

## THE SPECIES OF *SPHAEROLOBIUM* (FABACEAE) IN TASMANIA

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(with one plate and three text-figures)

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ISSN 0080–4703. Tasmanian Museum and Art Gallery, GPO Box 1164, Hobart, Tasmania 7001, Australia (ACR\*, WM); Department of Plant Biology (Botany), University of Western Australia, 35 Stirling Highway, Crawley, Western Australia 6009, Australia (RB). \* Author for correspondence.

Two species of the globe pea *Sphaerolobium* occur in Tasmania: *Sphaerolobium minus* Labill. and *S. vimineum* Sm. Information on their morphology, distribution and conservation status in the state is discussed based primarily upon Tasmanian Herbarium (HO) records. The leaf morphology of both species is described.

**Key Words:** *Sphaerolobium*, Fabaceae, Tasmania, morphology, distribution, conservation status.

### INTRODUCTION

The genus *Sphaerolobium* Smith is endemic to southern Australia and comprises 20 named species, 17 of which are restricted to southwest Western Australia. Of the species found in Western Australia, *S. vimineum* Sm. is widespread in wet habitats of the southwest corner from Perth to east of Esperance, and is also found in the eastern states (Crisp 1993, Butcher & Chappill 2001). Crisp (1993, 1994) showed that in eastern Australia three species of *Sphaerolobium* exist, although he recorded only a single species, *S. minus* Labill., from Tasmania. Butcher & Chappill (2001: 157) subsequently recorded *S. vimineum* from the state, and fieldwork by ACR has independently recognised that this species is present in Tasmania. In this paper the morphology of both species is described and notes on their distribution and conservation status in Tasmania are included. *Sphaerolobium* is often described as lacking leaves. However, specimens of both species have been collected with leaves and these features are included in the descriptions. Leaves are present in all species of *Sphaerolobium*, at least in juvenile plants and on new shoots, however, in most species the leaves are caducous (Crisp & Weston 1987). The nomenclature for both species follows Crisp (1993); the Tasmanian biogeographical zones are those of Orchard (1988).

### TAXONOMY

Measurements are based upon alcohol-preserved plants of both species collected near Coles Bay, supported by size estimates of herbarium specimens. The colour notes are based on observations of living plants.

**Key to species of *Sphaerolobium* in Tasmania**  
(modified from Crisp 1993)

Calyx and bracteoles uniformly green-black *in vivo*; standard broadly obovate, wings equal to exposed keel; style with narrow membranous elliptical wing, tapering from apex down to 1/3–1/2 length of style ..... *S. minus*

Calyx and bracteoles green with small black spots *in vivo*; standard reniform, wings longer than and enclosing keel; style with membranous hemispherical wing, not abruptly tapering, and as broad as long and < 1/4 length of style

..... *S. vimineum*

### *Sphaerolobium minus* Labill. (1805:108, t 138)

#### Type

Habitat in capite Van Diemen [Tasmania], *J.J. Labillardiere s.n.* (holo FL-W; iso BM, W) *vide* Crisp (1993) (pl. 1).

#### Description

*Subshrub* slender, to 60 cm high, usually leafless, green, glabrous, with woody perennating rootstock. *Stipules* absent. *Leaves* dark green and uniformly coloured, with pale margins becoming white when dried, alternate, shortly stalked almost sessile, ovate to lanceolate, concavo-convex and curved around stem, 2.5–4.8 mm long, 0.2–0.5 mm wide, acute, caducous, remnant leafbases 0.4–1.0 mm long. *Inflorescence* of 20–80 paired axillary flowers, basipetally flowering, 20–130 mm long. *Pedicels* green–black with a few black flecks, 1.2–2.0 mm long. *Bracts* green–black, glabrous, narrowly ovate, 2.1–2.5 mm long, 1.1–1.3 mm wide, caducous. *Bracteoles* green–black, glabrous, ovate, 2.2 mm long, 1.5 mm wide, caducous. *Calyx* uniformly green–black, 3.0–3.5 mm long, turbinate, tube 1.2–2.0 mm long, 50–80% as long as upper lip, upper lip formed by 2 adaxial/upper lobes fused along 80–90% of their length, 1.7–2.5 mm long and each lobe broadly ovate, lower 3 lobes narrowly triangular, 1.7–2.3 mm long. *Corolla* yellow or red and yellow; standard pure yellow, or with faint red, or broadly defined red region following veins for a short distance, surrounding ± domed eye towards the base of the standard, broadly obovate, 5.0–6.0 mm long, 5.5–6.0 mm wide, including a rectangular claw of 1.0–1.5 mm length, this without callosities, margins ± flat. Wings yellow infused with some red towards the base, rarely all yellow, ± obovate, 4.0–6.4 mm long, 1.7–2.7 mm wide, including a curved claw of 1.0–1.5 mm long, adaxial spur triangular, twisted, the apex of the blade rounded. Keel yellow with red apex, or all yellow rarely, ± equal to the wings, 4.5–6.0 mm long, 2.0–2.7 mm wide, including a

