

***Sphaerolobium benetectum* (Leguminosae: Mirbelieae),
a new species from south-west Western Australia**

Ryonen Butcher

Department of Botany, The University of Western Australia, Nedlands, Western Australia 6907

Abstract

Butcher, R. *Sphaerolobium benetectum* (Leguminosae: Mirbelieae), a new species from south-west Western Australia. *Nuytsia* 13(3): 449–455 (2001). A new species of *Sphaerolobium* Sm. that has been collected from three widely spaced locations in the extreme south-west of Western Australia is described and illustrated. *Sphaerolobium benetectum* R. Butcher is one of a group of species possessing a distinctly black-spotted calyx and is most closely related to *S. drummondii* Turcz. and *S. validum* R. Butcher ms. A key to the members of this group is provided.

Introduction

Sphaerolobium Sm. (Leguminosae: Mirbelieae) currently contains 18 named species, 15 of which are endemic to the south-west of Western Australia and occur between Kalbarri in the north and Israelite Bay in the east. The genus shows its greatest species diversity and endemism in seasonally and permanently wet habitats along the south coast between Margaret River and Albany, with two recently described taxa, *S. pubescens* R. Butcher and *S. rostratum* R. Butcher (Butcher 1998), having been identified from within this region. Another new species restricted to seasonally wet habitats of the south-west, but with a wider more scattered range, is described in this paper.

The author is currently performing a cladistic analysis and full revision of the genus and this paper is presented as part of a series dealing with some of the more problematic areas and pressing changes required in the taxonomy of *Sphaerolobium*. The new south-western Australian species is described ahead of the revision because it has a high conservation priority, being known only from three unprotected populations, one of which may already be extinct.

Methods

This study is based on observations of all specimens housed at PERTH as well as photographs of type material for 22 of the 24 names listed in "Australian Plant Name Index" (Chapman 1991) borrowed from M.D. Crisp (Australian National University). In addition to PERTH material, specimens on loan from BM, DNA, G, HO, K, MEL, NSW and P were also seen. Habit and foliage measurement data were

taken from live plants and herbarium specimens and floral characters were taken from fresh material, from plants preserved in 70% ethanol and from reconstituted herbarium specimens.

Taxonomy

Sphaerolobium benetectum R. Butcher, *sp. nov.*

Suffrutices graciles, 0.3–1 m alti; folia alterna ad verticillata, caduca. Flores in axillis foliorum binati. Calyx viridis, atropunctatus, tubo supralabium c. duplo brevior. Corolla luteo-aurantiaca ad rubra, 5.5–6.1 mm longa. Carina angusta obtusata alis longiore. Antherae in sicco dorsaliter prominentibus umbrinis. Stylus leniter curvatus. Alae infra apicem stigmatis longae et angustae (1.2 mm longae, 0.2 mm latae) fimbria marginali longa.

Typus: 7.5 km south-east along Collie–McAlinden road from Collie–Preston road, south of Collie, Western Australia, 12 November 1999, R. Butcher & F. Valton RB 855 (*holo:* PERTH 05541182; *iso:* CANB, MEL, NSW).

