

## Nowhere to be seen: *Deyeuxia abscondita* (Poaceae), a new but presumed extinct species from south-western Australia

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### SHORT COMMUNICATION

On 8<sup>th</sup> December 1877 Ferdinand von Mueller travelled from Bunbury to the Balingup area of Western Australia during a survey for a report on the forest resources for the government (Mueller 1879). A grass collected that day from ‘Preston River’ (Figure 1) or ‘Blackwood and Preston Rivers’, as stated on two different handwritten labels, lay unidentified even to genus for more than a hundred years until assigned to *Deyeuxia* Clarion ex P.Beauv. by N. Walsh in 1987. A second specimen remained unidentified for a further period until tentatively suggested to be *Lachnagrostis* Trin. by A.J. Brown in 2002 or *Dichelachne* Endl. by Walsh and Brown in 2003. When I was consulted as to whether the plant was known or a placement could be suggested, I could not recognise it and was unable to find a match in the collections at the Western Australian Herbarium (PERTH), but considered that *Pentapogon* R.Br. was another possible genus placement. Upon further, more detailed examination of its spikelets, I have concluded that it does indeed belong in *Deyeuxia*. Field work has so far failed to discover any live plants so it must be presumed to be extinct. It is formally described here to draw it to the attention of people who might look for it, enable its recognition if rediscovered, and to place on record the characteristics of this lost element of biodiversity.

***Deyeuxia abscondita*** T.Macfarlane, *sp. nov.*

*Type*: ‘Preston’s River’ [Preston River], Western Australia, 8 December 1877, *F. Mueller s.n.* (*holo*: MEL 72092); ‘Blackwood & Preston River’, Western Australia, 8 December 1877, *F. Mueller s.n.* (*iso*: PERTH ex MEL 2127721A).

Perennial(?), at least 55 cm tall, apparently caespitose, erect. *Culms* unbranched, slender, terete, *c.* 1 mm diam., *c.* 3-noded, the internodes about twice as long as the sheaths, moderately to densely pilose with two hair types, the longer hairs up to 2.5 mm long and spreading, erect or somewhat retrorse, the shorter ones consisting of minute prickles or short hairs up to 0.3 mm long, the nodes covered by a similar but denser and shorter indumentum. *Leaves* distributed along the culm, 5–15 cm apart; *sheath* tightly enveloping the culm, covering about half the length of most internodes, margins free, overlapping, indumentum as for the culm; *ligule* *c.* 1 mm long, firmly membranous, irregularly truncate, ciliate on lateral and distal margins, fairly densely and stiffly pilose on abaxial surface; *lamina*

of middle and lower leaves spreading to ascending, 13–20 cm long, 2.8–3.5 mm wide, linear, flat, the abaxial surface with well-spaced fine ribs, 3 or 4 of the ribs more prominent, lacking a conspicuously larger midrib, the indumentum somewhat sparse with spaced hairs along the ribs, the hairs straight, erect, to *c.* 0.8 mm long, with some shorter hairs and short recurved prickles, the adaxial surface strongly ribbed, with narrow, open furrows between the ribs, indumentum fairly dense but the surface clearly visible, the longer hairs to 1.3 mm long, straight, erect or inclined laterally above the surface, intermixed with short straight or curved hairs or prickles that are not consistently either antrorse or retrorse; lamina of upper 1 or 2 leaves much smaller, erect, the uppermost lamina 2.5–3.8 cm long, 6.5–14 cm below the lowest panicle branch, abaxial surface scabrous, adaxial surface indumentum as for the middle and lower leaves. Inflorescence an open, loose panicle,  $\pm$  pyramidal, 6.4–9 cm long, with relatively few (*c.* 25–35) spikelets, branches slender, widely spreading, devoid of spikelets in the basal 1.5–3 cm. Pedicels 1–8.5(–11) mm long. Spikelets 6–7 mm long, laterally compressed, purplish. Glumes gaping widely at anthesis, chartaceous, softer than the lemma, ovate in outline, 1-veined, keeled, acuminate with a short scabrid bristle-like point, equal or the upper one very slightly longer, the keel antrorsely scabrous to long-scabrous with a band of several rows of prickles, the sides of the glumes rather sparsely antrorsely scabrous to puberulous or sometimes glabrous on the upper glume. Floret narrowly ovoid, narrower and tapering in the upper 1/3–1/2, terete, brown. Lemma 6.2–6.5 mm long, about equal to the glume tips (very slightly shorter to very slightly longer), 5-nerved below the awn insertion, indurated, the surface rough, with very dense, very short antrorsely curved prickles, scarcely developed near the base, more strongly developed in the distal half; callus short, blunt, bearing hairs 1/5–1/4 as long as the lemma; apex with two points and a deep 2–2.5 mm sinus between them, the points scabrous, formed by the shortly excurrent inner lateral lemma veins, the outer veins only occasionally slightly excurrent, usually ending within or at the edge of the slight membranous shoulder on the outer lemma margins below the apical points; awn attached to the back of the lemma below the middle (*c.* 2/5 of the lemma length from the base), 10.4–11.4 mm long, almost twice the floret length, geniculate at *c.* 1 mm above the glume and lemma apices, lower 2/5 of the awn forming a strongly twisted scaberulous column, the remainder a straight untwisted scaberulous bristle conspicuously exerted from the glumes and bent sharply away from the floret. Palea about 3/4 the length of the lemma, firmly membranous, 2-keeled, the keels scaberulous on the apical 2/3, ending just below the palea apex, the apex narrow, minutely irregular, scabrid. Rachilla extension well-developed, *c.* 2 mm long, densely hairy, the hairs exceeding the tip as a *c.* 1 mm plumose tuft. Anthers 3, well-developed, 2.75–3 mm long, dark red, exerted at anthesis. (Figures 1, 2)

