

## Three new triggerplant species in *Stylidium* subgenus *Centridium* (Stylidiaceae) from Western Australia

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### Abstract

Lowrie, Allen and Kenneally, Kevin F. Three new triggerplant species in *Stylidium* subgenus *Centridium* (Stylidiaceae) from Western Australia. *Nuytsia* 12(2): 197-206 (1998). Three new Western Australian species, *Stylidium aceratum*, *S. diceratum* and *S. weeliwolli* Lowrie & Kenneally are described and illustrated. They belong to *Stylidium* subgenus *Centridium* (Lindl.) Mildbr., bringing the total number of species known in this subgenus to ten. A key is provided for taxa.

### Introduction

Three new species of triggerplant, belonging in *Stylidium* subg. *Centridium* (Lindl.) Mildbr. (Stylidiaceae) are described here. All members of this subgenus (Mildbraed 1908: 31) have a globose hypanthium, gynostemium mobility produced not by a sensitive hinged torosus but by the sensitive movement of a cunabulum from the convex set position to the concave triggered position, and a stipitate brush-like stigma. Haploid chromosome numbers of 11 and 13 have been recorded in this subgenus (Farrell & James 1979; S.H. James pers. comm.).

Ten species are now recognized in *Stylidium* subgenus *Centridium* in northern and western Australia, as follows:

1. Kimberley region of Western Australia and far north of Northern Territory. *Stylidium ceratophorum* O. Schwarz and *S. longicornu* Carlquist occur in both these regions while the new species *S. diceratum* is restricted to the Kimberley.
2. Ashburton District of the Eremean Botanical Province of Western Australia. The new species *Stylidium weeliwolli* is the first record from this region.
3. South-west of Western Australia. *Stylidium aceratum* (a new species), *S. calcaratum* R. Br., *S. ecorne* (F. Muell. ex F.H. Erickson & J.H. Willis) P.G. Farrell & S.H. James, *S. edentatum* Lowrie & Carlquist, *S. mimeticum* Lowrie & Carlquist and *S. perpusillum* Hook. f.

## Taxonomy

Key to the species of *Stylidium* subgenus *Centridium*

- 1: Appendage(s) present on gynostemium ..... 2  
 1 Appendage(s) absent on gynostemium ..... 6  
 2: Gynostemium with 2 appendages; corolla predominately orange  
 on adaxial surface ..... **S. diceratum**  
 2 Gynostemium with 1 appendage; corolla white or pink on adaxial surface ..... 3  
 3: Gynostemium bearing a recurved horn-shaped appendage on the bend ..... 4  
 3 Gynostemium appendage not horn-shaped ..... 5  
 4: Throat appendages 2; labellum elliptic, apex not emarginate,  
 irregularly serrate ..... **S. calcaratum**  
 4 Throat appendages 4; labellum lageniform, apex emarginate, not serrate ..... **S. weeliwolli**  
 5: Gynostemium appendage reniform, recurved from the bend;  
 nectary spur prominent, cradled by the horizontal posterior sepal ..... **S. mimeticum**  
 5 Gynostemium appendage square, recurved from the bend,  
 apex irregularly serrate; nectary spur absent or very poorly developed  
 and hidden behind the always vertical posterior sepal ..... **S. ecorne**  
 6: Corolla orange; posterior corolla lobes each deeply divided into 2  
 (so as to appear as 4 individual lobes) ..... **S. ceratophorum**  
 6 Corolla white to pink; posterior corolla lobes undivided ..... 7  
 7: Plants mostly 1.5–2.5 cm high; nectary spur absent ..... **S. perpusillum**  
 7 Plants mostly 4.5–25 cm high; nectary spur present ..... 8  
 8: Posterior corolla lobes cuneate, the apex obtuse and unlobed, with a  
 distinctive blunt lateral tooth at the base ..... **S. edentatum**  
 8 Posterior corolla lobes either cuneate with a tridentate apex or obovate  
 with a crenate apex, lacking basal tooth ..... 9  
 9: Plants mostly 5–9 cm tall; posterior corolla lobes cuneate, apex tridentate;  
 nectary spur shorter than the posterior sepal ..... **S. aceratum**  
 9 Plants mostly 10–25 cm tall; posterior corolla lobes obovate, apex crenate;  
 nectary spur longer than the posterior sepal ..... **S. longicornu**

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

*Stylidio calcarato* R. Br. affinis sed cornu appendicis e flexo gynostemii absenti.

