea* (Fabaceae) 2. Eastern Australian species with velutinous ovaries and incurved leaves. *Australian Systematic Botany* 16(2): 229–273. <https://doi.org/10.1071/SB01019>
- Department of Agriculture, Water and the Environment (2022) *Australia's bioregions (IBRA)*, IBRA7, Commonwealth of Australia. <https://www.awe.gov.au/agriculture-land/land/nrs/science/ibra>
- IUCN Standards and Petitions Subcommittee (2014) Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. <http://www.iucnredlist.org/technical-documents/categories-and-criteria>
- Orthia LA, Crisp MD, Cook LG, de Kok RPJ (2005) Bush peas: a rapid radiation with no support for monophyly of *Pultenaea* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 18(2): 133–147. <https://doi.org/10.1071/SB04028>
- Renner MAM, Barrett RL, Clarke S, Clugston JAR, Wilson TC, Weston PH (2022) Morphological and molecular evidence refute a broad circumscription for *Pultenaea glabra* (Fabaceae: Mirbelieae), with implications for taxonomy, biogeography, and conservation. *Australian Systematic Botany* 35: In press. <https://doi.org/10.1071/SB21030>
- Smith JE (1805) Remarks on the generic characters of the decandrous Papilionaceous plants of New Holland. *Annals of Botany* 1: 501–512. <https://bibdigital.rjb.csic.es/idurl/1/14565>
- Thompson J (1961) Papilionaceae. *Flora of New South Wales* 101: 46–79.
- Weston PH, de Kok RPJ (2002) *Pultenaea*, Pp. 549–565 in Harden, GJ (ed.) *Flora of New South Wales* Vol. 2, revised edn (University of New South Wales Press: Kensington)
- Weston PH, de Kok RPJ (2022) *Pultenaea*. New South Wales Flora Online. <http://plantnet.rbg Syd.nsw.gov.au> (accessed 3 May 2022)

Received 28 December 2021; accepted 17 May 2022