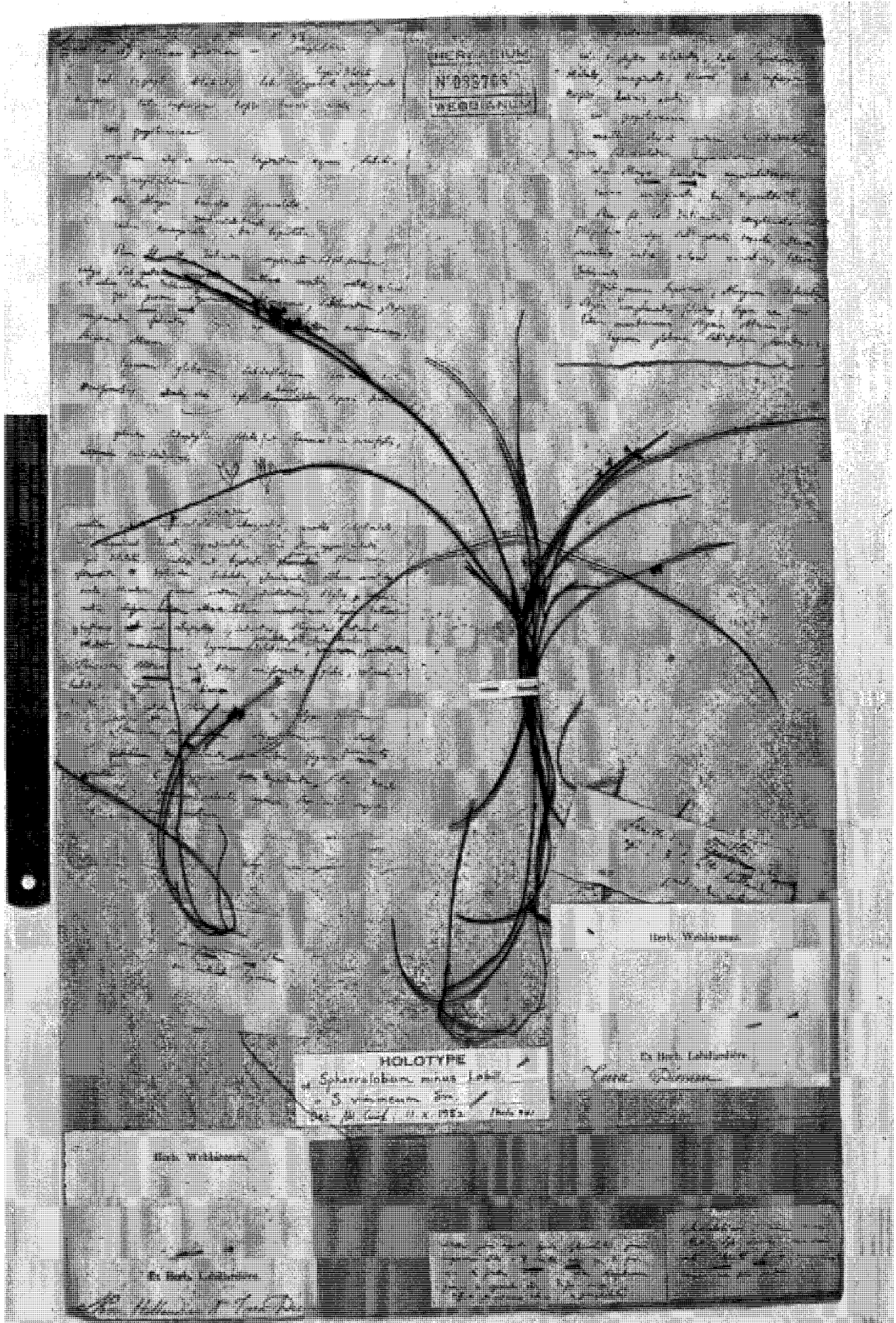


PLATE 1  
Holotype of *Sphaerolobium minus* Labill. from the Herb. Webbiana (Florence).

straight claw of 1.0–1.5 mm length, the blade pouched from the claw towards the adaxial edge, the apex obtuse and slightly upturned, the adaxial edge straight, adaxial spur triangular, the abaxial edge arcuate, angled downwards. *Stamens* with filaments 3.5–4.5 mm long; anthers  $\pm$  oblong, versatile, dorsifixed, c. 0.5 mm long, c. 0.3 mm wide, with small dorsal appendages. *Gynoecium* 6.0–7.0 mm long including the stipe (1.0–1.5 mm long) and the style (3.5–4.0 mm long), ovary glabrous, style straight to about one-third of its length, geniculate and curved distally, twisted towards apex, stylar wing narrow, fringed, 1.8–2.2 mm long. *Pod* light golden-brown, ellipsoid, 3.5–3.9 mm long, 2.4–2.6 mm wide, the style persistent, strongly bent backwards towards pod. *Seed* uniformly orange-light brown, 1.7–1.8 mm long, 1.2–1.3 mm wide,  $\pm$  ovate, laterally compressed, without an aril, testa smooth.

#### Common name

Common eastern globe pea.

#### Selected specimens examined

Tasmania: East Coast: Copping 42°09'S, 147°48'E, roadside, *J. Somerville s.n.*, 24 xi 1959 (HO12149); Cape Hauy Track, 43°09'S, 148°00'E, *G. Kantvilas s.n.