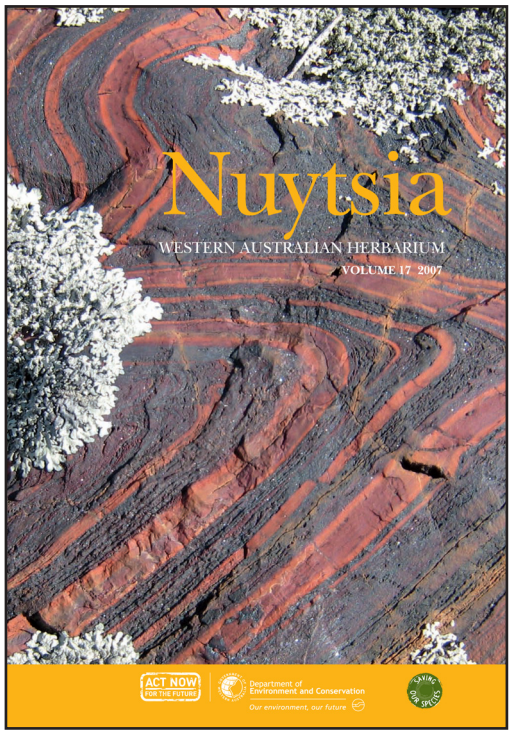
Nuytsia

WESTERN AUSTRALIA'S JOURNAL OF SYSTEMATIC BOTANY

ISSN 0085–4417



Wege, J.A. & Coates, D.J.

Observations on the rare triggerplant *Stylidium coroniforme* (Stylidiaceae) and the description of two allied taxa of conservation concern

Nuytsia 17: 433–444 (2007)

A special edition funded by the Western Australian Government's 'Saving our Species' biodiversity conservation initiative.

All enquiries and manuscripts should be directed to:

The Editor – NUYTSIA
Western Australian Herbarium
Dept of Environment and Conservation
Locked Bag 104 Bentley Delivery Centre
Western Australia 6983
AUSTRALIA

Telephone: +61 8 9334 0500
Facsimile: +61 8 9334 0515
Email: nuytsia@dec.wa.gov.au
Web: science.dec.wa.gov.au/nuytsia/

ACT NOW FOR THE FUTURE | Department of Environment and Conservation — Our environment, our future | SAVING OUR SPECIES

Observations on the rare triggerplant *Stylidium coroniforme* (Stylidiaceae) and the description of two allied taxa of conservation concern

Juliet A. Wege[1] and David J. Coates[2]

[1]Western Australian Herbarium, Department of Environment and Conservation, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[2]Science Division, Department of Environment and Conservation, Locked Bag 104, Bentley Delivery Centre, Western Australia 6983

Abstract

Wege, J.A. & Coates, D.J. Observations on the rare triggerplant *Stylidium coroniforme* (Stylidiaceae) and the description of two allied taxa of conservation concern. *Nuytsia* 17: 433–444 (2007). *Stylidium amabile* Wege & Coates, a new, rare triggerplant from near Maya in south-west Western Australia, is described and illustrated. This new species has morphological affinity to the rare Wongan Hills triggerplant *S. coroniforme* F.L.Erickson & J.H.Willis, but has a distinct stigma, a different pattern of corolla markings and is genetically distinct. A revised description of *S. coroniforme* is provided and *S. coroniforme* subsp. *amblyphyllum* Wege, a new infraspecific taxon with distinctive leaves and a distribution near Quairading, is recognised. These three taxa are among the most geographically restricted within the triggerplant genus and all are vulnerable to local extinction.

Introduction

Stylidium coroniforme F.L.Erickson & J.H.Willis is one of five triggerplants currently listed as Declared Rare Flora under the Western Australian Wildlife Conservation Act 1950 (Atkins 2006). This perennial species is characterised by a compact, rosetted habit, marginate leaves bearing a prominent apical mucro, and a cylindric hypanthium that is sterile in one loculus (Erickson & Willis 1966). Described from a population near Wongan Hills, *S. coroniforme* was at one point known from a single plant at the type locality (Stace & Coates 1995). Subsequent surveys have since located several additional populations in the Wongan Hills vicinity (Stace & Coates 1995; Stack *et al*. 2003).

Two populations with close morphological affinity to *S. coroniforme* were found in 1989 near Maya (Stace & Coates 1995), approximately 120 km north of Wongan Hills. Coates (1992, 2000) demonstrated that the level of genetic divergence between the Maya and Wongan Hills populations was high while phylogenetic analyses clearly showed two distinct population clusters, with the Maya populations considered to represent a distinct conservation unit and potentially a separate species. More recently, three additional populations with morphologically unique leaves were discovered during WWF-Australia's Woodland Watch surveys of private property near Quairading, some 130 km south-south-east of Wongan Hills. No intervening populations are known to occur between these three disjunct population centres (Figure 1).

In order to clarify the taxonomic and conservation status of the Maya and Quairading populations, vegetative and floral morphology of plants from all three regions was examined along with features of leaf anatomy.

Materials and methods

This study was based on the examination of herbarium specimens from the Western Australian Herbarium (PERTH), the State Herbarium of South Australia (AD) and the National Herbarium of Victoria (MEL), along with observations of wild plants and horticultural material grown at the Botanic Garden and Parks Authority. Corolla and column measurements are based upon examination of the following spirit collections: *J.A. Wege & C. Wilkins* JAW 902 and *J.A. Wege & K.A. Shepherd* JAW 1196 and 1197 (Maya); *J.A. Wege & C. Wilkins* JAW 881, *J.A. Wege & K.A. Shepherd* JAW 1188 and JAW 1235 (Wongan Hills); *M. Griffiths s.n.*, *J.A. Wege & M. Griffiths* JAW 1227 and JAW 1229 (Quairading).

