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PO Box 2732
Kent Town SA 5071
Australia



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Euphrasia amplidens W.R.Barker (Orobanchaceae), a new and very localised species from western Tasmania

W.R. Barker^{a, b}, M. Wapstra^c & B. French^c

^aState Herbarium of South Australia, PO Box 2732, Kent Town, South Australia 5071
E-mail: bill.barker@sa.gov.au

^bAustralian Centre for Evolutionary Biology and Biodiversity (ACEBB),
The University of Adelaide, South Australia 5005

^cEnvironmental Consulting Options Tasmania, 28 Suncrest Avenue, Lenah Valley, Tasmania 7008
E-mail: mark@ecotas.com.au

Abstract

This new species of *Euphrasia* sect. *Striatae* is known from the Wilson and Harman river catchments of the Pieman River watershed, western Tasmania. It occurs on open ultramafic pans surrounded by sclerophyllous heath and shrubby eucalypt woodland. It was known from a single fragment in the National Herbarium of Victoria collected during the 1800s, but not formally named. Now, recently collected from three closely separated sites, the species is described and illustrated. It is clearly naturally rare, although its conservation status needs clarification through further field survey.

Key words: *Euphrasia* sect. *Striatae*, new species, rare, localised, threatened, serpentine-endemic, Tasmania.

Introduction

Specimens of a distinctive new species of *Euphrasia* were collected in 2011 in the Pieman River catchment in Tasmania's west coast region. The entity matched a specimen collected in the 1800s from "Tasmania", previously identified as distinctive, but as yet undescribed (Barker 1982). This paper formally describes the new species, another Tasmanian endemic *Euphrasia* with an apparently highly localised distribution and precarious conservation status.

Taxonomy

Euphrasia amplidens W.R.Barker, *sp. nov.*

Holotype: Tasmania, catchment of the Wilson River, north of Pieman Road [specific locality details withheld], c. 115 m alt., 7 Dec. 2011, M. Wapstra & B. French s.n. (AD 250975). **Isotypes:** HO, MEL.

Euphrasia Sect. *Striatae* unnamed taxon: W.R.Barker, *J. Adelaide Bot. Gard.* 5: 107 (1982), in note.

Perennial herb, c. 6–13 cm or more tall (long branches in *Milner 16* lack their base), with a few to several ascending to erect branches arising from ground level up to the lower 30% of the length of the main branches (stem of first year plants not observed). *Stem* not seen (no first year plants in collection); main inflorescence-bearing branches c. 5–8.5 cm or more high to the base of the inflorescence, with distal erect parts simple or with shoots; upper 2–4 internodes longer than leaves, the longest internode 3–4.5 times the length of the upper leaves; axis with opposite rows

of short to moderately long eglandular hairs, absent between, with scattered to moderately dense glandular hairs 0.15–0.3 mm long, denser towards upper parts, sometimes throughout, sometimes absent at base, sometimes absent for most of length. *Cotyledons* not seen. *Leaves:* uppermost leaves of main inflorescence-bearing branches sub-spathulate, 3.5–5.8 × 2–4 mm; base long, narrowly attenuate, petiole-like; teeth 1 along each margin, bluntly obtuse, about ½-way along the leaf, 0.5–0.6 (–0.8) mm long; apical tooth bluntly broadly acute, 1.7–2.0 (–2.2) × 1.8–2.5 (–2.8) mm, with sessile gland patches exposed on the underside in the distal ½ of the leaf; lower leaves of similar dimensions, those on basal parts and on shoots much smaller. *Inflorescences* (seen early in flowering) but for lowermost 0–2 nodes dense racemes bearing c. 8–16 or more flowers, with lowest one or two nodes bearing 1–2 flowers; rachis as for axis, but the glandular indumentum dense; pedicels of lowermost flowers 1–1.5 mm long, shorter towards apex; apical bud cluster oblong-ellipsoid, initially c. 1–2 cm long. *Bracts* similar to upper leaves, but densely glandular hairy. *Calyx* c. 3–5 mm long, green, lined on margins and midlines of teeth and below clefts in black, covered externally by dense to moderately dense glandular hairs 0.2–0.3 mm long, internally on the distal half of the teeth by moderately dense glandular hairs 0.2 mm long; teeth narrow deltoid, bluntly acute, the median clefts c. 2.4–3.5 mm deep, the lateral clefts c. 1.8–2.8 mm deep. *Corolla* c. (6–) 8.5–9.5 mm long along the upper side, coloured blue-purple in mature bud, in flower blue purple on hood, paler whitish fine blue-