*, 17 xi 1979 (HO506905); Milligans Hill, Schouten Island 42°18' 26"S, 148°16' 13"E, *Eucalyptus* forest on dolerite, *Rozefelds 1912*, 14 xi 2000 (HO509311). North East: Pioneer, Gladstone Road, 41°04'S, 147°57'E, *Eucalyptus ovata* (*E. amygdalina*) low open woodland, *F. Duncan s.n.*, 15 xi 1980 (HO330025); Goulds Country, 41°14'S, 148°03'E, *A. Simson 630*, xi 1876 (HO512120); Near Turners Marsh, 41°16'S, 147°08'E, *A. Simson 2453*, x 1891 (HO512028). South West: Track to Southport Headland, 43°28'S, 146°59'E, coastal eucalypt/heath community, *Rozefelds 624*, 22 xi 1992 (HO323644). West Coast: Near Remine, 41°55'S, 145°10'E, buttongrass moorland, *S. J. Jarman s.n.*, 14 i 1984 (HO323150).

New South Wales: Central Tablelands. Near Carrington Falls on the Robertson-Jamberoo road, 34°37'S, 150°39'E, rather wet ground, alt. 2000 ft, *Eucalyptus* woodland, *M. Evans 2665*, 24 x 1967 (NSW263704, CANB, K, L, A, CHR, AD, US, E, BO, BISH).

South Australia: Region 7: Eyre Peninsula. Wanilla Conservation Park, 34°33'0"S, 135°43'15"E, west facing slope; white sand with ironstone pebbles near hill crest, *E. cladocalyx* woodland with tall understorey of *Leptospermum*, *Baeckea*, *Acacia gillii* and low understorey of *Hibbertia*, *Xanthorrhoea*, *Lepidosperma*, *Dillwynia*, *Adenanthos*, *Pultenaea*, *D. Hopton 218*, 26 x 1988 (CANB523515, AD).

