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A new species of *Glossocardia* Cass. from Laura, Cape York Peninsula, Queensland, Australia.

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Abstract

A new species of Asteraceae (subfamily Asteroideae, tribe Coreoposideae), from Cape York Peninsula is described as *Glossocardia synergasia* R.A.Kerrigan. This species is currently only known from the Type locality near Laura, Cape York Peninsula. It is unusual amongst Coreopsideae in having robust deflexed pappus awns. The new species is illustrated with photographs, and notes are provided on how it differs from related species.

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Introduction

As part of the Bush Blitz program, a biodiversity survey was conducted in Quinkan country, near Laura at the southern end of Cape York Peninsula, in early March 2017. Bush Blitz surveys are collaborative expeditions aimed at supporting biodiversity discovery in Australia, particularly in poorly surveyed areas (Bush Blitz 2026). The West Quinkan sandstones were prioritised during the survey due to a paucity of Queensland Regional Ecosystem mapping sites on this geology (Quinkan Country Qld 2017). Botanists from the Australian Tropical Herbarium (CNS) and Queensland Herbarium (BRI) worked alongside the Laura Rangers and the Western Yalanji Aboriginal Corporation to document plant diversity over a 2-week period. Over 700 plant records, representing 475 plant taxa and 18 detailed vegetation sites, were documented (Addicott et al. 2017, Quinkan Country Qld 2017). An Asteraceae specimen, *Worboys 1408*, remained unidentified at the time of reporting, likely because the specimen was in flower and had no mature cypselas, and the available identification keys were limited. The specimen was collected in an open woodland site on alluvium adjacent to Deighton Road and no additional specimens were collected at any other survey sites. Subsequent curation and additional collections indicate that this specimen is likely an undescribed species of Coreopsideae, distinguished by its very distinct two-awned pappus.

The tribe Coreopsideae, in the Heliantheae alliance (*sensu* Susanna et al. 2020; Schmidt-Lebuhn 2022), is represented by 7 genera in Australia: *Coreopsis* L., *Cosmos* Cav., *Bidens* L., *Dahlia* Cav., *Diodontium* F.Muell., *Glossocardia*, and *Trioncinia* (F.Muell.) Veldkamp (Orchard 2015).

Generic relationships within the tribe Coreopsideae remain unresolved, in part because morphological dif-

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ferences between genera are poorly defined (e.g. *Bidens* and *Coreopsis*) and are based on characters that appear to be easily lost or regained (Panero 2007; Crawford et al. 2009). Phylogenetic analyses of the tribe, using morphological data, resulted in the circumscription of three subtribes for Coreopsideae: Coreopsidinae, Petrobiinae, and Chrysanthellinae, with *Glossocardia* falling within subtribe Chrysanthellinae (Ryding & Bremer 1992). Subsequent phylogenetic analyses using ITS (Kimball & Crawford 2004), and ITS and cpDNA data (Mort et al. 2008) did not support the recognition of all three groups, as circumscribed by Ryding & Bremer (1992), with the large genera *Bidens*, *Coreopsis*, and *Coreocarpus* Benth. not monophyletic. However, phylogenetic analyses based on ITS data, with representatives of *Chrysanthellum* Rich., *Glossogyne*, and *Isostigma* Less. included in the analysis, did show support for a Chrysanthellinae clade (Kimball & Crawford 2004; Panero 2007; Crawford et al. 2009).

Chrysanthellinae *sensu* Panero (2007) includes the following genera: *Chrysanthellum* (11 spp., pantropical), *Diodontium* (1 sp., Australia), *Eryngiophyllum* Greenm. (2 spp., Mexico) - reported as synonym of *Chrysanthellum* by Crawford et al. (2009), *Glossocardia* (11 sp., eastern Africa, south-eastern Asia, Australia and Pacific islands), *Isostigma* (c. 15 spp., Argentina, Bolivia, Brazil, Paraguay and Uruguay), and *Trioncinia* (2 spp., Australia). Chrysanthellinae are distinguished by the combination of the following characters: receptacle paleae present; leaves alternate, sometimes on short internodes and restricted to the base of the plant; stigmatic branches with prominent, penicillate appendages, either as long as or several times longer than stigmatic area, and plants with C4 photosynthesis and Kranz anatomy syndrome (Panero 2007). The exception to this circumscription is *Diodontium*, which differs by opposite rather than alternate leaves.

