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Grevillea trichantha Olde, a third species with hairy flowers in the *Triloba* Group (Proteaceae: Grevilleoideae: Hakeinae) from the Marchagee Track, south-west Western Australia

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Abstract

Grevillea trichantha Olde, a rare species in the *Triloba* Group is described. It appears to be most closely related to another rare species, *G. metamorpha* Makinson and is more common, though its localised distribution still requires a high conservation priority. *Grevillea trichantha* is the third species in the *Triloba* Group in which the perianth is consistently, but not always uniformly, hairy. A short key differentiating the three species is provided.

Introduction

This paper is the fourth in a series aimed at resolving the taxonomy of the *Triloba* Group of *Grevillea sensu* Makinson (2000); see Olde 2020, 2021; Olde and Marriott 2021). Only two hairy-flowered species have been distinguished to date in the *Triloba* Group and to these a third, *G. trichantha,* is here added. *Grevillea erinacea* Meisn. was the first species to be described (Meisner 1855: 74). It was gathered during James Drummond's sixth and last collection to the north of Perth. Makinson (2000: 506) described the second species, *Grevillea metamorpha,* which was brought to attention by staff of the Western Australian Herbarium. This species seems to have the greatest affinity with *G. trichantha*, notwithstanding that none of the species have been phylogenetically tested using molecular data. *Grevillea metamorpha* is the rarest of the three, known only from a single, seed-obligate population in a degraded habitat on private land in the Warradarge district to the north-west of the population of *G. trichantha.* All three species have smooth fruits. Hairs on the floral parts, particularly the outer surface of the perianth, of these three species were often observed to be variable in density and, rarely altogether absent, or quickly caducous.

The distribution of hairs on the inflorescence, floral and vegetative parts reliably discriminates species in the *Triloba* Group. However, as McGillivray and Makinson (1993: 167) have pointed out, 'developmental abnormalities in flowers were more evident in this group than in other groups'. Pollen abnormalities in *G. vestita*, were first noted by Venkata Rao (1964). Venkata Rao (1966: 174) also observed free staminal filaments in some flowers of that species (normally adnate to the tepals). McGillivray and Makinson (1993) reported tepals 5 or more per flower (normally four), deformed styles, digynous and misshapen pollen (normally triporate). Makinson noted two pistils emergent from a single pedicel on a specimen sheet at CANB. In this examination of the Group the presence of random hairs on various floral organs that do not normally possess them was noted along with fusion of pedicels or styles and digynous styles.

The discussion on morphological and developmental abnormalities is relevant to a unique situation in the conceptual definition of *Grevillea trichantha*. Within the distribution of its population which extends over c. 1 km and involves numerous plants and ramets, all with hairy perianths, a single plant (*Olde* 01/46) was observed with glabrous flowers, leading initially to the belief that two species may have been present at the site. Microscopic comparison showed that it was otherwise indistinguishable from *G. trichantha,* apart from some simple hairs at the base on the adaxial surface of the perianth. Morphological conflicts exclude its inclusion in any another glabrous-flowered species such as *G. acrobotrya* Meisn., a seed-obligate species with a fusiform pollen-presenter and chocolate perianth limb, *G. amplexans* Diels, another seed-obligate species with amplexicaul leaves, *G. uniformis* (McGill.) Olde which has truncated leaf bases and *G. vestita* (Endl.) Meisn. which has a spreading vegetative indumentum. Since it lacked a population base, it was taken as a genetic variant or possible hybrid, the parentage of which could not be inferred from co-occurring plants.

The basis for any taxonomic decisions must be morphological consistency at the population level. However, the presence of occasional aberrant specimens does not invalidate a species concept and can simply be part of the evolutionary process. Along with the high reported and observed incidence of morphological abnormality in the *Triloba* Group, it was decided here to treat the glabrous-flowered specimen of *G. trichantha* (*Olde* 01/46) as 'abnormal' by virtue of the random and infrequent absence of floral hairs in the population as a whole. The species has therefore been conceptualised in terms of the morphology of the majority of individuals.

