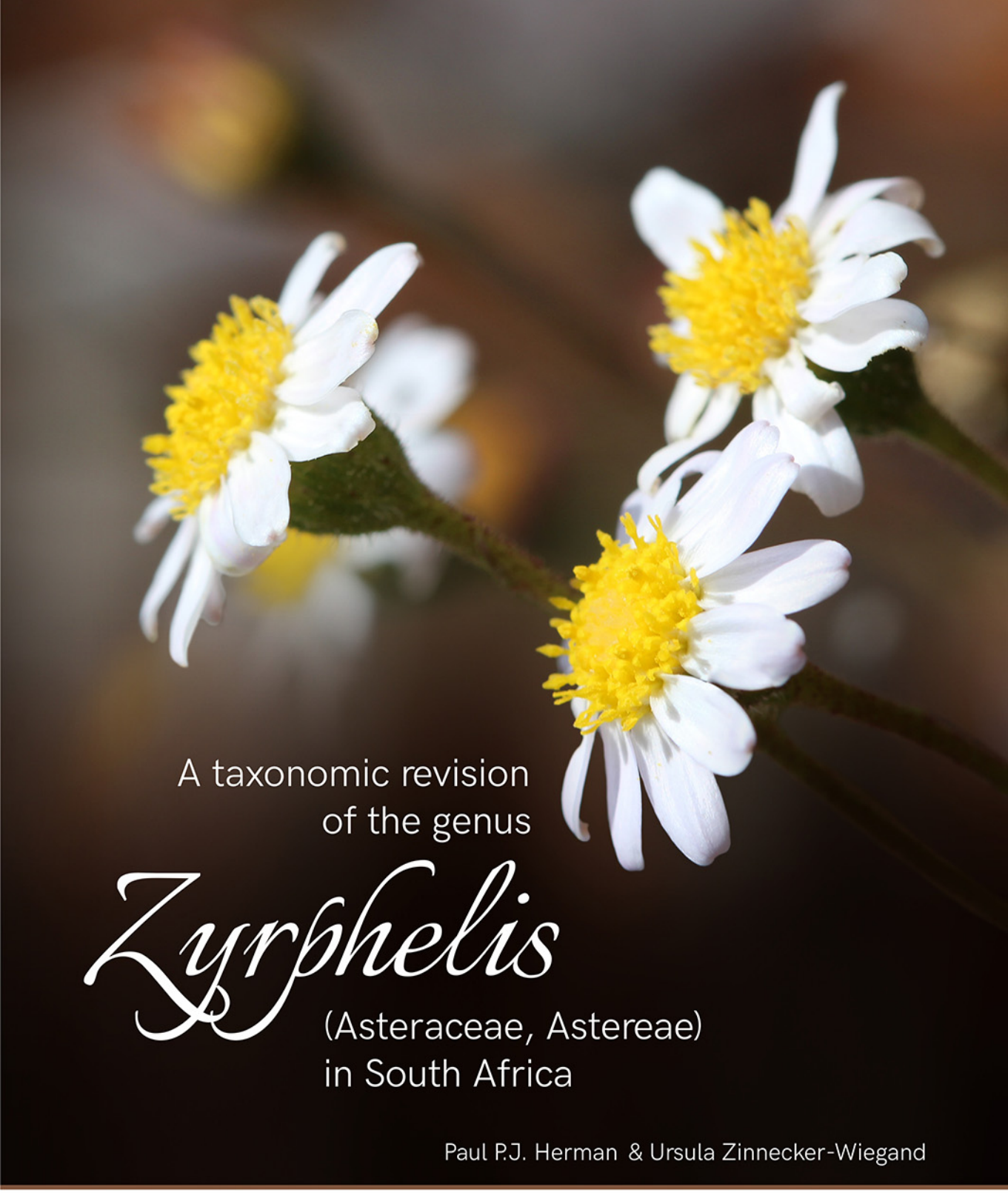


A taxonomic revision of the genus *Zyrphelis* (Asteraceae, Astereae) in South Africa

Paul P.J. Herman & Ursula Zinnecker-Wiegand

Strelitzia 45



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STRELITZIA

This series has replaced *Memoirs of the Botanical Survey of South Africa* and *Annals of the Kirstenbosch Botanic Gardens*, which the South African National Biodiversity Institute (SANBI) inherited from its predecessor organisations.

The plant genus *Strelitzia* occurs naturally in the eastern parts of southern Africa. It comprises three arborescent species, known as wild bananas, and two acaulescent species, known as crane flowers or bird-of-paradise flowers. The logo of SANBI is partly based on the striking inflorescence of *Strelitzia reginae*, a native of the Eastern Cape and KwaZulu-Natal that has become a garden favourite worldwide. It symbolysis the commitment of SANBI to champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.

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Zyrphelis lasiocarpa, © Nick Helme

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Abstract

A taxonomic account of the endemic genus *Zyrphelis* in South Africa is presented. The genus *Gymnostephium* is sunk under *Zyrphelis* and some taxa previously listed under *Mairia* moved to *Zyrphelis*. Twenty-one species (total 35 taxa) are recognised. *Zyrphelis ciliaris* subsp. *hirsuta* is elevated to species level, *Z. gracilis* is reduced to varietal level under *Z. fruticosa*, *Z. grauii* is reduced to varietal level under *Z. montana*, *Z. monticola* is sunk under *Z. microcephala* subsp. *microcephala*. The following new subspecies and varieties are described: ***Z. decumbens* var. *grandis***, ***Z. ecklonis* subsp. *longipedunculata***, ***Z. foliosa* var. *glabra***, ***Z. fruticosa* var. *pilosa***, ***Z. lasiocarpa* var. *minor***, ***Z. pilosella* var. *glandulifolia*** and ***Z. taxifolia* var. *robusta***. The following names are lectotypified here: *Felicia monticola*, *Gymnostephium leve*, *Mairia foliosa*, *M. lasiocarpa* and *M. montana*. Keys to the species, subspecies and varieties, full descriptions of all the taxa, distribution maps and illustrations are provided.



Zyrphelis montana, © Nick Helme



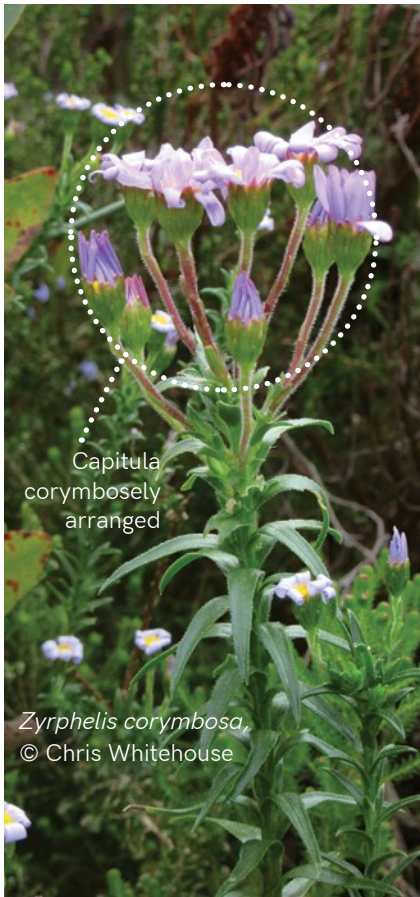
Zyrphelis montana, © Nick Helme

Introduction

The genus *Zyrphelis* Cass. belongs to the tribe Astereae of the family Asteraceae and is endemic to South Africa. Nesom and Robinson (2007) placed the South African genera *Zyrphelis*, *Gymnostephium* Less., *Amellus* L., *Chrysocoma* L., *Roodebergia* B.Nord., *Felicia* Cass. and *Poecilolepis* Grau in the subtribe Homochrominae, which they claimed as being an African and southeast to central Asian subtribe. Brouillet et al. (2009) also placed *Zyrphelis*, *Felicia, Polyarrhena* Cass., *Amellus*, *Chrysocoma* and *Poecilolepis* in the subtribe Homochrominae, but reserved it as a southern African subtribe. The genus *Zyrphelis* was first described in 1829 by Cassini. Nees (1833) also seemed to uphold it as an independent genus, but it was reduced to a subgenus within *Elphegea* by Lessing (1832), and a section within *Mairia* by Candolle (1836) and Harvey (1865). Although some name combinations were published under *Zyrphelis* by Kuntze (1891), these were not taken up by taxonomists as can be seen from the checklists compiled for the flora of southern Africa (Gibbs Russell et al. 1984, 1987; Herman 1993, 2003, 2006; Klopper et al. 2006); and the genus was not included by Bremer (1994) in his treatment of the tribe Astereae. The genus name *Zyrphelis* only resurfaced when Nesom published an article in 1994 on the repartition of the genus *Mairia* Nees in which he reinstated the genus *Zyrphelis* and discussed it together with the genera *Mairia* and *Gymnostephium*. Although Zinnecker-Wiegand undertook a taxonomic study on the genera *Mairia* Nees and *Zyrphelis* Cass. in 1990, the work was not effectively published (Ortiz & Zinnecker-Wiegand 2011). Therefore, the work was unknown and unavailable to taxonomists at large. In 2011, Ortiz & Zinnecker-Wiegand validated the new names and new combinations proposed by Zinnecker-Wiegand (1990) in her thesis. However, the article did not include a key to all the species, or species descriptions and distribution information for the other species. The first author of this revision [Herman] obtained a copy of the thesis and got permission from the original author (Zinnecker-Wiegand) as well as the University of Munich to publish, in English, the taxonomic section of the thesis. As the species of *Zyrphelis* sens. lat. was scattered among different genera, viz. *Mairia*, *Gymnostephium* and *Zyrphelis* sens. strict., and there exists no comprehensive key to all the species, it is difficult to identify specimens. The genus *Zyrphelis* has never been treated in its current circumscription, and is in need of full taxonomic treatment including a revised generic description and a key to all the species.



Zyrphelis nervosa, © Nick Helme



Zyrphelis corymbosa, © Chris Whitehouse

Material and methods

Collections and/or images of specimens housed in the following herbaria were studied: BM, BOL, G, G-DC, GRA, K, M, MO, NBG, P, PRE, S, SAASVELD in PRE, SAASVELD in NBG, SAM (NBG), STE in NBG, UPS-THUNB (acronyms after Holmgren et al. 1990). Images of some specimens, mostly types, were accessed and studied on the JSTOR website: (JSTOR Plants 2018/2019). All specimens and images quoted were seen by the first author. A lower-case 'e' after an herbarium acronym indicates that a specimen from that herbarium was accessed electronically. Measurements given were obtained from dried or re-hydrated herbarium material. Terminology used for morphological descriptions follows Montgomery (1977), but terminology used to describe the surface sculpturing of the cypselae is according to Beentje (2016). Involucral bracts, florets and cypselae were collected from herbarium material. The florets were softened in 'Windolene' and temporarily mounted on microscope slides in 'Windolene'. Digital images were obtained with a Zeiss Discovery V8 stereomicroscope. The cypselae were studied with a Phenom ProX Desktop Scanning Electron Microscope without prior coating. Information on Ecklon and Zeyher's localities were obtained from Glen & Germishuizen (2010). In the sections *Additional specimens examined*, locality citations were reproduced as given on the specimen labels. In a few cases, the locality names were corrected and text in foreign languages translated and are shown in square brackets. The South African material is arranged according to the Degree Reference System (Leistner & Morris 1976) with the place names given within quarter-degree squares (QDS).

Results

Involucral bracts

The involucral bracts are imbricately arranged in 3 to 5(6) rows with the outer shorter than the inner. They are usually keeled and the inner getting more and more conduplicate as the capitulum age. In the fruiting stage, the inner involucral bracts clasp the outer, mature ray cypselae (Figure 1A & B). In several species the inner involucral bracts are three-veined or three resinous veins are clearly visible e.g., *Z. ciliaris*, *Z. corymbosa*, *Z. leiocarpa*, *Z. spathulata* and *Z. taxifolia* (Figure 1C & D). In other species only one main vein can be distinguished e.g., *Z. decumbens*, *Z. ecklonis*, *Z. glabra*, *Z. levis* and *Z. pilosella* (Figure 2A). There are often oil glands along the veins e.g., *Z. levis* and *Z. fruticosa*



Figure 1. A, Involucral bract clasping cypsela in *Zyrphelis decumbens* var. *decumbens* (*Schlechter 9098* (TvlMus 2115), PRE); B, involucral bract clasping cypsela in *Z. microcephala* subsp. *foliosa* (*Esterhuysen 26401*, PRE); C, three-veined involucral bracts in *Z. nervosa* (*Stokoe s.n.* PRE27170, PRE); D, three-veined involucral bracts in *Z. taxifolia* var. *taxifolia* (*Taylor 6319a*, PRE).

var. *fruticosa* (Figure 2B & C). The stereome of the involucral bracts is usually distincty fenestrated as described by Hilliard & Burtt (1981) for the Gnaphaliinae.

Cypselae

The cypselae are laterally compressed. The ray florets are always female fertile. The ray style branches are bifurcate with marginal stigmatic areas, confluent at the apex. The disc florets in *Zyrphelis* are mostly functionally male, where the style branches have no stigmatic areas, but in a few cases they are bisexual and fertile where the style branches have marginal stigmatic areas basally, not confluent apically and produce fertile cypselae e.g. *Z. glabra*, *Z. levis*, *Z. microcephala* subsp. *microcephala* and *Z. pilosella* (Figure 3). The fertile disc cypselae are usually slightly different from the fertile ray cypselae. The ray cypselae are usually fairly densely clavate or filiform twin hairy and the epicarpic cells in surface view colliculate, areolate, flattish or with central or acentric protuberances, smooth, rugose or faintly granular (Figures 4A & B; 5A & B; 6A). The fertile disc cypselae are either glabrous or sparsely filiform twin hairy and the epicarpic cells in surface view arranged in rows, areolate, flat and ± smooth, or look like depauperate ray surfaces (Figures 4C & D; 5C & D; 6B) but looks different from the inner disc ovaries (Figure 6C).

In some taxa, however, some style branches, usually of the outer disc florets in a capitulum could have marginal stigmatic areas basally, while the inner ones do not have stigmatic areas e.g. *Z. decumbens*, *Z. lasiocarpa* and *Z. taxifolia*. In these taxa some of the outer disc florets produce pseudo-cypselae (Figure 7A, B, D, E); they are often almost paper thin, looking as if they are without any content (sterile). They sometimes resemble the fertile ray cypselae with similar looking epicarpic cells and twin hairs (Figure 8) or they look different from the ray cypselae (Figures 7C & F, 9 and 10).

Pappus

The pappus bristles are arranged in a single row. They are barbellate along the entire length or plumose in the upper part and barbellate to nude basally, occasionally with a few minute bristles among the longer bristles (Fig. 53C, 113A, 138). They are either persistent or caducous and seemingly absent.

Twin hairs

The cypselae are either glabrous or sparsely to densely covered with filiform twin hairs e.g. *Z. decumbens*, *Z. ecklonis*, *Z. foliosa*, *Z. glabra*, *Z. lasiocarpa*, *Z. microcephala*, *Z. pilosella*, *Z. spathulata* (Figure 11). In some species clavate twin hairs are found on the cypselae e.g. *Z. ciliaris*, *Z. corymbosa*, *Z. hirsuta*, *Z. levis*, *Z. nervosa* (Figure 12). In *Z. capensis, Z. glandulosa, Z. leiocarpa, Z. macrocarpa* and *Z. montana* the twin hairs are not typically filiform, nor are they clavate, but seem to be a hybrid between the two kinds of twin hairs, which we called *clavate-like* twin hairs (Figure 13A–D). In *Z. outeniquae* and *Z. taxifolia,* very short clavate-like twin hairs were observed (Figure 13E & F). See Table 1 for the distribution of these characters among all the currently recognised species of *Zyrphelis*.

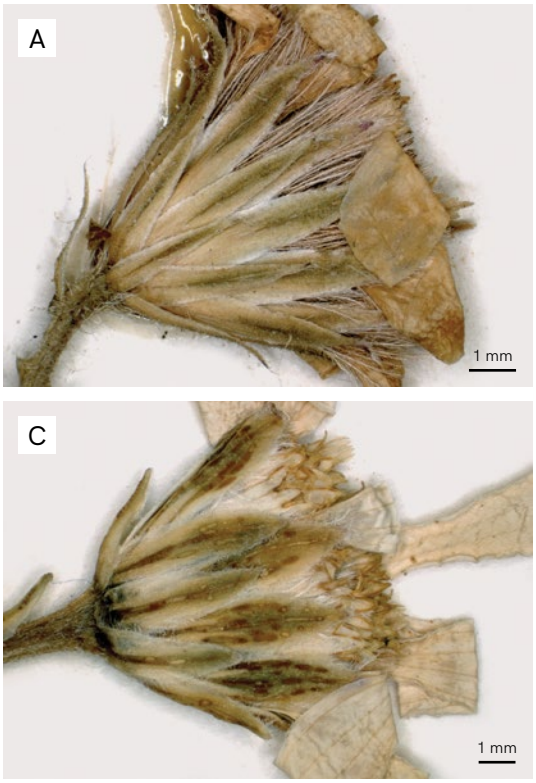


Figure 2. A, Involucral bracts with single main vein in *Zyrphelis ecklonis* subsp. *ecklonis* (*Esterhuysen 3289*, PRE); B, involucral bracts with oil glands along main vein in *Z. levis* (*Schlechter 10141*, PRE); C, involucral bracts with oil glands along veins in *Z. fruticosa* var. *fruticosa* (*Haynes 1485*, PRE).

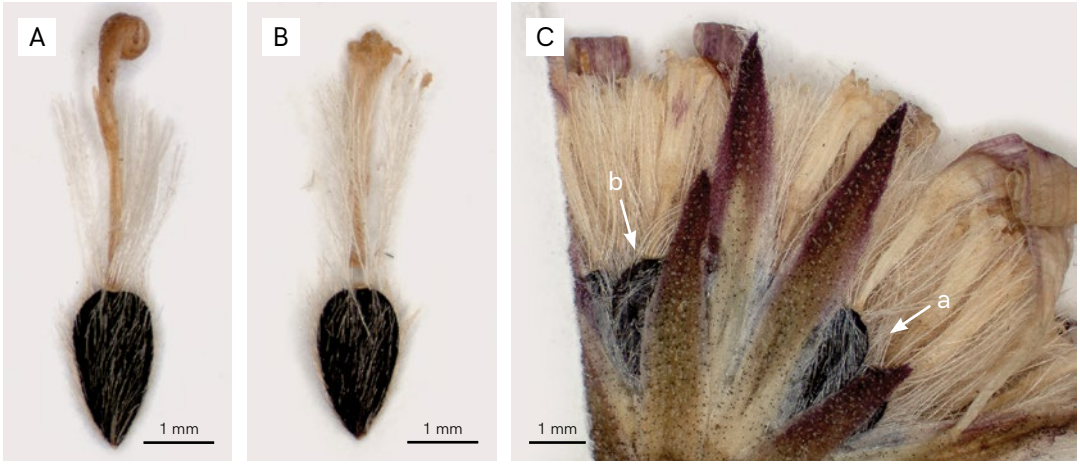


Figure 3. A, ray floret with cypsela in *Zyrphelis pilosella* var. *pilosella* (*Esterhuysen 8037*, BOL); B, fertile disc floret with cypsela in *Z. pilosella* var. *pilosella* (*Esterhuysen 8037*, BOL); C, capitulum with fertile ray (a) and disc cypselae (b) in *Z. pilosella* var. *glandulifolia* (*Hanekom 3045*, PRE).

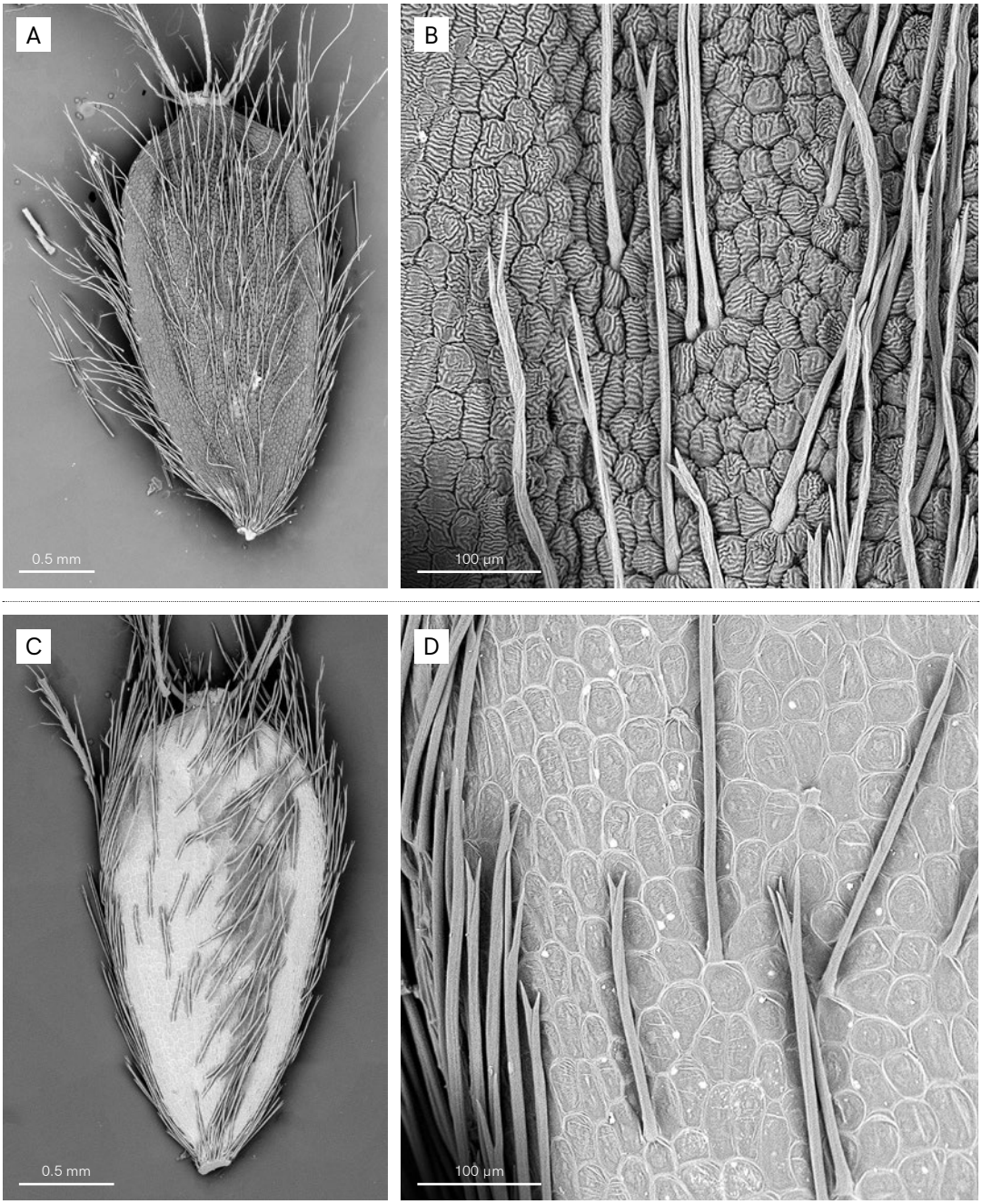


Figure 4. Scanning electron micrographs of A, B, ray; and C, D, fertile disc cypsela in *Zyrphelis pilosella* var. *pilosella*: epicarpic cells in ray cypsela ± colliculate in surface view, densely rugose; epicarpic cells in disc cypsela ± areolate in surface view, flat and ± smooth (A, B, *Esterhuysen 20368*, BOL; C, D, *Esterhuysen 8037*, BOL).

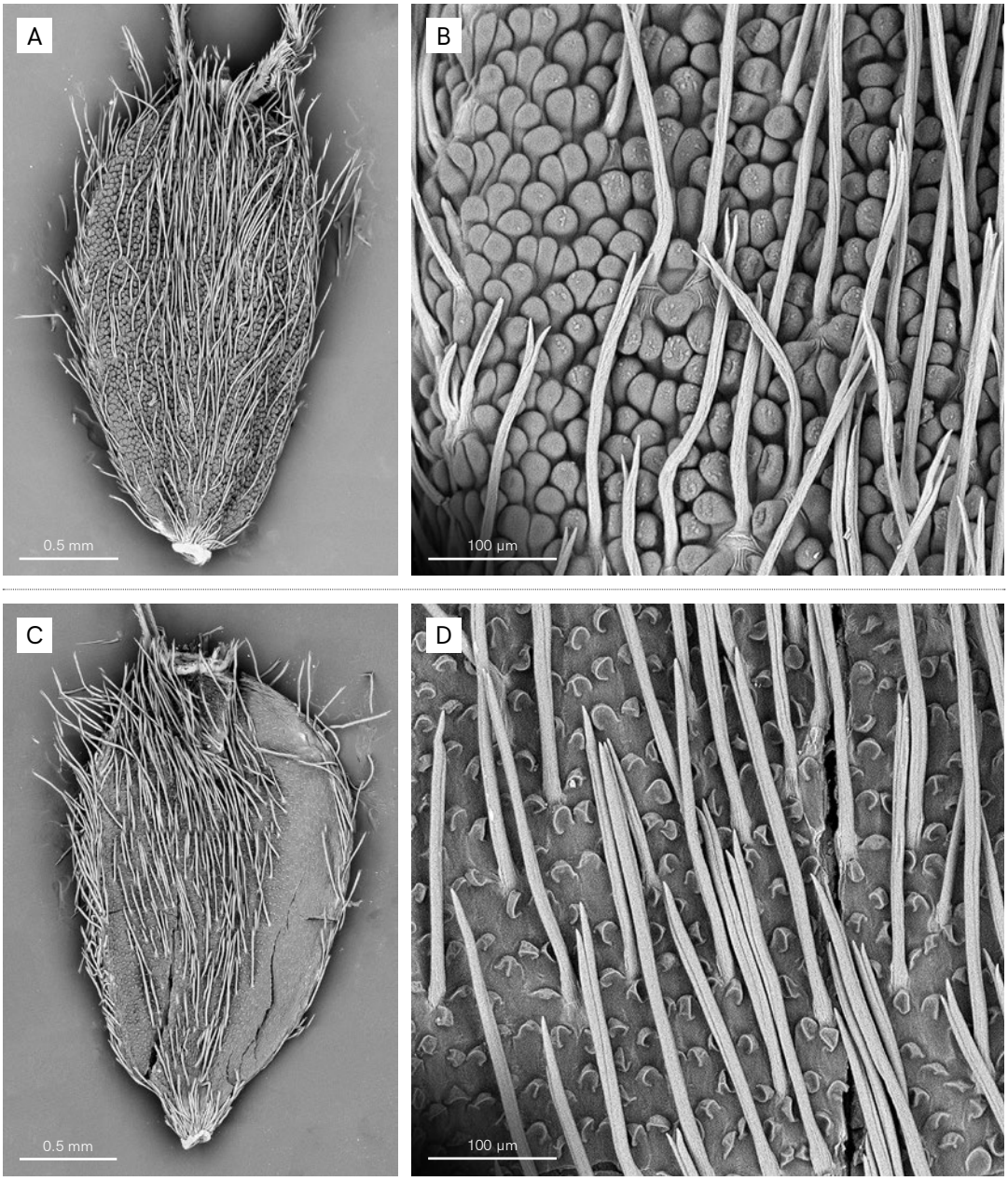


Figure 5. Scanning electron micrographs of A, B, ray; and C, D, fertile disc cypsela in *Zyrphelis microcephala* subsp. *microcephala*: in ray cypsela, epicarpic cells with central globose protuberance, or with globose protuberance towards pappus side of cells, ± smooth; in disc cypsela epicarpic cells with central globose protuberance or with globose protuberance towards pappus end of cells, but cells collapse, smooth (A, B, *Muir 2899* (PRE4001), PRE; C, D, *Esterhuysen 9280*, BOL).

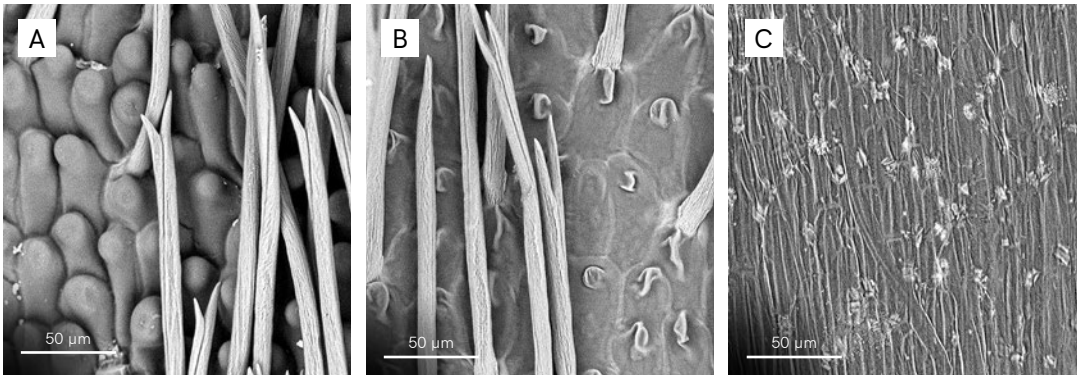


Figure 6. Scanning electron micrographs at higher magnification to show the epicarpic cells of A, the ray cypsela with globose protuberance towards pappus side of cells, ± smooth; B, the fertile outer disc cypsela with globose protuberance towards pappus end of cells, but cells 'collapse', smooth and C, the disc ovary with epicarpic cells ± oblong, arranged in rows. All in *Zyrphelis microcephala* subsp. *microcephala* (*Esterhuysen 28184*, PRE).

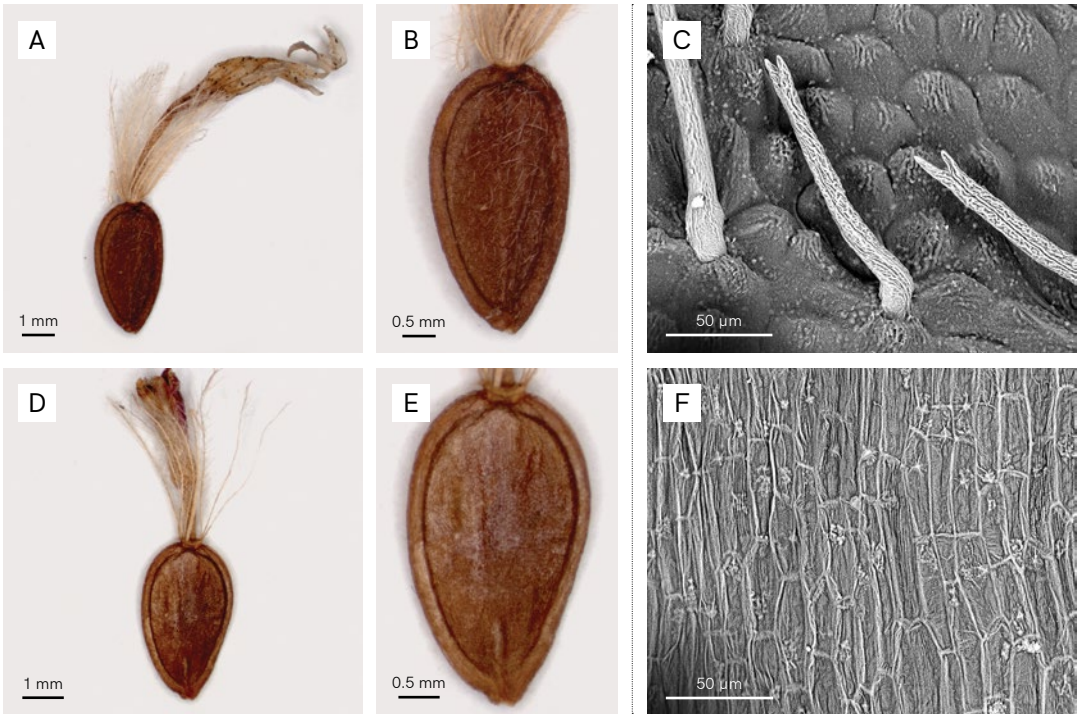


Figure 7. Ray floret A, B, with cypsela; and D, E, disc floret with pseudo-cypsela in *Zyrphelis taxifolia* var. *robusta*; scanning electron micrographs of the epicarpic cells of C, the ray cypsela with epicarpic cells ± colliculate to areolate in surface view, sparsely rugose; and F, disc pseudo-cypsela with epicarpic cells ± oblong in surface view, flat, smooth in *Z. taxifolia* var. *robusta* (all *Stokoe* PRE57041, PRE).

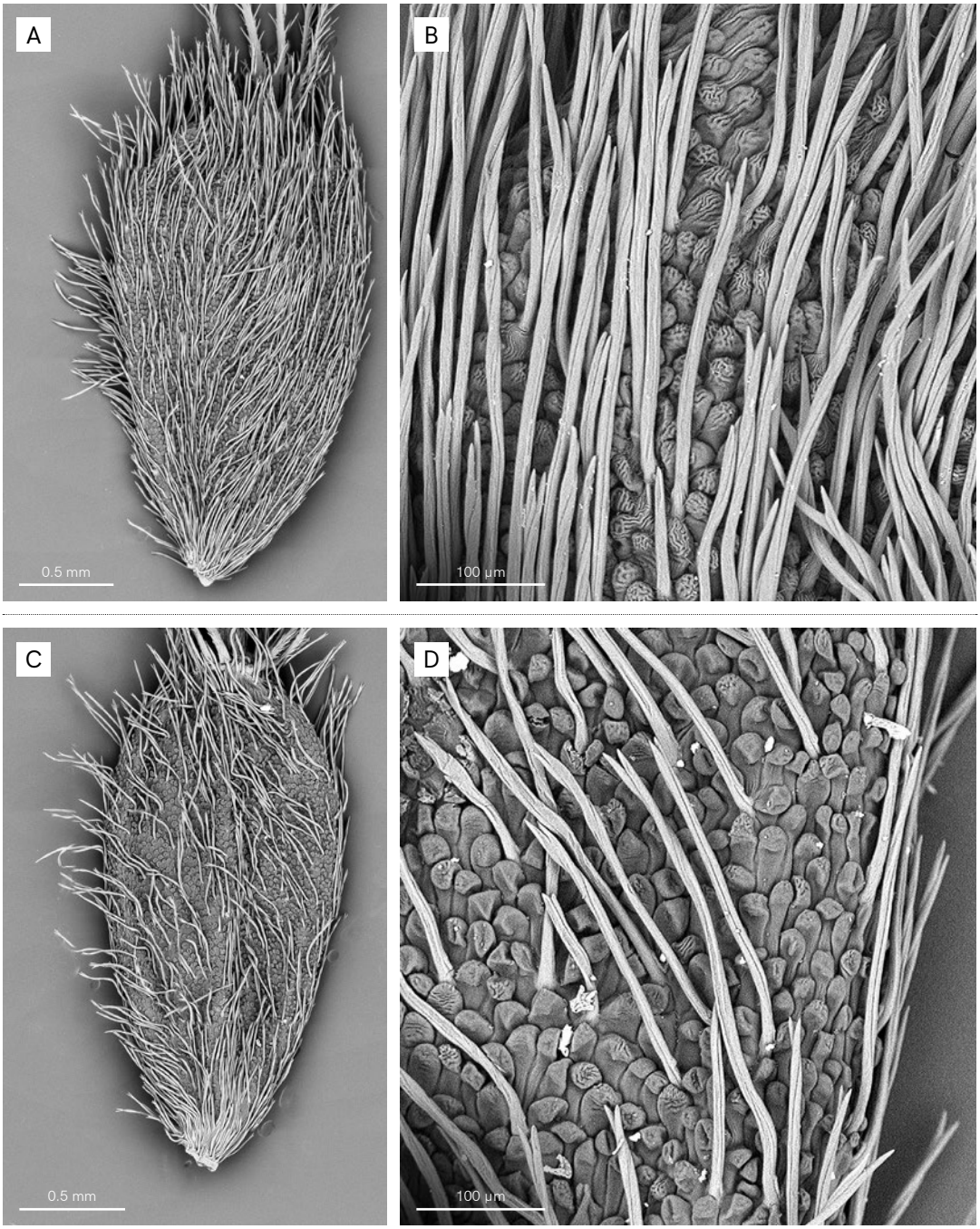


Figure 8. Scanning electron micrographs of A, B, ray cypsela; and C, D, outer disc pseudo-cypsela with ± similar looking epicarpic cells in *Zyrphelis decumbens* var. *decumbens* (all *Esterhuysen 30802*, BOL).

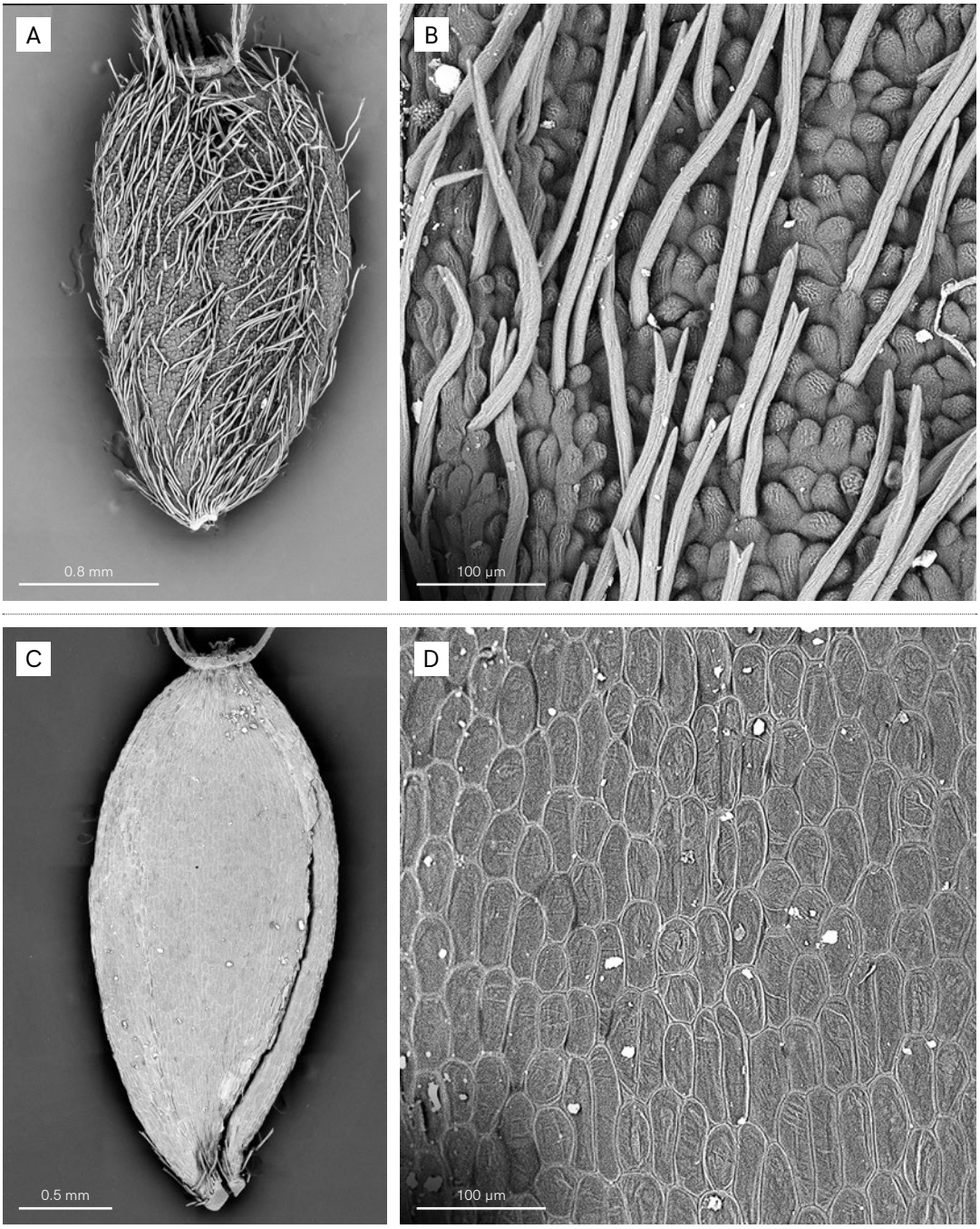


Figure 9. Scanning electron micrographs of A, B, ray cypsela; and C, D, outer disc pseudo-cypsela with different looking epicarpic cells in *Zyrphelis decumbens* var. *decumbens* (all *Schlechter 9098*, PRE).