Anatomical investigations were conducted on leaf material sampled from one plant from the following populations: *J.A. Wege & C. Wilkins* JAW 881, *J.A. Wege & C. Wilkins* JAW 902 and *J.A. Wege & M. Griffiths* JAW 1227. Leaf portions were embedded in glycol methacrylate and sectioned, according to methods outlined in Wege (2006a). The distribution map was created using DIVA-GIS Version 5.2.0.2. Precise locality statements have been withheld in view of the rarity of these taxa.

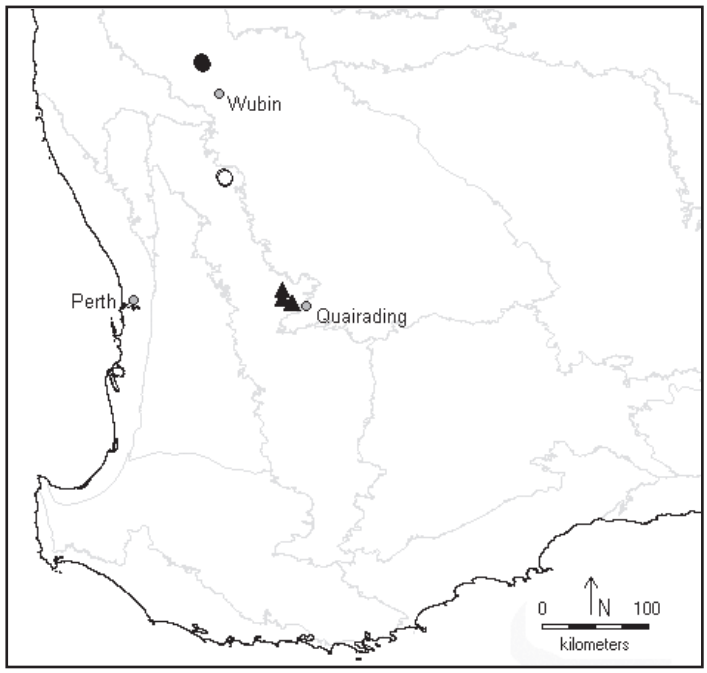


Figure 1. Distribution of *Stylidium amabile* (●), *S. coroniforme* subsp. *coroniforme* (○) and *S. coroniforme* subsp. *amblyphyllum* (▲) in south-west Western Australia. Version 6.1 IBRA regions (Department of the Environment and Water Resources 2007) are indicated in grey.

Results and discussion

Plants from all three regions possess a similar habit characterised by a short, thick stem stock clothed in persistent leaf bases, and simple, marginate leaves arranged in a rosette at the apex of the stem (Figures 3B, 4B, 5B). Adventitious roots are present but inconspicuous. The stems elongate and branch as the plant matures, however, each season's increment is relatively short and individuals therefore remain quite compact.

Young plants usually produce just a single scape whereas older plants give rise to numerous inflorescences that radiate out from the leafy stem stock (e.g. Figures 3B, 4C, 5C). The morphology and distribution of glandular hairs on the scape and floral parts is consistent between populations, as is the morphology of the hypanthium and calyx lobes. The hypanthium comprises one fertile and one sterile loculus; a trait recorded for some members of the morphologically distinct section *Rhynchangium* Benth., but otherwise uncommon within the genus. The four main corolla lobes are laterally-paired and of comparable size and shape, and the morphology of the labellum and the throat appendages is consistent. There is no significant difference in column length in plants from the three regions. Observed variation between the three populations is discussed below.

Leaves. Variation in both leaf morphology and anatomy exists between population centres (Figure 2). Leaves from the plants at Quairading (Figure 2A, iii & iv) are discretely narrower than those from Maya (Figure 2A, v & vi) and tend to be narrower than those at Wongan Hills (Figure 2A, i & ii). They are especially distinctive for their blunt to very shortly mucronate apices which contrast with the prominent hair-like mucro present on plants at both Wongan Hills and Maya. They also tend to have less conspicuous midribs, although some variation in this feature was observed both within and between populations from all three regions. There is a tendency for the plants at Maya to have longer and broader leaves than those from Wongan Hills, although these differences are not discrete.

The leaves from all populations are obtriangular to widely 'v'-shaped in transverse section (Figure 2B–D). The epidermal cells of the midrib and margins are enlarged and somewhat fibrous; the stomata occurring in association with smaller, unmodified epidermal cells in two zones on both surfaces. Palisade cells are present in the outer mesophyll on both sides of the leaf. More rounded spongy mesophyll cells are located to the inside of the palisade tissue, along with large intercellular air spaces and two rows of scattered vascular bundles. No sclerenchyma is associated with the vascular bundles.

