

Three new species of *Stylidium* (Stylidiaceae) from south-west Western Australia

Allen Lowrie¹ and Kevin F. Kenneally²

¹6 Glenn Place, Duncraig, Western Australia, 6023

²Science Publications Unit, Corporate Relations Division, Department of Conservation and Land Management, Locked Bag 29, Bentley Delivery Centre, Western Australia 6983

Abstract

Lowrie, A. and Kenneally, K.F. Three new species of *Stylidium* (Stylidiaceae) from south-west Western Australia. *Nuytsia* 13(): 293–302 (2000). Three new triggerplant species, *Stylidium hortiorum*, *Stylidium sidjamesii* and *Stylidium tinkeri* Lowrie & Kenneally are described and illustrated. All are endemic to south-west Western Australia and one of them has a high priority for conservation.

Introduction

The three new species described here are all members of *Stylidium* subgenus *Tolypangium* (Stylidiaceae). *Stylidium hortiorum* belongs to section *Saxifragoideae* Mildbr., the species which are characterized by having rosetted linear to obovate-spathulate leaves and simple racemose inflorescences (see Mildbraed 1908). *Stylidium sidjamesii* and *S. tinkeri* belong to section *Despectae* Mildbr. the species which are characterized by their small annual herbaceous habit; rosettes (when present) sparsely leaved; cauline leaves bracteiform, sparse and often inconspicuous; hypanthium linear or oblong; and labellum without basal appendages (Mildbraed 1908). All members of this subgenus occur in south-west Western Australia, with two taxa, *S. beaugleholei* J.H. Willis and *S. inundatum* R.Br., also recorded from South Australia, south-east Victoria and Tasmania.

The term “mirror-mounds” is adopted here for the silvery reflective structures borne in the corolla throat in *Stylidium hortiorum* as recorded previously for *Stylidium glabrifolium* Lowrie & Kenneally: “The mirror-like mounds are convex and so reflect sunlight regardless of the sun’s position throughout the day...The glistening mounds contain no nectar but act as a ruse to entice any flying insects that might act as pollinators.” (Lowrie & Kenneally 1997: 189).

Taxonomy

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

Stylidio coatesiano Lowrie & Carlquist affinis sed foliis minute scabris et glanduliferis trichomatibus obtectis; hypanthio infundibuliforme; fauce 3 speculo-tumulo ornato uterque paribus appendicibus spinoideis praeditis; labello appendicibus basalibus instructo.

Typus: north of Crawler Rd, Shire of York, [precise locality withheld], Western Australia, 24 October 1999, A. Lowrie 2399 & F. & J. Hort (*holo*: PERTH 05584922; *iso*: MEL).

