

A taxonomic revision of the basin-like rosetted triggerplants of the *Stylidium piliferum* complex (Stylidiaceae) from south-western Australia

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Abstract

Lowrie, A. & Kenneally, K.F. A taxonomic revision of the basin-like rosetted triggerplants of the *Stylidium piliferum* complex (Stylidiaceae) from south-western Australia. *Nuytsia* 28: 339–382 (2017). A taxonomic revision of the basin-like rosetted triggerplants of the *Stylidium piliferum* R.Br. complex (Stylidiaceae) from the south-west of Western Australia is presented. Fifteen species are recognised including the new species *S. amphora* Lowrie & Kenneally, *S. bindoon* Lowrie & Kenneally, *S. monticola* Lowrie & Kenneally, *S. nitidum* Lowrie & Kenneally, *S. ponticulus* Lowrie & Kenneally, *S. salmoneum* Lowrie & Kenneally, *S. strigosum* Lowrie & Kenneally and *S. vinosum* Lowrie & Kenneally. Revised descriptions are provided for seven named species: *S. bicolor* Lindl., *S. ciliatum* Lindl., *S. ferricola* Wege & Keighery, *S. hispidum* Lindl., *S. miniatum* Mildbr., *S. piliferum* and *S. pubigerum* Sond. All species are illustrated and a key is also provided.

Introduction

This paper presents a taxonomic revision of those species of *Stylidium* Sw. (Stylidiaceae) that share a similar life form to that found in the first-named species in this complex, *S. piliferum* R.Br. (subg. *Tolypangium* (Endl.) Mildbr. sect. *Lineares* (Benth.) Mildbr.). Species in this complex are endemic to Western Australia and form a natural group characterised by crowded, more-or-less incurved leaves that are arranged to form a ‘basin-like’ rosette, a term created by Erickson (1958).

The *S. piliferum* complex is further characterised by: partly connate calyx lobes (with two lobes connate for most of their length and three free to their base or more rarely connate); vertically-paired corolla lobes, with the anterior pair larger than the posterior pair; the absence of throat appendages, and presence of coloured throat markings that serve as insect guides.

Methods

This study is based on extensive field collecting, and studies in herbaria in Australia, the United Kingdom, Europe and the United States of America. We observed, photographed and collected most taxa during field studies conducted over many flowering seasons. One of us (AL) also collected fresh material, which was used either for preparation of voucher specimens (including spirit materials) or

to establish cultivated collections for further study. Morphological descriptions and illustrations were drawn up using dried, spirit, fresh and cultivated material.

Stylidium collections at the Western Australian Herbarium (PERTH) have been examined to determine their species status. Specimens in other herbaria were examined and photographed wherever it was possible to locate such material. In particular, one of us (KFK) examined Australian collections to identify type material in MEL and NSW as well as the following overseas herbaria: ABD, B, BM, C, E, G, GOET, HAL, HBG, K, L, LD, M, NY, P, S and UPS.

Key to the basin-like rosetted triggerplants

1. Leaf margins ciliate or hispid
 2. Entire scape and inflorescence glandular; leaf margins ciliate **S. ciliatum**
 - 2: Lower scape glabrous, upper scape and inflorescence glandular; leaf margins hispid **S. hispidum**
- 1: Leaf margins entire or serrulate
 3. Calyx with 2 connate and 3 connate lobes **S. pubigerum**
 - 3: Calyx with 2 connate and 3 free lobes
 4. Calyx lobes glabrous
 5. Hypanthium with glandular or non-glandular trichomes
 6. Hypanthium moderately to sparingly glandular; scapes ascending **S. ferricola**
 - 6: Hypanthium densely covered with glandular or non-glandular trichomes; scapes erect
 7. Hypanthium indumentum of yellowish non-glandular trichomes; main body of calyx lobes glabrous with marginal hyaline a little irregular and minutely ciliate **S. bindoon**
 - 7: Hypanthium indumentum of glandular trichomes arising from the apex of distinctive conical mounds; main body of calyx lobes glabrous, marginal hyaline serrulate, serrations irregularly very shortly ciliate, some cilia bearing glandular tips (scattered glands sometimes present on the calyx bases) **S. miniatum**
 - 5: Hypanthium glabrous
 8. Pedicels glabrous **S. nitidum**
 - 8: Pedicels glandular **S. monticola**
 - 4: Calyx lobes glandular
 9. Hypanthium narrowly oblong
 10. Hypanthium with glandular and non-glandular strigose trichomes **S. strigosum**
 - 10: Hypanthium with glandular and non-glandular upright trichomes **S. vinosum**
 - 9: Hypanthium ellipsoidal or obovoid
 11. Hypanthium broadly obovoid (ratio 6:4) **S. amphora**
 - 11: Hypanthium ellipsoidal to narrowly obovoid (ratio 3:1)
 12. Leaves linear **S. bicolor**
 - 12: Leaves oblanceolate

13. Corolla lobes with a distinctive bridge between the anterior and posterior pair; leaves silvery grey-green and shiny **S. ponticulus**
- 13: Corolla lobes without a distinctive bridge between the anterior and posterior pair; leaves green and not shiny
14. Corolla lobes salmon-pink, with a reddish mark near the base of each posterior lobe; leaves 1.4–2 cm long, 1.5–2 mm at widest point **S. salmoneum**
- 14: Corolla lobes white or pink, with yellow marks near the base of each posterior and anterior lobe; leaves 2–2.5 cm long, 1.5–1.6 mm at widest point..... **S. piliferum**

Taxonomy

Stylidium amphora Lowrie & Kenneally, *sp. nov.*

Type: Karomin Rocks, Nungarin, Western Australia, 12 October 1991, *A. Lowrie* 399 (*holo:* PERTH 08702470; *iso:* MEL).

Stylidium sp. Narembeen (W.E. Blackall *s.n.* /09/1929), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb; 20–28 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 3 tightly clustered rosettes arising from the apices of below-ground stems, with the bases adpressed to the soil surface, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, glabrous, oblanceolate, incurved, transversely narrowly semi-lenticulate in T.S., 3–4 cm long, 0.8–1 mm wide near the base, gradually dilating to 2–4 mm wide near the apex, *c.* 0.3 mm thick, margin translucent-white, hyaline, ± entire or a little irregularly serrate, apical mucro translucent-white, stiff, 1–1.2 mm long. *Scape* green, glabrous; bracts absent. *Inflorescence* usually racemose, sometimes pedunculate in groups of 2 or 3 flowers, peduncles and pedicels 7–12 mm long, inflorescence densely covered throughout with short glandular trichomes 0.2–0.3 mm long; floral bracts green, glabrous, ovate, 2.5–3 mm long, 1–1.2 mm wide, margin hyaline, ± entire, apical mucro translucent-white, stiff, 0.7–0.8 mm long; bracteoles similar to but much smaller than the floral bracts. *Hypanthium* green, broadly obovoid at anthesis, 5–5.5 mm long, 2–2.5 mm wide, densely covered with short glandular trichomes 0.2–0.3 mm long. *Calyx* with 2 lobes fused together for half their length, 1.8–2 mm long, 3 lobes free to their base, 2.5–2.7 mm long, margins entire, not hyaline, outer surface of the calyx sparsely covered with short glandular trichomes similar to those on the hypanthium. *Corolla* mostly always yellow but occasionally white or cream, abaxial surface yellow, glandular; lobes vertically-paired; anterior lobes 7–7.5 mm long, 2.5–3 mm wide, with red, triangular marks near the base, apical margins bearing glands; posterior lobes 6–6.5 mm long, 1.8–2.3 mm wide, with ± crescent-shaped, reddish marks near the base. *Labellum* boss green, ± narrowly obovate, *c.* 0.1 mm long, *c.* 0.8 mm wide, smooth; lateral appendages green, subulate, *c.* 0.7 mm long, *c.* 0.3 wide at the base; margins papillose, forming minute red beard *c.* 0.2 mm wide, with a few glands sometimes present. *Throat* yellow, appendages absent. *Gynostemium* *c.* 20 mm long, reddish, torosus yellow; anthers reddish maroon, positioned *c.* 45° to the gynostemium, *c.* 3 mm long, *c.* 1.5 mm wide, margins with translucent-white, moniliform hairs *c.* 1.5 mm long; pollen pale yellow; stigma 1, gibbose, *c.* 1.5 mm long, *c.* 0.5 mm wide when mature. *Capsule* broadly obovoid, *c.* 7 mm long, *c.* 4.5 wide near its apex, *c.* 1 mm wide at the base. *Seeds* not seen. (Figure 1)

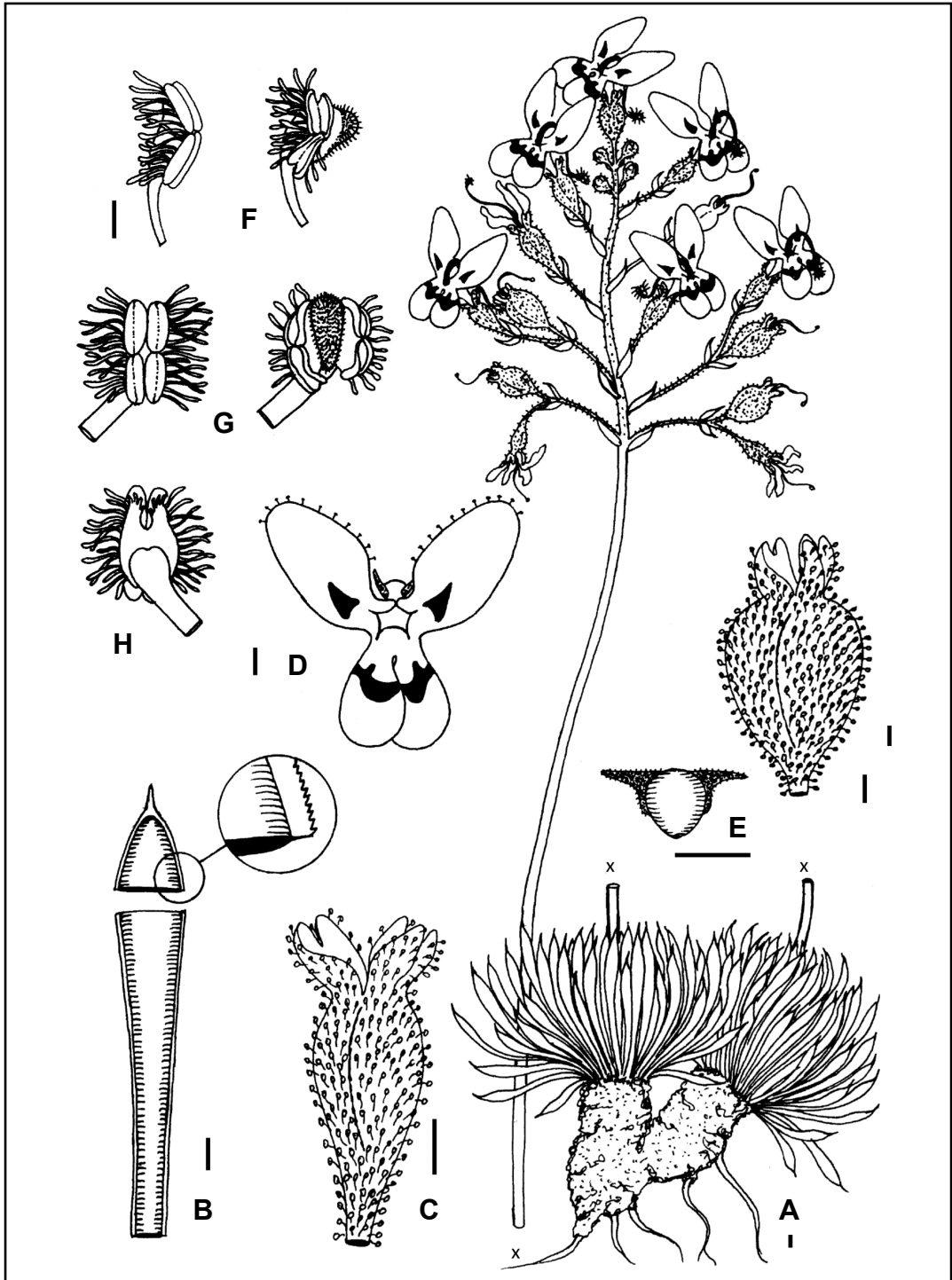


Figure 1. *Styliidium amphora*. A – habit of flowering plants; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigma grown out (right); H – abaxial view of gynostemium tip at anther stage; I – seed capsule. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 399.

Diagnostic features. *Stylidium amphora* is distinguished from other members of the *S. piliferum* complex by having a yellow corolla with a very long [c. 20 mm] gynostemium; reddish maroon anthers, with long translucent-white moniliform hairs on the margins; stigma gibbose; and a seed capsule that is distinctly broadly obovoid, c. 7 mm long, c. 4.5 wide near its apex and c. 1 mm wide at the base.

Selected specimens examined. WESTERN AUSTRALIA: near Newdegate [E of Lake Grace], 7 Nov. 1931, *W.E. Blackall* 1291 (PERTH); Cowcowing, Oct. 1904, *M. Koch* 1215 (PERTH); Karomin Rocks, Nungarin, 13 Oct. 1991, *A. Lowrie* 401 (PERTH); Karomin Road, near Mangowine Homestead, 10 Oct. 1992, *A. Lowrie* 679 (PERTH); Quairading, 20 Oct. 2011, *A. Lowrie* 4209 (PERTH); uncleared privately owned land on C.G. 10492, 1 km NW Mawson Siding, 19 km W Quairading, 8 Sep. 1977, *B.G. Muir* 397 C/W (PERTH).

Vernacular name. Amphora Triggerplant (here designated).

Distribution and habitat. Occurs in the Avon Wheatbelt in the region bordered by Quairading north 114 km to Cowcowing, east-south-east 70 km to Nungarin, south 246 km to Newdegate and north-west 208 km back to Quairading. Grows in loamy sand on the aprons of granite outcrops as well as in white, sandy soils on heathland. The soil types other collectors have recorded include sandy loam, pale sand, yellow sand, gravel soils, shallow brown loam over granite, and brown clayey sand. The associated vegetation communities too are variably recorded as: *Leptospermum roei* shrubland, sometimes with *Banksia* and *Verticordia*; *Allocasuarina acutivalvis* thickets; *Borya*, mosses, scattered shrubs in granite rock crevices to dwarf shrub places; open heath.

Flowering period. September to December.

Conservation status. Not threatened.

Etymology. The epithet *amphora* is from the Latin *amphora* – amphora, a container shaped in an obovoid form, used in vast numbers for the transport and storage of various products, both liquid and dry, but mostly for wine during the reign of the ancient Roman Empire. The epithet *amphora* is used as a noun in apposition and refers to the hypanthium as well as the seed capsule of this species being of a similar shape to an amphora.

Affinities. *Stylidium amphora* is chiefly distinguished from all other members of the *S. piliferum* complex by its distinctly broadly obovoid hypanthium and seed capsule.

In some specimens (e.g. *A. Lowrie* 679, PERTH) of *S. amphora* the posterior corolla lobes are sometimes fused basally, but to a lesser degree than *S. ponticulus* Lowrie & Kenneally. However, in these specimens this bridge-like structure has concavely curved sides between the anterior and posterior lobe bases, whereas in *S. ponticulus*, the bridge between these lobes has distinctively angled, parallel sides, and the posterior lobes are notably very small.

Furthermore, *S. amphora* is distinguished from *S. ponticulus* (whose contrasting morphological characters are given in parenthesis) by having: a very long [c. 20 mm] gynostemium (gynostemium c. 11.5 mm long); anthers reddish maroon (anthers dark maroon); with long, translucent-white, moniliform hairs on the margins (moniliform hairs translucent-red); stigma gibbose (stigma pulviniform).

Notes. In the field one of us (AL) has mostly seen yellow-flowered specimens; however, at the type

location a few specimens were found that had cream-coloured flowers. Other collectors have also labelled their herbarium gatherings as having just yellow flowers; however, some collectors record the flower colours of their gatherings as: white; cream with red stripes below and yellow throat; cream or yellow.

Stylidium bicolor Lindl., *Sketch Veg. Swan R.*: xxviii (1839); *Stylidium piliferum* var. *bicolor* (Lindl.) Mildbr., in Engl., *Pflanzenr.* (Heft 35): 71 (1908). *Type*: not cited [*vide* J.A. Wege, *in sched.*: Swan River, 1839, *J. Drummond s.n.*] (*iso*: K 000060741, K 000355199, K 000355200).

Perennial herb, 30–40 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 4 tightly clustered rosettes arising from the apices of below-ground branching stems, with their bases adpressed to the soil surface, very old plants branching above the soil surface; leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green on the adaxial surface, abaxial surface pale maroon, linear, incurved, transversely lenticulate in T.S., 2.5–3.5 cm long, 0.6–0.8 mm wide near the base, narrowing just above the base then gradually dilated to 1.2–1.3 mm wide near the apex, *c.* 0.4 mm thick, hyaline margin translucent-white, serrulate, 0.1–0.2 mm wide, apical mucro translucent-white, 2–2.5 mm long. *Scape* glabrous; with 1 or more (generally 3 or 4) scattered bracts similar to the floral bracts. *Inflorescence* mostly racemose, pedicels 4–8 mm long, inflorescence glandular, trichomes translucent-white, 0.2–0.3 mm long, tipped with blackish maroon gland; floral bracts ovate, 2–3 mm long, 0.6–0.8 mm wide, apical mucro translucent-white, 0.5–0.8 mm long, hyaline margin translucent-white, serrulate; bracteoles similar, 1–1.2 mm long, 0.4–0.5 mm wide. *Hypanthium* dark green, narrowly obovoid to narrowly oblong at anthesis, 3–4 mm long, 1.5–2 mm wide, densely glandular, trichomes translucent-white 0.2–0.3 mm long, tipped with blackish maroon glands. *Calyx* with 2 lobes connate almost to their apex, 2.5–3 mm long, 3 lobes free to base, 2.5–3 mm long, moderately glandular, margin hyaline, translucent-white, ± entire to a little irregular. *Corolla* white, abaxial surface whitish with reddish lanceolate mid-vein stripes, moderately glandular with scattered translucent-white trichomes tipped with blackish maroon glands; lobes vertically-paired; anterior lobes 4–4.5 mm long, 2.5–3 mm wide, bases yellow with reddish marks; posterior lobes 6–7 mm long, 3–3.5 mm wide, bases yellow with reddish marks. *Labellum* boss pale green, broadly obovate, *c.* 1 mm long, *c.* 1 mm wide, smooth; basal appendages 2, lateral, pale green tinged with red, subulate, *c.* 0.4 mm long, *c.* 0.2 mm wide at the base, papillose; margins red, papillose. *Throat* yellow, appendages absent. *Gynostemium* *c.* 12 mm long, red, torus pale green; anthers blackish maroon, positioned *c.* 45° to the gynostemium; margins with translucent-white moniliform hairs; pollen yellow; stigmas 2, clavate, one projected *c.* 0.7 above the anthers, the other projected *c.* 0.5 mm below. *Capsule* obovoid, *c.* 6 mm long, *c.* 3 mm wide. *Seeds* brown, ± ovoid in outline with ± angled longitudinal sides, 0.5–0.6 mm long, 0.35–0.4 mm wide, testa mostly smooth with a few scattered minute papillae. (Figure 2)

Diagnostic features. *Stylidium bicolor* is distinguished from all other species in the group by having a basal rosette of linear leaves; scape (including inflorescence) 30–40 cm long, with mostly single, alternate flowers along its rachis; corollas white, lobes vertically-paired, abaxial surface whitish with reddish lanceolate mid-vein stripes, anterior and posterior lobe bases yellow with reddish marks.

