

A taxonomic revision of the small Cape genus *Steirodiscus* (Asteraceae: Senecioneae)

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Keywords: Asteraceae, Senecioneae, *Steirodiscus* Less., southern Africa, taxonomy

ABSTRACT

The genus *Steirodiscus* Less. is revised, with full descriptions, nomenclature, illustrations and distribution data. Five species are recognised in two sections: sect. *Steirodiscus* with free involucre bracts and sect. *Psilothonna* with bracts connate into a smooth cup. *S. linearilobus* DC. is established as an earlier name for *S. schlechteri* Bolus, which is relegated to synonymy.

INTRODUCTION

Steirodiscus Less. is a minor genus of Senecioneae comprising five species of small, wiry annuals, all endemic to the Greater Cape Floristic Region (Goldblatt & Manning 2000; Herman *et al.* 2000). Currently included in subtribe Senecioninae (Pelser *et al.* 2010), its relationships within the subtribe are still unclear (Nordenstam *et al.* 2009). Although treated as one of the ‘othonnoid’ genera by Jeffrey (1992) on account of its ebracteolate and sometimes gamophyllous involucre, molecular data place it among the group of genera that includes *Bolandia* Cron, *Cineraria* L., *Emilia* Cass., *Mesogramma* DC. and *Stilpnogyne* DC., rather than with the Othonninae (Nordenstam *et al.* 2009; Pelser *et al.* 2010). A recent phylogenetic analysis of plastid and nuclear sequence data identifies *Steirodiscus* as one of several lineages with strongly incongruent positions in the two analyses (Pelser *et al.* 2010). Hybridization and incomplete lineage sorting were suggested as explanations for the incongruence.

Steirodiscus was established by Lessing (1832) to accommodate the species described by Linnaeus fil. (1782) as *Cineraria capillacea*, and was originally characterised by a uniseriate involucre of free bracts without associated bracteoles, female ray florets with pubescent cypselas, and male-fertile disc florets. At the same time Lessing (1832) also recognised the genus *Gamolepis* for four shrubby Cape species now treated in *Euryops* plus the solitary annual species *Othonna tagetes* L. (under the illegitimate superfluous name *Gamolepis annua* Less.), which were linked by their smooth, cup-shaped involucre, female ray and bisexual disc florets, and epappose cypselas.

These generic circumscriptions were followed by Candolle (1838), who added a second species, *Steirodiscus linearilobus* DC. The sole annual species of *Gamolepis*, *G. tagetes* (L.) DC., which had by then been selected as the lectotype of the genus (Pfeiffer 1874), was subsequently transferred to *Steirodiscus* by Schlechter (1899), who was struck by its marked similarity to that genus in habit, finely dissected leaves and epappose cypselas, despite the marked difference in their involucre. At this time two further species were described, *S. gamolepis* Bolus and *S. schlechteri* Bolus (Schlechter 1899), bringing the total in the genus to five. A sixth species [now *S. speciosus* (Pillans) B.Nord.] was later named by Pillans (1931) under the generic name *Gamolepis*.

Steirodiscus is defined by its annual habit, pinnatisect or bipinnatisect leaves with subsecund, linear-filiform segments, and solitary or laxly corymbose, radiate capitula with uniseriate, ebracteolate involucre, and all florets lacking a pappus. The involucre bracts may be free or connate into a smooth cup. The generic name is derived from the sterility of the disc florets in *S. capillacea* (Lessing 1832), but this condition is not easily assessed in flowering capitula as maturation of the central florets is tardy. We have confirmed that the central disc florets in *S. tagetes* fail to develop fruit but whether this is due to congenital sterility or to nutritional constraints we cannot say. This will need to be assessed through careful anatomical investigation for the presence or absence of an embryo in the central disc florets.

A brief review of the group under the illegitimate superfluous generic name *Psilothonna* (E.Mey. ex DC.) E.P.Phillips (Nordenstam 1968) was presented by Phillips (1950), who also provided a key to the five species recognised. This review, although based on very few collections, provided some much-needed clarity in the genus but Phillips (1950) inexplicably overlooked Candolle’s (1838) *S. linearilobus*. This name was applied (incorrectly as we show below) by Hutchinson (1946) to plants from the Klein Roggeveld and the species has remained poorly understood until now.

Five names in *Steirodiscus* are included in the Red List of South African Plants (Raimondo 2009), four as either EN or VU and *S. linearilobus* as DD signifying its uncertain identity. At the moment therefore, although

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MS. received: 2013-01-17.

six names are validly published in the genus, only five species are accepted (Goldblatt & Manning 2000). The genus is urgently in need of revision, not only to establish the number of recognised species and the application of the available names, but also the distribution and thus conservation status of the taxa. Three of the species (*S. gamolepis*, *S. linearilobus* and *S. speciosus*) are highly localised endemics and another (*S. tagetes*) is restricted to the West Coast, where it is evidently already extinct from part of its range and threatened by coastal development elsewhere. The fifth species (*S. capillaceus*), although relatively widespread, has not been recorded from most of its historical range for over 50 years.

We provide a complete taxonomic revision of *Steirodiscus*, including full descriptions and synonymy, illustrations and distribution data for all species. The species fall into two groups depending on whether the involucre bracts are free to the base or connate into a smooth cup, which we treat as the sections *Steirodiscus* and *Psilothonna* respectively.

MATERIALS AND METHODS

Specimens or digital images of all relevant types were examined, as well as all herbarium material from BOL, NBG, PRE and SAM (acronyms after Holmgren *et al.* 1990), the primary collections of species from southern Africa. All species were also located and studied in the field.

TAXONOMY

Steirodiscus Less., Synopsis generum Compositarum: 251 (1832). Type species: *S. capillaceus* Less.

Gamolepis Less.: 251 (1832). Type species: *G. tagetes* (L.) DC. (= *S. tagetes* (L.) Schltr.), lecto. designated by Pfeiffer: 1406 (1874).

Psilothonna (E.Mey. ex DC) E.P.Phillips: (1950), nom. illegit. superfl. pro *Gamolepis* Less. *Gamolepis* sect. *Psilothonna* E.Mey ex DC.: 40 (1838). Type species: *P. tagetes* (L.) E.P.Phillips = *S. tagetes* (L.) Schltr.

Small, subglabrous annual herbs with flexuose, wiry stems. *Leaves* alternate, sessile, pinnatisect or bipinnatisect with subsecund linear to filiform lobes, or uppermost leaf simple and filiform, mucronulate, arachnose in axils and on inner face of petiole when young. *Capitula* pedunculate, solitary on ultimate branches, usually forming lax corymbs; peduncles slender and wiry but widening and fistulose apically, with 1–3 scattered, minute, scale-like bracts. *Involucre* ecalyculate, subglobose to campanulate-obconic, bracts either free or connate ± two-thirds into smooth cup. *Receptacle* convex, epaleate. *Ray florets* female, bright yellow to orange-yellow, corolla tube cylindrical, sparsely pubescent on outer surface with multicellular trichomes often concentrated near top of tube, limb oblong, 2–4 times as long as tube, 4(5)-veined, apically 3(4)-toothed. *Stigmas* linear-oblong, with sterile apical appendage. *Disc florets* bisexual, evidently fertile but central florets sometimes

not developing mature fruits, yellow, corolla narrowly funnel-shaped, 5-lobed, sparsely pubescent or rarely glabrous, lobes suberect, ovate. *Anthers* ecalcarate and ecaudate, with lanceolate apical appendage. *Style* terete, branches linear-oblong, margins stigmatic, apices conical with ring of sweeping hairs. *Cypselas* obovoid or oblong, obscurely 5-angled and 10-ribbed, glabrous or pubescent. *Pappus* 0.

5 spp., South African west coast and near interior.