A basally rosetted caespitose perennial herb 18–31 cm (mostly 20–23 cm) tall including the scape and inflorescence; leafy rosettes 2–5 cm diam., singular or in clusters of mostly 2–3 but sometimes more, positioned just above the soil surface (younger plants) or positioned well above the soil surface (older plants) perched on stems bearing stilt roots. *Stem(s)* 1.5–4 cm long, short stems (of younger plants) hidden by the persistent long leafy remains of previous seasons' growth, spent leaves (of older plants) eventually deciduous, revealing the outline of the single or branching stems and stilt roots, rosette nodes \pm visible although still densely covered with spent (but now very much abbreviated) basal portions of the leaves. *Leaves* green, linear, 1.5–2.5 cm long, 0.7–2 mm wide, \pm lenticulate in section, adaxial surface convex, abaxial surface slightly concave with a raised and rounded longitudinal mid vein ridge, adaxial and abaxial surface as well as the margin minutely scabrid (easily visible with a 40x lens) and additionally covered with translucent white glandular trichomes 0.2–0.3 mm long. *Inflorescence(s)* 1–2 per rosette, racemose, 8–30-flowered, 16–27 cm long (including scape); scape green, reddish maroon in the upper parts, sometimes bearing a small solitary sparsely glandular bract just below the inflorescence, glabrous. *Floral bracts* green mottled reddish maroon, narrowly ovate as well as lanceolate, 1.5–2.5 mm long, 0.3–0.5 mm wide, sparsely glandular; bracteoles green mottled reddish maroon, narrowly ovate, 0.6–1.5 mm long, 0.2–0.4 mm wide, sparsely glandular. *Pedicels* reddish maroon, attached at the base to the inflorescence major axis by a distinctive yellow mound-like swelling (easily visible in live specimens, but somewhat deflated in dried specimens), 7–12 mm long, sparsely glandular only between the bracteoles and hypanthium. *Hypanthium* green or brown, infundibuliform, 1.5–2.5 mm long, 0.7–1 mm diam. at anthesis, sparsely glandular at the base only. *Calyx* of 5 free sepals, green or brown, reddish blotched towards the apex, with a fine translucent white hyaline margin, 2 sepals 2–2.5 mm long, 3 sepals 1.7–2 mm long, glabrous. *Corolla* pale yellow fading to creamy yellow with age, with irregular purple marks (sometimes absent) near the base of the lobes, abaxial surface pale yellow fading to creamy yellow, glabrous, lobes laterally paired; anterior lobes narrowly elliptic, 4–4.5 mm long, 2.2–3 mm wide; posterior lobes narrowly elliptic, 4–4.5 mm long, 2–2.2 mm wide. *Throat* dark yellow, bearing 3 mirror-mounds at the base of the posterior lobes, mounds yellow around their bases with apices pearl-like and sunlight reflective, each with a lateral pair of yellow thorn-like slightly falcate appendages. *Labellum* pale yellow to creamy yellow; boss narrowly ovate, convex, c. 0.7 mm long, c. 0.3 mm wide, smooth; apical point, c. 0.7 mm long, twisted and appressed over one edge of a sepal margin, papillose; basal appendages of different lengths, the one closest to the corolla lobe c. 0.2 mm long, the outer one c. 0.4 mm long, papillose. *Gynostemium* white, c. 5 mm long, c. 0.3 mm wide below the anthers, c. 0.5 mm wide at the base, the sensitive torosus yellow, positioned about mid way along the column, c. 0.6 mm wide, glabrous; anthers blackish maroon, vertically paired, abaxial surface covered with small glassy bead-like mounds, pollen white; stigma green, elliptic, cushion-like, c. 0.5 mm long, c. 0.3 mm wide. *Capsule* (including persistent sepals) powdery purple from c. midway to the apex, gradually changing to black towards base, infundibuliform, 2.5–3 mm long, 1.8–2 mm diam. *Seeds* dark brown, \pm ovoid or ellipsoid (mostly ovoid), 1.4–1.9 mm long, 1.1–1.4 mm diam., surface sculptured with large irregular longitudinal deep depressions creating an overall ruminant appearance on the non-depressed surface, entire surface (including depressions) longitudinally minutely striate. (Figure 1)

Other specimens examined. WESTERN AUSTRALIA: Westdale Hill, Shire of Beverley, [population 2, precise locality withheld], 6 Feb. 2000. F. & J. Hort 958 & M. Hislop (PERTH, MEL), same location, 19 Mar. 2000. F. & J. Hort 959 (PERTH, MEL); Dobaderry Rd, Shire of Beverley, [population 3, precise locality withheld], 19 Mar. 2000. F. & J. Hort 960 (PERTH, MEL); Dobaderry Rd, Shire of Beverley, [population 4, precise locality withheld], 19 Mar. 2000. F. & J. Hort 961 (PERTH, MEL).