Generic placement

Generic placement of this undescribed taxon was challenging because the deflexed pappus awns are dissimilar to any other genus in Australia. Furthermore, because of the rarity and geographic remoteness of many species of Australian native Coreopsideae, there is limited material of candidate genera at the right level of maturity to allow sufficient destructive sampling to understand the variability in morphology of the ray and disc florets, particularly with respect to the stigmatic lobes and cypsela development of the ray florets. Initially, the new taxon was considered to have affinities with *Glossocardia*, based on its alternate leaves, oblong to linear cypsela, pappus of 2 retrorsely barbed awns, disc and ray florets present, receptacle flat and paleae present. However, this new taxon's deflexed and robust awns, the ellipsoid rather than dorsoventrally compressed cypsela and the absence of cypsela ribs suggested it may require recognition at a generic level. Table 1 shows useful diagnostic characters for Australian genera of Chrysanthellinae. An unpublished phylogeny (Schmidt-Lebuhn pers. comm. 2025), using target capture sequencing with the Angiosperms 353 bait kit, which included all species of Australian *Glossocardia*, *Diodontium filifolium* F.Muell. and *Trioncinia retroflexa* (F.Muell.) Veldkamp, as well as *Isostigma* and other representatives of Coreopsideae, showed 100 % bootstrap support for this new taxon sitting within an Australian Chrysanthellinae clade. Unfortunately, resolution of the relationships between the taxa and genera within the clade was poor. While it is clear this new taxon belongs in a clade containing all Australian *Glossocardia* species, there is no evidence to resolve whether it has closer affinities to *Glossocardia* than other genera in the clade, i.e. *Diodontium* or *Trioncinia.*

Morphologically, the new species differs from *Diodontium* by the ray florets present vs absent, disc florets mostly 4-merous vs 5-merous, leaves alternate vs opposite, cypsela without wings vs cypsela winged and a pappus of two robust deflexed awns vs greatly reduced awns. From *Trioncinia* the new species differs by the number of awns on the cypsela, 2 vs 3–4 awns, the receptacle flat vs domed, the cypsela surface with irregular protuberances vs a cypsela with ribbed or transverse ridges. Ray florets of the new taxon are pistillate and produce cypselas. Veldkamp & Kreffer (1991) reported ray florets as sterile for *Trioncinia* while Orchard (2015) reported ray florets as female. Orchard (2015) did not explicitly describe the ray florets as producing cypselas and this may be another differentiating character between the *Trioncinia* and the new taxon. Based on the presence of 2 awns, ray florets 2–4 lobed, receptacle flat, and cypsela without transverse ridges this new taxon is placed provisionally in *Glossocardia*.

Glossocardia is a genus of eleven species, recognised by Veldkamp & Kreffer (1991) as being largely comprised of local endemics known from only a few localities. Based on current records in GBIF (n.d.), this observation holds today. Only two species, *Glossocardia bidens* (Retz.) Veldk. and *Glossocardia bosvallia* (L.f.) DC., have multinational distributions, known from eastern Africa, India, south-eastern Asia, Australia and the Pacific Islands (Veldkamp & Kreffer 1991, Veldkamp 1992; Panero 2007; Crawford et al. 2009). The remaining species are either restricted endemics (within country), only known from their type locality or from a limited distribution outside the type locality; or are geographically restricted and only known from a few collections from neighbouring or nearby countries.

Methods

This study is based on the examination of herbarium material at the Australian Tropical Herbarium (CNS), combined with observations of plants in the field. Measurements of the leaves, floral parts and fruits are based on dried herbarium material and material preserved in 70% ethanol. Although over 30 individuals were examined, ray florets were scarce and as a result

Table 1: Comparison table of vegetative and reproductive characters commonly used to describe and distinguish between genera of Australian Chrysanthellinae, including the species described here (Veldkamp & Kreffer 1991; Veldkamp 1992; Holland & Butler 2007; Orchard 2015). *italicised character states occur in species outside of Australia. *Diodonotium* is a monotypic genus and *Trioncinia* is an Australian endemic. ** Reported as flat in Panero (2007) but this is not corroborated in the source material Veldkamp & Kreffer (1991)