Key to species

- 1a Involucral bracts free to base, canaliculate (sect. *Steirodiscus*) 2
 - 2a Uppermost leaves filiform; involucre bracts and ray florets 8–12; ovaries and cypselas sparsely or densely puberulous; disc florets puberulous on lobes *S. capillaceus*
 - 2b Uppermost leaves pinnatisect or filiform; involucre bracts and ray florets 13–16; ovaries and cypselas glabrous; disc florets glabrous *S. linearilobus*
- 1a Involucral bracts connate for most of length into smooth cup (sect. *Psilothonna*) 3
 - 3a Leaves mostly 10–20 mm long with up to 3 pinnae; involucre 3.5–4.5 mm long; ray florets 4–8, half as many as involucre lobes; ovaries and cypselas pubescent *S. gamolepis*
 - 3b Leaves mostly 20–60 mm long with up to 8 pinnae; involucre 5–8 mm long; ray florets 8–15, ± as many as involucre lobes; ovaries and cypselas glabrous 4
 - 4a Involucre mostly 4–5 mm diam., campanulate; ray floret trichomes compound or lobed, ± coalescent into fleshy, fimbriate collar at top of tube *S. tagetes*
 - 4b Involucre mostly 2–3 mm diam., urceolate and constricted above ovaries when dry; ray floret trichomes simple, ± scattered at top of tube *S. speciosus*

Sect. *Steirodiscus*

Stems strongly flexuose (zig-zag); involucre cylindrical or subglobose with bracts free to base and canaliculate.

1. **Steirodiscus capillaceus** (L.f.) Less., Synopsis generum Compositarum: 251 (1832). *Cineraria capillacea* L.f.: 375 (1782). *Psilothonna capillacea* (L.f.) E.P.Phillips [as *P. capillacea* (Less.) E.P.Phillips]: 17 (1950). Type: South Africa, 'Cap. B. Spei' ['in arenosis Swartland' *vide* Thunberg 1823], *Thunberg s.n. UPS-THUNB 19907* (UPS-THUNB, holo.—microfiche!).

Steirodiscus linearilobus sensu Hutch.: 140 (1946), non DC.

Annual herb, 60–200 mm, stem strongly flexuose, corymbosely branched above or rarely below. *Leaves* alternate, ascending, mostly 15–40(–60) × 8–20 mm, pinnatisect or some leaves bipinnatisect, with up to 8 lobes on each side, lobes alternate or subopposite and subsecund, filiform to linear, 3–10 × 0.5 mm, entire or with 1 or 2 lobules, rarely median lobe markedly prolonged, uppermost leaf simple and filiform. *Capitula* solitary, pedunculate; peduncles 15–60 mm long, with 2 or 3 minute, scale-like bracts. *Involucre* subglobose, 4–5 × 4–5(–10) mm, bracts 8–12, free, convex abaxially and canaliculate adaxially, leathery and three-veined in basal two-thirds, with membranous margins, penicillate. *Ray florets* as many as involucre bracts and opposite them, yellow; tube cylindrical, 1.5 mm long, with scattered abaxial trichomes; blade (5–)7–10(–15) × 1.5–3.0 mm, spreading, recurved apically; ovary ellipsoid, 1.5

mm long, antrorsely densely puberulous, style branches partly exerted, 0.5 mm long. *Disc florets* fertile, yellow, 4.5 mm long; tube funnel-shaped, ± 2 mm long; lobes ± 1 mm long, ovate, sparsely puberulous, acute; ovary ellipsoid, 1.5 mm long, antrorsely densely puberulous, style branches 0.5 mm long. *Cypselas* obovoid, ± 1.5 mm long, densely antrorsely pubescent. *Flowering time*: Aug.–Sept. Figure 1.

Distribution and ecology: *Steirodiscus capillaceus* is the most widely distributed species in the genus, with a curiously scattered range along the West Coast from Hopefield to the foot of Piqueenierskloof Pass, in the northern Cedarberg and Bokkeveld Mountains, and further inland on the Klein Roggeveld at the foot of the Komsberg Pass (Figure 2). It favours sandy loam soils, typically in renosterveld shrubland.

Diagnosis and relationships: *Steirodiscus capillaceus* shares free involucre bracts with *S. linearilobus*, but is distinguished by the puberulous ovaries and cypselas, and by the sparsely puberulous corolla lobes of the disc florets. The uppermost leaves are invariably filiform.

Conservation status: although relatively widespread historically, *Steirodiscus capillaceus* has not been recorded from the Hopefield–Piketberg–Eendekuil and Bokkeveld localities for over sixty years and appears to be extinct there, likely as a result of agricultural expansion. The only recent records are from the Klein Roggeveld at the foot of the Komsberg Pass, where it is still relatively plentiful.

Additional specimens seen

NORTHERN CAPE.—**3119** (Calvinia): top of Vanrhyn's Pass, (–AC), 3 Sept. 1948, *R.H. Compton 20878* (NBG); sandy flats, (–AC), 12 Aug. 1961, *G.J. Lewis 5898* (NBG). **3220** (Sutherland): Klein Roggeveld, near Farm De Kom, (–DA), 15 Sept., 2004, *D.A. Snijman 1951* (NBG); 9.5 km S of top of Komsberg Pass, 4 055' [1 230 m], (–DA), shale flats in valley bottom, 9 Sept. 2006, *P. Goldblatt & L.J. Porter 12805* (MO, NBG); Klein Roggeveld, near rest stop above Farm Fortuin, (–DA), 18 Sept. 2011, *P. Goldblatt & J.C. Manning 13675* (MO, NBG); foot of Komsberg Pass, (–DA), 10 Sept. 2012, *J. Manning 3376* (NBG); Farm De Plat, N of homestead, 3 750' [1 130 m], (–DC), Karoo vegetation on sandy loam, 6 Sept. 1988, *A. Fellingham 1393* (NBG, PRE).

WESTERN CAPE.—**3218** (Clanwilliam): Piqueenierskloof [Piqueenierskloof], (–DB), 6 Aug. 1897, *R. Schlechter 10757* (BOL, PRE); Piketberg, Witwater, (–DC), 4 Oct. 1895, *H. Bolus 8495*