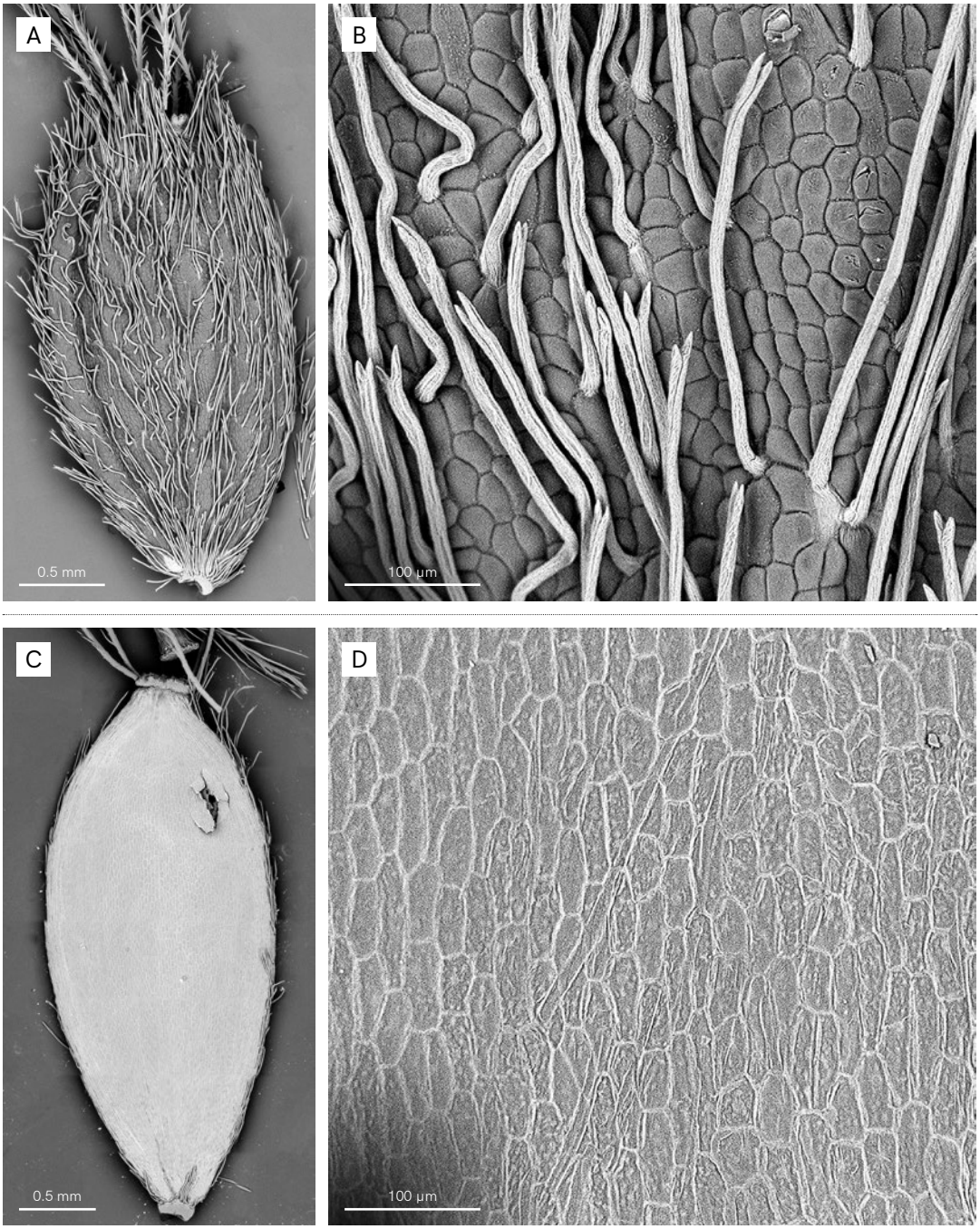


Figure 10. Scanning electron micrographs of A, B, ray cypsela; and C, D, outer disc pseudo-cypsela with different looking epicarpic cells in *Zyrphelis lasiocarpa* var. *lasiocarpa* (all *Leighton 2040*, PRE).

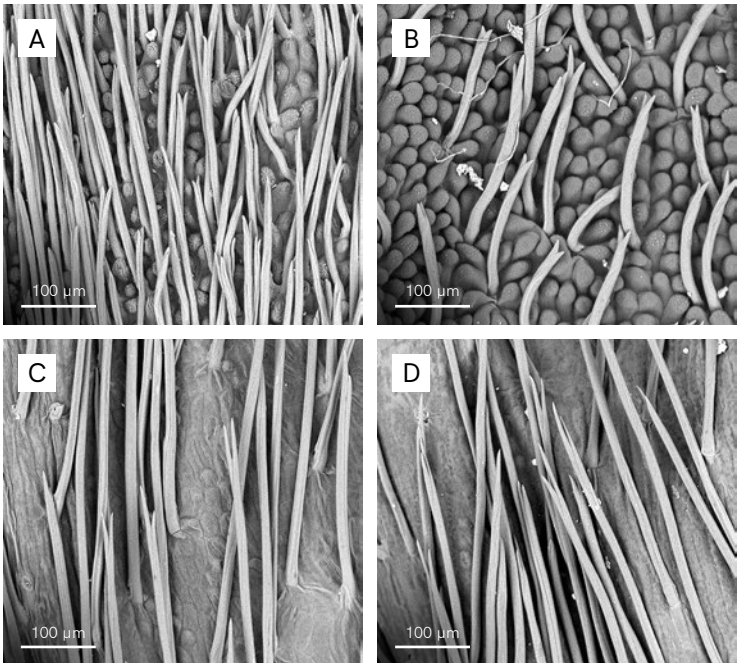


Figure 11. Scanning electron micrographs of filiform twin hairs on ray cypsela in A, *Zyrphelis ecklonis* subsp. *ecklonis* (*Compton 9615*, NBG); and B, *Z. spathulata* (*Barker 10860*, NBG); filiform twin hairs on both C, ray; and D, fertile disc cypsela in *Z. glabra* (*Esterhuysen 3888A*, BOL).

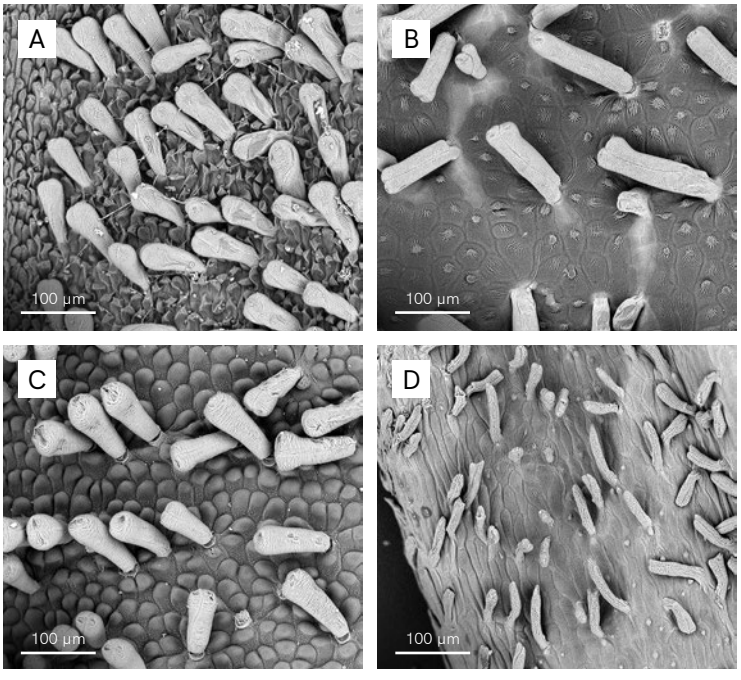


Figure 12. Scanning electron micrographs of clavate twin hairs on ray cypsela in A, *Zyrphelis ciliaris* subsp. *ciliaris* (*Bolus 6941*, PRE); B, *Z. corymbosa* (*Esterhuysen 2897*, PRE); C, *Z. nervosa* (*Oliver 10930*, NBG); and D, *Z. levis* (*Schlechter 10141*, PRE).

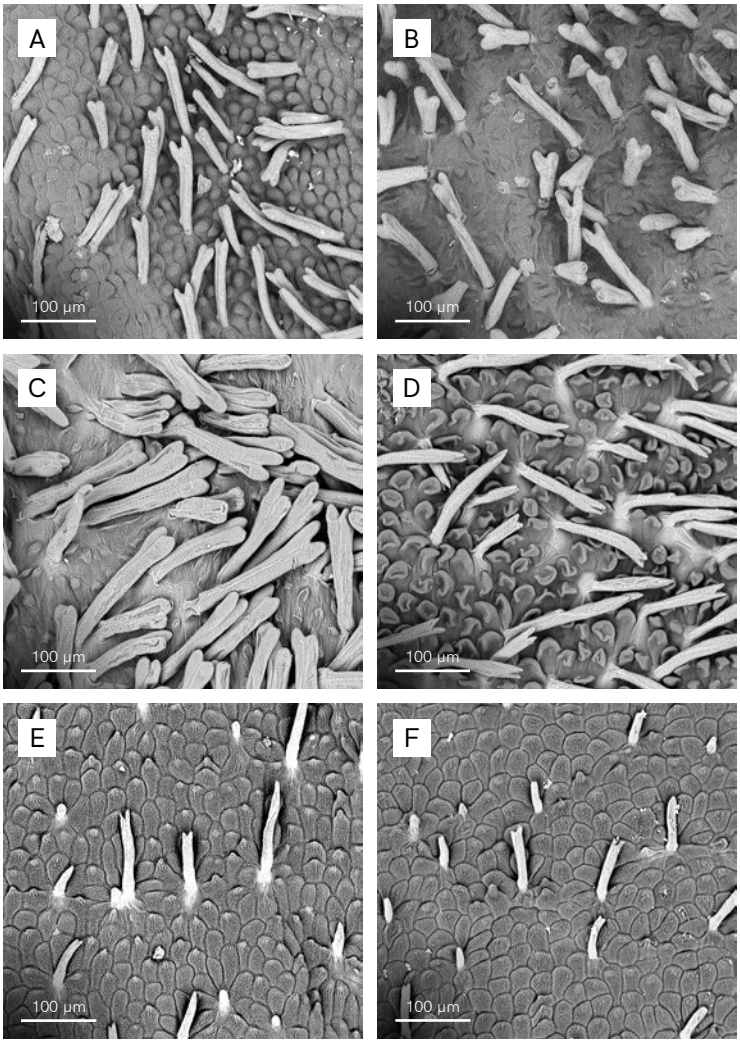


Figure 13. Scanning electron micrographs of clavate-like twin hairs on ray cypsela in A, B, *Zyrphelis leiocarpa* (A, *Esterhuysen 4033*, BOL; B, *Strey 886*, PRE); C, *Z. macrocarpa* (*Esterhuysen 32715*, BOL); and D, *Z. glandulosa* (*Esterhuysen 5071*, PRE); scanning electron micrographs of very short clavate-like twin hairs on ray cypsela in E, F, *Z. taxifolia* var. *taxifolia* (E, *McKinnon 258*, STE in NBG; F, *Wolley Dod 1200*, BOL).

Table 1. The division of taxa on the grounds of the pappus and various twin hairs on cypselae

Taxon	Pappus				Cypselae twin hairs				
	Pappus caducous/absent	Pappus persistent	Pappus barbellate/ subplumose	Pappus plumose	Cypselae glabrous	Cypselae with clavate twin hairs/glabrous	Cypselae with clavate-like twin hairs/glabrous	Cypselae with very small, clavate-like twin hairs	Cypselae with filiform twin hairs
Z. ciliaris	Y		Y			Y			
Z. hirsuta	Y		Y			Y			
Z. levis	Y		Y			Y			
Z. nervosa	Y		Y			Y			
Z. glandulosa	Y		Y				Y		
Z. leiocarpa	Y		Y				Y		
Z. fruticosa	Y			Y	Y				
Z. outeniquae		Y		Y				Y	
Z. taxifolia		Y		Y				Y	
Z. decumbens		Y		Y					Y
Z. ecklonis		Y		Y					Y
Z. foliosa		Y		Y					Y
Z. glabra		Y		Y					Y
Z. lasiocarpa		Y		Y					Y
Z. microcephala		Y		Y					Y
Z. pilosella		Y		Y					Y
Z. spathulata		Y		Y					Y
Z. montana var. *grauii*		Y		Y	Y				
Z. corymbosa		Y		Y		Y			
Z. capensis		Y		Y			Y		
Z. macrocarpa		Y		Y			Y		
Z. montana var. *montana*		Y		Y			Y		

Discussion

As currently circumscribed, representatives of the genus *Zyrphelis* are shrubs, dwarf shrubs, suffrutices, perennial or rarely annual herbs, decumbent, rosulate, erect, caespitose or virgate with alternate, simple, sessile leaves, an indumentum consisting of glandular and/or non-glandular hairs, solitary or sometimes corymbosely arranged capitula, involucral bracts in 3 to 5(6) rows, the female, fertile ray florets arranged in a single row, the laterally compressed ray cypselae, either glabrous or with filiform, clavate or clavate-like twin hairs, the functionally male or in a few cases bisexual and fertile, disc florets and pappus bristles, which are either persistent or caducous and either barbellate or plumose, arranged in a single row.

Representatives of the genus *Zyrphelis* as previously defined (Cassini 1829; Lessing 1832; Nees 1833; Candolle 1836; Harvey 1865; Nesom 1994; Nesom & Robinson 2007) have plumose pappus bristles. Nees (1833), Candolle (1836) and Harvey (1865) described the fertile cypselae as glabrous or sparsely to densely hairy. Nesom (1994) and Nesom & Robinson (2007) described the indumentum of the cypselae as strigose-sericeous consisting of filiform [twin] hairs with evenly connate tips. Thus traditionally *Zyrphelis* was considered to have plumose, persistent pappus bristles with glabrous or variously (twin) hairy cypselae, although Nesom & Robinson (2007) described the pappus as caducous.

Candolle (1836) described the pappus of his monotypic genus *Homochroma* (*H. ecklonis* = *Mairia ecklonis* (DC.) Sond. = **Z. ecklonis** (DC.) Kuntze) as bristles arranged in a single row, those of the ray florets ± 15 and of the disc florets ± 10, totally plumose or plumose chiefly towards the apex. He described the ray cypselae as villose and the disc cypselae as glabrous. Harvey (1865) reduced *Homochroma* to a section within *Mairia*, having plumose ('feathered') pappus bristles and densely silky ray cypselae. With this definition, *Homochroma* would fit in with the traditional description of the genus *Zyrphelis*.

The pappus of representatives of the genus *Gymnostephium* was described as few caducous bristles in disc florets and absent in ray florets ('Pappus disco obsoletus, paucisetosus, radio nullus') by Lessing (1832) and in a similar way by Nees (1833). Candolle (1836) described the pappus in *Gymnostephium* as few caducous, plumose-serrate bristles in disc florets and absent in ray florets. Harvey (1865) described it as 'Pappus caducous, of few setae, either shortly-feathery or barbato-serrate, ray florets either wholly without pappus or with 1 or 2 bristles'. Nesom (1994) described the pappus as 'basally caducous bristles, ... pappus of ray achenes lacking or of only 1–2 plumose or short-serrate bristles, disc achenes with more bristles'. Nesom & Robinson (2007) described the pappus as '1-seriate, caducous, lacking in ray florets, or with 1 or 2 plumose or barbellate bristles, disc florets with more bristles'. Lessing (1832) did not mention the indumentum of the cypselae in his genus description of *Gymnostephium* but described it as very short hairs in *G. hirsutum* or glabrous in *G. gracile*. Nees (1833) described the indumentum of the cypselae in *Gymnostephium* as somewhat hairy or scabrous. Candolle (1836) also described the cypselae as somewhat hairy ['subpilosa']. Harvey (1865) described the cypselae as 'glandularly-scabrous'. Nesom (1994) described the cypselae with 'short, white papillae, or glabrous to glabrate', while Nesom & Robinson (2007) described it as 'glabrous or with dense, white, papilliform setulae'. Thus traditionally

Gymnostephium was considered to have no or a few caducous barbellate or plumose pappus bristles and glabrous to glabrate cypselae or the surfaces sparsely to densely covered with short, white papillae.

In his description of the monotypic genus *Heteractis* (*H. falcata* = **Z. ciliaris** (DC.) Zinnecker-Wiegand), Candolle (1837, 1839) described the pappus as consisting of bristles arranged in a single row, the bristles sparsely scabrid and caducous. He described the surface of the cypselae as minutely glandular muriculate. With this definition, this taxon would fit in with the traditional description of the genus *Gymnostephium*.

One or both of the two characters, viz. persistent or caducous, plumose pappus bristles versus no or a few caducous barbellate or plumose pappus bristles and glabrous or variously (twin) hairy cypselae versus glabrous to glabrate cypselae or the surfaces sparsely to densely covered with short white papillae, were used to key out the two genera *Zyrphelis* and *Gymnostephium* as early as 1833 by Nees and more recently in Nesom (1994), Nesom & Robinson (2007) and Manning & Goldblatt (2012).

In the current circumscription of *Zyrphelis*, *Z. decumbens, Z. ecklonis, Z. foliosa, Z. glabra, Z. lasiocarpa, Z. microcephala, Z. pilosella* and *Z. spathulata* all have persistent plumose pappus bristles and filiform twin hairy cypselae – thus representing characters typical of the traditionally recognised *Zyrphelis*. *Zyrphelis ciliaris, Z. hirsuta, Z. levis* and *Z. nervosa* (all previously classified as *Gymnostephium*) have caducous barbellate or subplumose pappus bristles or the pappus seems to be absent and with glabrous or clavate twin hairy cypselae – thus representing characters typical of the traditionally recognised *Gymnostephium*. *Zyrphelis fruticosa* has, however, caducous, plumose pappus bristles and glabrous cypselae while *Z. corymbosa* has persistent plumose pappus bristles and clavate twin hairy cypselae. These two taxa present a link between the traditionally recognised *Zyrphelis* and *Gymnostephium*. *Zyrphelis taxifolia*, the type species of the genus *Zyrphelis*, has very small, clavate-like twin hairy cypselae and persistent plumose pappus bristles. There are also other taxa with overlapping characters linking the two genera e.g. *Z. glandulosa* and *Z. leiocarpa* both with caducous barbellate or sub-plumose pappus bristles and clavate-like twin hairy or rarely glabrous cypselae and *Z. capensis, Z. macrocarpa* and *Z. montana* var. *montana* with persistent plumose pappus bristles and cypselae with clavate-like twin hairs (see Table 1). In the view of these overlapping characters, it was decided to sink *Gymnostephium* under *Zyrphelis*.

Nesom (1994), in his key to the genera *Mairia*, *Zyrphelis* and *Gymnostephium*, described the involucral bracts of *Zyrphelis* and *Gymnostephium* as 'strongly concave'. In their description of the subtribe Homochrominae, Nesom & Robinson (2007) described the involucral bracts as not keeled. As described in the previous section, representatives of the genus *Zyrphelis* have keeled involucral bracts, the inner bracts usually clasping the cypselae when ripe.

In their key to the subtribes of the tribe Astereae, Nesom & Robinson (2007) at one point (couplé 18), mentioned the absence of resinous veins in the involucral bracts, with the subtribe Homochrominae keying out in this group. As described in the previous section, resinous veins on the involucral bracts were observed in several *Zyrphelis* taxa e.g. *Z. ciliaris*, *Z. corymbosa*, *Z. foliosa*, *Z. taxifolia*.

Harvey (1865) noted under his description of *Gymnostephium*: 'disc florets sterile with perfect, bifid styles, but abortive ovaries' and 'achenes of the disc linear, empty'. Several *Zyrphelis* taxa exhibit this

character, but there are some where the disc ovaries develop fertile cypselae e.g. *Z. glabra*, *Z. levis* and *Z. pilosella* or some of the outer disc florets develop pseudo-cypselae e.g. *Z. decumbens*, *Z. lasiocarpa*, *Z. montana* and *Z. taxifolia*.



Zyrphelis fruticosa, © Nick Helme

Taxonomic treatment

Zyrphelis

Cass., *Annales des Sciences Naturelles* (Paris): 420 (1829); Nees: 15, 250 (1833); Nesom: 87 (1994); Herman et al.: 166 (2000); Nesom & Robinson in Kubitzki: 293 (2007).

Elphegea Cass. subgen. II. *Zyrphelis* (Cass.) Less.: 183 (1832).
Mairia Nees sect. II. *Zyrphelis* (Cass.) DC.: 218 (1836).
Mairia Nees sect. II. *Zyrphelis* (Cass.) Harv. in Harv. & Sond.: 65 (1865).

Type species: *Zyrphelis taxifolia* (L.) Nees.

Gymnostephium Less.: 185 (1832); Nees: 15, 253 (1833); DC.: 300 (1836); Harv. in Harv. & Sond.: 66 (1865); Benth. in Benth. & Hook.: 266 (1873); Hoffm.: 159 (1889); Phillips: 781 (1951); Dyer: 666 (1975); Bremer: 422 (1994); Nesom: 87 (1994); Herman et al.: 141 (2000); Nesom & Robinson: 292 (2007).

Type species: *Gymnostephium gracile* Less. [lectotype designated by Nesom (1994).]

Heteractis DC.: 468 (1837); DC. in Delessert: 29 (1839).

Type species: *Heteractis falcata* DC.

Homochroma DC.: 324 (1836).
Mairia Nees sect. 3. *Homochroma* (DC.) Harv. in Harv. & Sond.: 66 (1865).

Type species: *Homochroma ecklonis* DC. [non *H. angolensis* Chiov., in Bull. Soc. Bot. Ital.: 43 (1924).]

Shrubs, dwarf shrubs, suffrutices, perennial or rarely annual herbs, decumbent, rosulate, erect, caespitose, virgate. *Leaves* alternate, rarely in a basal rosette, simple, margin mostly entire, occasionally distantly or sparsely minutely dentate or lobed, sessile, sometimes semi-amplexicaul, sometimes decurrent, blade rarely extending into petiole-like base, glabrous, variously hairy and/or stipitate glandular, often ciliate, herbaceous or semi-succulent, sometimes faintly 3-veined basally, but soon fading. *Capitula* heterogamous, radiate, terminal, solitary or corymbosely arranged, sessile or shortly to distinctly pedunculate. *Peduncles* glabrous, variously hairy and/or stipitate glandular, usually bracteate. *Involucre* obconical, campanulate, cup-shaped or rarely semi-globose. *Receptacle* pitted, epaleate. *Involucral bracts* in 3 to 5(6) rows, imbricate, outer shorter than inner, glabrous, variously hairy and/or stipitate

glandular, inner rows usually keeled and V- or Y-shaped thickened from base, stereome fenestrated, often with 3 orange-resinous veins (henceforth called 3-veined), margins often membranous, mostly ciliate or ciliate-fimbriate; inner bracts usually clasping ray cypselae in fruiting stage. *Ray florets* zygomorphic, female, fertile; corolla white, various shades of blue or violet, cream, yellow, rarely pink, sometimes turning red to maroon with age; *tube* often glandular, *limb* 4-veined, 3-dentate/-lobed, rarely 5-veined, 4-dentate/-lobed. *Style* bifurcate, *style branches* with marginal stigmatic areas, confluent at apex. *Ovaries* glabrous or sparsely to densely twin hairy, twin hairs filiform with acute apices, clavate or clavate-like. *Cypselae* brown to blackish, laterally compressed, often with thickened margins, glabrous or sparsely to densely twin hairy, twin hairs filiform, clavate or clavate-like. *Pappus bristles* arranged in a single row, either barbellate or plumose in upper part and barbellate to nude basally, occasionally with a few minute bristles among the longer bristles, persistent or caducous or seemingly absent. *Disc florets* actinomorphic, functionally male, sterile or bisexual and fertile; corolla yellow, tubular; *tube* sometimes with glandular hairs in lower part, 5-lobed, *lobes* often with marginal resin ducts and sub-apical glandular hairs, rarely also occasional non-glandular hairs. *Stamens* 5; *anthers* with ovate apical appendages, bases minutely caudate, ecalcarate, filament collars thickened. *Style* bifurcate, *style branches* with or without marginal stigmatic areas basally, not confluent apically, with deltoid, papillate apical appendages. *Ovaries* laterally compressed, often with thickened margins, totally glabrous, facies glabrous and margins twin hairy, or only tuft of twin hairs basally, or sparsely to densely twin hairy all over, twin hairs filiform, clavate or clavate-like. In *fertile disc florets* cypselae laterally compressed, often with thickened margins, glabrous or sparsely to densely twin hairy, twin hairs filiform, clavate or clavate-like. Sometimes ovaries of some outer disc florets develop pseudo-cypselae, laterally compressed, with thickened margins, glabrous or sparsely to densely twin hairy. *Pappus* as in ray florets.

Chromosome number: 2n = 18 (Zinnecker-Wiegand 1990).

Twenty-one species, thirty-five taxa, endemic to the Western Cape, one taxon (*Z. pilosella* var. *pilosella*) extending to the Northern Cape and one species (*Z. outeniquae*) extending to the Eastern Cape.

Key to *Zyrphelis* taxa

1a. Pappus bristles caducous, barbellate or (sub-)plumose apically, barbellate to nude basally or seemingly absent 2
1b. Pappus bristles persistent, plumose or sub-plumose 8

2a. Peduncle, involucral bracts and leaves glabrous, rarely leaves with few cilia basally . . . 1. *Z. levis*
2b. Peduncle (sparsely) hairy, stipitate glandular or hairy and stipitate glandular; involucral bracts and leaves glabrous, hairy, stipitate glandular or hairy and stipitate glandular or leaves glabrous, margins ciliate 3

3a. Peduncle (sparsely) hairy, involucral bracts glabrous, leaves glabrous or surfaces glabrous, margins ciliate or surfaces sparsely to densely hairy . . . . . 2. *Z. fruticosa*
3b. Peduncle and involucral bracts stipitate glandular or hairy and stipitate glandular, leaves stipitate glandular or stipitate glandular and hairy or surfaces glabrous, margins ciliate 4

4a. Peduncle, involucral bracts and leaves densely stipitate glandular . . . . . .3. *Z. glandulosa*
4b. Peduncle and involucral bracts hairy and stipitate glandular, leaves stipitate glandular and hairy or surfaces glabrous, margins ciliate 5

5a. Leaf surfaces glabrous, margins ciliate or ciliate-denticulate 6
5b. Leaves (minutely) stipitate glandular and hairy 7

6a. Shrub up to 1.5(2.4) m high, leaves up to 50(–130) mm long and up to 6(8) mm broad, margins ciliate or ciliate-denticulate, capitula arranged in many-headed, often dense corymbs, involucre up to 8(10) mm high and up to 15(17) mm broad across upper part . . . . . 4. *Z. nervosa*
6b. Erect or decumbent dwarf shrub up to 500 mm high, leaves up to 30 mm long and up to 3 mm broad, margins ciliate, capitula solitary or in few-headed corymbs, involucre up to 5(6) mm high and up to 9(10) mm broad across upper part . . . . . .5. *Z. ciliaris*

7a. Leaves linear-triangular or linear, up to 35(40) mm long, (densely) stipitate glandular, sparsely to densely hairy, margins entire or rarely minutely 1- or 2-denticulate, twin hairs on cypselae clavate, apices not separated, rounded or obtuse . . . . . 6. *Z. hirsuta*
7b. Leaves (very) narrowly obovate, linear-oblong, linear-elliptic, up to 25(30) mm long, (minutely) stipitate glandular and hairy, margins entire, minutely 1- or 2-denticulate or with 1 or 2 pairs of teeth or lobes, twin hairs on cypselae clavate-like, apices separated, acute to obtuse or cypselae glabrous . . . . . 7. *Z. leiocarpa*

8a. Surfaces of involucral bracts glabrous, margins and apex may be ciliate 9
8b. Surfaces of involucral bracts hairy, stipitate glandular or hairy and stipitate glandular, innermost sometimes ± glabrous 13

9a. Capitula usually corymbosely arranged terminally on branches, cypsela with clavate twin hairs . . . . . .8. *Z. corymbosa*
9b. Capitula solitary, ovaries and cypsela with filiform or clavate-like twin hairs, rarely glabrous 10

10a. Peduncle stipitate glandular and hairy . . . . . .9. *Z. macrocarpa*
10b. Peduncle hairy, not glandular 11

11a. Leaves succulent or semi-succulent, middle and inner involucral bracts broad in upper part, narrowly oblong or obovate, apices bluntly acute, with single main vein or veins not distinguishable but with distinct oil glands . . . . . 10. *Z. glabra*
11b. Leaves herbaceous or rigid, middle and inner involucral bracts narrow in upper part, ± narrowly oblong, linear-elliptic, narrowly ovate or very narrowly obovate, apices acute to acuminate, inner 3-veined 12

12a. Leaves narrow, linear to linear-triangular, 1.0–2.5 mm broad, confined to the Western Cape . . . . . 11. *Z. taxifolia*
12b. Leaves broader, elliptic, oblong, narrowly obovate, 2.5–12.0 mm broad, confined to the eastern border of the Western Cape Province in the Outeniqua Mountains and the western border of the Eastern Cape Province in the Tsitsikamma Mountains . . . . . .12. *Z. outeniquae*

13a. Peduncle, where visible, hairy, not glandular . . . . . 13. *Z. capensis*
13b. Peduncle stipitate glandular or glandular and hairy 14

14a. Rosulate perennial herbs; stipitate glands on peduncle and involucral bracts with dark heads; disc cypselae fertile . . . . . 14. *Z. pilosella*
14b. Erect or sometimes decumbent, ascending shrubs, dwarf shrubs, suffrutices, perennial herbs, rarely annual herbs; stipitate glands colourless or with reddish transverse walls; disc cypselae sterile, fertile or some outer developing pseudo-cypselae 15

15a. Stems and leaves stipitate glandular (sometimes minutely stipitate glandular) and hairy 16
15b. Stems glabrous or hairy, not glandular, leaves glabrous, hairy and/or stipitate glandular (sometimes minutely stipitate glandular) 18

16a. Involucral bracts not 3-veined, ray florets yellow, lemon or pale lemon yellow, rarely white . . . . . 18a. *Z. ecklonis* subsp. *ecklonis*
16b. Inner involucral bracts 3-veined (sometimes only faintly 3-veined), ray florets various shades of blue, mauve or white 17

17a. Ray cypselae 4 × 2.0(–2.5) mm, with clavate-like twin hairs or rarely glabrous, involucre (5.5–)6.0–10.0 mm high, pappus bristles 3.0–4.0(–4.5) mm long . . . 17a. *Z. montana* var. *montana*
17b. Ray cypselae 2–3 × 1.0–1.2(–1.8) mm, with filiform twin hairs, involucre 3.0–4.5(–5.0) mm high, pappus bristles 1.5–3.0 mm long . . . . . 20c. *Z. microcephala* subsp. *glandulosa*

18a. Leaves sparsely to densely stipitate glandular (sometimes minutely stipitate glandular) and bristly hairy, rarely without non-glandular hairs 19
18b. Leaves glabrous, hirsute or bristly hairy, not glandular 22

19a. Ray florets yellow, pale yellow, pale lemon yellow or cream, stipitate glands on peduncles and involucral bracts usually with reddish transverse walls, cypselae 2.5–3.2 × 1.4–2.0 mm, with filiform twin hairs 20
19b. Ray florets various shades of blue, mauve or white, stipitate glands on peduncles and involucral bracts without reddish transverse walls, cypselae 3.5–4.0 × 1.4–2.0(–2.5) mm, glabrous or with clavate-like twin hairs 21

20a. Upper leaves often with few stipitate glandular hairs abaxially on upper part and margins, peduncle (15–)20–40(–45) mm long, flowering time September and October . . . . . 18c. *Z. ecklonis* subsp. *strictifolia*
20b. Surfaces of lower leaves sparsely stipitate glandular or eglandular, surfaces of upper leaves densely stipitate glandular, peduncle (45–)60–85(–125) mm long, flowering time December and January . . . . . 18d. *Z. ecklonis* subsp. *longipedunculata*

21a. Leaves herbaceous, involucral bracts usually 3-veined (but not always obvious), ray ovaries/cypselae usually clavate-like twin hairy, rarely glabrous . . . 17a. *Z. montana* var. *montana*
21b. Leaves semi-succulent, involucral bracts not 3-veined, ray ovaries/cypselae glabrous . . . . . 17b. *Z. montana* var. *grauii*

22a. Involucral bracts not 3-veined 23

22b. Inner involucral bracts usually 3-veined (not always visible in all capitula of a specimen or only very faintly 3-veined). 31

23a. Stipitate glands on peduncles colourless, ray florets blue or white 24
23b. Stipitate glands on peduncles usually with red transverse walls, sometimes fading with age, ray florets blue, mauve, white, cream or yellow. 28

24a. Capitula small, involucre ≤ 6 mm high, ray cypselae ≤ 3 mm long, pappus bristles ≤ 3.0(3.5) mm long 25
24b. Capitula bigger, involucre ≥ 6 mm high, ray cypselae ≥ 3 mm long, pappus bristles ≥ 3 mm long 27

25a. Leaves obovate or narrowly obovate, flat, stems and leaves densely hirsute . . . . . 15a. *Z. decumbens* var. *decumbens*
25b. Leaves linear, linear-oblong, narrowly elliptic or very narrowly obovate, flat or slightly folded lengthwise, stems and leaves glabrous or sparsely to densely bristly hairy 26

26a. All capitula on a specimen sessile or shortly pedunculate . . . 20b. *Z. microcephala* subsp. *foliosa*
26b. Most capitula on a specimen usually distinctly pedunculate . . . . . 20a. *Z. microcephala* subsp. *microcephala*

27a. Twin hairs on ray cypselae filiform, leaves obovate or narrowly obovate, margins entire . . . . . 15b. *Z. decumbens* var. *grandis*
27b. Ray cypselae glabrous or with clavate-like twin hairs, leaves very narrowly obovate, narrowly elliptic or linear or very narrowly obovate in outline, margins entire or 1- or 2-denticulate . . . . . 17. *Z. montana*

28a. All capitula on a specimen sessile or shortly pedunculate . . . 20b. *Z. microcephala* subsp. *foliosa*
28b. Most capitula on a specimen usually distinctly pedunculate 29

29a. Inner involucral bracts usually obovate, bluntly or shortly acute, ray florets usually various shades of blue, purple, mauve, sometimes white, rarely cream or pale yellow . . . . . 20a. *Z. microcephala* subsp. *microcephala*
29b. Inner involucral bracts narrowly oblong to narrowly ovate, acute to acuminate, ray florets yellow, (pale) lemon yellow, pale yellow, cream or white 30

30a. Stems sparsely to densely softly woolly hairy, often also with tufts of silky hairs in especially upper leaf axils, capitula solitary or in few-headed corymbs. . . . . 18b. *Z. ecklonis* subsp. *oligocephala*
30b. Stems usually glabrous, rarely bristly hairy, capitula solitary . . . 18c. *Z. ecklonis* subsp. *strictifolia*

31a. Stems and leaves densely hirsute, leaves obovate to narrowly obovate, flat . . . 16. *Z. spathulata*
31b. Stems and leaves glabrous or sparsely to densely bristly hairy, leaves linear, narrowly oblong, linear-elliptic, linear-triangular or very narrowly obovate, flat or folded lengthwise 32

32a. All capitula on a specimen sessile or shortly pedunculate, leaves without embedded oil glands . . . . . 19. *Z. foliosa*

32b. Most capitula on a specimen usually distinctly pedunculate, leaves mostly with embedded oil glands 33

33a. Inner involucral bracts usually obovate, bluntly or shortly acute, capitula small, involucre 3–6 mm high, leaves small, up to 25 mm long (mostly 5–15 mm long) . . . . . 20a. *Z. microcephala* subsp. *microcephala*

33b. Inner involucral bracts usually narrow, acuminate, capitula bigger, involucre 5–8(–9) mm high, leaves up to 35 mm long . . . . . 21. *Z. lasiocarpa*

1. *Zyrphelis levis* (*Bolus*) *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011).

(Figures 14–17)

Gymnostephium leve Bolus: 138 (1905); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 329 (2000) (as *laeve*); Manning & Goldblatt: 382 (2012) (as *laeve*).

Type: South Africa, Western Cape, Worcester (3319): In paludosis ad pedes montium Skurfdebergen prope Gydouw, Koude Bokkeveldt, 3200 ft. [In seasonal marsh/swamp at the foot of the Skurweberg near Gydo, Koue Bokkeveld, 3200 ft. (975 m)], (–AB), January 1888, *Bolus 8625* (BOL150619) (BOL!, lecto. – designated here; BOL (BOL138805) – image JSTOR!, PRE 4 sheets!, STE in NBG!, iso-lecto.).