Victoria: East Gippsland. Turn-off to Genoa Creek, 4.6 km W of Genoa on Princess Hwy, 37°29'05"S, 149°33'00"E, growing in a moist depression, margin of open *E. considaniana-E. globoidea-E. ignorabilis* forest with *Bossiaea prostrata*, *Comesperma ericinum*, *Sowerbaea juncea* and *Hibbertia empetrifolia*, *J.H. Ross 3517*, 23 x 1991 (CANB501745, HO303763, BRI, CBG, S, MEL).

#### Remarks

Flower colour is variable with some flowers all yellow, while others are yellow with red flecking.

#### Distribution and ecology

*Sphaerolobium minus* is sometimes sympatric with *S. vimineum* (cf. *Rozefelds 2142 and 2139*) and often occurs in

seasonally wet areas, but also tolerates drier conditions, e.g. in *Eucalyptus ovata* woodland (*Duncan s.n.*). It has been collected from almost all regions (*sensu* Orchard 1988) of Tasmania, except very high montane areas (fig. 1). On mainland Australia, *S. minus* has been recorded from New South Wales, Victoria, South Australia and Queensland (Butcher & Chappill 2001: 158); and, as in Tasmania, has been collected from a wide range of habitats, although it shows a preference for damp, peaty substrates. This species does not occur in Western Australia.

#### Flowering

October–January

#### Conservation

This species is widespread and common throughout the State (fig. 1).

### *Sphaerolobium vimineum* Sm. in K.D. Koenig & Sims (1805: 509)

#### Type

Port Jackson, N[ew] S[outh] Wales, *J. White s.n.* 1793 (holo LINN: iso LIV) *vide* Crisp (1993).

#### Description

*Subshrub* slender, to 1 m high, usually leafless, green, glabrous, with woody perennating rootstock. *Stipules* absent. *Leaves* dark green with a few black punctate markings, with pale margins becoming white when dried, alternate, shortly stalked, linear–lanceolate to elliptical, slightly concavo-convex to almost flat in larger leaves, 3.5–6.5 mm long, 0.5–1.0 mm wide, caducous, remnant leaf bases about 1 mm long. *Inflorescence* of 15–60 paired axillary flowers, basipetally flowering, 20–180 mm long. *Pedicels* dark green with black punctate markings, 1.5–2.0 mm long. *Bracts* green with

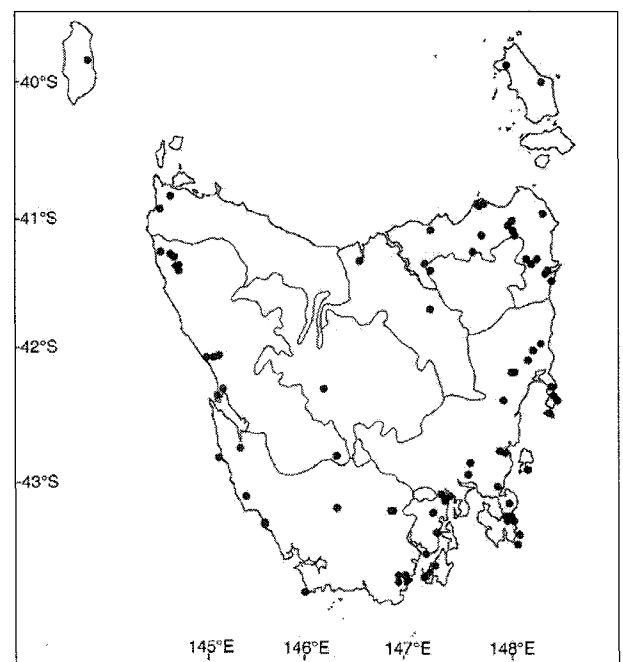


FIG. 1 — Distribution of *Sphaerolobium minus* in Tasmania based upon Tasmanian Herbarium (HO) records.