The epidermal cells along the leaf margin are transversely-elongated and, as a result of unequal growth in length, the ends appear as uneven prominences in surface view (Figure 2A). In contrast, the epidermal cells along the midrib are axially-elongated and arranged obliquely relative to the surface of the leaf. This unusual cell arrangement, which has been observed in a range of perennial triggerplants (Burns 1900; Mildbraed 1908; Wege 2006a), results in a multi-layered appearance in transverse section. The number of layers simply reflects the degree to which the epidermal cells overlap. This effect is strongest in the plant from Wongan Hills (Figure 2B) in which the adaxial midrib appears up to five layers deep and the abaxial midrib up to three layers deep. In contrast, only two layers are evident in the plant from Maya and only one or two layers were observed in the plant from Quairading. Further sampling is required to ascertain whether these anatomical differences are taxonomically informative.

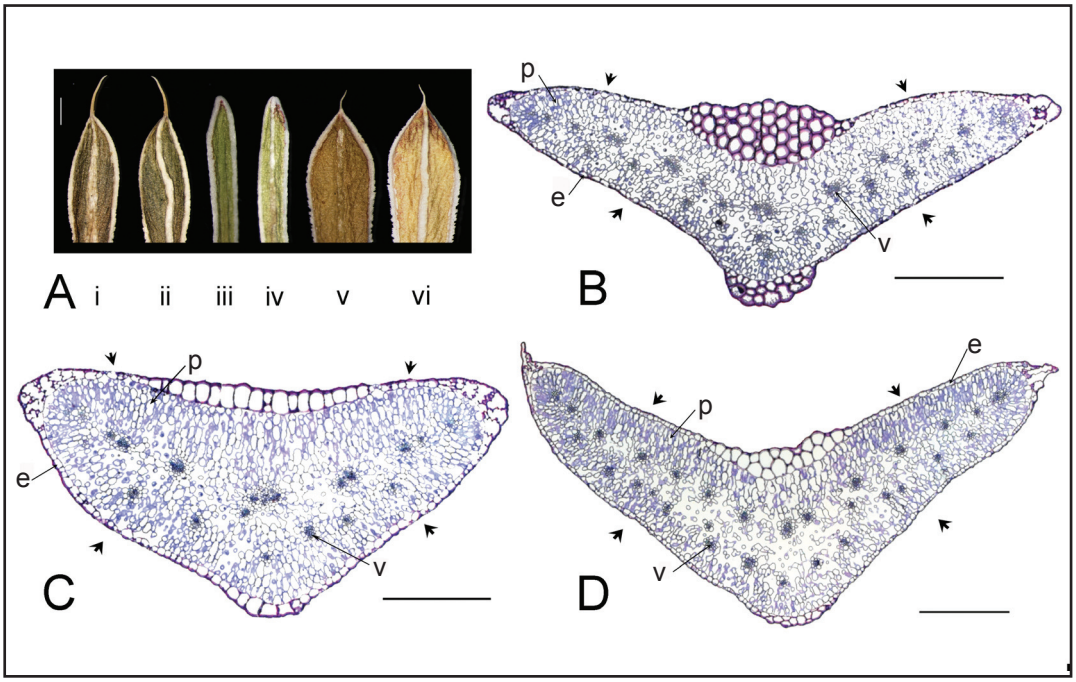


Figure 2. Leaf anatomy and morphology. A – *Stylidium coroniforme* subsp. *coroniforme* (Wongan, *P. Roberts s.n.*) = i (adaxial surface) and ii (abaxial surface), *S. coroniforme* subsp. *amblyphyllum* (Quairading, *M. Hislop* 3321) = iii (adaxial surface) and iv (abaxial surface), *S. amabile* (Maya, *J.A. Wege & C. Wilkins* JAW 902) = v (adaxial surface) and vi (abaxial surface); B – T.S. of *S. coroniforme* subsp. *coroniforme* (*J.A. Wege & C. Wilkins* JAW 881); C – T.S. of *S. coroniforme* subsp. *amblyphyllum* (*J.A. Wege & M. Griffiths* JAW 1227); D – T.S. of *S. amabile* (*J.A. Wege & C. Wilkins* JAW 902). Scale = 1 mm (A) and 0.5 mm (B–D). e = epidermis, p = palisade, v = vascular bundle, arrows indicate the position of bands of stomata.

Inflorescence and flowers. Plants from Maya have paniculate inflorescences, with the lower inflorescence units possessing up to five flowers. The Wongan Hills and Quairading populations tend to have flowers in racemes, although the lower inflorescence units occasionally bear two flowers. Like the leaf apices, the floral bracts in the plants from Quairading are subacute to shortly mucronate rather than obviously mucronate. The plants from Maya tend to possess longer hypanthia, however, there is continuous variation in this character between the three population centres. Ovule number is variable, with numbers ranging between 9–26 (Wongan Hills), 8–38 (Quairading) and 28–56 (Maya). These figures are based on limited number of samples so it is unclear whether the higher numbers from the plants at Maya is significant.

Plants at Maya differ from those at Wongan Hills and Quairading in having white to pale pink flowers with pink throat markings (Figure 5F) rather than yellow to cream flowers with red throat markings (Figures 3C, 4E). Flower colour can be an unreliable taxonomic character in *Stylidium*. It is of note that the flowers are recorded as creamy-pink in the type description of *S. coroniforme* and that some flowers in the Quairading populations were observed by one of us [JAW] to have a pinkish hue. Of greater taxonomic significance is the pattern of markings in the throat of the flower: a pair of markings is present on each of the four main corolla lobes in plants from Maya (Figure 5F), as opposed to a single marking in plants from Wongan Hills (Figure 3C) and Quairading (Figure 4E). The plants at Maya differ further from those at Wongan Hills and Quairading in having larger stigmas that are only shortly rather than prominently elongated (compare Figure 5G, iii with Figure 4F, iv).