Taxonomic note: Bolus (1905) cited three specimens in his original description: *Bolus 8625*, *Bolus 1169*, *Schlechter 10141*. Zinnecker-Wiegand (1990) and Ortiz & Zinnecker-Wiegand (2011) chose *Bolus 8625* as the type. A lectotype should have been designated. As H. Bolus donated his herbarium to the University of Cape Town and the herbarium was later named after him, the BOL specimen is designated here as the lectotype. Ortiz & Zinnecker-Wiegand (2011) did not quote the *Bolus 8625* specimens housed in BOL.

Sparsely branched, erect, slender, annual or perennial herb, up to 600 mm high. *Stems* glabrous, sometimes tinged reddish or reddish brown basally. *Leaves* alternate, sessile, linear to linear-filiform, 10–60 × 0.5–1.5 mm, erect, apex acute, mucronate, margin entire, blade flat or folded lengthwise, glabrous except for few cilia basally sometimes, sometimes with few embedded oil glands. *Capitula* radiate, solitary or in few-headed loose, open corymbs, pedunculate. *Peduncle* up to 180 mm long, glabrous, bracteate; *peduncular bracts* 2–9 per peduncle, 1.5–8.0 mm long, lower bracts linear to linear-triangular, upper very narrowly ovate to ovate, bases often swollen, glabrous, margins rarely shortly ciliate or fimbriate, margins of upper bracts occasionally broadly membranous, often with embedded oil glands along main vein. *Involucre* obconical to broadly obconical, 5–7 mm high by 4–9 mm across upper part. *Involucral bracts* arranged in 4 rows, imbricate, outer shorter than inner, glabrous; *outer row* semi-elliptic to ovate or obovate, 2.5–3.5 × 1–2 mm, apex obtuse to rounded or acute, margin broadly membranous, faintly fimbriate, slightly keeled and Y-shaped thickened basally, stereome fenestrated, often with oil glands along main vein; *second row* semi-elliptic to obovate, 3.0–4.2 × 1.5–2.2 mm, apex obtuse to rounded or acute, margin membranous, fimbriate, basally slightly keeled and Y-shaped thickened in lower half, stereome fenestrated, often with oil glands along main vein; *third row* obovate, oblong or narrowly elliptic, 4–6 × 2.0–2.5 mm, apex obtuse to broadly acute, margin membranous, fimbriate-ciliate, basally keeled and Y-shaped thickened, stereome fenestrated, with oil glands along main vein; *fourth row* narrowly obovate, 4.0–5.2 × 1.2–2.0 mm, apex ± bluntly acute to obtuse, margin membranous, shortly ciliate or fimbriate in upper part and around apex, keeled and Y-shaped thickened in lower half, stereome fenestrated, with oil glands along main vein. *Ray florets* female, fertile, corolla blue, pale saxe blue, lilac or white, *tube* 1.5–2.5 mm long, sometimes with few glandular hairs in upper part and around mouth, *limb* 3.0–5.5 mm long, 3-dentate. *Style* 1–2 mm



Figure 14. Scan of *Zyrphelis levis* specimen (*Esterhuysen 32853*, BOL).



Figure 15. *Zyrphelis levis*: A, glabrous leaves and stems (*Esterhuysen 32853*, PRE); B, glabrous peduncle (*Low 12159*, NBG); C, capitulum showing glabrous involucral bracts with broad membranous margins and oil glands along main veins (*Schlechter 10141*, PRE); D, glabrous ray cypsela (*Esterhuysen 32853*, PRE).

long, bifurcate, *style branches* linear-elliptic, 0.5–0.8 mm long, often unequal, stigmatic areas marginal, confluent at apex. *Ovary* 2.0–2.2 mm long, narrowly obovate, glabrous or densely clavate twin hairy. *Cypselae* reddish brown, obovate, 2.5–3.0 × 1.2–1.5 mm, laterally compressed, with slightly thickened margin, glabrous or with clavate twin hairs, twin hairs with obtuse or acute apices; epicarpic cells of glabrous cypselae oblong in surface view, ± smooth, epicarpic cells in cypselae with twin hairs oblong in surface view, surfaces faintly to distinctly striate, often with central protuberances. *Pappus* of barbellate bristles, 2–3 mm long, caducous. *Disc florets* functionally male, sterile or few outer bisexual, fertile; corolla yellow, tubular, *tube* 2.0–2.5 mm long, 5-lobed, *lobes* 0.5–0.8 mm long, often with glandular hairs sub-apically, sometimes with resin ducts along margins and resin glands in lobe sinuses. *Anthers* 1.2–2.0 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 1.2–2.0 mm long, bifurcate; *style branches* 0.5–1.0 mm long; of fertile florets linear to ovate, stigmatic areas marginal, not confluent at apex, with deltoid apical appendages; of functionally male florets ovate, papillate, without stigmatic areas. *Sterile ovaries* very narrowly obovate or very narrowly elliptic to linear, 1.5–2.0 × 1.5 mm, glabrous, rarely with few clavate twin hairs

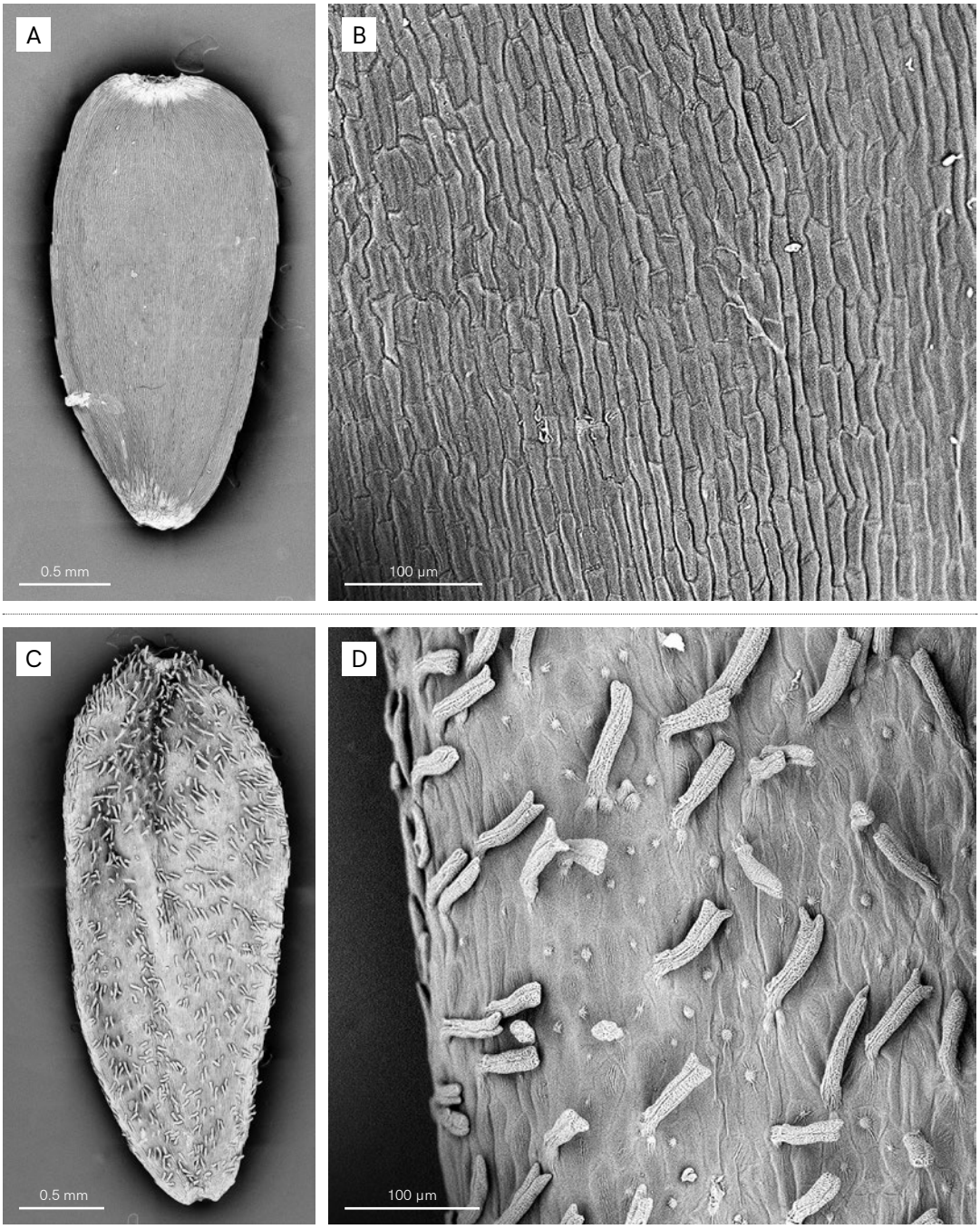


Figure 16. Scanning electron micrographs of ray cypsela of *Zyrphelis levis*: A, B, glabrous ray cypsela (*Esterhuysen 32853*, PRE); C, D, ray cypsela with clavate twin hairs (*Schlechter 10141*, PRE).

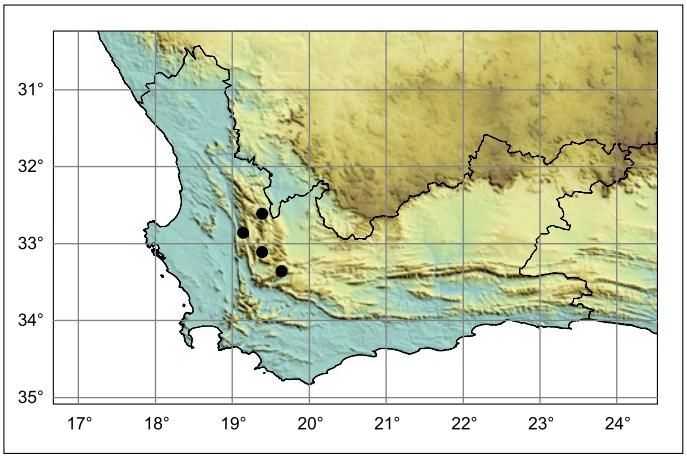


Figure 17. Distribution of *Zyrphelis levis*.

along one margin, sometimes with oil glands on shoulders. *Cypselae* in fertile disc florets brown, obovate, 2.0–2.5 × 1.0–1.5 mm, laterally compressed, glabrous, margin thickened, epicarpic cells smooth. *Pappus* of barbellate bristles, 2–3 mm long, caducous. *Flowering time*: November to January, April. Figures 14 to 16.

Diagnostic characters: *Zyrphelis levis* can be distinguished by the glabrous stems, leaves, peduncles, peduncular bracts as well as the glabrous, broad, involucral bracts, the caducous barbellate pappus bristles and the glabrous or clavate twin hairy cypselae.

Distribution: *Zyrphelis levis* occurs in the Koue Bokkeveld on the Skurweberge and on the east rand of the Hexrivierberge (Figure 17). It grows in seasonally wet sandy soil.

Conservation status: According to Helme et al. (2012b) its Red List Status is Rare, range-restricted but not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3219 (Wuppertal)**: Koude Bokkeveld, in montibus prope Tandfontein [Sandfontein], 4500 ft [in mountain near Tandfontein* [Sandfontein], 1371 m], (-CB), 25 January 1897, *Schlechter 10141* (PRE ×2, TvlMus1948, P e, S e); Kouebokkeveld, on Meulrivier, Vredelus farm, 920 m, (-CC), 10 November 2005, *Low 12159* (NBG). **3319 (Worcester)**: In graminosis humidis ad pedes montium Skurfdebergen prope Gydouw, 3100 ft. [in moist grassy places at the foot of the Skurweberg near Gydo, Koue Bokkeveld, 945 m], (-AB), December 1891, *Bolus 1169* (BOL, e); Ceres Division, Bokrivier at the N base of the Matroosberg, (-BC), 2 April 1972, *Esterhuysen 32853* (BOL, PRE ×2).

**Note*: The locality of *Schlechter 10141* is stamped on some labels as 'Tandfontein', a misinterpretation of Sclechter's handwriting. According to Jessop (1964) it should be Sandfontein.

2. *Zyrphelis fruticosa* *(DC.) Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1196 (2011).

(Figures 18–26)

Gymnostephium fruticosum DC.: 300 (1836); Harv.: 67 (1865); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 329 (2000); Manning & Goldblatt: 382 (2012).

Type: South Africa, Western Cape Province, Montagu (3320): Swellendam Division, Zwischen Sparrbosch und Trado, 2000–3000 Fuss, 25 Juli 1831 [Between Sparrbosch and Tradouw, 2000–3000 ft (609–914 m), 25 July 1831], (–DC), *Drège* 3696 (K000273628) (K, holo.; P – image, S (S-G-2974), iso.).

Slender, sprawling, dwarf shrubs, sparsely branched. *Stems* herbaceous or woody, pale brown, brown or reddish brown, older parts with old leafbase remains, upwards greenish, sometimes tinged reddish, glabrous or bristly hairy. *Leaves* alternate, sessile, erect, spreading horizontally or deflexed, blade flat, margin entire, revolute, surfaces glabrous or bristly hairy, with embedded oil glands, main vein prominent on lower surface. *Capitula* radiate, solitary, terminal and axillary, pedunculate; peduncle sometimes tinged reddish. *Involucre* obconical to campanulate. *Involucral bracts* in 3 or 4(5) rows, imbricate, outer shorter than inner, surfaces glabrous, apices often tinged reddish. *Ray florets* female, fertile, corolla pale blue, blue, saxe blue, purple or white, limb 3-dentate. *Style* bifurcate; *style branches* with stigmatic areas marginal, confluent at apex. *Cypselae* glabrous. *Pappus bristles* few or seemingly absent, plumose in upper part, nude basally, caducous. *Disc florets* functionally male, corolla yellow, 5-lobed, lobes with sub-apical glandular hairs, often with resin ducts along margins. *Anthers* 5, 1.5–2.0 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* papillate, without stigmatic areas. *Ovary* linear, ± 0.5–1.5 mm long, glabrous, sterile. *Pappus bristles* plumose in upper part, nude basally, caducous.

Key to varieties

1a. Annual or weak perennial herb?, capitula small (involucre 4–5 × (3–)4–6 mm; involucral bracts up to 4 mm long; limb of ray floret 3.0–4.5 mm long, tube of disc floret 2.5–3.0 mm long) . . . . . 2c. var. *gracilis*

1b. Shrublets with bigger capitula (involucre (5)6–8 × (3–)6–10(–11) mm; involucral bracts up to 6.5(–7.0) mm long; limb of ray floret up to 8.5 mm long, tube of disc floret 3–4 mm long) . . . 2

2a. Stems and leaves glabrous . . . . . 2a. var. *fruticosa*

2b. Stems and leaves bristly hairy . . . . . 2b. var. *pilosa*

2a. **Zyrphelis fruticosa** var. **fruticosa**

Shrublet, up to 500 mm high, stems woody, glabrous. *Leaves* scattered along stems but usually more densely set at bases of peduncles, linear, narrowly oblong or very narrowly obovate, (9–)13–35(–37)



Figure 18. Scan of *Zyrphelis fruticosa* var. *fruticosa* specimen (*Haynes 1485*, PRE).

× 1.5–4.0(–4.5) mm, apex acute, mucronate, glabrous, rarely with few short cilia at bases of upper leaves, surfaces sometimes with embedded oil glands. *Peduncle* (4–)11–60 mm long, sparsely to more densely, softly hairy, bracteate. *Peduncular bracts* (0)2 to 8(11) per peduncle, sometimes tinged pinkish, linear, linear-triangular, linear-ovate, narrowly ovate to ovate, (2.5–)3.0–7.0(–10.0) mm long, apex acute to acuminate, bases sometimes semi-amplexicaul and swollen, margins softly ciliate, surfaces glabrous, usually with embedded oil glands along main vein. *Involucre* narrowly to broadly cup-shaped to campanulate or obconical, (5–)6–7(–8) mm high and (3–)6–10(–11) mm broad across upper part. *Involucral bracts* in 4(5) rows, imbricate, outer shorter than inner, glabrous; *outer row* oblong-elliptic, narrowly ovate to ovate, (2–)3–4 × 1.0–1.5(–1.8) mm, apex acute, margin narrowly membranous, ± fimbriate-ciliate, usually narrowly V- or Y-shaped thickened, stereome fenestrated, usually with oil glands along main vein; *second row* oblong, narrowly ovate, ovate or obovate, (2.5–)4.0–4.5(–4.8) × 1.0–1.6(–1.8) mm, apex acute, margin membranous, ciliate, Y- or V-shaped thickened, stereome fenestrated, sometimes 3-veined, with oil glands along vein(s); *third row* elliptic, narrowly ovate or narrowly obovate, (4.0–)5.0–6.5 × 1.5–2.0 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate



Figure 19. *Zyrphelis fruticosa* var. *fruticosa*: A, glabrous leaves with embedded oil glands (*Esterhuysen 26220*, BOL); B, non-glandular, softly hairy peduncle (*Esterhuysen 26220*, BOL); C, capitulum showing glabrous, 3-veined involucral bracts with oil glands along main veins (*Haynes 1485*, PRE); D, glabrous ray cypsela (*Haynes 1485*, PRE).

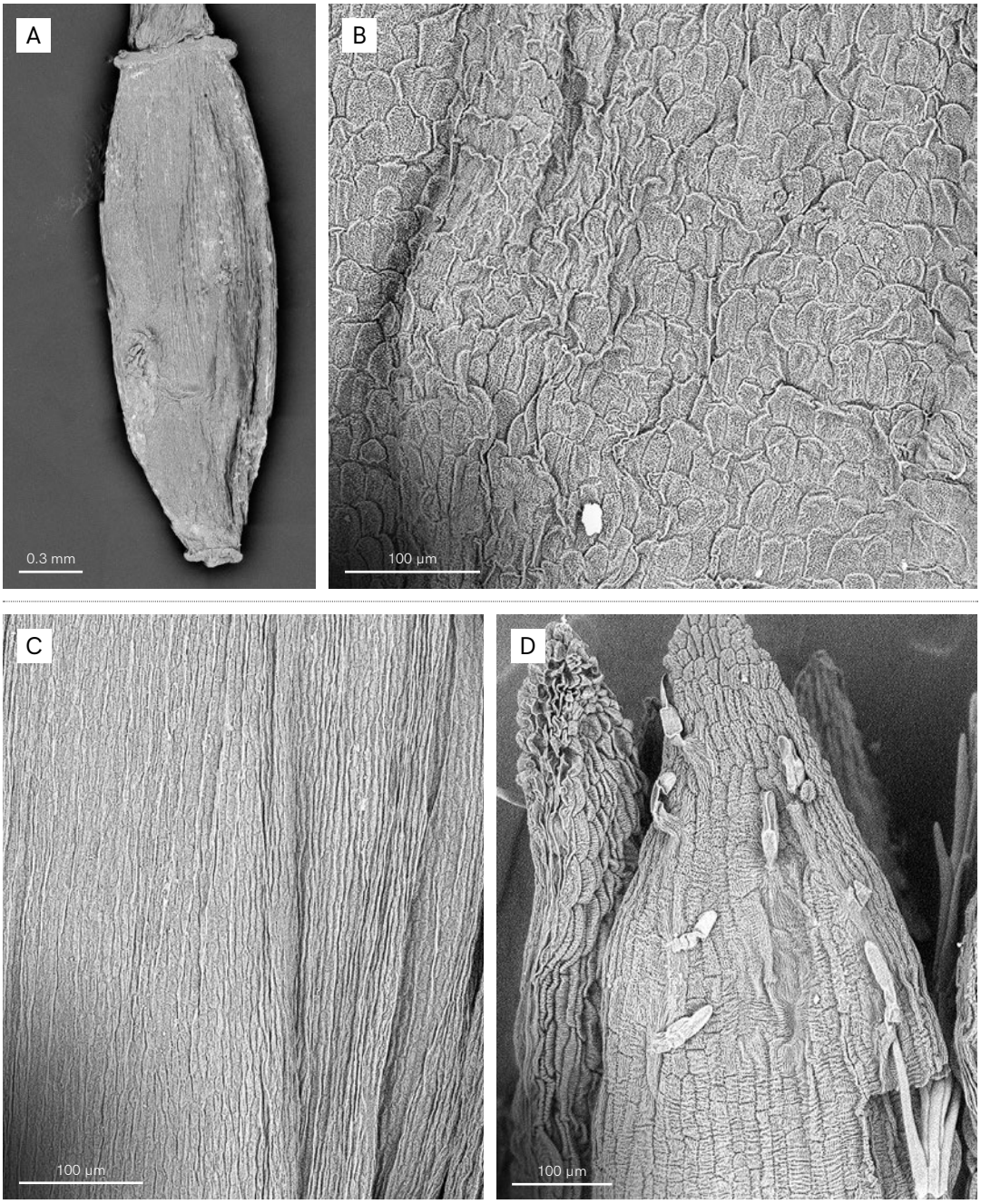


Figure 20. *Zyrphelis fruticosa* var. *fruticosa*: scanning electron micrographs of A, B, glabrous ray cypsela with densely rugose epicarpic cells (A, *Haynes 1423* STE in NBG; B, *Wurts 287* NBG); C, glabrous ray ovary (*Esterhuysen 34517*, BOL); D, sub-apical glandular hairs on disc lobes (*Esterhuysen 34517*, BOL).

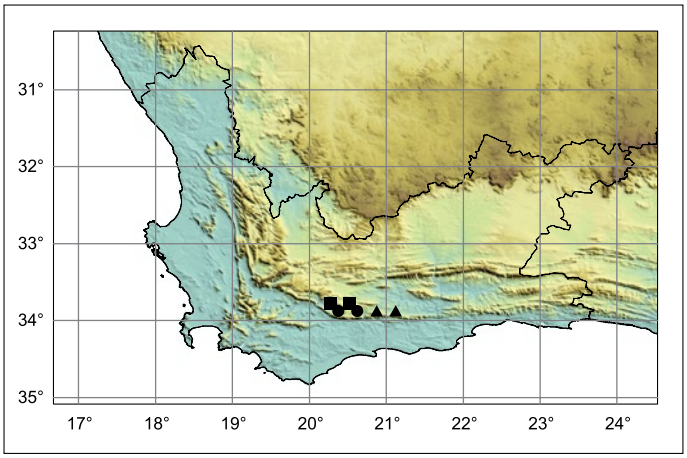


Figure 21. Distribution of *Zyrphelis fruticosa*: var. *fruticosa* ■; var. *pilosa* ▲; and var. *gracilis* ●.

in upper part, sometimes slightly keeled basally, Y- or V-shaped thickened, stereome fenestrated, usually 3-veined and with oil glands along vein(-s); *fourth row* narrowly obovate, obovate or elliptic, (4.5–)6.0–6.5 × (1.0–)1.5–2.0 mm, apex acute, margin membranous, ciliate in upper part, sometimes keeled in lower part, V- or Y-shaped thickened, stereome fenestrated, 3-veined, usually with oil glands along veins; sometimes a *depauperate inner row* very narrowly elliptic, 4.8–6.0 × ± 1.2 mm, apex acute, margin membranous, ciliate, Y-shaped thickened, stereome fenestrated, 3-veined with oil glands along veins. Corolla of *ray florets* pale blue, blue, saxe blue or purple; *tube* 1.5–2.0 mm long, with some glandular hairs on tube and around throat; *limb* 5.0–8.5 mm long. *Style* 1.0–2.5 mm long, *style branches* linear-ovate or linear-elliptic, (0.8–)1.0 mm long, acute or obtuse. *Ovary* and *cypselae* obovate to elliptic, 2.0–2.5 mm long, glabrous; epicarpic cells densely rugose. *Pappus bristles* few, 3–4 mm long, plumose in upper part, nude below, caducous or seemingly absent. Tube of *disc floret* 3–4 mm long; with few glandular hairs all along tube or concentrated around first widening; *lobes* (0.5–)1.0 mm long. *Style* 2–3(–4) mm long; *style branches* narrowly ovate or linear-elliptic, 1.0–1.2 mm long. *Pappus bristles* few, 3–4 mm long, plumose in upper part, nude below, caducous. *Flowering time*: March, July to September. Figures 18 to 20.

Diagnostic characters: The var. *fruticosa* can be distinguished by the glabrous stems and leaves, rarely with a few short cilia at the bases of the upper leaves, the sparsely to more densely, softly hairy peduncles, the glabrous, 3-veined involucral bracts, the glabrous ray cypselae with densely rugose epicarpic cells and the caducous pappus bristles, which are plumose in the upper part.

Distribution: *Zyrphelis fruticosa* var. *fruticosa* is endemic to the Langeberg, its distribution extends from the Clock Peaks at Swellendam to Barrydale (Tradouwspas) (Figure 21).

Conservation status: According to Kamundi et al. (2012) the Red List status of this taxon (species) is Least Concern – although it is range-restricted (EOO 610 km^2), it is locally fairly common in well-protected montane areas where it is not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3320 (Montagu)**: Swellendam Division, One o'clock Peak, upper S slopes, 4000 ft. [1219 m], (-CD), 4 August 1956, *Esterhuysen 26220* (BOL, PRE, STE in NBG); Swellendam Division, Twelve o'clock Pk, Langeberg, steep S slopes, 3500 ft. [1067 m], (-CD), 2 September 1956, *Esterhuysen 26266* (BOL, PRE); Swellendam Division, Langeberg above Swellendam, along the approach to Goedgeloof Peak, from the Clock Peaks path, on SE slope above small valley, 4200 ft. [1280 m], (-CD), 6 March 1977, *Esterhuysen 34517* (BOL); Swellendam, Swellendam State Forest, S upper slopes of Kop, east of Elfuurkop, 4000 ft. [1219 m], (-CD), 16 August 1977, *Haynes 1423* (PRE, STE in NBG); Swellendam State Forest, S slopes of Elfuurkop, moist shady areas, 3400 ft. [1036 m], (-CD), 27 September 1978, *Haynes 1485* (PRE, PRF in PRE); Swellendam District, S side of the Crown Mt [12 uurkop], (-CD), 2500 ft. [762 m], 11 August 1952, *Wurts 287* (NBG).

Without locality: Afr. austr., 1837, *Drège* s.n. (K000273627) (K).

2b. **Zyrphelis fruticosa** *(DC.) Zinnecker-Wiegand* var. **pilosa** *P.P.J.Herman, var. nov.*

Differs from the typical variety by the bristly hairy stems and leaves.

Type: South Africa, Western Cape, Montagu (3320): Swellendam Division, Lemoenshoek Pk [now known as Grootberg], S slopes, streamsides and sheltered spots, 4000–5000 ft [1219–1524 m], (-DD), 15 September 1944, *Esterhuysen 10453* (BOL, holo.; NBG, PRE, iso.).

Shrublet, up to 400 mm high, stems woody, sparsely to densely bristly hairy. *Leaves* scattered along stems, sometimes more densely set at bases of side branches and peduncles, oblong, linear-elliptic or narrowly elliptic, (6–)8–15(–30) × 1.5–4.0(–5.0) mm, apex acute, mucronate, sparsely to densely bristly hairy on both surfaces, rarely some leaves glabrous but with ciliate margins, often with embedded oil glands. *Peduncle* (2–)15–50(–80) mm long, softly hairy, bracteate. *Peduncular bracts* (2)3 to 6(13) per peduncle, very narrowly ovate, linear-triangular, linear, 3.0–5.0(–6.5) mm long, surfaces glabrous, margins ciliate, bases often semi-amplexicaul and swollen, swollen bases sometimes tinged pink or reddish, sometimes with oil glands along main vein. *Involucre* obconical or cup-shaped, 6–8 mm high by (6–)7–9(–10) mm across apical part. *Involucral bracts* in 4 rows, imbricate, outer shorter than inner, glabrous; *outer row* narrowly ovate or narrowly triangular, (3.2–)4.0 × 1 mm, apex acute, margin membranous, fimbriate-ciliate, usually V- or Y-shaped thickened, stereome fenestrated, often with oil glands along main vein; *second row* narrowly elliptic, narrowly oblong to very narrowly ovate, (4.0–)4.8–5.0 × 1.0(–1.2) mm, apex acute, margin membranous, fimbriate-ciliate, V- or Y-shaped thickened, stereome fenestrated, sometimes 3-veined, with oil glands along vein(-s); *third row* narrowly elliptic or narrowly obovate, (5.5–)6.2(–6.5) × 1.2–2.0 mm, apex acute, margin membranous, fimbriate-ciliate, surface often keeled basally, V- or Y-shaped thickened, stereome fenestrated, 3-veined, sometimes with oil glands along veins; *fourth row* narrowly obovate or narrowly elliptic, (6.0–)6.5(–7.0) × (1.2–)1.5 mm, apex acute, margin membranous, fimbriate-ciliate, surface keeled basally, V- or Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins. Corolla of *ray florets* blue, *tube* 2.0(–2.2) mm long, *limb* 5–6(–7) mm long. *Style* (1.5–)2.0 mm long, *style branches* 1 mm long. *Ray ovary* linear or linear-elliptic, 2.0–2.5 mm long, glabrous. *Cypsela* light brown to brown, obovate to elliptic, (3.8–)4.0(–5.0) × 1.5–2.2 mm, laterally compressed, glabrous, with thickened, paler margin; epicarpic cells ± areolate in surface view, surfaces densely rugose. *Pappus* bristles few, 3.5 mm long, plumose in upper part, nude basally, caducous or seemingly absent. Tube of *disc floret* 3.0(–3.5) mm



Figure 22. Scan of the holotype of *Zyrphelis fruticosa* var. *pilosa* (*Esterhuysen 10453*, BOL).



Figure 23. *Zyrphelis fruticosa* var. *pilosa*: A, bristly hairy stem and leaves; B, glabrous ray cypsela with thickened margin; C, glabrous ray ovary; D, E, scanning electron micrographs of glabrous ray cypsela showing the ± areolate, densely rugose epicarpic cells. (A, B, D, *Esterhuysen 10453*, NBG; C, E, *Esterhuysen 10454*, PRE).

long, with occasional hair on lower part of tube; *lobes* 1 mm long. *Style* (2.0–)2.5–3.0 mm long; *style branches* narrowly ovate, 1 mm long. *Pappus bristles* few, 3–4 mm long, plumose in upper part, nude basally, caducous. *Flowering time*: June, September and October. Figures 22, 23.

Diagnostic characters: The var. *pilosa* can be distinguished by the sparsely to densely bristly hairy stems and leaves. Some *Z. outeniquae* specimens look similar to *Z. fruticosa* var. *pilosa* but the pappus bristles in that species are persistent and the twin hairs on the cypselae are very small clavate-like.

Distribution: *Zyrphelis fruticosa* var. *pilosa* is endemic to the Langeberg. Compared to var. *fruticosa*, its distribution extends a little further east, from Grootberg (Lemoenshoek Peak) to Garcias Pass (Figure 21).

Conservation status: The same Red List status will probably apply to this taxon as to the var. *fruticosa* as it gows in similar situations.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3320 (Montagu)**: Swellendam Division, Lemoenshoek Pk [now known as Grootberg], summit and N slopes, 5300 ft [1615 m], (-DD), 15 September 1944, *Esterhuysen 10454* (PRE); Heidelberg District, Swellendam, valley in Langeberg between Tradouw Pass and Lemoenshoek Peak, near a stream or on moist slope, 3000 ft [914 m], (-DD), 4 September 1977, *Esterhuysen 34617* (BOL). **3321 (Ladismith)**: Swellendam, mountains, Garcias Pass, 1000 ft [305 m], (-CC), 2 October 1897, *Galpin 4119* (PRE); Swellendam, Gysman's Hoek, District Riversdale, near summit of Langeberg, (-CC), June 1909, *Muir 5215* (400) (PRE).

2c. **Zyrphelis fruticosa** *(DC.) Zinnecker-Wiegand* var. **gracilis** *(Less.) P.P.J.Herman, comb. & stat. nov.*

Gymnostephium gracile Less.: 186 (1832); Nees: 253 (1833); DC.: 300 (1836); Harv. in Harv. & Sond.: 67 (1865); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994).
Zyrphelis gracilis (Less.) Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand: 1196 (2011).

Type: South Africa, Western Cape, Montagu (3320): In Tradouw, (-DC), Floret Majo, *Mundt et Maire s.n.* (S, holo.; P e iso.).

Slender, very delicate, presumably annual or weak perennial herb up to 430 mm high, stems glabrous. *Leaves* scattered along stems, linear, 8–25 × 0.5–1.2 mm, apex acute, mucronate, surfaces glabrous, rarely with few short cilia at bases of leaves. *Peduncle* 30–60 mm long, sparsely, softly hairy, bracteate. *Peduncular bracts* (0)1 to 4 per peduncle, linear, linear-triangular, narrowly ovate to ovate, 1.5–5.0(–8.5) mm long, surfaces glabrous, margins ciliate, sometimes with swollen bases. *Involucre* cup-shaped to obconical, 4–5 mm high by (3–)4–6 mm across upper part. *Involucral bracts* in 3 rows, imbricate, outer shorter than inner, glabrous; *outer row* ovate or broadly ovate, 2.0–2.5 × ± 1.2 mm, apex acute or obtuse, margin ciliate, V-shaped thickened, stereome fenestrated, with oil glands along main vein; *second row* elliptic or obovate, 3.5–4.0 × ± 1.4 mm, apex acute, margin membranous, ciliate, slightly keeled in lower part, V- or Y-shaped thickened, stereome fenestrated, often 3-veined, with oil glands along main vein(-s); *third row* narrowly obovate to obovate, 4 × 1.0–1.5 mm, apex acute, margin membranous, ciliate in upper part, V- or Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins. Corolla of *ray florets* white drying purplish-maroon, *tube* 1.0–1.2 mm long, *limb* 3.0–4.5 mm long. *Style* ± 1 mm long; *style branches* linear-elliptic, linear-triangular, 0.5–1.0 mm long. *Ovary* ±1 mm long, glabrous. *Cypsela* reddish or brownish, obovate, 3–4 × 1.5–2.0 mm, laterally compressed, glabrous; epicarpic cells ± areolate in surface view, surfaces densely rugose. *Pappus bristles* 3 mm long, sub-plumose, caducous or seemingly absent. Tube of *disc florets* 2.5–3.0 mm long, with occasional glandular hair on lower part of tube; *lobes* 0.5–1.0 mm long. *Style* 2.0–2.5 mm long; *style branches* oblong to narrowly obovate or ovate, 1 mm long. *Pappus bristles* few, 2.5–3.0 mm long, sub-plumose, caducous. *Flowering time*: November and December. Figures 24 to 26.

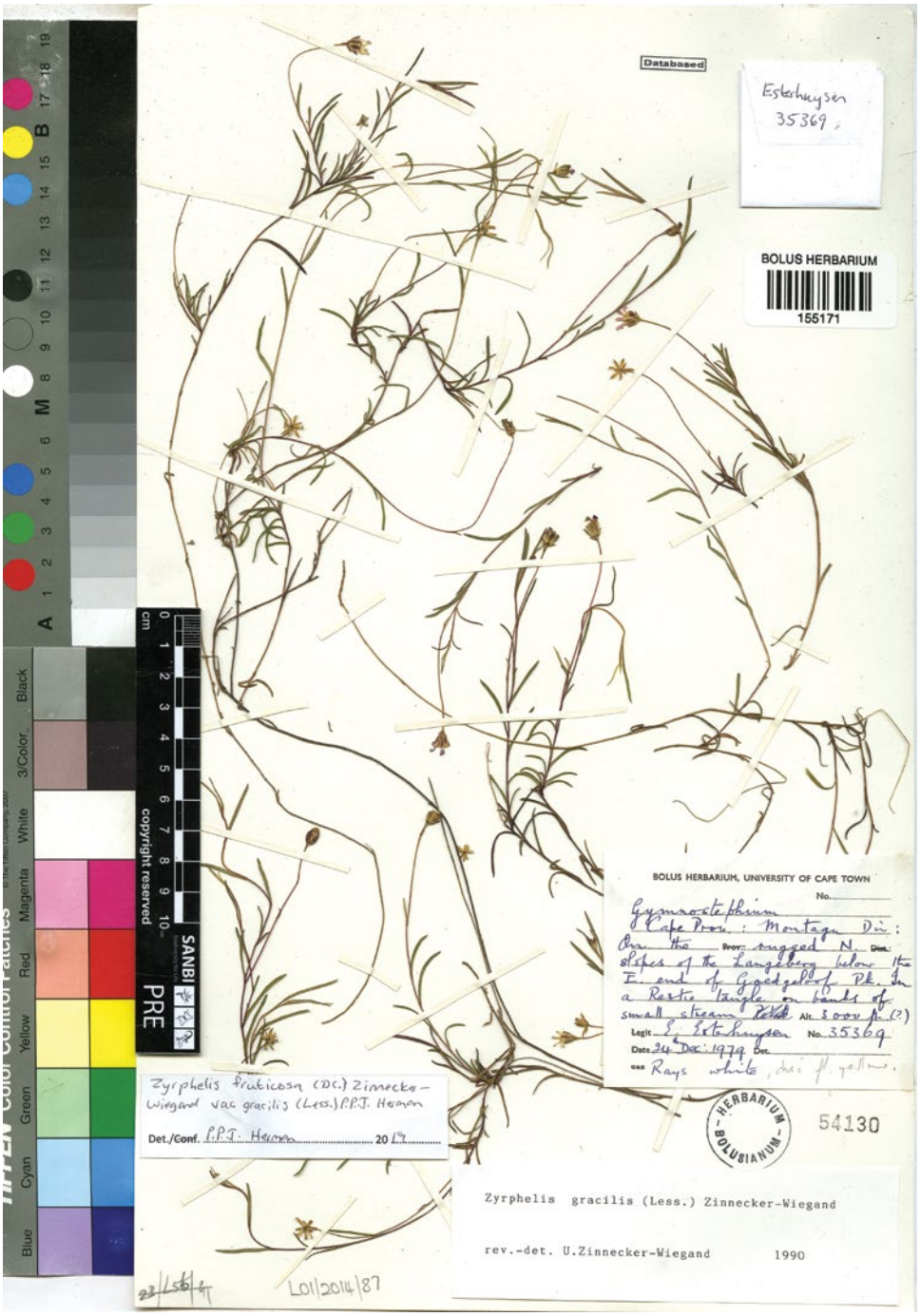


Figure 24. Scan of *Zyrphelis fruticosa* var. *gracilis* specimen (*Esterhuysen 35369*, BOL).



Figure 25. *Z. fruticosa* var. *gracilis*: A, glabrous leaves; B, sparsely softly hairy peduncle; C, capitulum with glabrous, 3-veined involucral bracts and oil glands along veins; D, glabrous ray cypsela (all *Esterhuysen 35369*, BOL).