black punctate markings, ovate, 1.5–2.8 mm long, 0.6–2.0 mm wide, caducous. *Bracteoles* green with black punctate markings, ovate, 0.7–3.5 mm long, 0.5–1.9 mm wide, caducous. *Calyx* green with black punctate markings, 3.5–4.0 mm long, turbinate, tube 1.7–2.5 mm long, about equal to the upper lip, upper lip formed by 2 anterior lobes fused along 75–85% of their length, 1.5–2.7 mm long and each lobe broadly ovate, lower 3 lobes narrowly triangular to lanceolate, 1.5–2.5 mm long. *Corolla* yellow with some red; standard usually yellow with semicircle of dark red markings following veins for a short distance bordering a  $\pm$  semicircular yellow ‘eye’, reniform, 4.6–7.0 mm long, 5.0–8.0 mm wide, including a rectangular claw of 1.0–1.5 mm length, this without callosities, margins curved, the blade shallowly emarginate, broadly auriculate. Wings yellow and broadly infused with some red towards the base,  $\pm$  oblong, 4.2–6.0 mm long, 1.5–3.0 mm wide, including a curved claw of about 1.0 mm length, adaxial spur rounded, petal pouched outwards near base and apical margins deflected inward, the apex of the blade rounded. Keel pale yellowish green with red apex, shorter than the wings, 4.0–5.0 mm long, 2.0–3.5 mm wide, including a straight claw of 1.0–1.5 mm length, petal everted in basal half, with a small pouch on the lateral surface, the apex rounded, the adaxial edge curved and arcuate, adaxial spur triangular, the abaxial edge arcuate, angled downwards. *Stamens* with filaments 4.0–4.5 mm long, anthers broadly elliptical, versatile, dorsifixed, 0.4–0.65 mm long, 0.4–0.5 mm wide, without visible appendages on dorsal surface. *Gynoecium* 6.5–8.0 mm long including the stipe (1.0–1.5 mm long) and the style (3.0–4.5 mm long); ovary glabrous, style curved over ovary adaxially, with stylar wing  $\pm$  hemispherical, 0.7–0.8 mm long. *Pod* light golden brown,  $\pm$  globose, strongly angled on adaxial edge towards style and stipe, the style persistent, fully reflexed and pressed against pod, 3.1–3.2 mm long, 2.8–3.4 mm wide. *Seed* uniformly yellow-light brown, ovate, about 1.5 mm long, about 1.1 mm wide, laterally compressed, without an aril, testa smooth.

#### Common name

Eastern spotted globe pea

#### Selected specimens examined

Tasmania: North East: Bay of Fires Coastal Reserve, N of Sloop Lagoon, 41°12'S, 148°16'E, coastal heath in inundated areas, *Rozefelds* 1468, 3 xii 1999 (HO500846). East Coast: Road to Coles Bay, Freycinet Peninsula, 42°58'44"S, 148°14'19"E, in swampy areas, regrowth after fire, *Rozefelds* 2139, 2146, 25 x 2001 (HO516991, HO516993); edge of swamp, SW of Coles Bay, *Rozefelds* 2158, 26 x 2001 (HO516992); 1 km SW of Cape Naturaliste, on lagoon shore burned in 1981, with *Patersonia fragilis*, *Selaginella uliginosa*, *Pultenaea dentata*, *Boronia parviflora*, etc. 2–2.5 m alt., 40°52'S, 148°12'E, *A.Moscal* 3428, 13 x 1983 (HO88577).

New South Wales: Central Highlands, Hanging Rock Swamp, 5.6 km NW of Penrose Railway Station in the Penrose State Forest, 34°39'S, 150°10'E, swamp, *Leptospermum obovatum*, *L. juniperinum*, *Viola caleyana*, etc., *R.G.Coveny*, *P.Hind*, *T.James* & *P.Kodala* 17196, 17 xi 1994 (NSW402258, CANB, MEL, BRI).

Queensland: Wide Bay Military Training Area, about 8 km NNW of Tin Can Bay Township, alt. 3 m, 25°51'S, 152°59'E, deep ‘wallum’ heath, *L.G.Adams* 3607, 22 ix 1980 (BRI430157, CANB).