Selected specimens examined. WESTERN AUSTRALIA: Guildford, Perth, Oct. 1901, *C. Andrews s.n.* (PERTH); 15.3 km from Jurien Bay toward Moora; at turnoff Moora-Eneabba road, 24 Sep. 1968, *E.M. Canning* WA/68 3392 (PERTH); 38 km S of the Geraldton Highway turnoff on the Eneabba road, 28 Sep. 1976, *R.J. Chinnock* 3197 (PERTH); Hi Vallee property (D. & J. Williams) Warradarge, southern end of main valley, 23 Oct. 1999, *M. Hislop* 1728 B (PERTH); 5 km S of Eneabba town site,

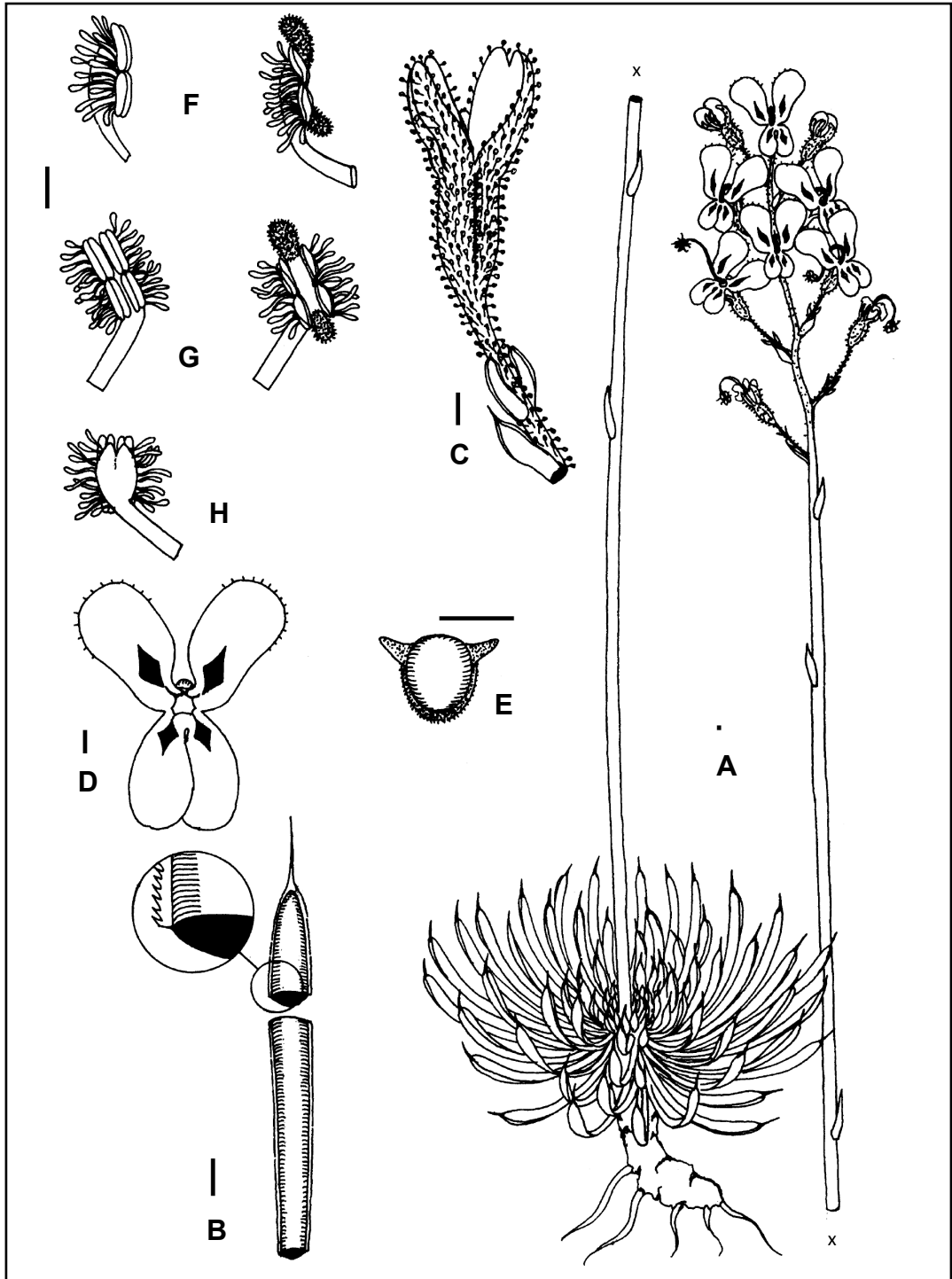


Figure 2. *Stylidium bicolor*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigmas grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 413.

11 Nov. 2014, *F. Hort* 21 (PERTH); 4–5 m[iles] S Hill River Bridge on road leaving bitumen road at 9.5 m[iles] E Jurien Bay going S to Cadda Road, Oct. 1971, *S. James* 71.10/35 (PERTH); north-western boundary of the Agriculture Protection Board complex, Bougainvillea Ave, Forrestfield (adj. to plot apbf-2), 24 Sep. 1992, *B.J. Keighery & N. Gibson* 920 (PERTH); 11.2 km N of Arrowsmith River, on the Brand Highway, N of Perth, 17 Oct. 1975, *K.F. Kenneally* 4694 (PERTH); Fynes Nature Reserve, E of Fynes Road, S of Mogumber Road, 7 Nov. 2006, *S. Kern & A. Rea* 12083 (PERTH); on Banovich Road (S end), c. 0.6 km S of creek crossing, Mt Lesueur region, 18 Oct. 1991, *A. Lowrie* 413 (MEL, PERTH); Yeal Nature Reserve, 50 m W from a point 690 m SSW of intersection of track and Airforce Road at 3.57 km W along Airforce Road from intersection with Duffy Road, 1.25 km N along Duffy Road from intersection of Airfield Road and Duffy Road, Gingin South, 14.8 km SW of Gingin, GSS site 9A, 17 Oct. 2008, *D.A. Mickle & M.L. Swinburn* 340 (PERTH); Watheroo National Park, 4 Oct. 1971, *R.D. Royce* 9557 (PERTH); 6.3 km from Brand Highway along Airfield Road, then Duffy Road, Yeal Swamp Nature Reserve, 10 Oct. 2006, *J.A. Wege* 1334 (PERTH); 1.6 km E on Cadda Road from Brand Highway, Badgingarra National Park, 20 Oct. 2009, *J.A. Wege* 1686 & *W.S. Armbruster* (PERTH); at the end of Schofield Road, near Welshpool Road, eastern coastal plain, Perth, 9 Oct. 1998, *J.A. Wege* 507 & *J. Bussell* (PERTH); c. 9.8 km W along Orange Springs Road from Brand Highway, Moore River National Park, 1 Oct. 2004, *J.A. Wege* 1223 & *K.A. Shepherd* (PERTH); 8.65 km N along Cockleshell Gully Road from Jurien East Road, Lesueur National Park, 24 Sep. 1996, *J.A. Wege* 214 & *R. Wiltshire* (PERTH); E of Yardonogo Nature Reserve, Mt Adams Road, c. 30 km S of Dongara, 23 Oct. 2006, *G. Woodman & B. Taylor* D 5 – 2 (PERTH).

Distribution and habitat. Swan Coastal Plain north, extending from Welshpool to Arrowsmith River. Grows in: deep white or grey sand in open *Banksia* woodlands as well as low shrubland with scattered emergent mallee and *Nuytsia*; yellow-grey sand in *Banksia* and *Allocasuarina* woodland; white sand over clay colluvium in *Banksia/Acacia/Cycas* [? *Macrozamia*] and loam in woodland dominated by *Banksia menziesii*, *B. attenuata* and *Eucalyptus todtiana*; sandy grey soils in low open heath.

Vernacular name. Northern Sandplain Triggerplant (here designated).

Flowering period. September to November.

Conservation status. Reasonably widespread and well-represented within the conservation estate.

Etymology. The epithet is from the Latin *bi-* (two-) and *-color* (-coloured), and refers to the corolla colour.

Affinities. *Stylidium bicolor* is morphologically similar to *S. ponticulus* because it too typically has a simple raceme inflorescence. *Stylidium bicolor* differs from *S. ponticulus* (whose contrasting characters are given in parenthesis) by having: leaves dull, linear, transversely lenticulate in T.S., mucro 2–2.5 mm long (leaves shiny silvery grey-green, oblanceolate, transversely narrowly obtriangular with a prominent abaxial longitudinal mid-vein in T.S., mucro 1–1.8 mm long); corolla white, abaxial surface whitish with reddish, lanceolate, mid-vein stripes, anterior and posterior lobe bases joined together (corolla white or pink, abaxial surface white, anterior lobes connected to the posterior lobes by a little bridge).

Notes. Mildbraed (1908) reduced *S. bicolor* to a variety of *S. piliferum*; however, this species has been recognised in Western Australia since 2006 (Western Australian Herbarium 1998–). *Stylidium bicolor* differs considerably from *S. piliferum* (whose contrasting principal characters are given in parenthesis) by having: linear leaves (leaves oblanceolate); mostly single-flowered pedicels (peduncles

mostly multi-flowered); corolla lobes with yellow and reddish marks near the base (corolla lobes with yellow marks near the base).

Stylidium bindoon Lowrie & Kenneally, *sp. nov.*

Type: on the corner of Julimar Road and Plunkett Road, c. 22 km west of Toodyay, Western Australia, 21 September 1991, A. Lowrie 324 (*holo*: PERTH 08702519; *iso*: MEL).

Stylidium sp. Bindoon (K.F. Kenneally 11405), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb; 7–14 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 4 tightly clustered rosettes arising from the apices of below-ground stems and sitting above the ground on stilt roots; leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, incurved, transversely falcate with the abaxial longitudinal mid-vein prominent in T.S., 0.9–1.2 cm long, 0.5–0.6 mm wide near the base, gradually dilating to 0.8–1.2 mm wide near the apex, c. 0.3 mm thick, hyaline margin translucent-white, serrulate, 0.1–0.15 mm wide, apical mucro translucent-white, 3–6 mm long. *Scape* glabrous; bracts absent. *Inflorescence* racemose, densely covered with translucent-yellow non-glandular trichomes c. 0.1 mm long, with a cluster of translucent-white trichomes c. 0.2 mm long each tipped with a blackish maroon gland; pedicels 3–6 mm long; floral bracts ovate, 2–3 mm long, 0.5–0.6 mm wide, mucro translucent-white, 0.7–1.5 mm long, hyaline margin translucent-white, serrulate; bracteoles similar, 1.2–1.5 mm long, 0.2–0.3 mm wide. *Hypanthium* dark green, narrowly oblong at anthesis, 3.5–6 mm long, 0.5–1 mm wide at the base, dilated to 0.9–1.5 mm at the apex, densely covered with non-glandular yellowish trichomes c. 0.1 mm long, with a cluster of translucent-white trichomes c. 0.2 mm long, each tipped with a blackish maroon gland, positioned on the base of the hypanthium and extending onto the pedicel. *Calyx* glabrous, 2 lobes connate almost to their apex, 3 lobes free to their base, 2–3 mm long, margin hyaline, translucent-white, a little irregular and minutely ciliate. *Corolla* pale yellow fading to cream, abaxial surface pale yellow blushed with red along the mid-vein, moderately glandular with scattered translucent-white trichomes tipped with blackish maroon glands; lobes vertically-paired; anterior lobes 5–7 mm long, 2.8–3 mm wide, with yellowish green marks near their base, posterior lobes 7–9 mm long, 2.5–3.5 mm wide, with yellowish green marks near the base. *Labellum* boss pale green, broadly obovate, c. 0.9 mm long, c. 1 mm wide, smooth; basal appendages 2, white, subulate, lateral, c. 0.6 mm long, c. 0.3 mm wide at the base, papillose; margins and apical beard white, irregular, c. 0.1 mm wide, papillose. *Throat* with yellowish green marks only, appendages absent. *Gynostemium* c. 15 mm long, reddish, torus yellowish green; anthers reddish, positioned c. 45° to the gynostemium; margins with short, translucent, pale red, moniliform hairs; pollen white; stigmas 2, clavate, projected between the spent anthers, the upper one c. 0.7 long, the lower one c. 0.5 mm long. *Capsule* not seen. *Seeds* not seen. (Figure 3)

Diagnostic features. *Stylidium bindoon* is distinguished from all other members of the *S. piliferum* complex by having: a basal rosette of oblanceolate leaves; a glandular, narrowly oblong hypanthium with glabrous calyx lobes, with the hypanthium densely covered with non-glandular, yellowish trichomes, with a cluster of translucent, white trichomes c. 0.2 mm long, each tipped with a blackish maroon gland, positioned at the base of the hypanthium and extending onto the pedicel; and a pale yellow (fading to cream) corolla.

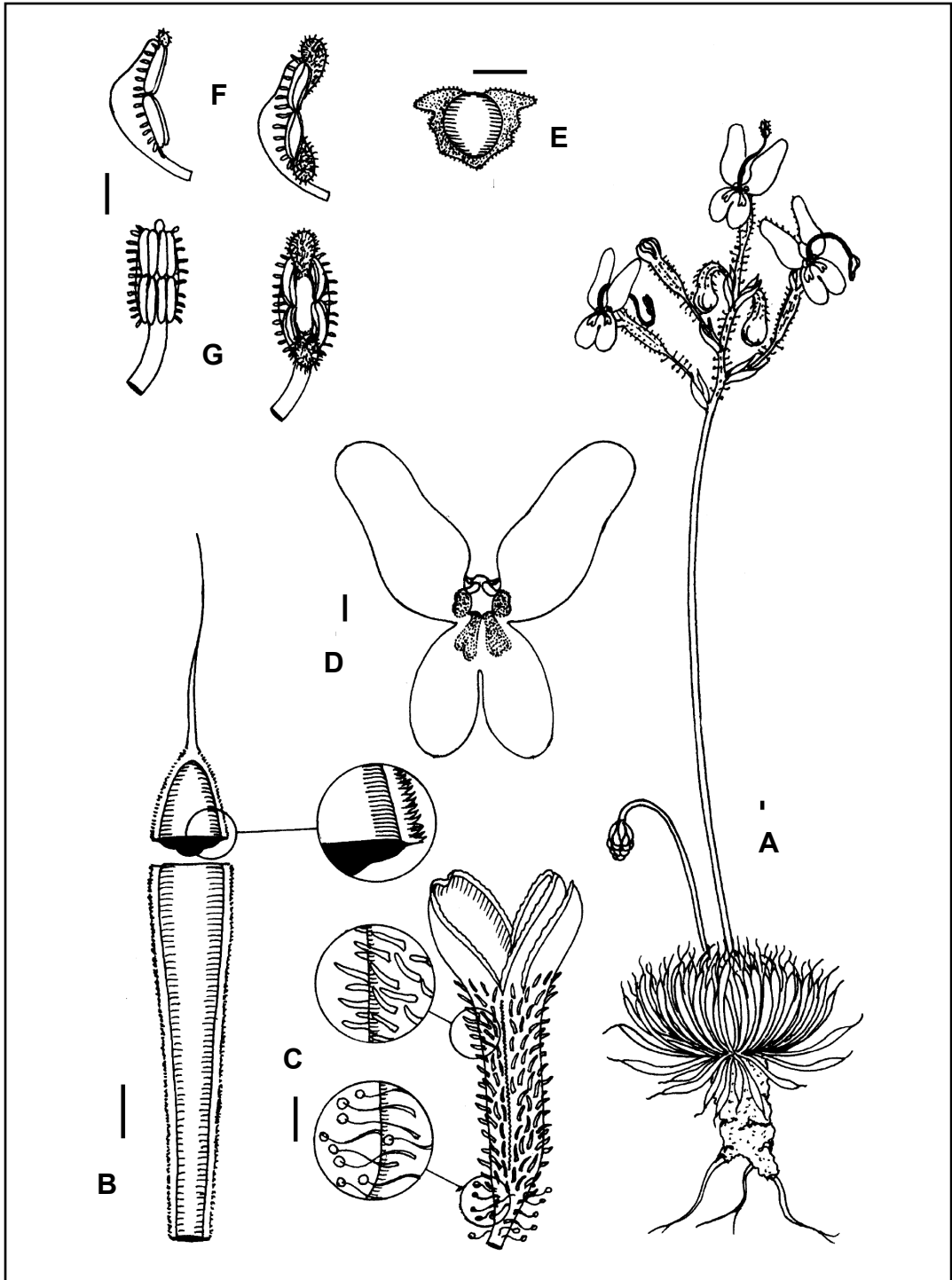


Figure 3. *Styliidium bindoon*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, with indumentum details (insets); D – corolla; E – labellum; F – lateral view of gynoecium tip showing anthers (left), and with the stigmas grown out (right); G – adaxial view of gynoecium tip showing anthers (left), and with the stigmas grown out (right). Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 324.

Selected specimens examined. WESTERN AUSTRALIA: 66 mile peg on Geraldton Road [5 km S of Wannamal on the Geraldton Highway], 1 Oct. 1947, *C.A. Gardner* 8652 (PERTH); c. 6 miles S of Toodyay on Toodyay-Perth Road, Sep. 1974, *S. James* 74.9.17 (PERTH); behind Mount Rupert Station, Mount Rupert Estate is 6 km N of the Wongan Hills-Piawanning Road, W of Wongan Hills township, 10 Sep. 1975, *K.F. Kenneally* 4587 (PERTH); track into Julimar Forest, 20 km E of junction of Great Northern Highway and Dewars Pool-Bindoon Road and 17.5 km SW on track into forest, 3 Nov. 1993, *K.F. Kenneally* 11405 (PERTH); on Dewars Pool Road, c. 5 km E of Great Northern Highway, 14 Sep. 1991, *A. Lowrie* 302 (MEL, PERTH); on Dewars Pool-Bindoon Road, c. 7 km E of Great Northern Highway, 14 Sep. 1991, *A. Lowrie* 303 (MEL, PERTH); on Great Northern Highway c. 1.2 km S of Hay Flat Road, 28 Sep. 1991, *A. Lowrie* 334 (MEL, PERTH); on Great Northern Highway in swamp just E of the junction with Rutland Road, Bullsbrook, 2 Oct. 1991, *A. Lowrie* 356 (MEL, PERTH); just N of the entrance of Walyunga National Park W boundary, 2 Oct. 1991, *A. Lowrie* 368 B (MEL, PERTH); transect number: DP15, Dewars Pool Road, c. 21.9 km E of the intersection with Toodyay-Bindi-Bindi Road, 11 Oct. 2000, *B. Morgan* BMor 15 (PERTH); E of Bindoon, 10 Sep. 1952, *A. Notley s.n.* (PERTH); transect number: DP07, Dewars Pool Road, c. 24.1 km E of the intersection with Toodyay-Bindi-Bindi Road, 30 Sep. 2000, *M.E. Trudgen* MET 21,172 (PERTH); rest area c. 7.6 km E on Calingiri-Wongan Hills Road from Great Northern Highway, 9 Oct. 2002, *J.A. Wege* 662 (PERTH); c. 1.2 km E of Railway Road, Clackline Nature Reserve, 5 Oct. 2010, *J.A. Wege* 1781 (PERTH); c. 9 km S of Toodyay on Toodyay Road, 29 Sep. 2002, *J.A. Wege* 657 & *C. Wilkins* (PERTH).

Vernacular name. Bindoon Triggerplant (here designated).

Distribution and habitat. Occurs on the Swan Coastal Plain, in the Jarrah Forest and north to the Avon Wheatbelt. Grows: along breakaway ridge lines in brown clayey sand over laterite in open wandoo and jarrah woodland with *Banksia sessilis*; in brown gravel, laterite in *Eucalyptus accedens* open woodland with *Banksia squarrosa*; in laterite gravel with open shrubs in open wandoo woodland; in laterite in jarrah and marri open woodland; in grey-brown gritty quartzite sand with *Banksia menziesii* woodlands and heath; in brown loamy sand with fine gravel in *Eucalyptus marginata* woodlands and mixed, low open heath.

Flowering period. September to October.

Conservation status. Reasonably widespread and well represented within the conservation estate.

Etymology. This species is named after the town-site of Bindoon (Latitude 31° 23' S, Longitude 116° 06' E). Bindoon was gazetted in 1953, but the name has been in use in this area for over 150 years. It is derived from the name given by an early settler, Mr William Locke Brockman, to the property he surveyed in 1843. Bindoon is an Aboriginal name, thought to mean 'place where yams grow' (*vide* Landgate 2017). The epithet is formed as a noun in apposition.

Affinities. *Stylidium bindoon* is morphologically similar to *S. miniatum* Mildbr. as both species have a glandular hypanthium with glabrous calyx lobes. It differs from *S. miniatum* (whose contrasting characters are given in parenthesis) by having: oblanceolate leaves (leaves linear); a narrowly oblong hypanthium, densely covered with non-glandular, yellowish trichomes c. 0.1 mm long with a cluster of translucent white trichomes c. 0.2 mm long, each tipped with a blackish maroon gland, positioned on the base of the hypanthium and extending onto the pedicel (hypanthium narrowly obovoid, glandular, glandular trichomes ± of similar length arising from the apex of distinctive translucent conical mounds, gland mounds extending onto the pedicel for a short distance).

Stylidium ferricola Wege & Keighery also has a glandular hypanthium with glabrous calyx lobes and on present knowledge appears to be a species confined to the Whicher Range east of Busselton some 240 km south of the closest populations of *S. bindoon* near Bullsbrook. While both *S. bindoon* and *S. ferricola* share a narrowly oblong hypanthium, it is densely covered with non-glandular trichomes in the former species (with some glandular trichomes at the base and on the pedicel) and glandular trichomes in the latter.

Notes. *Stylidium bindoon* was first discovered growing with *S. semaphorum* Lowrie & Kenneally when one of us (AL) was undertaking a survey of this rare triggerplant in an area referred to generally as the Bindoon region. This species was first discovered south of the small town of Bindoon and accordingly, the epithet *bindoon* has been chosen for this species.