*Typus:* Great Northern Highway, north of Bullsbrook [precise locality withheld], Western Australia, 9 November 1991, A. Lowrie 496 (*holo:* PERTH 04980336; *iso:* MEL).

A fibrous-rooted annual herb 5–9 cm high (including inflorescence); stem translucent white, 2.5–4 mm long, 0.8–1 mm diam.; basal rosette of leaves flat, 5–12 mm diam. *Leaves* spatulate, 3–6 mm long, 0.7–1.5 mm wide near apex, 0.3–0.6 mm wide at the base, flat in section, glabrous. *Inflorescence* usually a simple dichasium but also the beginnings of a compound dichasium in older plants, 5–9 cm long (including peduncle), glandular. *Bracts* and *bracteoles* lanceolate, 1.5–2 mm long,

0.5–0.6 mm wide, sparsely glandular. *Pedicels* 10–24 mm long, glandular. *Hypanthium* globose, 1.6–2 mm diam. at anthesis, glandular. *Sepals* 5, all free to the base, lanceolate, glandular; anterior pair horizontal and splayed outwards under the anterior corolla lobes, 1.6–2.5 mm long; middle pair erect, 1.5–1.9 mm long; posterior sepal horizontal, 1.3–1.5 mm long. *Corolla* dark pink with a white base on adaxial surface, pale pink on abaxial surface, glabrous, lobes vertically paired; anterior lobes geniculate, 6–7 mm long, 1.4–1.8 mm wide, apex  $\pm$  tricrenate; posterior lobes cuneate, 5.5–7 mm long, 1.7–2 mm wide, apex tridentate. *Nectary spur* c. 0.8 mm long, cradled by the posterior sepal. *Throat* white, bearing 2 smooth mounds, each positioned at the sinus of the anterior and posterior corolla lobes, with deeply and irregularly lacinate margins between the mounds, and 2 conical appendages c. 0.5 mm long at the base of the posterior corolla lobes. *Labellum* positioned below the sinus of the anterior corolla lobes, purple with a white base, concave, elliptic, c. 2 mm long, c. 1.8 mm wide; apex cuspidate, c. 0.5 mm long, with shorter serrate segments either side, sparsely glandular. *Gynostemium* c. 3 mm long, the erect non-sensitive basal column c. 1.5 mm long, the sensitive cunabulum c. 1.5 mm long, appendage(s) absent from the bend of the gynostemium; anthers yellow, pollen yellow; stigma stipitate between the anthers, c. 2 mm long, apex brush-like. *Capsule* globose, 2.5–2.7 mm diam. *Seeds* rusty brown,  $\pm$  ellipsoid, 0.2–0.25 mm long, 0.1–0.15 diam., rugose. (Figure 1)

*Other specimen examined.* WESTERNAUSTRALIA: Type location [precise locality withheld], 3 Nov. 1993, K.F. Kenneally 11398 (PERTH).

*Distribution.* Known only from the type location.

*Habitat.* Grows in sandy soils on swamp heathland with *Stylidium calcaratum*, *S. mimeticum*, *S. utricularioides* Benth. and paperbarks (*Melaleuca*).

*Flowering period.* October–November.

*Chromosome number.* S.H. James (pers. comm.) has obtained a chromosome number count of  $n = 11$  for *Stylidium aceratum*. The voucher specimen for this previously unpublished record is A. Lowrie 496.

*Conservation status.* CALM Conservation Codes for Western Australian Flora: Priority Two. The species is known from only one locality, which is on a nature reserve. Known only from small colonies numbering 20 to 100 plants and scattered individuals over the southern portions of the nature reserve. A survey to establish the total population size over the entire nature reserve is recommended.

*Etymology.* The specific epithet *aceratum* is from the Greek prefix *a* – lacking and *ceras* – horn in reference to the absence of an appendage on the bend of the gynostemium.

*Affinities.* The nearest relative to *Stylidium aceratum* is *S. calcaratum*. Both species have geniculate anterior corolla lobes and tridentate posterior corolla lobes and a chromosome number of  $n = 11$ . *S. aceratum* differs from *S. calcaratum* (whose contrasting characters are given in parenthesis) by having 2 conical throat appendages at the base of the posterior corolla lobes (2 throat appendages reniform); nectary spur shorter than the posterior sepal (longer than the posterior sepal); appendage absent from the bend of the gynostemium (appendage present at the bend of the gynostemium); and labellum apex cuspidate with shorter serrate segments either side (labellum apex shortly serrate throughout).