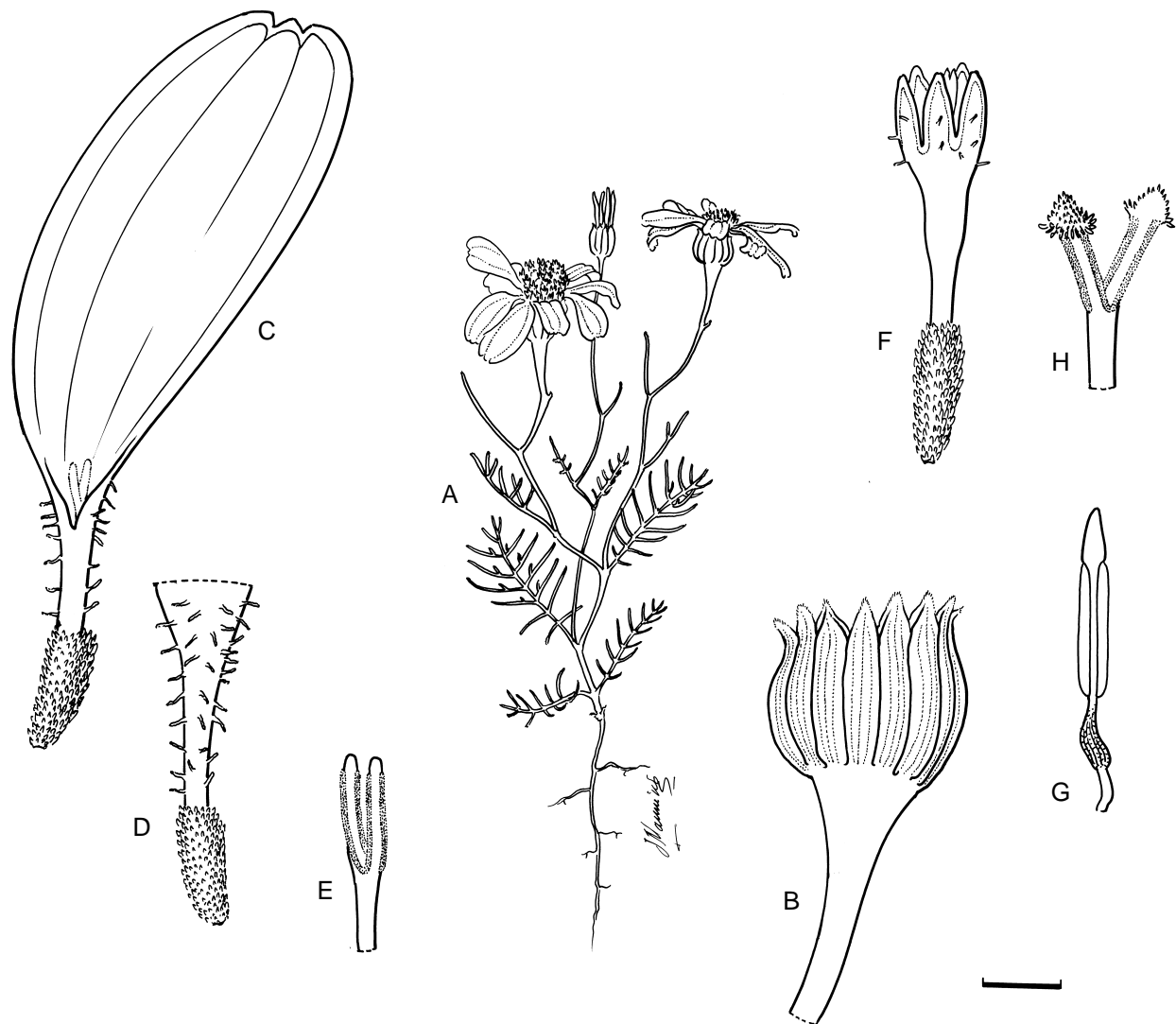


FIGURE 1.—*Steirodiscus capillaceus*, Manning 3376. A, plant; B, involucre; C, ray floret; D, ray floret detail of abaxial side of tube; E, ray floret stigma; F, disc floret; G, disc floret anther; H, disc floret stigma. Scale bar: A, 10 mm; B, 2mm; C, D, F, 1 mm; E, G, H, 0.5 mm. Artist: J. Manning.

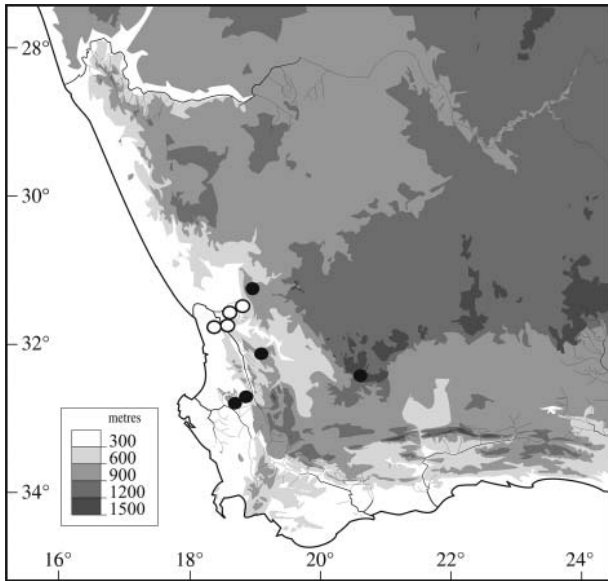


FIGURE 2.—Distribution of *Steiroidiscus capillaceus*, ●, and *S. linearilobus*, ○.

(NBG, PRE). **3219** (Wuppertal): Koudeberg, (–AA), 28 Aug. 1896, *R. Schlechter* 8721 (BOL, PRE); Bidouw, (–AA), 7 Sept. 1953, *R.H. Compton* 24232 (NBG); Wuppertal, (–AC), 20 Aug. 1959, *W.F. Barker* 8992 (NBG); gate at entrance to Wuppertal property, (–AC), 8 Sept. 1974, *P.Goldblatt* 2530 (MO, NBG); Braakfontein [Citrusdal], (–?CA), 11 Sept. 1894, *R. Schlechter* 5282 (PRE). **3318** (Cape Town): near Hopefield, (–AB), Sept. 1905, *H. Bolus* 12706 (BOL).

2. *Steiroidiscus linearilobus* DC., *Prodromus systematis naturalis regni vegetabilis* 6: 74 (1838 ‘1837’). Type: South Africa, Olifantsrivier, Knakarberg [Knakkiesberg], foot of hills, July 1839, *Drege s.n.* (G-DC, holo.—microfiche!; E, HAL, HBG, K, iso.—ALUKA images!).

Steiroidiscus schlechteri Bolus: 217 (1899), syn. nov. *Psilothonna schlechteri* (Bolus) E.P. Phillips: 17 (1950). Type: South Africa, [Western Cape], Vanrhynsdorp Dist., Windhoek [Farm], 31 July 1896, *R. Schlechter* 8358 (BOL, holo.!; S, iso.).

Annual herb, 60–150 mm, stem strongly flexuous, corymbosely branched above. *Leaves* alternate, ascending, mostly 20–60 × 15–20(–35) mm, pinnatisect or bipinnatisect, with up to 10 lobes on each side, lobes alternate or subopposite and subsecund, filiform to linear, 3–15 × 0.5 mm, entire or with 1 or 2 lobules, uppermost leaves usually pinnatisect, sometimes simple and filiform. *Capitula* solitary, pedunculate; peduncles 20–50 mm long, with 2 or 3 minute, scale-like bracts. *Involucre* cylindrical to subglobose, 4–5 × 4–5 mm, bracts 13–16, free, convex abaxially and canaliculate adaxially, leathery and three-veined in basal two-thirds, with membranous margins, penicillate. *Ray florets* fewer than involucre bracts, 7–10, yellow; tube cylindrical, 2.5 mm long, with abaxial trichomes near top; blade 7–10 × 1.5–2.0 mm, spreading, recurved apically; ovary terete with slightly thickened distal collar, 1.5 mm long, glabrous, style branches exerted, 1 mm long. *Disc florets* bisexual, yellow, 5 mm long; tube funnel-shaped, ± 3 mm long; lobes ± 1 mm long, ovate, acute; ovary terete, 1.5 mm long, glabrous, style branches 1 mm long. *Cypselas* unknown. *Flowering time*: Aug. (Sept.). Figure 3.

Distribution and ecology: only rarely collected, *Steiroidiscus linearilobus* is a local endemic of the lower reaches of the Olifants River and adjacent flats south and east of Vanrhynsdorp, recorded from the Knakkiesberg west of Klaver, northeastwards to the foot of the Kooie Mountains (Figure 2). The species occurs on sandy flats in open shrubland, including Klaver Sandy Shrubland (Mucina & Rutherford 2006).

Diagnosis and relationships: *Steiroidiscus linearilobus* is distinguished from *S. capillaceus* by its glabrous ovaries and cypselas, and by its glabrous disc florets. The ray florets are slightly fewer than the involucre bracts, which number 13–16 vs. 8–12 in *S. linearilobus*, and the uppermost leaves are either simple or pinnatisect, but invariably simple in *S. capillaceus*.

Steiroidiscus linearilobus was described from a collection made by Drège at the base of the Knakkiesberg, an inselberg west of Klaver (Candolle 1838) but the name was inexplicably overlooked by Phillips (1950) in his review of the genus (as *Psilothonna*). A later collection from just east of Klaver formed the basis for *Steiroidiscus schlechteri* (Bolus 1899), separated from *S. linearilobus* essentially by its glabrous ovaries. The vestiture of the ovaries in *S. linearilobus* is not mentioned in the protologue and its identity has remained uncertain until now. It is only through the kindness of Mark Newman at the Royal Botanic Garden, Edinburgh, who dissected the Edinburgh isotype and confirmed that the ovaries of Drège’s collection are glabrous (Newman pers. com.), that we are able to establish firmly that the two names are conspecific. Bolus (1899) distinguished *S. schlechteri* from *S. linearilobus* (and *S. capillaceus*) by its stouter habit, smaller leaves, larger heads, and glabrous achenes, but this is evidently just a general diagnosis of the species rather than an implication that the ovaries in *S. linearilobus* are pubescent. This implied pubescence of the ovaries in *S. linearilobus* led Hutchinson (1946) to misapply the name to his collection of *S. capillaceus* from the Klein Roggeveld.