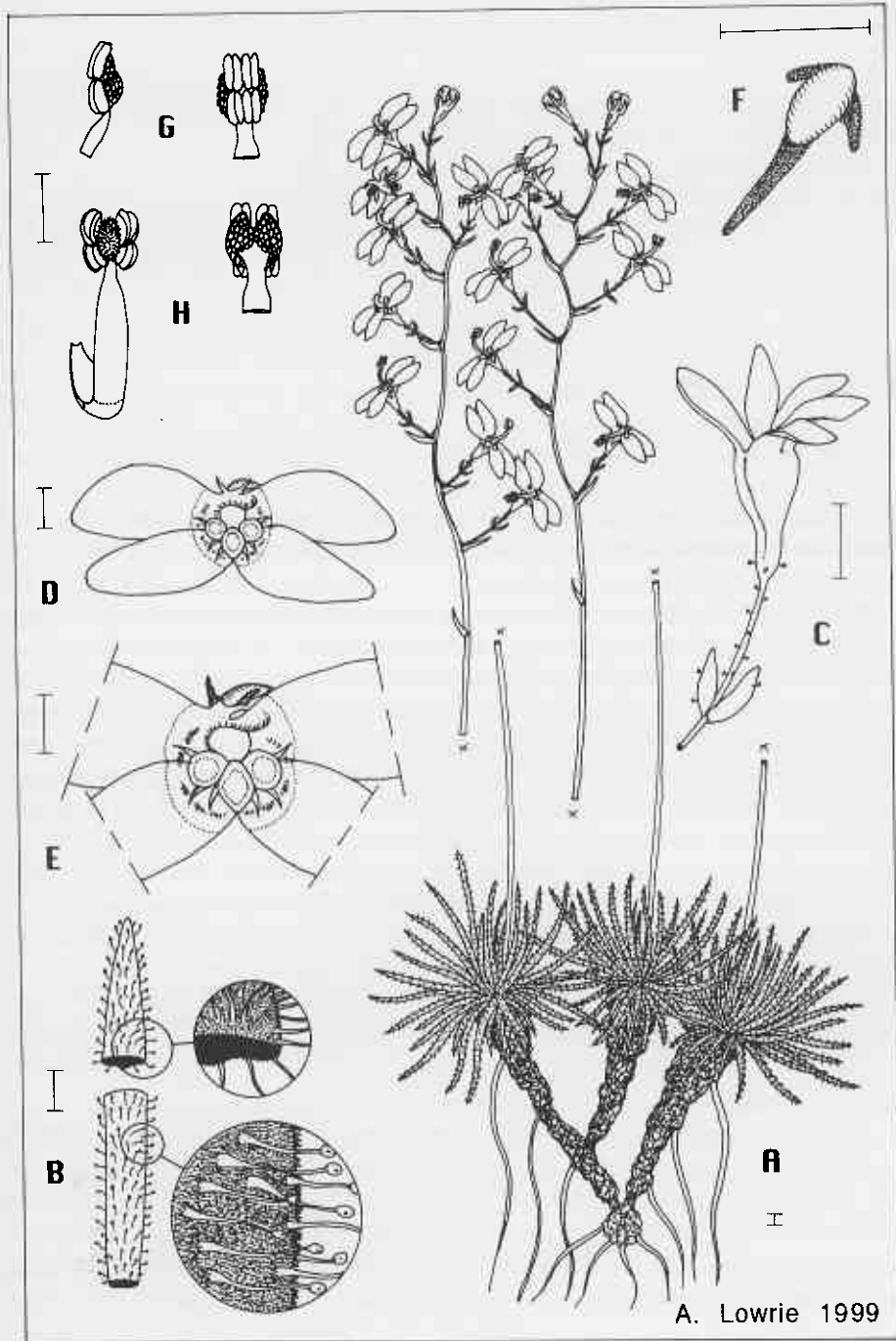


Figure 1. *Stylidium hortiorum* A – habit of flowering plant; B – leaf (adaxial surface) and leaf section, with enlargements showing scabrid and glandular indumentum; C – hypanthium and sepals with pedicel and bracteoles below; D – corolla; E – throat of corolla enlarged showing the 3 mirror-mounds with thorn-like appendages at the base of the posterior lobes; F – labellum; G – side and front views of gynostemium tip; H – front view of gynostemium, showing entire column, sensitive torus (on bend) and mature stigma and back view of gynostemium tip. Scale bar for all = 1 mm. Drawn from A. Lowrie 2399 (PERTH, MEL).

Distribution. Occurs in the Shire of York region where it is known from the type collection area and at three other locations, c. 30 km, 35 km and 55 km south in the Shire of Beverley.

Habitat. Grows in clayey sand covered by laterite gravel over weathered granite. Restricted to the upper slopes and summits of hills and breakaways. Occurs with *Drosera spilos* Marchant & Lowrie; *Stylidium paulineae* Lowrie & Kenneally and *S. amoenum* R. Br., *Grevillea scabra*, *Hakea spathulata* and *Leucopogon gracillimus* at the type location; *Gastrolobium trilobum*, *Goodenia pinifolia*, *Hakea loranthifolia*, *Grevillea monticola*, *Stylidium leptocalyx* Sond. and *Petrophile heterophylla* (at the site of collection F. & J. Hort 959); *Eucalyptus accedens*, *Gastrolobium trilobum*, *Astroloma* sp., *Dryandra sessilis*, *Hibbertia enervia*, *Goodenia pinifolia* and sedge sp. (at the site of collection F. & J. Hort 960); *Eucalyptus accedens*, *Gastrolobium trilobum*, *Hakea trifurcata*, *Grevillea monticola*, *Dryandra sessilis*, *D. nobilis*, *Goodenia pinifolia*, *Leucopogon cinereus* and *Macrozamia riedlei* (at the site of collection F. & J. Hort 961).

Phenology. Flowering October to early November. Mature seed shed by mid December.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority Two. Known from four locations including a nature reserve, and currently not under threat.

Etymology. The epithet *hortiorum* is named in honor of Fred and Jean Hort, botanical enthusiasts who were with one of us (A.L.) when this species was discovered.