*Diagnostic features.* *Deyeuxia abscondita* may be distinguished from all other Australian members of the genus by the following combination of characters: culms pilose, nodes hairy; leaf lamina 2.8–3.5 mm wide, flat, abaxial surface sparsely hairy along ribs; adaxial surface densely hairy; inflorescence an open, loose panicle,  $\pm$  pyramidal, branches slender, widely spreading, devoid of spikelets in basal 1.5–3 cm; spikelets 6–7 mm long; glumes equal or the upper very slightly longer, acuminate with a short bristle-like point, keels scabrous; lemma 6.2–6.5 mm long, about equal to glumes; awn persistent, attached *c.* 2/5 from base of lemma, 10.4–11.4 mm long, almost twice the floret length, conspicuously exerted from the glumes; rachilla extension well-developed, *c.* 2 mm long, densely hairy, with apical plumose tuft; anthers 2.75–3 mm long.

*Specimens examined.* *Deyeuxia abscondita* is currently known only from the type material (see above).

*Phenology.* Flowering recorded in early summer. Fruiting not recorded but likely to be mid- to late summer.

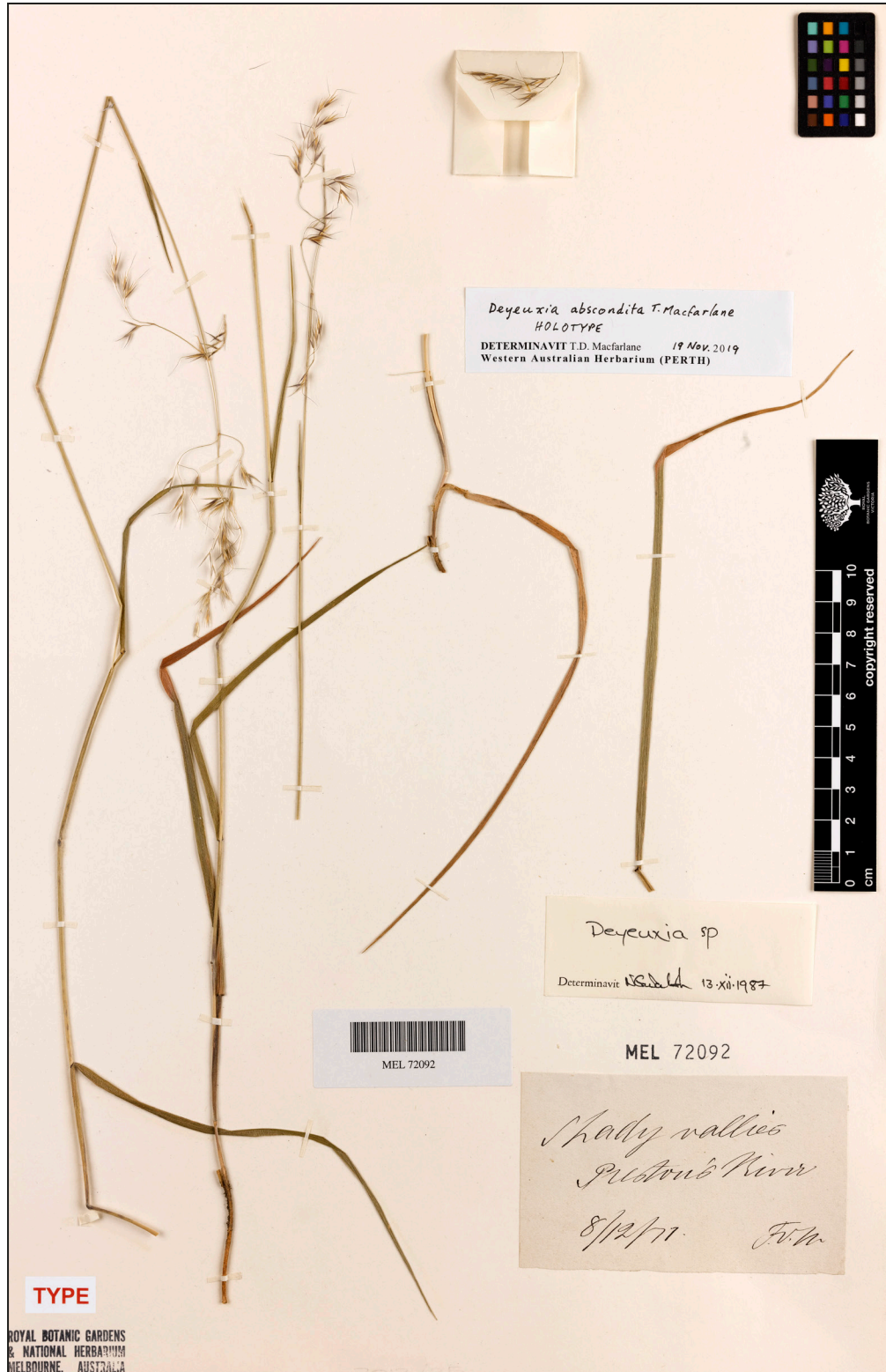


Figure 1. Holotype of *Deyeuxia abscondita*. Reproduced with permission from the National Herbarium of Victoria.



Figure 2. *Deyeuxia abscondita*. A – habit, showing culm and leaves; B – panicle and upper part of culm; C – floret, showing protruding plumose tuft of hairs from rachilla extension and enlargement of a lateral lobe apex (inset); D – spikelet; E – section of culm, leaf sheath and both leaf lamina surfaces, showing indumentum; F – ligule and base of leaf lamina. Scale bars = 10 mm (A, B); 1 mm (C, D); 3 mm (E); 2 mm (F). Drawn by Cielito Marbus from *F. Mueller s.n.* (PERTH ex MEL 2127721A).

*Distribution and habitat.* The distribution is currently known only in general terms of near the Preston River (and perhaps the Blackwood River) in the south-west of Western Australia. The recorded habitat on the available specimen labels is damp, shaded forest valleys.

*Conservation status.* *Deyeuxia abscondita* is presumed extinct since it has not been collected for 142 years or found during a limited number of targeted field searches over many years. I assume that Mueller collected it only once (see Typification below). As the more definite of the two location statements on the two specimens is 'Preston's River', it seems likely from his route that Mueller collected it along the road or track between Boyanup and Donnybrook in the valley of the Preston River or near a lesser stream in the subsequent section between Donnybrook and Balingup which lies between the two major rivers. The only information found on Mueller's travel route is the following comment: 'While completing my tour from Swan River I went along the base of the Darling ranges to the Collie and Preston River, through much