Western Australia: 2 km NW of Frenchmans Bay Rd on La Perouse Rd, 35°5'6"S, 117°55'57"E, *Eucalyptus* woodland and dense *Agonis* scrub surrounding low lying swamp, with dense sedges, *Callistachys lanceolata*, *Patersonia* sp., *Anigozanthus* sp., *R.Butcher* & *J.Chappill* RB 347, 10 x 1997 (UWA); E side of Hay River Bridge, between river and Keith Rd., W of Denmark, 34°57'58"S, 117°27'55"E, flat swampy area in *Melaleuca* woodland with shrubland comprising *Sollya heterophylla*, species of *Andersonia*, *Dampiera*, *Conostylis*, *Brachysema* and sedges, *R.Butcher* & *J.Chappill* RB 350 10 x 1997 (UWA); Cape Le Grand National Park, 33°51'S, 122°27'E, sandy soil, *R.D.Royce* 8701, 21 x 1969, (PERTH2922088); Cape Le Grand National Park, 33°51'S, 122°27'E, sandy soil, *R.D.Royce* 8830, 22 x 1969 (PERTH2922339).

#### Remarks

Crisp (1993) suggested that eastern and western Australian collections of *Sphaerolobium vimineum* might represent different taxa. This supposition may have been based on the colour variation evident within this species across its range. Notes on herbarium specimens from New South Wales, Victoria and Queensland indicate that the flowers of *S. vimineum* are yellow to orange with red–brown markings, and this matches the few collections made in Tasmania to date, but flowers of this species from Western Australia are more commonly orangey-pink to red and the wings and keel are usually uniformly pink to red. Variation in corolla colour is evident across the southwest of Western Australia however, with some collections (*R.D.Royce* 8701, 8830) more closely matching eastern states material in being predominantly yellow–orange. The pattern of colour variation across the state has also been observed in other Western Australian species of *Sphaerolobium*, e.g. *S. drummondii* Turcz., *S. macranthum* Meisn., *S. medium* R. Br., *S. grandiflorum* R. Br., *S. daviesiodes* Turcz. and *S. racemulosum* Benth., and is not felt to be consistent enough for the colour forms to warrant formal taxonomic recognition (Butcher & Chappill 2001).

#### Distribution and ecology

The species has rarely been collected in Tasmania and is known only from swamps and the edges of lagoons in the northeast of the state (fig. 2).

#### Flowering

October–December

#### Conservation status

Although *S. vimineum* has been collected from swampy heath habitats in South Australia, Victoria, New South Wales and Queensland (Butcher & Chappill 2001: 157), the rarity of this species in these states has not been discussed, and collection information available from herbarium specimens indicates that abundance at any given site ranges from rare to locally common. In southwest Western Australia *S. vimineum* is widespread, but its distribution is patchy and corresponds with appropriate, seasonally wet habitat, with only a few collections made from drier sites and these in high rainfall areas. Much of the suitable habitat of *S. vimineum* in the Perth metropolitan area and on the Swan Coastal Plain has been destroyed by development and land-clearing for agriculture.

In Tasmania, this species has been collected from only four localities in the northeastern part of the state, and no

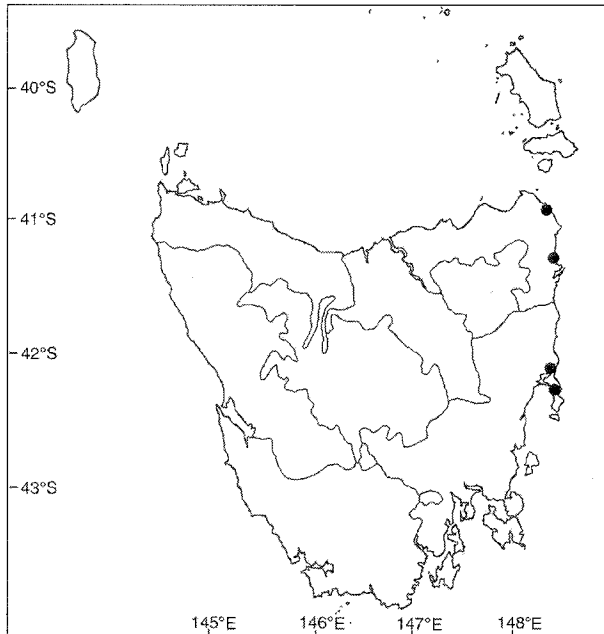


FIG. 2 — The distribution of *S. vimineum* in Tasmania based upon Tasmanian Herbarium (HO) records.