Affinities. The closest relative to *Stylidium hortiorum* is considered to be *S. coatesianum*. Both have basal rosettes supported on stilt roots (in older specimens), leaves (without magnification) appear hairy, and racemose inflorescences that bear yellow flowers. *S. coatesianum* differs from *S. hortiorum* in having the margins of the leaves incurved with the adaxial and abaxial surfaces as well as the margins densely covered with short white translucent non glandular hairs, the abaxial surface of the corolla lobes bearing red wine-coloured marks over most of the yellow surface; labellum without basal appendages; throat appendages with 3 slight mounds, not smooth and shining, but similar in texture and colour to the petal surface, and 4 yellow longitudinally flattened appendages, lacinate at their apices with brown capitate tips; and mauve pollen.

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

Stylidio utricularioides Benth. affinis sed corollae lobo antico anguste elliptico, supra marginem exteriorem parum concavo, 1.5–1.7 mm longo, 0.6–0.7 mm lato; lobo postico obovato apice plerumque apiculato sed saepe obtuso, 1.8–2.3 mm longo, 1–1.4 mm lato; chromosatum numero $n = 30$.

Typus: along Great Northern Highway north of Bullsbrook, 1 km south of Wandena Rd (south end), on east side of highway, Western Australia, 9 November 1991, A. Lowrie 494 (*holo:* PERTH 05584957; *iso:* MEL).

Erect annual herb 3–6 cm (mostly 3.5–4 cm) tall including inflorescence; basal stem (below the soil) white-translucent, cylindrical, hollow, sheath-like, 3–4 mm long, c. 1 mm diam., surrounding a solid stem 0.2–0.3 mm diam.; major stem axis and lateral branches when present (above the soil) reddish maroon, mature specimens often branching from low on the stem, 2.5–4 cm long, 0.4–0.6 mm diam., branches when present 1.5–2.5 cm long, with 4–8 bract-like leaves scattered along the erect major stem

axis, with smaller numbers of bract-like leaves scattered along the branches, glabrous very low on the plant, sparsely glandular above and throughout. *Leaves* reddish maroon, subulate, 1.5–2.5 mm long, 0.5–0.7 mm wide, sessile, adaxial surface longitudinally concave in section, leaves very low on the plant glabrous, all other leaves sparsely glandular on the margin and abaxial surface. *Inflorescence* a 1–3-flowered terminal raceme, up to 1.5 cm long, additional inflorescences arising from the apex of the branches, sparsely glandular throughout. *Floral bracts* subulate, 1.5–2.5 mm long, 0.3–0.4 mm wide, sparsely glandular; bracteoles absent. *Pedicels* 2–2.5 mm long, sparsely glandular. *Hypanthium* oblong, 3.5–6.5 mm long, 0.7–1 mm diam. at anthesis, sparsely glandular. *Calyx* of 3 free sepals and 2 connate sepals, 1.5–1.7 mm long, sparsely glandular, connate sepals united to within c. 0.1 mm of their apex. *Corolla* white with pink tips, yellow at the base of all lobes with a red linear mark near the base on the inner margin of the anterior lobes only, abaxial surface of the anterior lobes white with pink tips with a red mid vein, sparsely glandular, posterior lobes of similar colouring but glabrous, lobes vertically paired; anterior lobes narrowly elliptic in outline, with the upper outer margin a little concave, 1.5–1.7 mm long, 0.6–0.7 mm wide; posterior lobes obovate, apex commonly apiculate, but often obtuse, 1.8–2.3 mm long, 1–1.4 mm wide. *Throat* bearing 6 yellow papillose appendages, 4 appendages in V-shaped opposite pairs, the lower appendage of each pair c. 0.5 mm long, the other c. 0.4 mm long, joined by a raised \pm four-sided papillose pad between and positioned near the sinus and base of the posterior lobes; 2 appendages conical, c. 0.15 mm long, positioned near the base of the anterior lobes. *Labellum* positioned c. 0.1 mm below the sinus of the anterior corolla lobes; boss pale yellow, ovate, convex, c. 0.5 mm long, c. 0.25 mm wide, smooth; apical point pale yellow, c. 0.1 mm long, touching one edge of the connate sepals, glabrous. *Gynostemium* c. 3.5 mm long, c. 0.1 mm wide below the anthers, dilating to c. 0.3 mm wide towards the sensitive torus, positioned c. 1.5 mm above the c. 0.25 mm wide base, glabrous; anthers maroon, vertically paired, abaxial surface covered with erect glassy moniliform hairs to the margins, pollen pale greyish blue; stigma green, elliptic, cushion-like and bristly, c. 0.4 mm long, c. 0.3 mm wide, well developed when anthers are actively shedding pollen. *Capsule* narrowly ellipsoid or narrowly obovoid 3–5 mm long, 0.8–1 mm diam. *Seeds* brown, \pm ellipsoid, 0.3–0.35 mm long, 0.15–0.2 diam., with smooth, prominent, slightly undulating longitudinal ridges. (Figure 2)