As an example of similar abnormalities in the Group the following selected specimens can be cited in support:

- *Buegge* D101 (PERTH05399580); *G. anethifolia sens lat.*; hairs abnormally on some pedicels.
- *Preiss* 722 (MEL52538); *G. vestita* (Endl.) Meisn. subsp. *vestita*; hairs on pedicels.
- *Melville* 4140 (MEL98972; NSW621037); *G. triloba* Meisn.; hairs on pedicels.
- *P. Althofer* 178 (NSW125527); *G. anethifolia* R.Br.; scattered hairs on the dorsal surface of the ovary.

Morphology

Descriptive layout and morphological terminology follows Olde (2015), largely inspired by the extensive descriptions given by McGillivray and Makinson (1993). Inflorescence terminology was discussed by Olde and Marriott (1993) and Makinson (2000: 11). The term super-conflorescence was introduced by the latter but branched conflorescences is preferred here, the various inflorescence units of which are here termed unit conflorescences. Petiole terminology follows Hickey (1973). Petioles described as 3-merous, have a central vein (which may extend down the branch at the point of attachment or not, and two lateral veins that spread widely or scarcely at all. Floral branches refer to branches of a shrub on which conflorescences aggregate preferentially cf. leafy branches. The term *buds* alludes to conflorescence buds discussed by Olde and Marriott (2009). Although rhizomatous plants generally reproduce asexually, the presence of occasional fertile fruits (seed facultative) is a diagnostic feature worthy of taxonomic note.

Key to species of the *Triloba* Group with hairy outer perianth surfaces

A Plant habit monomorphic; all leaves similar and with the undersurface fully enclosed by margins; floral branches absent ..... ***G. erinacea***

A* Plant habit dimorphic; leaves polymorphic, reduced on floral branches, most with the undersurface exposed; floral branches usually present ..... B

B Generative habit seed-obligate; habit spindly, erect, 1.5–1.8 m high; style scarcely dilated above the stylar constriction; pollen-presenter fusiform with straight sides ..... ***G. metamorpha***

B* Generative habit rhizomatous; habit bushy, spreading, 0.5–0.8 m high; style prominently dilated above the stylar constriction; pollen-presenter broadly ovoid usually with convex sides ..... ***G. trichantha***

Taxonomy

Grevillea trichantha Olde, **sp. nov**.

Type: Western Australia: 2.1 km east of Brand Highway on Marchagee Track, *P.M. Olde, N. Marriott & K. Alcock* 01/134, 9 Sep 2001 (holo: NSW1099549; iso: CANB, K, MEL, PERTH).

Diagnosis: *Grevillea trichantha* is most similar to *Grevillea metamorpha* Makinson but differs in its low-growing (v. spindly, erect) habit of growth and rhizomatous generative (*v*. seed-obligate) habit; mature leaves generally smaller, 0.5–1.5(–1.8) cm long, usually tripartite with lateral lobes (*v*. 1.4–2.4 cm long, obovate-cuneate and apically dentate); stylar dilation ovoid, abruptly widened to *c*. 0.5 mm above a narrow constriction zone (*v*. stylar dilation very narrowly ovoid, scarcely swollen, to 0.3 mm wide); pollen-presenter bulbous-conical with convex sides (*v*. pollen-presenter subfusiform, narrowly truncate-conical to subcylindrical with straight sides).