Sub-shrub 0.3–1 m tall, up to 0.45 m wide, erect; stems slender, terete. *Stipules* absent. *Leaves* alternate to more or less whorled, sessile, linear to lanceolate, 3–3.5 mm long, 0.3–0.5 mm wide, acute, caducous before flowering. *Inflorescence* of paired, axillary flowers, the leaves caducous, forming a terminal raceme, 50–200 mm long, with 10–100 flowers, flowering basipetal. *Pedicels* 1–1.5 mm long. *Bracts* caducous. *Bracteoles* mid to dark green with irregular black spots over surface, lanceolate, c. 2.2 long, c. 1 mm wide, caducous. *Calyx* mid to dark green with irregular black spots over surface, the spots \pm aggregating at margins of lobes, turbinate, 3.5–4 mm long, the tube c. half as long as the upper lip; upper lip fused along 70–75% of its length, 2.3–2.7 mm long, broadly curved to falcate; lower lobes lanceolate, 2.1–2.6 mm long. *Corolla* yellow-orange and pink to red; standard yellow-orange and red, ovate, 5.1–6.3 mm long, 4.7–5.1 mm wide, including an oblong claw 0.7–0.9 mm long, this with flat to incurved margins and without callosities, the blade entire, slightly auriculate to auriculate, the eye \pm oblong with a flared apex, this with an irregular margin and with a diffuse red surround following veins for a short distance; wings pink-red, oblong, 5–5.5 mm long, 1.8–1.9 mm wide, including a claw 0.6–0.9 mm long, the whole shallowly pouched near spur, the apex of the blade rounded, the adaxial spur angled, 0.5–0.7 mm long; keel yellow and red, longer than the wings, 5.6–6.2 mm long, 2.3–2.6 mm wide, including a narrow claw 1.1–1.3 mm long, the whole pouched parallel to adaxial edge, the apex obtuse, the adaxial edge straight, the spur angled, 0.6–0.8 mm long, the abaxial edge gently arcuate. *Stamens* with filaments 4.5–5 mm long; anthers rotund to oblong, versatile, dorsifixed, 0.4–0.6 mm long, 0.3–0.5 mm wide, oblong appendages prominent on dorsal surface, orange to red on dried specimens. *Gynoecium* 6.5–9 mm long including the stipe (1–1.3 mm long, c. 0.2 mm wide); ovary glabrous, green; style 3–5.2 mm long, gently curving adaxially, with a narrow (1.2–1.4 mm long, c. 0.2 mm wide), densely fringed subapical wing; stigma shortly tufted. *Pod* green when immature, \pm orbicular, compressed obliquely on adaxial surface, c. 2.7 mm long, c. 2.3 mm wide. *Seeds* 2, not seen at maturity. (Figure 1A–I)

Other specimens examined. WESTERN AUSTRALIA: Mt Lindesay 4WD track, c. 3 km due E of Mt Lindesay, NNW of Denmark, 11 Nov. 1998, R. Butcher & J. Chappill RB 667 (PERTH, K); Collie Road South (7.7 km E along McAlinden–Cardiff road), 29 Oct. 1997, R.J. Cranfield 11474 (PERTH); off Mt Lindesay track, Denmark, 6 Nov. 1982, E.J. Croxford 1904 (PERTH); 5 km N of Brennan's Ford along Scott River road, NE of Augusta, 16 Nov. 1982, K.H. Rechinger 59871 (G).