Stylidium ciliatum Lindl., *Sketch Veg. Swan R.* xxviii (1839); *Candollea ciliata* (Lindl.) F.Muell., *Syst. Census Austral. Pl.*: 86 (1882); *Stylidium piliferum* var. *ciliatum* (Lindl.) Mildbr., *Pflanzenr.* (Engler) IV. 278 (Heft 35): 71 (1908). *Type*: not cited [Swan River, Western Australia, 1835–1838, *J. Drummond s.n.*] (*lecto, fide* J.A. Wege, *Nuytsia* 20: 81 (2010): CGE; *isolecto*: CGE, FI 113117, G-DC, K 000060728, M).

Stylidium setigerum DC., *Prodr.* 7(2): 782 (late December 1839). *Type*: ‘in Novâ-Hollandiâ ad Swan-river’, [Western Australia, 1835–1838,] *J. Drummond s.n.* (*holo*: G-DC; *iso*: CGE, FI 113117, K 000060728, M).

Stylidium ciliatum var. *minor* Sond. [published as β *minor*], in Lehm., *Pl. Preiss.* 1(3): 374 (1845). *Type*: In lapidosis montis Barker vel Bokkenbop, Plantagenet, [Western Australia,] October 1840, *L. Preiss* 2266 (*lecto, fide* J.A. Wege, *Nuytsia* 20: 81 (2010): MEL 293336; *isolecto*: G, LD, P 00313119).

Perennial herb, 8–40 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons’ growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 20 tightly clustered rosettes arising from the apices of below-ground stems and adpressed to the soil surface, leaves of the present season’s rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, incurved, transversely lenticular with the mid-vein on the abaxial surface prominent in T.S. near the apex, 1.7–3 cm long, 0.6–0.8 mm wide near the base, gradually dilating to 0.7–0.9 mm wide near the centre, dilated to 1.4–1.7 mm wide near the apex, *c.* 0.5 mm thick, margins translucent-white, 0.1–0.3 wide, lower margin serrate, upper margin distinctly ciliate, cilia 0.2–0.3 long, apical mucro translucent-white, hair-like, 3–5 mm long, abaxial surface of leaf lamina near the apex a little scabrous. *Scape* reddish, densely covered from base to apex with a mixture of short and long golden yellow glandular trichomes 0.4–1 mm long; bracts when present oblanceolate, *c.* 4 mm long, *c.* 1 mm wide, hyaline margin translucent-white, ciliate, and bearing an apical mucro *c.* 2 mm long, resembling leaves. *Inflorescence* \pm paniculate, peduncles 3–6-flowered, peduncles *c.* 8 mm long, pedicels *c.* 4.5 mm long, inflorescence densely covered throughout with a mixture of short and long, golden yellow glandular trichomes; floral bracts green, obovate, 3–5 mm long, 1.3–2 mm wide, hyaline margins absent, margins fringed with a mixture of short and long, golden yellow glandular trichomes, apical mucro translucent-white, 1–1.2 mm long; bracteoles without an apical mucro, otherwise similar to but much smaller than the floral bracts. *Hypanthium* reddish, narrowly obovoid at anthesis, 3–5 mm long, 2–2.2 mm wide, densely covered with a mixture of short and long, golden yellow glandular trichomes 0.3–1 mm long. *Calyx* with 2 lobes connate, 2.5–3.5 mm long, 3 lobes free to their base, 2–3 mm long, densely covered with a mixture of short and long, golden yellow glandular trichomes

similar to those on the hypanthium. *Corolla* lobes cream, abaxial surface cream tinged with yellow, glandular, glands on abaxial surface of corolla golden yellow; lobes vertically-paired, anterior lobes 6–7 mm long, 3.5–4.5 mm wide, with yellow marks near the base; posterior lobes 5–6 mm long, 2.5–3.5 mm wide, with yellow marks near the base. *Labellum* boss yellow, ± broadly obovate, *c.* 0.7 mm long, *c.* 0.4 mm wide, smooth; basal appendages 2, yellow, wing-like and apically dentate, lateral, *c.* 0.5 mm long, *c.* 0.7 mm wide at the base, papillose; margins (including *c.* 0.4 mm wide triangular apex) with yellow papillae. *Throat* yellow, appendages absent. *Gynostemium* *c.* 13 mm long, reddish, torosus yellow; anthers dark reddish maroon, positioned *c.* 45° to the gynostemium, *c.* 2.5 mm long, *c.* 2.7 mm wide, with translucent-red moniliform hairs along the margins, *c.* 1 mm long; pollen milky white and vitreous; stigmas 2, obovoid, *c.* 1 mm long, *c.* 0.6 mm wide, divaricate. *Capsule* not seen. *Seeds* not seen. (Figure 4)

Diagnostic features. *Stylidium ciliatum* is distinguished by having ciliate leaf margins and its entire scape covered with glandular trichomes.

Selected specimens examined. WESTERN AUSTRALIA: Telephone Road, near junction with Sonny Road, E of Corbalup Road, 4 Nov. 1997, *A.R. Annels* 5919 (PERTH); edge of Donnelly Plains, N of Manjimup-Bridgetown Road, 1 Nov. 1969, *A.M. Ashby* 3098 (PERTH); 1.7 km SW from Dale Road along power line, 7 Oct. 2003, *R.J. Cranfield* FC 618 (PERTH); Parsons Swamp Road, *c.* 350 m W of T junction with Whistlers Road, bearing NE, 29 Oct. 1998, *R. Davis* 8528 (PERTH); The Common, Darkan townsite, 3 Oct. 1998, *V. Crowley* 930 (PERTH); Logue Brook Dam Road, *c.* 1 km E of South Western Highway, 9 km NNE of Harvey, 17 Oct. 1997, *T.R. Lally* 1511 & *B. Fuhrer* (PERTH); on Albany Highway 20.7 km N of Williams, 8 Oct. 1991, *A. Lowrie* 372 (PERTH); Reservoir Road, S of Mundaring Weir, 4 Oct. 2000, *K. Macey* 207 (PERTH); Forest Road, off Crooked Brook Forest, SE of Dardanup, 14 Nov. 2003, *J.A. Wege* 1126 (PERTH); junction of Williamson Road and Claymore Road, SE of Busselton, 2 Nov. 2004, *J.A. Wege* 1253 (PERTH).

Vernacular name. Golden Triggerplant (Erickson 1958).

Distribution and habitat. Grows in lateritic gravelly soils throughout the Avon Wheatbelt, Jarrah Forest and Swan Coastal Plain bioregions.

Flowering period. October to November.

Conservation status. Not threatened.

Chromosome number. $n = 14$, *S. James* 66.10/41 [Oct. 1966] (James 1979).

Etymology. The epithet is from the Latin *ciliatus* (fringed with hairs along the margins), and refers to its ciliate leaf margins.

Affinities. *Stylidium ciliatum* is a distinctive species, readily distinguished from all other members of the *S. piliferum* complex by its ciliate leaf margins and the entire scape densely covered with a mixture of short and long golden yellow glandular trichomes.

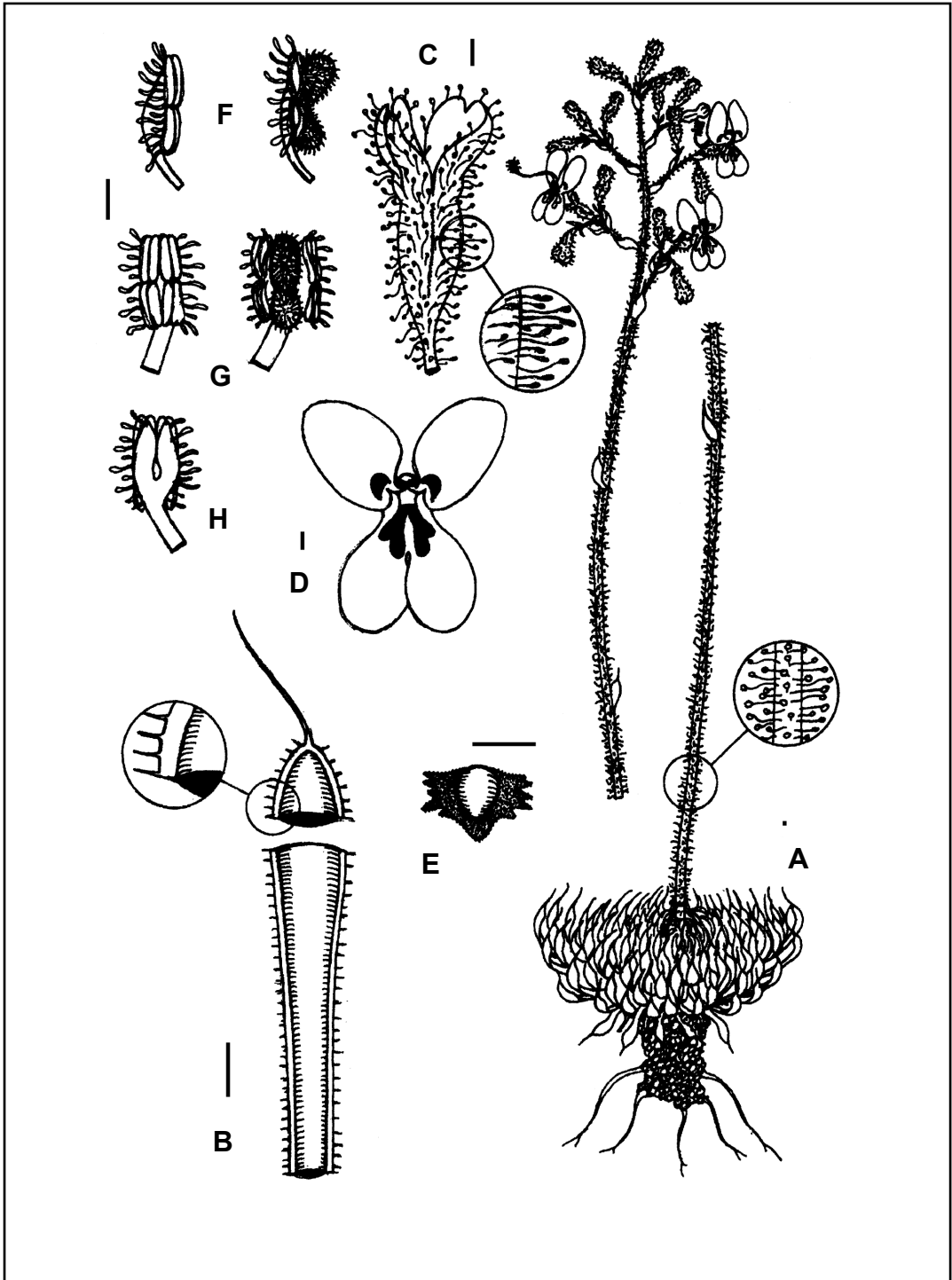


Figure 4. *Stylidium ciliatum*. A – habit of flowering plant with enlarged section of scape (inset); B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, with indumentum detail (inset); D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigmas grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 372.

Stylidium ferricola Wege & Keighery, *Nuytsia* 17: 445–452 (2007). *Type*: Whicher Range, Western Australia [locality withheld for conservation reasons], 4 November 1993, *G.J. Keighery* 12932 (*holo*: PERTH 05472148; *iso*: MEL).

Perennial herb, 9–15 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 14 tightly clustered rosettes arising from the apices of below-ground stems and adpressed to the soil surface, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, narrowly oblanceolate, slightly incurved towards its apex, transversely narrowly semi-lenticulate in T.S., 10–20 mm long, 1–1.5 mm wide near the base, gradually dilated to 1–1.7 mm wide near the apex, *c.* 0.2 mm thick, hyaline margin entire, mucro translucent-white, hair-like, *c.* 4 mm long. *Scape* reddish, distinctly curved and glabrous at its base, becoming glandular towards apex; bracts ovate, 2–4 mm long, margins narrowly hyaline with an apical mucro. *Inflorescence* ± paniculate, 4–40-flowered, peduncles 15–45 mm long, 2–9-flowered, pedicels 3–5 mm long; floral bracts similar to the scape bracts, bracteoles also similar but shorter and narrower. *Hypanthium* reddish, narrowly oblong at anthesis, 3–8 mm long, 0.5–1.2 mm wide, moderately to sparingly glandular. *Calyx* with 2 lobes connate, fused together for more than half their length towards the apex, 1.2–2 mm long, 3 lobes free to their base, 1.2–2 mm long, margin narrowly hyaline. *Corolla* cream with pinkish red apical margin; lobes vertically-paired; anterior lobes *c.* 7 mm long, *c.* 1.2 mm wide, with reddish marks at the base surrounded by a lemon yellow zone; posterior lobes *c.* 5 mm long, *c.* 1.2 mm wide, with lemon yellow marks only near the base. *Labellum* boss ovate, *c.* 0.5 mm long, smooth; basal appendages subulate, *c.* 0.5 mm long, lateral, papillose. *Throat* lemon yellow, appendages absent. *Gynostemium* 9.5–12.5 mm long, reddish, torus lemon yellow; anthers maroon, positioned *c.* 45° to the gynostemium, without moniliform hairs along the margins; pollen yellow; stigma 1, obovoid, positioned between the upper anthers. *Capsule* not seen. *Seeds* not seen. (Figure 5)

Diagnostic features. *Stylidium ferricola* is distinguished by having: a scape which is notably curved outwards from its basal rosette before it ascends vertically; a mostly glabrous scape that only becomes glandular near its apex; a moderately to sparingly glandular, narrowly oblong hypanthium with glabrous calyx lobes, 2 of which are connate and 3 free to their base; and cream corollas with pinkish red apical margins.

Other specimen examined. WESTERN AUSTRALIA: [locality withheld for conservation reasons] 11 Nov. 1993, *B.J. Keighery & N. Gibson* 623 (PERTH).

Vernacular name. Ironstone Triggerplant (here designated).

Distribution and habitat. Restricted to the massive ironstones of the Whicher Scarp, adjacent to the Swan Coastal Plain, south of Busselton. Grows in seasonally wet, poorly drained slopes. Shallow red-brown clay loam over ironstone. Recorded from burnt low heath (*G.J. Keighery* 12932) and scrub with *Hakea oldfieldii*, *Dryandra squarrosa* subsp. *argillacea* and *Pericalymma ellipticum* (*B.J. Keighery & N. Gibson* 623).

Flowering period. Flowering in late October and November.

Conservation status. Listed by Smith (2017) as Priority One under Conservation Codes for Western Australian Flora. It is known from two occurrences of a Threatened Ecological Community, both

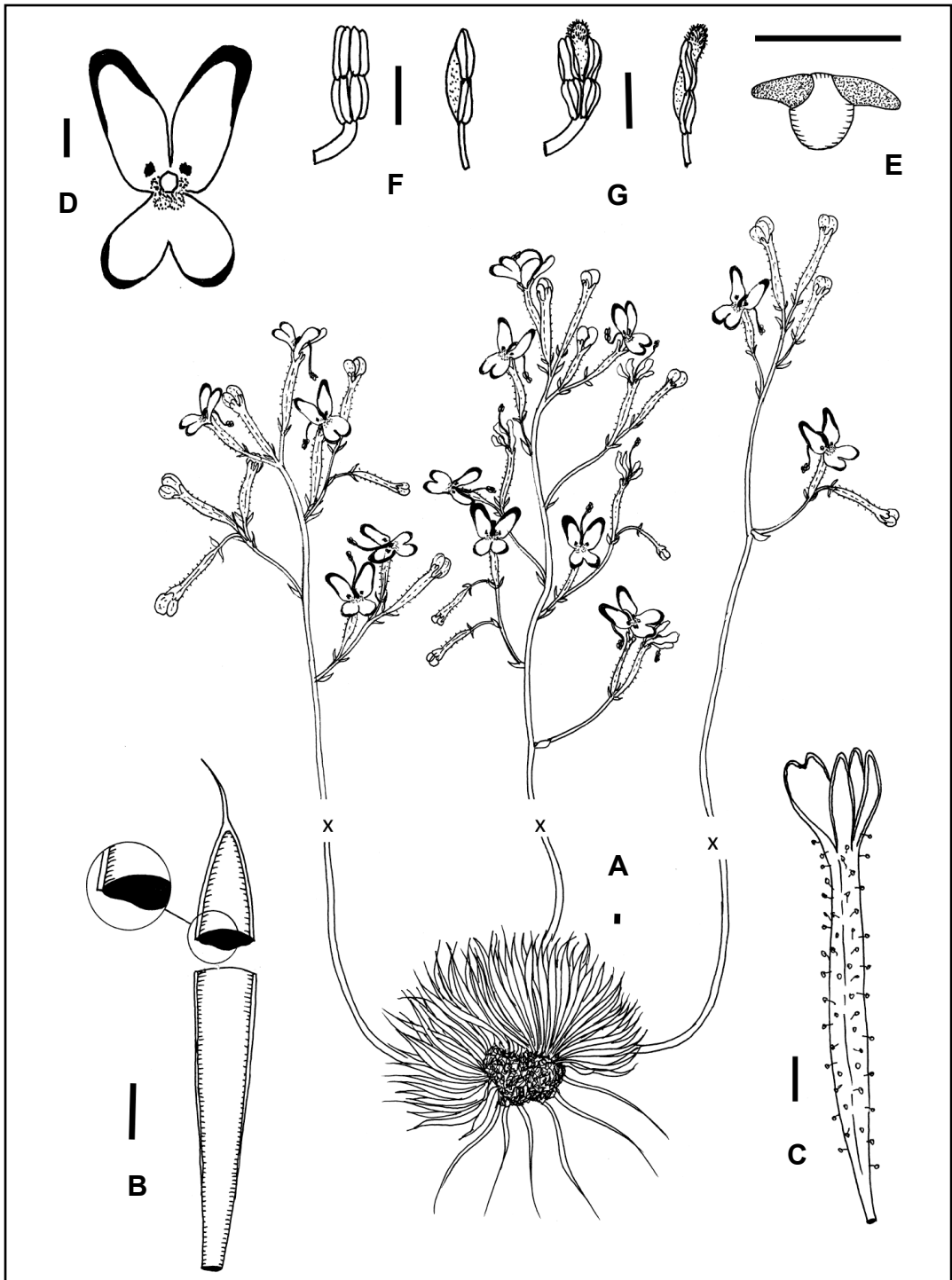


Figure 5. *Styloidium ferricola*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes; D – corolla; E – labellum; F – front view (left) and lateral view (right) of gynostemium tip showing anthers; G – front view (left) and lateral view (right) of gynostemium tip showing stigma grown out at apex. Scale bar = 1 mm. Drawn by Allen Lowrie from *G.J. Keighery* 12932 (B), *B.J. Keighery & N. Gibson* 623 (C–G), and a photograph by Greg Keighery (A).

of which are associated with the Whicher Scarp and located within State forest (Wege *et al.* 2007). One of us (AL) has over four seasons tried to locate *S. ferricola* in both of its recorded locations and throughout the Whicher Range without success.

Etymology. The epithet is from the Latin *ferrum* (iron) and the suffix *-cola* (inhabiting), and refers to this species' habitat preference.

Affinities. *Stylidium ferricola* is morphologically similar to *S. vinosum* Lowrie & Kenneally and *S. strigosum* Lowrie & Kenneally as these species all have an oblong hypanthium and a calyx that has two lobes connate and three lobes free to their base. *Stylidium ferricola* is distinguished from *S. vinosum* and *S. strigosum* in the following triplet:

1. Scapes curved before ascending; hypanthium moderately to sparingly glandular, with calyx lobes glabrous **S. ferricola**
2. Scapes erect; hypanthium and calyx lobes with dense non-glandular trichomes along with a few scattered glands **S. vinosum**
3. Scapes erect; hypanthium and calyx lobes with both strigose and straight non-glandular trichomes and sometimes with a few scattered glandular trichomes **S. strigosum**

Stylidium hispidum Lindl., *Sketch Veg. Swan R.*: xxix (1839). *Type*: not cited [*fide* J.A. Wege, in *sched.* Swan River, *s. dat.*, *J. Drummond s.n.*] (*iso*: K 000060734, ?K 000060723, ?K 000355146).

Stylidium hispidum var. *parviflorum* Sond., in Lehm., *Pl. Preiss.* 1(3): 375 (1845). *Type*: 'In asperis ad radices jugi montium Darling's-range, Perth, Sep. 1841. Herb. Preiss. No. 2270.' (*n.v.*).