Conservation status: *Steiroidiscus linearilobus* is a local endemic known historically from just four localities in close proximity to one another. The only recent collection is from the verge of the N7 motorway south of Klaver.

Additional specimens seen

WESTERN CAPE.—**3118** (Vanrhynsdorp): Urionskraal, (–DB), 4 Sept. 1955, *W.F. Barker* 8569 (NBG); sandy flats near foot of Tigerberg [Tierberg], 4 Sept. 1955, *G.J. Lewis* 4665 (SAM); Klaver, (–DC), Oct. 1917, *Roberts & Adendorff* 17685 (PRE); Van Rhynsdorp Road near Klaver, (–DC), Aug. 1932, *M. Lavis* 20259 (BOL); ± 5 km S of Klaver, cutting on N7, (–DC), 24 Aug. 2012, *J. Manning* 3367 (NBG).

Uncertain locality: Namaqualand, Aug. 1931, *J.W. Mathews s.n.* (BOL).

sect. *Psilothonna* (*E.Mey ex DC.*) *J.C. Manning & Goldblatt*, comb. nov. *Gamolepis* sect. *Psilothonna* *E.Mey ex DC.*: 40 (1838). Type species: *S. tagetes* (L.) Schltr.

Stems weakly or more strongly flexuous; involucre campanulate or obconic with bracts connate ± two-thirds in a smooth cup.

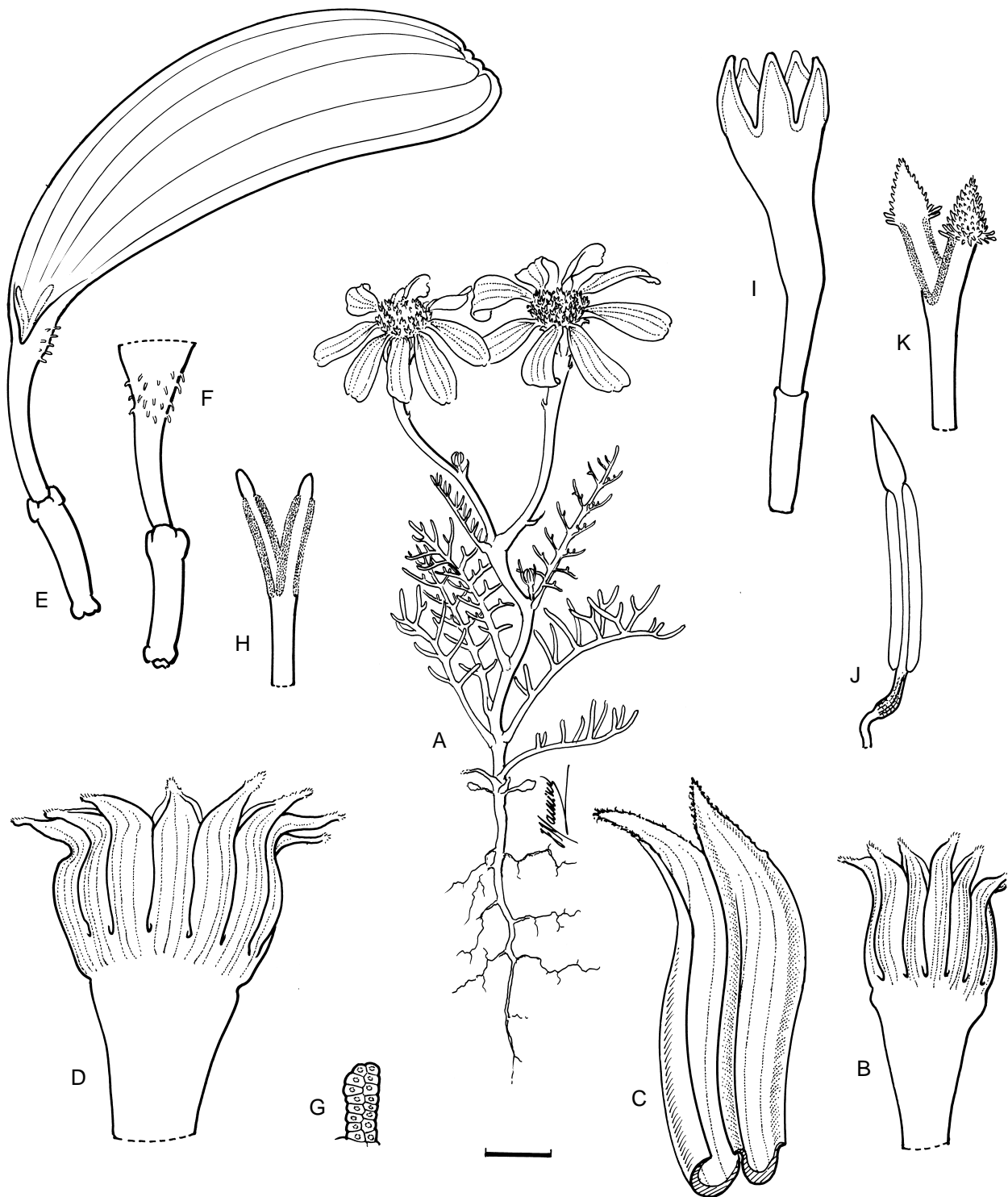


FIGURE 3.—*Steirodiscus linearilobus*, Manning 3367. A, plant; B, involucre; C, detached involucre bracts, abaxial view; D, fruiting involucre; E, ray floret; F, ray floret detail of abaxial side of tube; G, ray floret trichome (much enlarged); H, ray floret stigma; I, disc floret; J, disc floret anther; K, disc floret stigma. Scale bar: A, 10 mm; B, D, 2 mm; C, E, F, I, 1 mm; H, J, K, 0.5 mm. Artist: J. Manning.

3. *Steirodiscus tagetes* (L.) Schltr. in *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie*: 216 (1899), in obs. *Othonna tagetes* L.: 1234 (1758). *Gamolepis annua* Less.: 251 (1832), nom. illegit. superfl. *Gamolepis tagetes* (L.) DC.: 40 (1838 '1837'). *Psilothonna tagetes* (L.) E.P.Phillips: 17 (1950). Type: South Africa, without locality or collector, Herb. Linn. 1038.1 [LINN—ALUKA image!, lecto., designated by Nordenstam in Jarvis: 716 (2007)].

Annual herb, (50–)100–200 mm, stem flexuous, corymbose above. *Leaves* alternate, ascending, mostly 30–60 × 15–20 mm, pinnatisect or some leaves rarely bipinnatisect, with up to 8 lobes on each side, lobes alternate or subopposite and subsecund, filiform to oblong, 5–12 × 0.5–1.0(–1.5) mm, entire or with 1 or 2 lobules, uppermost leaves sometimes simple and linear-filiform. *Capitula* solitary, pedunculate; peduncles 10–60 mm long, with 2 or 3 minute, scale-like bracts.

Involucre campanulate, 5–8 × 4–5(–6) mm, bracts (8–)10–13(–15), connate for two-thirds their length, free parts lanceolate, with narrow membranous margins, penicillate. *Ray florets* as many as bracts and opposite them, 8–15, yellow or rarely pale orange; tube narrowly cylindrical, ± 3.5 mm long, with abaxial trichomes in transverse band at top of tube, trichomes fleshy and coalescent or palmate and forming distinct fimbriate collar at junction between tube and blade; blade 8–10 × 3–4 mm, spreading, recurved apically; ovary terete, 2.5 mm long, glabrous, longitudinally colliculate, style branches partly or fully exerted, ± 1 mm long. *Disc florets* bisexual, yellow, 6–7 mm long; tube narrowly funnel-shaped, ± 4.5 mm long, sparsely pubescent in distal half; lobes ± 1 mm long, ovate, acute; ovary terete, 2 mm long, glabrous, longitudinally colliculate, style branches ± 1 mm long. *Cypselas* obovoid-prismatic, ± 2.5 mm long, glabrous, longitudinally colliculate, obscurely 5-angled and 10-ribbed. *Flowering time*: Sept.–Oct. Figure 4.