Character	***Glossocardia synergasia***	***Glossocardia****	***Diodontium filifolium***	***Trioncinia***
Longevity	annual / ephemeral	perennial *or annual*	perennial	perennial
Tap root	thin taproot	woody taproot *or slender taproot*	?	thick woody taproot
Leaf position	cauline	basal and/or cauline	cauline, crowded at base and in lower part of branches	basal
Leaf arrangement	alternate, occasionally opposite basally or clustered around branching points	alternate sometimes opposite	opposite	alternate
Leaf outline	simple and entire to trilobed*;* entire leaves linear, filiform or terete	pinnatipartite to pinnatifid or bipinnatifid, sometimes simple	simple, linear	pinnatifid or bipinnatifid,
Ray Floret	2–4 lobulate female	2–3 lobulate female	absent	2 lobulate female
Disc Floret	4(–5)-merous bisexual	4–5 merous bisexual	5-merous bisexual	4–5-merous bisexual (Holland & Butler 2007), 4-merous bisexual (Orchard 2015
Receptacle	flat	flat	flat	domed **
Cypsela shape (side view)	narrowly oblong to linear, straight	narrowly oblong to linear, lanceolate, straight to curved inward	broadly elliptic to orbicular to broadly obovate (including wings), ± shallowly curved inward	narrowly oblong to oblanceolate, slightly curved inward or straight
Cypsela shape (cross section)	terete to ellipsoid	strongly dorso-ventrally compressed to oblate (flattened at the poles)	dorso-ventrally compressed -± concave (*pers obs.)*	cypsela angular to asymmetrically ovoid
Cypsela awns	pappus of 2 retrorsely barbed awns, strongly deflexed in flower and fruit	pappus of 2 barbed awns, erect or diverging in flower, sometimes becoming reflexed in fruit as cypsela bends inwards *or absent*	pappus 2 (–3) awns, reduced, erect or spreading in flower and fruit, sometimes absent	pappus of 3 or 4 awns erect to spreading in flower becoming reflexed or spreading in fruit,
Cypsela ornamentation	smooth with finely textured irregular protuberances	ribbed along length of cypsela *or smooth*	with broad wings the length of the cypsela	ribbed and/or with transverse ridges

dimension ranges are narrow or absent for some ray floret characters e.g. stigma lengths. Measurements of the capitulum length and diameter exclude the limb of the ray florets.

Key to Australian species of *Glossocardia.*

Modified from Veldkamp (1992) and Orchard (2015).

1 Flower heads more than 30 mm diameter; involucral bracts transversely folded and reflexed; ray florets with ligule more than 10 mm long ***G. orthochaeta***

1 Flower heads less than 10 mm diameter; involucral bracts straight, not transversely folder and reflexed; ray florets with ligule less than 5 mm long **2**

2 Awns strongly deflexed, running parallel to cypsela (even when immature), awns robust - the width of awn about half the width of the cypsela ***G. synergasia***

2 Awns erect, spreading or reflexed, never running parallel to cypsela (even when immature), awns not robust - width of awn much less than half the width of the cypsela **3**

3 Mature cypsela ± straight, with awns erect or spreading ***G. bidens***

3 Mature cypsela strongly incurved, the awns reflexed ***G. refracta***

Taxonomy

Glossocardia synergasia R.A.Kerrigan, *sp. nov.*

Type: Queensland. Cook District: Deighton Road, Laura, 17 March 2025, *R.A. Kerrigan 1450 & F.A. Zich* (holo: BRI; iso: CNS [CNS157281], CANB, DNA).

Differing from other species of *Glossocardia* by the pappus of stout awns strongly deflexed and running parallel to cypsela, and cypsela ellipsoid in cross section.

Ephemeral herb or short-lived annual, erect, single stemmed or occasionally with 2 or 3 upper branches, 10–26 (–35) cm tall, with a slender tap root; stem glabrous (Fig.1). Leaves cauline, occasionally a basal pair present. Lamina of basal pair, simple, filiform, opposite, sessile, connate at base and forming collar around stem. Upper cauline leaves alternate, occasionally opposite or clustered around branching points*;* petioles absent. Lamina of upper cauline leaves decurrent to shallowly stem clasping at base, simple, entire to trilobed*;* entire leaves linear, filiform or terete, 15–75 mm long x 0.5–1 mm wide, lateral lobes linear, filiform or terete to 9–15 mm long; mucronate with mucro to 0.4 mm long, sometimes shallowly recurved, midvein visible abaxially when dry; multicellular hairs present on young leaves.

Inflorescence a few solitary terminal capitula on long peduncles up to 8 cm long; peduncles glabrescent, multicellular hairs present when young; occasionally with a leaf like bract below the capitula, bract herbaceous with narrow scarious irregular margin. Capitula radiate with ray florets on the margin and tubular flowers in the middle, to 10 mm diameter (excluding limb on ray florets) and 8 mm long (excluding limb on ray florets) (Fig.2a–b).

Phyllaries 2 to 3, often 2 large and 1 smaller, occasionally with a bract intermediate in form between phyllaries and paleae but not subtending a floret. Phyllary overall shape obtriangular, herbaceous with a scarious margin (Fig.2c). Herbaceous centre narrowly oblong /narrowly elliptic,(2.5–) 3–5.6 (–8) mm long x 0.5–0.9 mm wide, concave when fresh, green, occasionally drying with yellow tinge; apex acute with recurved or straight mucro; multicellular hairs sparse on inner surface of herbaceous centre. Scarious margin present along length of bract or occasionally underdeveloped and asymmetric, margin reduced or up to 0.4 mm wide with an erose edge, broadening to a truncate apex finishing at or below herbaceous tip; white; multicellular hairs along edge of distal broadening (obscure in dried specimens).