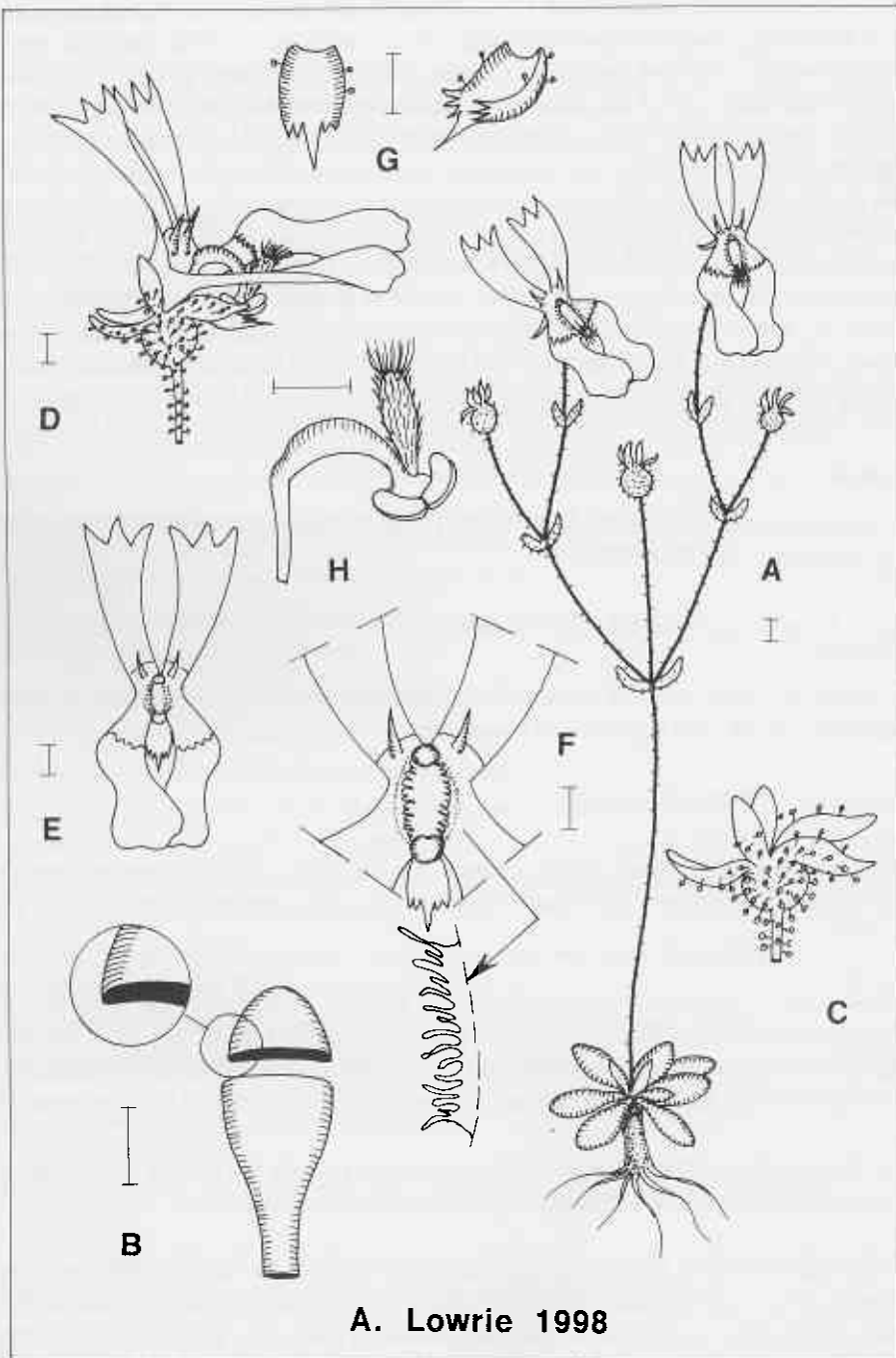


Figure 1. *Styliidium aceratum*. A - habit of flowering plant; B - leaf, enlarged section left; C - hypanthium and sepals; D - lateral view of corolla, gynostemium and hypanthium; E - corolla; F - throat appendages; G - labellum; H - lateral view of gynostemium, anthers and stipitate stigma in the set-non-triggered position. Scale bar for all = 1 mm. Drawn from A. Lowrie 496.