Taxonomic conclusions. There is an inherent problem when assessing the circumscription of rare taxa since there is a limited amount of material available for study and, in this instance, no geographic intermediates to assess character variation. This was further compounded by a lack of material seen in the field at Wongan Hills, although this shortfall was somewhat overcome by the ready availability of cultivated material.

On the basis of available data, three distinct taxa are recognized in this study. We consider the differences in stigma morphology and the pattern of throat markings in the plants at Maya to be taxonomically significant at the species level. Stigma morphology is consistent within other species of *Stylidium*, and the pattern of throat markings has previously been used, in part, to distinguish between other species pairs in *Stylidium* (e.g. *S. leptocalyx* Sond. and *S. stenosepalum* E.Pritz., Wege 2006b). The plants at Maya also tend to have wider leaves, more floriferous inflorescence units and longer hypanthia. This decision is also supported by the high level of genetic divergence comparable to species level differentiation, and two independent phylogenies based on maximum likelihood analysis of gene frequency data and Unweighted Pair Group Method with Arithmetic Mean (UPGMA) analysis of genetic distance data (Coates 2000).

The leaves of the plants from Quairading, which are narrowly-oblanceolate, fibrous, marginate, blunt to shortly mucronate and glabrous, are unique within *Stylidium*. The blunt to shortly mucronate floral bract apices further distinguish them from the plants at Maya and Wongan Hills. Whilst the leaves and bracts of these plants are highly diagnostic, the flowers are comparable to plants found at Wongan Hills, suggesting that subspecies status is most appropriate.

Taxonomy

Stylidium coroniforme F.L.Erickson & J.H.Willis, *Vic. Naturalist* 83(5): 108 (1966). *Type*: Wongan Hills, Western Australia, 17 September 1963, *R. Erickson & J.H. Willis s.n.* (*holo*: MEL 2295763!; *iso*: PERTH 1008099!).

Caespitose perennial herb, 7–20 cm high. *Trichomes* glandular, 0.15–0.3 mm long, stalks translucent, heads red to red-black, ellipsoid; eglandular trichomes absent. *Stems* partly buried or slightly elevated above the soil, thickened, branched or unbranched, bearing persistent leaf bases. *Leaves* rosulate, oblanceolate, apex blunt to prominently mucronate, margin white with minute prominences, midribs often conspicuous, (1–)2–4 cm long, 0.8–2.8 mm wide, glabrous. *Scapes* 4–25 cm high, 0.6–2.5 mm wide, glabrous at base, glandular along inflorescence axis. *Inflorescence c*. 6–40-flowered, racemose or paniculate; units 1.2–2.8 cm long, 1–2-flowered; bracts ovate, apex subacute to mucronate, margin ± hyaline, 3–11 mm long, glabrous to sparingly glandular; bracteoles situated at base of hypanthium, 2–6 mm long, glandular; pedicels to 4 mm long, glandular. *Hypanthium* cylindric, straight to slightly arcuate, compressed in T.S. and with one cell of ovary infertile, 6–16 mm long, 0.7–2 mm wide, glandular. *Calyx lobes* free, apex subacute, margin ± hyaline, 2–4 mm long, 0.6–1.5 mm wide, glandular. *Corolla* yellow (rarely pinkish) with one set of red throat markings and a yellow throat, flushed red on reverse, tube 2–4 mm long, lobes laterally-paired; anterior lobes elliptic, anterior margin strongly arcuate, 3.5–5.5 mm long, 2–3.3 mm wide; posterior lobes elliptic, often slightly falcate, 3.8–6.2 mm long, 2–3 mm wide; abaxial surface glandular. *Labellum* boss yellow, orbicular to ovate, 0.7–1.2 mm long, 0.5–1.2 mm wide, glabrous; margin red, papillose; lateral appendages red to yellowish, 0.7–1.8 mm long, papillose. *Throat appendages* 2, filiform to subulate, yellow with red tips, 0.7–1.8 mm long, sometimes absent or reduced in size in cultivated material. *Column* yellow at

base, red above, 9.5–15 mm long; anther locules transversely fixed relative to column, red, subtending hairs present; stigma entire, circular to elliptic, 0.4–0.6 mm long, 0.2–0.5 mm wide. *Mature capsules* and seed not viewed.

Phenology. Flowering in September and October.

Notes. Two subspecies are recognised. They differ in features of leaf and bract morphology and are geographically isolated.

a. Stylidium coroniforme F.L.Erickson & J.H.Willis subsp. **coroniforme**

Illustrations. Erickson & Willis (1966) p. 109, Plate 1; Grieve & Blackall (1982) p. 55 of supplement, No. 48b; Brown *et al*. (1998) p. 106.

Leaves oblanceolate, 1.5–4 cm long, 1.2–2.5 mm wide, apex conspicuously mucronate, mucro 0.5–2.5 mm long. *Floral bracts* conspicuously mucronate. (Figures 2A, i & ii; 3)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] 11 Sep. 1926, *E.H. Ising s.n*. (AD); 1964, *M. Rogers s.n*. (PERTH); 27 Sep. 1999, *P. Roberts s.n*. (PERTH); 30 Sep. 1984, *J.H. Ross* 2847 (MEL); 11 Sep. 2003, *J.A. Wege & C. Wilkins* JAW 881 (PERTH); 11 Oct. 2004, *J.A. Wege & K.A. Shepherd* JAW 1235 (PERTH); 23 Sept. 2004, *J.A. Wege & K.A. Shepherd* JAW 1188 (PERTH).