Seedlings not seen. *Mature plant* a low-growing, dimorphic, rhizomatous, seed facultative, probably self-compatible *shrub* 0.5–0.8(–1.2) m high, 1–1.5 m wide, bushy at base with multiple ascending to spreading columnar floral branches. *Branchlets* 0.5–1 mm thick, terete, sericeo-tomentose, sometimes subvillous. *Ramet leaves* (basal leaves on root-suckers) (*Olde 01/134d*) 2.5–4 cm long, 1 cm wide, coarsely pinnatifid. *Adult leaves* 0.5–1.5(1.8) cm long, 5–12 mm wide, polymorphic, becoming gradually reduced on floral branches below and in the flowering zone; vegetative leaves crowded, sessile or very shortly petiolate, spreading to ascending, obovate in gross outline, flat to slightly secund, most usually coarsely 3–7-fid to biternate, the primary lobes deeply -sect or -fid; leaves on flower-bearing branchlets trifid to trisect in the distal 10 cm, with occasional lobes secondarily divided; *new growth* coppery-green, tomentose-villous; *leaf base* narrowly cuneate; *primary lobes* 3–5, ascending; *central lobe* usually bifid or trifid, sometimes deeply bi-lobed or bi-sect; *ultimate central lobes* 1.5–10 mm long, (0.7–) 0.8–2.2 mm wide, ascending, triangular to broadly triangular on vegetative leaves, linear or very narrowly triangular on floral branches, flat (sometimes slightly divaricate on floral branches); *lateral lobes* either simple or one or both either secondarily bi- or tripartite; *ultimate lateral leaf lobes* 0.3–1 cm long, 0.7–0.8 mm wide, spreading, linear to obovate-trifid, triangular; *apices of lobes* acute, spinescent, pungent; s*pine* 0.3–1.5 mm long, black with yellow base, straight or shortly curved; *margins* smoothly recurved to angularly revolute on smaller or reduced leaves, angularly refracted about the intramarginal vein on larger leaves; *adaxial surface* irregular, convex to concave, sometimes with depressions at the sinuses, glabrous or openly sericeous and soon glabrescent, the midvein scarcely evident, secondary veins and intramarginal veins faintly evident to obscure; *abaxial surface* mostly exposed, densely white sericeous except the veins subglabrous, prominent; *texture* coriaceous; *petioles* 0–0.2 mm long, 0.3 mm wide, normal, 3–merous, the medial axis not extending down the branchlet, the lateral veins scarcely spreading; adaxial surface concave, sparsely to moderately sericeo-tomentose, usually with scattered appressed short hairs; abaxial surface convex, pubescent to glabrous. *Conflorescences* simple or branched, usually axillary, occasionally subterminal on short side branches, not exceeding the leaves, mostly confined to the upper axils; *subterminal conflorescences* simple to 4-branched, *axillary conflorescences* simple to 4-branched; *unit conflorescences* 1 cm long, 1–1.2 cm wide,, subglobose, 14–20- flowered, acropetal; *buds* 1–2 mm long, usually pedunculate, globose, not overarched by bractiform leaves, development not arrested; *peduncles* 0.1–3 mm long, sericeous; *floral rachises* 4–8 mm long, 0.3–0.4 mm wide, white sericeo-tomentose, the hairs not to scarcely exceeding the rim of the nodes, slightly tapered distally; *involucral bracts* not seen; *common bracts* 0.6–1 mm long, 0.6–1 mm wide, sparsely sericeous outside, glabrous inside, ovate-acuminate, caducous at early bud stage. *Flower colour* pedicels white to creamy; perianth white with grey to dull yellow limb; pistils white, the pollen-presenter ageing purplish-pink after anthesis. *Flowers* acroscopic, not nectariferous, fragrance not noted, entomophilous; *pedicels* 5–7 mm long, 0.2–0.3 mm wide, sparsely sericeous, the apex gradually but slightly expanded, ascending, straight, not crowded; *basal pedicels* 5–7 mm long; *distal pedicels* 5–6 mm long; torus 0.7 mm wide, scarcely wider than the apex of the pedicel, transverse to slightly oblique; nectary absent to obscure and rising *c*. 0.1 mm above the toral rim, U-shaped with entire margin. *Pistil* 3.5–4 mm long, glabrous; *gynophore* 1.5–1.8 mm long; *ovary* 0.5 mm diam., round in side-view, compressed, remaining smooth after fertilisation; *stylar constriction* 0.2–0.4 mm long, 0.2 mm wide, incurved; *stylar swelling* 0.8–1 mm long, 0.35–0.5 mm width, tapering to 0.3 mm slightly below the style–end, ovoid; *pollen–presenter* 0.5–0.6 mm long, broadly conical with convex sides, the *base* 0.4–0.6 mm wide, abruptly divergent from, to gradually merged with, the style-end, straight to slightly oblique at *c*. 10°, not rimmed; *stigma* (0.1–)0.2 mm wide, oblique. *Perianth* (just before anthesis) 3–3.5.mm long, 0.5–1 mm wide, actinomorphic; *perianth tube* white in bud, 2–2.5 mm long, 0.5–1 mm maximum width, narrowly obovoid, contracting below the limb into a neck 0.5 mm wide; cylindrical, glabrous inside or sometimes a few scattered minute trichomes just above the base on each tepal or rarely sparsely pilose adjacent to the ovary; *perianth limb* 1–1.2 mm long, 1.2–1.5 mm wide, depressed globose to spheroidal, not ribbed; *tepals* 3–3.5 mm long, 0.3 mm wide at base, 0.5 mm wide in upper half, 0.2 mm wide below the limb; abaxial surface sericeous to sericeo-tomentose, sometimes the hairs only scattered on mature flowers, sometimes becoming glabrescent; adaxial surface glabrous or a few scaly simple trichomes 0.1–0.2 mm long at base, elsewhere papillose and usually farinaceous, the midrib obscure; *tepal-limbs* 1–1.2 mm long, 1 mm wide, the midrib obscure. *Fruits* follicular,