forest land, timbered prevalingly with *Eucalyptus marginata* ...' (Mueller 1878). The valley bottom has been largely cleared for agriculture because the land is flat, the soils are considered fertile and there was better water availability, so if *D. abscondita* grew near the river, there is little original vegetation left in which to search for the species. If its habitat extended beyond the valley bottom to the lower hill slopes at the sides of the valley, then there is more native vegetation remaining where the species might persist. A recent survey identified a few occurrences of promising habitat in narrow, steep-sided valleys of minor streams that match Mueller's habitat description, but *D. abscondita* has not so far been among the suite of native grasses observed. In order to highlight the species as conservation significant, *D. abscondita* will be listed as Priority One under Conservation Codes for Western Australian Flora (M. Smith pers. comm.) until such time as a formal nomination for listing as Extinct can be prepared and evaluated. Meanwhile, further surveys are strongly encouraged.

*Etymology.* The epithet is from the Latin *absconditus* (hidden or concealed), in reference to the fact that the species has not been located in the 142 years following the original collection.

*Vernacular name.* Preston Bentgrass.

*Affinities.* There has previously been doubt about the correct genus in which to place the specimens described here as *D. abscondita*, with *Deyeuxia*, *Dichelachne* and *Lachnagrostis* all having been suggested on specimen annotations, and my own unpublished speculation about *Pentapogon* as another possibility. Detailed study of the material shows that *Deyeuxia* is the appropriate placement, based on the most similar species and the spikelet features, viz. the spikelets laterally compressed, having one floret, disarticulating above the 1-nerved glumes, the lemma indurated, harder than the glumes, with a 2-pointed apex and a dorsal, geniculate awn that is twisted basally and no more than twice as long as the lemma body, and the palea relatively long as compared to the lemma (Watson *et al.* 1992–; Weiller *et al.* 2009). *Dichelachne* differs by having a longer awn that is attached higher on the lemma, and a narrower lemma. *Pentapogon* differs in having the lateral lemma lobes produced into rather long, distinct, scabrous awns in addition to the central dorsal awn. *Lachnagrostis* usually has the following combination of features: an annual or perennial habit with culms that disarticulate at maturity so that the whole fruiting inflorescence disperses, a relatively delicate lemma that is less firm than the glumes, often truncate though nerves sometimes excurrent as points or bristles, and dorsally awned (sometimes terminally awned or awnless) (Jacobs & Brown 2009).