Distribution. Known from several discrete populations near Wongan Hills, in the Avon Wheatbelt of south-west Western Australia (Figure 1).

Habitat. Shallow sand over laterite in upland habitats. *Allocasuarina* and *Dryandra* scrub, or mallee woodland.

Figure 3. *Stylidium coroniforme* subsp. *coroniforme*. A – habitat; B – habit, showing the scapes radiating out from the central leaf rosettes; C – flower. Photographs by J.A. Wege. A, C = *J.A. Wege & K.A. Shepherd* JAW 1188, B = cultivated material at BGPA (October 2004).

Conservation status. Listed as Declared Rare Flora under the Western Australian Wildlife Conservation Act 1950, with a ranking of Endangered (Atkins 2006). As noted by Stack *et al*. (2003), this ranking will need to be reviewed in view of the taxonomic research presented here.

Spotting features. Distinguished from all other taxa within the genus by the following combination of characters: a rosetted habit, oblanceolate, fibrous and marginate leaves with prominently mucronate apices, a cylindric and glandular hypanthium that is sterile in one loculus, laterally-paired corolla lobes, one set of throat markings, two filiform throat appendages per flower and a prominently stalked stigma.

Notes. The type description of *S. coroniforme* subsp. *coroniforme* and the associated illustration indicate that the labellum lacks lateral appendages; however, long lateral appendages are present on both the holotype and isotype, and have been observed in all plants examined in the field and in cultivation. In cultivated plants the throat appendages were filiform, subulate, or absent altogether; however, it is not known whether similar variation is present in naturally-occurring populations of *S. coroniforme* subsp. *coroniforme*. Throat appendages are known to vary within some species of *Stylidium* (Raulings & Ladiges 2001; Wege 2006a, 2006b).

Like many other perennial triggerplants, *S. coroniforme* subsp. *coroniforme* is a disturbance opportunist, with populations typically going through bottleneck-flush cycles in association with temporary habitat perturbations such as fire (Coates 1992).

b. Stylidium coroniforme subsp. **amblyphyllum** Wege, *subsp. nov*.

Stylidio coroniformi F.L.Erickson & J.H.Willis subsp. *coroniformi* affinis sed foliis angustioribus et apicum subacutis ad mucronatis brevioribus differt.

Typus: north-west of Quairading, Western Australia [precise locality withheld for conservation purposes], 10 October 2002, *M. Griffiths s.n.* (*holo*: PERTH 06941850).

Leaves linear to narrowly-oblanceolate, 1–2.5 cm long, 0.8–1.5 mm wide, apex subacute to very shortly mucronate, mucro <0.2 mm long. *Floral bracts* subacute to very shortly mucronate. (Figures 2A, iii & iv; 4)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] 3 Sep. 2002, *R. Davis* WW 65–19 (PERTH); 1889, *A. Eaton s.n.* (MEL 2156103); 28 Sep. 2004, *M. Hislop & M. Griffiths* WW 141–31 (PERTH); 28 Sep. 2004, *M. Hislop* 3321 (PERTH); 5 Oct. 2004, *J.A. Wege & M. Griffiths* JAW 1227 (PERTH); 5 Oct. 2004, *J.A. Wege & M. Griffiths* JAW 1229 (PERTH).

Distribution. Presently known from a small cluster of populations north-west of Quairading, in the Avon Wheatbelt of south-west Western Australia (Figure 1).

Habitat. Favours lateritic soils on breakaways. Recorded growing with *Eucalyptus argyphea*, *E. wandoo*, *Dryandra armata* and *Hakea subsulcata*; *Dryandra armata*, *D. nobilis* and *Beaufortia incana*; and in open *E. salmonophloia* woodland with *Grevillea insignis*.

Conservation status. Listed as Priority One under Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (Atkins 2006). *Stylidium coroniforme*