Perennial herb, 12–28 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 1 to 8 tightly clustered rosettes arising from the apices of below-ground stems, raised above the soil surface on stilt roots, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, tinged with pale maroon, linear, incurved, transversely narrowly elliptic with a prominently ciliate abaxial longitudinal ridge in T.S., 1.5–3 cm long, 0.4–0.5 mm wide near the base, gradually dilating to 0.7–1.3 mm wide near the centre then tapering to the apex, *c.* 0.6 mm thick, margins above the base distinctly hispid, each stiff hair 0.3–0.5 mm long and well-spaced from its neighbours, apical mucro translucent-white, hair-like, 5–7 mm long. *Scape* reddish, glabrous in its lower 2/3, then gradually becoming densely covered in a mixture of short and long, golden yellow, glandular trichomes; bracts absent. *Inflorescence* ± racemose when single-flowered, ± paniculate when flowers in groups of 2 or 3, peduncles 6–10 mm long, pedicels 3–8 mm long, inflorescence densely covered in a mixture of short and long, golden yellow, glandular trichomes 0.2–0.4 mm long; floral bracts green, obovate, 2–2.5 mm long, 0.4–0.8 mm wide, margins not hyaline, fringed with a mixture of short and long, golden yellow, glandular trichomes, apical mucro translucent-white, 1–1.5 mm long; bracteoles similar but much smaller than the floral bracts. *Hypanthium* green and reddish, narrowly obovoid at anthesis, 3.5–4 mm long, 1.4–1.5 mm wide, indumentum similar to that on inflorescence. *Calyx* with 2 lobes connate, 3–3.5 mm long, 3 lobes free to their base, 3–3.5 mm long, margins scarcely or not hyaline, entire, adaxial surface indumentum similar to that on the hypanthium. *Corolla* creamy white, abaxial surface creamy white, glandular; glands golden yellow; lobes vertically-paired; anterior lobes 8–9 mm long, 3.8–4 mm wide, with

greenish yellow marks near the base, upper margins bearing golden yellow glands; posterior lobes 6.5–7 mm long, 3–3.5 mm wide, with greenish yellow smudges around small reddish marks near the base. *Labellum* boss yellow, ± orbicular, *c.* 0.1 mm long, *c.* 0.9 mm wide, smooth; basal appendages yellow, triangular, lateral, *c.* 0.5 mm long and wide; margins irregularly wavy, papillose, *c.* 0.2 mm wide. *Throat* greenish yellow, appendages absent. *Gynostemium* *c.* 18 mm long, reddish, torosus greenish yellow; anthers dark reddish maroon, positioned *c.* 45° to the gynostemium, *c.* 3 mm long, *c.* 1.5 mm wide; with translucent-red moniliform hairs along the margins, *c.* 0.2 mm long; pollen yellow, vitreous; stigma 1, obovoid and projected above the anthers before anthesis, stigma after anthesis clavate, elongating and reflexing, *c.* 1.2 mm long, *c.* 0.5 mm wide when mature. *Capsule* not seen. *Seeds* not seen. (Figure 6)

Diagnostic features. *Stylidium hispidum* is distinguished from all other members of the *S. piliferum* complex by having: leaf margins distinctly hispid, the abaxial longitudinal ridge densely ciliate; the scape glabrous in its lower two-thirds before becoming densely covered with a mixture of short and long, golden yellow, glandular trichomes in its upper parts and throughout its inflorescence.

Selected specimens examined. WESTERN AUSTRALIA: Red Hill-Toodyay Road, 18 Sep. 1956, *A.M. Baird s.n.* (PERTH); Ellis Brook Valley Reserve, 18 Sep. 1999, *H. Bowler* 378 (PERTH); 35 mile peg between Bindoon and Bullsbrook, Northern Highway [*c.* 1 km NE of Muchea on Great Northern Highway], 13 Sep. 1967, *S. Carlquist* 3120 (PERTH); Gorrie Road, 5.5 km SSE of Chidlow, 1 Nov. 1996, *R. Davis* 1574 (PERTH); Kalamunda, 5 Oct. 1951, *R. Erickson s.n.* (PERTH); Fairbridge Farm School, Pinjarra, 25 Aug. 1941, *C.A. Gardner s.n.* (PERTH); E of Churchman's Brook Reservoir, 11 Oct. 1976, *A.M. George* 126 (PERTH); Darlington, Oct. 1973, *S. James* 73.10/15 (PERTH); Darlington scarp, 8 Sep. 1966, *K.F. Kenneally s.n.* (PERTH); on Reserve Road, Muchea, 1 Oct. 1988, *A. Lowrie* 01 (PERTH); The Lakes, 9 Oct. 1988, *A. Lowrie s.n.* (PERTH); on Red Gully Road, *c.* 18 km E of Brand Highway, 20 Oct. 1989, *A. Lowrie s.n.* (PERTH); 8.3 km E along Kingsley Drive from South West Highway, 6 Nov. 2003, *J.A. Wege* 1086 (PERTH); 6.65 km NW of Williams Road on Del Park Road, NW of Dwellingup, 2 Nov. 2006, *J.A. Wege* 1397 & *B.P. Miller* (PERTH); 600 m N along Nettleton Road from Jarrahdale Road, 24 Oct. 1996, *J.A. Wege* 278 & *J.A. Wege Snr* (PERTH).

Vernacular name. White Butterfly Triggerplant (Erickson 1958).

Distribution and habitat. Widespread throughout the Jarrah Forest on lateritic gravelly soils.

Flowering period. August to November.

Conservation status. Reasonably widespread and well-represented within the conservation estate.

Chromosome number. *n* = 14 *fide* *S. James* UWA 1295 Sep. 1971 (James 1979).

Etymology. The epithet is from the Latin *hispidus* (having short stiff hairs), and refers to the leaf margins which are distinctly hispid with each well-spaced hair 0.3–0.5 mm long.

Affinities. *Stylidium hispidum* is morphologically similar to *S. ciliatum* as both species have fringed leaf margins. *Stylidium hispidum* differs from *S. ciliatum* (whose contrasting characters are given in parenthesis) by having: upper leaf margins distinctly hispid (margins ciliate); a glabrous scape in its lower two thirds and glandular in its upper parts (entire scape glandular).

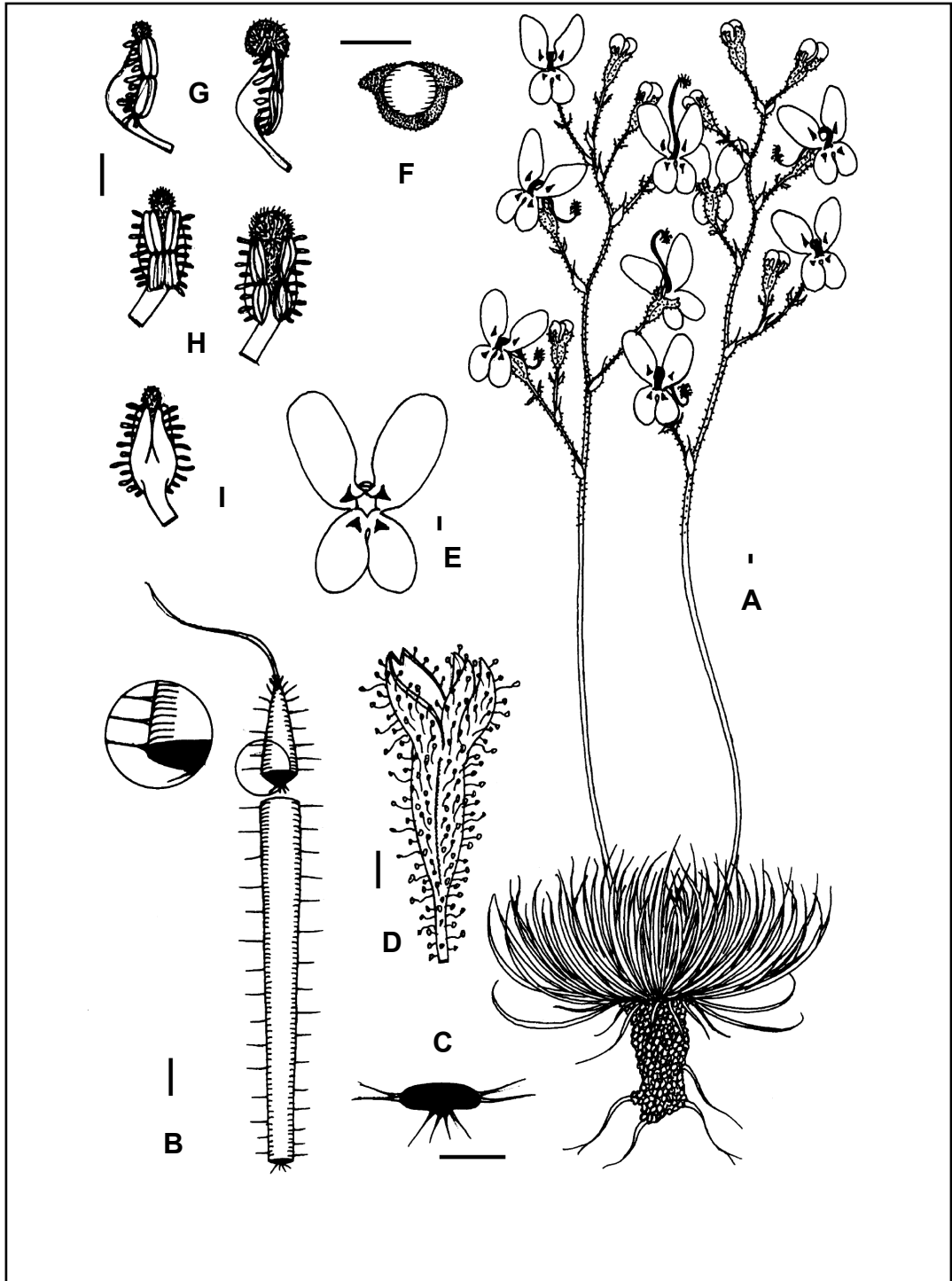


Figure 6. *Stylidium hispidum*. A – habit of flowering plants; B – leaf, and enlarged section (inset); C – leaf, transverse section showing indumentum position; D – hypanthium and calyx lobes; E – corolla; F – labellum; G – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); H – adaxial view of gynostemium tip showing anthers (left), and with stigma grown out (right); I – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie s.n. (PERTH 08702438).

Notes. The juvenile stigma of *S. hispidum* is present between the upper pair of anthers well-before anther dehiscence. When the pollen is finally spent, the stigma develops further by increasing its overall size, growing longer and bending backwards over the apex of the spent anthers when mature.

Stylidium miniatum Mildbr., *Pflanzenr.* (Engler) IV. 278 (Heft 35): 69–70 (1908). *Type:* In fruticetis Moore River, August 1901, *E. Pritzel* 581 (*lecto, fide* J.A. Wege, *Nuytsia* 20: 85 (2010): W; *isolecto:* BM, E, G, K 000355138, M, NSW, P, PERTH 01641565). *Paralecto* [residual syntypes]: Moore River östlich bei Mogumber zwischen Gebüsch auf lehmigkeisigem Boden ca. 175 m ü. M., August 1901, *L. Diels* 4031 (B, *n.v.*, destroyed in WWII); Western Australia, *s. dat.*, *J. Drummond* 277 (BM, CGE, E, G, K 000060915, K 000060917, LD, MEL 2295036, W); Distr. Avon: Melbourne, *s. dat.*, *K.A.A. von Hügel s.n.* (B, *n.v.*, destroyed in WWII).

Perennial herb, 12–28 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 1 or more clustered rosettes arising from the apices of below-ground stems, raised above the soil surface on stilt roots, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, linear, incurved, transversely cuneate in T.S., 1.5–2.5 cm long, 0.4–0.5 mm wide near the base, 0.7–0.8 mm wide near the apex, *c.* 0.5 mm thick, hyaline margin and mid-vein on abaxial surface translucent-white, serrulate, apical mucro translucent-white, 1–3 mm long. *Scape* glabrous; bract(s) similar to the floral bracts sometimes present in the upper parts. *Inflorescence* racemose, often paniculate in the lower parts, inflorescence glandular, glandular trichomes \pm of similar length, peduncles 1–3-flowered, the basal peduncles and pedicels 4–10 mm long, the upper ones shorter; floral bracts linear, 2–4.5 mm long, apical mucro and hyaline margin translucent-white, margin serrulate with the apex of the serrations irregularly shortly ciliate; bracteoles similar, 1–2 mm long. *Hypanthium* narrowly obovoid at anthesis, 3.5–5 mm long, 0.7–1.5 mm wide, glandular, glandular trichomes \pm of similar length, arising from the apex of distinctive, translucent, conical mounds, gland mounds extending onto the pedicel for a short distance. *Calyx* glabrous, sometimes with scattered glands at their base, 2 connate almost to their apex, 3 free to base, 2–3 mm long, hyaline margin translucent-white, edges serrulate with the apices of the serrations very shortly and irregularly ciliate, some cilia bearing a glandular tip. *Corolla* salmon-pink (R.H.S. Orange-Red 33D), abaxial surface salmon-pink with scattered white trichomes bearing red apical glands; lobes vertically-paired; anterior lobes 5–6 mm long, 1.5–3 mm wide, with dark pink marks near the base; posterior lobes 4–4.5 mm long, 1.3–2.5 mm wide, with dark pink marks near the base. *Labellum* boss greenish yellow, obovate, *c.* 1 mm long, *c.* 0.8 mm wide, smooth; basal appendages, white, subulate, lateral, *c.* 0.5 mm long, papillose; margins narrow, irregular, white with the apex a little reddish, papillose, with a few white trichomes bearing red apical glands scattered along the edges. *Throat* greenish yellow, appendages absent. *Gynostemium* *c.* 14 mm long, reddish, torus yellowish green; anthers beige, positioned *c.* 45° to the gynostemium; with reddish moniliform hairs along the margins; pollen white; juvenile stigmas obovoid and present between the upper and lower anther pairs when anthers are shedding pollen (see notes below), stigmas 2, pyriform, extending beyond the spent-anther pairs. *Capsule* not seen. *Seeds* not seen. (Figure 7)

Diagnostic features. *Stylidium miniatum* is distinguished from all members of the *S. piliferum* complex by its hypanthium bearing glands arising from the apex of distinctive, translucent, conical mounds.

Selected specimens examined. WESTERN AUSTRALIA: opposite Bundarra Nature Reserve, corner of Gillingarra and Capitela Roads, Gillingarra, 4 Oct. 2006, *C. Danese & D. Rayner* B 1006-20 (PERTH); Melbourne District: Moore River, Aug. 1901, *Dr Diels & Pritzel s.n.* (PERTH); Cataby

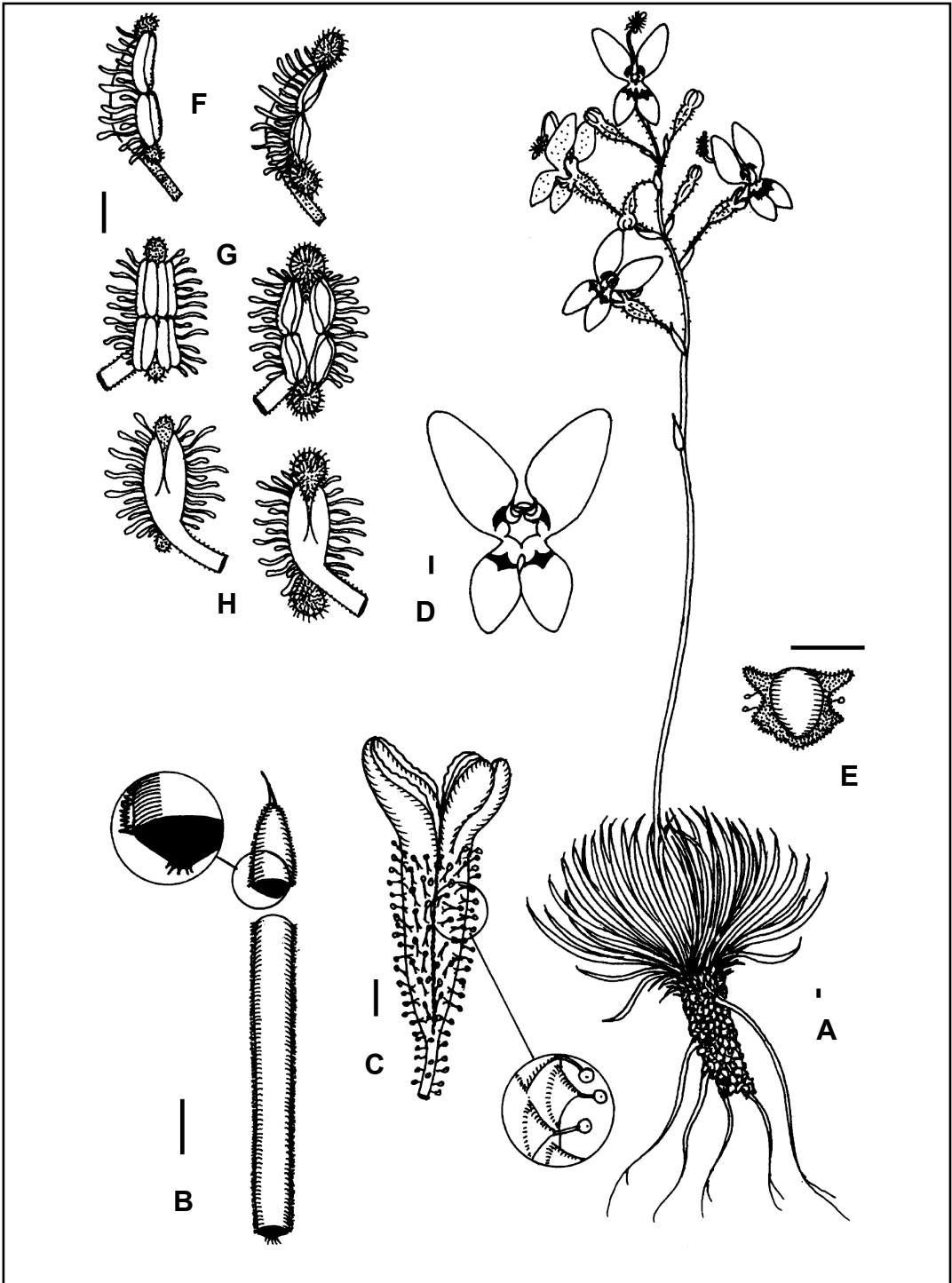


Figure 7. *Stylidium miniatum*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, with indumentum detail (inset); D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers and juvenile stigmas (left), and with the stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers and juvenile stigmas (left), and with the stigmas grown out (right); H – abaxial view of gynostemium tip at anther stage (left), and with the stigmas grown out (right). Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie s.n. (PERTH 08702586).

Roadhouse on Great Northern Highway, 163 km N of Perth, 16 Sep. 1993, *D.J. Edinger* 849 (PERTH); W of Wyening, 23 Sep. 1951, *R. Erickson s.n.* (PERTH); W of Bolgart, Oct. 1952, *R. Erickson s.n.* (PERTH); 5–6 m[iles] [8–9.6 km] S of New Norcia, 1 Oct. 1947, *C.A. Gardner* 8671 (PERTH); Hi Vallee property (D. & J. Williams) Warradarge, track along E side of main valley, 13 Sep. 1999, *M. Hislop* 1515 (PERTH); site 153. P. Toster and P. Phillips property, W side of Coalara Road, c. 1 km of Boothendarra Road, NW of Watheroo, 22 Sep. 2005, *M. Hislop & M. Griffiths* WW 153 – 30 (PERTH); SE of Coomallo Creek pumping station, 10 Aug. 1977, *R.J. Hnatiuk* 770728 (PERTH); outside Gingin Cemetery, Sep. 1971, *S. James* 71.9/64 (PERTH); quadrat WMA18. Tathra National Park. A 29805. Shire of Carnamah. Garibaldi Road, 28 Sep. 1999, *M.A. Langley* 2037 & *P.M. Smith* (PERTH); 0.6 km S of Gillingarra, 18 Sep. 1990, *A. Lowrie s.n.* (PERTH); Wannamal West Road, c. 4 km E of Brand Highway, 5 Oct. 1990, *A. Lowrie* 158 (PERTH); site no. CAH003. Cairn Hill Westrail Reserve, c. 11 km N of Moora on the Midlands Road. The plot is on the E side of track to the radio tower towards the top of the hill, c. 700 m along the track from the Midlands Road, 23 Oct. 2000, *M. Trudgen* 21221 (PERTH); adjacent to the Kolburn Water Treatment Plant, W of Moora on the Dandaragan Road, 17 Sep. 2002, *M.E. Trudgen* 21591 (PERTH); 300 m SW on Fynes Road from Mogumber West Road, 20 Oct. 2011, *J.A. Wege* 1870 (PERTH); 1.75 km N of Coorow-Green Head Road on Brand Highway, 14 Sep. 1996, *J.A. Wege* 208 & *K. Shepherd* (PERTH).

Vernacular name. Pink Butterfly Triggerplant (Erickson 1958).

Distribution and habitat. Occurs on the Swan Coastal Plain north of Gingin, extending into the Avon Wheatbelt. Grows: on hill crests in lateritic soils in low heath with scattered emergent *Hakea*; hilltops in white-grey sand-gravel over laterite-boulder in heath with scattered marri; on low lateritic hillsides often on firebreaks in species-rich low closed heath with emergent *Eucalyptus gittinsii*, *Xanthorrhoea drummondii*, *Calothamnus sanguineus*, *Isopogon adenanthoides* and *Hakea conchifolia*; on massive laterite mesa tops in dark grey, shallow sand in pockets and crevices with heath; on lateritic upland in orangey brown rocky clayey sand with *Eucalyptus* sp. dominant woodlands.