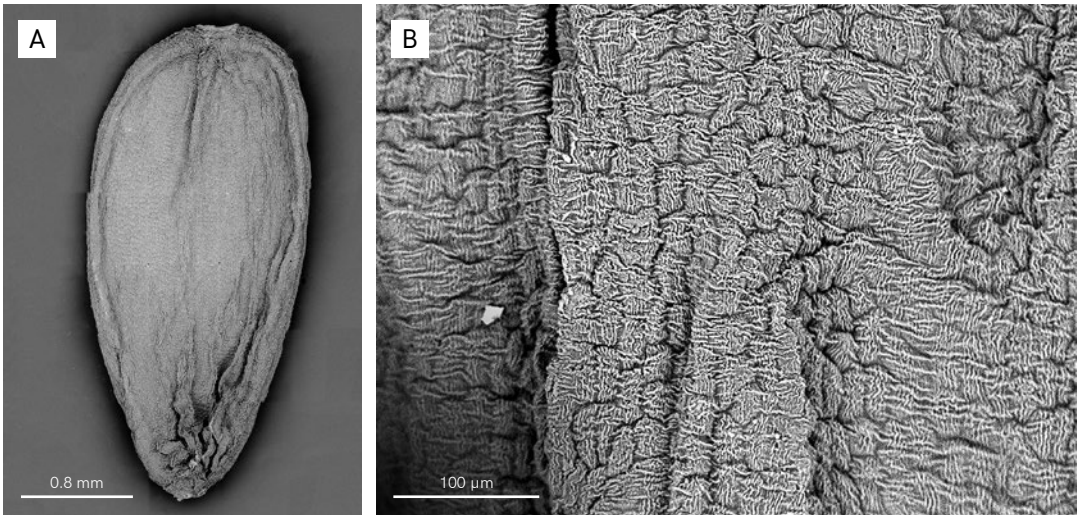


Figure 26. Scanning electron micrographs of A, B, glabrous ray cypsela of *Zyrphelis fruticosa* var. *gracilis* showing the ± areolate, densely rugose epicarpic cells (A, B, *Esterhuysen 35369*, BOL).

Diagnostic characters: Differs from the typical variety by being a slender (annual?) herb with small capitula, flowering later in the season. Only the type specimen and two additional collections were studied. The type specimen consists of a single branch with a fairly young capitulum. The peduncle is short and covered by peduncular bracts. It is therefore not possible to determine whether it has the same kind of indumentum as the other specimens studied. The other two specimens have sparsely hairy peduncles.

Distribution: Endemic to the Langeberg (Figure 21).

Conservation status: According to Von Staden (2012) the Red List status of this taxon [species] is Rare, but it is protected within the Marloth Nature Reserve and not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3320 (Montagu)**: Montagu Division, on the rugged N slopes of the Langeberg below the east end of Goedgeloof Pk, on the banks of a small stream, 3000 ft [914 m], (-CD), 24 December 1979, *Esterhuysen 35369* (BOL); Swellendam State Forest, Langeberg, Zuurplaats se Strome, along disused part of Swellendam Trail, in very damp situation, 1200 m, (-CD), 5 November 1987, *McDonald 1462* (PRE).

3. *Zyrphelis glandulosa* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1196 (2011).

(Figures 27–30)

Type: South Africa, Western Cape Province, Caledon (3419): Caledon Division, River Zonder Einde Mts [Riviersonderend Mountains], Schilpadkop, ridge, 3000 ft [914 m], (–BA), 2 January 1953, *Esterhuysen 21029* (BOL, holo.).

Erect dwarf shrub, up to 400 mm high, woody at base, ± corymbosely branched from base or from the middle or only in upper third, stems densely stipitate glandular. *Leaves* alternate, sessile, densely set to scattered along stems, erect or spreading, flat, linear or linear-elliptic, (10–)15–30(–50) × (1.0–)1.5–2.0(–3.0) mm, apex acute, mucronate, base semi-amplexicaul, sometimes briefly decurrent, margins entire or rarely minutely 1- to 3-denticulate [1 specimen, *Esterhuysen*, *5071* (PRE)], surface densely stipitate glandular. *Capitula* small, solitary, pedunculate; *peduncle* sometimes tinged reddish, (40–)50–80(–140) mm long, densely stipitate glandular, bracteate; *peduncular bracts* 1 to 4, narrowly ovate, linear-ovate to linear-triangular, 3.0–7.5 mm long, densely stipitate glandular, upper bracts usually with swollen bases. *Involucre* obconical, cup-shaped or campanulate, (5–)6(–7) mm high; (6–)7–8(–9) mm across upper part. *Involucral bracts* in 3 to 4, rarely 5 [1 specimen] rows, imbricate, outer shorter than inner; *outer row* linear-triangular, narrowly triangular to triangular or narrowly ovate, 3–4 × 0.5–1.4 mm, apex acute to acuminate, often tinged reddish, margin fimbriate, surface densely stipitate glandular, V-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *second row* narrowly ovate, 4 × 1 mm, apex acute to acuminate, often tinged reddish, margin narrowly membranous, fimbriate, surface stipitate glandular, V-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *third row* narrowly obovate or oblong, 5.0–6.2 × (1.0–)1.2 mm, apex acute, acuminate or bluntly acute to obtuse, reddish, margin narrowly membranous, fimbriate-ciliate, surface stipitate glandular, keeled, V- or Y-shaped thickened, stereome fenestrated, often 3-veined, sometimes with oil glands along vein(-s); *fourth row* linear to narrowly obovate, 5.2–6.0 × (0.8–)1.5 mm, apex acute, bluntly acute to obtuse, often tinged reddish, margin narrowly membranous, fimbriate-ciliate, surface stipitate glandular, keeled, Y-shaped thickened, stereome fenestrated, often 3-veined, sometimes with oil glands along vein(-s); *fifth row* (1 specimen) very narrowly elliptic, 5 × 0.5 mm, apex acute, margin membranous, fimbriate-ciliate, sparsely stipitate glandular, V-shaped thickened, stereome fenestrated. *Ray floret* female, fertile, corolla pale blue or pale mauve; *tube* 1.5(–1.8) mm long, glabrous or with glandular hairs in upper part and around mouth; *limb* 5(–6) mm long, 3- or ?4-lobed. *Style* 1.5–2.5 mm long, bifurcate; *style branches* narrowly ovate or linear-elliptic, 0.5–1.0 mm long, stigmatic areas marginal, confluent at apex. *Ovary* obovate or elliptic, 2.8–3.0 mm long, with clavate-like twin hairs, apices of twin hairs acute to obtuse. *Cypsela* brown, elliptic, 3.5 × 2 mm, laterally compressed, with thickened margin, clavate-like twin hairy or rarely glabrous, apices of twin hairs bluntly acute to obtuse; epicarpic cells of twin hairy cypselae with ± globose protuberances, smooth in surface view, epicarpic cells of glabrous cypselae ± areolate, flat and smooth in surface view; some glabrous cypsela observed in 1 specimen only [*Esterhuysen 5071* (PRE)]. *Pappus bristles* barbellate or sub-plumose, 2 mm long, caducous. *Disc floret* functionally male, corolla yellow; *tube* 2.5–3.0 mm long, glabrous, 5-lobed; *lobes* 0.5–1.0 mm long, with



Figure 27. Scan of *Zyrphelis glandulosa* specimen (*Esterhuysen 20785*, BOL).

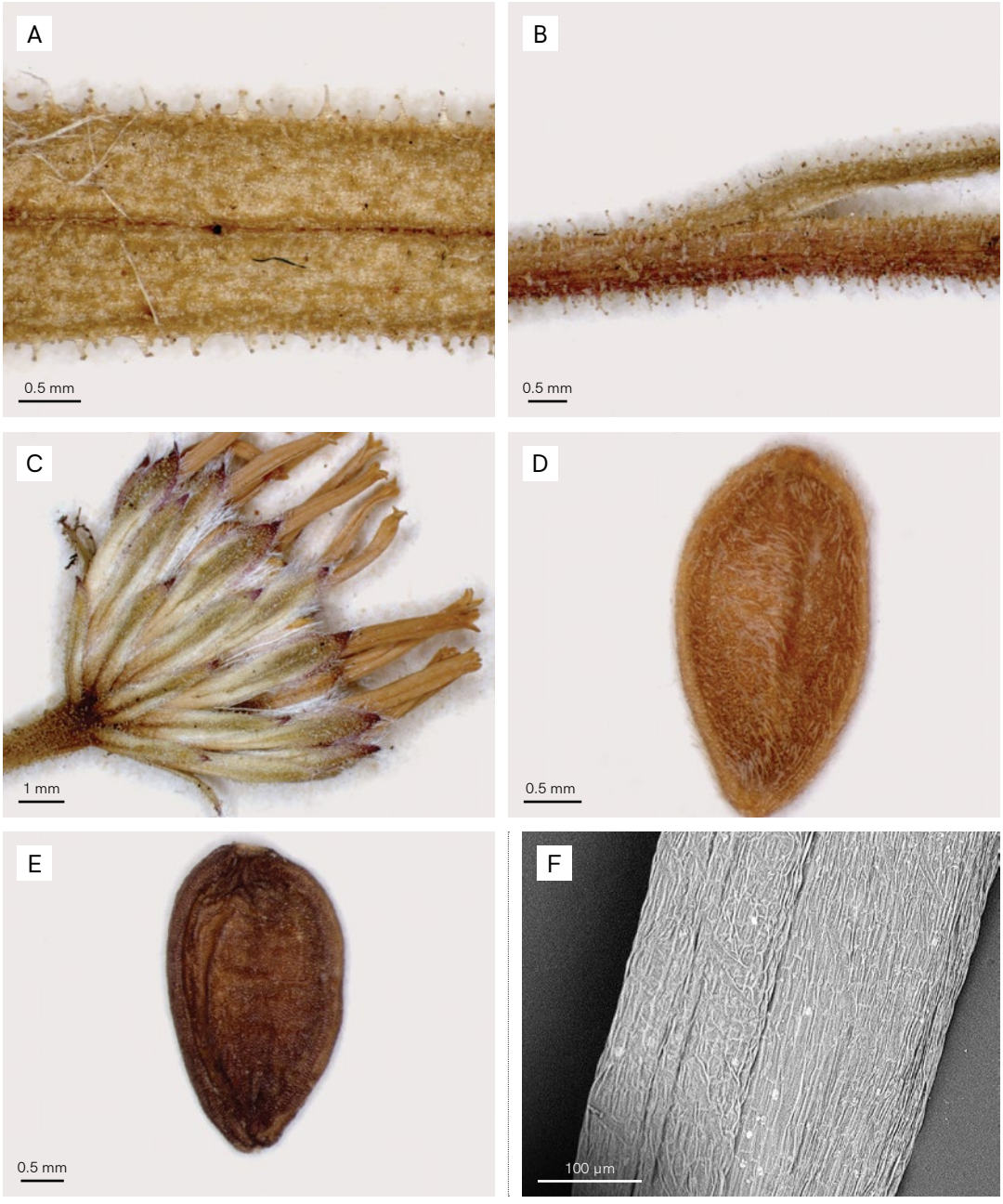


Figure 28. *Zyrphelis glandulosa*: A, densely stipitate glandular leaf (*Esterhuysen 20785*, BOL); B, densely stipitate glandular peduncle (*Esterhuysen 20785*, BOL); C, capitulum with stipitate glandular involucral bracts (*Esterhuysen 5071*, PRE); D, hairy and E, glabrous ray cypsela with thickened margin (*Esterhuysen 5071*, PRE); F, scanning electron micrograph of glabrous, sterile disc ovary (*Esterhuysen 5071*, PRE).

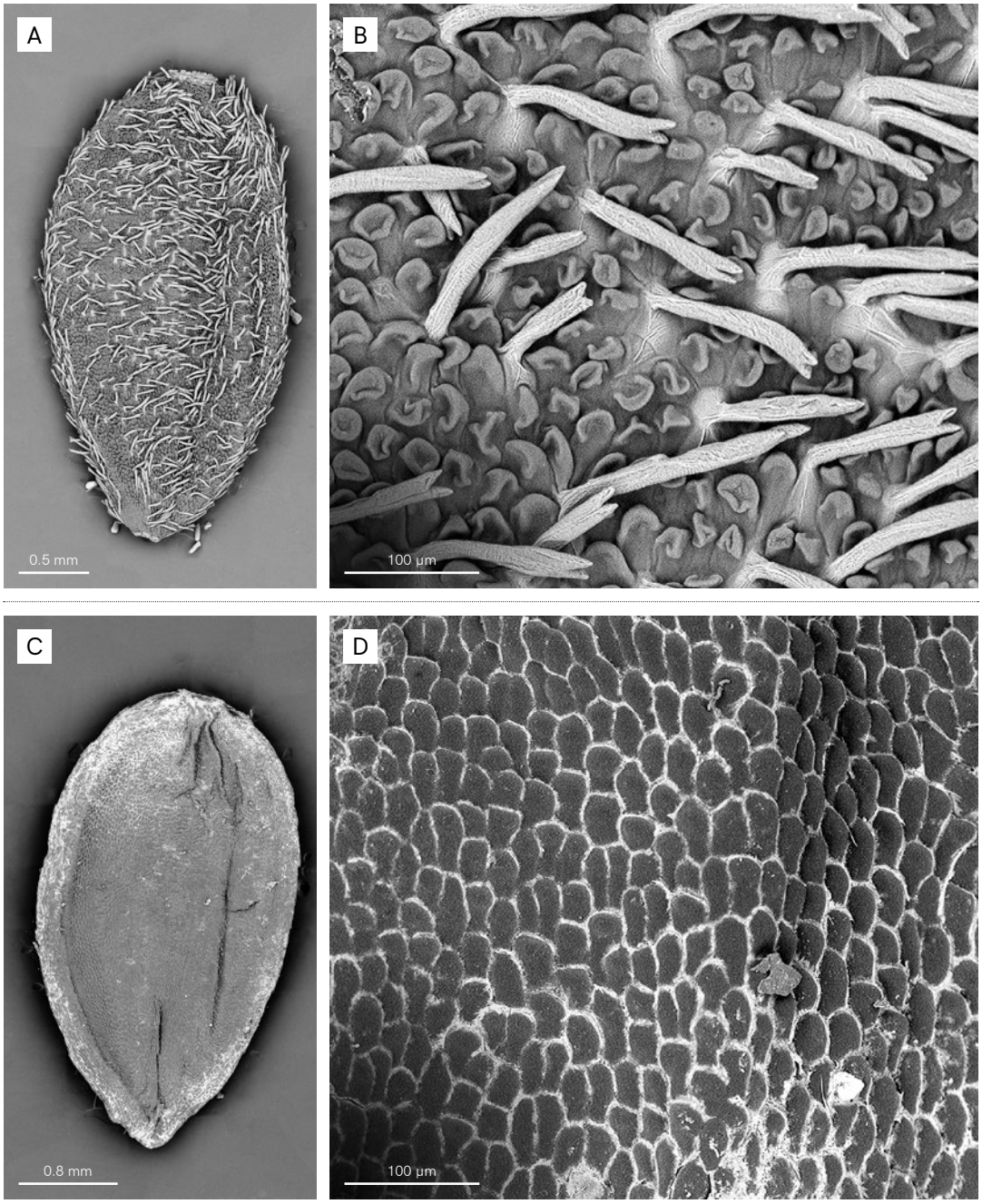


Figure 29. *Zyrphelis glandulosa*: scanning electron micrographs of A, B, ray cypsela with clavate-like twin hairs and epicarpic cells with smooth, ± globose protuberances; C, D, glabrous ray cypsela with ± areolate, flat and smooth epicarpic cells, margin thickened (all *Esterhuysen 5071*, PRE).

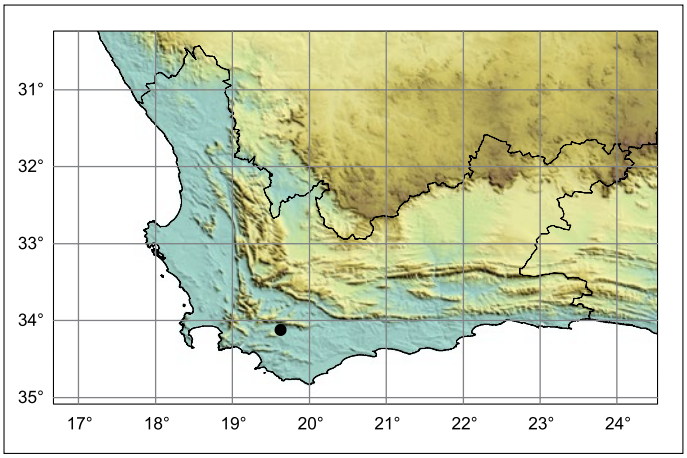


Figure 30. Distribution of *Zyrphelis glandulosa*.

sub-apical glandular hairs, with marginal resin ducts. *Anthers* 1.8(–2.0) mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.5–3.0 mm long, bifurcate; *style branches* elliptic or narrowly ovate, 1 mm long, papillate, without stigmatic areas. *Ovary* linear to linear-ovate, 2 mm long, glabrous, epicarpic cells oblong, flat and ± smooth in surface view. *Pappus bristles* barbellate, 2.5(–3.0) mm long, caducous. *Flowering time*: November, January and April. Figures 27 to 29.

Diagnostic characters: *Zyrphelis glandulosa* can be distinguished by the indumentum consisting of dense stipitate glandular hairs covering the stems, leaves, peduncles and involucral bracts, the linear leaves, the clavate-like twin hairs on the ray cypselae and the caducous barbellate pappus bristles. It superficially resembles *Z. hirsuta*, but the indumentum of that species consists of stipitate glandular hairs mixed with non-glandular bristle hairs and the leaves are mostly linear-triangular – from a broad base narrowing to a narrow, sharp tip. *Zyrphelis hirsuta* flowers earlier in the season (October) than *Z. glandulosa*.

Distribution: *Zyrphelis glandulosa* is distributed in a small area in the Riviersonderendberge (Figure 30). Except for the type specimen, which was collected in 1953, only two other specimens were studied, one collected in 1941 and the other in 1952.

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Vulnerable D2 as it is potentially threatened by competition from alien invasive plants.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: Caledon Division, S slopes of River Zonder Einde Mts [Riviersonderend Mountains], near Greyton, (Schilpadkop area), (–BA), 3500 ft [1067 m], 30 November 1952, *Esterhuysen 20785* (BOL).

Vague locality: Caledon Division, River Zonder Einde Mts [Riviersonderend Mountains], kloof on south side, (3419BA/BB), 12 April 1941, *Esterhuysen 5071* (PRE).

4. *Zyrphelis nervosa* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1198 (2011).

(Figures 31–34)

Agathaea corymbosa Turcz.: 60 (1851) (non *Z. corymbosa* (Harv.) Kuntze, 1891); Walp.: 172 (1858).

Gymnostephium corymbosum (Turcz.) Harv. in Harv. & Sond.: 68 (1865); Dyer: t. 952 (1944); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 328 (2000); Manning & Goldblatt: 381 (2012).

Type: South Africa, Western Cape Province, Caledon (3419): Caledon Distr., Near River Zonder Einde, Appelskraal, (–BB), September, *Zeyher 2741* (SAM, holo.; M (fragment), PRE, S, iso.).

Taxonomic note: Zinnecker-Wiegand annotated all the above type specimens (except the PRE specimen) as isotypes (*Isotypus*). However in her thesis (Zinnecker-Wiegand 1990) she designated the SAM specimen as the holotype (*Holotypus*).

Shrub up to 1.5(2.4) m high, ± solitary basally, branching upwards into corymbose flowering branches, stems glabrous, rarely few bristles on lower parts of stems. *Leaves* alternate, sessile, densely set, imbricate, erect or recurved, linear-triangular to narrowly triangular, (11–)20–50(–130) × (1.5–)2.0–6.0(–8.0) mm, flat or some lower leaves folded lengthwise, apex acute, sometimes mucronate, base semi-amplexicaul, briefly decurrent, margins entire, often thickened and pale to whitish, ciliate or ciliate-denticulate in basal half, cilia broad-based (cilia often break off, creating illusion of small teeth), upper parts of margins with or without cilia, sometimes some leaves without cilia, surfaces glabrous, often 3-veined from base but lateral veins fading soon upwards, sometimes with embedded oil glands. *Capitula* radiate, arranged in terminal corymbose synflorescences, seemingly racemose when young, pedunculate. *Peduncle* (15–)25–70(–150) mm long, bristly hairy and stipitate glandular, bracteate; *peduncular bracts* (3)4 to 12 per peduncle, similar to leaves but much smaller, linear-triangular, narrowly triangular to very narrowly ovate, 3–11(–20) mm long, stipitate glandular and often bristly hairy, lower bracts rarely glabrous, sometimes ciliate, often with oil glands along main vein, upper often with swollen bases. *Involucre* campanulate, broadly cup-shaped or broadly obconical, 5–8(–10) mm high by 9–15(–17) mm across upper part. *Involucral bracts* in 4 or 5(6) rows, imbricate, outer shorter than inner; *outer row* narrowly triangular, very narrowly ovate or narrowly ovate, 3.0–5.5 × 0.8–1.4 mm, apex acute to acuminate, often reddish, with tuft of few cilia around apex, margin sometimes narrowly membranous, sometimes with few cilia, surface stipitate glandular and usually bristly hairy, ± V-shaped thickened from base, stereome fenestrated, sometimes with oil glands along main vein; *second row* very narrowly ovate, narrowly triangular, narrowly oblong, very narrowly elliptic or very narrowly obovate, 3.8–6.5 × 0.5–1.5 mm, apex acute to acuminate, often reddish, tuft of few cilia around apex, margin sometimes very narrowly membranous in lower half, sometimes with few cilia in upper third, surface stipitate glandular and usually bristly hairy, sometimes slightly keeled, V- or Y-shaped thickened from base, stereome fenestrated, sometimes



Figure 31. Scan of *Zyrphelis nervosa* specimen (*Esterhuysen 18763*, PRE).

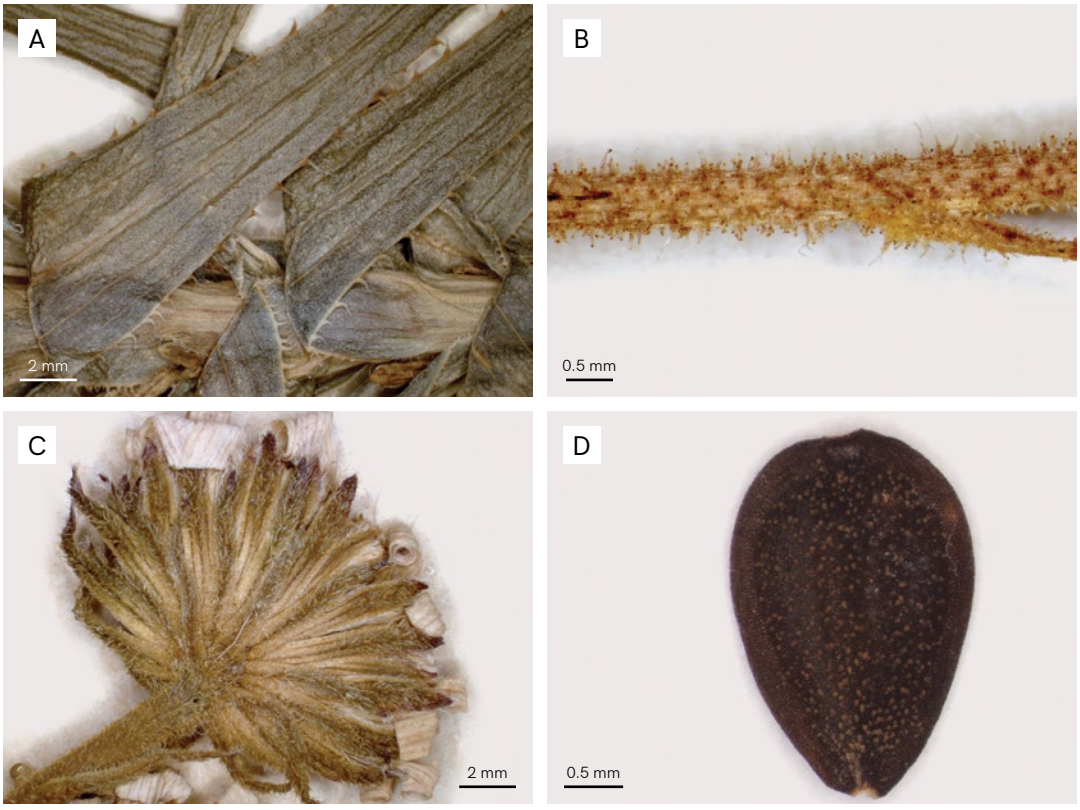


Figure 32. *Zyrphelis nervosa*: A, glabrous, ciliate-denticulate leaves showing the three veins basally (*Esterhuysen 18763*, PRE); B, bristly hairy and stipitate glandular peduncle (*Rycroft 3268*, NBG); C, capitulum showing 3-veined, bristly hairy and stipitate glandular involucral bracts (*Stokoe s.n.* PRE27170, PRE); D, ray cypsela with clavate twin hairs (*Rycroft 3268*, NBG).

3-veined, sometimes with oil glands along vein(-s); *third row* narrowly ovate, narrowly oblong, narrowly elliptic or narrowly obovate, 4.5–7.5 × 0.5–1.6 mm, apex acute to acuminate, often reddish, ciliate around apex, margin often very narrowly membranous, surface stipitate glandular and bristly hairy, keeled and V- or Y-shaped thickened from base, stereome fenestrated, often (2)3-veined, sometimes with oil glands along vein(-s); *fourth row* narrowly obovate, narrowly oblong to oblong, very narrowly ovate, 4.8–7.5 × 1–2 mm, apex acute to acuminate, often reddish, with tuft of hairs at apex, margin often membranous and ciliate in upper half or upper third, surface stipitate glandular and often bristly hairy, often keeled and V- or Y-shaped thickened, stereome fenestrated, 3-veined, often with oil glands along veins; *fifth row* narrowly oblong to very narrowly obovate or very narrowly elliptic, 4.2–8.0 × 1.0–1.5 mm, apex acute to acuminate, often reddish, margin narrowly membranous in middle part, ciliate in upper third or quarter and around apex, surface stipitate glandular and often bristly hairy in upper part, sometimes keeled, V- or Y-shaped thickened, stereome fenestrated, 3-veined; *sixth row* very narrowly obovate, 6.5 × 1 mm, apex acute, margin membranous,

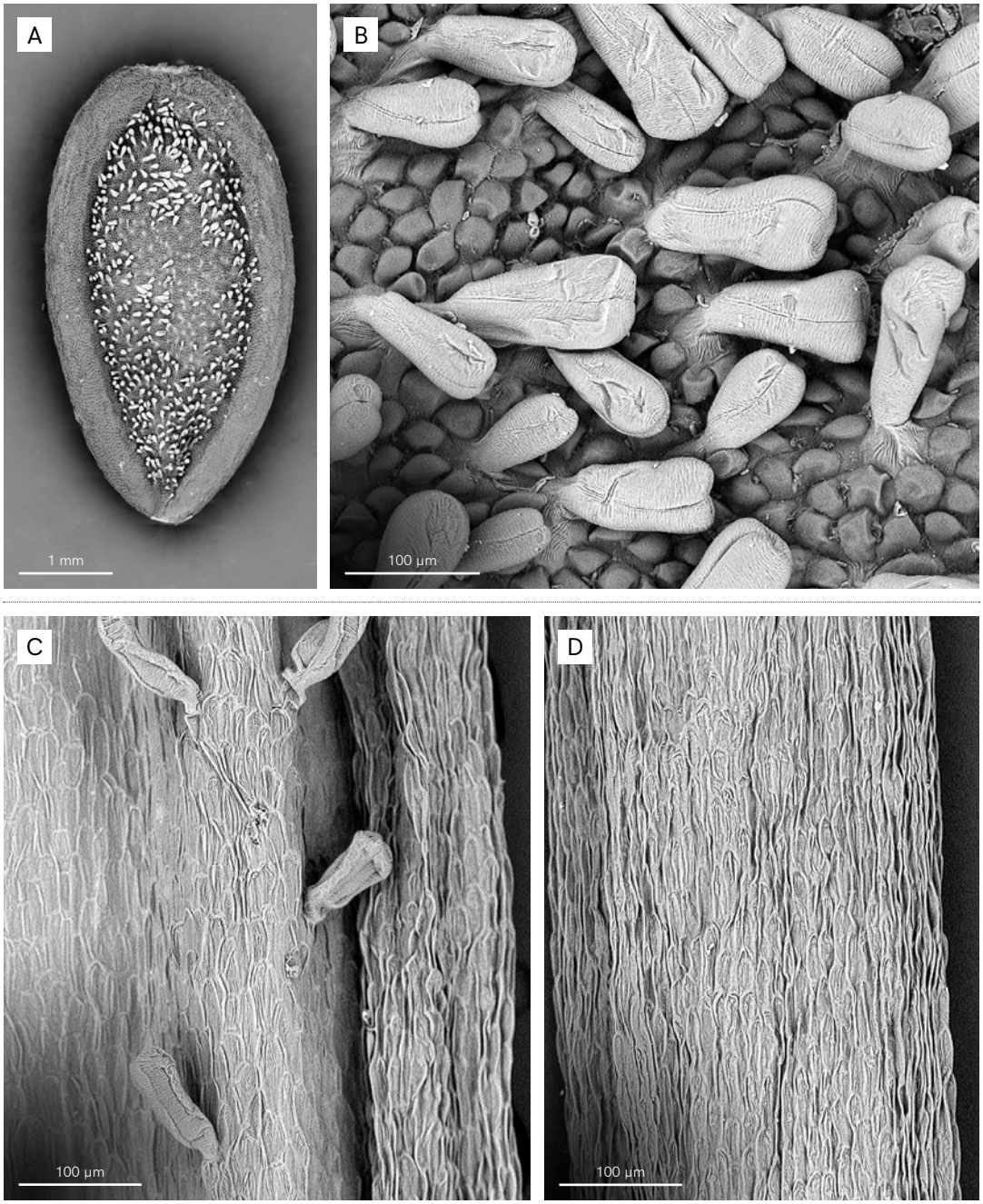


Figure 33. *Zyrphelis nervosa*: Scanning electron micrographs of A, B, ray cypsela with glabrous, thickened margin and surface with clavate twin hairs, epicarpic cells colliculate and smooth (A, B, *Esterhuysen 25074*, PRE); C, outer disc ovary with few clavate twin hairs (*Esterhuysen 25074*, PRE); D, inner glabrous disc ovary (*Oliver 10930*, NBG).

fimbriate-ciliate in upper part, surface stipitate glandular and few bristle hairs, keeled and V-shaped thickened at base, stereome fenestrated, 3-veined. *Ray florets* female, fertile, corolla white, white tinged pink, pink, mauve, saxe blue or violet-pink, *tube* 1.5–3.0 mm long, with glandular hairs on upper part of tube, *limb* (5–)6–11 mm long, 3-lobed, often with glandular hairs on lower part of limb. *Style* 1–2 mm long, bifurcate; *style branches* linear-elliptic to elliptic, narrowly ovate or ovate, 0.5–1.0 mm long, sometimes slightly unequal in length, stigmatic areas marginal, confluent apically. *Ovary* linear-elliptic to linear-obovate, 1.5–3.0 mm long, margin glabrous, ± thickened, carpopodium small, surface with clavate twin hairs. *Cypselae* brown, dark reddish brown or black, obovate to elliptic, 3–5 × 1.5–2.8 mm, laterally compressed, margin thickened and glabrous, surface with short, clavate, white twin hairs, epicarpic cells ± colliculate and smooth in surface view. *Pappus* of few barbellate bristles, 1.5–3.5 mm long, caducous. *Disc florets* functionally male, corolla yellow, tubular, *tube* 2.0–3.5 mm long, 5-lobed, *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs and often with resin ducts along margins. *Anthers* 1.5–1.8 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.5–2.2 mm long, bifurcate, *style branches* ± linear-deltoid, elliptic to narrowly ovate or oblong, 0.5–1.0 mm long, papillate, without stigmatic areas or in some brief stigmatic areas in sinusses of branches. *Ovary* sterile, elliptic or linear-elliptic, 1.0–3.2 mm long, glabrous; some outer ovaries very narrowly elliptic or very narrowly obovate, with ± thickened, glabrous margin but surface with few, short, clavate twin hairs; epicarpic cells oblong in surface view. *Pappus* of few barbellate bristles, 2.0–3.5 mm long, caducous. *Flowering time*: June to November. Figures 31 to 33.

Diagnostic characters: *Zyrphelis nervosa* is one of two species in the genus that grows to over 1 m high (the other one is *Z. corymbosa*). It is distinguished by the large capitula arranged in terminal corymbose synflorescences, the long, linear-triangular to narrowly triangular glabrous leaves with ciliate or ciliate-denticulate margins, the cypselae with clavate twin hairs and the barbellate, caducous pappus bristles. It looks very similar to *Z. corymbosa*: they have similar growth forms, similar looking leaves, corymbose synflorescences and both have clavate twin hairs on the ray cypselae. However in *Z. nervosa* the peduncle is stipitate glandular and bristly hairy, the peduncular bracts and the involucral bracts are stipitate glandular and bristly hairy, the pappus bristles are barbellate, caducous and its distribution is confined to the Riviersonderend Mountains while in *Z. corymbosa* the peduncle is bristly hairy, the peduncular bracts and the involucral bracts are glabrous, the pappus bristles are plumose, persistent and it occurs in the Klein River Mountains and Kogelberg area. *Zyrphelis outeniquae* resembles *Z. nervosa* and *Z. corymbosa* but is characterised by the solitary, large capitula, woolly peduncles, glabrous, ciliate peduncular bracts with embedded oil glands, glabrous or rarely sparsely woolly involucral bracts, plumose, persistent pappus bristles, sparse, very short clavate-like twin hairs on the ray cypselae and is confined to the Outeniqua Mountains at the eastern border of the Western Cape Province and the Tsitsikamma Mountains at the western border of the Eastern Cape Province. *Zyrphelis nervosa* also superficially resembles *Z. macrocarpa* and *Z. hirsuta*. See Table 2 (pg. 52) for comparison of these five taxa.

Distribution: *Zyrphelis nervosa* occurs in the Riviersonderendberge and is endemic to that area (Figure 34). It usually grows in damp conditions.

Conservation status: According to Helme & Raimondo (2012b) its Red List status is Critically Endangered C2a(i) as it is threatened by competition from alien invasive pines.

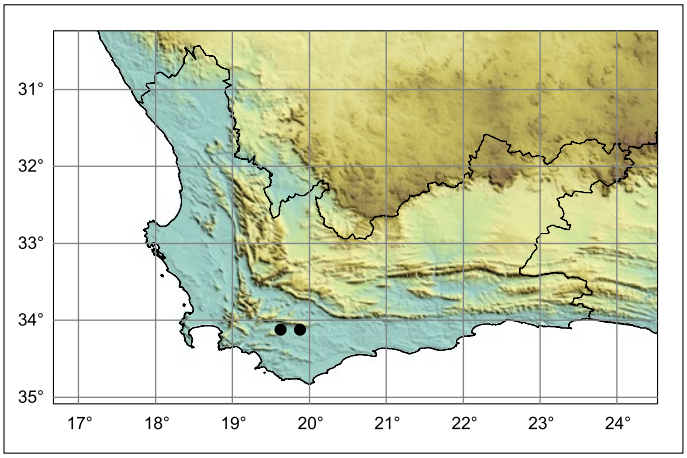


Figure 34. Distribution of *Zyrphelis nervosa*.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: Hardepeerkloof, Greyton Nature Reserve, S slopes of Riviersonderend Mountains, damp slopes in ravine, 360 m, (-BA), 21 September 1978, *Rycroft 3268* (NBG); Caledon Division, Rivier Sonderend [Riviersonderend] Mountains, slopes in kloof near Sonderend, (-BB), 20 November 1955, *Esterhuysen 25074* (BOL, PRE); Olifantsrivierkloof, steep sided valley running from Riviersonderend into the mountains, along river bank, (-BB), 15 July 1976, *Goldblatt 3590* (PRE); Riviersonderend Mountains, Pilaarkop, main ridge WNW of peak, rocky moist steep slope facing S, 4800 ft [1463 m], (-BB), 28 October 1997, *Oliver 10930* (NBG); Olifants River Kloof, Riviersonderend, in streambed, rooted in wet peaty soil, 650 ft [198 m], (-BB), 15 July 1976, *Rourke 1560* (PRE); River Sonder End [Riviersonderend] Mountains, Kloof Streams, 3000 ft [914 m], (-BB), no date, *Stokoe s.n.* PRE27170 (PRE); Bredasdorp Division, River Zonder Einde [Riviersonderend] Mountains, near River Zonder Einde, damp places near stream, (-BB), 14 June 1949, *Wilman 487* (BOL, PRE).

Without precise locality: Caledon Division, River Zonder Einde [Riviersonderend] Mountains, October 1940, *Stokoe 7594* (BOL155134) (BOL); Caledon Division, Rivier-sonder-End Mts [Riviersonderend Mountains], June 1949, *Stokoe s.n. SAM62005* (PRE); Caledon Division, Rivier Sonder End Mts [Riviersonderend Mountains], *Stokoe s.n. SAM57034* (PRE); River Zonder End [Riviersonderend], 2000 ft [610 m], 17 October 1945, *Stokoe s.n*. NBG0024246 (NBG); Caledon Division, Rivier-Sonderend [Riviersonderend] Peak, steep banks and stream sides on S slopes, 4500–5000 ft [1372–1524 m], 2 September 1951, *Esterhuysen 18763* (PRE).

Table 2. Comparison between *Zyrphelis corymbosa*, *Z. hirsuta, Z. macrocarpa*, *Z. nervosa*, *Z. outeniquae*

Name	Pappus bristles	Capitula arrangement	Peduncle hairs	Involucral bract hairs	Ray ovary twin hairs	Ray cypselae twin hairs	Distribution
Z. nervosa	barbellate, caducous	corymbose	stipitate glandular & bristly hairy	stipitate glandular & bristly hairy	clavate	clavate	Riviersonderend Mountains
Z. hirsuta	barbellate, caducous	solitary	stipitate glandular & bristly hairy	stipitate glandular & bristly hairy	clavate	clavate	Riviersonderend Mountains
Z. corymbosa	plumose, persistent	corymbose	bristly hairy	glabrous	clavate	clavate	Klein Rivier Mountains & Kogelberg
Z. macrocarpa	plumose, persistent	solitary	stipitate glandular & bristly hairy	glabrous	clavate-like twin hairs	not seen	Riviersonderend Mountains
Z. outeniquae	plumose, persistent	solitary	softly curly hairy	glabrous, rarely woolly hairs	glabrous or sparsely very short clavate-like twin hairs	few very short clavate-like twin hairs	Outeniekwa & Tsitsikamma mountains

5. *Zyrphelis ciliaris* *(DC.) Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1195 (2011).

(Figures 35–41)

Felicia ciliaris DC.: 221 (1836).