Fig. 1. *Euphrasia amplidens*. A growth habit; B flower (from front); C flower (part side on).

purple lines on front of lobes, darker behind, becoming darker after anthesis, with mid yellow spot on lower side of mouth and deep in throat at point of insertion of stamens; *tube* c. 5.0–5.5 mm long, externally glabrous, but for distal extension of hood indumentum and short glandular hairs at separation of lips; *hood* c. 4.0 mm long, including lobes c. 5–5.5 mm broad, excluding lobes c. 2.5–3 mm broad, externally covered with dense, moderately long (0.2 mm), antrorse eglandular hairs, internally with long fine eglandular hairs at distal end behind upper cleft, otherwise apparently glabrous, the *upper lobes* facing forward in more or less same plane, erose-truncate or shallowly emarginate, glabrous behind, with cleft between c. 1.7 mm deep; *lower lip* concave from above, downturned, c. 8 × 9–10 mm, glabrous externally proximal parts covered by sparse to dense short eglandular hairs mixed with scattered short glandular hairs, distally glabrous, the lower lobes shallowly emarginate, with clefts between c. 4 mm deep. *Stamens* with *filaments* glabrous, the anterior pair c. 4–4.5 mm long, the posterior c. 3.5–4 mm long; *anthers*

c. 1.6–1.7 × 0.9–1.05 mm, mid brown, with *connectives* glabrous, with *slits* almost glabrous, lined distally by dense, very short hairs overlain by sparse short to long eglandular hairs, with rearmost pair of *awns* c. 0.35–0.6 mm long, longer than other three awn pairs c. 0.2–0.3 mm long. *Ovary* laterally compressed, in lateral view oblong-ovate, with rounded apex, covered by dense antrorse setae 0.1–0.2 mm long over distal ½–⅓; ovules c. 30–32; style c. 9–9.5 mm long, shortly eglandular setose in distal ⅔; stigma sub-globular, c. 0.15 mm diameter. *Capsule* 3.5–4 mm long, slightly shorter than surrounding calyx, laterally compressed obloid, with rounded apex in lateral view, densely setose, with hairs 0.15 mm long, over distal ⅓ of length, externally dull mid brown, internally shiny pale brown; *seeds* white, obliquely broad ellipsoid, 1.3–1.5 × 0.6–1 mm. **Fig. 1–2.**

Diagnosis. By its glabrous anther backs this new species belongs in sect. *Striatae*, but differs from most species of that section by the corolla not being prominently striated; it shares glandular hairs with *E. gibbsiae* Du Rietz, but differs by its attenuate leaf bases. Such leaf bases are



Fig. 2. Uppermost leaves, from dried herbarium specimens, of main inflorescence-bearing axes in *Euphrasia amplidens*. A–B Upper inflorescence leaves, silhouettes in actual size; C Upper pair of leaves, just below inflorescence, of showing adaxial (LHS) and abaxial (RHS) leaf surfaces. Scale bar: 0.5 mm. — A M. Wapstra & B. French s.n. (AD250975); B P. Milner 16 (AD250981); C K. Ziegler s.n. (HO566956, right hand sprig on sheet).

evident in *E. striata* R.Br., *E. fragosa* W.R.Barker and *E. semipicta* W.R.Barker, but from all of these it differs by its glandular indumentum, dense on the calyces, bracts and rachis and extending onto the leaves and branches.

Phenology. Flowering specimens have been collected in late November and early December, immature fruit in December, and capsules with mature seeds in May, but the variation in flowering and fruiting period is not known.

Distribution. At present, the new taxon is known from one historical (probably 1870s) collection of unknown provenance (simply labelled “Tasmania”) and three recent (2011/2012) collections. The recent collections are from one general area in the catchments of the Wilson and Harman rivers, in the broader Pieman River watershed, west of Tullah, in the State’s central west (Fig. 3); one site is about 1 km from the others, separated from them by a major river, while the other two are c. 500 m apart, separated by dense shrubby vegetation seemingly highly unsuitable for the species.