Flowering period. September to October.

Conservation status. Reasonably widespread and well-represented within the conservation estate.

Etymology. The epithet is from the Latin *miniatus* (saturn-red, ‘painted with red lead’) which may refer to the salmon colour of the corolla markings and not the corolla colour.

Affinities. *Stylidium miniatum* is morphologically similar to *S. bindoon* and *S. ferricola* as these three species have hypanthium indumentum and glabrous calyx lobes. *Stylidium miniatum* differs from ¹*S. bindoon* and ²*S. ferricola* whose contrasting characters are given in parenthesis by having: an obovoid hypanthium (¹ & ² narrowly oblong); hypanthium with glands arising from conical mounds (¹densely covered with non-glandular trichomes; ²moderately to sparingly glandular).

Notes. The juvenile stigmas are present between the upper and lower anther pairs when anthers are still shedding pollen. By the time the anthers are spent, the stigmas have developed well-beyond the anther pairs. It is not known if the stigmas are receptive to their own or other clones’ pollen during the period pollen is being shed.

Stylidium monticola Lowrie & Kenneally, *sp. nov.*

Type: Stirling Range, Western Australia [precise locality withheld for conservation reasons], 4 November 2008 [specimens collected 5 October 2008, grown on to flower in cultivation], *A. Lowrie* 3948, *R. Nunn* & *G. Bourke* (*holo:* PERTH 08702489; *iso:* MEL).

Stylidium sp. Bluff Knoll (S. Barrett s.n. 8/11/1994). Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb, 3.5–5 cm tall, with basin-like rosettes of regularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants solitary from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 35 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green on adaxial surface, pale maroon on abaxial surface, oblanceolate, mostly flat, slightly incurved near apex, transversely narrowly lenticulate in T.S., 9–10 mm long, 0.3–0.4 mm wide near the base, gradually dilating to 0.6–1 mm wide near the apex, *c.* 0.2 mm thick, margin hyaline, irregularly serrulate, apical mucro translucent-white, hair-like, 0.8–1 mm long. *Scape* reddish, glabrous; bracts absent. *Inflorescence* solitary or racemose, racemes up to 3-flowered, pedicels bearing glandular trichomes between the bracteoles and hypanthium, otherwise glabrous; floral bracts green, narrowly ovate, 1.8–2 mm long, 0.3–0.4 mm wide, apical mucro 0.4–0.5 mm long, margin hyaline ± entire; bracteoles similar to but much smaller than the floral bracts. *Hypanthium* green and red, mostly all reddish, narrowly obovoid at anthesis, 3.5–4 mm long, 1–1.5 mm wide, glabrous. *Calyx* margins hyaline, entire, lobes glabrous, sometimes bearing a tiny apical mucro, 2 lobes connate, fused together almost to their apex, 1.2–1.5 mm long, 3 lobes free to their base, 1.2–1.5 mm long. *Corolla* white and pale to dark pink, abaxial surface pale pink with a faint red mid-vein near base, glandular; lobes vertically-paired; anterior lobes 4.5–5 mm long, 2–2.5 mm wide, with lemon yellow marks near the base, apices entire; posterior lobes 4–4.5 mm long, 2–2.3 mm wide, with lemon yellow marks near the base. *Labellum* boss green, ± elliptical, *c.* 0.7 mm long, *c.* 0.4 mm wide, smooth; basal appendages reddish, lateral, subulate, *c.* 0.7 mm long, *c.* 0.25 wide at the base; apex with a reddish papillose margin. *Throat* lemon yellow, appendages absent. *Gynostemium* *c.* 9 mm long, green and reddish, torus lemon yellow; anthers maroon, positioned *c.* 45° to the gynostemium, *c.* 2.2 mm long, *c.* 1 mm wide; with translucent-white moniliform hairs *c.* 0.3 mm long along the margins; pollen cream; stigma 1, pulviniform and positioned between the spent vertical anthers, *c.* 0.5 mm diam. and projected forwards *c.* 0.6 mm when mature. *Capsule* not seen. *Seeds* not seen. (Figure 8)

Diagnostic features. *Stylidium monticola* is distinguished from other members of the *S. piliferum* complex by its 1–3-flowered inflorescence on scapes 3.5–5 cm long; glabrous hypanthium and calyx lobes; pedicels bearing glandular trichomes between the bracteoles and hypanthium, otherwise glabrous.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] *s. dat.*, *Anonymous s.n.* (PERTH 03172554); 8 Nov. 1994, *S. Barrett s.n.* (PERTH 04245997).

Vernacular name. Stirling Range Triggerplant (here designated).

Distribution and habitat. Known from locations in the Stirling Range in Western Australia. Grows in grey sandy clay with sandstone quartzite shard rubble with *Astartea fascicularis*, *Taxandria marginata*, and *T. linearifolia*.

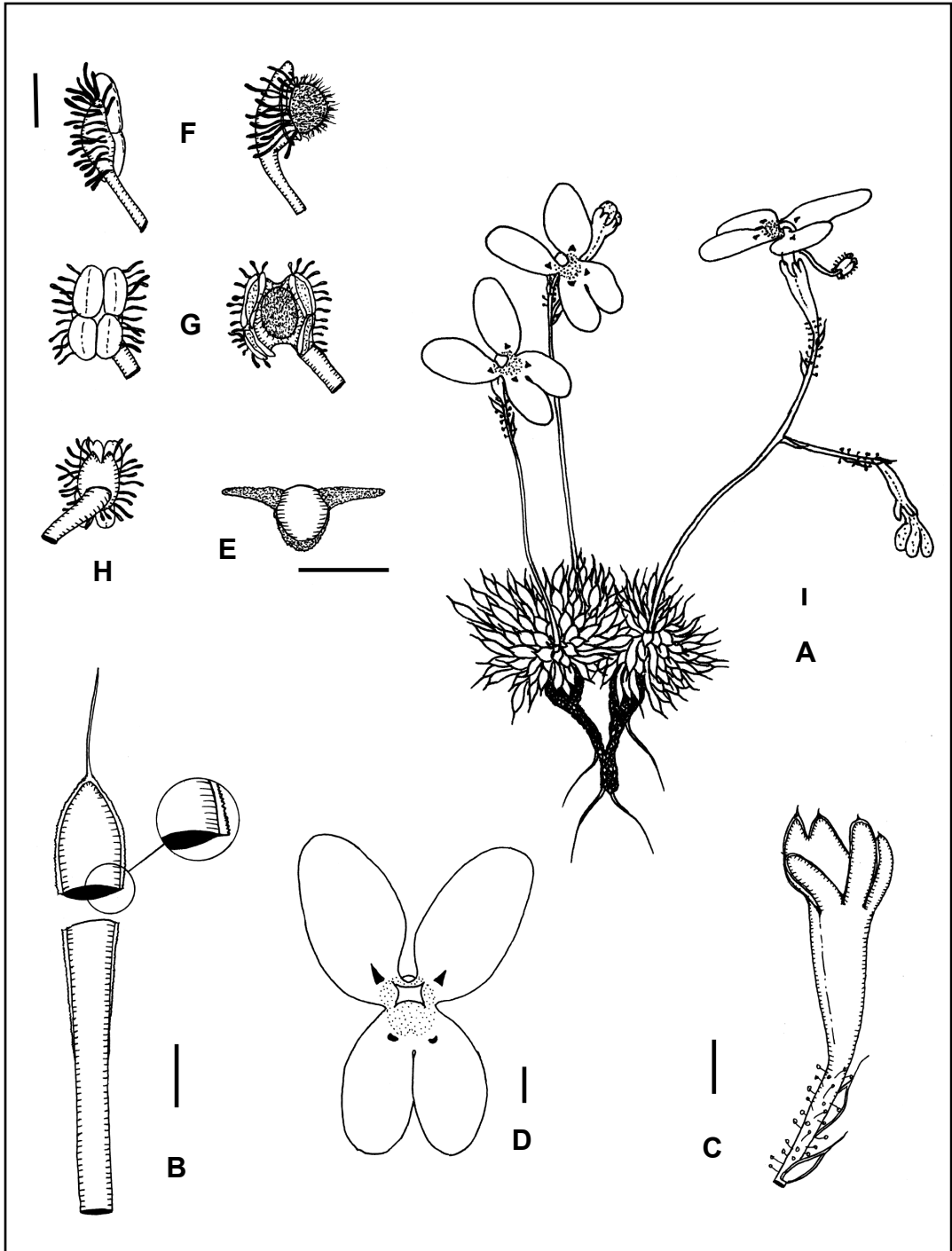


Figure 8. *Stylidium monticola*. A – habit of flowering plants; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, and glandular hairs in region of mucronate bracteoles; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigma grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 3948, R. Nunn & G. Bourke.

Flowering period. November.

Conservation status. Listed by Smith (2017) as Priority Two under Conservation Codes for Western Australian Flora, under the name *Stylidium* sp. Bluff Knoll (S. Barrett s.n. 8/11/1994), due to its restricted, but reserved, occurrence.

Etymology. The epithet is from the Latin *monti-* (mountain-) and the suffix *-cola* (-dweller), in reference to this species' habitat, which is restricted to the summits of the Stirling Range.

Affinities. *Stylidium monticola* is morphologically similar to *S. nitidum* Lowrie & Kenneally as both species have a glabrous, narrowly obovoid hypanthium and glabrous calyx lobes. *Stylidium monticola* is distinguished from *S. nitidum* by having glandular upper pedicels, whereas the pedicels of *S. nitidum* are completely glabrous.

Notes. Although *S. monticola* is the smallest species within the *S. piliferum* complex it is shown to be one of the hardiest species in the complex. At the time of collection for the type material (5 October 2008) the day was extremely cold and snowing.

Stylidium nitidum Lowrie & Kenneally, *sp. nov.*

Type: Milyeannup State Forest, Jalbarragup, Western Australia [precise locality withheld for conservation reasons], 23 November 2007, A. Lowrie 3736 & G. Graham (*holo:* PERTH 08702497; *iso:* MEL).

Stylidium sp. Glabrous inflorescence (R. Davis 7917), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb, 18–28 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants solitary from an unbranched stem, with the base adpressed to the soil; older plants comprising 3 to 14 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green on adaxial surface, maroon on abaxial surface, oblanceolate, mostly flat, slightly incurved near apex, transversely narrowly lenticulate in T.S., 7–9 mm long, 0.5–0.6 mm wide near the base, gradually dilating to 1–1.5 mm wide near the apex, *c.* 0.4 mm thick, margins hyaline, irregularly serrulate, mucro translucent-white, hair-like, 3.5–4 mm long. *Scape* reddish, glabrous; a single narrowly ovate bract, 2.5–3 mm long, 0.6–0.8 mm wide with a translucent-white, ± entire, hyaline margin as well as an apical mucro 2.5–3 mm long, is sometimes present. *Inflorescence* racemose, glabrous, pedicels 4–17 mm long; floral bracts green, similar in shape and size to the bracts on the scape; bracteoles similar to but much smaller than the floral bracts. *Hypanthium* green, green and red or reddish, narrowly obovoid at anthesis, 3–3.5 mm long, 1.2–1.4 mm wide, glabrous, shining. *Calyx* with 2 lobes connate, fused together to within *c.* 0.5 mm of their apex, 2.8–3 mm long, 3 lobes free to their base, 2.8–3 mm long, glabrous, shining, similar to the hypanthium, margins translucent-white, hyaline entire. *Corolla* cream, abaxial surface creamy yellow with a faint red mid-vein near base, sparsely glandular; lobes vertically-paired; anterior lobes 6.5–8.5 mm long, 2–2.7 mm wide, with lemon yellow markings near the base; posterior lobes 5–6 mm long, 1.7–2.3 mm wide, with lemon yellow markings near the base. *Labellum* boss yellow, ± orbicular, *c.* 0.8 mm diam., smooth; basal appendages yellow, lateral, subulate, *c.* 0.3 mm long, *c.* 0.3 mm wide at the base; apical margins reddish, papillose, with a few glands. *Throat* lemon yellow, appendages absent. *Gynostemium* *c.* 12 mm long,

pale green with reddish margins, torus lemon yellow; anthers reddish maroon, positioned *c.* 45° to the gynostemium, *c.* 2 mm long, *c.* 0.8 mm wide; with translucent-pink moniliform hairs along the margins, *c.* 0.5 mm long; pollen cream; stigma 1, pulviniform and positioned between the spent vertical anthers, stigma *c.* 1.2 mm long, *c.* 0.8 mm wide and projected forwards *c.* 0.3 mm when mature. *Capsule* not seen. *Seeds* not seen. (Figure 9)

Diagnostic features. *Stylidium nitidum* is distinguished from all other species within the *S. piliferum* complex by its glabrous scape and inflorescence, and its glossy, glabrous hypanthium and calyx lobes.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 22 Oct. 1996, *R. Davis* 7917 (PERTH); 1 Dec. 2004, *D. Marsh* DM 32 (PERTH).

Vernacular name. Shiny Triggerplant (here designated).

Distribution and habitat. Occurs in the southern Jarrah Forest. Grows in grey sand mostly under *Casuarina* and *Baeckea* species amongst *Casuarina* needle litter in low open woodland, common over a 30 m distance along track higher up than creek line.

Flowering period. October to November.

Conservation status. Listed by Smith (2017) as Priority One under Conservation Codes for Western Australian Flora, under the name *S. sp.* Glabrous inflorescence (*R. Davis* 7917). Currently only known from these three herbarium collections.

Etymology. The epithet *nitidum* is from the Latin *nitidus* (shiny), and refers to this species' glossy, glabrous hypanthium and calyx lobes.

Affinities. Refer to the comparative comments under *S. monticola*.

Notes. *Stylidium nitidum* was first collected on a botanical survey by *R. Davis* in October 1996. Specimens of this species came to light when we were annotating the *S. piliferum* complex collections housed at PERTH in 2007.

Stylidium piliferum R.Br., *Prodr. Fl. Nov. Holland.*: 569 (1810). *Candollea pilifera* (R.Br.) F.Muell., *Syst. Census Austral. Pl.*: 86 (1882). *Type*: King George III's Sound, December 1801, *R. Brown s.n.*, Bennett No. 2583 [*lecto, fide* J.A. Wege, *Nuytsia* 20: 85 (2010): BM; *isolecto*: BM, E, K 000060745].

Stylidium piliferum var. *minor* Mildbr., *Pflanzenr.* (Engler) IV. 278 (Heft 35): 71 (1908). *Stylidium piliferum* subsp. *minor* (Mildbr.) Carlquist, *Aliso* 7(1): 40 (1969). *Type*: King George's Sound [Western Australia], December 1801, *R. Brown s.n.*, Bennett No. 2583 (*lecto, fide* J.A. Wege, *Nuytsia* 20: 85 (2010): BM; *isolecto*: BM, E, K 000060745). *Paralecto* [residual syntypes]: Kent, Hammersley River, October 1901, *L. Diels* 4931 (B, *n.v.*, destroyed in WWII).

Stylidium saxifragoides Lindl., *Sketch Veg. Swan R.* xxviii (1839). *Type*: not cited [*fide* J.A. Wege, *Nuytsia* 20: 85 (2010): Swan River, Western Australia, *s. dat.*, *J. Drummond s.n.* (*holo*: CGE; *iso*: K 000060754)].

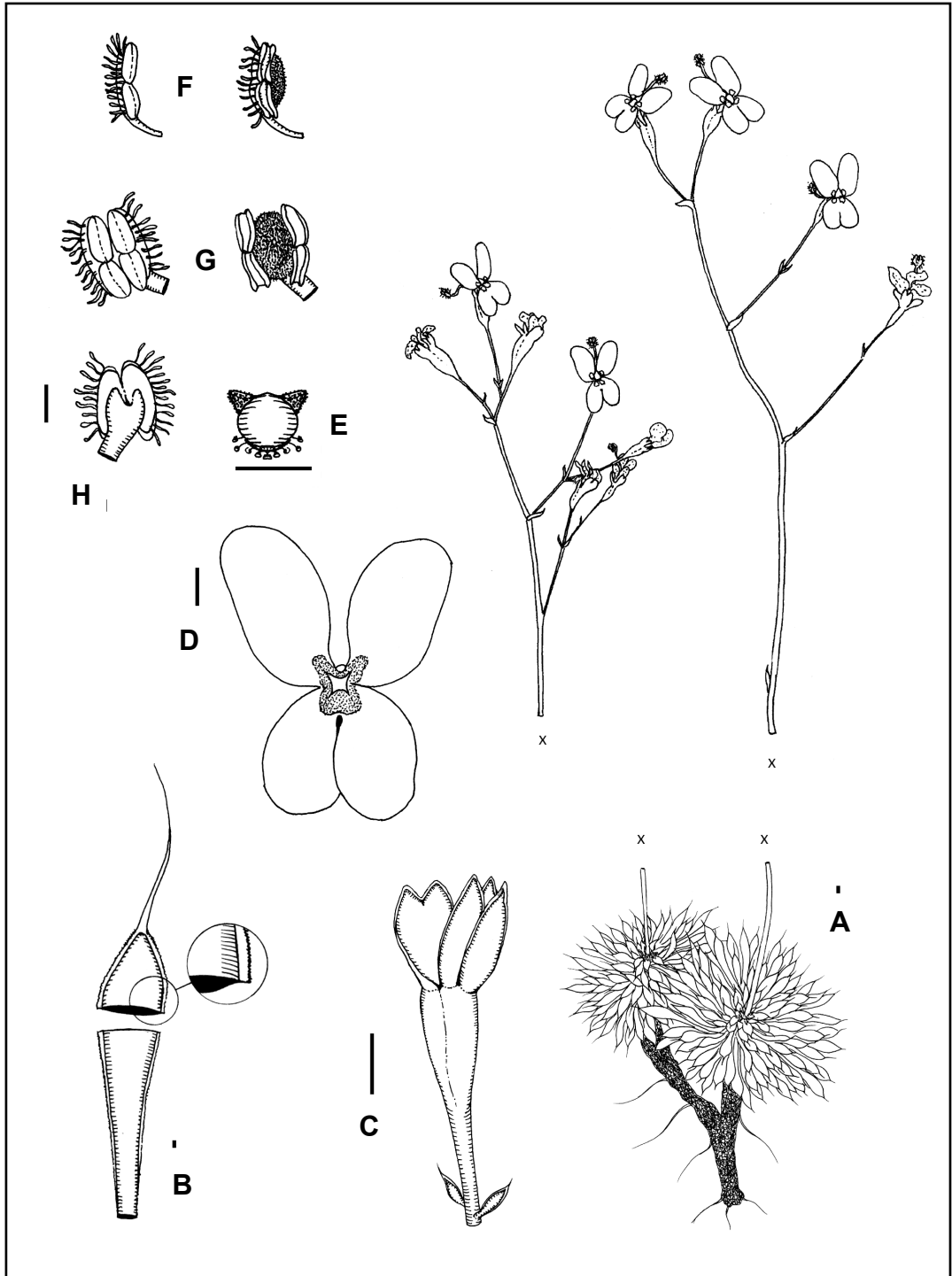


Figure 9. *Stylidium nitidum*. A – habit of flowering plants; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, and glabrous pedicel with bracteoles; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigma grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 3736 & G. Graham.