Gymnostephium ciliare (DC.) Harv. in Harv. & Sond.: 68 (1865); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 328 (2000); Manning & Goldblatt: 381 (2012).

Type: South Africa, Western Cape Province, Montagu (3320): Zwellendam, am Berge [on hills/mountains at Swellendam], (-CD/DC), 1836, *Drège 5842* (G-DC, holo. – image; P (P028738) e, iso.). [Probably Langeberg near Swellendam.]

Felicia kraussii Sch.Bip. in Walp.: 956 (1843); Sch.Bip.: 669 (1844).

Type: South Africa, Western Cape, Worcester (3319): In summitate montium (Baviansklоof) prope Gnadenthal, Zwellendam, 3000 ped., in Promontorio bonae spei [top of the mountain (Baviaansklоof) near Genadendal, Swellendam, 3000 ft [914 m], Cape of Good Hope], (-CC), Dec. 1839, *Krauss 537* (P (P029009) e, holo.; TUB e, iso.).

Note: It is uncertain whether the Krauss specimen in M is actually an isotype as there is a handwritten label attached to one of the specimens on the sheet with the number 5843 written on it.

Felicia ciliata Schltr. in Engl.: 201 (1899).

Type: South Africa, Western Cape, Worcester (3319): In saxosis, in summo cacumine montis "Baviansberg" prope Genadendal, in ditione Caledon, alt. 4800 ped. [In rocky/stony places on high peaks of Baviaansberg, near Genadendal, Caledon Distr., 4800 ft. [1463 m]], (-CC), 23 Dec. 1896, *Schlechter 9818* (S, holo.; BOL, PRE 2 sheets, iso.).

Heteractis falcata DC.: 469 (1837); DC. in Delessert: 29 (1839).

Type: South Africa, Western Cape, Worcester (3319): Gnadenthal, in der Babiansklоof und am Berg, an felsigen, meistens etwas schattigen und feuchten Oertern, 1000–2000 Fuss [Genadendal, in Baviaansklоof and on the mountain, on rocky, mostly shady and moist habitat, 1000–2000 ft [305–609 m]], (-CC), 27 October 1828, *Drège 1730* (P (P028733) e, holo.; K (K000273624) e, P (P028734) e, S (S07-9699) iso.) (locality information from Drège 1843).

Osteospermum falcatum E.Mey. ex DC. in Drège coll., *fide* DC. (1837: 469).

Erect or decumbent shrub or dwarf shrub. *Stems* mostly glabrous, sometimes bristly hairy. *Leaves* alternate, sessile, flat or folded lengthwise upwards, apex acute, base broad, margins entire, ciliate or eciliate; surfaces glabrous or upper leaves shortly bristly hairy on lower surface, sometimes with embedded oil glands. *Capitula* radiate, solitary or in few-headed corymbs, pedunculate; peduncle stipitate glandular and sparsely bristly hairy, bracteate. *Involucre* campanulate, semi-globose, cup-shaped

or obconical. *Involucral bracts* in 3 or 4 rows, imbricate. *Ray florets* female, fertile. *Cypsela* obovate, surface glabrous or with clavate twin hairs, margin usually thickened, glabrous. *Pappus bristles* barbellate, few, caducous. *Disc florets* functionally male, corolla with sub-apical glandular hairs and resin ducts along margins. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Ovary* linear or elliptic, glabrous or with microscopically small clavate twin hairs. *Pappus bristles* barbellate, few, caducous.

Key to subspecies

1a. Leaves 0.5–3.0 mm broad, base broad, semi-amplexicaul, often shortly decurrent, margins long ciliate at base of leaves, upper part of margin eciliate, rarely some leaves totally without cilia, peduncular bracts with ciliate margins and stipitate glandular surfaces, sometimes bristly hairy, involucral bracts stipitate glandular and sparsely bristly hairy . . . . . 5a. subsp. *ciliaris*

1b. Leaves 1.2–2.0 mm broad, base only slightly widened, with eciliate or basally shortly, sparsely and softly ciliate margins, peduncular bracts usually glabrous but ciliate, involucral bracts glabrous or occasionally bristly hairy . . . . . .5b. subsp. *angustifolia*

5a. **Zyrphelis ciliaris** subsp. **ciliaris**

Erect or decumbent dwarf shrub up to 300 mm high. *Stems* mostly glabrous, sometimes bristly hairy, often tinged reddish. *Leaves* alternate, sessile, densely set to scattered along stems, erect or recurved, flat basally, slightly folded lengthwise upwards, linear to linear-triangular, 6–22(–27) × 0.5–3.0 mm, apex acute, mucronate, base broad, semi-amplexicaul, often shortly decurrent, margins entire, shortly ciliate for its entire length or up to ¾ of leaf length or long ciliate at base of leaves, cilia decreasing in length upwards, upper part of margin eciliate, rarely some leaves totally without cilia; surface glabrous, occasionally upper leaves shortly bristly hairy on lower surface, sometimes with embedded oil glands. *Capitula* radiate, solitary or in few-headed corymbs, pedunculate. *Peduncle* (20–)35–100(–120) mm long, sometimes tinged reddish, stipitate glandular and sparsely bristly hairy, bracteate. *Peduncular bracts* 2 to 8 per peduncle, linear, linear-triangular, very narrowly ovate, 3–10(–13) mm long, margins ciliate, surface stipitate glandular, sometimes bristly hairy, bases often swollen. *Involucre* campanulate to semi-globose or cup-shaped, (3.5–)4.5–5.0(–6.0) mm high and (7–)8–9(–10) mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner; *outer row* linear-triangular or very narrowly ovate, 2.5–3.0 × 0.5 mm, apex acute, often reddish, with tuft of few hairs, margin very narrowly membranous in lower part, fimbriate, surface stipitate glandular and sparsely bristly hairy, V-shaped thickened, stereome fenestrated; *second row* narrowly triangular, narrowly ovate or narrowly obovate, 3.2–4.0 × 0.5–1.0 mm, apex acute, often reddish, with tuft of few hairs, margin membranous in lower part, fimbriate-ciliate, surface stipitate glandular and with few bristle hairs, V-shaped thickened, stereome fenestrated; *third row* narrowly elliptic, narrowly oblong or narrowly obovate, 4.0–4.8 × 0.8–1.0 mm, apex acute, often reddish, margin membranous, fimbriate basally, ciliate in upper part and around apex, surface stipitate glandular and few bristle hairs, keeled in lower part, V- or Y-shaped thickened, stereome fenestrated, often 3-veined, often with oil glands along veins; *inner row* narrowly elliptic or narrowly obovate, 3.5–4.5 × 1 mm, apex acute, reddish, margin membranous, fimbriate



Figure 35. Scan of the holotype of *Zyrphelis ciliaris* subsp. *ciliaris* (*Drège 5842*, G-DC).



Figure 36. *Zyrphelis ciliaris* subsp. *ciliaris*: A, glabrous but ciliate leaves; B, stipitate glandular and sparsely bristly hairy peduncle; C, capitulum showing stipitate glandular and sparsely bristly hairy, 3-veined involucral bracts; D, young, hairy ray cypsela (all *Bolus 6941*, PRE).

basally, ciliate in upper half and around apex, surface stipitate glandular, few bristle hairs, keeled basally, V-shaped thickened, stereome fenestrated, often 3-veined and often with oil glands along veins. *Ray florets* female, fertile, corolla blue, purple or violet, *tube* 1.0–1.8 mm long, with glandular hairs in upper part; *limb* 4.5 mm long, 4-veined. *Style* 1.0–1.5 mm long, bifurcate; *style branches* linear or very narrowly ovate, 0.5–0.6 mm long, obtuse, stigmatic areas marginal, confluent at apex. *Ovary* elliptic or narrowly obovate, 2.0–2.4 × 0.8–1.0 mm, with short, clavate twin hairs or seemingly glabrous. *Cypsela* black, obovate, 2.5–3.0 × 1.6–1.8 mm, laterally compressed, carpopodium distinct, surface glabrous or with few minute clavate twin hairs, margin usually thickened, glabrous; epicarpic cells in glabrous cypselae arranged ± in rows, ± oblong in surface view, flat and ± smooth. *Pappus bristles* barbellate, few, 1.5–2.0 mm long, caducous. *Disc florets* functionally male, corolla yellow, *tube* 2.0–2.5 mm long, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs and resin ducts along margins. *Anthers* 1.0–1.2 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.5–2.0 mm long, bifurcate; *style branches* ovate, 0.5–1.0 mm long, papillate, without stigmatic areas. *Ovary* linear or elliptic, ± 1 mm long, glabrous or with microscopically small clavate twin hairs. *Pappus bristles* barbellate, few, ± 2 mm long, caducous. *Flowering time*: October, December and April. Figures 35 to 37.

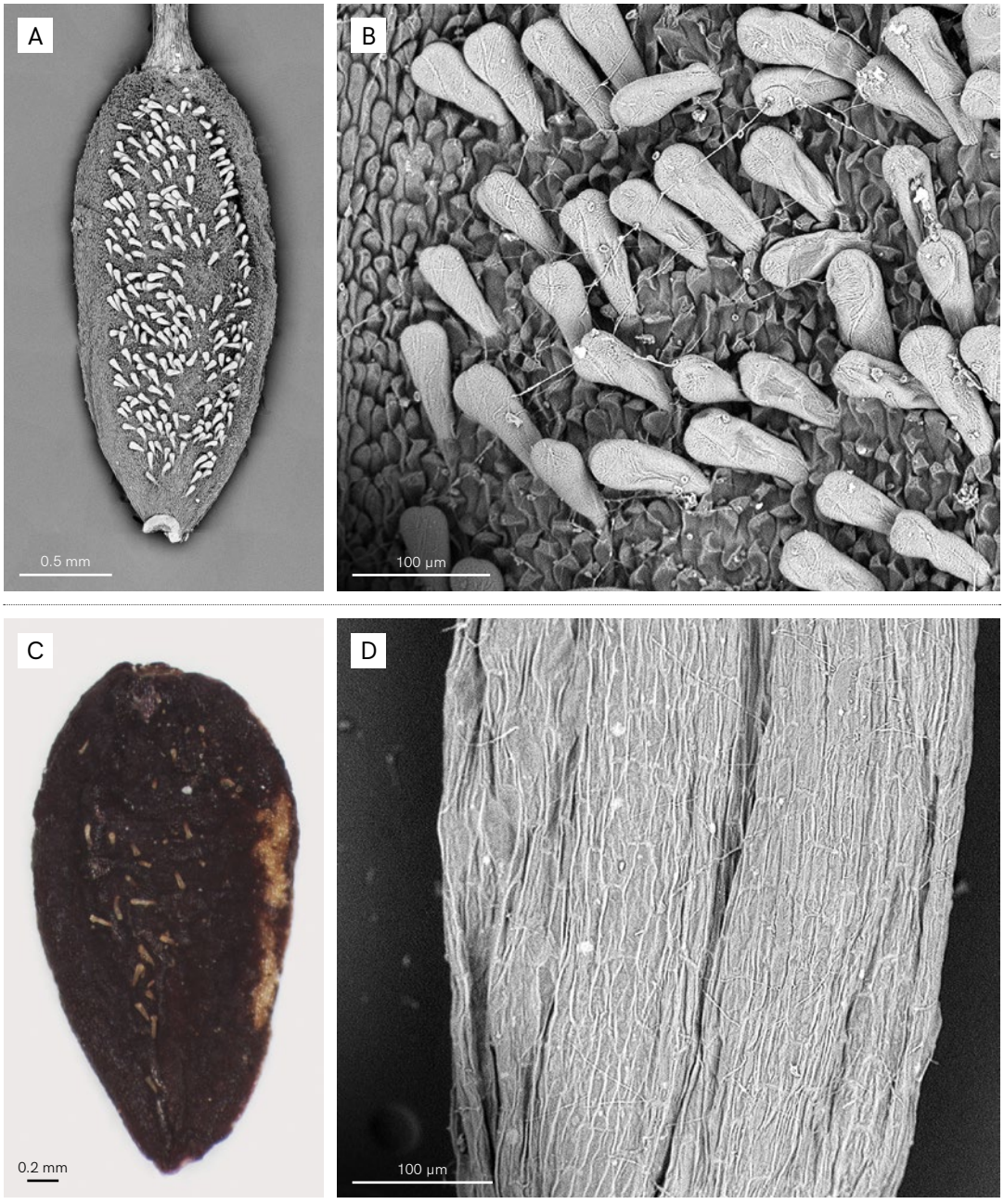


Figure 37. *Zyrphelis ciliaris* subsp. *ciliaris*: scanning electron micrographs of A, B, the young ray cypsela showing the clavate twin hairs and conspicuous carpopodium (*Bolus 6941*, PRE); C, stereomicrograph of the mature ray cypsela with few clavate twin hairs (*Schlechter 9818* (TvlMus1484), PRE); D, scanning electron micrograph of the sterile, glabrous disc ovary (*Bolus 6941*, PRE).

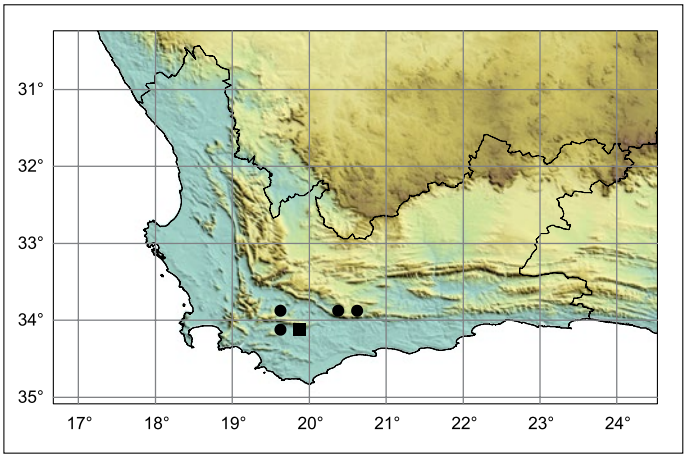


Figure 38. Distribution of *Zyrphelis ciliaris* subsp. *ciliaris* ●; and subsp. *angustifolia* ■.

Diagnostic characters: *Zyrphelis ciliaris* subsp. *ciliaris* can be distinguished by the linear to linear-triangular, glabrous leaves usually with ciliate margins, the stipitate glandular and (sparsely) bristly hairy peduncle and involucral bracts, the caducous, barbellate pappus bristles and the clavate twin hairs on the cypselae.

Distribution: *Zyrphelis ciliaris* subsp. *ciliaris* has its centre of distribution in the Riviersonderendberge, but the type was apparently collected in the Langeberg near Swellendam (Figure 38).

Conservation status: According to Helme et al. (2012a) the Red List status of this taxon is Data Deficient (DDD) as there is insufficient information about it. As it has been collected more than 100 years ago, this taxon remains too poorly known and it is not possible to determine its status (Helme et al. 2012a).

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: In summo monte prope Genadendal, 2000 ped. [on high mountain near Genadendal, 2000 ft. [609 m]], (–BA), Dec. 1894, *Bolus 6941* (BOL, PRE); Genadendal, in Montibus [in mountains], 3200 ft. [975 m], (–BA), 1 April 1897, *Schlechter 10300* (BOL), TvlMus 1661 (PRE).

5b. **Zyrphelis ciliaris** (*DC.*) *Zinnecker-Wiegand* subsp. **angustifolia** (*Harv.*) *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1195 (2011).

Gymnostephium angustifolium Harv. in Harv. & Sond.: 67 (1865); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 328 (2000); Manning & Goldblatt: 381 (2012).

Type: South Africa, Western Cape Province, Caledon (3419): Feuchte Stellen auf dem Berge am Rivierzonder Einde, [moist places in the mountains at Riviersonderend], (–BB?), Sept., *Zeyher 2743* (S, (S-G-2972), holo.; K, M 2× (fragments), NBG e, P ×2 e, iso.).



Figure 39. Scan of the holotype of *Zyrphelis ciliaris* subsp. *angustifolia* (*Zeyher 2743*, S).



Figure 40. *Zyrphelis ciliaris* subsp. *angustifolia*: A, narrow, glabrous leaves; B, stipitate glandular and bristly hairy peduncle; C, capitulum showing glabrous, 3-veined involucral bracts; D, ray cypsela with thickened margin (all *Zeyher 2743*, K).

Small shrub, ± 500 mm high, branches brown or reddish brown, glabrous. *Leaves* alternate, sessile, scattered along stems, erect, flat or mostly folded lengthwise, linear to linear-triangular, 8–30 × 1.2–2.0 mm, apex acute, bases slightly widened, margins of lower leaves eciliate or shortly and sparsely ciliate basally or half way up, margins of middle and upper leaves and at growth points softly and shortly ciliate basally, upper parts of margins eciliate, surfaces glabrous, sometimes with embedded oil glands. *Capitula* radiate, solitary, pedunculate. *Peduncle* 20–45 mm long, stipitate glandular and sparsely to more densely bristly hairy, bracteate. *Peduncular bracts* 3 to 9 per peduncle, linear-ovate to linear-triangular, 2–6 mm long, margins ciliate, surfaces glabrous or occasionally stipitate glandular, often with embedded oil glands, bases usually swollen. *Involucre* obconical, 4–5 mm high, 7–10 mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate; surfaces glabrous or with occasional bristle hairs in upper part along midline of inner bracts (K and M specimens), more bristly hairy and stipitate glandular(?) (S specimen); outer bracts with tuft of hairs at apex, inner bracts with membranous, ciliate margins, their surfaces V- or Y-shaped thickened, 3-veined. *Ray florets* with glandular hairs on tube. *Cypsela* brown, obovate, laterally compressed, with glabrous, thickened margin, surface

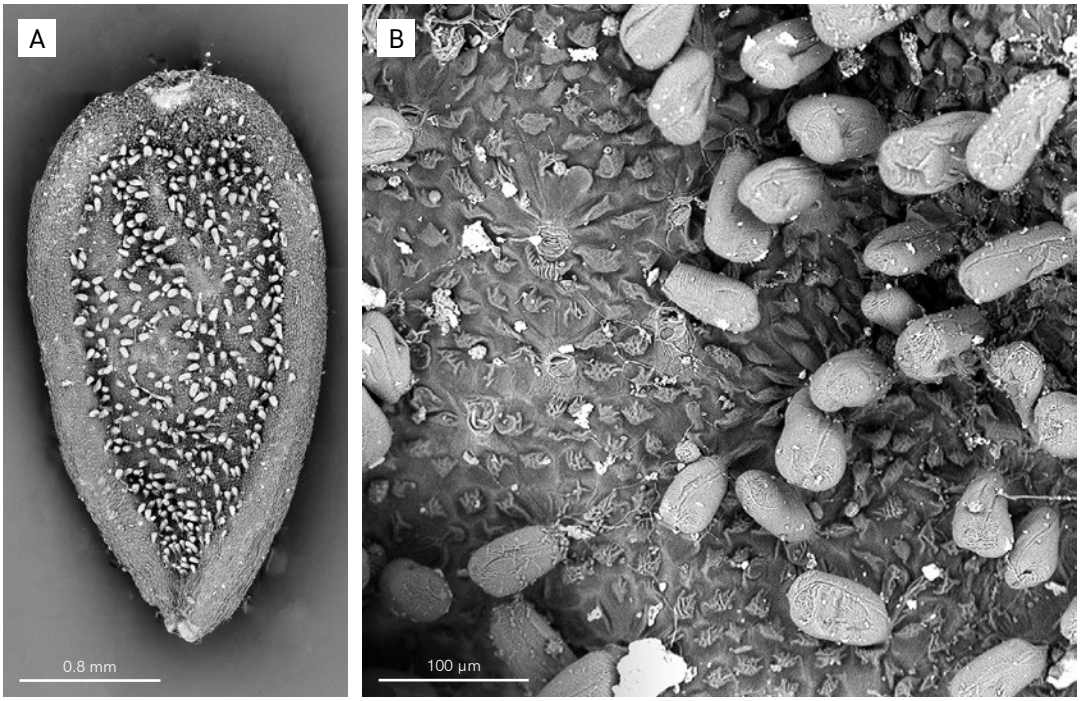


Figure 41. *Zyrphelis ciliaris* subsp. *angustifolia*: A, B, scanning electron micrographs of the ray cypsela showing the glabrous, thickened margin, the clavate twin hairs on the surface and the epicarpic cells with central, smooth or sometimes with striated protuberances (*Zeyher 2743*, K).

with clavate twin hairs; epicarpic cells in surface view ± colliculate and smooth, sometimes with small central, striated protuberance. *Pappus* of few barbellate bristles, caducous. *Disc florets* with subapical glandular hairs on lobes and resin ducts along margins; *tube* with glandular hairs in lower part. *Ovary* linear, glabrous, sterile. *Pappus* of few barbellate bristles, caducous. *Flowering time*: September. Figures 39 to 41.

Diagnostic characters: *Zyrphelis ciliaris* subsp. *angustifolia* can be distinguished from the typical species by the narrower leaves with eciliate or basally shortly, sparsely and softly ciliate margins, the usually glabrous but ciliate peduncular bracts, the glabrous or occasionally bristly hairy involucral bracts.

Distribution: *Zyrphelis ciliaris* subsp. *angustifolia* is only known from the type collection. The locality information is vague, but its distribution in the Riviersonderendberge is near to that of the typical species (Figure 38).

Conservation status: According to Helme & Von Staden (2012) the Red List status of this taxon is Data Deficient – Insufficient Information. It might perhaps only be an ecotype of the typical species, but for the time being it is kept as a separate entity until more material of both the subspecies is available.

6. *Zyrphelis hirsuta* *(Less.) P.P.J.Herman, comb. nov.*

(Figures 42–45)

Gymnostephium hirsutum Less.: 186 (1832); Nees: 254 (1833); DC.: 300 (1836); Harv. in Harv. & Sond.: 68 (1865); Bond & Goldblatt: 172 (1984); Nesom: 93 (1994); Goldblatt & Manning: 329 (2000); Manning & Goldblatt: 382 (2012).

Zyrphelis ciliaris (DC.) Zinnecker-Wiegand subsp. *hirsuta* (Less.) Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand: 1195 (2011).

Type: South Africa, Western Cape Province, Caledon (3419): Gnadenthal et Steenbockrivier ad Svarteberge [Genadendal and Steenboksrivier near Swartberg], (–BA), 1828, *Ecklon s.n*. (S, holo.).

Dwarf shrub or suffrutex, up to ± 400 mm high, corymbosely branched in upper part, stems densely stipitate glandular and bristly hairy. *Leaves* alternate, sessile, densely set or scattered along stems, erect or recurved, flat, rarely folded lengthwise, linear-triangular to linear, 12–35(–40) × (1.5–)2.5–3.0(–5.0) mm, apex acute, often mucronate, bases broad, semi-amplexicaul and often briefly decurrent, margins entire or some minutely 1- or 2-denticulate, surface densely stipitate glandular and sparsely to equally densely bristly hairy, often 3-veined from base, soon fading upwards. *Capitula* radiate, solitary (often on corymbose upper branches), pedunculate. *Peduncle* 22–120 mm long, densely stipitate glandular and bristly hairy, bracteate; *peduncular bracts* 1 to 6 per peduncle, filiform, linear to linear-triangular, (3.5–)4.0–15.0 mm long, bristly hairy and stipitate glandular, bases sometimes swollen. *Involucre* campanulate, 5–6 mm high, 7–13 mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner; *outer row* narrowly ovate or narrowly triangular, 3.0–3.5 × 0.8–0.9 mm, apex acute, margin very narrowly membranous in lower part, surface densely stipitate glandular, few bristle hairs, sometimes V-shaped thickened and then stereome fenestrated; *second row* narrowly ovate or narrowly triangular, 3.5–4.5 × 0.6–1.0 mm, apex acute, apex sometimes tinged reddish, margin very narrowly membranous in lower part, fimbriate, surface densely stipitate glandular, few bristle hairs, V-shaped thickened from base, stereome fenestrated; *third row* narrowly oblong or narrowly obovate, 4.5–6.0 × ± 1 mm, apex acute to acuminate, apex sometimes tinged reddish, margin narrowly membranous, fimbriate-ciliate, surface densely stipitate glandular, slightly keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes 3-veined; *inner row* obovate to narrowly obovate, 4.5–5.8 × 1.0–1.2 mm, apex acute, apex sometimes tinged reddish, margin membranous, ciliate in upper part, surface densely stipitate glandular, keeled, V- or Y-shaped thickened, stereome fenestrated, 2- or 3-veined. *Ray florets* female, fertile; corolla blue (Lessing 1832; Harvey 1865); *tube* 2 mm long, with many glandular hairs; *limb* 5.5–8.0 mm long, 3-lobed. *Style* 1.0–1.8 mm long, bifurcate; *style branches* ovate, elliptic, 0.5–0.8 mm long, stigmatic areas marginal, confluent at apex. *Ovary* narrowly obovate, 2.0–2.5 mm long, carpopodium small, densely clavate twin hairy. *Cypselae* brown to dark brown, narrowly obovate to obovate, 3.0–3.5 × 2.0–2.2 mm, laterally compressed, margin slightly thickened, glabrous, carpopodium small, surface with clavate twin hairs; epicarpic cells colliculate in surface view, smooth. *Pappus* of few barbellate bristles, 2.0–2.6 mm long, caducous. *Disc florets* functionally male; corolla tubular; *tube* 2.5 mm long, sometimes with



Figure 42. Scan of *Zyrphelis hirsuta* specimen (*Stokoe 2487*, BOL).



Figure 43. *Zyrphelis hirsuta*: A, stipitate glandular and bristly hairy leaf; B, densely stipitate glandular and bristly hairy peduncle; C, capitulum showing 3-veined, stipitate glandular and sparsely bristly hairy involucral bracts; D, ray cypsela with glabrous, thickened margin and clavate twin hairs on surface (all *Stokoe 2487*, BOL).

glandular hairs in lower part; *lobes* 0.5–0.8 mm long, with sub-apical glandular hairs and resin ducts along margins. *Anthers* 1.2–1.5 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2 mm long, bifurcate; *style branches* ovate to narrowly ovate, 0.6–1.0 mm long, papillate, without stigmatic areas. *Ovary* linear, 1–2 mm long, glabrous, sterile; epicarpic cells oblong in surface view, ± smooth. *Pappus* of few barbellate bristles, 2.0–2.5 mm long, caducous. *Flowering time*: October. Figures 42 to 44.

Diagnostic characters: *Zyrphelis hirsuta* can be distinguished by the linear-triangular to linear, (densely) stipitate glandular and (sparsely to equally densely) bristly hairy leaves, with entire margins or sometimes minutely 1- or 2-denticulate, the densely stipitate glandular and bristly hairy peduncle and outer involucral bracts, inner not bristly hairy, the cypselae with clavate twin hairs and the barbellate, caducous pappus bristles. It is superficially similar in appearance to *Z. nervosa* but can be distinguished from that species by the characteristic indumentum consisting of stipitate glandular hairs mixed with some bristle hairs on the stems and leaves. See Table 2 (pg. 52) for comparison with other similar-looking taxa.

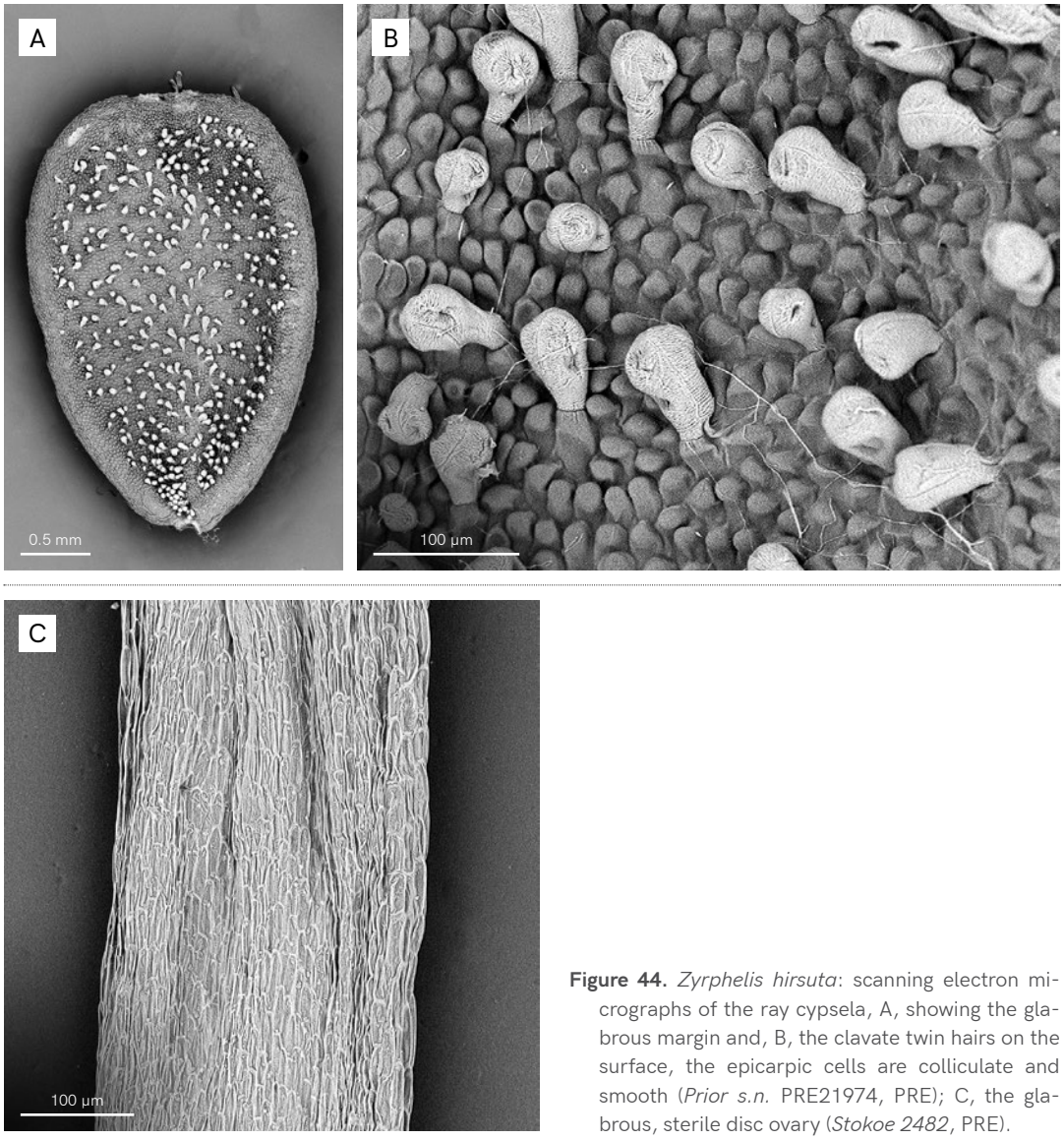


Figure 44. *Zyrphelis hirsuta*: scanning electron micrographs of the ray cypsela, A, showing the glabrous margin and, B, the clavate twin hairs on the surface, the epicarpic cells are colliculate and smooth (*Prior s.n.* PRE21974, PRE); C, the glabrous, sterile disc ovary (*Stokoe 2482*, PRE).

Distribution: *Zyrphelis hirsuta* occurs in the Riviersonderendberge near Genadendal (Figure 45). Except for the type specimen, only three other herbarium specimens were studied, one collected in 1846 and two in 1930. A small population of less than ten plants was found in 2006 (Helme & Raimondo 2012a).

Conservation status: According to Helme & Raimondo (2012a) the Red List Status of this taxon is Critically Endangered D as its habitat is threatened by alien invasive pines.

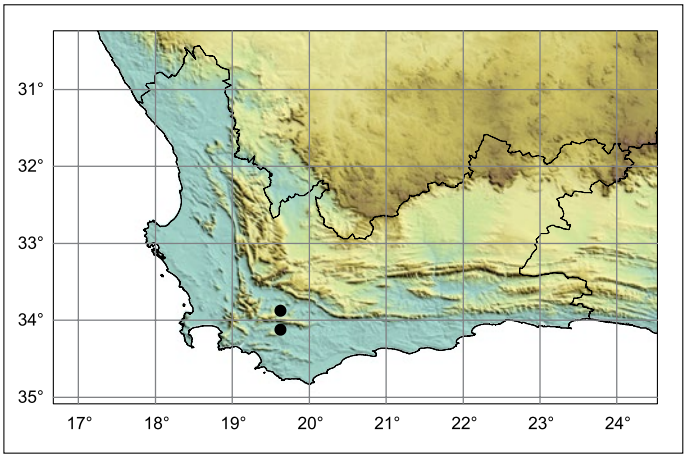


Figure 45. Distribution of *Zyrphelis hirsuta*.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Worcester District, Wilde Paarde Berg, 20 miles [32 km] S of Worcester, wet place, (-DC), 1 October 1930, *Stokoe 2482* (PRE). **3419 (Caledon)**: Caledon District, Genadendal, (-BA), 8 October 1846, *Prior s.n.* PRE21974 (PRE); Caledon Division, Baviaanskloof, on damp rocks, (-BA), October 1930, *Stokoe 2487* (BOL).

7. *Zyrphelis leiocarpa* *(DC.) Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011).

(Figures 46–50)

Agathaea leiocarpa DC.: 225 (1836).
Aster leiocarpus (DC.) Harv. in Harv. & Sond.: 84 (1865).

Type: South Africa, Western Cape Province, Worcester (3319): Draakensteensbergen [Drakensteinberge], alt. 3–4000 ped. [914–1219 m], (-CC), 1835, *Drège 5841* (S, holo.; G-DC e, P e, iso.).

Taxonomic note: The *Drège* specimen in G-DC has a label attached to it with the name *Agathaea diffusa* written on; *A. diffusa* DC. is the basionym of *Felicia diffusa* (DC.) Grau. According to Grau (1973) *F. diffusa* has opposite, entire leaves, characters the specimen on this sheet does not have. Clearly a wrong label was attached to the sheet. The P specimen has the date 14/10/1833 on it.

Perennial herb or suffrutex, up to 400(–605) mm high, branched from base, ascending. *Stems* often tinged reddish, densely bristly hairy, usually also minutely to obviously stipitate glandular. *Leaves* alternate, sessile, scattered along branches to sometimes fairly densely set or in tufts at bases of flowering shoots, erect, flat, narrowly to very narrowly obovate, linear, linear-elliptic, linear-oblong, (4–)6–25(–30) × 1–5 mm, apex acute, in specimens with obovate leaves, base (long) attenuate, margins sometimes revolute or slightly thickened, entire or with 1 or 2 pairs of teeth or lobes (above middle), sometimes only 1 tooth per leaf, lobes very narrowly elliptic to linear, up to 3.5 mm long, sometimes appearing tridentate apically, surfaces bristly hairy, (minutely) stipitate glandular. *Capitula* radiate, solitary, terminal, pedunculate. *Peduncle* 15–100 mm long, often tinged reddish, bristly hairy and stipitate glandular, hairs mostly with reddish transverse walls, bracteate. *Peduncular bracts* (0)1 to 4 per peduncle, linear, linear-triangular, linear-obovate, linear-elliptic to filiform, 2.5–14.0(–15.0) mm long, bristly hairy, (minutely) stipitate glandular, upper bracts with swollen bases. *Involucre* broadly cup-shaped, campanulate to obconical, (3–)4–6 mm high, (3.0–)3.5–10.0(–11.0) mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices reddish; *outer row* linear, linear-triangular, linear-elliptic, linear-oblong, very narrowly ovate, 3–4(–5) × 0.2–0.5(–0.6) mm, apex acute to acuminate, with tuft of few hairs at apex, surface bristly hairy, stipitate glandular, V-shaped thickened from base, stereome fenestrated; *second row* very narrowly ovate, oblong, linear, very narrowly elliptic, narrowly obovate, (3.5–)4.0–5.0(–6.0) × (0.2–)0.5–1.0 mm, apex acute to acuminate, with tuft of hairs at apex, margin ciliate in upper part, surface bristly hairy, stipitate glandular, often (slightly) keeled, enveloping ray cypselae, V- or Y-shaped thickened from base, stereome fenestrated, 3-veined; *third row* narrowly to very narrowly obovate, very narrowly elliptic, 4–6 × 0.5–1.2 mm, apex acute to acuminate, with tuft of hairs at apex, margin membranous, ciliate in upper part, surface stipitate glandular, sometimes few bristle hairs, keeled at base, Y-shaped thickened from base, stereome fenestrated, 3-veined, with oil glands along veins; *fourth row* very narrowly obovate, very narrowly elliptic, 4.2–5.2 × 0.5–0.8(–1.0) mm, apex acute, margin membranous, ciliate in upper part,



Figure 46. Scan of *Zyrphelis leiocarpa* specimen (*Esterhuysen 29281*, PRE).