Paleae present, up to 9 per capitula, subtending each floret, overall shape narrowly obcordate (obovate with emarginate apex), petaloid with a scarious margin, concave when fresh and cradling floret. The petaloid centre variable in shape, narrowly oblong, narrowly elliptic, narrowly lanceolate or narrowly oblanceolate, (4.6–) 5–6 mm long x (0.5–)1 –1.8 (–2) mm wide, yellow; apex acute; abaxial surface with a central ridgeline or shallow keel; multicellular hairs with a stout base and a long bent threadlike tip dotted along ridgeline and scattered across apex of palea. Scarious margin present along length of palea, widening and obtuse at apex to 1 mm wide, margin erose, paler yellow to white, occasional multicellular hairs present along margins (Fig.2d).

Ray florets female, (1–) 2 or 3 per capitulum, 2–3 (–4) lobed, c. 7 mm long (Fig.3a); lamina c. 2–3.7 mm long, nerves 5–7; tube constricted below lamina and 1.5 mm long; style exserted from tube; stigma 2-armed; stigma arms c. 0.5–0.75 mm long, papillae absent or reduced; ovary 3 mm long, unilocular with basal placentation. Pappus of 2 stout awns, deflexed and running parallel to cypsela; awns 2.5 mm long.

Disk florets bisexual, 3–6 per capitulum, 4 (–5)-merous, c. 6 mm long, yellow; corolla with dilated apical tube and constricted basal tube; dilated part 1.5 mm long, with lobes free in apical third, free lobes 0.5 mm long, tube 1 mm; constricted basal part 1 mm long; style exserted; stigma 2–armed (Fig.3b). Stigma arms comprised of broadly oblong, receptive surfaces c. 3 mm long, often with a channelled midline visible, which constricts into a linear appendage, c. 0.7 mm long; appendages papillate throughout (Fig.3c). Stamens 4 (–5); anthers connate in tubular sheath around style, opening adaxially, 2 celled, c. 0.8 mm long, base truncate, apex with triangular appendage; filaments free for c. 1 mm and attached to corolla tube near junction of corolla lobe tube and corolla tube. Ovary 3 mm long, unilocular with basal placentation. Pappus of 2 stout awns, deflexed and running parallel to cypsela; awns 2 mm long (shorter than ray floret awns).

Cypsela rod-like, straight, slightly tapering at base and terete to ellipsoid in cross section, 6 –7 mm long x 0.75–1 mm wide, becoming strongly dorso-ventrally flattened at apex, about 0.5–0.8 mm from apex (Fig.3d). Cypsela surface black to reddish brown, finely textured with irregularly protuberances (sclerifications) distributed patchily across the surface; protuberances reddish brown, light brown, fawn or yellow in colour. Cypsela body glabrous or rarely with fine thread-like hairs. Pappus of 2 stout deflexed awns, dorso-ventrally compressed, 0.3–0.4 mm wide, light brown, fawn, yellow, running parallel to body of the cypsela for up to ½ length c. 3.8–4 mm long. Awns retrorsely barbed, hairs about 0.4 mm long.

Deighton Road, NE of Laura, 11 March 2017, *S.J. Worboys 1408* (CNS); Deighton Road, NE of Laura, 17 March 2025, *R.A. Kerrigan 1451 & F.A. Zich* (CANB, CNS); Deighton Road, NE of Laura, 17 March 2025, *R.A. Kerrigan 1452 & F.A. Zich* (CNS).

Distribution & habitat. The only known population of this species is found near Laura in southern Cape York