monospermous, 10 mm long, 6 mm wide, oblong-ellipsoidal, transverse to very oblique on incurved pedicel with attachment subposterior, 2–3 mm from base on dorsal side; *fructual style* oblique; *fructual pollen-presenter* conical; *pericarp* 0.5–0.7 mm thick along the suture, thicker at the ends; *exocarp* smooth; *mesocarp* crustaceous; *endocarp* smooth. *Seeds* not seen. (Figures 1, 2)

Fig. 1. a. Flowering branchlet of *Grevillea trichantha*. b. New growth of *Grevillea trichantha*. c. *Grevillea trichantha* in natural habitat. Photos: a, c by P.M. Olde; b by I. Gilmour.

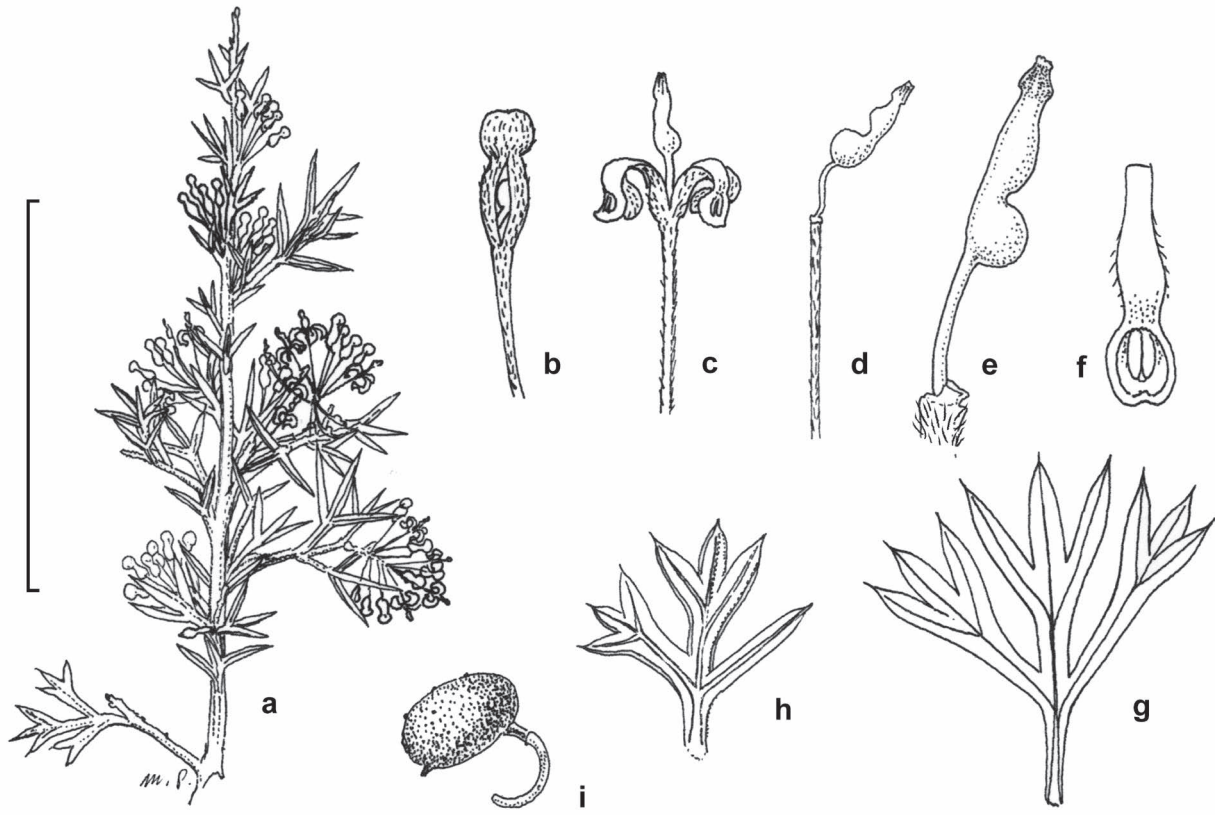

Fig. 2. *Grevillea trichantha*. a. Habit. b. Flower bud before anthesis. c. Flower after anthesis. d. Flower without perianth. e. pistil. f. Tepal inner surface. g, h. Leaf variants. i. Follicle. Scale bar: a = 50 mm; b, c = 12.5 mm; d = 10 mm; e, f. = 5 mm; g, h = 25 mm; i = 33 mm. Illustration: M. Pieroni; modified for publication by L. Elkan.

Diagnostic characters: Low-growing, rhizomatous, dimorphic habit, bushy at base. Mature leaves usually coarsely bipinnatifid; floral branches with sessile, highly reduced trisect leaves, often with secondary division; leaves flat or secund with under-surface exposed and densely sericeous. Conflorescences simple or few-branched, axillary or subterminal, shortly pedunculate; peduncles, floral rachises, outer surface of common bracts, pedicels, and outer surface of perianth sparsely to densely