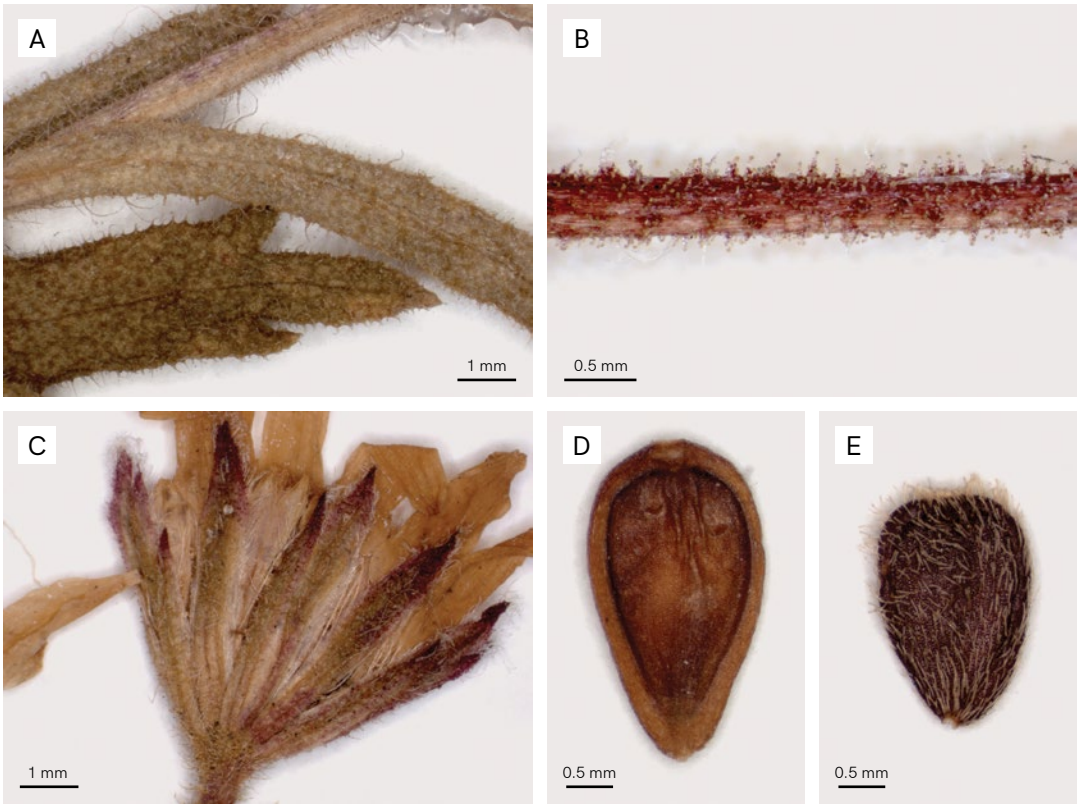


Figure 47. *Zyrphelis leiocarpa*: A, stipitate glandular and bristly hairy leaves showing the dentate leaf margin (*Esterhuysen 29281*, PRE); B, stipitate glandular and bristly hairy peduncle, hairs with reddish tranverse walls (*Worsdel s.n.* BOL31463, BOL); C, capitulum showing the stipitate glandular and bristly hairy, 3-veined involucral bracts (*Esterhuysen 29281*, PRE); D, glabrous ray cypsela (*Esterhuysen 14032*, BOL); E, hairy ray cypsela (*Worsdel s.n.* BOL31463, BOL).

surface sparsely bristly hairy, stipitate glandular, keeled, Y-shaped thickened, stereome fenestrated, 3-veined. *Ray florets* female, fertile, corolla white or bluish white, saxe, pale saxe blue, blue, pale blue, mauve, violet, turning purple brown, *tube* 1.5–2.0 mm long, with few glandular hairs in upper part; *limb* 3.5–6.0(–8.5) mm long, 3-lobed. *Style* (1.0–)1.2–2.0 mm long, bifurcate; *style branches* linear, linear-elliptic, (0.5–)0.6–1.0(–1.2) mm long, stigmatic areas marginal, confluent at apex. *Ovary* narrowly obovate, narrowly elliptic, (1.5–)2.0–3.0 mm, with clavate-like twin hairs or rarely glabrous. *Cypselae* brown, dark reddish brown, black, obovate, (2.5–)3.0–3.5(–4.0) × (1.2–)1.8–2.0(–2.2) mm, laterally compressed, margin thickened, pale brown, carpopodium small, surface mostly with clavate-like twin hairs or rarely glabrous (even in the same specimen e.g., *Leighton 3031* (BOL)), but then sometimes with few twin hairs around base; apices of twin hairs acute to obtuse; epicarpic cells in both hairy and glabrous cypselae colliculate to globose in surface view, rugose or striated. *Pappus bristles* few, 1.5–2.5(–3.0) mm long, sparsely sub-plumose or barbellate in upper part, barbellate to ± nude

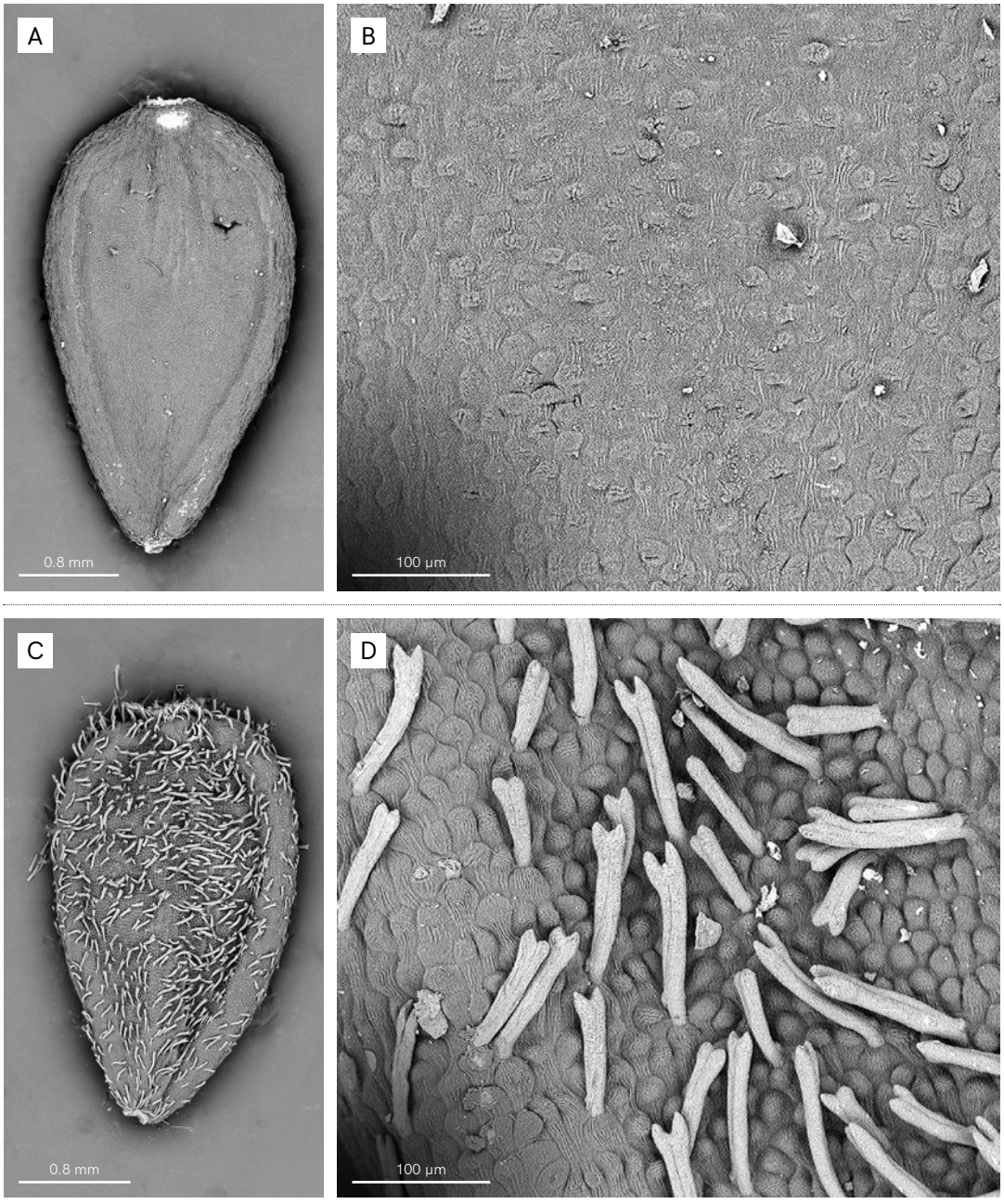


Figure 48. *Zyrphelis leiocarpa*: scanning electron micrographs A, B, of the glabrous ray cypsela with thickened margin (*Esterhuysen 14032*, BOL); C, D, the ray cypsela with thickened margin and clavate-like twin hairs (*Esterhuysen 4033*, BOL). Epicarpic cells in both hairy and glabrous cypselae colliculate to globose in surface view, rugose or striated.

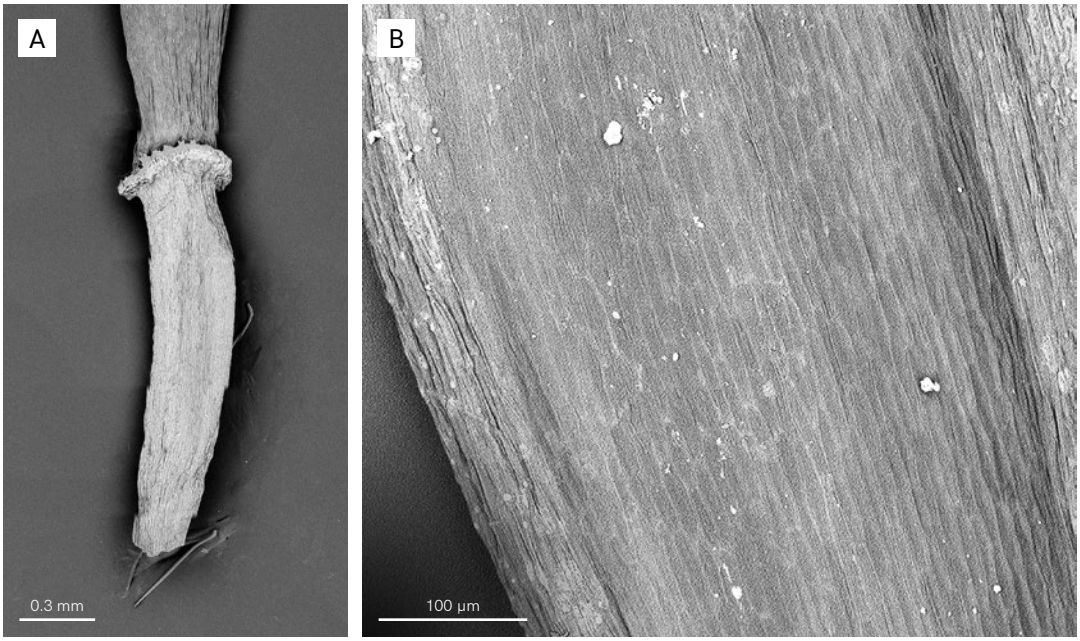


Figure 49. *Zyrphelis leiocarpa*: scanning electron micrographs of, A, the glabrous, sterile disc ovary (*Strey 886*, PRE); B, higher magnification of the disc ovary showing the epicarpic cells ± oblong in surface view, flat, ± smooth (*Esterhuysen 21398*, PRE).

basally, caducous. *Disc florets* functionally male, corolla yellow; *tube* 2.0–2.5(–2.8) mm long, with few glandular hairs on tube, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, occasionally with single, long, non-glandular hair, with resin ducts along margins, sometimes apices reddish. *Anthers* (1.0–)1.2–2.0 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* (1.0–)1.5–2.0 mm long, bifurcate; *style branches* narrowly ovate, linear, (0.5–)0.8–1.0 mm long, without or rarely with marginal stigmatic areas, with deltoid papillate apical appendages. *Ovary* linear, narrowly elliptic, sometimes narrowly obovate with thickened margin, (1.2–)1.5–2.0 mm long, glabrous, sometimes with few twin hairs apically or around base or few on surface, sterile, carpopodium distinct; epicarpic cells ± oblong in surface view, flat, ± smooth. *Pappus* (1.5–)2.0–3.0 mm long, sub-plumose or barbellate in upper part, barbellate to ± nude basally, few, caducous. *Flowering time*: May and July to December. Figures 46 to 49.

Note: When Candole (1836) described this species, he specifically mentioned '… achaeniis maturis **glaberrimis**.' Harvey (1865) similarly noted in his key to the species (p. 71) and his description of the species (p. 84) '… ripe achenes quite **glabrous**'. The species name *leiocarpa*, chosen by Candole (1836), reiterate the glabrous cypselae. The Drège specimen (holotype housed in S) has hairy ray ovaries and hairy ray cypselae while the image of the Drège specimen (isotype housed in G-DC) studied, showed glabrous cypselae. However, during this study, only three specimens with glabrous cypselae were encountered, both mounted (mixed collections) with specimens containing twin hairy cypselae.

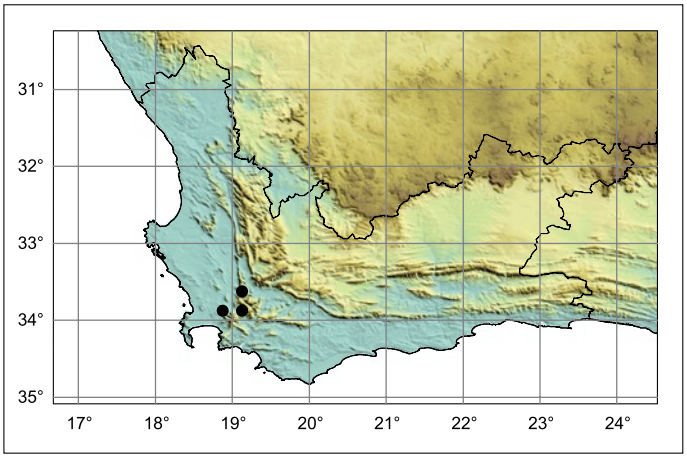


Figure 50. Distribution of *Zyrphelis leiocarpa*.

Candolle also described the disc 'cypselae' [ovaries] as sterile and **puberulous**, but all the specimens studied had glabrous disc ovaries.

Diagnostic characters: *Zyrphelis leiocarpa* is distinguished by the bristly hairy and stipitate glandular leaves, peduncles and involucral bracts, the flat, narrowly to very narrowly obovate, linear, linear-elliptic or linear-oblong leaves with margins entire or with 1 or 2 pairs of teeth or lobes, the 3-veined involucral bracts, the ray cypselae with clavate-like twin hairs, rarely glabrous and the sub-plumose or barbellate caducous pappus bristles. Very similar in appearance to *Z. montana* but can be distinguished from that taxon by the much smaller capitula and the caducous, sub-plumose to barbellate pappus bristles. See Table 3 (pg. 73) for comparison.

Distribution: *Zyrphelis leiocarpa* occurs from Simonsberg, Jonkershoekberge, Groot Drakensteinberge to the Wemmershoek-, Klein Drakenstein- and Limietberge in the north (Figure 50).

Conservation status: According to Von Staden (2012) the Red List status of this species is Rare but occurring in well-protected montane areas and not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3318 (Cape Town)**: Stellenbosch Div., Simonsberg, lower slopes, above Hellshoogte, (-DD), 29 October 1961, *Esterhuysen 29281* (BOL, PRE); Stellenbosch Distr., Square Tower Peak, Jonkershoek, on steep stony-rocky slopes, NE-W aspects, 3000 ft [914 m], (-DD), 30 November 1975, *Esterhuysen 34141* (BOL, PRE sheet 1 & 2, S, SAASVELD in PRE); Stellenbosch Div., slopes at foot of Great Drakenstein Mountains, near Pniel, (-DD), 14 September 1947, *Esterhuysen 14032* (with glabrous and hairy ray cypselae) (BOL); Stellenbosch District, Jonkershoek, Langrivier, 2000 ft [610 m], (-DD), August 1965, *Kerfoot K.5423* (SAASVELD in PRE); Stellenbosch Distr., Simonsberg, 1000 m, (-DD), 6 September 1946, *Strey 801* (PRE); Stellenbosch Distr., Botmanskop, (-DD), 2 August 1946, *Strey 886* (PRE, 2 sheets); Jonkershoek Mt, near Stellenbosch, (-DD), August 1912, *Worsdel s.n. BOL31463* (BOL). **3319 (Worcester)**: Paarl Div., Seven Sister Mountain, steep stony E slopes, 3500 ft [1067 m], (-CA), 14 November 1954, *Esterhuysen 23919* (with glabrous and hairy ray cypselae) (BOL);

Table 3. Comparing *Z. leiocarpa*, *Z. montana* var. *montana* and *Z. montana* var. *grauii*

Character	*Z. leiocarpa*	*Z. montana* var. *montana*	*Z. montana* var. *grauii*
Involucre	4–6 mm high (3.5–)4.0–10.0(–11.0) mm across	(6.5–)7.0–12.0(–14.0) mm high, (6.5–)7.0–12.0(–14.0) mm across	(6.0–)6.5–10.0 mm high; 8–14(–15) mm across
Ray tube	1.5–2.0 mm	2.0–3.0(–3.5) mm	(2.0–)2.5–3.0(–3.5) mm
Ray limb	3.5–6.0(–8.5) mm	(5.0–)6.0–7.5(–10.5) mm	6–10 mm
Ray pappus	1.5–2.5(–3.0) mm	3.0–4.0(–4.5) mm	3.5–4.0(–4.5) mm
Disc tube	2.0–2.5(–2.8) mm	(2.8–)3.0–4.0 mm	3–4 mm
Disc style	(1.0–)1.5–2.0 mm	2.0–3.0(–3.8) mm	(1.5–)2.5–3.0(–4.0) mm
Disc style branches	(0.5–)0.8–1.0 mm	(0.5–)1.0–1.2 mm	1.0–1.5 mm
Disc pappus	(1.5–)2.0–2.5(–3.0) mm	3.0–4.5 mm	(3.0–)4.0–4.5 mm
Ray and disc pappus	caducous, sub-plumose to barbellate above, barbellate to nude basally	persistent, plumose above, barbellate to nude basally	persistent, plumose above, barbellate to nude basally

Paarl-Worcester Div., slopes at head of Du Toits Kloof, S aspect, 2800 ft [853 m], (-CA), 25 September 1955, *Esterhuysen 24711* (BOL); Worcester Div., Upper Wellington Sneeuwkop, rocky W slopes, 3000 ft [914 m], (-CA), 11 November 1956, *Esterhuysen 26535* (BOL, PRE, S) (S specimen with glabrous and hairy ray cypselae, in one capitulum both hairy and glabrous cypselae observed); Wellington Division, Bain's Kloof Pass, W of lodge, rocky sandstone slope, fynbos, 600 m, (-CA), 3 September 1993, *A. & B. Strid 37509* (S); Wellington Distr., Bains Kloof, (-CA), July 1940, *Kies 64* "A" (NBG); Bains Kloof, common in sand among rocks, (-CA), 22 August 1953, *Leighton 3031* (BOL); Paarl Div., Wemmershoek, (-CC), 14 December 1940, *Esterhuysen 4033* (BOL); Paarl Div., slopes of Klein Drakenstein Mts above Paarl, roadside bank, (-CC), 24 May 1953, *Esterhuysen 21398* (PRE); Paarl Division, Gt Drakenstein Mts, (-CC), October 1945, *Esterhuysen 11912* (S).

8. *Zyrphelis corymbosa* *(Harv.) Kuntze, Revisio generum plantarum*: 374 (1891).

(Figures 51–54)

Mairia corymbosa Harv. in Harv. & Sond.: 66 (1865); Bond & Goldblatt: 180 (1984).
Felicia corymbosa (Harv.) Compton: 312 (1931).
Aster corymbosa (Harv.) Fourc.: 84 (1934).
Gymnostephium papposum G.L.Nesom: 93 (1994); Goldblatt & Manning: 329 (2000); Manning & Goldblatt: 382 (2012).

Type: [South Africa, Western Cape, Caledon (3419):] Kleinriviersberg, bei der Mündung des Klynrivier, steinige Bergplätze, 1000–3000 ft, [Kleinriviersberge, at the mouth of the Kleinrivier, rocky mountainous location, 308–914 m], (–AD), August ?1830, *Zeyher 2742* (S (S-G-3913), holo.; M (M0104604), P, e, PRE ×2, STE in NBG (NBG0200171), iso.).

Shrub, up to 1 m high, stems glabrous, rarely with some bristle hairs. *Leaves* alternate, sessile, scattered along stems to densely set, erect, perpendicular to stems or sometimes recurved, flat, sometimes folded lengthwise, linear, linear-elliptic, linear-triangular, narrowly triangular, very narrowly ovate or very narrowly elliptic, (8–)10–30(–40) × 1.5–4.0(–5.0) mm, apex acute, often mucronate, base (briefly) decurrent, margin entire, often thickened and whitish, ciliate-denticulate (cilia broad-based, upper bits breaking off, leaving impression of small teeth) in lower leaves, in upper leaves margins ciliate, upper part of margin often without cilia, or leaves without cilia, surface glabrous, sometimes with few bristle hairs on lower surface, 3-veined basally but side veins soon fading, sometimes with embedded oil glands. *Capitula* radiate, corymbosely arranged terminally and axillary on side branches, rarely some solitary, pedunculate. *Peduncle* 15–50(–120) mm long, bristly hairy, bracteate; *peduncular bracts* 2–13 per peduncle, narrowly ovate, linear-triangular to filiform, 2–12 mm long, surfaces glabrous, sometimes with oil glands along main vein and embedded oil glands on laminas, margins ciliate, rarely without cilia, upper bracts often with swollen bases, lower bracts often with broadened bases. *Involucre* campanulate to broadly obconical, 6–8 mm high by (7–)8–13(–14) mm wide across upper part. *Involucral bracts* in 4 or 5 rows, imbricate, outer shorter than inner, apices often tinged reddish; *outer row* narrowly ovate, narrowly triangular or narrowly elliptic, 2.5–4.5 × 0.6–1.2 mm, apex acute, margin narrowly membranous, fimbriate-ciliate, surface glabrous, V-shaped thickened from base, stereome fenestrated, sometimes with oil glands along main vein; *second row* narrowly ovate, narrowly oblong, narrowly elliptic to very narrowly obovate, 3.4–5.5 × 0.8–1.2 mm, apex acute, rarely acuminate, margin (narrowly) membranous, fimbriate-ciliate, surface glabrous, often slightly keeled at base, ± V- or Y-shaped thickened from base, stereome fenestrated, usually 3-veined, sometimes with oil glands along vein(-s); *third row* narrowly elliptic, narrowly oblong to narrowly obovate or very narrowly ovate, 4–7 × 1–2 mm, apex acute, margin (narrowly) membranous, fimbriate-ciliate, surface glabrous, slightly keeled at base, V- to Y-shaped thickened, stereome fenestrated, usually 3-veined, sometimes with oil glands along vein(-s); *fourth row* narrowly obovate to narrowly elliptic, 5.5–7.0 × 1.2–2.0 mm, apex acute, margin (narrowly) membranous, fimbriate-ciliate in upper half, surface glabrous, keeled in lower half, V- or Y-shaped thickened, stereome fenestrated,

A



Figures 51. Scans of *Zyrphelis corymbosa* specimens to show the variation in young and mature synflorescences: A, *Gillett 4219* (BOL); B, *Williams 2533* (PRE).

B



Figures 51 (continued). Scans of *Zyrphelis corymbosa* specimens to show the variation in young and mature synflorescences: A, *Gillett 4219* (BOL); B, *Williams 2533* (PRE).



Figure 52. *Zyrphelis corymbosa*: A, glabrous, ciliate-denticulate leaves (*Esterhuysen 34983*, BOL); B, bristly hairy peduncle; C, capitulum showing 3-veined, glabrous involucral bracts; D, ray cypsela with clavate twin hairs (B–D *Gillett 4219*, BOL).

3(–5)-veined, sometimes with oil glands along veins, enveloping ray cypsela; sometimes *depauperate fifth row* narrowly obovate, ± 6.0–6.5 × 1.0–1.5 mm, apex acute, margin membranous, ciliate, surface glabrous, slightly keeled and V-shaped thickened, stereome fenestrated, 3-veined, often with oil glands along veins. *Ray florets* female, fertile, corolla saxe blue, blue or pale blue or pale mauve; *tube* (1.5–)2.0–2.5 mm long, glabrous or with few glandular hairs in upper part; *limb* (5.0–) 6.5–8.0 mm long, 3-lobed/-dentate, often with glandular hairs around mouth. *Style* 1–2 mm long, bifurcate; *style branches* oblong, elliptic, linear-elliptic, 0.5–1.2 mm long, stigmatic areas marginal, confluent at apex. *Ovary* linear-elliptic, narrowly obovate, 2.0–3.5 mm long, with obvious carpopodium, with dense clavate twin hairs. *Cypselae* blackish or dark brown or reddish brown, obovate to elliptic, 2.5–3.5 × 1.5–2.2 mm, laterally compressed, margin thickened, carpopodium not so obvious, surfaces with short clavate twin hairs all over, epicarpic cells ± areolate in surface view, mostly with small, striated protuberances in central or towards pappus end of cells. *Pappus* of plumose bristles, 2–3 mm long, persistent. *Disc florets* functionally male, corolla yellow; *tube* 2.5–3.0 mm long; 5-lobed, *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, sometimes also occasional

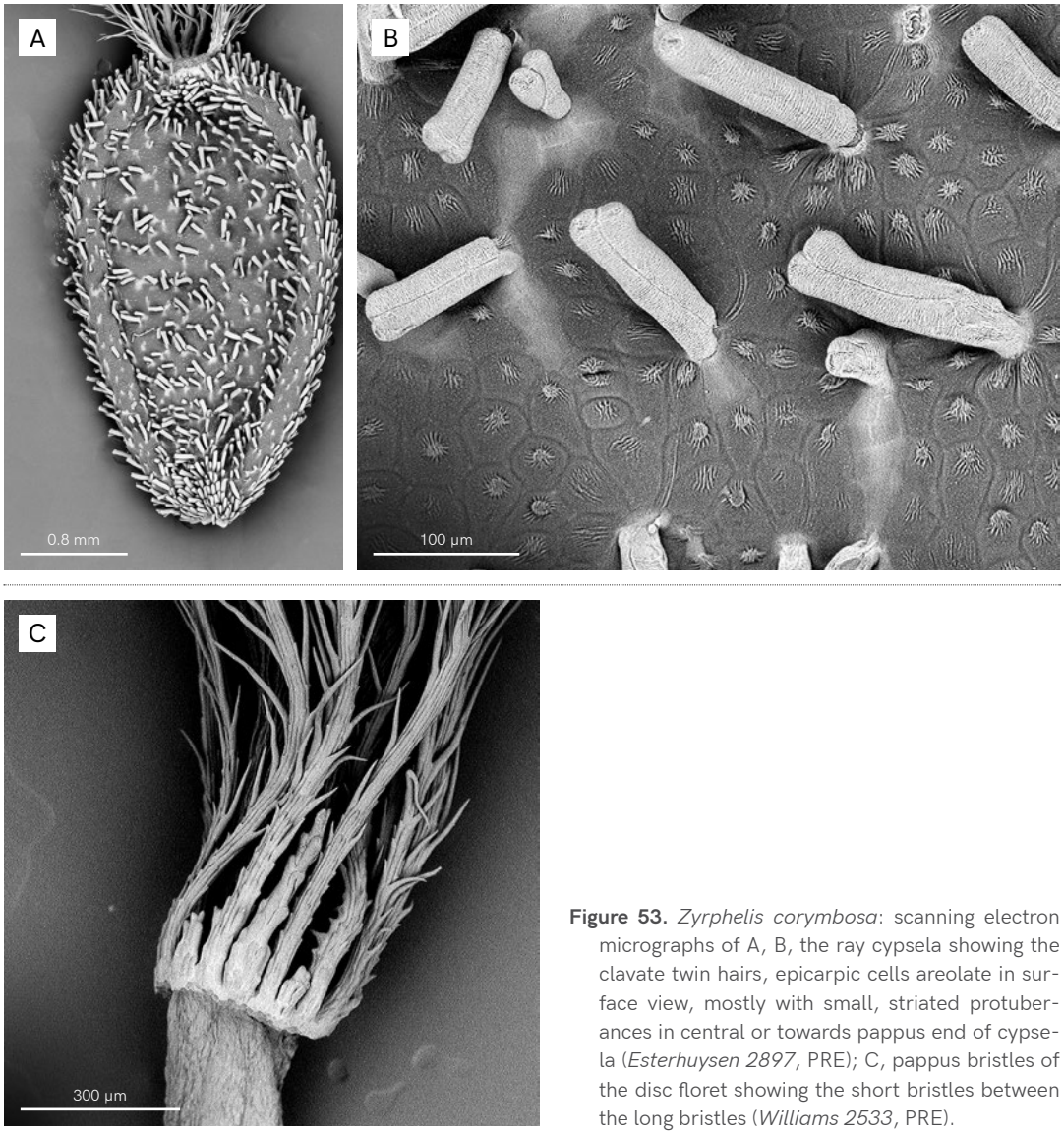


Figure 53. *Zyrphelis corymbosa*: scanning electron micrographs of A, B, the ray cypsela showing the clavate twin hairs, epicarpic cells areolate in surface view, mostly with small, striated protuberances in central or towards pappus end of cypsela (*Esterhuysen 2897*, PRE); C, pappus bristles of the disc floret showing the short bristles between the long bristles (*Williams 2533*, PRE).

non-glandular hairs, sometimes with resin ducts along margins and resin glands in sinuses. *Anthers* 5, 0.8–1.8 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2.0–2.2 mm long, bifurcate; *style branches* ovate, narrowly ovate, linear-triangular, 0.6–1.0 mm long, papillate, without or rarely with short stigmatic areas in sinuses of branches. *Ovary* linear to narrowly oblong, 2–3 mm long, with thickened margin, glabrous or rarely with few clavate twin hairs, sterile, epicarpic cells oblong in surface view, seemingly smooth. *Pappus bristles* plumose in upper part,

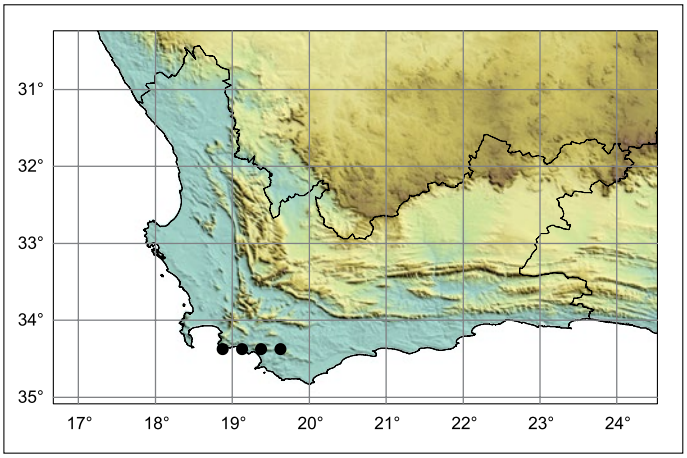


Figure 54. Distribution of *Zyrphelis corymbosa*.

nude basally, 2.5–3.0 mm long, persistent, sometimes with very small bristles among longer bristles. *Flowering time*: August, September and December. Figures 51 to 53.

Oil glands were observed on the shoulders of sterile, disc ovaries in *Esterhuysen 33616a* (BOL) and *Burman 1204* (BOL).

Diagnostic characters: *Zyrphelis corymbosa* is the second species in the genus growing up to 1 m or more and can be distinguished by the flat or sometimes folded, linear, linear-elliptic or linear-triangular, glabrous leaves with entire or ciliate-denticulate margins, the large capitula corymbosely arranged, the bristly hairy peduncles, the 3-veined, glabrous involucral bracts, the persistent plumose pappus bristles and the short clavate twin hairs on the cypselae.

Zyrphelis corymbosa looks very similar to *Z. nervosa*: they have similar growth forms, similar looking leaves, corymbose synflorescences and both have clavate twin hairs on the ray cypselae. However, in *Z. corymbosa* the peduncle is bristly hairy, the peduncular bracts and the involucral bracts are glabrous, the pappus bristles are plumose, persistent and it occurs in the Klein River Mountains and Kogelberg area while in *Z. nervosa* the peduncle is stipitate glandular and bristly hairy, the peduncular bracts and the involucral bracts are stipitate glandular and bristly hairy, the pappus bristles are barbellate, caducous and its distribution is confined to the Riviersonderend Mountains. *Zyrphelis outeniquae* resembles *Z. corymbosa* and *Z. nervosa* but is characterised by the solitary, large capitula, woolly peduncles, glabrous, ciliate peduncular bracts with embedded oil glands, glabrous or rarely sparsely woolly involucral bracts, plumose, persistent pappus bristles, sparse, very short, clavate-like twin hairs on the ray cypselae and is confined to the Outeniqua Mountains at the eastern border of the Western Cape Province and the Tsitsikamma Mountains at the western border of the Eastern Cape Province. *Zyrphelis corymbosa* also superficially resembles *Z. macrocarpa*. See Table 2 (pg. 52) for comparison with other similar looking taxa.

Distribution: *Zyrphelis corymbosa* has a small distribution area in the Kleinrivierberge and in the Kogelberg area (Figure 54). It grows in moist and shady habitats.

Conservation status: According to Von Staden (2012) the Red List status of *Z. corymbosa* is Endangered B1ab(iii,v)+2ab(iii,v) as it is threatened by competition from alien invasive plants across its range.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3418 (Simonstown)**: Caledon Div., Palmiet River, near mouth, (–BD), 18 September 1938, *Gillett 4219* (BOL, PRE). **3419 (Caledon)**: Caledon Distr., Hermanus, at base of cliffs on mountain above the town, (–AC), 8 September 1974, *Esterhuysen 33616a* (BOL); Caledon Distr., Hermanus, along the path beyond the Rotary Drive, in marshy places near a stream, (–AC), 6 August 1978, *Esterhuysen 34983* (BOL); Caledon Div., Vogelgat Nature Reserve, Hermanus, (–AD), 10 September 1983, *Burman 1204* (BOL); Voelgat Nature Reserve, SW slopes, sandy mountains soil, (–AD), 1 September 1978, *Goldblatt 4794* (PRE); Caledon Division, Vogelgat near Vogelpool and elsewhere, near streamsides and damp places, 1100 ft [335 m], (–AD), 6 August 1978, *Williams 2533* (PRE); In montibus pone Vogelgat, 3000 ft [on mountains behind Vogelgat, 914 m], (–AD), 2 December 1896, *Schlechter 9538* (PRE), TvlMus 3544 (PRE).

Without precise locality: Caledon Div., SE slopes of the Klein River Mountains, September 1940, *Esterhuysen 2897* (BOL, PRE).

9. *Zyrphelis macrocarpa* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011).

(Figures 55–58)

Type: South Africa, Western Cape, Caledon (3419): Caledon Div., River Zonder Einde Mts [Riviersonderend Mountains], (–BA/BB), October 1940, *Stokoe 7593* (BOL, holo.).

Shrublets, up to 300 mm high, stems apparently glabrous, but not readily visible due to densely set leaves. *Leaves* alternate, sessile, densely set, imbricate, lower and middle leaves often ± horizontally orientated or recurved, upper leaves erect, flat or sometimes slightly folded lengthwise, linear to linear-triangular or narrowly triangular, (13–)17–30(–50) × 2.5–3.0(–5.0) mm, apex acute, mucronate, base broadened, semi-amplexicaul, shortly decurrent, margins sometimes thickened, ciliate to ciliate-denticulate (cilia break off leaving broad bases creating impression of denticulations), or in some upper leaves cilia absent in upper half of leaf margin, surface glabrous, sometimes with embedded oil glands. *Capitula* radiate, solitary, terminal, pedunculate. *Peduncle* 35–40(–55) mm long, bristly hairy, stipitate glandular, bracteate; *peduncular bracts* 2 to 4 per peduncle, narrowly triangular or narrowly ovate, (5–)6–8(–12) mm long, with broadened, almost cordate and swollen bases, margins ciliate, surfaces glabrous, margins and apices often tinged reddish. *Involucre* broadly cup-shaped to campanulate or broadly obconical, (7–)8–10 mm high, 10–12(–14) mm across upper part. *Involucral bracts* in 4 rows, imbricate, outer shorter than inner, apices tinged reddish, surfaces glabrous; *outer row* narrowly triangular to triangular or narrowly ovate, 4.2–5.8 × 1.2–1.8 mm, apex acute, margin sometimes narrowly membranous, fimbriate-ciliate, surface sometimes V-shaped thickened from base and then stereome fenestrated, sometimes with oil glands along main vein; *second row* narrowly oblong, narrowly elliptic or narrowly ovate, 5–7 × 1.8(–2.0) mm, apex acute, margin narrowly membranous, fimbriate-ciliate, surface often V- or Y-shaped thickened from base, stereome fenestrated, sometimes 3-veined, often with oil glands along main vein(-s); *third row* oblong, narrowly elliptic or obovate, (6–)7 × 2.0(–2.2) mm, apex acute, margin membranous in lower half, fimbriate, ciliate around apex, slightly keeled in lower third, Y-shaped thickened from base, stereome fenestrated, 3-veined, often with oil glands along veins; *fourth row* narrowly obovate, 6.0–7.2 × 2.0(–2.2) mm, apex acute to acuminate, margin membranous in middle half, ciliate in upper half, surface sometimes with short, white, thickish hairs in upper part, keeled in lower third, enveloping ray cypselae, V- or Y-shaped thickened from base, stereome fenestrated, 3-veined, often with oil glands along veins. *Ray florets* female, fertile, corolla saxe blue or pale mauve; *tube* 2(–3) mm long, with glandular hairs in upper part and around mouth, *limb* 7 mm long, 3-lobed, sometimes with few glandular hairs on lower part of limb. *Style* 1.8(–2.5) mm long, bifurcate; *style branches* narrowly elliptic, 1.0(–1.5) mm long, apex acute or obtuse, stigmatic areas marginal, confluent at apex. *Ovary* narrowly obovate, oblong or elliptic, (2.5–)3.0(–3.5) mm long, carpopodium not obvious, surfaces with clavate-like twin hairs, apices of twin hairs obtuse or bluntly acute; epicarpic cells ± areolate in surface view, with small, central, striated protuberances. Mature cypsela not seen. *Pappus* of plumose or sub-plumose bristles, 2–3 mm long, persistent. *Disc florets* functionally male, corolla yellow; *tube* 3.0(–3.5) mm long, 5-lobed, *lobes* 1 mm long, with sub-apical glandular hairs and resin ducts along margins. *Anthers* 1.5(–1.6) mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2–3 mm



Figure 55. Scan of *Zyrphelis macrocarpa* specimen (*Oliver 10931*, PRE).



Figure 56. *Zyrphelis macrocarpa*: A, glabrous, ciliate-denticulate leaves (*Oliver 10931*, PRE); B, stipitate glandular and bristly hairy peduncle (*Oliver 10931*, PRE); C, capitulum showing glabrous, 3-veined involucral bracts with oil glands along veins (*Oliver 10931*, PRE); D, young, hairy ray cypsela (*Esterhuysen 32715*, BOL).

long, bifurcate; *style branches* ovate or linear, (0.8–)1.0 mm long, papillate, without or sometimes with short marginal stigmatic areas near base and with deltoid, papillate apical appendages. *Ovary* sterile, linear or very narrowly elliptic, 2.5 mm long, glabrous, sometimes with occasional clavate-like twin hair, apices of twin hairs ± obtuse; epicarpic cells ± oblong in surface view, smooth, flat. *Pappus* of plumose or sub-plumose bristles, 3.0(–3.5) mm long, persistent. *Flowering time*: October. Figures 55 to 57.

Diagnostic characters: *Zyrphelis macrocarpa* can be recognised by the linear-triangular or narrowly triangular, glabrous leaves with ciliate or ciliate-denticulate margins, the solitary capitula on bristly hairy and stipitate glandular peduncles, the glabrous, 3-veined involucral bracts, the clavate-like twin hairs on the ovaries and the plumose or sub-plumose, persistent pappus bristles. *Zyrphelis macrocarpa* superficially resembles *Z. nervosa*, *Z. corymbosa* and *Z. outeniquae*. See Table 2 (pg. 52) for comparison with other similar looking taxa.

Distribution: *Zyrphelis macrocarpa* is known from only a few collections in the Riviersonderendberge and is endemic there (Figure 58).