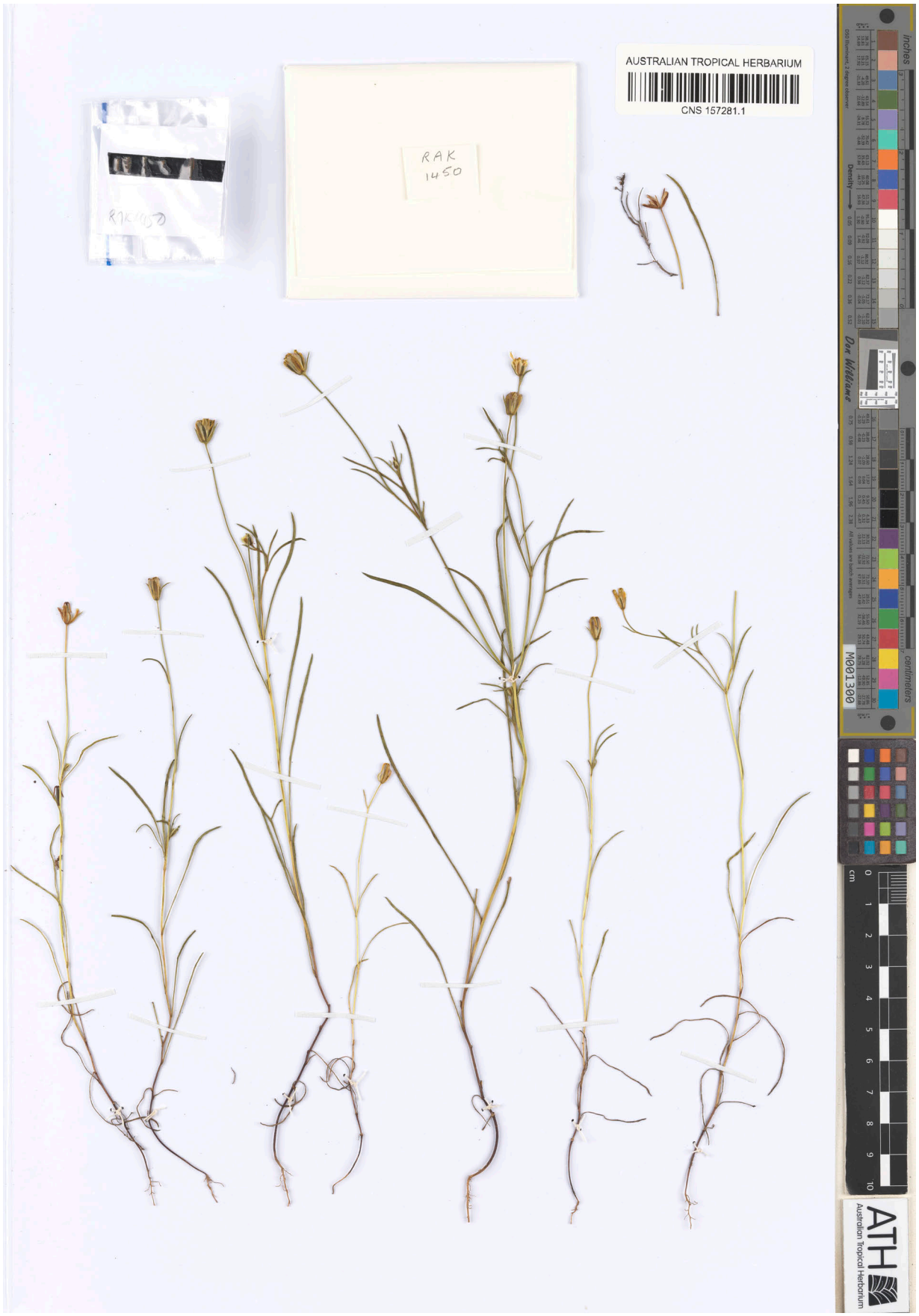


Figure 1. Isotype of *Glossocardia synergasia* (Photo CC BY-NC Australian Tropical Herbarium). Voucher: R.A.Kerrigan 1450, CNS 157281.1.