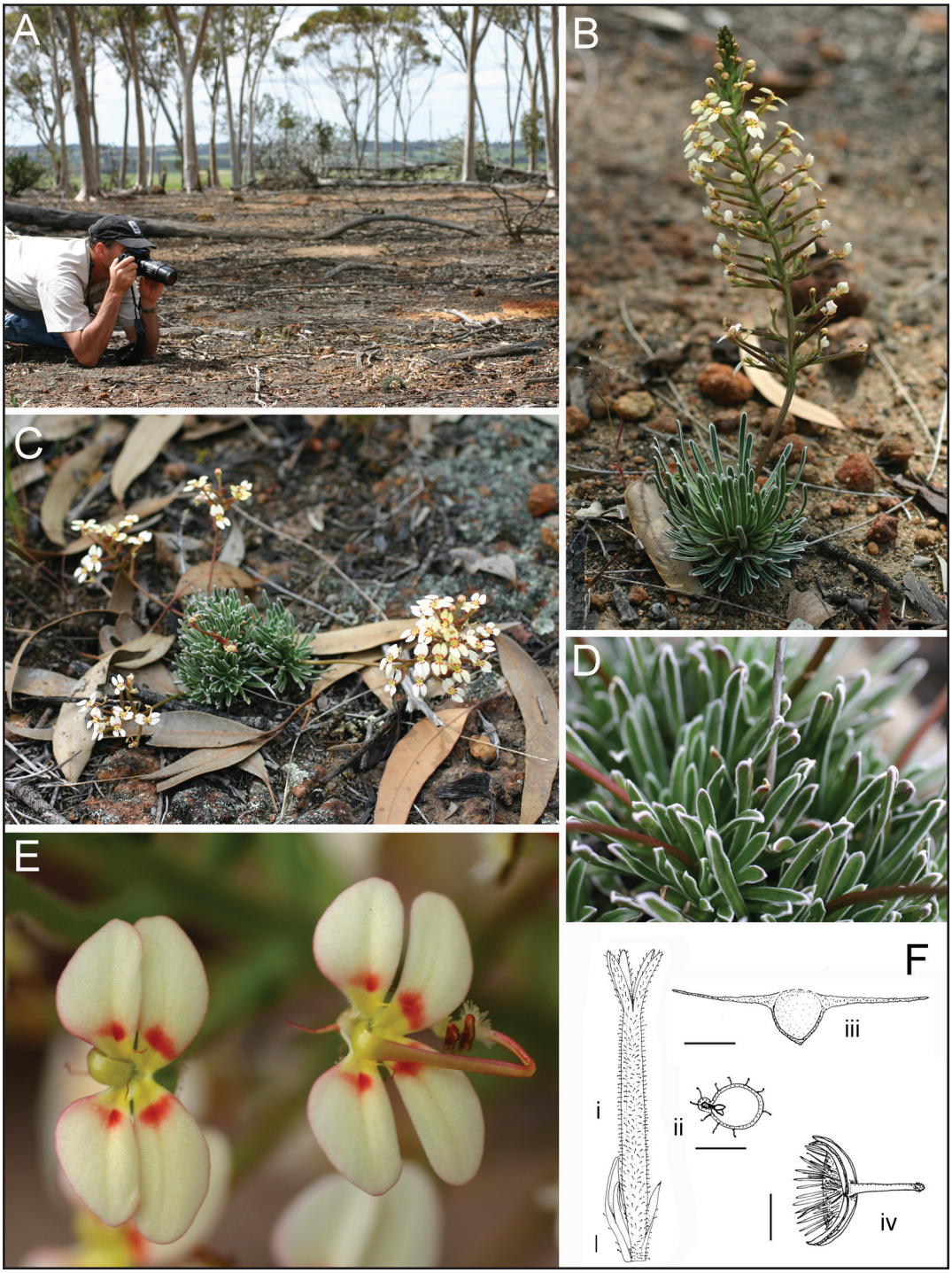


Figure 4. *Stylidium coroniforme* subsp. *amblyphyllum* (*J.A. Wege & M. Griffiths* JAW 1227). A – Mike Griffiths (WWF-Australia) photographs an individual on a breakaway at the type locality; B & C – habit; D – leaves with subacute to shortly mucronate apices; E – a pair of flowers, showing the trigger poised (LHS) and released (RHS); F – i) hypanthium, ii) T.S. of hypanthium showing one sterile and one fertile loculus, iii) labellum with long laterial appendages, iv) stigma, scale = 1mm. Photographs by J.A. Wege.

subsp. *amblyphyllum* is known from three small populations occurring on private property. Further survey is urgently required to determine whether this subspecies should also be listed as Declared Rare Flora.

Etymology. The subspecies epithet is taken from the Greek (*ambly*-, blunt and -*phyllum*, leaf) in reference to the distinctive leaf apices of this taxon.

Spotting features. Distinguished from all other taxa within the genus by the following combination of characters: a rosetted habit, narrowly oblanceolate, fibrous and marginate leaves with subacute to very shortly mucronate apices, a cylindric and glandular hypanthium that is sterile in one loculus, laterally-paired corolla lobes, one set of throat markings, two filiform throat appendages per flower and a prominently stalked stigma.

Notes. *Stylidium coroniforme* subsp. *amblyphyllum* was first collected in 1889 by Miss Alice Eaton from the "East sources of the Swan River" (MEL 2156103). It is one of a number of triggerplants of conservation significance first collected in the 19th century but not recognised and described until recently (see Wege 2007, this issue).

Stylidium amabile Wege & Coates, *sp*. *nov*.

Species haec ab *Stylidio coroniformi* F.L.Erickson & J.H.Willis differt corollae lobis bimacculatis, foliis usque ad 4 mm latis, et stigmatibus subsessilibus et grandioribus.

Typus: near Maya, Western Australia [precise locality withheld for conservation purposes], 4 October 1989, *D*. *Coates* 3389 (*holo*: PERTH 06941710).