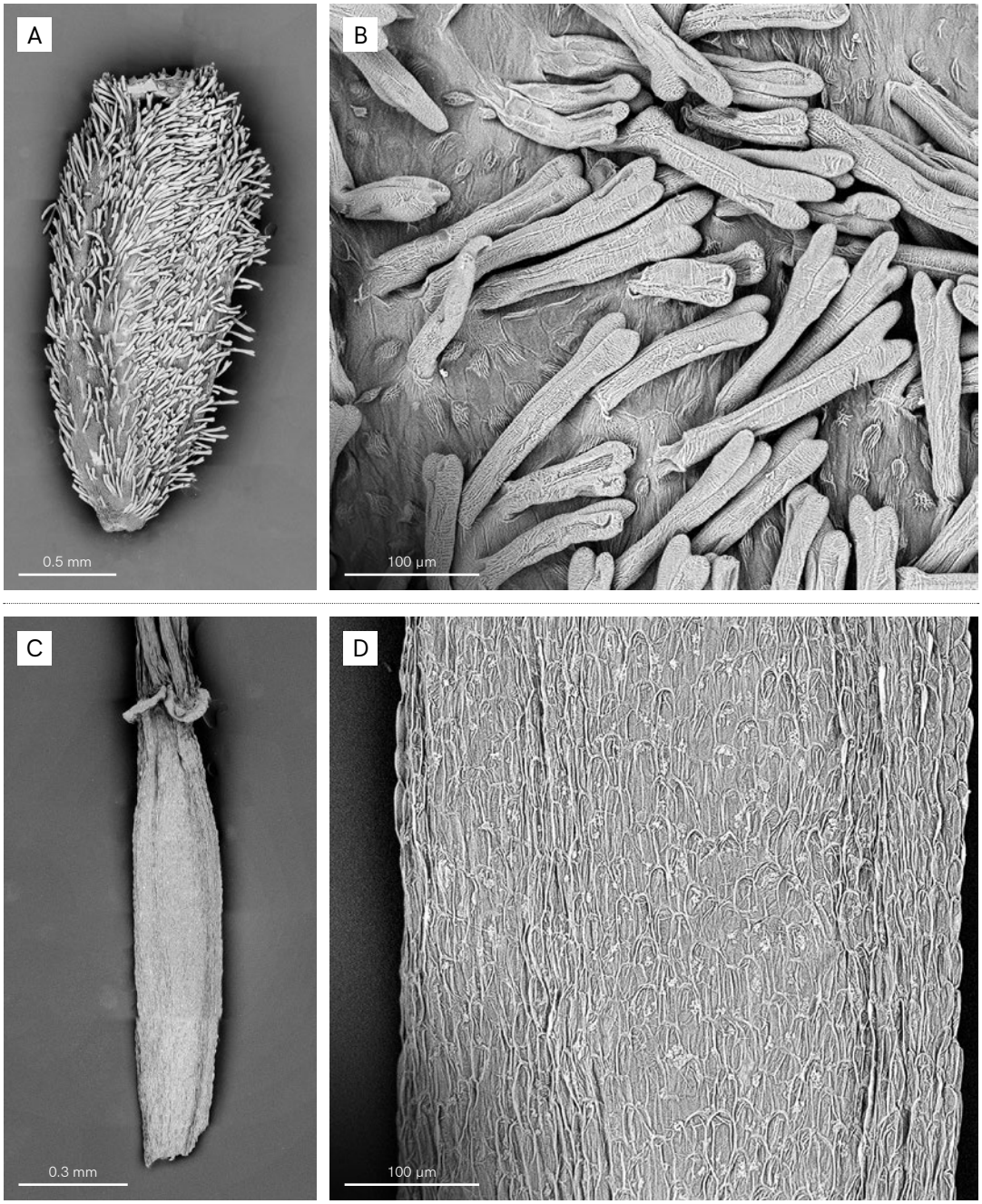


Figure 57. *Zyrphelis macrocarpa*: scanning electron micrographs of the young ray cypsela, A, B, showing the clavate-like twin hairs, the epicarpic cells areolate in surface view, with small, central, striated protuberances (*Esterhuysen 32715*, BOL); C, D, the glabrous, sterile disc ovary (*Oliver 10931*, PRE).

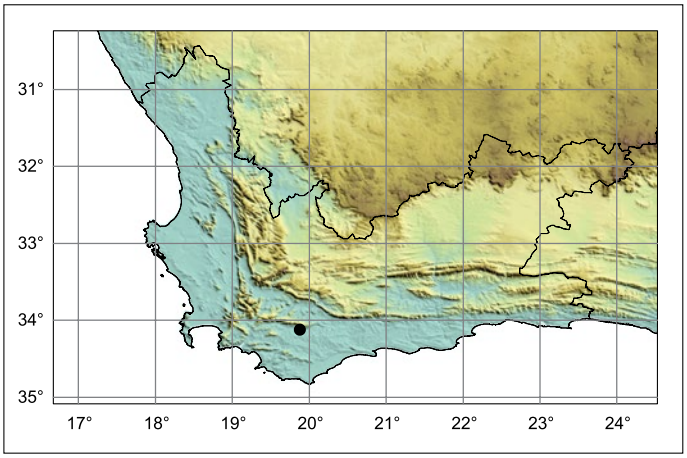


Figure 58. Distribution of *Zyrphelis macrocarpa*.

Conservation status: Except for the type specimen collected in 1940, two other specimens collected in 1971 and 1997 were seen. According to Von Staden (2012) the Red List status of this species is Data Deficient based on collections made in 1940. However, more recent collections are available and the Red List status can be updated.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: Caledon Distr., R.Z.E. Mts [Riviersonderend Mountains], steep S slopes and ledges near Pilaarkop, (-BB), 21 October 1971, *Esterhuysen 32715* (BOL); Riviersonderend Mtns, Pilaarkop, main ridge WNW of peak, rocky moist steep slope facing S, 4000 ft [1219 m], (-BB), 28 October 1997, *Oliver 10931* (PRE).

10. *Zyrphelis glabra* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1196 (2011).

(Figures 59–62)

Type: South Africa, Western Cape Province, Worcester (3319): Worcester Division, ledges on S side below summit of Buffelshoek Peak, Hex River Mountains, 6500 ft (1981 m), (–AD), 13 December 1948, *Esterhuysen 14843* (BOL138796) (BOL, holo.; (BOL138797) BOL, NBG, iso.).

Decumbent, ascending perennial herb, suffrutex or dwarf shrub, 80–290 mm high. *Stems* woody basally, upwards sometimes tinged reddish, often rooting, glabrous. *Leaves* alternate, densely set to scattered along stems, sessile, semi-amplexicaul and usually shortly decurrent, flat, rarely slightly folded lengthwise, semi-succulent, upper leaves erect, middle and lower leaves spreading to recurved, (narrowly) obovate, narrowly elliptic, 6–13(–14) × (1.0–)1.5–3.0 mm, apex acute to obtuse, margin entire, finely and sparsely ciliate basally, especially in uppermost leaves or without cilia, surface glabrous, often with embedded oil glands, bases sometimes tinged reddish. *Capitula* radiate, solitary, pedunculate. *Peduncle* (10–)15–50 mm long, sometimes reddish, sparsely to densely softly, curly hairy, bracteate. *Peduncular bracts* (2–)4–9(–10) per peduncle, (narrowly) ovate, oblong or linear-triangular, (2.5–)3.5–6.0(–7.0) mm long, apex acute or obtuse, margin sparsely ciliate basally or all along, surface glabrous, with embedded oil glands, lower bracts semi-amplexicaul, upper bracts with swollen bases, sometimes 3-veined. *Involucre* (broadly) obconical to campanulate or cup-shaped, 10–12(–13) mm high, (9–)12–20 mm across upper part. *Involucral bracts* in 5 rows, imbricate, outer shorter than inner, apices often tinged reddish; *outer row* (narrowly) ovate, obovate, narrowly elliptic or oblong, (4.0–)4.5–5.0(–6.2) × (1.2–)1.5 mm, apex acute or obtuse, few cilia around apex, margin narrowly membranous sometimes, sometimes faintly fimbriate, surface glabrous, sometimes V-shaped thickened from base, sometimes stereome fenestrated, with embedded oil glands; *second row* (narrowly) obovate, oblong, elliptic or narrowly ovate, (5.5–)6.0–8.0 × (1.5–)1.6–2.0 mm, apex acute or obtuse, with tuft of hairs, margin sometimes fimbriate, membranous in lower part, surface glabrous, sometimes keeled, sometimes V- or Y-shaped thickened from base, stereome fenestrated, with embedded oil glands; *third row* narrowly elliptic, narrowly oblong or narrowly obovate, 7–10 × 1.5–2.0 mm, apex acute to obtuse, margin membranous in lower part, ciliate around apex, surface glabrous, slightly keeled, V- or Y-shaped thickened from base, stereome fenestrated, with embedded oil glands; *fourth row* narrowly obovate, linear-elliptic or linear-oblong, 9.0–10.2 × 1.5–2.0 mm, apex acute, margin membranous in middle part, sometimes fimbriate, ciliate around apex, surface glabrous, slightly keeled, V- or Y-shaped thickened from base, stereome fenestrated, with embedded oil glands; *fifth row* linear, linear-elliptic or very narrowly obovate, 9.8–11.5 × 1.0–1.8 mm, apex acute, margin membranous in middle part, ciliate around apex, surface glabrous, sometimes slightly keeled, V- or Y-shaped thickened from base, stereome fenestrated, with few embedded oil glands along main vein. *Ray floret* female, fertile, corolla blue, mauve, violet-blue; *tube* (2.5–)3.0–5.0 mm long, with longish glandular hairs along tube and lowest part of limb; *limb* 7.0–10.6 mm long, shallowly 3-lobed. *Style* 3–5 mm long, bifurcate; *style branches* linear-elliptic, 1.2(–1.5) mm long, sometimes slightly unequal in length, *stigmatic areas* marginal, confluent at apex. *Ovary* very narrowly obovate or linear, 3.0(–3.8) mm long, densely filiform twin hairy. *Cypsela* dark brown, (narrowly) obovate, 4–5 × 1.2–1.8 mm, laterally compressed,



Figure 59. Scan of the holotype of *Zyrphelis glabra* (*Esterhuysen 14843*, BOL).



Figure 60. *Zyrphelis glabra*: A, glabrous leaves (*Esterhuysen 14843*, BOL); B, sparsely, softly hairy peduncle (*Esterhuysen 14843*, BOL); C, capitulum showing the glabrous involucral bracts with oil glands (*Esterhuysen 14843*, BOL); D, hairy ray cypsela (*Helme 6633*, NBG).

with slightly thickened margin, carpopodium small or not obvious, surfaces (densely) long filiform twin hairy, apices of twin hairs ± equal, acute; epicarpic cells ± oblong in surface view, flat and ± smooth. *Pappus bristles* 4–5 mm long, plumose, persistent. *Disc floret* bisexual, fertile, corolla yellow; *tube* (3.0–)4.0(–4.6) mm long, with longish glandular hairs in lower part, 5-lobed; *lobes* 1 mm long, with subapical glandular hairs and sometimes resin ducts along margins. *Anthers* (1.8–)2.0 mm long, with (narrowly) ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2.5–5.0 mm long, bifurcate; *style branches* linear, 1.4–1.5 mm long, *stigmatic areas* marginal, with deltoid, papillate apical appendages. *Ovary* linear or linear-elliptic, 3.0(–3.8) mm long, densely, long filiform twin hairy. *Mature cypselae* as in ray florets. *Pappus bristles* 4–5 mm long, plumose, persistent. *Flowering time*: November to January. Figures 59 to 61.

Diagnostic characters: *Zyrphelis glabra* can be recognised by the decumbent, ascending habit, the obovate or narrowly elliptic, semi-succulent leaves, the glabrous stems, leaves and involucral bracts, the large, solitary capitula on softly curly hairy peduncles, the middle and inner involucral bracts broad

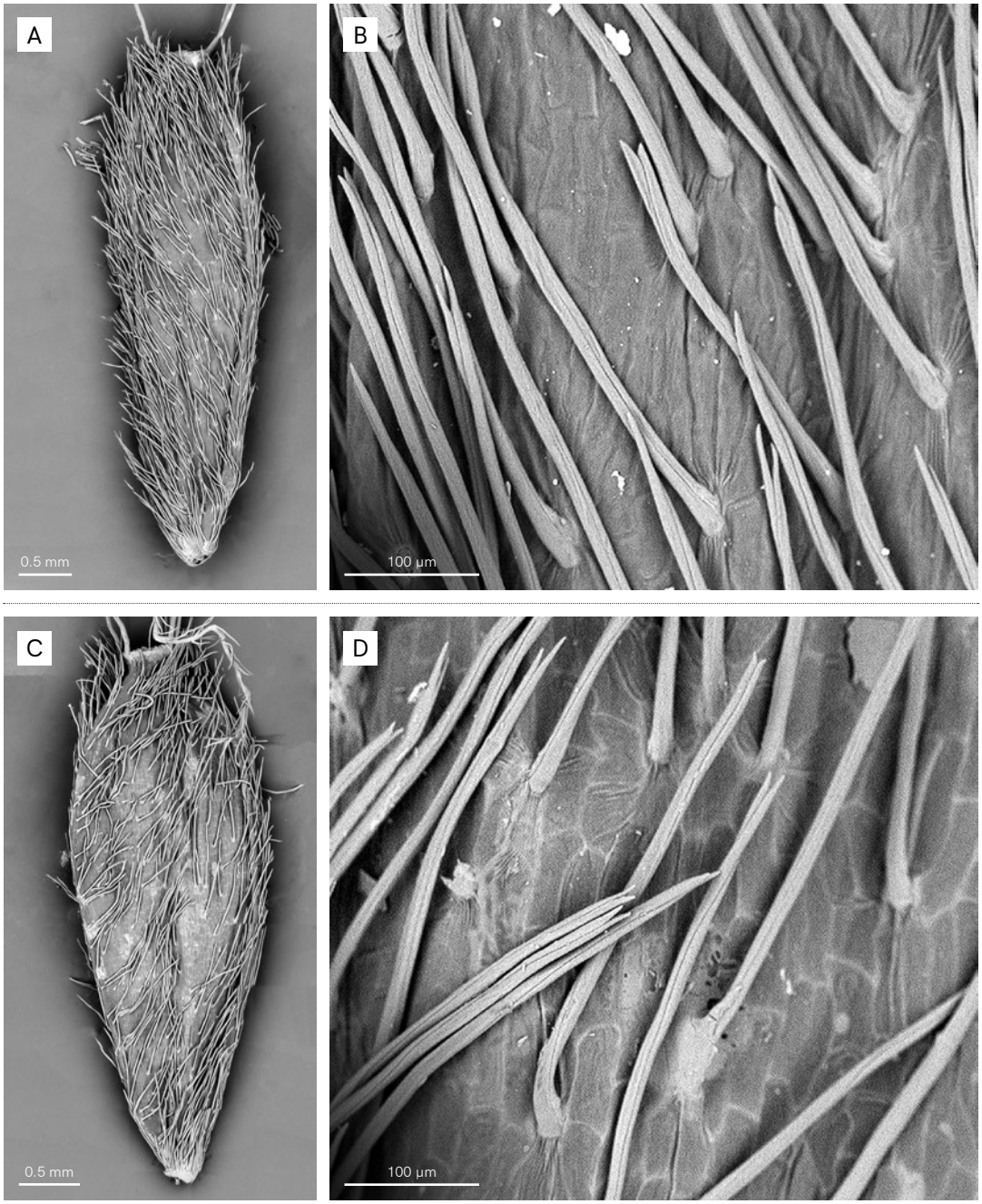


Figure 61. *Zyrphelis glabra*: scanning electron micrographs of the ray cypsela, A, B, showing the filiform twin hairs, epicarpic cells ± oblong in surface view, flat and ± smooth (*Esterhuysen 14843*, BOL); C, D, the fertile disc cypsela with filiform twin hairs, epicarpic cells ± oblong in surface view, flat and ± smooth (*Esterhuysen 27423*, PRE).

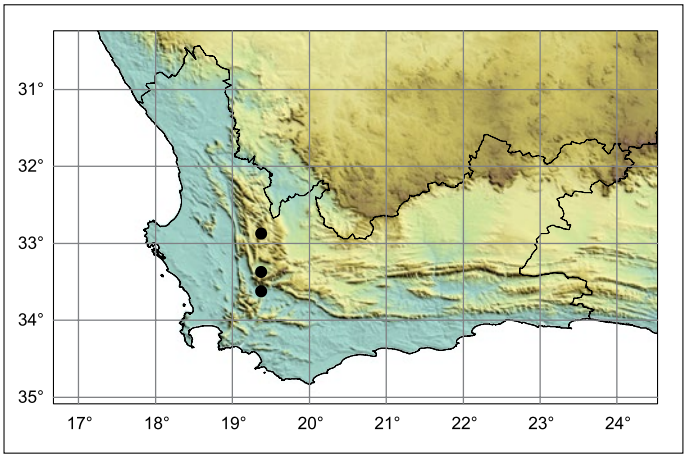


Figure 62. Distribution of *Zyrphelis glabra*.

in the upper part and with distinct oil glands, not 3-veined, the fertile disc florets, the filiform twin hairy ray and disc cypselae and the plumose, persistent pappus bristles.

Distribution: *Zyrphelis glabra* occurs in a small area in the Kouebokkeveld- and Hexrivierberge (Figure 62).

Conservation status: According to Von Staden (2012) the Red List status of this species is rare but not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3219 (Wuppertal)**: Ceres Div., [Koue]Bokkeveld, Tafelberg, SE slopes, shady cliffs in crevices, 5000 ft [1524 m], (-CD), 8 December 1940, *Esterhuysen 3888A* (BOL); Ceres District, Koue Bokkeveld, Tafelberg, S facing cliffs & ledges, in seasonally damp crevices, partial shade, 1700–1780 m, (-CD), 26 November 2010, *Helme 6633* (BOL, NBG). **3319 (Worcester)**: Worcester District, Hex River Mountains, Sentinel Peak, ledges at base of cliffs, S aspect, 5500 ft [1676 m], (-AD), 15 December 1957, *Esterhuysen 27423* (BOL, PRE, S); Worcester Div., Hex River Mountains, Horseshoe Peak, gully, S side, 5800 ft [1768 m], (-CB), 1 January 1955, *Esterhuysen 24057* (BOL).

11. *Zyrphelis taxifolia* *(L.) Nees*, *Genera et Species Asterearum*: 250 (1833); Kuntze: 374 (1891); Nesom: 92 (1994); Goldblatt & Manning: 373 (2000); Manning & Goldblatt: 431 (2012).

(Figures 63–69)

Aster taxifolius L.: 102 (1760), 1225 (1763); Berg.: 286 (1767); Lam.: 301 (1783); Willd.: 2014 (1803); Pers.: 441 (1806/1807); non *Aster taxifolius* Spreng.: 526 (1826) = *Aster muricatus* Thunb. = **Felicia muricata** (Thunb.) Nees.

Mairia taxifolia (L.) DC.: 218 (1836); Harv. in Harv. & Sond.: 65 (1865); Bond & Goldblatt: 180 (1984).

Type: LINN 997.1 (Herb Linn, e, holo.)

Leyssera ciliata Thunb.: 160 (1800); Willd.: 2132 (1803); Pers.: 457 (1806/1807); Poir.: 347 (1813); Thunb.: 690 (1823); Spreng.: 570 (1826).

Elphegea ciliata (Thunb.) Less.: 126 (1831); Less.: 183 (1832).

Type: [South Africa, Western Cape, Cape Town (3318):] Crescit in summis lateribus et in collibus inferioribus Montis Tabularis. Floret Februario et sequentibus mensibus [grows on high and lower hillsides of Table Mountain], (-CD), February, *Thunberg* (Herb. *Thunberg 20078*, UPPS, e, holo.).

Aster ciliaris Thunb. in herb. L'Her., fide DC.: 218 (1836), [G00495696 (G-DC)].

Zyrphelis amoena Cass.: 421 (1829); 598 (1830).

Type: [South Africa, Western Cape, Cape Town (3318?):] Cap de Bonne-Espérance [Cape of Good Hope], 1829, *A. Lesson & d'Urville107* (P e).

Mairia pinifolia Sch.Bip. ex Walp.: 955 (1843).

Mairia taxifolia (L.) DC. var. *pinifolia* (Sch.Bip. ex Walp.) Harv.: 65 (1865).

Type: [South Africa, Western Cape, Cape Town (3318):] In Promontorio bonae spei in latere occidentali montis Duyvelsberg altitudine 2000 pedum. [Cape of Good Hope, on the western side of Devils Peak, at an altitude of 2000 ft = 610 m], (-CD), Julio [July], *Schultz Bipontinus 651* (MO-5481702, holo., M e, iso.).

Aster filiformis Eckl. ex DC. in Herb. Moric., fide DC.: 218 (1836).

Type: [South Africa, Western Cape, Cape Town (3318):] Inter saxa in praeruptis mont. tabul. altitud. 4000 [on steep rocky slopes, Table Mountain, 1219 m], (-CD), October, *Ecklon 103*b [MO, M (M0104550, M0104551) e, PRE).

Note: There are some specimens with the collector number *Ecklon 103* and others *Ecklon 103b*. Candolle (1836) referred to *Ecklon 103b*. There are two specimens in S (S06-11779 and S-G-708) with Ecklon's handwritten labels, on which the name *Aster filiformis*, the number *103*, the date *10 October 1827* and the locality

auf dem Gipfel des Tafelberges, is clearly visible. The sheet S06-11779 contains another specimen collected in December 1825 with the number S07-2912. On the two specimens in M (M0104550 and M0104551), one specimen in PRE and a specimen in MO, a printed label is attached with the name *Aster filiformis* Wild., the number *103b*, the date *October* (no day or year) and the locality *inter saxa in praeruptis mont. tabul. altitud. 4000*. The specimen on the sheet M0104550 has a handwritten tag attached to it with a different number (something like *8243*).

Erect perennial herb, suffrutex or dwarf shrub; *stems* glabrous. *Leaves* alternate, sessile, densely set to scattered along stems, erect to spreading or recurved, flat or folded lengthwise, or flat basally, folded lengthwise upwards, linear to linear-triangular, narrowly triangular, rarely linear-obovate, apex acute, mucronate or bristle-tipped mucronate, base semi-amplexicaul, sometimes slightly decurrent, margins entire, ciliate; surface glabrous, mostly with embedded oil glands. *Capitula* radiate, terminal, solitary, distinctly pedunculate. *Peduncle* woolly hairy, bracteate. *Involucre* obconical to broadly obconical, campanulate or (broadly) cup-shaped. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices or upper parts often tinged red. *Ray florets* female, fertile. *Style* bifurcate. *Ovary* sparsely, shortly clavate-like twin hairy or twin hairs microscopically small and surface appears glabrous. *Cypsela* laterally compressed, margin thickened, with carpopodium, sparsely, (microscopically small) shortly clavate-like twin hairy or surfaces appear glabrous. *Pappus bristles* plumose, nude basally, persistent. *Disc florets* functionally male. *Anthers* with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* without stigmatic areas or with short, marginal stigmatic areas basally and deltoid, papillate apical appendages. *Ovary* glabrous or sparsely, small clavate-like twin hairy. Some outer disc florets develop pseudo-cypsela, surface glabrous, shiny. *Pappus bristles* plumose, nude basally, persistent.

Superficially similar to *Z. lasiocarpa*, but that species has stipitate glandular and bristly hairy peduncles and dense, (long) filiform twin hairy cypselae.

Key to varieties

1a. Perennial herb, suffrutex or dwarf shrub, stems woody basally, herbaceous upwards, involucre up to 12 mm high and up to 18(–20) mm broad, flowering time ± throughout the year, but with a peak from May to September. . . . . 11a. var. *taxifolia*

1b. Dwarf shrub, stems woody, involucre up to 14(–15) mm high, and up to 25 mm broad, flowering time August to October . . . . . 11b. var. *robusta*

11a. **Zyrphelis taxifolia** var. **taxifolia**

Erect perennial herb, suffrutex, or dwarf shrub, up to 500 mm high, stems solitary or with few branches from the base and sparsely to laxly branched upwards, sometimes almost virgate, rarely ascending; *stem* somewhat woody at base, herbaceous upwards, often tinged reddish, glabrous. *Leaves* alternate, sessile, densely set to scattered along stems, erect to spreading or recurved, flat or folded



Figure 63. Scan of *Zyrphelis taxifolia* var. *taxifolia* specimen (*Esterhuysen 18854*, PRE).



Figure 64. *Zyrphelis taxifolia* var. *taxifolia*: A, glabrous, ciliate leaves with embedded oil glands (*Esterhuysen 31096*, BOL); B, woolly hairy peduncle (*Taylor 6319a*, STE in NBG); C, capitulum showing the glabrous, 3-veined involucral bracts with oil glands along the veins (*Taylor 6319a*, STE in NBG); D, ray cypsela with thickened margin (*Stauffer & Esterhuysen 5064*, PRE); E, glabrous pseudo-cypsela of disc floret with thickened margin (*Esterhuysen 33320*, BOL).

lengthwise, or flat basally, folded lengthwise upwards, linear to linear-triangular, narrowly triangular, rarely linear-obovate, (5–)7–30(–40) × 1.0–2.0(–2.5) mm, apex acute, mucronate or bristle-tipped mucronate, base semi-amplexicaul, sometimes slightly decurrent, margins entire, sometimes whitish and appear thickened, lower leaves usually with short cilia basally or without cilia or cilia sometimes broken off creating illusion of denticulate margin, middle and upper leaves long and densely ciliate in lower half, length and density of cilia decreases upwards along margin, upper parts of margin without cilia, sometimes ciliate along entire margin, rarely without cilia, surface glabrous, mostly with embedded oil glands. *Capitula* radiate, terminal, solitary, distinctly pedunculate. *Peduncle* 10–115 mm long, often tinged reddish, woolly hairy, of increasing density towards capitula, rarely bristly hairy (*Esterhuysen 33320*, BOL), bracteate. *Peduncular bracts* 2 to 11(12) per peduncle, linear-triangular, narrowly triangular, (rarely) very narrowly ovate or linear-ovate, linear or linear-filiform, 4–15(–16) mm long, sometimes tinged reddish, bases semi-amplexicaul, of upper bracts often swollen, margins

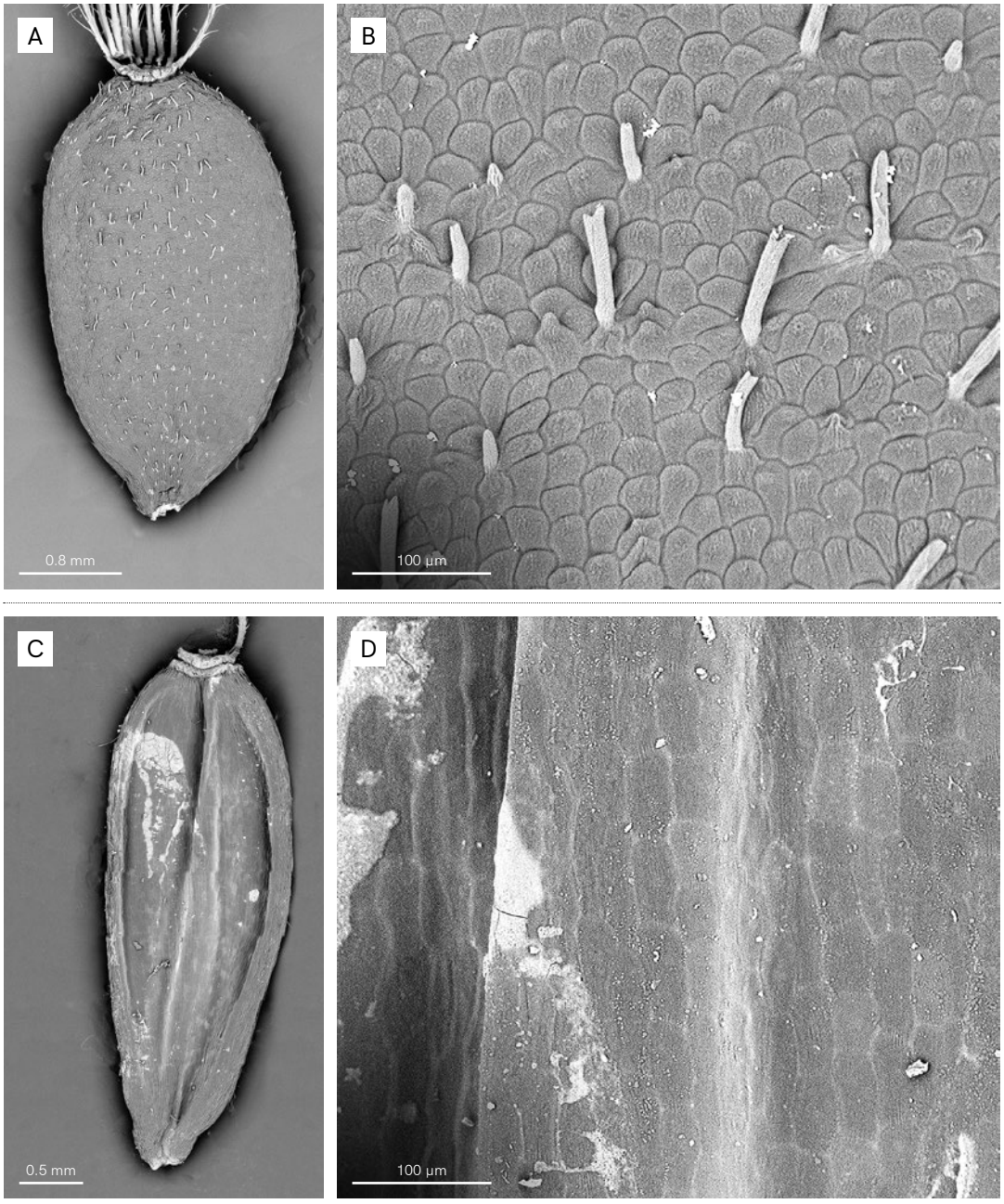


Figure 65. *Zyrphelis taxifolia* var. *taxifolia*: scanning electron micrographs of the ray cypsela, A, showing the very short clavate-like twin hairs, B, epicarpic cells ± oblong in surface view, rarely ± areolate, striated or only tips towards pappus side of cypsela striated (*Wolley Dod 1200*, BOL); C, the glabrous pseudo-cypsela of a disc floret, D, epicarpic cells ± oblong in surface view, flat, smooth or faintly striated (*Esterhuysen 33320*, BOL).

ciliate, surface glabrous, usually with embedded oil glands; not always clear cut distinction between upper leaves and lower bracts. *Involucre* obconical to broadly obconical, campanulate or (broadly) cup-shaped, 7–12 mm high, 7–18(–20) mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices or upper parts often tinged red; *outer row* linear, linear-elliptic, narrowly oblong, (vary) narrowly triangular, linear-triangular or very narrowly ovate, 4.0–6.5 × 1.0–1.2(–1.5) mm, apex acute to acuminate, margins sometimes narrowly membranous, fimbriate-ciliate, longer basally, shorter around apex, surface glabrous, sometimes slightly keeled, usually V-shaped thickened, stereome sometimes fenestrated, often with oil glands along main vein; *second row* narrowly oblong, (very) narrowly elliptic, (very) narrowly ovate, narrowly triangular, rarely (very) narrowly obovate, 5–8(–9) × 1.0–1.5 mm, apex acute to acuminate, margin narrowly membranous, fimbriate-ciliate, surface glabrous, sometimes slightly keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes 3-veined, with oil glands along vein(-s); *third row* oblong or narrowly oblong, linear-elliptic, (very) narrowly obovate or narrowly ovate, (6.5–)7.0–10.0 × (1.0–)1.2–2.0 mm, apex acute to acuminate, margin narrowly membranous, fimbriate-ciliate in upper part, surface glabrous, keeled and V- or Y-shaped thickened from base, stereome fenestrated, usually 3-veined, with oil glands along vein(-s); *fourth row* narrowly elliptic, narrowly oblong, linear to (very) narrowly obovate, (7.0–)7.2–10.0 × (1.0–)1.5–2.0 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate in upper part, surface glabrous but sometimes with few, very short, thick, white hairs in upper part, keeled and Y-shaped thickened from base, stereome fenestrated, 3-veined, with oil glands along veins. *Ray florets* female, fertile; corolla pink, dark pink, mauve, blue, saxe blue, dark saxe blue or Wedgwood blue; *tube* (1.5–)2.0–3.0 mm long, usually with glandular hairs on upper part and around mouth, *limb* (4.5–)5.0–9.0 mm long, 3-, rarely 4-lobed. *Style* 1.5–3.0 mm long, bifurcate; *style branches* linear, linear-elliptic, linear-triangular, (0.5–)1.0–1.2(–1.5) mm long, stigmatic areas marginal, confluent at apex. *Ovary* linear, linear-elliptic or narrowly obovate, 2.0–3.0(–3.5) mm long, sparsely, shortly clavate-like twin hairy or twin hairs microscopically small and surface appears glabrous. *Cypsela* (dark) brown, reddish brown or blackish, (narrowly) obovate, ovate, or elliptic, 3.0–4.0(–4.2) × (1.4–)1.5–2.0 mm, laterally compressed, margin thickened, with carpopodium, surfaces sparsely, (microscopically small) shortly clavate-like twin hairy, apices of twin hairs acute, or surfaces appear glabrous; epicarpic cells ± oblong in surface view, rarely ± areolate, striated or only tips towards pappus side of cells striated, rarely ± smooth. *Pappus bristles* 3–4 mm long, plumose, nude basally, persistent. *Disc florets* functionally male; corolla yellow, tubular; *tube* 2.5–3.5 mm long, glabrous, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, sometimes also few non-glandular hairs, usually with resin ducts along margins, sometimes tinged reddish. *Anthers* 1.5–2.0 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2.0–3.0(–3.2) mm long, bifurcate; *style branches* narrowly ovate or linear, 1 mm long, without stigmatic areas or with short, marginal stigmatic areas basally and deltoid, papillate apical appendages. *Ovary* linear or linear-elliptic, ovate, very narrowly obovate, 1.5–3.0 mm long, margin thickened, sometimes with distinct oil glands on shoulders, with carpopodium, glabrous or rarely sparsely, shortly clavate-like twin hairy; epicarpic cells ± oblong in surface view, flat, ± smooth. In 2 specimens (*Compton 13510*, PRE; *Esterhuysen 33320*, BOL) some pseudo-cypselae were observed developing from some outer disc florets: brown, obovate, 3–4 × 1.6 mm, margin thickened, with small carpopodium, surface glabrous, shiny; epicarpic cells ± oblong in surface view, flat, smooth or faintly striated. *Pappus bristles* 3–4 mm long, plumose, nude basally, persistent. *Flowering time*: Recorded throughout the year but with a peak from May to September. Figures 63 to 65.

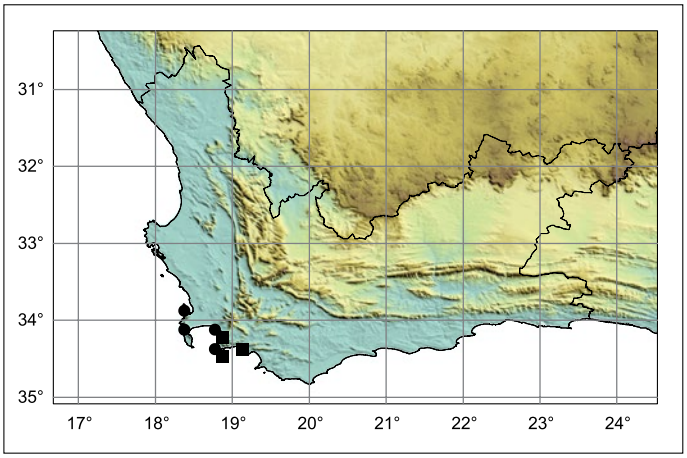


Figure 66. Distribution of *Zyrphelis taxifolia* var. *taxifolia* ● and var. *robusta* ■.

Diagnostic characters: *Zyrphelis taxifolia* var. *taxifolia* is characterised by the glabrous, flat or folded, linear to linear-triangular leaves, ciliate in the lower half, the woolly hairy peduncles, the solitary, fairly large capitula, the glabrous involucral bracts with acute to acuminate apices, the mostly 3-veined inner involucral bracts with embedded oil glands, the glabrous or at most microscopically small (short) clavate-like twin hairy cypselae and the persistent plumose pappus bristles.

Distribution: *Zyrphelis taxifolia* var. *taxifolia* occurs in the Cape Peninsula on Table Mountain and Constantiaberg, east to Kogelberg, and north on Somerset Sneeuwkop (Figure 66).