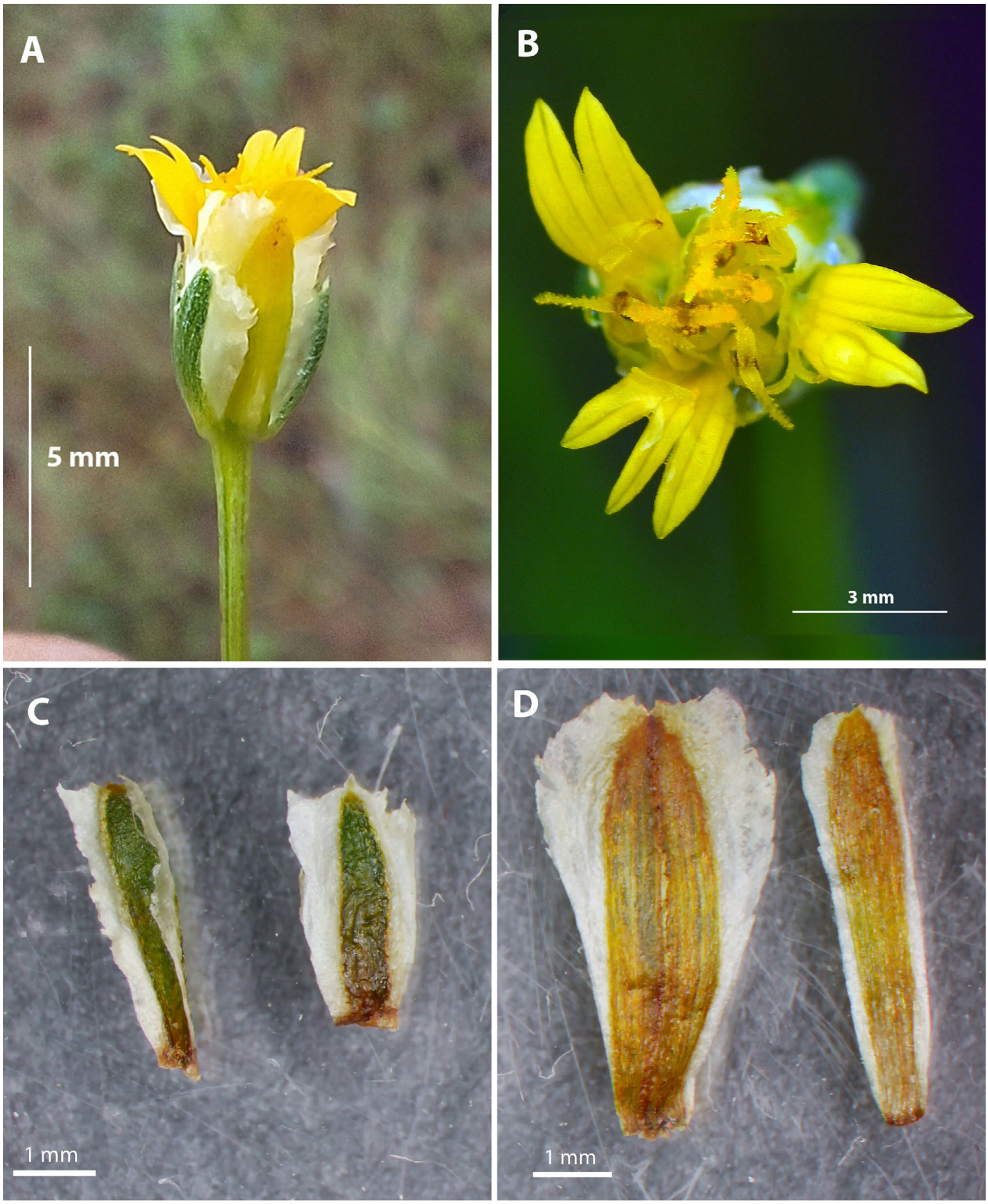


Figure 2. Morphology of capitula, phyllaries, and paleae of *Glossocardia synergasia*. A. Side view of capitulum (fresh), B. Plan view of capitulum (fresh) , C. Herbaceous outer phyllaries (spirit material), D. Petaloid paleae (spirit material). Voucher: R.A.Kerrigan 1450, CNS 157281. Photos: A, C, D - R.A. Kerrigan; B - F.A. Zich.

Peninsula, in the Cook District of Queensland, Australia (Fig.4). The species occurs as an ephemeral herb to 30 cm in the ground layer of a *Melaleuca foliolosa* low open woodland, adjacent to a small stream, amongst annual grasses/sedges herbs on sandy loam (Fig.5). This community is mapped as Regional Ecosystem (RE) 3.3.47 ("*Melaleuca citrolens*± *M. foliolosa* low open woodland along drainage lines") on the Qld Government Regional Ecosystem Database (Queensland Herbarium 2024; Queensland Globe 2025).