Other specimens examined. WESTERN AUSTRALIA: near The Lakes turnoff S of the road to York, 13 Dec. 1997, A. Lowrie 1991 (PERTH, MEL); Banovich Rd just before right angle bend and start of walk trail to Mt Lesueur, 22 Oct. 1998, A. Lowrie 2141 (PERTH, MEL); nature reserve, on Great Northern Highway N of Bullsbrook, 1 km S of Wandena Rd (south end) [type location], 24 Oct. 1998, A. Lowrie 2168 (PERTH, MEL); on Brand Highway, c. 15 km N of Cataby, 21 Oct. 1999, A. Lowrie 2386 & R.E. Oliver (PERTH, MEL).

Distribution. Extends from the Mt Lesueur region south to The Lakes.

Habitat. Grows in black sandy soil on a winter wet swamp flat at the type location, in similar soil on the margins of a lake at The Lakes as well as at a swamp margin near Cataby, and in brown loam in a winter wet floodway depression in the Mt Lesueur region.

Phenology. Flowering late October to mid December.

Chromosome number. $n = 30$, A. Lowrie 494 (S.H. James previously unpublished data).

Conservation status. The type location is a CALM nature reserve. This location and the other three known locations are currently not under threat.

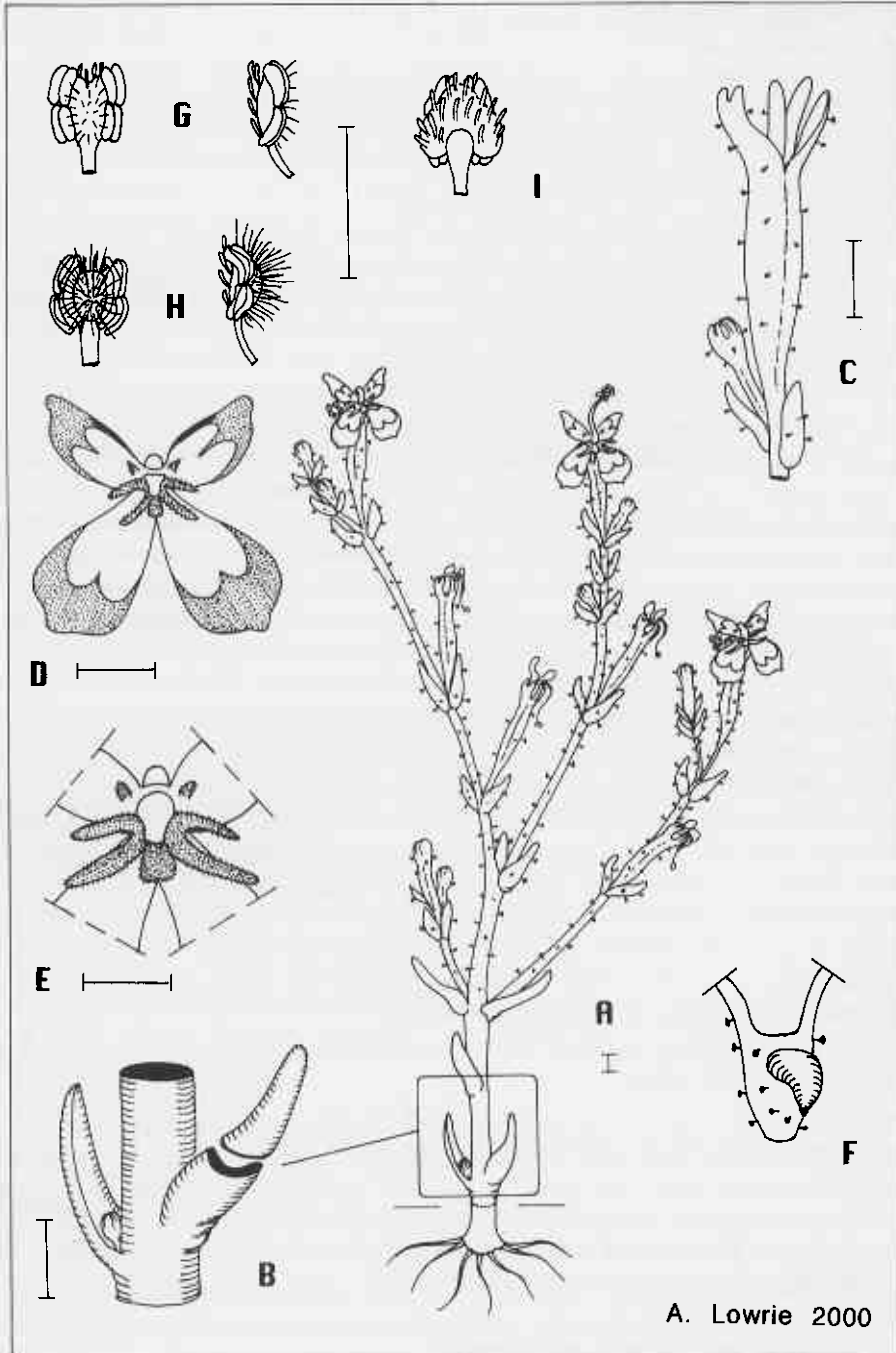


Figure 2. *Styliidium sidjamesii* A - habit of flowering plant; B - leaves and section of leaf, and portion of lower stem major axis; C - hypanthium and sepals with pedicel, floral bracts and juvenile flower bud below; D - corolla; E - throat of corolla enlarged showing the 4 V-shaped opposite paired appendages joined by a raised \pm four-sided pad between and the 2 conical appendages, positioned near the base of the anterior; F - labellum showing its position on the corolla tube below the sinus of the anterior corolla lobes; G - front and side views of gynostemium tip; H - front and side views of gynostemium tip with mature stigma; I - back view of gynostemium tip. Scale bar for all = 1 mm. Drawn from A. Lowrie 2168 [type location] (PERTH, MEL).

Etymology. The epithet *sidjamesii* honours the late Associate Professor Sidney Herbert James (1933–1998) who used Stylidiaceae extensively for his work in cyto-evolution and population genetics (see A. Burbidge *et al.* 1999), and honours his friendship and collaboration with both authors over many years.

Affinities. The three closest relatives to *Stylidium sidjamesii* are considered to be *S. inundatum* (of which *S. despectum* R. Br. is probably a synonym), the *Stylidium* species recorded and illustrated as *S. despectum* in Erickson (Erickson 1958: 56, plates 7 & 11), and *S. utricularioides* Benth.