Habitat. No information is available on the habitat of the 1800s collection. Two of the recent sites supporting the species are very similar. Both are broad flats with impeded drainage, effectively permanently slightly inundated due to the high regional annual rainfall,

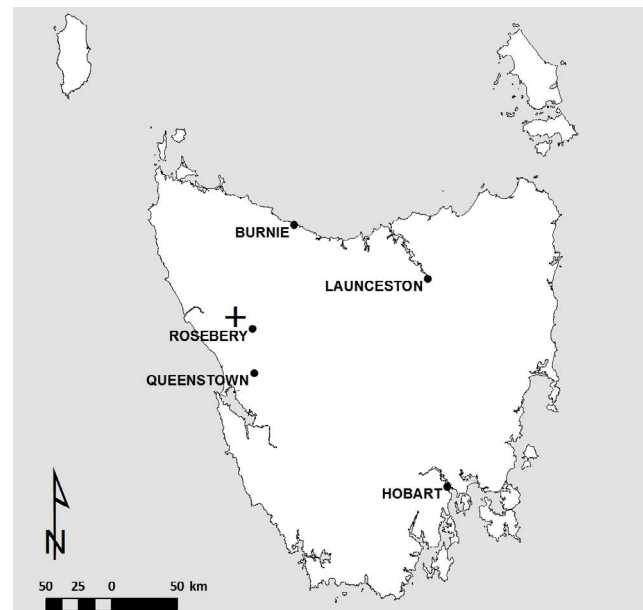


Fig. 3. Distribution of *Euphrasia amplidens* (cross).

surrounded by denser shrubby eucalypt woodland dominated by *Eucalyptus nebulosa*. Plants grow on the margins of the open sediment pans and on the edges of small slightly raised islands of heathy vegetation amongst the pans (Fig. 4–5). Associated plant species include *Leptospermum lanigerum*, *Baekkea leptocaulis*, *Sprengelia propinqua*, *Epacris glabella*, *Bauera rubioides* and *Gahnia grandis*. The third site is on the gentle slope of the ridge above one of the other sites. Here plants are growing in better drained soils, but are still in small openings in otherwise denser vegetation. Elevation varies from c. 110–120 m (sites on flats) to c. 190 m (ridge site). All sites occur on Cambrian ultramafic geology, identified on geology maps as “dominantly serpentinised layered dunite and harzburgite”.

The disturbance history of the area supporting the species is undocumented but includes some mineral extraction. Both the open sediment pan sites are on or close to old tracks and at least one appears to have been “worked over” (evidence of old mullock piles and that some of the drainage channels are the result of anthropogenic channelling). The openness of the sites is probably maintained by a combination of naturally poor drainage and fire events.

Population parameters. Based on knowledge from surveys to date, the species has an extent of occurrence of c. 43 ha, and an area of occupancy of less than 1 ha. The number of individuals at the three sites has not been formally documented: field observations indicate numbers such as 71 over c. 0.5 ha, 34 in less than 0.5 ha, 12 in c. 4 m², and c. 25 in 9 m², so that the total number of individuals is so far estimated to be less than 250.

Reservation status. The only recent collections of the new taxon are from the Meredith Range Regional Reserve, a gazetted reserve under the Tasmanian *Nature Conservation Act 2002*. The name Regional Reserve is



Fig. 4. Typical habitat of *Euphrasia amplidens* – an open sediment pan amongst otherwise dense scrubby eucalypt woodland.

applied to an area of land with high mineral potential or prospectivity and predominantly in a natural state. The purpose of such reserves is mineral exploration and development of mineral deposits, and the controlled use of other natural resources, while protecting and maintaining the natural and cultural values of that area of land.

Threats. The habitat supporting the species is subject to natural fire events that probably maintain the open gaps required for the species to persist in the absence of competition. Anthropogenic burning may be undertaken within the range of species, but is unlikely to be a threat *per se* (although undertaking such burns outside the peak flowering and fruit set period is suggested). Mineral exploration and extraction is the most likely activity to disturb populations of the species, but the impact would depend on the extent and nature of the disturbance. Further surveys would be warranted prior to any destruction of individuals or disturbance to potential habitat to ensure decisions are made in the context of the whole population.