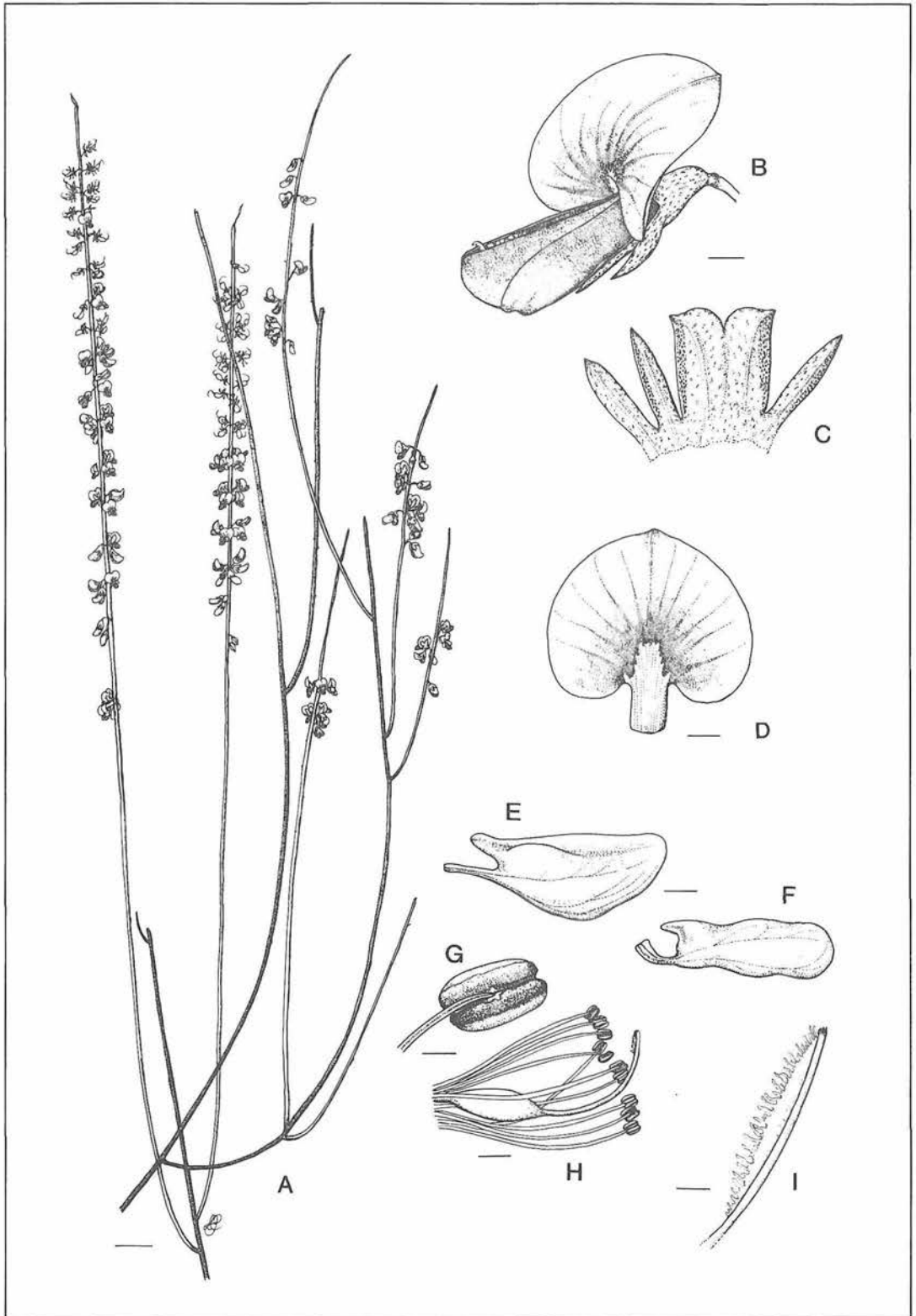


Figure 1. Illustrations of *Sphaerolobium benetectum*. A - habit; B - whole flower; C - calyx; D - standard petal showing roughly oblong eye with irregular margin; E - keel petal; F - wing petal; G - detail of dorsal surface of anther cells showing darker ridges; H - gynoecium showing gently curved style and anthers; I - detail of elongate sub-stigmatic wing showing long fringing hairs. Scale bars: A = 10 mm; B-F & H = 1 mm; G & I = 0.2 mm. Illustrations taken from R. Butcher & F. Valton RB 855 and drawn by Lorraine Cobb.

Distribution. *Sphaerolobium benetectum* has been found in three disjunct locations in the south-west of Western Australia; just south of Collie, north-east of Augusta and at the base of Mt Lindesay, north-west of Denmark (Figure 2).

Habitat. *Sphaerolobium benetectum* has been collected from low-lying, seasonally wet areas fringing swamps, from grey sandy loam over granite and white-grey to pinkish-light brown gravelly sandy clay. Associated vegetation includes *Eucalyptus* and scattered *Allocasuarina* woodland with a scrub understorey of *Agonis*, *Grevillea*, *Xanthosia rotundifolia*, *Dampiera*, *Sphaerolobium medium*, *S. grandiflorum* and sedge species, as well as low open shrubland at the intergrade between upland *Eucalyptus* woodland and swampland *Agonis* and *Callistemon* thicket.