*Notes.* *Stylidium aceratum* grows near populations of *S. calcaratum* as well as *S. mimeticum* at the type location. Also populations of *S. ecorne* have been found about 1 km south of the type location. Extensive exploration in the area has found no hybrids between these taxa. The latter two species differ from *S. aceratum* in chromosome number, both having  $n = 13$  (S.H. James pers. comm.), a factor which may contribute to their reproductive isolation.

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

*Stylidio longicorno* Carlquist affinis sed pagina adaxiali corollae pro parte maxima aurantiaca, appendicibus fauce 4 et cornu-appendicibus 2 supra flexum gynostemii ornata.

*Typus:* Along sandy creek crossing on road to Beverley Springs [precise locality withheld], Kimberley, Western Australia, 2 August 1996, A. Lowrie 1526 (*holo:* PERTH 04980344; *iso:* MEL).

A fibrous-rooted annual *herb* 15–35 cm high (including inflorescence); stem translucent white, 0.5–3 mm long, 0.3–0.4 mm diam.; basal rosette of leaves flat, 10–16 mm diam. *Leaves* lanceolate (longer ones) or spatulate (shorter ones), 5–8 mm long, 1–2.5 mm wide near the apex, 0.2–0.6 mm wide at the base, flat in section, glabrous. *Inflorescence* variable, 1-flowered, 3-flowered simple dichasium, 2–4-flowered raceme (juvenile specimens) or a many-flowered compound dichasium with some of the upper branches racemose (mature specimens), 6–15 cm long, glandular. *Bracts and bracteoles* lanceolate or elliptic, 1.5–3 mm long, 0.5–1.3 mm wide, glandular. *Pedicels* 15–65 mm long, glandular. *Hypanthium* globose, 0.9–1.4 mm diam. at anthesis, glandular. *Sepals* 5, all free to the base, lanceolate, glandular; anterior pair horizontal and splayed outwards under the anterior corolla lobes, 1.3–2.3 mm long; middle pair erect, 1.2–1.7 mm long; posterior sepal horizontal, 1.5–2 mm long. *Corolla* cream on abaxial surface with broad dark pink veins, glabrous, lobes vertically paired; anterior lobes yellowish orange with dark orange veins on adaxial surface, with 2 short and 2 long yellow radial stripes from the throat as well as a band of yellow around the glandular inside margins of the lobes, cuneate-falcate, 3.5–4.5 mm long, 2–3 mm wide, apex emarginate; posterior lobes blushed salmon pink over yellowish orange on adaxial surface and bearing reddish marks at the base with outward radiating lines, obovate, 2.5–4.5 mm long, 1.7–2.3 mm wide, apex irregularly crenate. *Nectary spur* cream, 4.5–6.5 mm long, cradled by posterior sepal. *Throat* yellow, bearing 4 (2 pairs) of appendages at base of posterior corolla lobes; appendages narrowly ovate, acute, the upper pair *c.* 1.3 mm long, the others *c.* 0.8 mm long. *Labellum* positioned below the the sinus of the anterior corolla lobes, green, concave, obovate, *c.* 1.5 mm long, *c.* 1 mm wide, apex irregularly serrate, glabrous. *Gynostemium* *c.* 2.2 mm long, the erect non-sensitive basal column *c.* 0.8 mm long, the sensitive cunabulum *c.* 1.3 mm long, with 2 lateral incurved horn-like appendages on the bend of the gynostemium; stigma stipitate between the anthers, *c.* 1 mm long, apex brush-like. *Capsule* globose, 2.5–3 mm diam. *Seeds* rusty brown,  $\pm$  compressed-ovoid, 0.2–0.3 mm long, 0.1–0.15-diam., longitudinally finely ribbed. (Figure 2)

*Other specimen examined.* WESTERN AUSTRALIA: Type location [precise locality withheld], Aug. 1993, M.D. Barrett 235 (PERTH).

*Distribution.* Known only from the type location.