Distribution and ecology: *Steirodiscus tagetes* is relatively widely distributed along the West Coast of Western Cape, from St Helena Bay to False Bay (Figure 5). There are historical records from the Cape Peninsula but the species is probably now extinct there. It occurs on sand dunes near the coast, typically in lightly disturbed situations in strandveld vegetation, especially Cape Flats Dune Strandveld, where it may be locally abundant.

Diagnosis and relationships: the most common member of sect. *Psilothonna*, *Steirodiscus tagetes* is distinguished by the characteristic compound trichomes on the ray florets. These palmate structures (Figure 4E) form a fleshy, collar-like fringe around the top of the corolla tube at the base of the limb (Figure 4C, D), and are readily visible with a hand lens. The capitula are typically larger than in *S. gamolepis* and *S. speciosus*, with a campanulate involucre 4–5 mm diam. It is superficially very similar to *S. speciosus*, but in this species the trichomes on the ray florets are not coalescent into compound structures and the involucre is generally smaller, 2–3 mm diam. The flowers in both species are typically bright yellow but may also be tinged orange. The species is variable in flower size with the largest and most attractive forms occurring west of Atlantis.

Conservation status: Once relatively widely recorded along the West Coast, *Steirodiscus tagetes* is now extinct from the Cape Peninsula and probably also around Langebaan as a result of the extensive urbanisation there. The only recent collections are those from Macassar and along the West Coast west of Atlantis.

Additional specimens seen

WESTERN CAPE.—**3218** (Clanwilliam): ± 5 km S of St Helena, Fransvlei, 120 m, (–CC), 3 Sept. 2008, *N. Helme 5643* (NBG); Berg River, (–CD), 21 Sept. 1940, *R.H. Compton 9472* (NBG); Berg River Station, (–CD), in sand, 1 Oct. 1943, *R.H. Compton 15105* (NBG). **3318** (Cape Town): Saldanha Bay, hillside, (–AA), 27 Sept. 1930, *E.E. Galpin 11500* (PRE); hills NE of Langebaan, (–AA), Oct. 1933, *N.S. Pillans 7005* (BOL); Geelbek road, (–AA), 28 Sept. 1953, *W.F. Barker 8159* (NBG); near Langebaan, (–AA), 2 Oct. 1970, *M.R. Levyns 11725* (BOL); near Hopefield, (–AB), 13 Sept. 1894, *R. Schlechter 5322* (SAM); sand dunes on W coast opposite turnoff to Atlantis, (–CA), 11 Sept. 2004, *P. Goldblatt & L.J. Porter 12395* (MO, NBG); R307 opposite Atlantis, (–CB), 29 Sept. 2012, *J. Manning 3377* (NBG); W coast N of Atlantis turnoff, (–CB), 26 Sept. 1998, *P. Goldblatt & J. Manning 11028* (MO, NBG); Melkbosch Strand, (–CB), 16 Oct. 1947,

Schrieber s.n. NBG24181 (NBG); sandy places, Paarden Eiland, Nov., without year, *Zeyher s.n.* (SAM); Cape Flats, Stikland, 62 m, (–DC), 30 Aug. 1979, *C. Boucher 4501* (NBG); Cape Flats, (–DC), 16 Sept. 1944, *R.H. Compton 15975* (NBG); between Brackenfell and Kraaifontein along road to Paarl, (–DC), 17 Sept. 1975, *E. Esterhuysen 33975* (BOL); Cape Flats Nature Reserve, (–DC), 27 Oct. 1978, *A.B. Low 738* (NBG). **3418** (Simonstown): Hout Bay, (–AB), 4 Sept. 1941, *R.H. Compton 112289* (NBG); 3 Sept. 1950, *A.J. Middelmoot 1576* (NBG); Klipfontein Road, (–BA), sand dunes, 30 Aug. 1931, *M.R. Levyns 3172* (BOL); coastal dunes between Eerste River and Swartklip, (–BA), 1 Oct. 1939, *N.S. Pillans 9207* (BOL); Durban Road Station, (–CD), Sept. 1877, *H. Bolus 3778* (BOL, SAM); near Retreat Station, (–AB), Sept. 1892, *H. Bolus 7242* (BOL, PRE); Strandfontein, (–BA), 18 Sept. 1942, *R.H. Compton 13697* (NBG); Somerset Strand, (–BB), 2 Oct. 1921, *G.C. Nel 1282* (PRE); Macassar, Somchem, 20 m, (–BB), 28 Sept. 1995, *A.B. Louw 2473* (NBG).

Without precise locality: ‘prope Piketberg’, Oct. 1892, *H. Bolus 13575* (PRE); ‘prope Darling’, Sept. 1905, *H. Bolus 12734* (PRE).

Uncertain collections: Groenekooft [Mamre], without date, *Zeyher s.n.* pp. (SAM); ‘Prom. bon. Spei, Driefontein’, Nov. without year, *Zeyher 828* pp. (SAM) [These two collections by Zeyher include plants of both *S. tagetes* and *S. speciosus*, but as these are hopelessly muddled between the various duplicates it is unclear whether they were growing together or mixed up later].

4. ***Steirodiscus speciosus* (Pillans) B.Nord.** in *Opera Botanica* 20: 31 (1968), in obs. *Gamolepis speciosa* Pillans: 50 (1931). *Psilothonna speciosa* (Pillans) E.P. Phillips: 17 (1950). Type: South Africa, [Western Cape], between Darling and the coast, exhibited at Darling Show, Sept. 1929, collector unknown *Pillans sub BOL18965* (BOL, holo.!, K, iso.—ALUKA image!).

Annual herb, 80–300 mm, stem flexuous, corymbosely branched above. *Leaves* alternate, ascending, mostly 30–40 × 15–20 mm, pinnatisect or some leaves rarely obscurely bipinnatisect, with up to 7 lobes on each side, lobes alternate or subopposite and subsecund, filiform, 3–12 × 0.5 mm, entire or with 1 or 2 lobules, uppermost leaf sometimes simple and filiform. *Capitula* solitary, pedunculate; peduncles 20–40 mm long, with 1–3 minute, scale-like bracts. *Involucre* campanulate when fresh but drying urceolate with marked constriction above ovaries, 5–6 × 2–4 mm, bracts 11–15(–18), connate for two thirds their length, free parts lanceolate, with narrow membranous margins, penicillate. *Ray florets* ± as many as bracts and opposite them, 11–18, yellow or rarely pale orange; tube narrowly cylindrical, 2.0–3.5 mm long, with scattered abaxial trichomes at top of tube; blade 7–10 × 3–4 mm, spreading, recurved apically; ovary terete, 2.5 mm long, glabrous, longitudinally colliculate, style branches partly or fully exerted, ± 1 mm long. *Disc florets* bisexual, yellow, 4–5 mm long; tube narrowly funnel-shaped, 3–4 mm long, sparsely pubescent in distal half; lobes ± 1 mm long, ovate, acute; ovary terete, 2.5 mm long, glabrous, longitudinally colliculate, style branches ± 1 mm long. *Cypselas* obovoid-prismatic, ± 2.5 mm long, glabrous, longitudinally colliculate. *Flowering time*: Sept.–Oct. Figure 6.