Phenology. Flowers of *Sphaerolobium benetectum* have been collected in late October and November. Immature fruits have been collected in November.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority One. The three known populations of *Sphaerolobium benetectum* are unprotected and considered potentially threatened, with one possibly already extinct. A survey of the Mt Lindesay population of *S. benetectum* in November 1998 following a January controlled burn of the region found only one plant growing in an unburned depression, although numerous young plants of *S. drummondii* Turcz., *S. medium* R. Br. and *S. grandiflorum* (R. Br.) Benth. were located, suggesting that *S. benetectum* may have low tolerance to fire. Similarly, the large population growing south-east of Collie is located in a swampy area surrounded by *Phytophthora* infected Jarrah/Banksia woodland and, although the susceptibility of *S. benetectum* to die-back is not known, this situation may pose a risk to this population at a later date. Extensive survey of the Scott River Road locality in October and November 1998 failed to relocate the population from which the Rechinger 59871 collection was made, probably due to the high level of vegetation degradation and weed invasion along this road, and it is possible that this population is already extinct. As a consequence of these perceived threats, immediate further survey for *S. benetectum* is recommended.

Etymology. The specific epithet is derived from the Latin words – *bene* and – *tectus* which together mean “well hidden” or “well concealed” in reference to the long period of time in which this taxon remained uncollected and undescribed, as well as the difficulty with which further collections were made due to the cryptic nature of the species.

Affinities. *Sphaerolobium benetectum* has close affinities with a number of species in the genus which possess a mid- to dark-green calyx with black spots over the entire surface, in addition to black spots covering bracts and bracteoles and located along the margins of leaves. A key to the species contained in this group is presented as part of this paper. Within this group, *S. benetectum* is most similar to *S. drummondii* and *S. validum* R. Butcher ms, taxa previously and erroneously included under *S. macranthum* Meisn. (Bentham 1864; Butcher & Chappill in press), in having slightly raised appendages on the dorsal surface of anther cells which are orange to red when specimens are dried and a keel which is straight on the adaxial edge and arcuate on the abaxial edge. Of these two taxa, *S. validum* is more similar to *S. benetectum* as flowers are yellow-orange and red, the sub-apical stylar wing is prominently fringed and the anther appendages are oblong, drying orange to red and visible from the ventral surface of the anther at the apex and base. These two species can be differentiated however by their standard eye, which is stellate in *S. validum* and oblong with slightly irregular edges in *S. benetectum*; the stylar wing, which is narrowly triangular (0.5–0.7 x 0.1–0.2 mm) in *S. validum* and elongate (c. 1.2 x 0.2 mm) in *S. benetectum*, as well as by their habit; *S. validum* is more-or-less woody at the base with very thick, usually short branches whilst *S. benetectum* is more-or-less herbaceous with

slender, long branches. Comparatively, *S. drummondii* can be more easily distinguished from *S. benetectum* as its flowers are orange-red, pink-purple or cream, the standard eye is domed to cordate, the sub-apical stylar wing lacks a fringed margin and the anther appendages are usually pale orange and hastate to rhombic.

Although the keel of *Sphaerolobium benetectum* is straight on the adaxial edge and arcuate on the abaxial edge, the curvature is less pronounced and the apex of the keel is less obtuse in this species than in *S. validum* and *S. drummondii*. In this respect, as well as in its slender stems and floral coloration, *S. benetectum* resembles *S. medium*. These two species can be differentiated however, as *S. medium* has a keel which is more-or-less straight to gently curved on both edges with an acuminate apex, a stellate standard petal eye and a naked style. In its slender stems, *Sphaerolobium benetectum* also resembles *S. vimineum* and *S. fornicatum* Benth., but can be easily differentiated from each of these taxa by the shape of its keel petals; *S. vimineum* has a keel which is broadly curved on both the adaxial and abaxial edges with an obtuse to truncate apex whilst that of *S. fornicatum* is strongly arcuate on the adaxial edge and \pm straight on the abaxial edge, with a broadly obtuse apex.