Both *Stylidium utricularioides* and *S. sidjamesii* grow near each other at the type location. Both have an ephemeral life form consisting of a fleshy major stem axis with lateral branches, bract-like leaves, vertically paired white with pink tipped flowers bearing 6 throat appendages. *S. utricularioides* differs from *S. sidjamesii* in having larger flowers with anterior and posterior lobes each *c.* 5 mm long, posterior lobes \pm pandurate or spatulate and always distinctly dilated at their apex, and a chromosome number (S.H. James previously unpublished data) of $n = 15$, A. Lowrie 500 (PERTH).

Stylidium inundatum has been recorded in a similar seasonally wet habitat approximately 1 km south of the *S. sidjamesii* type location. *S. inundatum* is distinguished from *S. sidjamesii* by having a basal rosette of non whorled leaves, laterally paired flowers, and a non-sensitive fixed forward-arched gynostemium.

The *Stylidium* species recorded as *S. despectum* in Erickson is known to us from Palgarup in the Manjimup region and from Walpole to Manypeaks on the south coast of south-west Western Australia. This taxon has a similar lifeform to that of *S. sidjamesii* and in pressed material it is difficult to distinguish the two taxa without the aid of a microscope. However, in living material this species is easily distinguished from *S. sidjamesii* by its 3 mound-like, *c.* 0.2 mm high, papillose, throat appendages. It also has a chromosome number (S.H. James previously unpublished data) of $n = 15$, A. Lowrie 549 (PERTH). Further study is required to determine the status of this taxon in relation to *S. inundatum* and *S. despectum*.

Notes. The majority of the larger and older specimens of *Stylidium sidjamesii* from the type location are rather robust plants. These specimens have a major stem diameter at least two to four times greater than smaller and finer specimens from the same location. Specimens from the other known locations compare well with the smaller and finer plants from the type location. Specimens from the Mt Lesueur region differ from the type in having very pale pink corolla tips.

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

Stylidio xanthopis R. Erickson & J.H. Willis affinis sed foliis omnibus caulinis, corollae lobis parte supera alba vel pallido rosea, corollae lobis anticis anguste ellipticis leviter falcatis, corollae lobis posticis panduratis apice emarginatis, faucis appendicibus 6, quorum 4 in paribus oppositis crista separatis, 2 conicis, polline pallido malvino differt.

Typus: north-east of Eneabba, [precise locality withheld], Western Australia, 22 October 1998, A. Lowrie 2144 (*holo:* PERTH 05405009; *iso:* MEL).