*Deyeuxia*, in the sense used here, which follows *Flora of Australia* (Weiller *et al.* 2009) rather than including *Dichelachne* (Kellogg 2015, following the molecular results of Brown 2013) or being included within *Calamagrostis* Adans. as sect. *Deyeuxia* (Clarion ex P.Beauv.) Dumort. (Clayton *et al.* 2006–),

is a large genus of 110–195 species, mainly from the southern hemisphere, with 35 species in Australia (Walsh 2015; Kellogg 2015). The classification of the group of grasses to which *Deyeuxia* belongs, namely subfamily Pooideae Benth., tribe Poeae R.Br., subtribe Agrostidinae Fr. (Soreng *et al.* 2015, 2017), has been the subject of some molecular phylogenetic studies but the Australian members are not fully resolved, nor has the status and membership of *Deyeuxia* been settled world-wide (Saarela *et al.* 2017; Soreng *et al.* 2017). Consequently, *Deyeuxia* is currently the appropriate generic name for the new species.

Most of the c. 35 Australian species of *Deyeuxia* occur in the higher rainfall parts of eastern Australia, chiefly in New South Wales, Victoria and Tasmania, often growing at higher altitudes (Vickery 1940; Jacobs & Hastings 1993; Walsh 1994; Weiller *et al.* 2009). Three species are currently recognised in Western Australia (Western Australian Herbarium 1998–): *D. drummondii* (Steud.) Vickery, *D. inequalis* Vickery and *D. quadriseta* (Labill.) Benth. These three species are all distinct from *D. abscondita* in having very dense, compact (spike-like) inflorescences rather than a loose panicle. Most eastern Australian species likewise have dense, compact inflorescences although several have panicles described as open or loose but differ from *D. abscondita* in spikelet features, e.g. *D. frigida* F.Muell. ex Benth. has very unequal glumes and a shorter, deciduous awn, *D. rodwayi* Vickery has a shorter, often straight awn that is deciduous and attached higher on the lemma, *D. accedens* Vickery has shorter spikelets and the awn is much shorter relative to the lemma, and *D. scaberula* Vickery has shorter spikelets and the awn is scarcely longer than the lemma, attached higher and straight with a non-twisted column. Two species with dense, compact inflorescences have similar, but not identical, spikelet characteristics as compared with *D. abscondita*: *D. monticola* (Roem. & Schult.) Vickery, which differs in having an awn attached near the base of the lemma, and *D. densa* Benth., which has an awn that is obscurely geniculate, weakly twisted and attached at or above the midpoint of the lemma. *Deyeuxia abscondita* stands out among Australian species of the genus by its pilose culms, nodes, sheaths and leaf blades. A few species have been described as pubescent on the sheath or upper leaf surface, e.g. *D. appressa* Vickery, *D. accedens* and *D. acuminata* Vickery, but the indumentum is apparently considerably less developed in these species and is absent from the stems and nodes (Vickery 1940).

*Typification.* The only two specimens of *D. abscondita* have labels on plain paper in Mueller's writing that look as though they were written at the same time, although the wording differs slightly. The original labels read as follows: 'Shady vallies Preston's River 8/12/77. F.v.M' (MEL 72092) and 'Blackwood & Preston River, damp shaded forest vallies 8/12/77. F.v M' (PERTH ex MEL 2127721). The plant material and the labels are so similar that the two specimens are treated here as a single gathering. The isotype specimen (PERTH ex MEL 2127721A, i.e. the elements labelled A), is co-mounted with a vegetative piece of another species (PERTH ex MEL 2127721B), possibly *D. quadriseta*.

### Acknowledgements

I thank Neville Walsh and Austin Brown, National Herbarium of Victoria, Melbourne, for bringing the Mueller specimens to my attention and arranging for me to borrow them, for descriptive notes and photos and for discussion. MEL is thanked for the loan of the Mueller specimens, for expeditiously providing the scan of the holotype and for generously donating the isotype specimen MEL 2127721 to PERTH. Cielito Marbus prepared the excellent illustration. Christopher French participated in my 2019 field search. Andrew Webb, Flora Conservation Officer, South West Region, DBCA, provided valuable advice from himself and private property owners on locations to search for *D. abscondita*.

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