Perennial herb, 35–50 cm tall, with basin-like rosettes of regularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants solitary from an unbranched stem, with the base adpressed to the soil; older plants comprising 3 to 8 clustered rosettes arising from the apices of below-ground stems with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green blushed with pale maroon on adaxial surface, pale maroon on abaxial surface, oblanceolate, slightly incurved apically, transversely narrowly cuneate in T.S., 2–2.5 cm long, 0.8–1 mm wide near the base, 1.5–1.6 mm wide near the apex, *c.* 0.5 mm thick, margins hyaline, serrulate, apical mucro translucent-white, 1–4 mm long. *Scape* glabrous; bracts rarely present but when present similar to the floral bracts. *Inflorescence* paniculate, peduncles 1–6-flowered, the basal ones 1.2–3.5 cm long, the upper ones shorter, pedicels 5–10 mm long, inflorescence throughout densely glandular, glandular trichomes short and long; floral bracts linear to narrowly elliptic, 2.5–6 mm long, margins hyaline, serrulate, basally glandular, translucent-white apical mucro 0.8–2 mm long; bracteoles similarly shaped 1–2 mm long, with a shorter or absent mucro as well as glands occurring closer to the apex. *Hypanthium* ellipsoidal at anthesis, 3–5 mm long, 1.6–1.7 mm wide, densely glandular, with short and long glandular trichomes. *Calyx* moderately densely glandular, with short and long glandular trichomes, 2 lobes connate almost to their apex, 3 lobes free to base, 2–2.5 mm long. *Corolla* white, abaxial surface white with a faint pinkish stripe near base of each corolla lobe; lobes vertically-paired; anterior lobes 5–6.5 mm long, 2–3 mm wide, with a little, yellow, stippled mark near the base; posterior lobes 4–5 mm long, 1.5–2.3 mm wide, bearing a yellow, strap-like mark having an emarginate apex, extending from the throat of the corolla onto the base of each lobe. *Labellum* boss yellow, broadly elliptic, *c.* 0.8 mm long, *c.* 0.6 mm wide, smooth; basal appendages 2, yellow, triangular, *c.* 0.3 mm long, papillose; margins yellow, dentate, papillose. *Throat* appendages absent. *Gynostemium* *c.* 1.3 mm long, reddish, torus yellow; anthers dark red, positioned *c.* 45° to the gynostemium; with reddish moniliform hairs along the margins; pollen white; stigma elliptic, pulviniiform, *c.* 1.8 mm long, *c.* 0.8 mm wide. *Capsule* ellipsoidal, *c.* 5 mm long, *c.* 3 mm wide. *Seeds* not seen. (Figure 10)

Diagnostic features. *Stylidium piliferum* is distinguished from all other members of the complex by having: oblanceolate leaves, with a translucent-white, serrulate, hyaline margin; a densely glandular, ellipsoidal hypanthium; calyx lobes with 2 calyx lobes connate almost to their apex and 3 free to base; a white corolla with yellow marks near the base of each corolla lobe.

Selected specimens examined. WESTERN AUSTRALIA: Marbellup Road, W of Albany on South Coast Highway, 4 Dec. 2009, *W.S. Armbruster* 09-113 (PERTH); Richards Road at NE boundary of Gull Rock National Park, 5 Dec. 2009, *W.S. Armbruster* 09-120 (PERTH); near top of hill above Betty's Beach, 8 Dec. 2009, *W.S. Armbruster* 09-127 (PERTH); SE corner of reserve, Shirley Balla Swamp, 28 Nov. 2013, *L. Barrett* 86 (PERTH); 1 km from the Cape Riche Camping Ground along the track to the Salmon Fishermen's camp, 8 Oct. 2013, *G. Byrne* 4864 (PERTH); site MR1. 6 km W on Mowen Road from Vasse Highway, Nannup, 16 Nov. 2001, *R.J. Cranfield* 17478 (PERTH); Boyup Brook road to Donnybrook 21 km NNW of Boyup Brook, 3 Nov. 2011, *R.J. Cranfield* 25892 & *G. Henderson* (PERTH); Kent Road, *c.* 3 km N of Qualen Road. Gunapin Block, Wandoo National Park, 10 Nov. 2008, *A. Crawford* 1880 (PERTH); Lake Mealup, Pinjarra, 18 Oct. 2003, *K.E. Creed* 118 (PERTH); Pinjarra Industrial Area, 24 Oct. 2002, *P. Foreman* PJ 243 & *J. Kelly* (PERTH); walk trail along Oldfield estuary, *c.* 1 km S from Access Road off Munglinup Beach Road, 9 Oct. 2006, *M. Hislop* 3667 (PERTH); Bow River, SW Western Australia, Dec. 1912, *S.W. Jackson* *s.n.* (PERTH); W of South West Highway, on Storey Road, Waroona, 1 Nov. 1991, *A. Lowrie* 450 (PERTH); road off to right *c.* 10 km S of Ravensthorpe on Hopetoun Road, 25 Sep. 2006, *D.E. Murfet* 5402 & *A. Lowrie* (AD); Reserve A21064 located *c.* 15 km directly NE of Arthur River townsite, 2 Nov. 2002, *F. Obbens* 63/02 & *H. Jensen* (PERTH); Wilgie Creek Reserve, 40339, W side of Yunderup Road North, N side

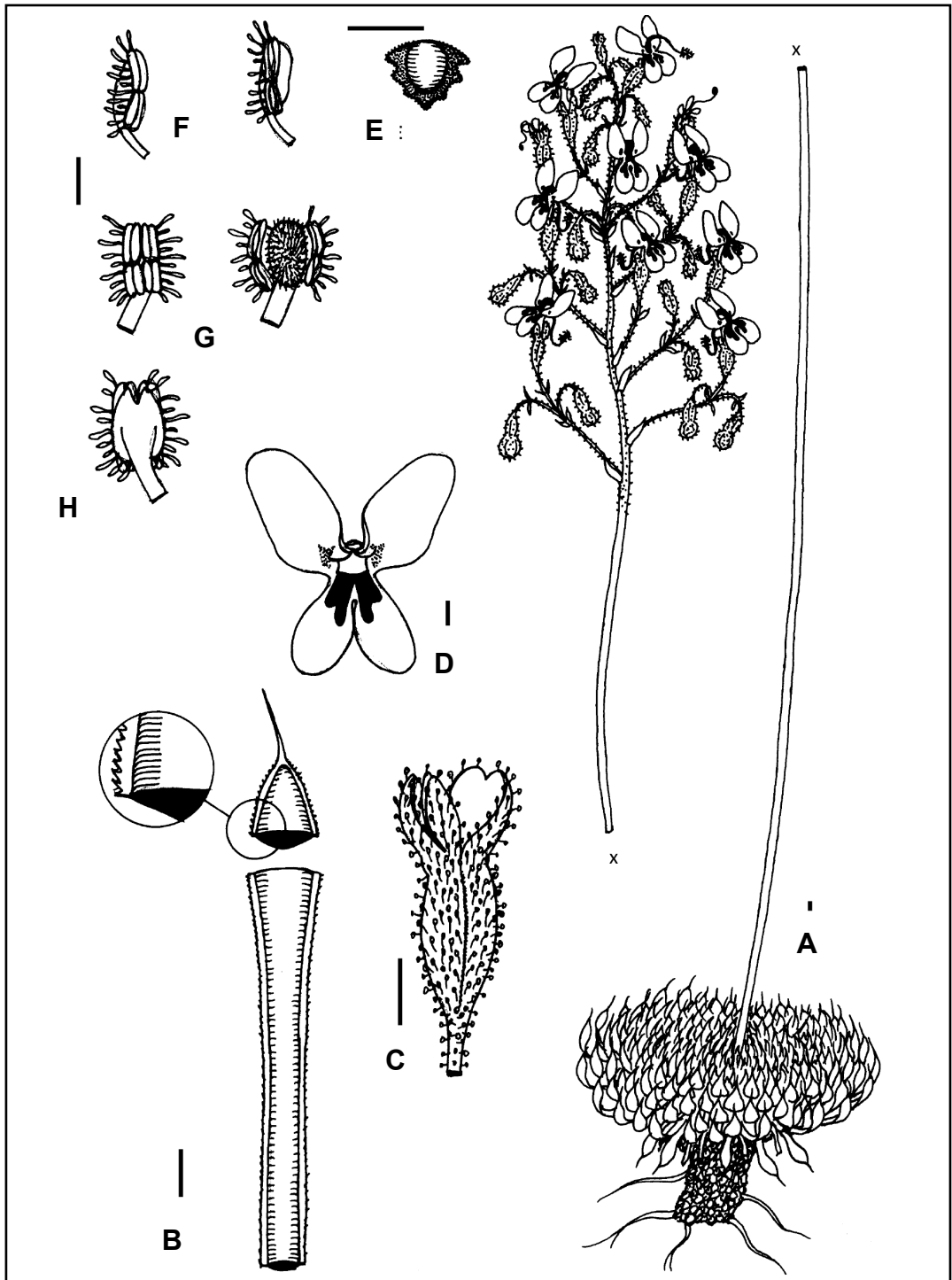


Figure 10. *Stylidium piliferum*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with the stigma grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 450.

of creek, North Yunderup, Pinjarra, 16 Sep. 2002, *P.G. Payne* 57 (PERTH); 8 km from Two Rocks, near the intersection of Smokebush and Tringa Roads, Two Rocks, 21 Sep. 2002, *K.C. Richardson* 104 (PERTH); 200 m N of Gracetown Road, near E boundary of National Park, NW of Margaret River, 20 Oct. 1999, *J. Scott* 122 (PERTH); Cape Le Grand, Transect E1, Cape Le Grand National Park, 1 Nov. 2001, *C. Tauss* 1-21 (PERTH); N of Gnangara Road, W side of Lot 46 Maralla Road, locality of Ellenbrook, 28 Oct. 1999, *M.E. Trudgen* 20574 & *M. Wood* (PERTH); quadrat 3, Reserve 424, West Talbot Road, York, 26 Oct. 2002, *C. & A. Warburton* 9 (PERTH); 3.9 km S. on Shelly Beach Road from Coombes Road, West Cape Howe National Park, W of Albany, 4 Dec. 2003, *J.A. Wege* 1160 (PERTH); track E of railway line, S of South Coast Highway, Marbellup Nature Reserve, W of Albany, 2 Nov. 2010, *J.A. Wege* 1803 (PERTH).

Vernacular name. Common Butterfly Triggerplant (Erickson 1958).

Distribution and habitat. Occurs on the Swan Coastal Plain, in the southern Jarrah Forest and east to the Esperance Plains. Grows: in grey sand on an east down-sloping hill in low shrubland; on low lying plain with grey sand in *Banksia* woodland with *Anigozanthos manglesii*, *Banksia attenuata*, *Boronia crenulata*, *B. ramosa*, *Burchardia congesta*, *Caesia* sp., *Chamaescilla corymbosa*, *Stylidium* sp., *Thysanotus patersonii*; in wetland with bare dry white-grey sand to clayey sand surrounded by forest to shrubland associated with *Eucalyptus marginata* and *Persoonia longifolia*; in sandy soils in dense coastal heath at base of small boulders; on hill slope above winter-wet area in white sand in *Allocasuarina - Eucalyptus* woodland; on plain with gentle slope in grey sand in open *Eucalyptus marginata*, *Eucalyptus wandoo* woodland with low open shrubs and *Xanthorrhoea preissii*; in dry white sand in 1–1.5 m heath over dense sedges with *Adenanthos cuneatus*, *Banksia repens* and *Lepidosperma carphoides*; in ironstone pebbles with sand in heathland; in yellow-grey sand over granite with light litter in low Peppermint woodland with *Banksia attenuata*, *Nyctisia floribunda*, *Melaleuca thymoides*, *Dasyogon bromeliifolius*.

Flowering period. September to December.

Conservation status. Reasonably widespread and well-represented within the conservation estate.

Etymology. The epithet is from the Latin *pilifer* (bearing hairs) and refers to the apex of the leaf which ends in a hair-like point. The term mucro has been adopted by us to describe the apical leaf appendage.

Notes. Although *Stylidium piliferum* is reasonably consistent in its morphological characters it does vary considerably in overall size of plants.

Stylidium ponticulus Lowrie & Kenneally, *sp. nov.*

Type: Kalbarri National Park, near place called Z Bend by Murchison River, Western Australia, 9 October 1982, *A. Strid* 20802 (*holo:* PERTH 02969106; *iso:* MEL).

Stylidium sp. Kalbarri (*A. Carr* 145) *p.p.*, Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb, 15–18 cm tall, with basin-like rosettes of regularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base addressed to the soil; older plants comprising

1 or more clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* silvery grey-green and shiny on both surfaces, oblanceolate, incurved, narrowly obtriangular with a prominent abaxial longitudinal mid-vein in T.S., 1.2–1.7 cm long, 0.6–0.8 mm wide near the base, gradually dilating to 1.3–1.8 mm wide near the apex, *c.* 0.4 mm thick, margin hyaline, serrulate, 0.1–0.15 mm wide, apical mucro translucent-white, 1–1.8 mm long. *Scape* glabrous; bracts absent. *Inflorescence* racemose, densely covered with golden glandular trichomes 0.2–0.4 mm long, tipped with blackish maroon glands, pedicels (and peduncles that sometimes occur) glandular; floral bracts ovate, 2–2.5 mm long, 0.6–0.8 mm wide, apical mucro translucent-white, 1.2–1.5 mm long, margins hyaline, translucent-white, serrulate; bracteoles similar, 1.2–1.5 mm long, 0.4–0.6 mm wide. *Hypanthium* dark green, \pm narrowly ellipsoidal at anthesis, 3.5–4 mm long, 1.3–1.8 mm wide, densely covered with golden glandular trichomes 0.2–0.4 mm long, tipped with blackish maroon glands. *Calyx* with 2 lobes connate almost to their apex, 3 lobes free to base, 2–2.5 mm long, margins hyaline, a little irregular but mostly entire, moderately covered with golden glandular trichomes 0.2–0.4 mm long, tipped with blackish maroon glands. *Corolla* white, or pale yellow fading to white, or pale pink with darker pink margins, abaxial surface white, moderately glandular with scattered, translucent trichomes tipped with blackish maroon glands; lobes vertically-paired; posterior lobes 3–4 mm long, 2.8–3.7 mm wide, fused at their base to form a little greenish yellow-coloured bridge 1–1.5 mm long, 1–1.5 mm wide which is connected to the anterior lobes, posterior lobes with large red marks positioned on the white section just before the greenish yellow base; anterior lobes 6–7 mm long, 3–3.8 mm wide, white with smaller red marks near the base. *Labellum* boss pale green, broadly elliptic, *c.* 0.9 mm long, *c.* 0.8 mm wide, smooth; basal appendages 2, pale green, lateral, subulate, *c.* 0.5 mm long, *c.* 0.3 mm wide at the base, papillose; margins reddish, papillose. *Throat* greenish yellow, appendages absent. *Gynostemium* *c.* 11.5 mm long, reddish, torus reddish and/or yellow; anthers dark maroon, positioned *c.* 45° to the gynostemium; with translucent-red moniliform hairs along the margins; pollen yellow; stigmas 1, gibbose, between the spent vertical anthers, *c.* 1.5 mm long, *c.* 0.8 mm wide. *Capsule* not seen. *Seeds* not seen. (Figure 11)

Diagnostic features. *Stylidium ponticulus* is distinguished from all other members of the *S. piliferum* complex by its silvery grey-green basal rosette of neatly arranged, shiny leaves; corolla white, or pale-yellow fading to white, or pale pink with darker pink margins; small posterior corolla lobes that are narrowly fused at their base to form a distinctive little bridge between the anterior and posterior lobes.

Selected specimens examined. WESTERN AUSTRALIA: [specimens with corolla white or pale yellow fading to white] 5 km along Robinson Road from Bunney Road, SW of Mingenew, 17 Oct. 1992, *A. Carr* 145 (MGW., PERTH); 20 km S [of] Kalbarri, 11 Oct. 1984, *D. & B. Bellairs* 2080 (PERTH); Vermin fence – S of Kalbarri, 8 Oct. 1988, *D.R. & B. Bellairs* 2077 (PERTH); N side of Ajana-Kalbarri road, 12.3 km from townsite, 30 Oct. 1999, *D. & B. Bellairs* 6118 (KALB., PERTH); Kalbarri National Park, near Ajana-Kalbarri Road, 9 Sep. 1993, *K. Bremer & M. Gustafsson* 53 (PERTH, UPS); between turnoff to Pot Gorge and Pot Gorge, 26 Sep. 1974, *G. Perry* 305 (PERTH); [specimens with corolla pink] 20 km SE of Dongara, 14 km WSW of Mt Adams, 14 Nov. 1979, *S.D. Hopper* 1517 (PERTH); SW sector of Boonanarring Nature Reserve, Gingin, 22 Nov. 2001 *F. & J. Hort* 1652 (PERTH); in beige sand in Yordanogo Nature Reserve W of Mt Adams, SE of Dongara, 22 Oct. 2007, *A. Lowrie* 3613 (MEL, PERTH); in beige sand N of Origin Gas Plant, Yordanogo Nature Reserve W of Mt Adams, SE of Dongara, 22 Oct. 2007, *A. Lowrie* 3618 A (MEL, PERTH).

Vernacular name. Bridge-petalled Triggerplant (here designated).

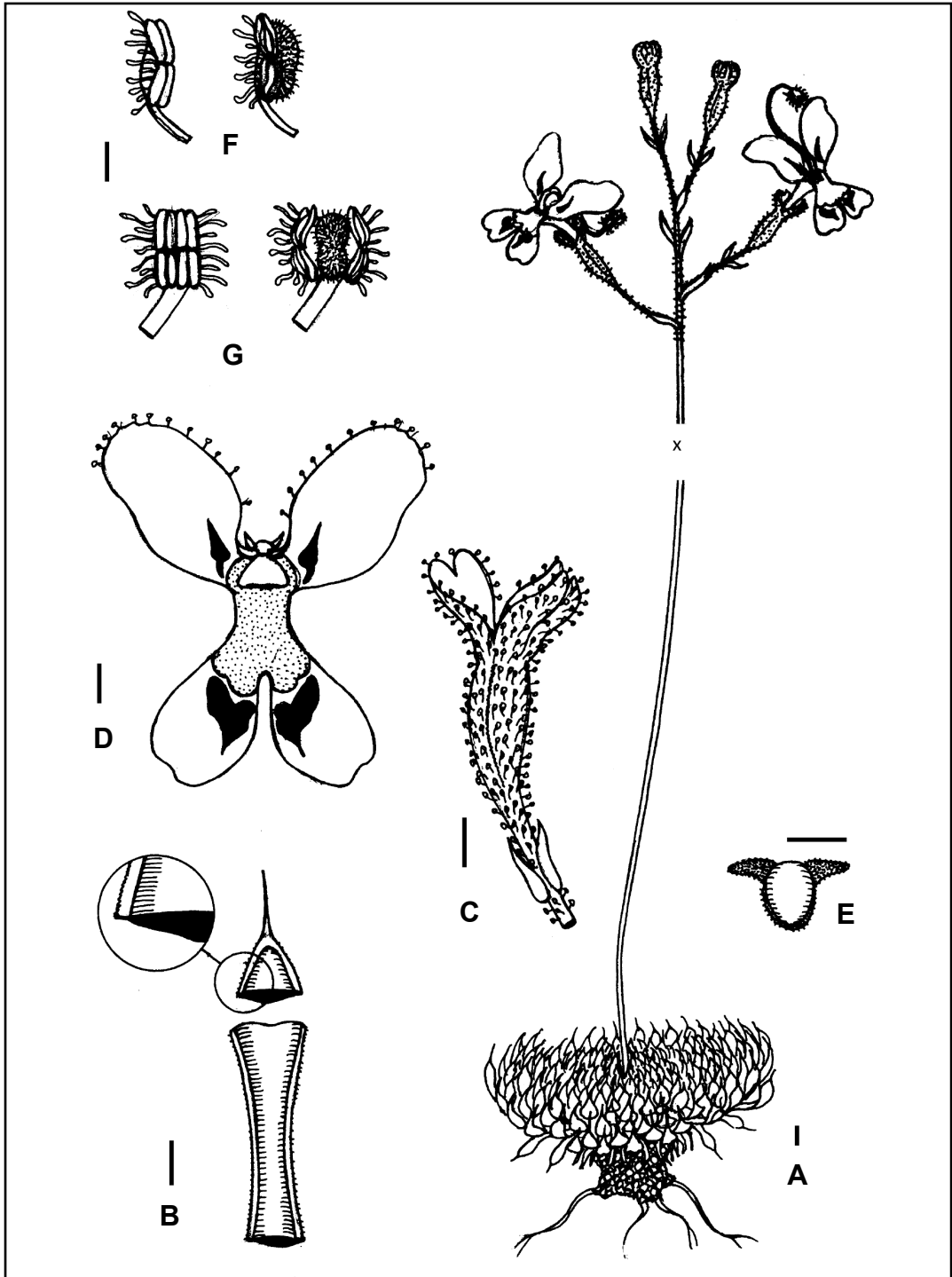


Figure 11. *Styliidium ponticulus*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, and glabrous bracteoles; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with the stigma grown out (right). Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 637.

Distribution and habitat. Occurs on the north Swan Coastal Plain from Dongara to Kalbarri National Park. The white, or pale-yellow fading to white-flowered forms grow in light brown sand, yellow sand, and white sand or beige sand on heathland. The pink-flowered form occurs west of Mt Adams, south-east of Dongara growing in beige or deep yellow sands in heathland with *Banksia hookeriana*, *B. menziesii*, *B. elegans* and *B. attenuata*.

Flowering period. September to November.

Conservation status. Reasonably widespread and well-represented within the conservation estate.

Etymology. The epithet is Latin and means ‘little bridge’, and is used as a noun in apposition. It refers to the distinctive bridge between the anterior and posterior corolla lobes.

Affinities. *Stylidium ponticulus* is morphologically similar to *S. amphora* and *S. salmoneum* Lowrie & Kenneally, which both have posterior corolla lobes that are more or less fused at their base to form a bridge between the anterior and posterior lobes. In *S. ponticulus*, however, the posterior corolla lobes’ basal constriction is rather narrow and is prominently displayed as a little bridge when it is in full flower, whereas the flowers of both *S. amphora* and *S. salmoneum* have the bases of the anterior and posterior corolla lobes almost touching each other and rarely display the bridge between their corolla lobes.