Erect annual herb 3–7 cm (mostly 4–5 cm) tall including inflorescence; stem (below the soil) white-translucent, cylindrical, hollow, sheath-like, 1.5–5 mm long, *c.* 1 mm diam., surrounding a solid stem *c.* 0.2 mm diam.; stem (above the soil) green, mottled reddish brown, 2.5–3.5 cm long, 0.3–0.4 mm diam.,

with 5–7 bract-like leaves scattered along erect stem, sparsely glandular throughout. *Leaves* green, mottled reddish brown, narrowly elliptic, 0.8–1.2 mm long, *c.* 0.4 mm wide, sessile, adaxial surface longitudinally concave in section, margin and abaxial surface sparsely glandular. *Inflorescence* a 1–5-flowered terminal raceme up to 3.5 cm long, an additional inflorescence sometimes arising from the axil of a lower leaf, sparsely glandular throughout. *Floral bracts* narrowly elliptic-lanceolate, 1–1.5 mm long, 0.2–0.3 mm wide; bracteoles narrowly elliptic-lanceolate, 0.7–1 mm long, 0.1–0.2 mm wide, sparsely glandular. *Pedicels* 4–7.5 mm long, sparsely glandular. *Hypanthium* oblong, 2.5–3.5 mm long, 0.5–0.6 mm diam. at anthesis, sparsely glandular. *Calyx* of 3 free sepals and 2 connate sepals, 1.2–1.4 mm long, connate sepals united to within *c.* 0.3 mm of their apex, sparsely glandular. *Corolla* white to pale pink, yellow at the base of all lobes with red marks near the base of the anterior lobes only, abaxial surface white with a few red broken lines along the midvein, glandular on the anterior lobes only, lobes vertically paired; anterior lobes narrowly elliptic in outline, with the inner margin and the upper outer margin concave thus presenting the lobe as slightly falcate, 1.7–2.5 mm long, 1.2–1.7 mm wide; posterior lobes pandurate, apex emarginate, 3.3–4 mm long, 1.7–3 mm wide. *Throat* bearing 6 yellow papillose appendages; 4 appendages in opposite pairs *c.* 0.6 mm long, joined by a papillose ridge between and positioned at the base of the posterior lobes; 2 appendages conical, *c.* 0.2 mm long, positioned near the base of the anterior lobes. *Labellum* positioned *c.* 0.1 mm below the sinus of the anterior corolla lobes; boss yellow, broadly ovate, convex, *c.* 0.3 mm long, *c.* 0.4 mm wide, smooth; apical point yellow, *c.* 0.2 mm long, twisted and appressed over the edge of the connate sepals margin, glabrous. *Gynostemium* 5–6.3 mm long, *c.* 0.2 mm wide, geniculate *c.* 1.5 mm below the anthers, the sensitive torus *c.* 0.5 mm long, *c.* 0.4 mm wide, positioned *c.* 1.5 mm above the *c.* 0.3 mm wide base, glabrous; anthers blackish maroon, vertically paired, abaxial surface with glassy clavate moniliform hairs along the margins, pollen pale mauve; stigma orbicular, cushion-like, *c.* 0.6 mm diam. *Capsule* narrowly ellipsoid or narrowly obovoid, 3–5 mm long, 0.8–1 mm diam. *Seeds* brownish orange, \pm ellipsoid, 0.2–0.25 mm long, 0.1–0.15 diam., with smooth, prominent, undulating longitudinal ridges and very fine shallow transverse ridges between. (Figure 3)

Other specimen examined. WESTERN AUSTRALIA: NE of Eneabba, [precise locality withheld], 22 Oct. 1998, A. Lowrie 2147 (PERTH, MEL).

Distribution. Known only from the type collection area and nearby locations in the same seasonal wetland system.

Habitat. Grows in grey (white-grained) sandy soil under low shrubs with *Stylidium mimeticum* Lowrie & Carlquist (A. Lowrie 2146 (PERTH, MEL)) and *Levenhookia leptantha* Benth. (A. Lowrie 2145 (PERTH, MEL)) in a seasonal wetland system.

Phenology. Flowering in October.

Conservation status. CALM Conservation Codes for Western Australian Flora: Priority One. Known only from the type and nearby locations on uncleared private land and currently not under threat.

Etymology. The epithet *tinkeri* is named in honour of Allan Neil Tinker, naturalist and botanical enthusiast who first discovered this species.

Affinities. The closest relative to *Stylidium tinkeri* is considered to be the “Yellow-eyed Triggerplant” *S. xanthopis* R. Erickson & J.H. Willis. Both species have a corolla with a distinctive yellow centre. *S. xanthopis* differs from *S. tinkeri* in having basal leaves rosetted as well as cauline; upper portions of the corolla lobes dark pink; anterior corolla lobes broadly elliptic, posterior corolla lobes obovate, slightly falcate; throat appendages 5, mound-like; and pollen cobalt blue.