*Habitat.* Grows in sandy soils on the margins of creek with *Stylidium ceratophorum*, *S. rubriscapum* W.V. Fitzg., *Drosera caduca*, *D. paradoxa*, *Byblis liniflora* and *Grevillea pteridifolia*.

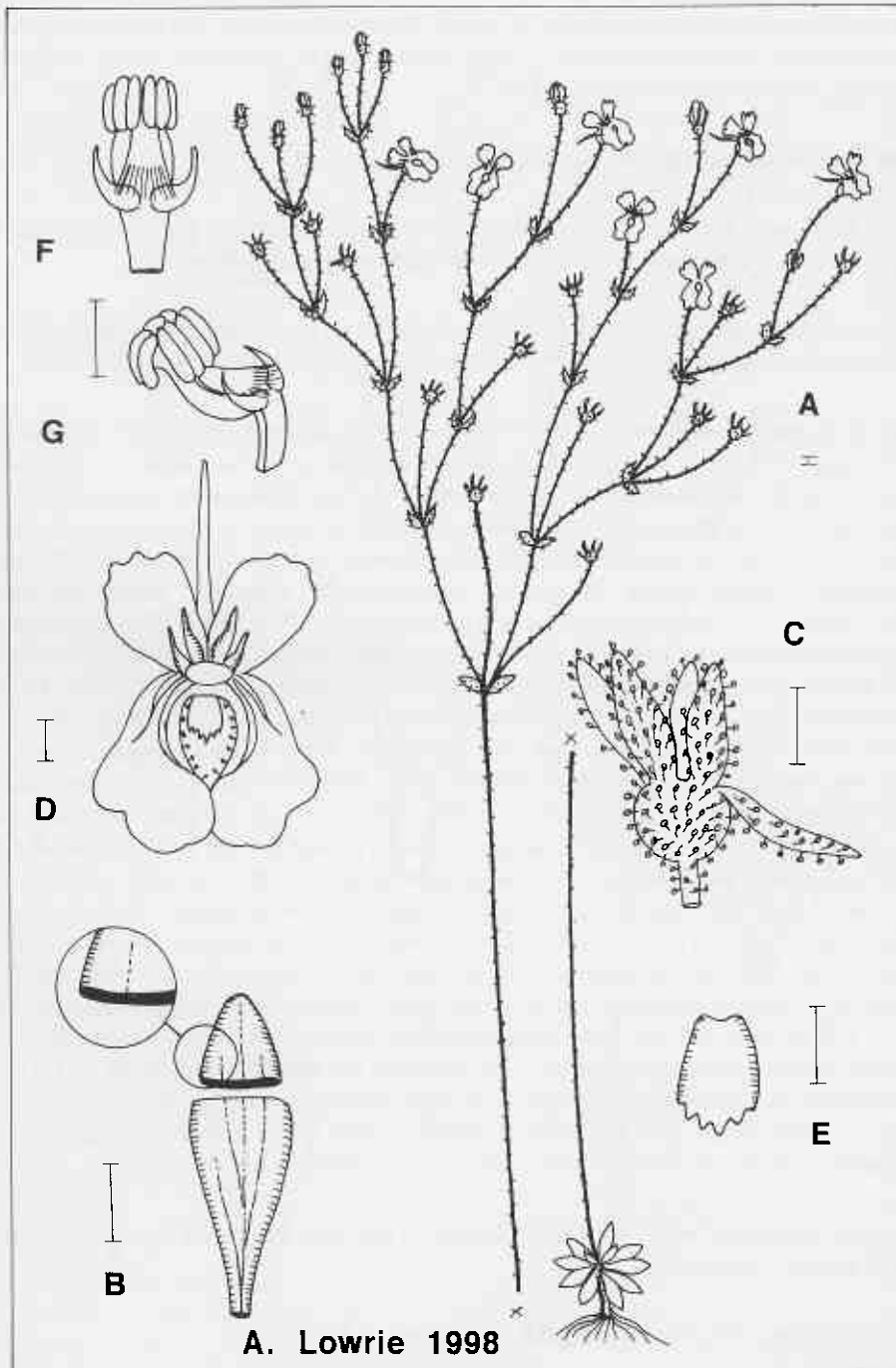


Figure 2. *Styloidium diceratum*. A – habit of flowering plant; B – leaf, enlarged section left; C – hypanthium and sepals; D – corolla; E – labellum; F – front view of gynostemium, anthers and stipitate stigma in the triggered position; G – lateral view of gynostemium, anthers and stipitate stigma in the triggered position. Scale bar for all = 1 mm. Drawn from M.D. Barrett 235 & A. Lowrie 1526.