sericeous; floral rachises 4–8 mm long; pedicels 5–7 mm long; common bracts 0.6–1 mm long, 0.6–1 mm wide; nectary obscure to scarcely evident; pollen-presenter ovoid- to bulbous-conical with convex sides; perianth actinomorphic; fruits rare, follicular with smooth exocarp.

Distribution: Western Australia, where known to date only from the type locality in the Coorow LGA. It occurs in the South-west (SW) Botanical Province(s), in the Lesueur Sandplain Subregion of the Geraldton Sandplains IBRA Region.

Phenology: Flowering occurs mainly in Spring with spasmodic flowering at other times, mainly in response to increased rainfall. Fruits, which set rarely, have not been collected when mature.

Habitat and ecology: Flat to undulating terrain. Grows in dense, mixed Proteaceae heath with *Adenanthos* sp., *Banksia candolleana*, *B. nivea*, *B. tridentata*, *B. incana* var. *brachyphylla*, *B. sphaerocarpa*, *Conospermum* sp., *Grevillea eriostachya*, *G. saccata*, *G. shuttleworthiana* subsp. *canarina*, *G. uncinulata sens lat*., *Hakea recurva*, *H. eneabba*, *Lambertia* sp., *Stirlingia* sp. and *Synaphea* sp. Other associated species include *Eucalyptus todtiana*, *Eremaea* sp., *Hibbertia* sp. and *Verticordia grandis.* Soils are white gravelly sand. Elevation ± 220–230 m asl.

Conservation status: Grows in a scattered roadside population spread over *c*. 1 km to the east of the Brand Highway. A conservation code of Priority One is recommended.