Conservation status. Assessing the conservation status of a species represented by one historical and a single

localised contemporaneous group of collections is fraught with difficulties, but we believe a case should be presented to inform land managers with guidance on appropriate management of the new taxon. The paucity of collections is indicative of a naturally rare and restricted taxon. However, the region of its occurrence is somewhat remote and surveys are usually undertaken in response to development proposals rather than deliberately targeting potential habitat. The fact that the vascular plant species associated with ultramafic substrates in Tasmania have received considerable attention (e.g. Brown et al. 1986; Jarman & Mihaich 1991; Orchard 1991; Gray 2008), including in the west (e.g. Heazlewood Hill, Serpentine Ridge, Serpentine Hill), suggests that the lack of collections from other areas may represent a genuine geographic restriction. While further surveys in the region are undoubtedly warranted, a conservation status of Critically Endangered on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Endangered on the Tasmanian *Threatened Species Protection Act 1995* is suggested. Tasmania supports a suite of locally endemic taxa of *Euphrasia*, many of which are formally listed as threatened and included in the *Tasmanian lowland Euphrasia species*



Fig. 5. *Euphrasia amplidens* grows in and around the “islands” of vegetation and on the fringes of the scrub around the open sediment pans (individuals circled).

flora recovery plan (Threatened Species Section 2011), which includes relevant information on the management of locally restricted taxa.

Notes. The species was collected at some time in the 1800s, being represented in the Mueller Herbarium of the National Herbarium of Victoria (Fig. 6). The undated fragmentary collection *Scott MEL 41790* from an unknown locality in Tasmania, was noted under Sect. *Striatae* by Barker (1982, p. 107) as being remarkable for its unusually proportionate leaf apex, and a narrowly attenuate leaf base not seen in glandular hairy species of the section, being more akin to *E. striata*. “Scott” was most likely James Reid Scott (1839–1877), who arrived in Tasmania in 1856, and was a politician, surveyor, explorer and keen botanist. Between 1873 and 1876 he made various expeditions to little-explored parts of the west and southwest of Tasmania, reporting to the Minister of Lands that the area should be opened up and made accessible to encourage prospecting and mining (Smith 1976). The fact that Scott was interested in areas suitable for mining, supports the presumption that he may have collected his specimen from an area of high mineral prospectivity, such as ultramafic geology,

which expresses itself obviously in the landscape and vegetation.

Measurements of the flowers and their parts have been confined to two flowers only soaked in mild aqueous detergent, one at anthesis (the node above with flowers in mature bud) and the other clearly post-anthesis, but still attached in the calyx, together with examination of a series of flowers across the type and *Milner 16* in AD. Apart from the corolla parts, most dimensions have been checked against the dried specimens. Measurements of the capsule and seeds were made from the *Ziegler s.n.* collection in HO, which was collected 5–6 months later than the *Milner 16* and holotype material.

More collections and observations are needed to establish the full morphological variability of the species and the extent of its geographic and ecological range. Of particular interest is its relationship with serpentine soils. Tasmania supports several so-called “serpentine-endemics”, flora restricted to soils derived from ultramafic or serpentinite-bearing rocks, a globally recognised phenomenon (e.g. Anacker et al. 2011). Most notable amongst the Tasmanian examples are *Tetradlea gunnii*, restricted to a small area near Beaconsfield in the State’s northeast (Brown et al. 1986), *Micranthemum*