The corolla of *S. ponticulus* is 9–11 mm long, either white or pale yellow fading to white, or pale pink with darker pink margins, whereas *S. amphora* has a yellow corolla 13–14 mm long and *S. salmoneum* has a salmon-pink to orange corolla 11–12 mm long. *Stylidium ponticulus* is further distinguished from these species by its basal rosette of regularly arranged, shiny, silvery grey-green leaves; the leaves of *S. amphora* and *S. salmoneum* are green, not shiny, and unevenly or irregularly arranged within the rosette.

Notes. Some herbarium specimens at PERTH (i.e. PERTH08172439; 07487002; 05728886; 05728894; 05728983; 05480787; 05728878) were annotated by one of us (AL) and attributed to *S. ponticulus* in 2007; these are all referable to *S. salmoneum*.

Stylidium pubigerum Sond., in Lehm., *Pl. Preiss.* 1(3): 383 (1845). *Candollea pubigera* (Sond.) F.Muell., *Syst. Census Austral. Pl.*: 86 (1882). *Type:* In solo limoso arenoso inter frutices prope Woodbridge, Perth [Western Australia], 14 October 1839, *L. Preiss* 2278 (*lecto, fide* J.A. Wege, *Nuytsia* 25: 199 (2015): MEL293413; *isolecto:* BR 0000005423217, FI, G 00358839, G 00358840, G 00358841, GOET 011208, L 0012063, LD 1745431, M 0175788, MEL 293411, MEL 293412, MO-797522, P00712418, TCD [as *L. Preiss* 651 *p.p.*], W). *Paralectotypes* [*residual syntypes*]: Swan River [Western Australia, 1841], *J. Drummond* [1:] 543 (BM 001041318, E 00279184, G 00358835, G 00358836, K 000060759, K 000355288, K 000355293, MEL 2295042, OXF, P 00712423, P 00313120, W).

Perennial herb, 6–12 cm tall, with basin-like rosettes of regularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons’ growth; young plants solitary from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 12 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season’s rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, incurved, transversely obtriangular with a prominent abaxial longitudinal mid-vein in T.S. in its upper part, 1.8–2 cm long, 0.7–1.2 mm wide near the base, gradually dilating to 1.3–2.5 mm wide near the apex, *c.* 0.7 mm thick, hyaline margin translucent-white, 0.1–

0.15 mm wide, serrulate in its lower half and either serrulate or entire in its upper half, apical mucro translucent-white, hair-like, 2.5–5 mm long. *Scape* reddish, glabrous; bracts absent. *Inflorescence* racemose, sometimes in groups of 2 or 3 flowers on a peduncle, inflorescence moderately covered throughout with non-glandular trichomes; floral bracts green, ovate, 2.5–3 mm long, 0.8–1 mm wide, hyaline margins serrulate and hair-like mucro translucent white, 1–1.2 mm long; bracteoles similar, 1–1.5 mm long, 0.3–0.5 mm wide, hair-like mucro translucent white, 0.5–0.7 mm long. *Hypanthium* reddish, narrowly oblong at anthesis, 7–12 mm long, 1.2–1.5 mm wide, densely covered with golden green, non-glandular trichomes *c.* 1 mm long. *Calyx* distinctly 2-lipped, 2 lobes connate, lobes free for 0.5–0.6 mm from their apex and 3 lobes connate, lobes free for 0.5–1 mm from their apex, margin hyaline \pm absent, entire, densely fringed and covered with similar golden green non-glandular trichomes to those on the hypanthium. *Corolla* pale yellow, abaxial surface yellow with faint reddish marks along mid-vein area, glandular; lobes vertically-paired; anterior lobes 4.5–6.5 mm long, 2.5–3 mm wide, mostly with reddish marks near the base; posterior lobes 3–4 mm long, 2.2–2.5 mm wide, with mostly reddish markings near the base. *Labellum* boss yellow, \pm broadly reniform, *c.* 1 mm wide, smooth; margins with a very narrow, reddish, papillose beard and bearing a few glandular trichomes *c.* 0.4 mm long. *Throat* greenish yellow, appendages absent. *Gynostemium* *c.* 13.5 mm long, reddish, torus greenish yellow; anthers yellow, reddish along margins of openings, positioned *c.* 60° to the gynostemium, with very short, translucent-red moniliform hairs along the margins; pollen yellow, vitreous; stigmas 2, ellipsoidal, one projected above and the other below between the spent vertical anthers, *c.* 1 mm long. *Capsule* not seen. *Seeds* not seen. (Figure 12)

Diagnostic features. *Styidium pubigerum* is distinct from all other members of the *S. piliferum* group by having two and three of its calyx lobes fused together to form two lips; narrowly oblong reddish hypanthium that is densely covered with non-glandular trichomes.

Selected specimens examined. WESTERN AUSTRALIA: Midland Junction, Oct. 1902, *C. Andrews s.n.* (PERTH); between Bolgart and Wyening, 3 Oct. 1967, *S. Carlquist* 3598 (PERTH); John Forrest National Park S of Railway, 6 Oct. 1998, *R. Davis* 6802 (PERTH); E of the Lakes turnoff on road to York, Wambyn Nature Reserve, 9 Oct. 1998, *R. Davis* 7181 (PERTH); Bolgart, 6 Oct. 1952, *R. Erickson s.n.* (PERTH); Chidlow–Wooroloo, Oct. 1951, *J. Gentilli s.n.* (PERTH); Owen Road, Darlington, Oct. 1965, *S. James* 65.10/27 (PERTH); Glen Road, Darlington, Oct. 1973, *S. James* 71.10/20 (PERTH); 6 miles [9.66 km] S of Toodyay on Toodyay–Perth Road, Sep. 1974, *S. James* 74. 9/19 (PERTH); on Albany Highway 20.7 km N of Williams, 8 Oct. 1991, *A. Lowrie* 373 (PERTH); The Lakes just E of turnoff to York, 11 Oct. 1992, *A. Lowrie* 691 (PERTH); Bowelling–Duranillin Road, 2 km from junction of Roelands–Lake King Highway, SW of Darkan, 31 Oct. 1994, *A. Lowrie* 1079 (PERTH); 4 km W of Bakers Hill, 14 Oct. 1989, *B. Nordenstam & A. Anderberg* 636 (PERTH); Cannington, 27 Sep. 1982, *G.J. Weber s.n.* (PERTH); 400 m along track 5.2 km E of Albany Highway on Extracts Road, Wandering Shire, 22 Oct. 2002, *J.A. Wege* 706 (PERTH); *c.* 9.9 km S of Brookton Highway on Watershed Road, 16 Oct. 2008, *J.A. Wege* 1551 & *A.D. Crawford* (PERTH); junction of Forest Street and Bolgart West Road, Bolgart, 1 Oct. 1996, *J.A. Wege* 236 & *C. Wilkins* (PERTH).

Vernacular name. Yellow Butterfly Triggerplant (Erickson 1958).

Distribution and habitat. Occurs throughout the Jarrah Forrest from John Forrest National Park to Wandering. Grows: on upper hill-slopes in brown loam over laterite in open wandoo woodland in yellow-brown clayey sand over laterite in open marri, jarrah and wandoo woodland; on flat slope with dry yellow brown gravel, laterite and granite sheet in marri and wandoo woodlands with *Allocasuarina huegeliana*, *Xanthorrhoea preissii*, *Grevillea pilulifera* and *Hibbertia hypericoides*; granite outcrop in yellow-grey clayey sand in low shrubland of *Verticordia*, *Hakea*, *Hibbertia*, sedges and *Xanthorrhoea*;

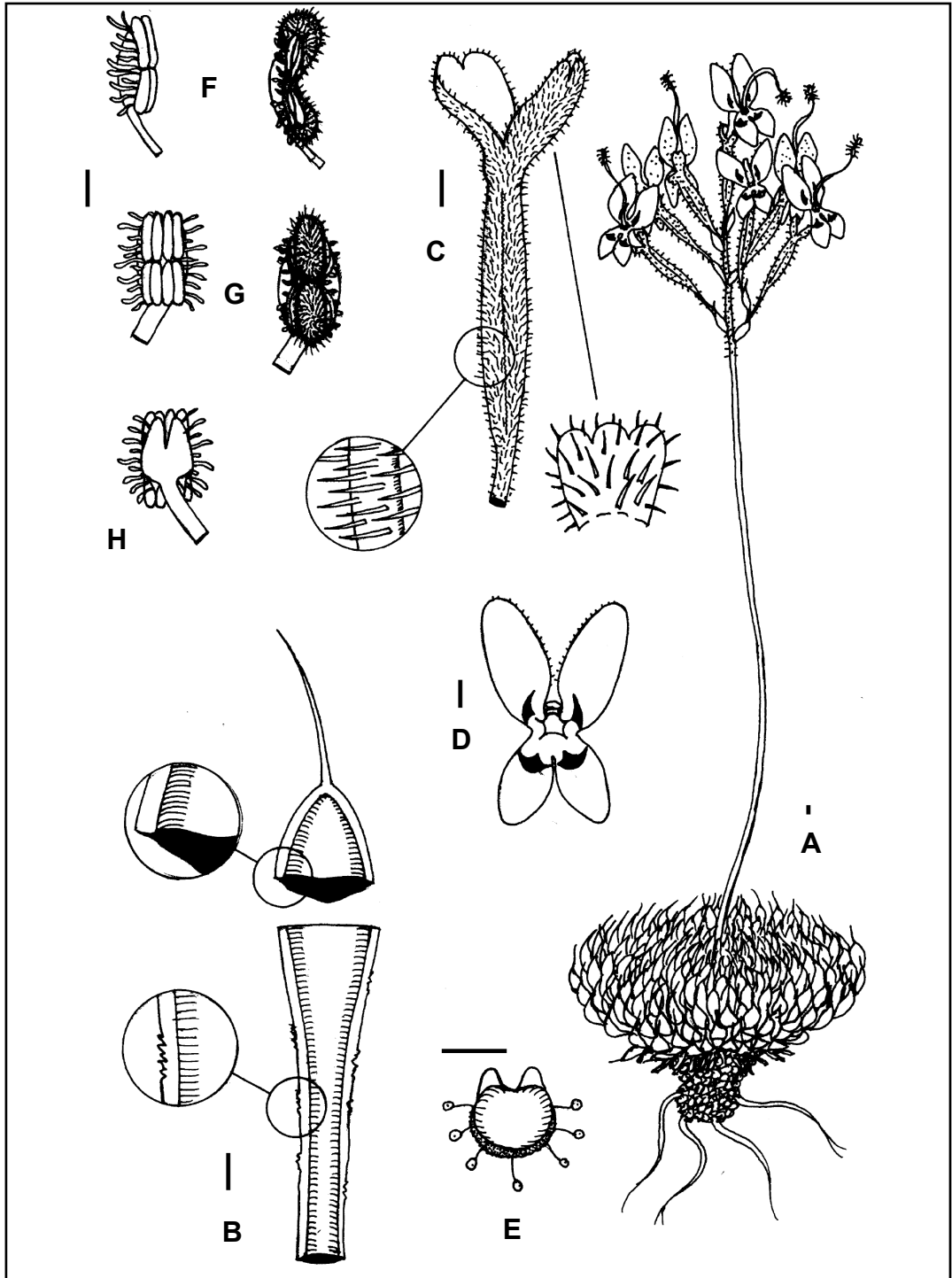


Figure 12. *Stylidium pubigerum*. A – habit of flowering plant; B – leaf, and enlarged sections (insets); C – hypanthium and calyx lobes, with details of indumentum (inset) and trilobed apex of connate calyx lobes; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with the stigmas grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 691.

upland, middle of rise in heavy brown clay over granite with sedges in low open woodland; red-brown clayey sand in open *Eucalyptus* woodland.

Flowering period. September to December.

Conservation status. Not threatened.

Chromosome number. $n = 14$ *vide* S. James 71.10/20 Oct. 1971 (James 1979).

Etymology. The epithet is from the Latin *pubi-* (softly hairy) and *-ger* (bearing), a reference to its indumentum of non-glandular trichomes.

Affinities. *Stylidium pubigerum* is morphologically distinct from all other species within the *S. piliferum* complex by its narrowly oblong hypanthium with two and three of its calyx lobes fused together to form two lips, all covered with non-glandular trichomes.

Notes. The two stigmas, one projected above and the other below the anthers, are not always fully-developed together. The lower stigma is present in rudimentary form only when the upper stigma is fully mature. Often this lower stigma does not develop to maturity if the upper stigma has been pollinated.

A population of *S. pubigerum* comprising plants with pale yellow flowers without reddish marks near the corolla lobe bases, has been observed in the Red Hill area of the Darling Range. Other than flower colour this population is similar to the rest in all of its other morphological characters.

Stylidium salmoneum Lowrie & Kenneally, *sp. nov.*

Type: Luelf Road off Gunapin Ridge Road, Gunapin State Forest, under power lines *c.* 100 m south from farm fence, south-east of Reference Tree AZ 92/1, Western Australia, 17 November 1999, A. Lowrie 2433 & F. & J. Hort (*holo:* PERTH 08702462; *iso:* MEL).

Perennial herb, 14–32 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 1 to 6 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, incurved, transversely lenticulate in T.S., 1.4–2 cm long, 1.3–1.5 mm wide near the base, narrowing just above the base to 0.8–1 mm wide, dilating to 1.5–2 mm wide near the apex, *c.* 0.5 mm thick, margins hyaline, serrulate, 0.1–0.2 mm wide, apical mucro translucent-white, 2–3.5 mm long. *Scape* glabrous; bracts absent. *Inflorescence* racemose, sometimes paniculate in the lower parts, inflorescence glandular, trichomes translucent-white, 0.2–0.4 mm long, tipped with blackish maroon glands; floral bracts ovate, 2–2.5 mm long, 1–1.5 mm wide, apical mucro translucent-white, 0.5–1 mm long, margins hyaline, serrulate; bracteoles similar, 1.5–2 mm long, 0.6–0.7 mm wide. *Hypanthium* dark green, ellipsoidal to narrowly obovoid at anthesis, 3.5–4 mm long, 1.5–1.8 mm wide, densely glandular, trichomes translucent-white 0.2–0.4 mm long, tipped with blackish maroon glands. *Calyx* sparsely glandular, 2 lobes connate almost to their apex, 3 lobes free to base, 2–2.5 mm long, margin hyaline, serrulate. *Corolla* salmon-pink (from pink [R.H.S. Red-Purple 62C] to orange [R.H.S. Orange 27A to 28B]), abaxial surface whitish with pinkish margins and a reddish stripe along mid-vein near base, moderately glandular with scattered translucent-white

trichomes 0.2–0.4 mm long, tipped with blackish maroon glands; lobes vertically paired; anterior lobes 6–6.5 mm long, 3.7–4 mm wide, unmarked; posterior lobes 5–5.5 mm long, 3–3.2 mm wide, with a large, reddish mark near the base. *Labellum* boss greenish yellow, obovate, c. 0.8 mm long, c. 0.7 mm wide, smooth; basal appendages 2, greenish yellow to reddish at base, lateral, subulate, c. 0.7 mm long, c. 0.2 mm wide at the base, c. 0.1 mm wide near the apex, papillose; margins and c. 0.2 mm long apex, papillose. *Throat* greenish yellow, appendages absent. *Gynostemium* c. 14 mm long, reddish; torosus pale yellowish green and shiny; anthers blackish maroon, positioned in line with the gynostemium, with translucent-red moniliform hairs along the margins; pollen pale yellow; stigmas 2, mammiform, c. 1.5 mm long, c. 1 mm wide. *Capsule* obovoid, 5–6.5 mm long, 2.5–3 mm wide. *Seeds* ± ovoid in outline with ± angled longitudinal sides, 0.5–0.6 mm long, 0.3–0.35 mm wide, brown, testa papillose. (Figure 13)

Diagnostic features. *Stylidium salmoneum* is distinguished from all other members in the *S. piliferum* complex by its salmon-pink corolla lobes, which bear large, reddish marks near the base of the posterior pair only.

Selected specimens examined. WESTERN AUSTRALIA: Wattening, on the NE corner of Munyerring Block, Julimar CON, off the southern boundary of Training area, c. 3 km N of Bindoon-Dewars Pool Road. On E side of the granite outcrop, 28 Dec. 2005, *F. Hort* 2897 (PERTH); Bolgart, 7 Nov. 1948, *R. Erickson s.n.* (PERTH); Deefor Road, Flynn State Forest, York: take Deefor Road for 1.75 km E of Kent Road then take the minor track N for 550 m to the SE edge of the shrubland, 20 Nov. 1999, *F. Hort, J. Hort & M. Hislop* 803 (PERTH); Qualen Road, Gunapin State Forest, York: 11.1 km E of Catchment Road, 20 Nov. 1999, *F. Hort, J. Hort & M. Hislop* 804 (PERTH).

Vernacular name. Salmon-Pink Triggerplant (here designated).

Distribution and habitat. Occurs in the Jarrah Forrest, extending into the Avon Wheatbelt. Grows in yellow-grey, yellow-brown clayey sand over decomposed sheet granite in open areas with granitic heathland vegetation surrounded by wandoo, jarrah and marri woodland.

Flowering period. November to December.

Conservation status. A restricted but common species at the majority of its known locations and currently not threatened.

Etymology. The epithet is Latin, meaning ‘salmon-pink’ and refers to the colour of the corolla. The corolla can vary from one population to the next, being any of the hues in the Royal Horticultural Society (1986) colour charts between R.H.S. Red-Purple 62C to R.H.S. Orange 27A or 28B.

Affinities. *Stylidium salmoneum* is distinguished from all other species within the *S. piliferum* complex that have a glandular, ellipsoidal to narrowly obovoid hypanthium (at anthesis), and glandular calyx lobes, by its large, reddish marks near the base of the posterior lobes. The anterior lobes of this species lack the reddish marks seen on *S. amphora*, *S. bicolor*, *S. hispidum* and *S. ponticulus*.

Stylidium salmoneum is morphologically similar to *S. amphora* and *S. ponticulus*, and the differences between these three species are given in *Affinities* below the description of *S. ponticulus*.

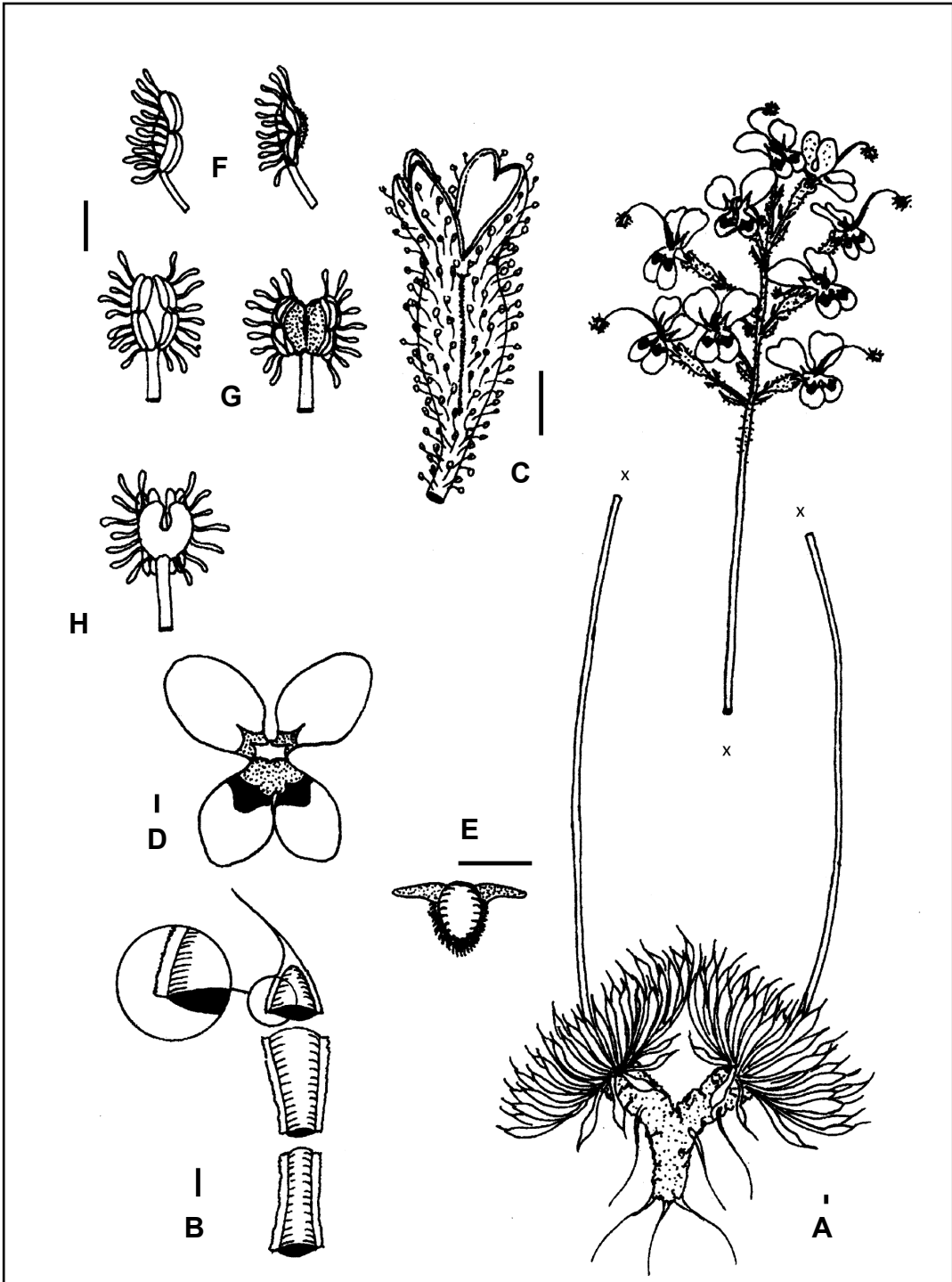


Figure 13. *Styliidium salmoneum*. A – habit of flowering plants; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigma grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with the stigma grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 2433 & F. & J. Hort.