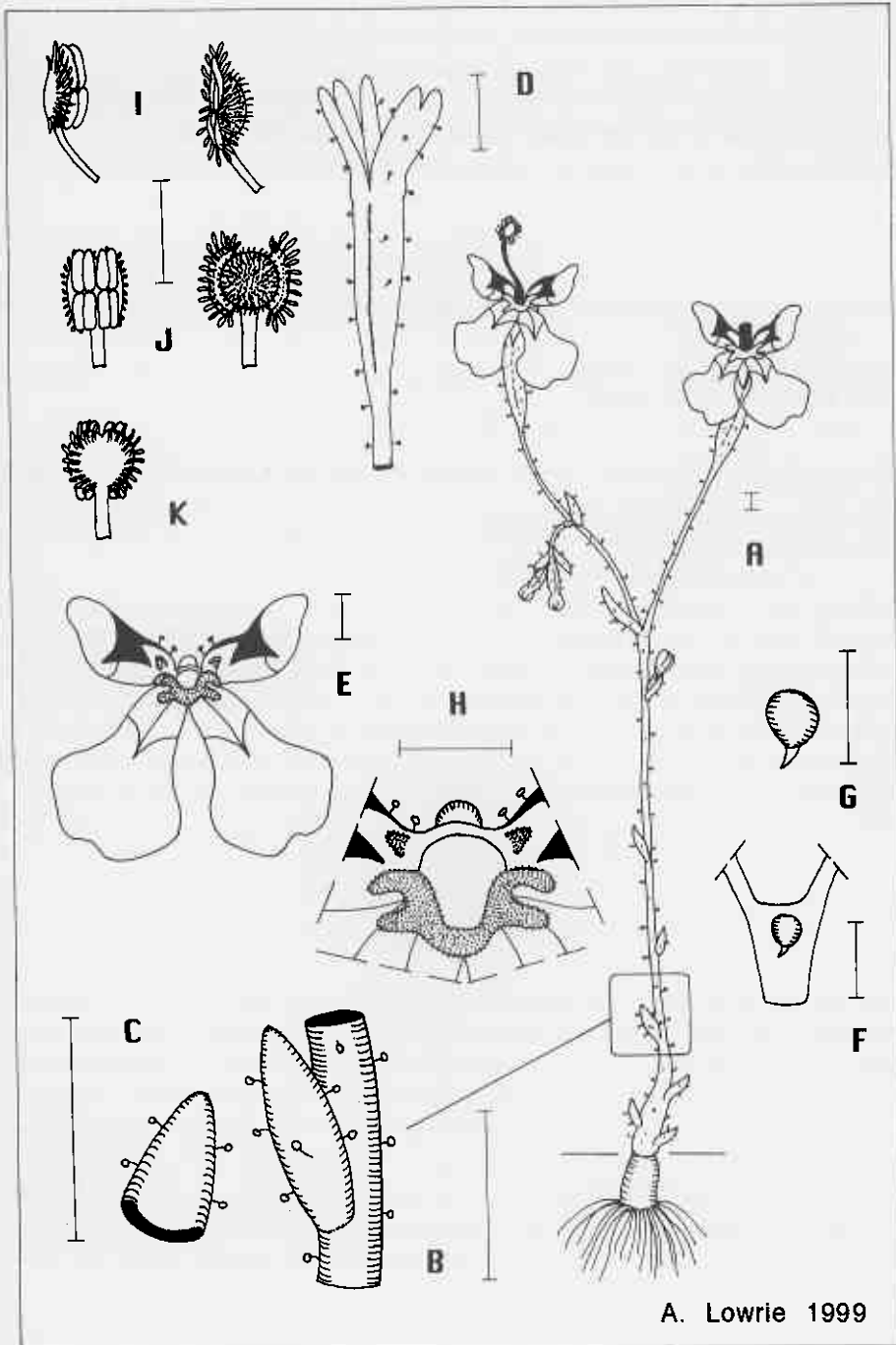


Figure 3. *Stylidium tinkeri* A - habit of flowering plant; B - stem section and leaf; C - leaf section; D - hypanthium and sepals; E - corolla; F - labellum, showing its position on the corolla tube below the sinus; G - labellum; H - throat appendages; I - side views of gynostemium tip, with mature anthers (left) and mature stigma (right); J - front views of gynostemium tip, with mature anthers (left) and mature stigma (right); K - back view of gynostemium tip. Scale bar for all = 1 mm. Drawn from A. Lowrie 2144 (PERTH, MEL).

Acknowledgements

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