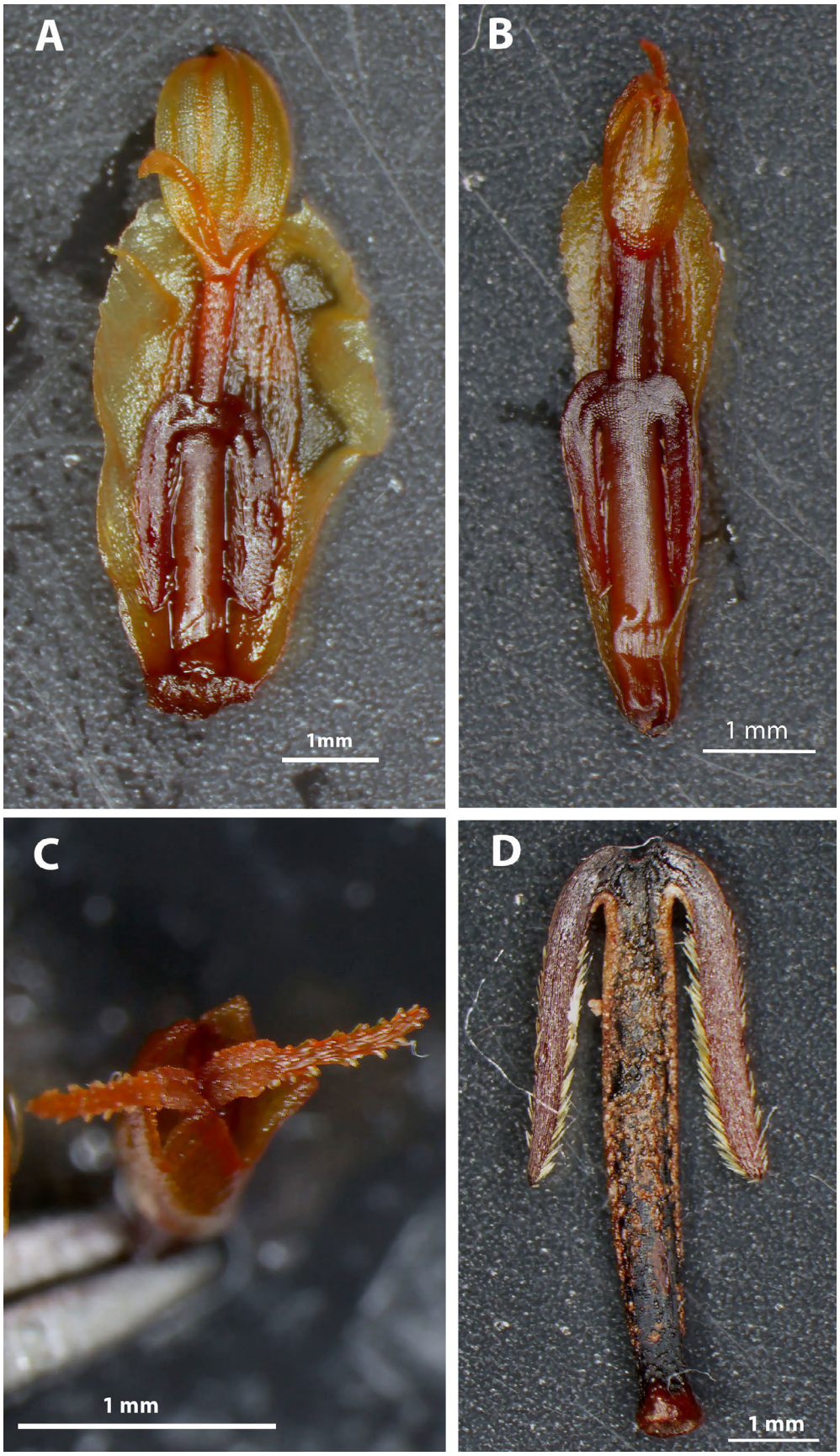


Figure 3. Morphology of florets, stigmas and cypsela of *Glossocardia synergasia*. A. Ray floret cradled by palea and with deflexed pappus awns (spirit material), B. Tubular floret cradled by palea and with deflexed pappus awns (spirit material), C. Stigmatic lobes, tubular floret, showing penicillate appendages (spirit material), D. Cypsela with deflexed pappus awns (spirit material). Voucher: R.A.Kerrigan 1450, CNS 157281. Photos: A-D - R.A. Kerrigan.