Notes. Regardless of the corolla colour, the gynostemium of *S. salmoneum* is always reddish, with the torosus (the bent, mobile portion of the gynostemium) positioned just above the throat of the corolla, pale yellowish green, and shiny. When the gynostemium is in the set position and held against the boss of the labellum, the torosus shines and flickers in the sunlight, acting like a nectary gland with promise of a large nectar reward.

Stylidium strigosum Lowrie & Kenneally, *sp. nov.*

Type: Warradarge, Western Australia [precise locality withheld for conservation reasons], 18 October 1991, A. Lowrie 415 (*holo:* PERTH 08702640; *iso:* MEL).

Stylidium sp. Banovich Road (F. & J. Hort 1884), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb, 9–20 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 6 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, mostly flat, only slightly incurved near apex, transversely narrowly triangular in T.S., 2–5 cm long, 1.2–1.4 mm wide near the base, gradually dilating to 3.5–4 mm wide near the apex, *c.* 0.5 mm thick, margins hyaline ± entire, irregularly serrate in places, apical mucro translucent-white, stiff, 1–1.2 mm long. *Scape* green, very sparsely covered with strigose, non-glandular trichomes; bracts often present, ovate, 3.5–4 mm long, 1.2–1.4 mm wide, apical mucro 0.5–0.6 mm long, margins hyaline, ± entire. *Inflorescence* racemose, compact, moderately covered throughout with strigose as well as straight, non-glandular trichomes 0.2–0.3 mm long; floral bracts green, similar in shape and size to the scape bracts; bracteoles similar to but much smaller than the floral bracts. *Hypanthium* green, narrowly oblong at anthesis, 8–8.5 mm long, 1–1.5 mm wide, covered with strigose as well as straight, non-glandular trichomes 0.2–0.3 mm long, sometimes also with a few, scattered glandular trichomes. *Calyx* with 2 lobes connate to within *c.* 0.7 mm of their apex, 2.5–2.8 mm long, 3 lobes free to their base, 2.5–2.7 mm long, margins entire, adaxial surface covered with glandular and non-glandular trichomes similar to those on the hypanthium. *Corolla* salmon-pink to yellow, including all shades and mixtures of these colours in between, abaxial surface yellowish white, glandular; lobes vertically paired; anterior lobes 5.5–6 mm long, 3–3.5 mm wide, with lemon yellow marks near the base, apical margins bearing glands; posterior lobes 4–4.5 mm long, 2.2–2.7 mm wide, with lemon yellow marks near the base. *Labellum* boss pale yellow, ± ovate, *c.* 0.8 mm long, *c.* 0.6 mm wide, smooth; basal appendages pale yellow, lateral, subulate, *c.* 0.5 mm long, *c.* 0.2 wide at the base; margins with tiny, papillose, pale yellow beard *c.* 0.2 mm wide. *Throat* lemon yellow, appendages absent. *Gynostemium* *c.* 11 mm long, pale green, torosus lemon yellow; anthers yellow, positioned *c.* 45° to the gynostemium; with translucent-pink, clavate, moniliform hairs *c.* 0.5 mm long along the margins; pollen yellow; stigmas 2, mammiform, one projected above, the other projected below and positioned between the spent vertical anthers, *c.* 2.8 mm long, *c.* 0.4 mm wide, projected forwards *c.* 0.3 mm long when mature. *Capsule* not seen. *Seeds* not seen. (Figure 14)

Diagnostic features. *Stylidium strigosum* is distinguished from all other members in the *S. piliferum* complex by its: large, flat, leafy rosettes of irregularly arranged, oblanceolate leaves that are only slightly incurved near the apex; narrowly oblong hypanthium covered with strigose and straight, non-glandular trichomes, sometimes also with a few, scattered glands; flowers being salmon-pink to yellow and all shades and mixtures of these colours in between.

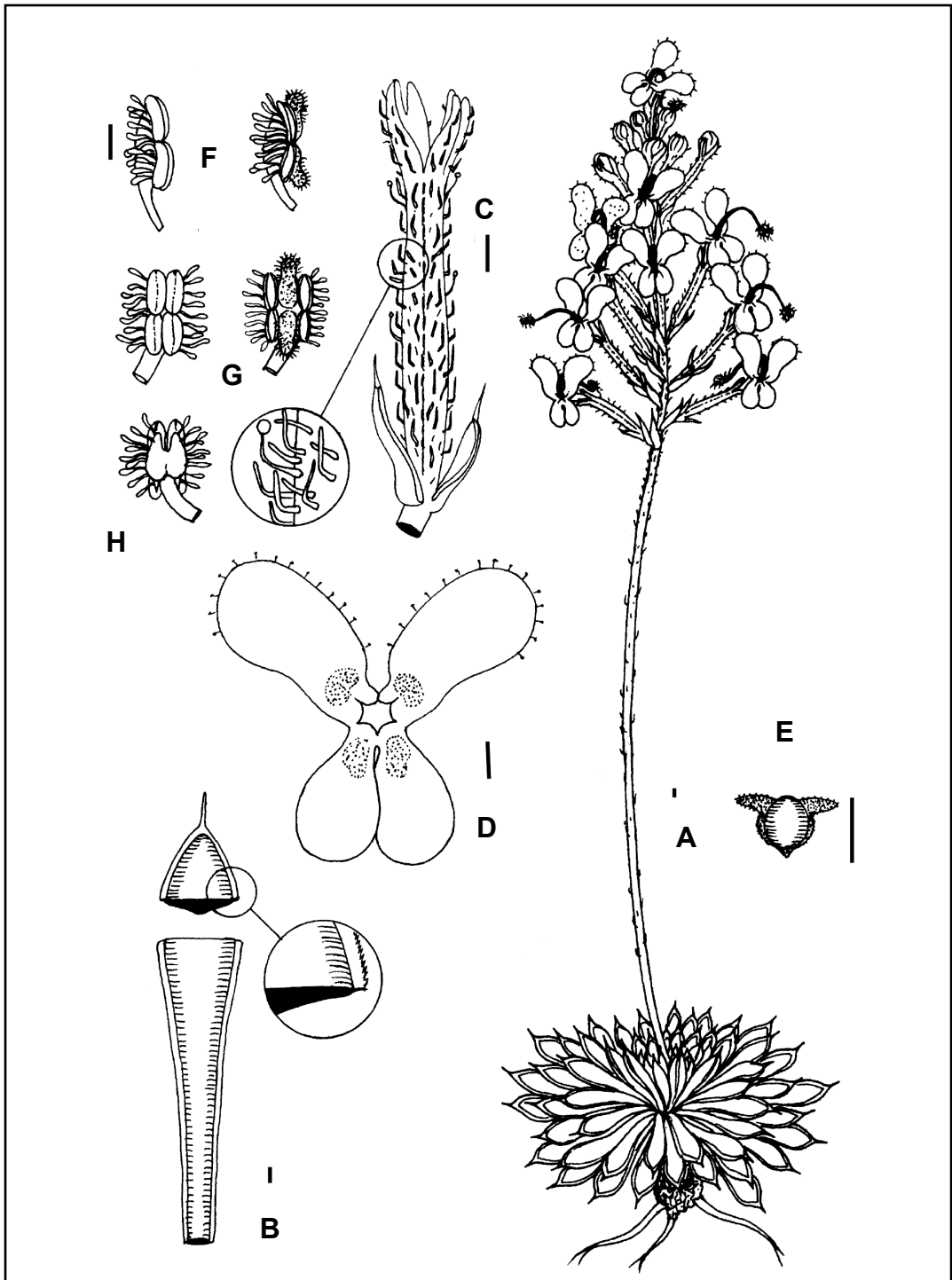


Figure 14. *Stylidium strigosum*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, with detail of indumentum (inset) and glabrous, mucronate bracteoles; D – corolla; E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers (left), and with stigmas grown out (right); H – abaxial view of gynostemium tip at anther stage. Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 415.

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld for conservation reasons] 9 Oct. 2014, *A. Lowrie* 4379 (PERTH); 11 Oct. 2006, *J.A. Wege* 1357 (PERTH); 21 Oct. 2009, *J.A. Wege* 1699 & *W.S. Armbruster* (PERTH); 30 Sep. 2004, *J.A. Wege* 1217 & *K.A. Shepherd* (PERTH).

Vernacular name. Strigose Triggerplant (here designated).

Distribution and habitat. Occurs in the northern Swan Coastal Plain, growing in white-grey clayey sand over laterite in closed heathland.

Flowering period. September to October.

Conservation status. Listed by Smith (2017) as Priority One under Conservation Codes for Western Australian Flora, under the name *S. sp.* Banovich Road (F. & J. Hort 1884).

Etymology. The epithet is from the Latin *strigosus* (covered with straight, rigid, close-pressed, rather short, bristle-like hairs), a reference to this species' indumentum, especially on the hypanthium.

Affinities. *Stylidium strigosum* is morphologically similar to *S. bindoon*, *S. ferricola* and *S. vinosum* as all four species have narrowly oblong hypanthia at anthesis and two connate and three free calyx lobes. Both *S. bindoon* and *S. ferricola* have more or less glabrous calyx lobes whereas *S. vinosum* and *S. strigosum* have both glandular hypanthia and calyx lobes. *Stylidium strigosum* differs from *S. ferricola* by having an indumentum of strigose as well as straight, non-glandular trichomes, whereas that of *S. ferricola* is moderately to sparingly glandular.

Notes. First discovered by one of us (AL) in October 1991 adjacent to cleared farmland with some populations extending into an adjoining nature reserve.

Stylidium vinosum Lowrie & Kenneally, *sp. nov.*

Type: Julimar Forest, Western Australia [precise locality withheld for conservation reasons], 3 November 1993, *K.F. Kenneally* 11400 (*holo:* PERTH 03282112).

Stylidium sp. Dewars Pool (K.F. Kenneally 11400), Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 17 June 2015].

Perennial herb, 18–23 cm tall, with basin-like rosettes of irregularly arranged leaves, arising from the apices of rhizome-like stems produced during the previous seasons' growth; young plants comprising a single rosette from an unbranched stem, with the base adpressed to the soil; older plants comprising 2 to 6 clustered rosettes arising from the apices of below-ground stems, with their bases adpressed to the soil, leaves of the present season's rosette(s) (excluding the central juvenile leaves) deciduous by late summer dormancy. *Leaves* green, oblanceolate, incurved, transversely gull-winged with an abaxial longitudinal prominent mid-vein in T.S., 1.8–2.5 cm long, 0.6–0.8 mm wide near the base, gradually dilated to 1.8–2 mm wide near the apex, *c.* 0.3 mm thick, margins hyaline, serrulate, 0.1–0.15 mm wide, mucro translucent white, 2.5–3 mm long. *Scape* glabrous; bracts absent. *Inflorescence* racemose, pedicels 3–4 mm long, inflorescence densely covered with non-glandular trichomes, with a few, scattered glandular hairs, non-glandular trichomes translucent-white 0.1–0.2 mm long, scattered translucent-white glandular trichomes 0.2–0.3 mm long tipped with blackish maroon glands; floral bracts ovate, 2.5–3 mm long, 0.8–1.2 mm wide, apical mucro translucent-white, 0.5–0.8 mm

long, margin hyaline, serrulate; bracteoles similar, 2–3 mm long, 0.5–0.7 mm wide. *Hypanthium* dark bronze-green, narrowly oblong at anthesis, 9–12 mm long, 1.2–1.4 mm wide, densely covered with non-glandular trichomes, with a few, scattered glands, non-glandular trichomes translucent-white, 0.1–0.2 mm long, scattered translucent-white glandular trichomes 0.2–0.3 mm long tipped with blackish maroon glands. *Calyx* with 2 lobes connate almost to their apex, 3 lobes free to base, 2.5–3 mm long, margins hyaline, mostly entire, densely covered with similar hairs and glands to those on the hypanthium. *Corolla* white, abaxial surface mostly red wine-coloured with a thin, pale yellow margin, glandular with scattered translucent trichomes tipped with blackish maroon glands; lobes vertically paired; anterior lobes 5.5–6.5 mm long, 2–3 mm wide, with yellowish green and reddish marks near the base; posterior lobes 6.5–7.5 mm long, 3.5–4 mm wide, with yellowish green and reddish marks near the base. *Labellum* boss green, ± orbicular, *c.* 1 mm long, *c.* 0.8 mm wide, smooth; basal appendages 2, lateral, yellowish green, subulate, *c.* 0.5 mm long, *c.* 0.3 mm wide at the base, papillose; margins yellowish green with a reddish beard, papillose, bearing glandular trichomes *c.* 0.1 mm long. *Throat* yellowish green with 3 pearlescent squares (?pseudo-nectaries), appendages absent. *Gynostemium* *c.* 17 mm long, reddish, torus yellowish green; anthers reddish, positioned *c.* 45° to the gynostemium, with very short, translucent-white to -pale red moniliform hairs along the margins; pollen pale yellow; stigmas 2, obovoid, one projected above, the other projected below between the spent vertical anthers, *c.* 0.5 mm long. *Capsule* obovoid, 9–12 mm long, 1.8–2 mm wide. *Seeds* ± turbinate, papillose, 0.5–0.55 mm long, 0.4–0.5 mm wide with irregular longitudinal ridges and grooves, testa dark reddish brown. (Figure 15)

Diagnostic features. *Stylidium vinosum* is distinguished from other members of the *S. piliferum* complex by its: narrowly oblong hypanthium and calyx lobes being densely covered with non-glandular trichomes, with a few, scattered glands and scattered translucent-white glandular trichomes tipped with blackish maroon glands; abaxial corolla surface having large, red wine-coloured markings covering the central parts of each lobe.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 3 Dec. 2008, *A. Crawford* 1907 (PERTH); Oct. 1952, *R. Erickson s.n.* (PERTH); 2 Oct. 1947, *C.A. Gardner* 8713 (PERTH); 18 Sep. 2008, *M. Hislop* WW226 & *P. Lewis* (PERTH); 29 Sep. 2007, *F. Hort* 3050 & *B. Hort* (PERTH); 21 Sep. 1991, *A. Lowrie* 327 (MEL, PERTH); 21 Sep. 1991, *A. Lowrie* 329 (PERTH); 20 Oct. 2011, *J.A. Wege* 1869 (PERTH); 23 Sep. 2007, *J.A. Wege* 1402 & *B.P. Miller* (PERTH).

Vernacular name. Julimar Triggerplant (here designated).

Distribution and habitat. Occurs throughout the Jarrah Forrest. Grows in white or grey sand over laterite soils in jarrah and wandoo forest as well as red-brown clayey loam over laterite in open wandoo woodland with *Acacia* species.

Flowering period. October to November.

Conservation status. Listed by Smith (2017) as Priority One under Conservation Codes for Western Australian Flora, under the name *S. sp.* Dewars Pool (K.F. Kenneally 11400).

Etymology. The epithet *vinosum* is from the Latin *vinosus* (wine-coloured), in reference to the purplish red-coloured abaxial surface of the corolla lobes.

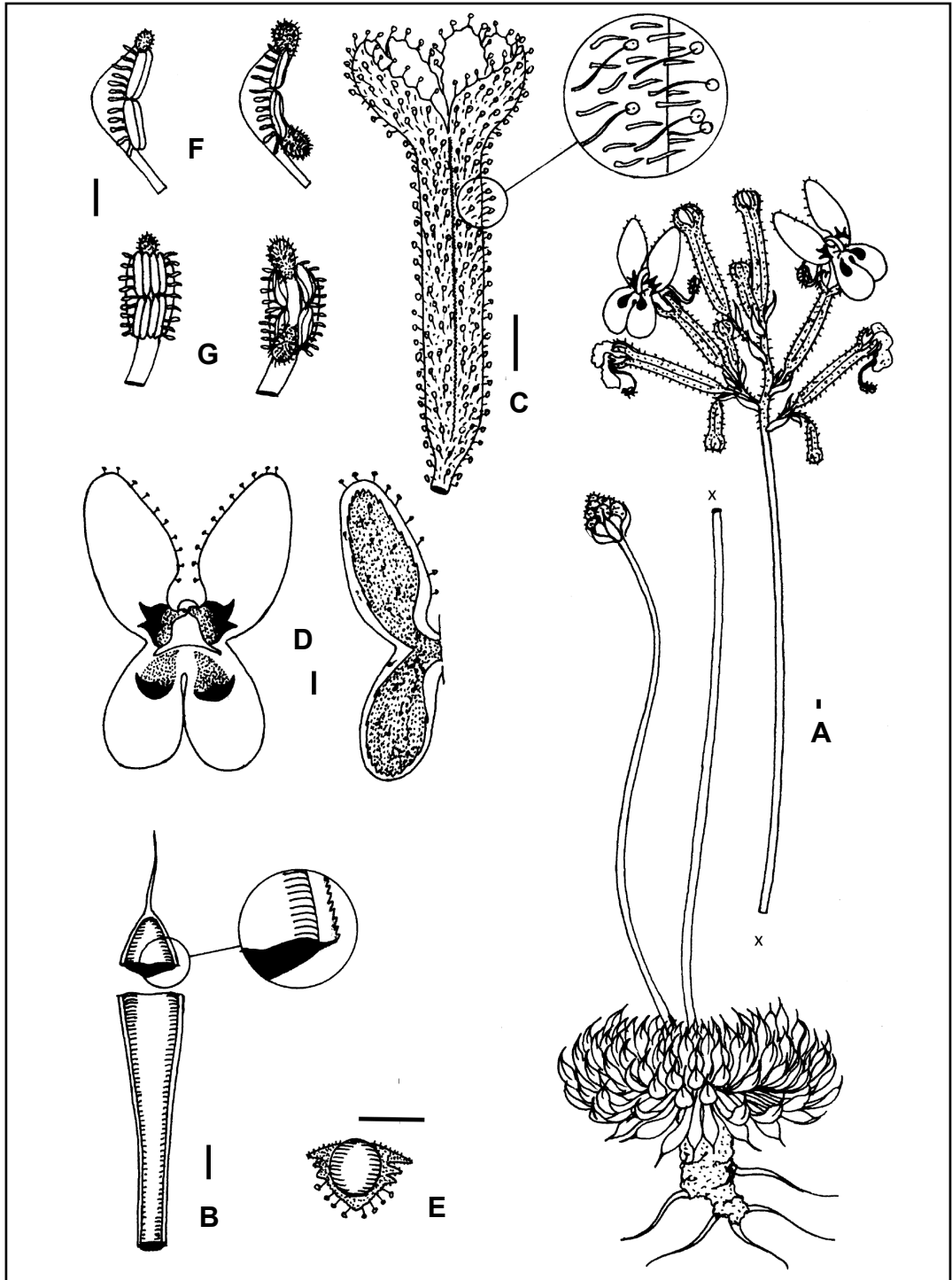


Figure 15. *Stylidium vinosum*. A – habit of flowering plant; B – leaf, and enlarged section (inset); C – hypanthium and calyx lobes, with detail of indumentum (inset); D – corolla (left), and abaxial surface showing red region (right); E – labellum; F – lateral view of gynostemium tip showing anthers (left), and with the stigmas grown out (right); G – adaxial view of gynostemium tip showing anthers (left), with the stigmas grown out (right). Scale bar = 1 mm. Drawn by Allen Lowrie from A. Lowrie 329.

Notes. *Stylidium vinosum* grows near *S. bindoon* at one location in the Julimar Conservation Park: *S. vinosum* only grows here in a white sand patch with jarrah c. 2 hectares in area; *S. bindoon* grows nearby in sand and laterite soils with wandoo forest. Examination of the area showed each species was restricted to its preferred soil type. In one area where the two soil types converged each species was shown not to grow in the other's habitat.

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