attempt has been made to accurately assess or survey the numbers of plants in these areas. As *Sphaerolobium* was considered to be represented by a single species in Tasmania (Curtis & Morris 1993, Buchanan 1999), flora surveys in the past are therefore likely to have uncritically referred all records of the genus to *S. minus*. The few known herbarium collections, the limited geographical extent of the species in Tasmania, the specialised habitat requirements and the fragmented distribution of the species would suggest that *S. vimineum* requires listing under the Tasmanian *Threatened Species Protection Act* 1995. While adequate information on the distribution of the species is currently not available, a conservation status of 'rare' under the Act is considered appropriate. A higher conservation rating may be required once field surveys have been undertaken to assess both population size and distribution of *S. vimineum* in Tasmania. As in Western Australia, land-clearing and development and the drainage of swamps for agriculture and pasture have probably resulted in the loss of suitable habitat, and may represent an ongoing threat to the species in the future.

## DISCUSSION

Flowering specimens are needed to accurately distinguish between *Sphaerolobium minus* and *S. vimineum*. *Sphaerolobium vimineum* differs from *S. minus* most noticeably in the spotted appearance of the calyx, in that the standard is almost twice as wide as long, and that the wing petals enclose the keel (Fig. 3A, B, F, G). In addition, the wing on the style is hemispherical in *S. vimineum*, while in *S. minus* it is narrow and tapers down from the apex (Fig. 3C, H). Observations of *S. vimineum* and other species in the genus also indicate that leaves are present on all new growth but fall before flowers are fully formed in the axils and so are rarely

collected (Crisp & Weston 1987). In a few herbarium specimens available the leaves of *S. minus* are ovate to lanceolate and uniformly coloured while those of *S. vimineum* are more elliptical and dark green with a few black punctate markings (fig. 3D, E, I, J). It is, however, possible to find both broadly elliptic and linear-lanceolate leaves on a single specimen of *S. vimineum*.

*Sphaerolobium vimineum* has only been collected from northeastern Tasmania (fig. 2). This region is an interesting biogeographical zone as it includes a large number of species that are shared with mainland Australia, and that reach their southern limit in this area. Species restricted to northeastern Tasmania, which also occur on mainland Australia, include *Caustis pentandra*, *Dockrilla striolata*, *Drosera glanduligera*, *Eucalyptus sieberi*, *Hydrocotyle callicarpa*, *H. capillaris*, *Leionema bilobum*, *Lepidosperma forsythii*, *L. viscidum*, *Muehlenbeckia adpressa*, *Pseudanthus ovalifolius*, *Ricinocarpus pinifolius*, *Sphaerolobium vimineum*, *Thryptomene micrantha*, *Villarsia exaltata*, *Viminaria juncea* and *Zieria littoralis*. The northeastern corner of the state could be interpreted as a refugium for species, such as *S. vimineum*, that may formally have been more widespread. Alternatively, lower sea levels at various times in the Quaternary, including during the Last Glacial, led to the formation of a land bridge between mainland Australia and northern Tasmania (Macphail 1979, Kirkpatrick & Fowler 1998; G. Jordan pers. comm. 2002). It is equally plausible that some of these species may have invaded this region during drier periods, or that there could have been a bi-directional movement of species during drier periods in the Quaternary, assuming suitable and/or continuous habitat conditions existed.