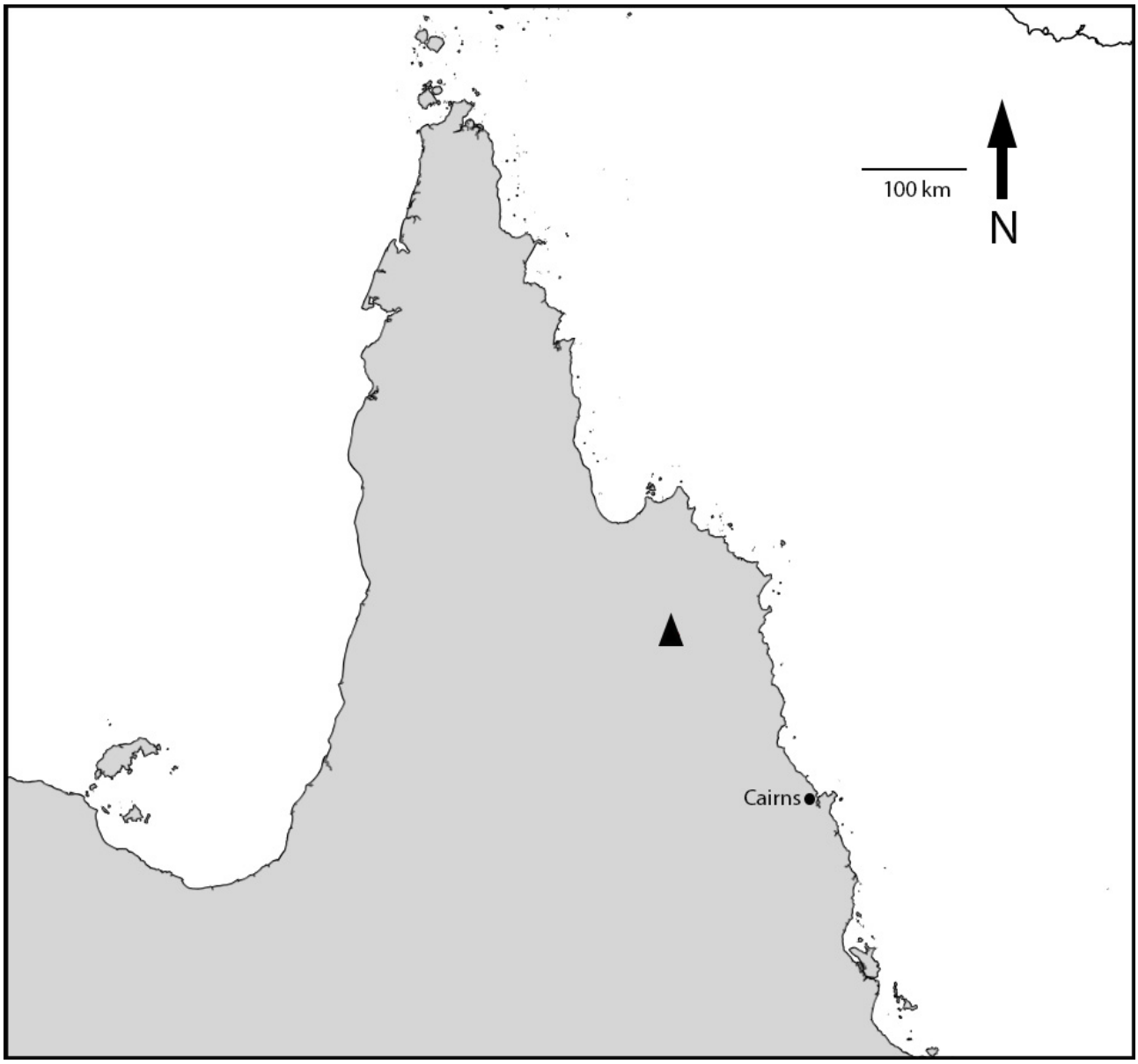


Figure 4. Location of *Glossocardia synergasia* (triangle) population near Laura.

Conservation status. This species is known from a single population of approximately several hundred individuals, and although there are no obvious immediate threats to the population it remains on unprotected land within 70 m of an unsealed road. Further survey of likely habitat around Laura, where the type collection was made, did not locate further populations. Approximately 84000 ha of the Regional Ecosystem supporting the only known population of *Glossocardia synergasia* (RE 3.3.4) has been documented, with the community found in the following protected areas: Olkola NP (CYPAL), Rinyirru (Lakefield) NP (CYPAL), Lama Lama NP (CYPAL), Muundhi (Jack River) NP (CYPAL), KULLA (McIlwraith Range) NP (CYPAL), Cape Melville NP (CYPAL), Errk Oykangand NP (CYPAL), Alwal NP (CYPAL) (Queensland Herbarium 2024; Queensland Globe 2025). Further survey work is required in these areas before a confident assessment of the conservation status can be realised. RE 3.3.4 is currently recognised as potential habitat for the NCA listed species Dendrobium johannis Rchb.f.. The type locality of *Glossocardia synergasia* is adjacent what looks like an old railway line.

Etymology. The species epithet for this taxon uses the Greek word for collaboration -*synergasia*- to reflect the contributions from the botanical community including Asteraceae specialists at Australian herbaria, as well as contributions from Bush Blitz and Laura Rangers.

Notes. This species is relatively cryptic in the ground layer. Superficially, it resembles *Iphigenia indica* (L.) Kunth with the ovoid inflorescence sometimes misidentified from a distance as an *Iphigenia* capsule, a common species emergent at the same time of year. The species appears to be short lived and emerges, flowers and sets fruit in the middle of the wet season when collectors are less likely to be active on unsealed roads.



Figure 5. Site photo of *Glossocardia synergasia* population. Photo: - R.A. Kerrigan.

Disclosures

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