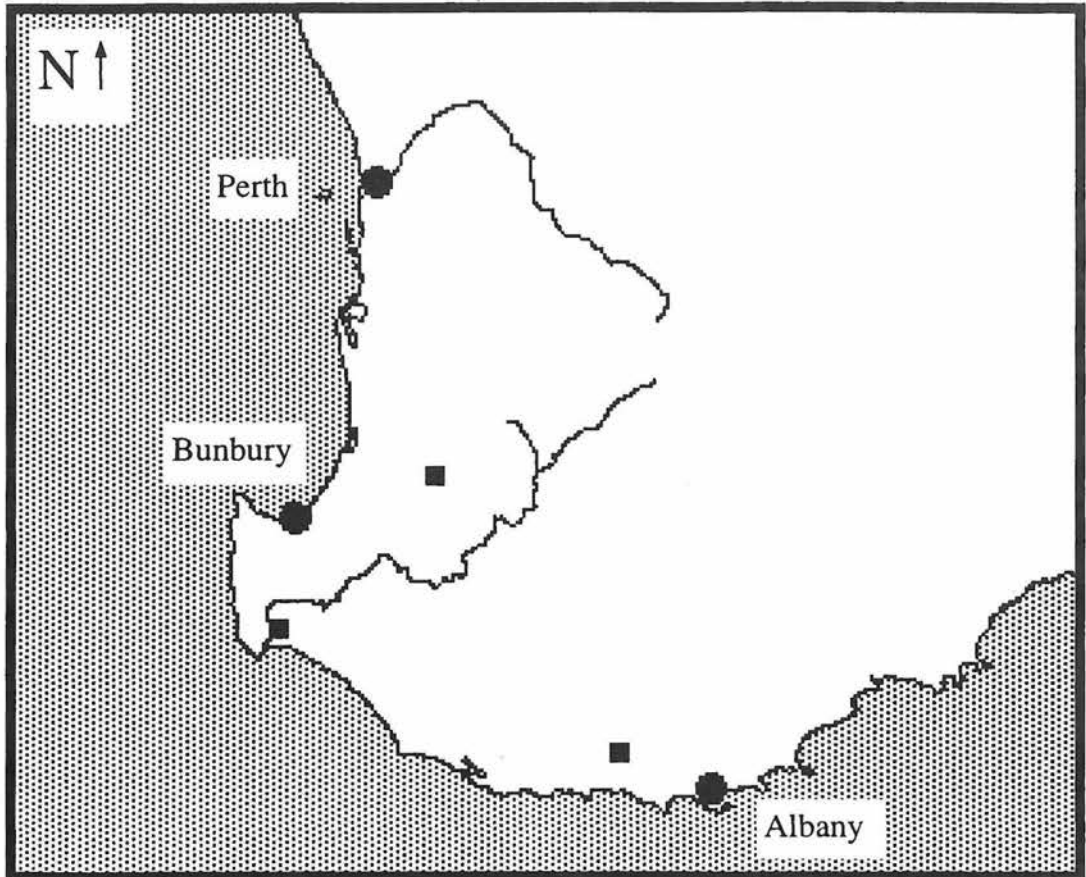


Figure 2. Distribution of *Sphaerolobium benetectum* in the south-west of Western Australia.

Key to *Sphaerolobium* with distinctly black-spotted calces

A complete key for the identification of all *Sphaerolobium* species is still in preparation, but a partial key is presented here to allow the identification of *S. benetectum* and all other taxa in the 'spotted calyx' group.