## ACKNOWLEDGEMENTS

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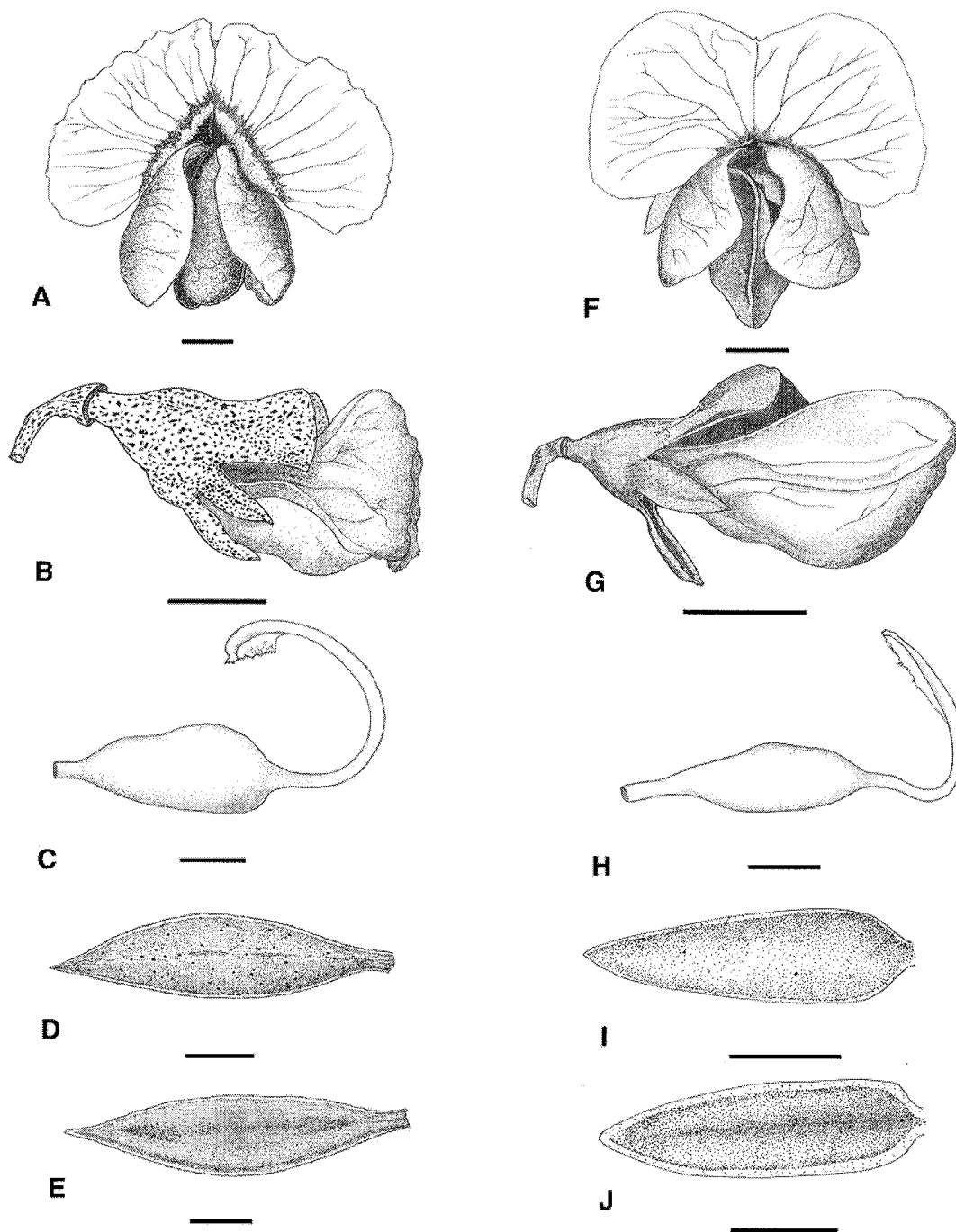


FIG. 3—*Sphaerolobium vimineum* Smith. (A) flower showing shape of standard; (B) flower with standard removed displaying conspicuously speckled calyx and wings enclosing the keel; (C) gynoecium; (D) leaf, adaxial view; (E) leaf, abaxial view. F–J. *S. minus* Labill. (F) flower showing shape of standard; (G) flower with standard removed displaying non-speckled calyx and wings equal to the keel in length; (H) gynoecium; (I) leaf adaxial view; (J) leaf abaxial view.

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