Distribution and ecology: a highly local endemic of the West Coast between Darling and Atlantis (Figure 5), *Steirodiscus speciosus* is very poorly known. Described from plants collected between Darling and the coast

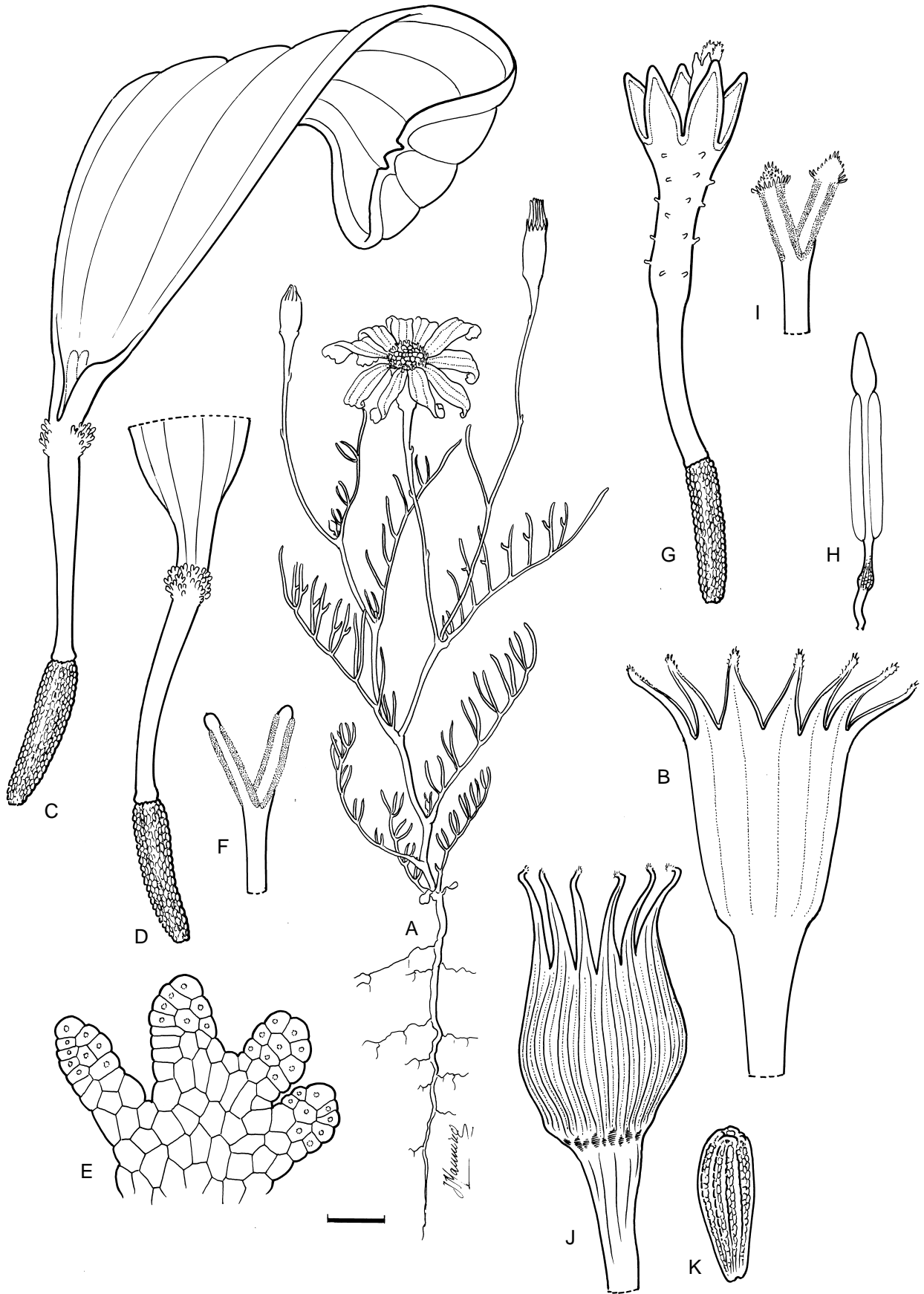


FIGURE 4.—*Steirodicus tagetes*, Manning 3377. A, plant; B, involucre; C, ray floret; D, ray floret detail of abaxial side of tube; E, ray floret trichome (much enlarged); F, ray floret stigma; G, disc floret; H, disc floret anther; I, disc floret stigma; J, ray cypsela; K, disc cypsela. Scale bar: A, 10 mm; B, 2mm; C, D, G, J, K, 1 mm; F, H, I, 0.5 mm. Artist: J. Manning.

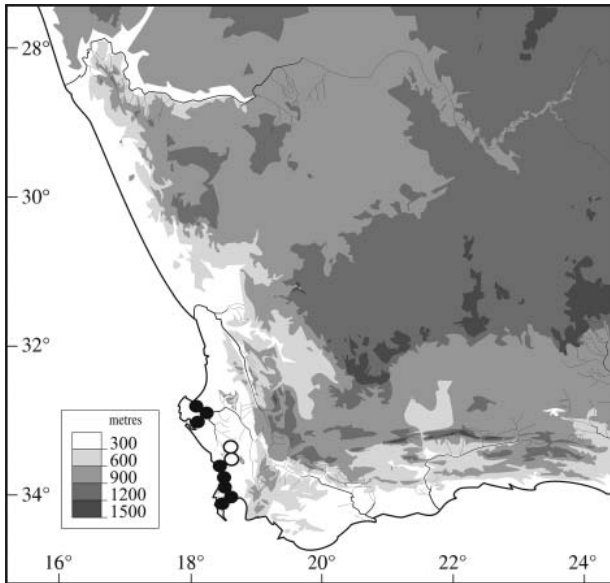


FIGURE 5.—Distribution of *Steirodiscus tagetes*, ●, and *S. speciosus*, ○.

and exhibited at the Darling Show in September 1929, the only recent collections of the species are from near Atlantis, where we have found it in deep sandy soils in sand plain fynbos, specifically Atlantis Sand Fynbos (Mucina & Rutherford 2006). The records for *S. speciosus* all fall within the distribution of this vegetation type and the species thus appears to be restricted to it. Germination in *S. speciosus* is evidently stimulated by light disturbance as we first encountered the species after a fire the previous summer and later along the roadside but have never seen it in mature vegetation.

Diagnosis and relationships: *Steirodiscus speciosus* is very similar to *S. tagetes* and was diagnosed against it by Pillans (1931) (as *G. annua*), and as having larger ($\pm 18 \times 3.5\text{--}4.0$ mm), more numerous (14–23) orange rays lacking a distinct annulus of papillae around the mouth of the tube and with more strongly exerted styles. Most of these characters do not hold, even in the type of *S. speciosus*, which has up to 15 rays that are no larger than are found in most populations of *S. tagetes* and also does not differ in the styler characters. Although the specific status of the taxon was questioned in 1933 by R.A. Dyer (letter on K isotype), Phillips (1950) accepted the species in his synopsis of the genus (as *Psilothonna*), but keyed it against *S. tagetes* solely on the absence (vs. presence) of ‘glands’ at the base of the rays. Both taxa, like all species in the genus, have multicellular trichomes (‘glands’) at the top of the ray corolla tube on the abaxial (outer) side and the critical difference between them is in the nature of the trichomes themselves. In *S. tagetes* the trichomes coalesce into compound, palmate structures (Figure 4E) that form a fimbriate collar around the corolla tube (Figure 4C, D) whereas in *S. speciosus* the individual trichomes remain discrete (Figure 6C, D). *S. speciosus* is also distinguished by its smaller involucre, 2–4 mm diam., which constricts markedly above the ovaries as it dries, giving it a characteristic urceolate shape in herbarium specimens (Figure 6B). This is not evident in fresh material, at which time the distinction between the two species is

more cryptic, requiring careful examination of the ray floret vestiture with a hand lens. Ecologically *S. speciosus* appears to favour sand plain fynbos (this remains to be confirmed for additional populations) whereas *S. tagetes* is definitely restricted to strandveld vegetation along the coast.

Conservation status: *Steirodiscus speciosus* is a highly local endemic with just a single recent collection near Atlantis, where it is under immediate threat from urbanisation.