Etymology: *Gk. trich-* hairy, *anthos-* flower, in reference to the hairy floral organs of this species.

Discussion: (*Grevillea trichantha* is one of only three species in the *Triloba* group with hairs on the floral organs. The other two, *G. erinacea* and *G. metamorpha*, differ in their seed-obligate generative habit. *Grevillea erinacea* further differs in its monomorphic leaves, all of which have linear-subulate lobes with strongly revolute margins that fully enclose the leaf abaxial surface up to the midvein.) Differences from *G. metamorpha,* a

very rare species with 15 plants counted in a 2015 post-fire survey by the author, are outlined above (and see fig. 3). Both *Grevillea trichantha* and *G. metamorpha* exhibit a similar pattern of leaf reduction from broad basal vegetative leaves to trisect, xeromorphic leaves on the floral branches. The specimen of *G. metamorpha* (*Olde 99/131a*) also has hairs behind the anthers, a feature not seen elsewhere in the *Triloba* Group. All three species occur in the same IBRA region of south-west Western Australia.

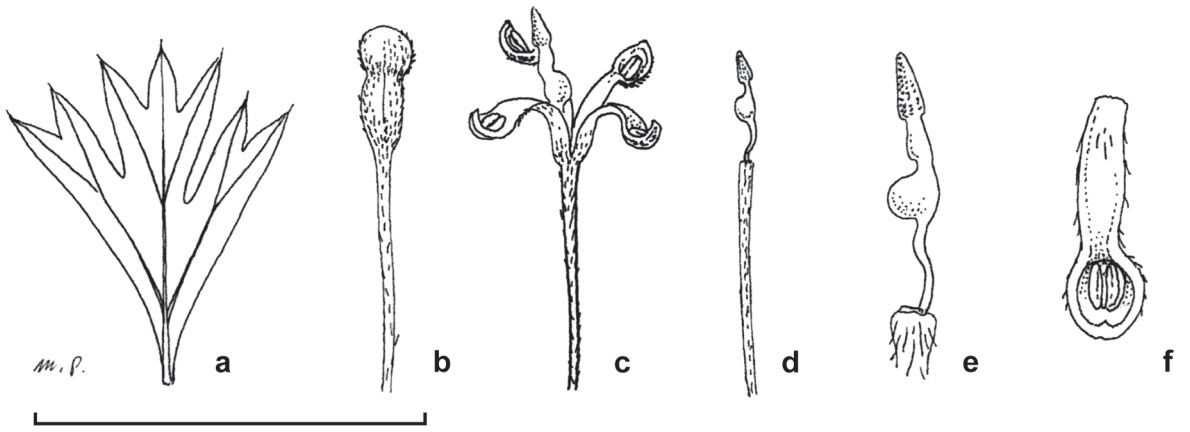

Fig. 3. *Grevillea metamorpha*. a. Leaf. b. Flower bud before anthesis. c. Flower after anthesis. d. Flower without perianth. e. Pistil. f. Tepal inner surface. Scale bar: a = 25 mm; b, c, d = 12.5 mm; e, f. = 6.25 mm. Illustration: M. Pieroni; modified for publication by L. Elkan.

Selected specimens: WESTERN AUSTRALIA: Marchagee Track, 0.8 km west of Mazza Road, Badgingarra, north side of track, *P.M. Olde 01/46, K. Alcock & N. Marriott,* 31 Aug 2001 (AD, CANB, K, MEL, NSW); Marchagee Track, 0.7 km west of Mazza Road, Badgingarra, south side of track, *P.M. Olde 01/48, K. Alcock & N. Marriott,* 31 Aug 2001 (CANB, NSW, PERTH); Marchagee Track, 1.9 km east of Brand Highway, gravel pit *c*. 50 m north of track, *P.M. Olde* 02/94 & N. Marriott, 7 Sep 2002 (NSW, PERTH); Between 0.3–1 km west of Mazza Rd. on Marchagee Track, *P.M. Olde 13/217 & G. Meiklejohn*, 29 Aug 2013 (MEL, NSW, PERTH).

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