Caespitose perennial herb, 6–23 cm high. *Trichomes* glandular 0.15–0.3 mm long, stalks translucent, heads red to red-black, ellipsoid; eglandular trichomes absent. *Stems* partly buried or slightly elevated above the soil, thickened, branched or unbranched, bearing persistent leaf bases. *Leaves* rosulate, oblanceolate, apex conspicuously mucronate, margin white with minute prominences, midribs usually conspicuous, 1.2–6 cm long, 1.8–4 mm wide, glabrous. *Scapes* 4–28 cm high, 0.8–2 mm wide, glabrous at base, glandular along inflorescence axis. *Inflorescence c*. 9–55-flowered, paniculate; units 2–3.5 cm long, 1–5-flowered; bracts ovate, apex mucronate, margin ± hyaline, 2.5–7 mm long, 1–3 mm wide, glandular; bracteoles situated at base of hypanthium, 3–5.5 mm long, glandular; pedicels to 1mm long, glandular. *Hypanthium* cylindric, straight to slightly arcuate, compressed in T.S. and with one cell of ovary infertile, 8–23 mm long, 0.9–2.2 mm wide, glandular. *Calyx lobes* free, apex subacute, margin ± hyaline, 2.5–3.7 mm long, 0.5–1.2 mm wide, glandular. *Corolla* pale pink to whitish with 2 sets of pink throat markings and a white throat, tube 2–3.5 mm long, lobes laterally-paired; anterior lobes elliptic, anterior margin strongly arcuate, 3.5–5.5 mm long, 2–3 mm wide; posterior lobes elliptic, often slightly falcate, 3.5–5.8 mm long, 2–3.2 mm wide; abaxial surface glandular. *Labellum* boss cream to yellow, orbicular to ovate, 0.8–1.2 mm long, 0.8–1.2 mm wide, glabrous; margin red, papillose; lateral appendages red, 1.3–2.5 mm long, papillose. *Throat appendages* 2, filiform, white with pink tips, 0.9–2.2 mm long. *Column* white at base, pink-red above, 11–14 mm long; anther locules transversely fixed relative to column, red, subtending hairs present; stigma entire, shortly stalked, elliptic, 0.6–1 mm long, 0.5–0.6 mm wide. *Capsule* cylindric, tapering to apex, *c*. 10–25 mm long. *Seeds* brown, 0.8–1.1 mm long, 0.4–0.6 mm wide, papillose. (Figures 2A v, vi; 5)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld] 30 Nov. 2004, *A. Crawford* ADC 787 (PERTH); 13 Nov. 1996, *S. Patrick* 2881 (PERTH); 16 Sep. 2003, *J.A. Wege & C. Wilkins* JAW 902 (PERTH); 28 Sep. 2004, *J.A. Wege & K.A. Shepherd* JAW 1196 (PERTH); 28 Sep. 2004, *J.A. Wege & K.A. Shepherd* JAW 1197 (PERTH).

Distribution. Geographically restricted to the Maya area in the Avon Wheatbelt of south-west Western Australia (Figure 1).