Additional specimens seen

WESTERN CAPE.—**3318** (Cape Town): Darling, (–AC), 16 Oct. 1942, Mrs W.M. Duckitt NBG24186 (NBG); near Darling, (–AC), Sept. 1946, T.P. Stokoe SAM59958 (SAM); 11 Sept. 1950, M. Johns NBG 24185 (NBG); Mamre Road, (–BC), sand, 2 Oct. 1931, M.R. Levyns 3269 (BOL); sandy flats 2 miles [3 km] S of Mamre, (–CB), 1 Sept. 1940, N.S. Pillans 9255 (BOL). **3320** (Cape Town): between Melkbos and Mamre, (–CB), 1932, L. Bolus s.n. PRE43910 (PRE); 16 km along Mamre road from turn-off on Melkbosstrand road, (–CB), 23 Sept. 1974, Nordenstam & Lundgren 1986 (S); sandy flats near Atlantis, S of Mamre, (–CB), bright orange flowers, 27 Sept. 1995, P. Goldblatt & J. Manning 10334 (MO, NBG); 500 m S of Mamre-Atlantis T-junction, (–CB), 10 Oct. 2012, J.Manning & Goldblatt 3383 (NBG).

Uncertain collections: Groenekooft [Mamre], without date, Zeyher s.n. pp. (SAM); Rietvley [Rietvlei], without date, Zeyher 1679 (BOL, NBG); ‘Prom. bon. Spei, Driefontein’, Nov. without year, Zeyher 828 pp. (BOL, NBG, SAM). [These three collections by Zeyher include plants of both *S. tagetes* and *S. speciosus* but as these are hopelessly muddled between the various duplicates, it is unclear whether they were growing together or mixed up later].

5. *Steirodiscus gamolepis* Bolus in Schltr. in Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 27: 216 (1899). *Psilothonna gamolepis* (Bolus) E.P. Phillips: 17 (1950). Type: South Africa, [Western Cape], Ceres Road, 11 Sept. 1896, R. Schlechter 8974 (BOL, lecto!, designated here; BR, E, HBG, K, M, P, PRE, S, isolecto.—ALUKA images!). [Syntype: South Africa, [Western Cape], Tulbagh Kloof, 30 Sept. 1892, H. Bolus 8605 (BOL!, NBG!, NH, PRE, syn.]. [The Schlechter collection is selected as lectotype as being better represented in herbaria internationally.]

Annual herb, 60–130 mm, stem flexuous, simple or sparsely corymbosely branched above. Leaves alternate, ascending, mostly 10–20 × 5–10 mm, trisect or pinna-tisect, with 1–3 lobes on each side, lobes alternate or opposite and subsecund, filiform, 1–5 × 0.5 mm, uppermost leaves simple and filiform. Capitula solitary, conspicuously pedunculate; peduncles 30–60 mm long, with 1 or 2 minute, scale-like bracts. Involucre narrowly campanulate or obconic, 3.5–4.5 × 1.5–3.0 mm, bracts 10–14, connate for two thirds their length, free parts lanceolate, with narrow membranous margins, penicillate. Ray florets \pm half as many as bracts, 4–8, yellow; tube narrowly cylindrical, 2 mm long, with scattered abaxial trichomes at top of tube extending onto base of blade; blade 6–8 × 2–3 mm, spreading, recurved apically; ovary terete, 2 mm long, antrorsely pubescent in basal two thirds, style branches exerted, \pm 0.75 mm long. Disc florets bisexual, yellow, 3 mm long; tube funnel-shaped, 2 mm long, glabrous; lobes \pm 1 mm long, ovate,

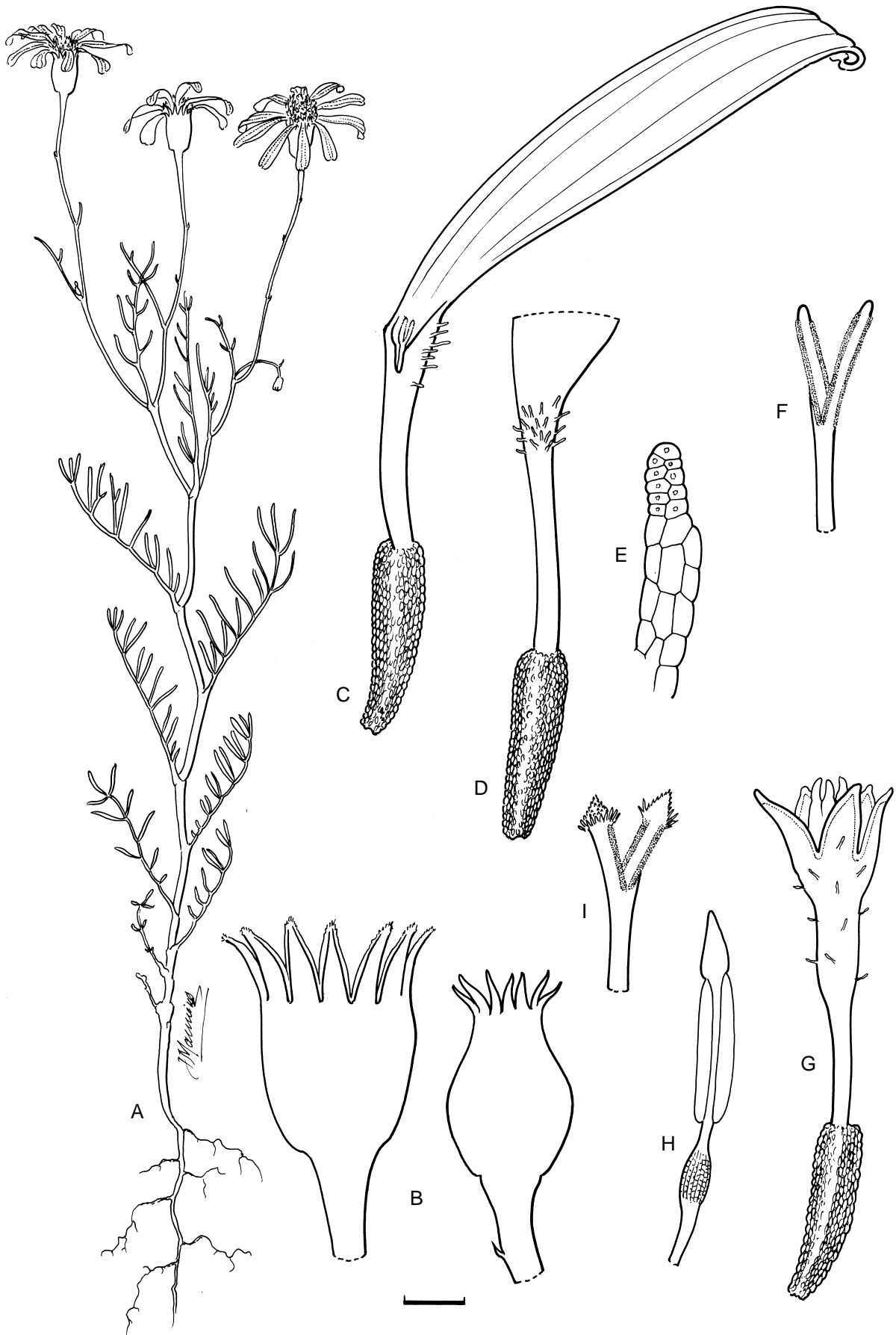


FIGURE 6.—*Steirodicus speciosus*, Manning & Goldblatt 3383. A, plant; B, involucre, fresh (left) and dried (right); C, ray floret; D, ray floret detail of abaxial side of tube; E, ray floret trichome (much enlarged); F, ray floret stigma; G, disc floret; H, disc floret anther; I, disc floret stigma. Scale bar: A, 10 mm; B, 2mm; C, D, G, 1 mm; F, H, I, 0.5 mm. Artist: J. Manning.

acute; ovary terete, 2 mm long, antrorsely pubescent in basal two thirds, style branches 0.5 mm long. *Cypselas* flask-shaped (ray) or terete (disc), \pm 2 mm long, antrorsely pubescent in basal two thirds. *Flowering time*: Aug.–Sept. Figure 7.