- 1 Flowers in terminal or lateral racemes, opening from the base (**Group 1—not included here**)
 1: Flowers paired in leaf axils, inflorescence racemiform with flowers opening from the apex **Group 2**

Group 2

- 1 Calyx mid to dark green with distinct black spots over entire surface when fresh and dried 2
 1: Calyx pale green to brown when dried with fine, green to brown spots towards apices of lobes when fresh **alternative not included**
 2 Calyx tube one-third to three-quarters length of upper lip 3
 2: Calyx tube *c.* equal in length to upper lip 6
 3 Keel petals acute to obtuse, *c.* equal in length to wings; style with a subapical wing; dorsal surface of anthers with appendages appearing pale orange to red when dried 4
 3: Keel petals acuminate, longer than the wings; style without a subapical wing; dorsal surface of anthers without orange to red appendages when dried. (Mt Lesueur to Fitzgerald River National Park) **S. medium**
 4 Stylar wing broad (0.3–0.8 mm wide), without a marginal fringe or with a few villi; standard eye domed to cordate; corolla orange-red or pink-purple, occasionally all cream. (Geraldton to Cape Arid National Park) **S. drummondii**
 4: Stylar wing narrow (0.1–0.2 mm wide), fringed; standard eye oblong to stellate; corolla yellow, yellow and red or pink-purple 5
 5 Branches short and thick; standard emarginate, not auriculate, standard eye stellate; stylar wing 0.5–0.7 mm long; stigma prominently tufted. (Bremer Bay to Esperance) **S. validum ms.**
 5: Branches elongate and slender; standard entire, auriculate, standard eye ± oblong; stylar wing 1.2–1.4 mm long; stigma papillose. (Collie, Augusta & Mt Lindesay) **S. benetectum**
 6 Keel petal apex beaked; calyx without black margin to lobes; ovary yellow with green-brown spots in lower half. (Walpole area) **S. rostratum**
 6: Keel petal apex obtuse or truncate; calyx usually with black margin to lobes; ovary a uniform colour 7
 7 Keel strongly geniculate with an erect apex; ovary dark green-brown to black. (Witchcliffe, Walpole to Albany and Stirling Range National Park) **S. grandiflorum**
 7: Keel gently to broadly arcuate on the adaxial surface with an obtuse apex; ovary pale green or yellow 8
 8 Standard petal longer than wings and keel; keel petals without red spots; stylar wing nearly as broad as long. (Perth to Albany, Fitzgerald River National Park, also New South Wales, South Australia, Victoria and Queensland) **S. vimineum**
 8: Standard petal shorter than or equal to the keel; keel petals with red spots from apex; stylar wing 3–4 times as long as broad. (Perth to Albany) **S. fornicatum**

Acknowledgements

I would especially like to thank Paul Wilson for his considerable help with the Latin component as well as Jenny Chappill for her comments on previous drafts and Mike Crisp from the Australian National University for the loan of type photographs. Illustrations of *Sphaerolobium benetectum* were kindly provided by Lorraine Cobb from the Department of Botany, University of Western Australia. Thanks are also due to CALM, Neville Marchant and the staff and volunteers at PERTH, BM, DNA, G, HO, K, MEL and NSW for provision of herbarium facilities and loan material. Additional thanks for their assistance in locating, or attempting to locate, populations are due to Ray Cranfield, Rob Davis, Ben Hartmann, Mike Hislop, Frederic Valton, Juliet Wege and Dan Wildy. This research was supported by an ABRS grant provided to Dr J. Chappill at University of Western Australia.

References

- Bentham, G. (1864). "Flora Australiensis." Vol. 2. (Reeve & Co.: London.)
- Butcher, R. (1998). *Sphaerolobium pubescens* and *Sphaerolobium rostratum* (Leguminosae: Mirbeliaceae), new species from Western Australia. *Nuytsia* 12(2): 171-178.
- Butcher, R. & Chappill, J.A. (in press). The *Sphaerolobium macranthum* (Leguminosae: Mirbeliaceae) complex revised. *Australian Systematic Botany* xx(x): xxx-xxx.
- Chapman, A.D. (1991). "Australian Plant Name Index." Australian Flora Series, No. 15. (Australian Government Publishing Service: Canberra.)