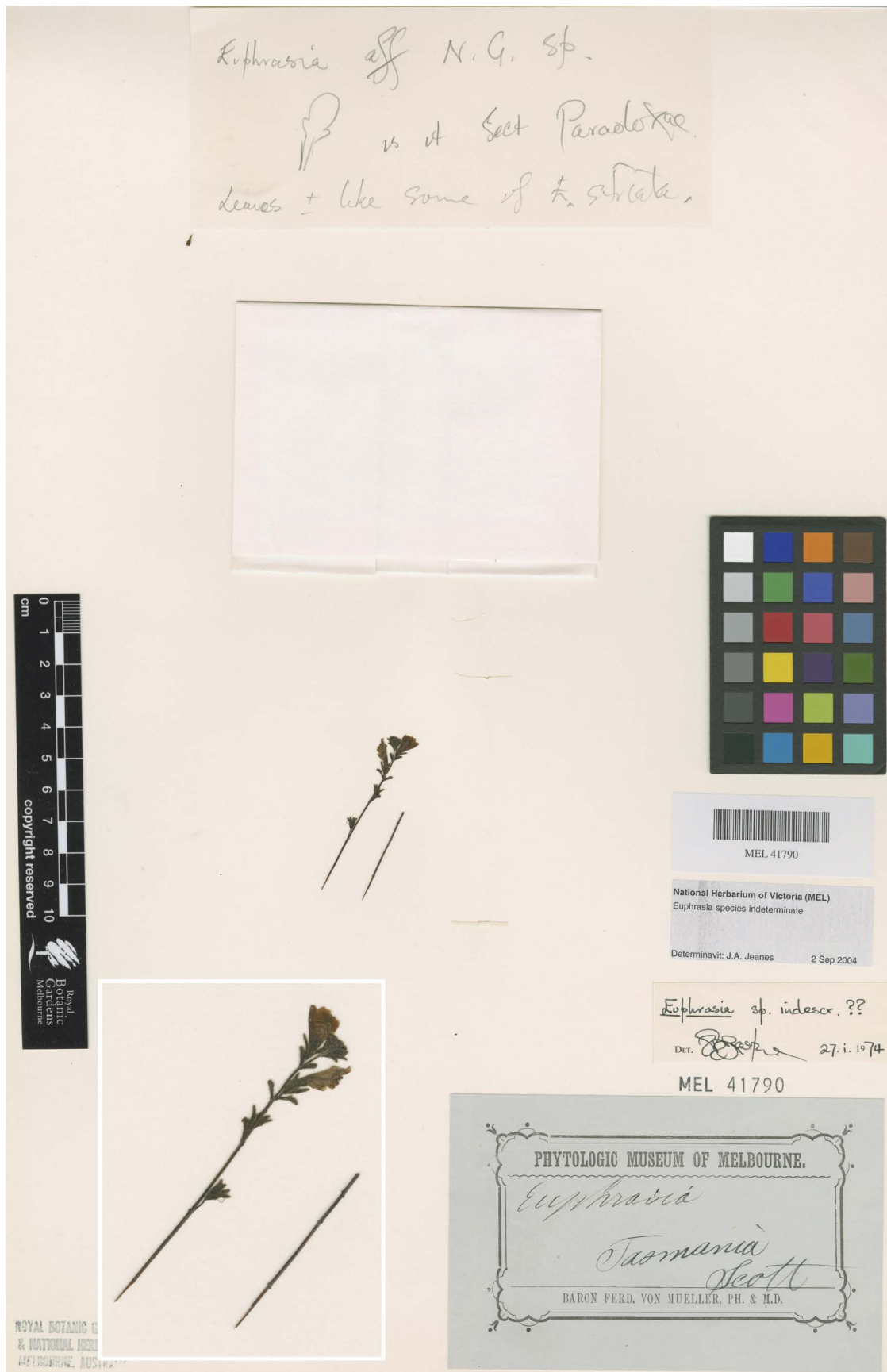


Fig. 6. The old *Scott* specimen from Tasmania in the National Herbarium of Victoria (MEL 41790), enlarged in inset (reproduced with permission from the Royal Botanic Gardens Melbourne).

serpentinum and *Epacris glabella*, both restricted to three serpentine exposures in the State's west (Jarman & Mihaich 1991; Orchard 1991), and possibly a recently described species of *Eucalyptus*, *E. nebulosa*, apparently restricted to a limited part of the Pieman River catchment on ultramafic substrates (Gray 2008). These latter three species co-occur with *E. amplidens*. Whether *E. amplidens* is another taxon wholly restricted to ultramafic substrates is not yet known; further surveys are required to document the extent of its geographic and ecological range. Discovery of novel sites will probably require considerable resources to access remote openings in otherwise virtually impenetrable scrub, but it is noted that the geological complex, with which the taxon appears to be associated, extends several kilometres to the northwest/southeast of the collection area and there appear to be numerous similar vegetation openings associated with drainage features.

Etymology. The epithet is a substantive, derived from the Latin *amplus* (large) and *dens* (tooth), alluding to the large apical leaf lobe (Fig. 2), which is unusual amongst species of *Euphrasia* in Australia and elsewhere, alluded to by Barker (1982, l.c.). A common name of **Pieman eyebright** is suggested, reflecting the distribution of the species.

Additional specimens examined

TASMANIA. West Coast region: *P. Milner 16*, Wilson River, 120 m, 28 Nov. 2011 (HO 568027, AD 250981); *Scott s.n.*, Tasmania [without locality or date] (MEL 41790); *K. Ziegler s.n.*, Wilson River, NW Tasmania, 2 May 2012 (HO 566956).

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