*Flowering period.* June–August.

*Conservation status.* CALM Conservation Codes for Western Australian Flora: Priority One. *Stylidium diceratum* is only known from the type locality but as the region is poorly botanically explored, it is possible that it exists over a much larger area.

*Etymology.* The specific epithet *diceratum* from the Greek prefix *di* – two and *ceras* – horn in reference to the two appendages on the bend of the gynostemium.

*Affinities.* The nearest relative to *Stylidium diceratum* is *S. longicornu*. *S. diceratum* is easily distinguished from *S. longicornu* by its orange corolla, 2 horn-like appendages on the bend of the gynostemium and nectary spur *c.* 3 times longer than the posterior sepal.

*Stylidium diceratum* may be confused with *S. ceratophorum* because both species have an orange corolla, and they coexist at the *S. diceratum* type location. *S. ceratophorum* is distinguished from *S. diceratum* by having a corolla twice as large, with the posterior lobes each deeply divided to appear as 4 individual lobes and the anterior lobes ovate-falcate. It also differs in corolla orientation so that the gynostemium operates from above rather than from below.

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

*Stylidio calcarato* R. Br. affinis sed corolla appendicibus fauce 4 et lobis anterioribus valde cruciformibus ornata differt.

*Typus:* Weeli Wolli Creek, *c.* 90 km north-west of Newman, Western Australia, 22° 54' S, 119° 13' E, 28 August 1991, *D.E. Murfet* 1097 (*holo:* PERTH 04980328; *iso:* MEL).

A fibrous-rooted annual *herb* 10–25 cm high (including inflorescence); stem white, 1–4 mm long, 0.5–0.7 mm diam.; basal rosette of leaves flat, 10–50 (mostly 17–25) mm diam. *Leaves* spatulate or lanceolate, 6.5–27 (mostly 11–13) mm long, 3–4.5 (mostly 3–3.5) mm wide near apex, 0.3–1 (mostly 0.7–0.8) mm wide at the base, flat in section, glabrous, apex obtuse or acute. *Inflorescence* an open much branched compound dichasium, 10–25 cm long (including peduncle), glandular. *Bracts* and *bracteoles* obovate-elliptic, 2.2–4.5 mm long, 1.4–2.2 mm wide, apex acute, sparsely glandular. *Pedicels* 10–20 mm long, glandular. *Hypanthium* globose, 1.2–1.7 mm diam. at anthesis, glandular. *Sepals* 5, all free to the base, lanceolate, glandular; anterior pair horizontal and splayed outwards under the anterior corolla lobes, 2–2.5 mm long; middle pair erect, 2–2.5 mm long; posterior sepal horizontal, 1.8–2.5 mm long. *Corolla* dark pink on adaxial surface with reddish marks at the base, glabrous, lobes vertically paired; anterior lobes geniculate, always distinctly cruciform, 7.5–8.5 mm long, 1.8–2 mm wide, apex emarginate; posterior lobes cuneate, 5.5–6 mm long, 3–3.5 mm wide, apex ± tricrenate. *Nectary spur* 2–2.5 mm long, cradled by posterior sepal. *Throat* bearing 4 rod-shaped appendages, 2 at the base of anterior corolla lobes and 2 at the base of posterior corolla lobes; anterior appendages fused along their length, *c.* 1.5 mm long; posterior appendages free to base, *c.* 1.7 mm long. *Labellum* positioned below the sinus of the anterior corolla lobes, concave, lageniform, *c.* 1.7 mm long, *c.* 0.8 mm wide, apex emarginate, glabrous. *Gynostemium* *c.* 3.2 mm long, the erect non-sensitive basal column *c.* 1.5 mm long, the sensitive cunabulum *c.* 1.7 mm long, with a horn-like appendage *c.* 0.2 mm long on the bend of the gynostemium; anthers dark yellow; stigma stipitate between the anthers, *c.* 1.5 mm long, apex brush-like. *Capsule* globose, 2–3 mm diam. *Seeds* dark brown, ± ellipsoid, 0.25–0.3 mm long, 0.15–0.2 diam., rugose. (Figure 3)