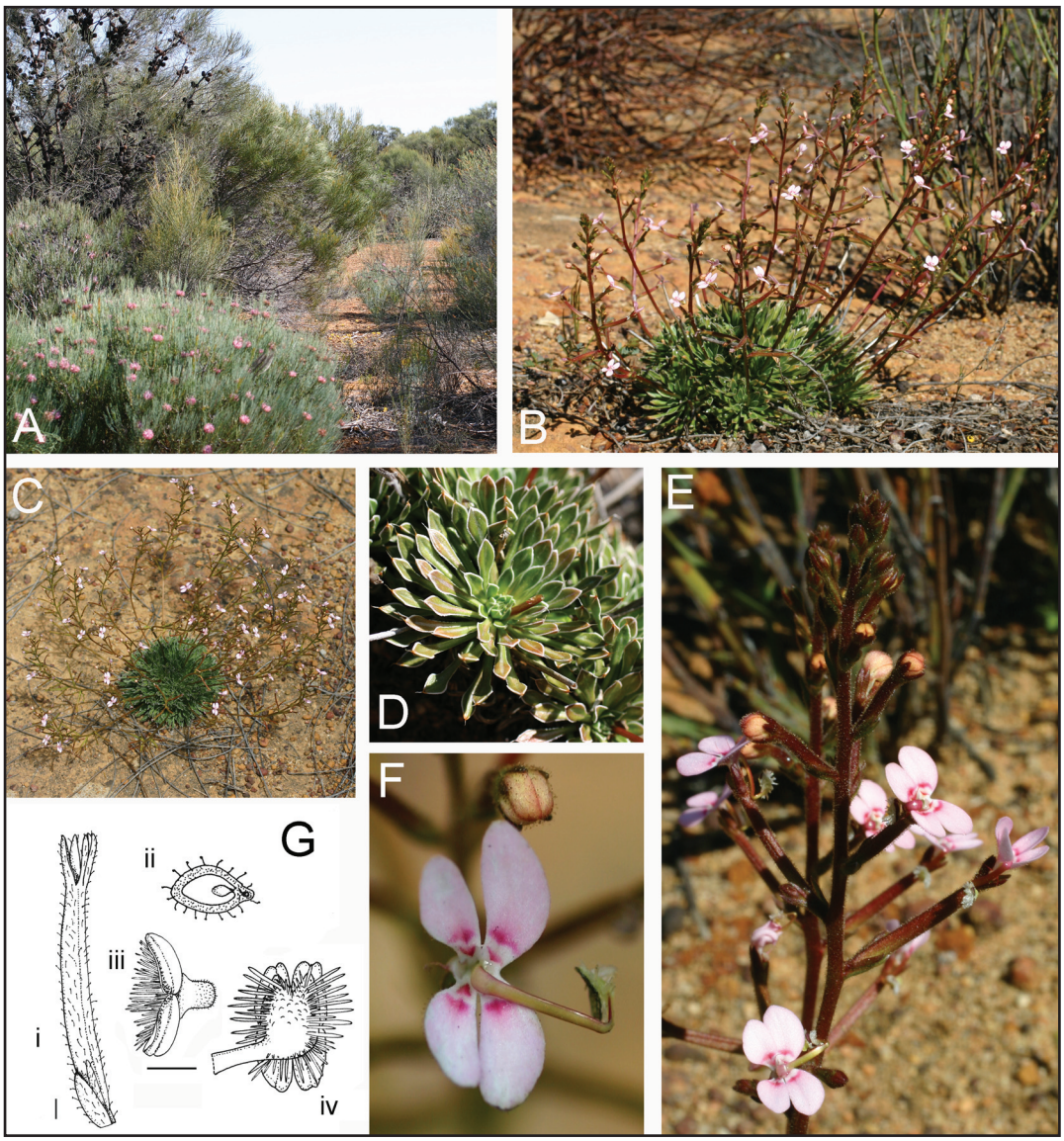


Figure 5. *Stylidium amabile* (*J.A. Wege & K.A. Shepherd* JAW 1196). A – habitat; B, C – habit; D – leaf rosette; E – inflorescence; F – flower with trigger released; G – i) hypanthium, ii) T.S. of hypanthium showing one sterile and one fertile loculus, iii) stigma, iv) connective, showing subtending anther hairs, scale = 1 mm. Photographs by J.A. Wege.

Habitat. Grows high in the landscape, on sandy lateritic gravel in *Eucalyptus* and *Allocasuarina* scrub-heath or *Allocasuarina* and *Acacia* scrub.

Phenology. Flowering during September and October. Fruiting in November and December.

Conservation status. Listed as Declared Rare Flora under the Western Australian Wildlife Conservation Act 1950, with a ranking of Critically Endangered (Atkins 2006).

Etymology. The species epithet is taken from the Latin (*amabilis*) meaning lovable, or worthy of love.

Spotting features. Distinguished from all other taxa within the genus by the following combination of characters: a rosetted habit, oblanceolate, fibrous and marginate leaves with prominently mucronate apices, a cylindric and glandular hypanthium that is sterile in one loculus, laterally-paired corolla lobes, two sets of throat markings, two filiform throat appendages per flower and a shortly stalked stigma.

Acknowledgements

This research was commenced under an Australian Biological Resources Study grant and completed through the Western Australian Government's 'Saving Our Species' biodiversity conservation initiative. Anatomical sections were obtained at the Centre for Microscopy and Microanalysis at The University of Western Australia (UWA). Thanks to Mike Griffiths and the WWF-Australia Woodland Watch initiative for a highly valued contribution to this research; Elaine Ng and the Williams family for granting access to their properties; the Botanic Gardens & Parks Authority for the provision of cultivated material; DEC staff for their assistance, especially Mike Hislop, Rob Davis, Alanna Chant, Gemma Phelan and Cathy Page; John Murphy for Laboratory support at UWA; Carol Wilkins for field assistance; Kelly Shepherd for comments on the manuscript and field assistance; and the Directors of AD and MEL for access to their collections.

References

Atkins, K.J. (2006). "Declared Rare and Priority Flora list for Western Australia." (Department of Environment and Conservation: Kensington, Western Australia.)

Brown, A., Thomson-Dans, C. & Marchant, N. (1998). "Western Australia's Threatened Flora." (Department of Conservation and Land Management: Perth.)

Burns, G.P. (1900). Beitrage zur kenntniss der Stylidiaceen. *Flora* 87: 313–354.

Coates, D.J. (1992). Genetic consequences of a bottleneck and spatial genetic structure in the triggerplant *Stylidium coroniforme* (Stylidiaceae). *Heredity* 69: 512–520.

Coates, D.J. (2000). Defining conservation units in a rich and fragmented flora: implications for the management of genetic resources and evolutionary processes in south-west Western Australia. *Australian Journal of Botany* 48(3): 329–339.

Department of the Environment and Water Resources (2007). IBRA Version 6.1. http://www.environment.gov.au/parks/nrs/ibra/version6-1/index.html. Updated 6th February 2007. [accessed June 2007]

Erickson, R. & Willis, J.H. (1966). Some Additions to Australian Stylidiaceae. *The Victorian Naturalist* 83(5):107–112.

Grieve B.J. & Blackall W.E. (1982). "How to know Western Australian wildflowers. Part IV." 2nd Ed. (University of Western Australia Press: Nedlands.)

Mildbraed, J. (1908). Stylidiaceae. *In*: A. Engler (Ed) "Das Pflanzenreich." IV, 278. (Wilhelm Engelmann: Weinheim.)

Raulings, E.J. & Ladiges, P.Y. (2001). Morphological variation and speciation in *Stylidium graminifolium* (Stylidiaceae), description of *S. montanum*, and reinstatement of *S. ameria*. *Australian Systematic Botany* 14(6): 901–935.

Stace, H.M. & Coates, D.J. (1995). "Wongan Hills Triggerplant (*Stylidium coroniforme*) Recovery Plan." (Department of Conservation and Land Management: Perth.)

Stack, G., Willers, N. & Brown, A. (2003). "Wongan Hills Triggerplant (*Stylidium coroniforme*) Recovery Plan 2003–2008." (Department of Conservation and Land Management: Perth.)

Wege, J.A. (2006a). *Stylidium diplotrichum* (Stylidiaceae): a new scale-leaved triggerplant from south-west Western Australia, with taxonomic and anatomical notes on morphologically allied species. *Nuytsia* 16(1): 183–197.

Wege, J.A. (2006b). Taxonomic observations on the *Stylidium leptocalyx* complex (Stylidiaceae). *Nuytsia* 16(1): 221–231.

Wege, J.A. (2007). New species and new circumscriptions in *Stylidium* (Stylidiaceae). *Nuytsia* 17: 415–432.