Distribution and ecology: *Steirodiscus gamolepis* is restricted to the flats at the foot of the Elandsbloof Mountains near Tulbagh (Figure 8) and remained very poorly known until recent collections established its occurrence on Elandsberg Nature Reserve, where it is now best known. The type from Ceres Road appears to come from the Tulbagh Valley itself, but other records are from the western side of the mountains between Gouda and Hermon. At Elandsberg Nature Reserve, *S.*

gamolepis is locally abundant on seasonally wet gravelly flats in alluvium fynbos shrubland, and available data suggests that the species is endemic to Swartland Alluvium fynbos and possibly also Breede Alluvium Fynbos (Mucina & Rutherford 2006).

Diagnosis and relationships: The smallest species in the genus, *Steirodiscus gamolepis* is distinctive in its short, few-lobed leaves and diminutive, markedly pedunculate capitula with the peduncle grading into the narrowly campanulate or obconic involucre. The rays are relatively few, up to half as many as the involucre lobes, and the ovaries and cypselas are pubescent in the basal two thirds but glabrous above. The corollas of the disc florets are glabrous and unique in the genus in the

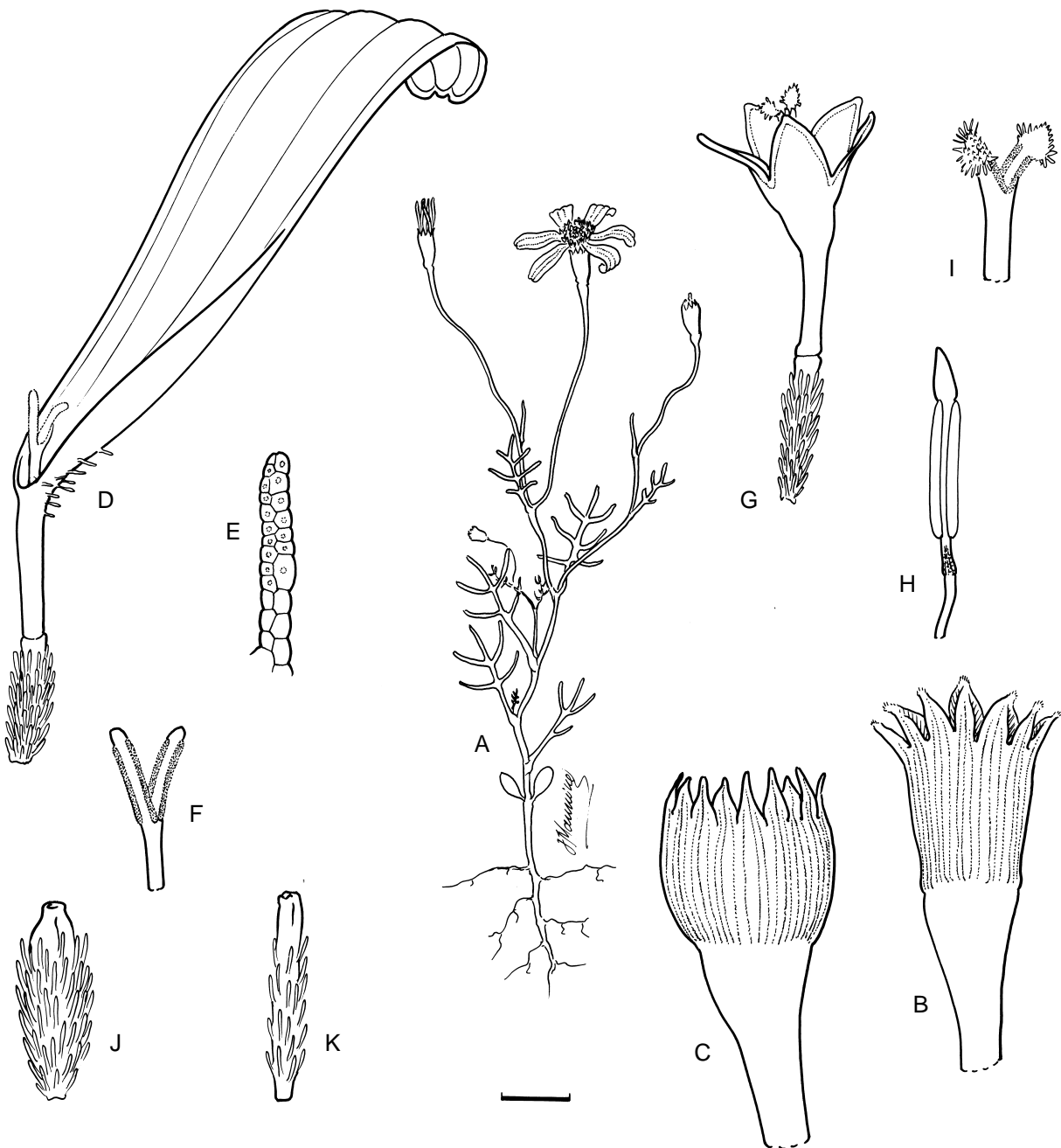


FIGURE 7.—*Steirodiscus gamolepis*, Manning 3366A. A, plant; B, involucre; C, fruiting involucre; D, ray floret; E, ray floret trichome (much enlarged); F, ray floret stigma; G, disc floret; H, disc floret anther; I, disc floret stigma; J, ray cypsel; K, disc cypsel. Scale bar: A, 10 mm; B, C, 2mm; D, G, J, K, 1 mm; F, H, I, 0.5 mm. Artist: J. Manning.

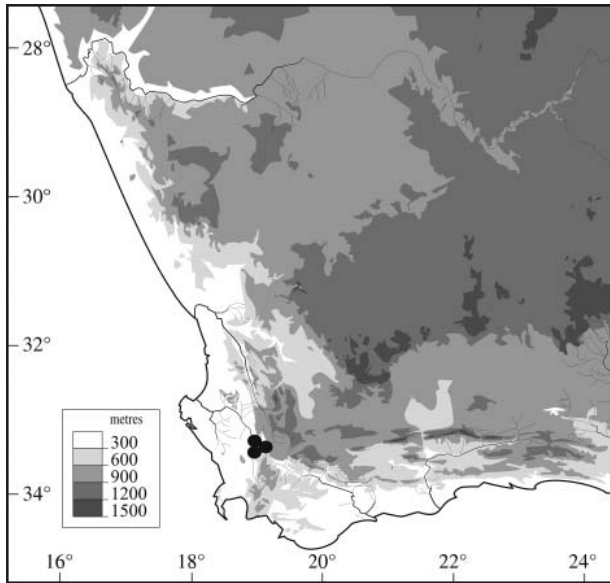


FIGURE 8.—Distribution of *Steirodiscus gamolepis*, ●.

short upper expanded portion of the perianth tube, much shorter than both the cylindrical lower portion and the lobes. Other members of sect. *Psilothonna* are larger in all respects, with less conspicuous peduncles that are sharply differentiated from the involucre, ± as many rays as involucral lobes, disc florets that are sparsely puberulous on the corolla, with the upper expanded portion ± as long as the lobes and the lower portion, and glabrous ovaries and cypselas. The peduncles in *S. gamolepis* are unusually tough and wiry. The seasonally inundated habitat is unique in the genus, other species preferring drier, mostly sandy flats.

Conservation status: *Steirodiscus gamolepis* is a highly local endemic known to persist only at Elandsberg Nature reserve, where it is still relatively plentiful.

Additional specimens seen

WESTERN CAPE.—**3319** (Worcester): flats near Piquetberg Station, (–AA), Oct. 1892, *F. Guthrie 2624b* (NBG); Elandsberg Farm and Nature Reserve, (–AC), 24 Aug. 2009, *L. Husted 780* (NBG); Bo-Hermon, Elandsberg Nature Reserve, (–AC), 15 Oct. 2011 [fruiting], *Manning 3359* (NBG); 15 Oct. 2011, *J. Manning 3359* (NBG); 10 Aug. 2012, *J. Manning 3366A* (NBG).

ACKNOWLEDGEMENTS

We are grateful to Elizabeth Parker and Stephen Boatwright for assistance in the field, and to Bertil Nor-

denstam for valuable comments and additional records from S. The electronic maps were prepared by Michelle Smith. Material was collected under permits from the conservation authorities of Western and Northern Cape provinces.

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