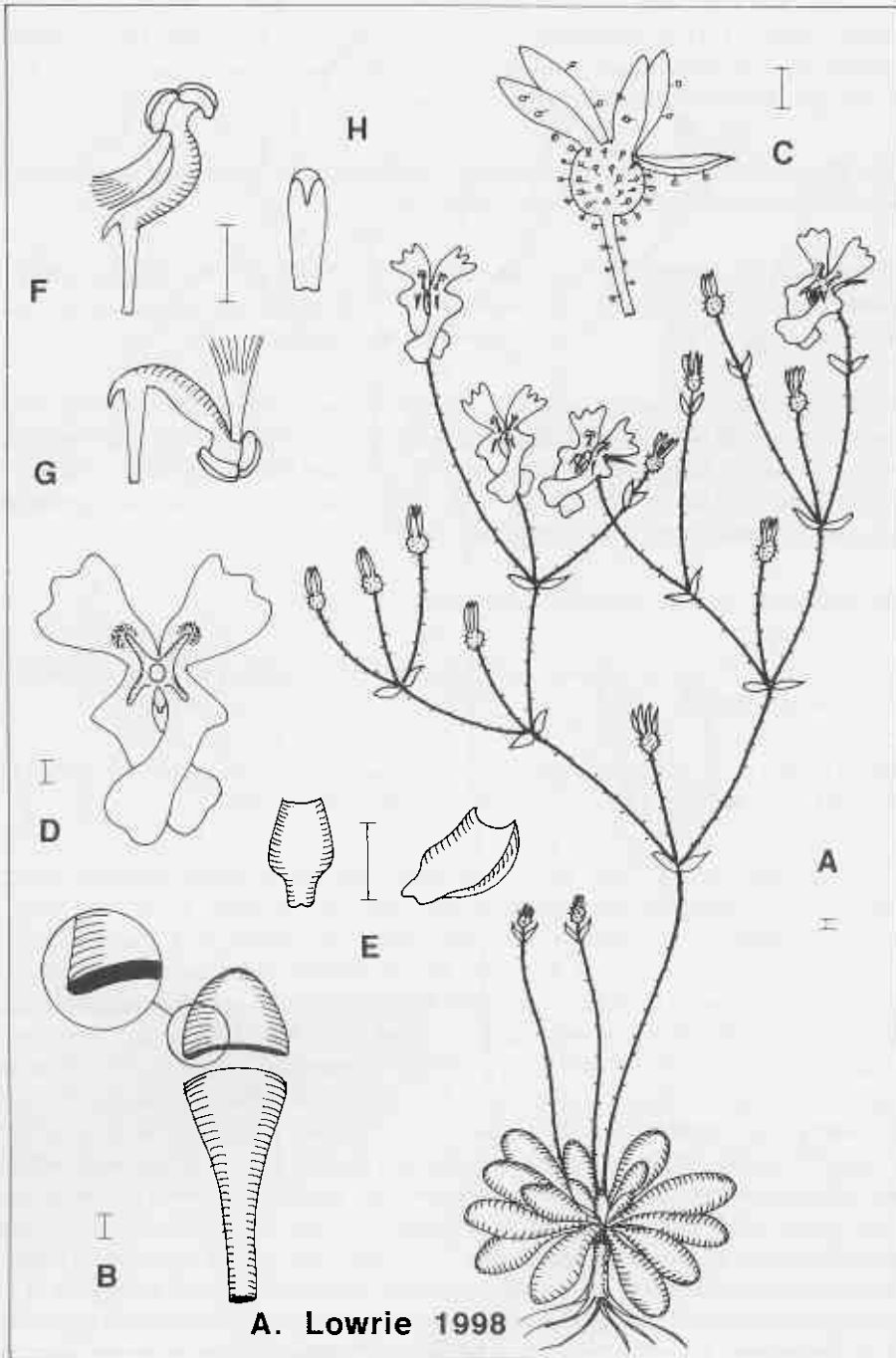


Figure 3. *Styliidium weeliivoli*. A - habit of flowering plant; B - leaf, enlarged section left; C - hypanthium and sepals; D - corolla; E - labellum; F - lateral view of gynostemium, anthers and stipitate stigma in the triggered position; G - lateral view of gynostemium, anthers and stipitate stigma in the set-non-triggered position; H - front view of horn-like appendage on the bend of the gynostemium. Scale bar for all = 1 mm. Drawn from D.E. Murfet 1097.



*Other specimens examined.* WESTERN AUSTRALIA: Base of Mt Augustus, Aug. 1997, *K. Coate s.n.* (PERTH); Weeli Wolli Springs, 22° 45' S, 119° 15' E, 22 Mar. 1994, *E. Holland 4200 & N. Casson* (PERTH); Weeli Wolli Creek, near springs, 8 Sep. 1992, *M.E. Trudgen 11489* (PERTH); Barlee Range Nature Reserve, 15.2 km WSW of Jarrabuduundy Bore, 18.3 km N of Mt Palgrave, 18.9 km SW of Wongajerra Well, 23° 12' 35" S, 115° 59' 24" E, 6 July 1995, *S. van Leeuwen 1864* (KARRATHA, PERTH); Barlee Range Nature Reserve, 16 km WSW of Jarrabuduundy Bore, 17.2 km N of Mt Palgrave, 20.2 km SW of Wongajerra Well, 23° 13' 08" S, 115° 58' 44" E, 6 July 1995, *S. van Leeuwen 1873* (KARRATHA, PERTH).

*Distribution.* Known from the type location *c.* 90 km north-west of Newman, *c.* 350 km west of the type locality in the Barlee Ranges and *c.* 270 km south-west of the type locality at Mt Augustus.

*Habitat.* Grows in gritty sandy soil along the edge of watercourse (*D.E. Muret 1097*); in wet root mass of *Melaleuca leucadendra* at edge of permanent pool and in similar but drier ground in sandy clay amongst root fibres with *Eleocharis geniculata*, *Lobelia* sp., *Fimbristylis* sp. and *Stemodia grossa* (*M.E. Trudgen 11489*); alongside pool at base of gorge, in gritty brown clay loam with lots of silt and organic material (*S. van Leeuwen 1864*); in damp red brown soil, gritty silty soil, low in landscape, herffield around edge of pool (*S. van Leeuwen 1873*); and with *Drosera indica*, Edney's Walk, Mt Augustus (photos seen by authors, vouchers not collected, pers. comm. J. Thompson 1998).

*Flowering period.* August–September.

*Conservation status.* CALM Conservation Codes for Western Australian Flora: Priority Two. *Stylidium weeliwolli* is locally abundant at its known locations and currently not under threat.

*Etymology.* The specific epithet, *weeliwolli* is from the Australian Aboriginal words meaning “we are water running” or simply “running water”. The type location along Weeli Wolli Creek falls within the region used by the linguistic group known as the Nyiyaparli (sometimes incorrectly spelt Niapaili). This nomenclatural information was provided by Gordon Uline, a senior law person in this language group and communicated to us by Dr Stephen van Leeuwen, CALM, Karratha.

*Affinities.* The nearest relative to *Stylidium weeliwolli* is the south-western species *S. calcaratum*. *S. weeliwolli* differs from *S. calcaratum* (whose contrasting characters are given in parentheses) by having 4 rod-shaped throat appendages, 2 fused along their length and 2 subulate and free to base (throat appendages 2, reniform); anterior corolla lobes distinctly cruciform (anterior corolla lobes meeting at apex but only slightly crossed over each other); posterior corolla lobes apex  $\pm$  tricrenate (apex tridentate); and labellum lageniform, apex emarginate (labellum elliptic, apex irregularly serrate).

*Notes.* *Stylidium weeliwolli* has been recorded as a perennial plant (*M.E. Trudgen 11489*), but this is doubtful as all other taxa in *Stylidiaceae* subg. *Centridium* are annuals.

### Acknowledgements

We would like to thank Denzel Muret and Malcolm Trudgen for their collections and their personal communications regarding field observations of *Stylidium weeliwolli*; Dr Stephen van Leeuwen for his collections, personal communications and information gathered for the meaning of Weeli Wolli;

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### References

- Farrell, P.G. & James, S.H. (1979). *Stylidium ecorne* (F. Muell. ex Erickson and Willis) *comb. et stat. nov.* (Stylidiaceae). *Australian Journal of Botany* 27: 39-45.
- Mildbraed, J. (1908). Stylidiaceae. In: Engler, A. (ed.) "Das Pflanzenreich." Vol. IV, 278 (35). pp. 1-98 (Engelmann: Leipzig.)