Conservation status: According to Helme et al. (2012a) the Red List status of this taxon is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3318 (Cape Town)**: Tafelberg, an felsigen und feuchten Oertern auf dem Berg, 3000 Fuss Höhe, meistens im Februar und März gesammelt [Table Mountain, in rocky and damp places, 914 m high, collected mostly in February and March], (-CD), *Drège s.n.* (S16-6481), (S16-6476), (S); Auf dem Gipfel des Tafelberges [on the summit of Table Mountain], (-CD), 10 October 1827, *Ecklon 103* (S-G-708, S06-11779) (S); Cape Peninsula, summit Table Mtn, 3500 ft [1067 m], (-CD), 18 November 1897, *Galpin 4120* (PRE); Table Mountain, 2500 ft [762 m], (-CD), 17 July 1890, *Guthrie 573* (BOL); Kapkolonie, Tafelbergen [Cape Colony, Table Mountain], (-CD), 2 December 1934, *Hafström s.n.* (S16-6483), (S13-33280), (S13-33278) (S); 9 December 1934, *Hafström s.n.* (S13-33274) (S); 18 December 1936, *Hafström s.n.* (S13-33283) (S); Table Mountain, 1 km SW of Grootkop, along path E of Victoria gulley, seasonally damp shallow sands, 700 m, (-CD), 26 May 2007, *Helme 4665* (NBG); Cape Town, Table Mountain, (-CD), 5 August 1933, *Humbert 9611* (PRE); Tafelberget [Table Mountain], ca. 1000 m höh [high], (-CD), 14 April 1962, *Hummel s.n.* (S16-6495) (S); Cape Peninsula, Table Mountain, lower plateau, (-CD), May 1915, *Kensit s.n.* PRE2119 (PRE); Herb US15606 (STE in NBG); Peninsula Div., Table Mountain, top of Skeleton Gorge, ca. 700 m s.m., (-CD), 3 June 1962, *Nordenstam 128* (S); Cape Peninsula, summit of Table Mountain, very common, (-CD), 12 May 1918, *Pillans 3065* (BOL, PRE); collected on Table Mountain, (-CD), July 1846, *Prior s.n.* PRE42027 (PRE); Cape Peninsula, Table Mountain, 3000 ft [914 m], (-CD), 2 January 1948, *Rodin 3199* (BOL, PRE); Cape Town, Camps Bay, (-CD), May 1886, *Thode A107* (PRE); Cape Div., summit of Table

Mountain, 3000 ft [914 m], (-CD), 24 November 1938, *Wall s.n*. (S16-6450) (S); Cape Distr., Table Mountain, (-CD), 8 December 1937, *Wall s.n*. (S16-6449), (S16-6474) (S); Cape Peninsula, summit of Table Mountain, (-CD), 21 August 1895, *Wolley Dod 243* (BOL); Cape Peninsula, summit of Table Mountain, (-CD), 8 March 1896, *Wolley Dod 991* (BOL); Cape Peninsula, near summit of Twelve Apostles, (-CD), 25 June 1896, *Wolley Dod 1200* (BOL). **3418 (Simonstown)**: Steep damp upper slopes of Skoorsteenkop, (-AB), 2 October 1935, *Acock s.n.* (S16-6489) (S); Cape Peninsula District, Constantiaberg, swamp, 2800 ft [853 m], (-AB), 17 December 1939, *Compton 8212* (BOL, NBG); Cape Peninsula, Constantiaberg, steep rocky SW slopes, common on upper slopes after fire, ± 2000 ft [610 m], (-AB), 15 August 1965, *Esterhuysen 31096* (BOL, PRE, S 2×); Cape Peninsula, Constantiaberg, vom Gipfel bis gegen Pass, in Brandfläche [from the top towards the pass, in burnt area], 700 m, (-AB), 29 August 1963, *Stauffer & Esterhuysen 5064* (PRE); Simonstown Distr., SE of Noordhoek Peak, streambank, 2300 ft [701 m], (-AB), 2 June 1965, *Taylor 6319a* (PRE, STE in NBG); Stellenbosch District, Somerset West Sneeu[w]kop, on moist south slopes, below cliffs, 4800–5000 ft [1463–1524 m], (-BB), 1 November 1973, *Esterhuysen 33320* (BOL); Simonstown Distr., Platberg, Kogelberg Forest Reserve [Kogelberg Nature Reserve], SE slope, damp, 2500 ft [762 m], (-BD), 17 August 1968, *Boucher 147* (SAASVELD in PRE); Kogelberg State Forest [Kogelberg Nature Reserve], SE Pringle East Peak, above Post Office at Betty's Bay, moist southerly slopes, 2600 ft [792 m], (-BD), 19 September 1974, *Boucher 2506* (STE in NBG); Caledon District, Hangklip, 1500 ft [457 m], (-BD), 5 September 1942, *Compton 13510* (PRE); Caledon Division, S slopes of Pringle East Peak, near summit, (-BD), 16 September 1951, *Esterhuysen 18854* (BOL, NBG, PRE); Caledon Division, Pringle East Peak, S and SW slopes, below summit, 2000–2500 ft [610–762 m], (-BD), 21 September 1952, *Esterhuysen 20398* (BOL, PRE); Caledon Division, Mountains behind Betty's Bay, (-BD), 5 September 1942, *Leighton s.n.* BolHerb. 31464 (BOL32891, BOL).

Without exact locality: Cap. B. Spei [Cape of Good Hope], 1840, *Drège s.n.* (S16-6478 (S); Jan. 1845, *Wahlberg s.n.* (S16-6487) (S).

Unlikely locality: Zwischen Hexriviersberg und Bokkeveld, auf der Bergfläche und auf steinigen Hügeln, 3000–4000 Fuss [between Hexriviersberg and Bokkeveld, on the mountain face and stony hills, 914–1219 m], (3319BD/CB), September, *Drège s.n.* (S16-6477) (S).

11b. **Zyrphelis taxifolia** var. **robusta** *P.P.J.Herman, var. nov*.

Type: South Africa, Western Cape, Caledon (3419): Caledon District, Palmiet River Mountains [Palmietberge], 900 m, (-AC), August 1924, *Stokoe 983* (PRE, holo.).

Dwarf shrub, up to 400 mm high, sparsely branched or few stems from the base, rarely ascending. *Stems* woody, glabrous. *Leaves* alternate, sessile, usually densely set (imbricate) or less often scattered along stems, erect or (slightly) recurved, flat or (slightly) folded lengthwise in upper part, or flat basally, folded lengthwise upwards, linear to linear-triangular, (7–)12–30(–35) × (1.0–)1.5–2.5 mm, apex acute, mucronate or bristle-tipped mucronate, base semi-amplexicaul, sometimes slightly decurrent, margins entire, of lower leaves usually with short cilia basally or cilia sometimes broken off creating illusion of denticulate margin, of middle and upper leaves long and densely ciliate in lower half, upper parts of margin without cilia, sometimes ciliate along entire margin, surface glabrous, mostly with embedded oil glands. *Capitula* radiate, terminal, large, solitary, distinctly pedunculate. *Peduncle* 20–60(–70) mm long, often tinged reddish, woolly hairy, of increasing density towards capitula, bracteate. *Peduncular bracts* (2)4 to 9 per peduncle, linear-triangular, linear or linear-filiform, (6–)7–14 mm long, bases semi-amplexicaul, of upper bracts often swollen, margins ciliate, surface glabrous, usually with embedded oil glands; not always clear cut distinction between upper leaves and lower bracts. *Involucre* obconical



Figure 67. Scan of the holotype of *Zyrphelis taxifolia* var. *robusta* (*Stokoe 983*, PRE).



Figure 68. *Zyrphelis taxifolia* var. *robusta*: A, glabrous, ciliate leaves; B, woolly hairy peduncle; C, capitulum showing the glabrous, 3-veined involucral bracts; D, hairy ray cypsela with thickened margin; E, the glabrous pseudocypsela of a disc floret with thickened margin (all *Stokoe s.n.* PRE57041, PRE).

to broadly obconical, campanulate or cup-shaped, 10–12(–15) mm high, 12–25 mm across upper part. *Involucral bracts* in 4 rows, imbricate, outer shorter than inner, apices or upper parts usually tinged red; *outer row* linear, narrowly oblong, narrowly triangular or very narrowly ovate, (6.0–)6.8–7.0 × (1.0–)1.5 mm, apex acute, margins membranous, fimbriate-ciliate, (longer basally, shorter around apex), surface glabrous, usually V-shaped thickened basally, stereome fenestrated, often with oil glands along main vein; *second row* narrowly oblong, very narrowly elliptic, (very) narrowly ovate, narrowly triangular, (7–)8(–10) × (1.2–)1.5(–1.6) mm, apex acute to acuminate, margin (narrowly) membranous in lower part, fimbriate-ciliate, surface glabrous, V-shaped thickened from base, stereome fenestrated, with oil glands along main vein; *third row* narrowly oblong, linear, (very) narrowly obovate, (9.0–)10.0(–12.5) × (1.5–)2.0 mm, apex acute to acuminate, margin (narrowly) membranous, fimbriate-ciliate, surface glabrous, usually keeled and V-or Y-shaped thickened from base, stereome fenestrated, usually 3-veined, with oil glands along veins; *inner row* elliptic, very narrowly elliptic, linear to very narrowly obovate, (7.8–)10.0–12.0 × (1.2–)2.0 mm, apex acute to acuminate, margin (narrowly) membranous, fimbriate-ciliate, surface glabrous but sometimes with few, very short, thick, white hairs

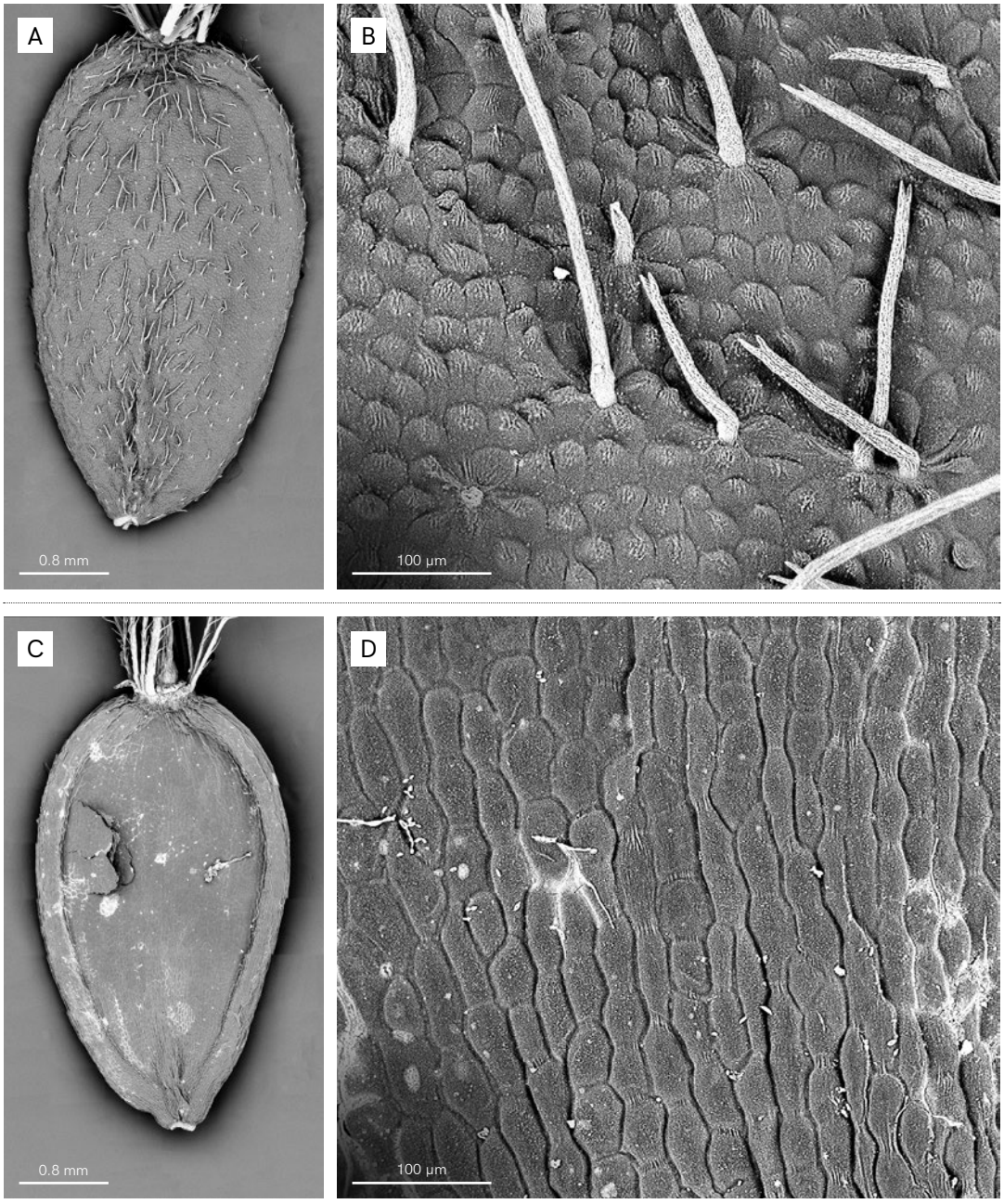


Figure 69. *Zyrphelis taxifolia* var. *robusta*: scanning electron micrographs of the ray cypsela, A, B, showing the short clavate-like twin hairs, epicarpic cells ± colliculate to areolate in surface view, sparsely rugose; C, D, the glabrous pseudo-cypsela of a disc floret with thickened margin, epicarpic cells ± oblong in surface view, flat, ± smooth (all *Stokoe s.n.* PRE57041, PRE).

in upper part, keeled and V- or Y-shaped thickened from base, stereome fenestrated, 3-veined, with oil glands along veins. *Ray florets* female, fertile; corolla blue or pink; *tube* (2–)3 mm long, usually with glandular hairs on upper part and around mouth; *limb* (6–)8–9 mm long. *Style* (1.8–)2.0–3.0 mm long, bifurcate; *style branches* linear, linear-elliptic or narrowly ovate, (0.8–)1.2 mm long, stigmatic areas marginal, confluent at apex. *Ovary* elliptic, 3.0–3.2 mm long, with small carpopodium, sparsely, shortly clavate-like twin hairy. *Cypsela* brown, (narrowly) obovate, elliptic, 3.5–5.2 × 1.5–2.2 mm, laterally compressed, with thickened margin, with small carpopodium, surfaces sparsely, shortly clavate-like twin hairy, apices of twin hairs acute; epicarpic cells ± colliculate to areolate in surface view, sparsely rugose. *Pappus bristles* (3–)4 mm long, plumose, nude basally, persistent. *Disc florets* functionally male; corolla yellow, tubular; *tube* 2.5–4.0 mm long, glabrous, 5-lobed; *lobes* 1 mm long, with subapical glandular hairs, usually with resin ducts along margins. *Anthers* (1.2–)2.0 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* (2–)3 mm long, bifurcate; *style branches* (narrowly) ovate, (0.6–)1.0 mm long, without stigmatic areas or with short, marginal stigmatic areas basally and deltoid, papillate apical appendages. *Ovary* linear, elliptic or very narrowly obovate, 2.0–4.5 mm long, with thickened margin, with carpopodium, sterile, glabrous; epicarpic cells ± oblong in surface view, flat, ± smooth. In 1 specimen (*Stokoe s.n*. PRE57041, PRE) few pseudocypselae were observed: 4 × 2 mm, glabrous, margin thickened, epicarpic cells ± oblong in surface view, flat, ± smooth. *Pappus bristles* (3–)4(–5) mm long, plumose, nude basally, persistent. *Flowering time*: August to October. Figures 67 to 69.

Diagnostic characters: More robust and sturdy than var. *taxifolia* and with larger capitula.

Distribution: var. *robusta* occurs in a small area in the southern Hottentots-Hollandberge, Kogelberg and Palmietrivierberge (Figure 66).

Conservation status: The Red List status of this taxon is probably the same as that for the var. *taxifolia*: Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3418 (Simonstown)**: Caledon Division, Hottentots Holland Mountains, (–BB), no date, *Stokoe 6603* (NBG); Caledon Division, Kogelberg, (–BB), September 1944, *Stokoe s.n.* PRE57041 (PRE); August 1947, *Stokoe s.n.* SAM50930 (PRE); Kogelberg Forest Reserve [Kogelberg Nature Reserve], Voorberg summit, moist peaty sand, 800 m, (–BD), 2 October 1971, *Boucher 1646* (PRE).

Porterville Division, top of Cardouw Pass [Dasklip Pass], (3219CC), 15 September 1953, *Lewis s.n.* SAM66151B (PRE) – this specimen was mounted as part of a *Z. pilosella* collection on the same sheet. It is highly unlikely that *Z. taxifolia* occurs in that area and the specimens were probably mixed up during the mounting process.

12. *Zyrphelis outeniquae* *(Fourc.) Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1198 (2011).

(Figures 70–73)

Aster outeniquae Fourc.: 84 (1934).

Type: South Africa, Eastern Cape, Steytlerville (3324): Humansdorp District, Mountain slopes above forest, Witte Els Bosch, 3000 ft [Witelsbos, 914 m], (-CC), September 1920, *Fourcade 925* (BOL, holo.; BOL, M, iso.).

Mairia fourcadei Schonl. *ined*. (manuscript name on M specimen).

Erect, semi-shrub, up to 600 m high, sparsely branched. *Stem* woody, glabrous or sometimes with a few bristle hairs, densely leafy. *Leaves* alternate, sessile, densely set, imbricate, elliptic, oblong or narrowly obovate, 8–52 × 2.5–12.0 mm, erect or ± recurved, flat, apex acute, mucronate, base semi-amplexicaul, briefly decurrent, margins entire, mostly revolute, margins of lower and middle leaves glabrous or ciliate-denticulate (cilia break off creating impression of denticulations), margins of upper leaves usually ciliate, surface glabrous or rarely with few bristle hairs, single veined or sometimes 3-veined basally but 2 lateral veins soon fading, often with numerous small, round, orange-coloured embedded oil glands. *Capitula* radiate, solitary, terminal, pedunculate. *Peduncle* 20–70 mm long, softly curly hairy, hairs on broad bases, densely so below capitula, bracteate; *peduncular bracts* 4–8(–10), linear, linear-triangular or oblong, 7–10(–13) mm long, surface glabrous, margin ciliate, often with swollen bases and embedded oil glands. *Involucre* campanulate or broadly obconical, 10–14 mm high, 12–25 mm across upper part. *Involucral bracts* in (3)4 rows, imbricate, outer shorter than inner; *outer row* narrowly ovate or obovate, 6–9 × 1.4–2.5 mm, apex acute, margin membranous, fimbriate-ciliate, surface glabrous or rarely sparsely woolly hairy, V-shaped thickened from base, stereome fenestrated, often with embedded oil glands; *second row* obovate or elliptic, 8.0–10.5 × 1.5–3.0 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface glabrous or rarely sparsely woolly hairy, often keeled and V- or Y-shaped thickened from base, stereome fenestrated, often 3-veined and with embedded oil glands; *third row* narrowly ovate or obovate, 9.5–11.5 × 2–3 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface glabrous or rarely sparsely and finely woolly hairy, often keeled and Y-shaped thickened from base, stereome fenestrated, 3-veined, often with embedded oil glands; *fourth row* narrowly elliptic or narrowly obovate, 10.5–12.0 × 1.5–2.0 mm, apex acute to acuminate, margin narrowly membranous, fimbriate-ciliate, surface glabrous or rarely with few short woolly hairs sometimes, slightly keeled basally, V- or Y-shaped thickened from base, stereome fenestrated, 3-veined, with oil glands along veins. *Ray florets* female, fertile, corolla white, rarely pink or mauve; *tube* 2.0–3.5 mm long, with glandular hairs along tube and around mouth, *limb* 9.0–13.5 mm long, 3-lobed. *Style* 2.0–3.8 mm long, bifurcate; *style branches* linear-elliptic or elliptic, 1.0–1.5 mm long, stigmatic areas marginal, confluent at apex. *Ovary* narrowly ovate or elliptic, 2.2–4.2 mm long, with small carpopodium, (sparsely and) very short clavate-like twin hairy or glabrous. *Cypselae* reddish black, obovate, 5.2 × 2.4 mm, laterally compressed, margin thickened, with small carpopodium, surfaces with very short clavate-like twin hairs, apices of twin hairs obtuse to acute, unequal, sometimes glabrous; epicarpic cells in twin hairy cypselae



Figure 70. Scan of the isotype of *Zyrphelis outeniquae* (*Fourcade 925*, BOL).



Figure 71. *Zyrphelis outeniquae*: A, glabrous but ciliate-denticulate leaves with embedded oil glands; B, softly hairy peduncle; C, capitulum showing the glabrous, 3-veined involucral bracts with oil glands along the veins; D, minutely hairy ray cypsela (all *Fourcade 925*, BOL).

± areolate to slightly elongated and striated in surface view, of glabrous cypselae ± oblong in surface view. *Pappus bristles* 4 mm long, plumose, barbellate to nude basally, persistent. *Disc florets* functionally male, corolla yellow, tubular; *tube* 3.0–4.5 mm long, with glandular hairs on lower part of tube, 5-lobed; *lobes* 0.5–1.2 mm long, with sub-apical glandular hairs and resin ducts along margins. *Anthers* 1.0–2.2 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2.5–3.8 mm long, bifurcate; *style branches* linear, 1.0–1.5 mm long, stigmatic areas marginal, not confluent, with deltoid, papillate apical appendages. *Ovaries* elliptic, narrowly obovate or linear, 2.5–4.0 mm long, of outer disc florets with thickened margin and very short clavate-like twin hairs along margins and on surfaces, apices of twin hairs unequal, of inner disc florets glabrous; epicarpic cells oblong in surface view, flat and ± smooth to faintly striated. *Pappus* bristles 4.0–4.5 mm long, plumose, barbellate or nude basally, persistent. *Flowering time*: September to October. Figure 70 to 72.

Diagnostic characters: *Zyrphelis outeniquae* is characterised by the glabrous, elliptic, oblong or narrowly obovate leaves with ciliate-denticulate margins, the solitary, large capitula, the woolly peduncles,

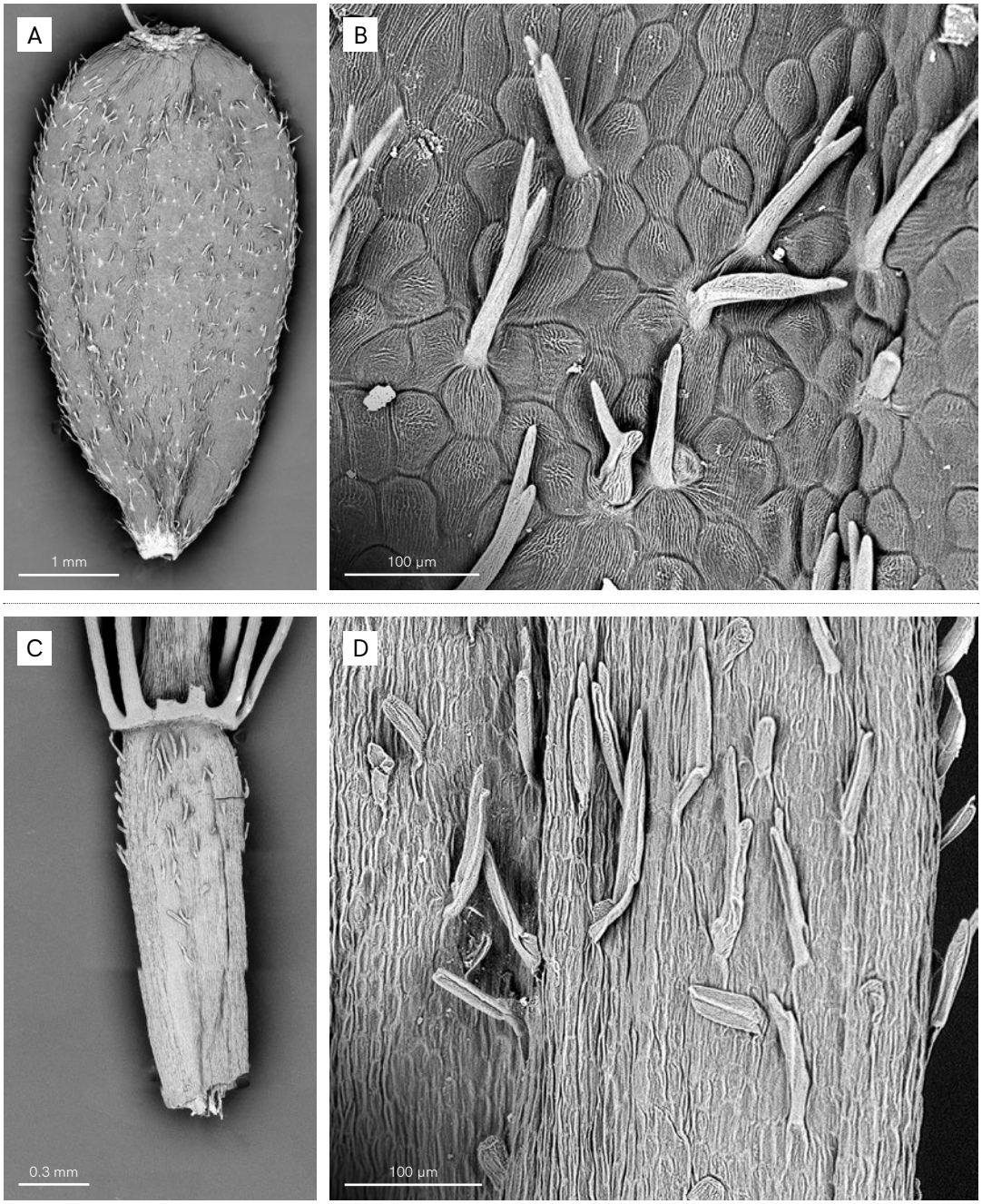


Figure 72. *Zyrphelis outeniquae*: scanning electron micrographs of A, B, the ray cypsela showing the clavate-like twin hairs, epicarpic cells ± areolate to slightly elongated and striated in surface view (*Fourcade 925*, BOL); C, D, the disc ovary with few clavate-like twin hairs (*Bond 1595*, NBG).

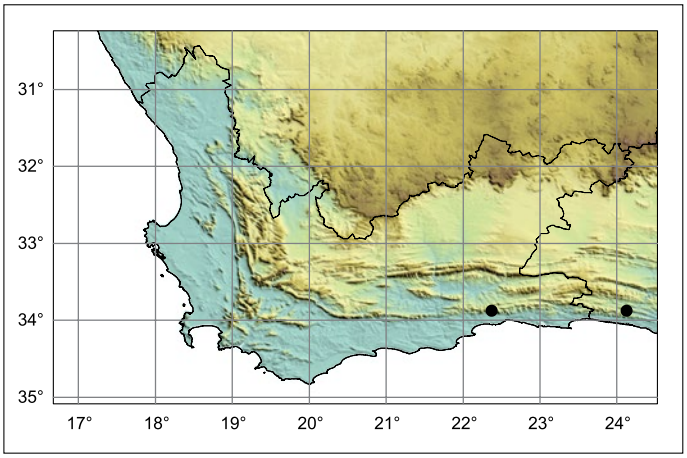


Figure 73. Distribution of *Zyrphelis outeniquae*.

the glabrous, ciliate peduncular bracts with embedded oil glands, the glabrous or rarely sparsely woolly involucral bracts, the plumose, persistent pappus bristles, the sparse, very short clavate-like twin hairs on the ray cypselae and is confined to the Outeniqua Mountains at the eastern border of the Western Cape Province and the Tsitsikamma Mountains at the western border of the Eastern Cape Province. It resembles *Z. nervosa* and *Z. corymbosa*, but both *Z. corymbosa* and *Z. nervosa* have corymbose synflorescences and clavate twin hairs on the ray cypselae. *Zyrphelis corymbosa* has bristly hairy peduncles, the peduncular bracts and the involucral bracts are glabrous, the pappus bristles are plumose, persistent and it occurs in the Klein River Mountains and Kogelberg area in the Western Cape. *Zyrphelis nervosa* has stipitate glandular and bristly hairy peduncles, the peduncular bracts and the involucral bracts are stipitate glandular and bristly hairy, the pappus bristles are barbellate, caducous and its distribution is confined to the Riviersonderend Mountains, also in the Western Cape. *Zyrphelis outeniquae* also superficially resembles *Z. macrocarpa*. See Table 2 (pg. 52) for comparison with other similar looking taxa.

Distribution: *Zyrphelis outeniquae* represents the taxon in the genus that occurs the furthest east. It occurs at the eastern border of the Western Cape Province in the Outeniqua Mountains and the western border of the Eastern Cape Province in the Tsitsikamma Mountains (Figure 73).

Conservation status: According to Von Staden (2012) the Red List status of this species is Vulnerable D2 as it is potentially threatened by competition from alien invasive plants.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3322 (Oudtshoorn)**: George, slopes west of Cradock Peak, 1300 m, (-CD), 1 October 1978, *Bond 1595* (NBG); George District, Cradock Berg, 3000 ft [914 m], (-CD), 24 September 1897, *Galpin 4169* (PRE2014) (PRE).

13. *Zyrphelis capensis* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1195 (2011).

(Figures 74–77)

Type: South Africa, Western Cape Province, Simonstown (3418): Cape Peninsula, near Olifant's Bosch [Olifantsbos], (–AD), 6 November 1932, *Salter 2844* (BOL138794) (BOL, holo.; (BOL138795) BOL, iso.).

Dwarf shrub, up to 250 mm high, branched from base. *Stems* woody at base, glabrous or bristly hairy. *Leaves* alternate, sessile, densely set, imbricate, erect, linear to very narrowly obovate or very narrowly elliptic, 7–16(–20) × 1.0–1.5 mm, apex acute, mucronate, blade slightly folded lengthwise or flat, margin entire, margin of lowest leaves with few short cilia or eciliate, margin of middle and upper leaves long and densely ciliate basally, length and density of cilia decrease towards apex, upper part of margin usually without cilia, surface glabrous, with occasional bristle hair on lower surface or densely bristly hairy on both surfaces (1 specimen), often minutely white punctate. *Capitula* radiate, solitary, terminal, almost sessile or very shortly pedunculate. *Peduncle* as long as or shorter than subtending leaves, (3–)6–15(–20) mm long, densely, softly bristly hairy, hairs on broad bases, bracteate; *peduncular bracts* 0 to 3 per peduncle, filiform, linear or linear-triangular, 3.0–4.5(–5.0) mm long, margin ciliate, hairy on lower or both surfaces, rarely glabrous, bases sometimes swollen. *Involucre* obconical, campanulate or cup-shaped, 5–7 mm high, (6–)7–9(–11) mm across upper part. *Involucral bracts* in 3 (or 4) rows, imbricate, outer shorter than inner, apices often reddish; *outer row* narrowly triangular, linear-triangular or very narrowly ovate, 4 × 0.5–1.0 mm, apex acute or acuminate, margin usually narrowly membranous, ciliate, surface (sparsely) bristle hairy, sometimes V-shaped thickened and then stereome fenestrated; *second row* narrowly elliptic, narrowly ovate or narrowly obovate, 4.6–5.5 × 1 mm, apex acute or acuminate, margin sometimes narrowly membranous, sometimes with few long cilia in lower part, upper part fimbriate, surface (sparsely) bristle hairy, keeled and V- or Y-shaped thickened, stereome fenestrated, faintly 3-veined, two side veins translucent, oil glands along veins; *third row* narrowly obovate or narrowly elliptic, 6 × 1.4 mm, apex acute, margin membranous, fimbriate-ciliate, surface with occasional bristle hair or glabrous, strongly keeled, Y-shaped thickened, stereome fenestrated; *fourth row* very narrowly elliptic, narrowly obovate to obovate, 5–6 × 1.0–1.5 mm, apex acute, margin membranous, fimbriate, ciliate around apex, surface glabrous or with occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated, 3-veined, two side veins translucent, oil glands along veins. *Ray florets* female, fertile; *tube* 2–3 mm long, glabrous; *limb* 5.0–6.0(–6.5) mm long, 3-lobed. *Style* (1.5–)2.0–2.5 mm long, bifurcate; *style branches* linear-elliptic or linear-ovate, 0.8–1.2 mm long, stigmatic areas marginal, confluent at apex. *Ovary* obovate, (1.8–)2.0 mm long, with dense clavate-like twin hairs. *Cypsela* brown, obovate to elliptic, 2.5 × 1.0–1.2 mm, laterally compressed, margin ± thickened, carpopodium small or not obvious, surfaces with clavate-like twin hairs, apices of twin hairs bluntly acute; epicarpic cells ± colliculate in surface view, smooth. *Pappus* bristles 3–4 mm long, plumose, barbellate or nude basally, persistent. *Disc florets* functionally male, corolla yellow; *tube* 3 mm long, glabrous, 5-lobed; *lobes* (0.5–)1.0 mm long, with sub-apical glandular hairs and with occasional non-glandular hair, often with resin ducts along margins. *Anthers* 0.8–1.8 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2–3 mm



Figure 74. Scan of *Zyrphelis capensis* specimen (*Greuter 21886*, PRE).



Figure 75. *Zyrphelis capensis*: A, white punctate, glabrous, ciliate leaves (*Salter 2844*, BOL); B, softly bristly hairy peduncle (*Salter 1851*, BOL); C, capitulum with outer involucral bracts bristly hairy, inner bracts glabrous and 3-veined (*Salter 1851*, BOL); D, hairy ray cypsela with thickened margin (*Salter 2844*, BOL).

long, bifurcate; *style branches* ovate or elliptic, 1 mm long, without stigmatic areas, papillate. *Ovary* elliptic, oblong or linear, (1.0–)1.8–2.0 mm long, glabrous, often with thickened margin; epicarpic cells oblong in surface view, flat and ± smooth. *Pappus* bristles 3–4 mm long, plumose, barbellate to nude basally, persistent. *Flowering time*: October and November. Figure 74 to 76.

Diagnostic characters: *Zyrphylis capensis* can be recognised by the glabrous or occasionally bristly hairy, stiff, erect, densely set leaves, usually slightly folded lengthwise, with long, densely ciliate margins, the almost sessile or very shortly pedunculate, solitary capitula, the softly bristly hairy peduncles, the bristle hairy, not glandular, 3-veined, involucral bracts, inner sometimes glabrous, the persistent plumose pappus bristles and the cypselae with clavate-like twin hairs. See Table 4 (pg. 114) for comparison with other similar looking taxa (*Z. foliosa*, *Z. microcephala* subsp. *foliosa*).

Distribution: *Zyrphylis capensis* occurs in the Cape Peninsula where it is confined to the Cape of Good Hope Nature Reserve (Figure 77).

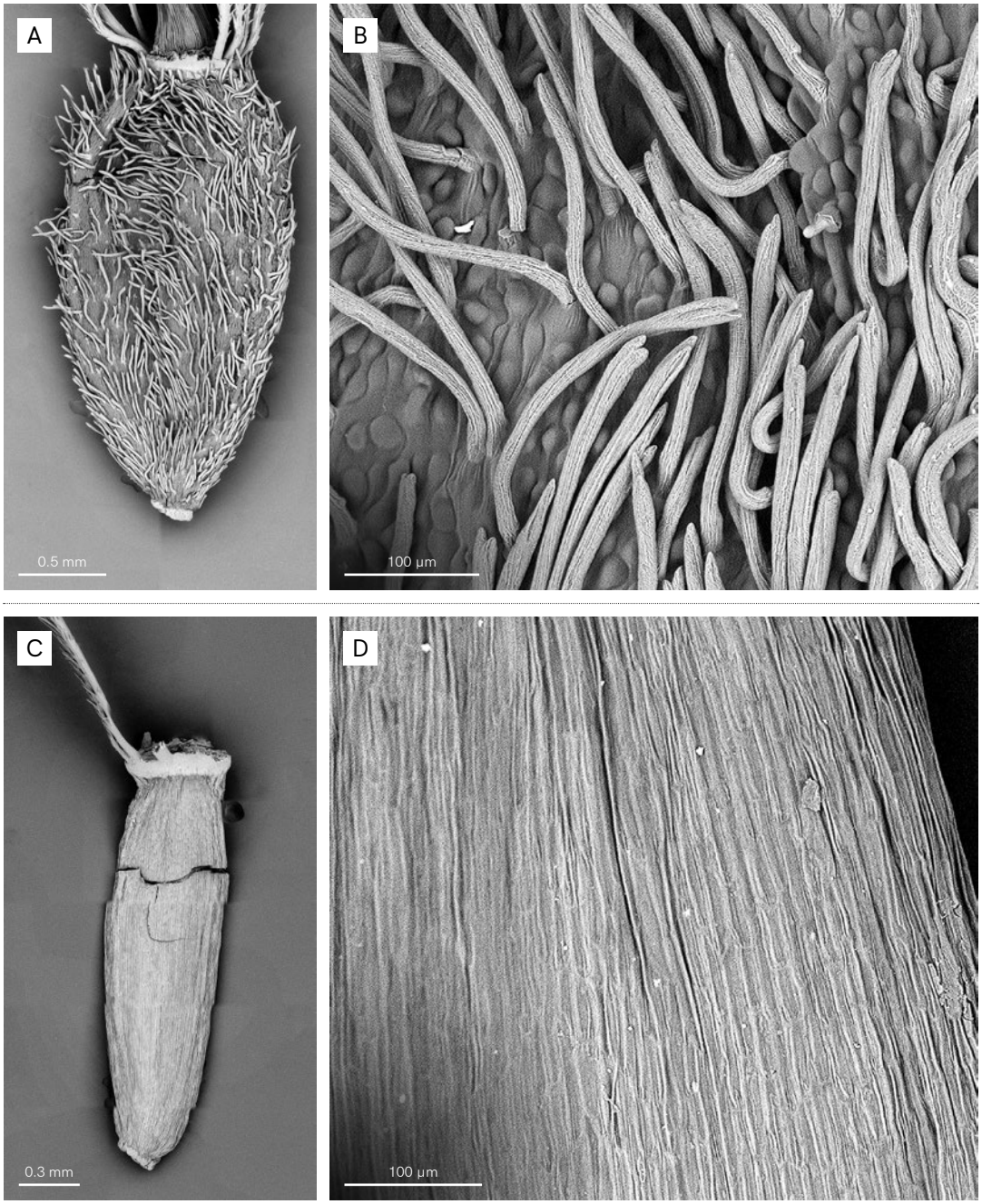


Figure 76. *Zyrphelis capensis*: scanning electron micrographs of A, B, the ray cypsela showing clavate-like twin hairs, epicarpic cells ± colliculate in surface view, smooth (*Greuter 21886*, PRE); C, D, of glabrous, sterile disc ovary (*Salter 2844*, BOL).

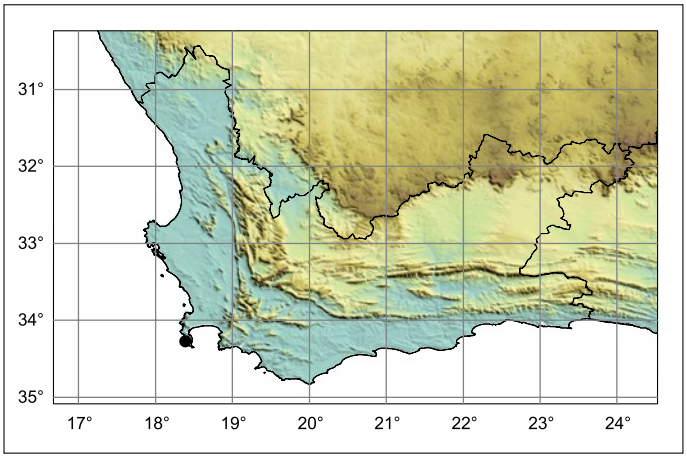


Figure 77. Distribution of *Zyrphelis capensis*.

Conservation status: According to Von Staden (2012) the Red List status of this species is Data Deficient – Insufficient Information. It should probably be ranked as Rare, but not threatened as it occurs in a nature reserve.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3418 (Simonstown)**: Cape of Good Hope Nature Reserve, Olifantsbos, hillsides and hills above Matroosdam, sandy ground and sandstone outcrops, 50 m, (-AD), 17 October 1989, *Greuter 21886* (PRE); Olifant's Bosch [Olifantsbos], (-AD), 26 November 1931, *Salter 1851* (BOL); Near Olifants Bosch [Olifantsbos], (-AD), *Salter s.n. Herb.nr. 49772* (NBG).

Table 4. Comparing *Z. capensis*, *Z. foliosa* and *Z. microcephala* subsp. *foliosa*

Character	*Z. capensis*	*Z. foliosa*	*Z. microcephala* subsp. *foliosa*
Peduncle	densely softly bristly hairy; ***not glandular***	stipitate glandular, often with dark heads; (sparsely) bristly hairy	(sparsely) stipitate glandular; (sparsely) bristly hairy; all often with reddish transverse walls
Involucral bracts	glabrous or with few bristle hairs; ***not glandular***; *inner 3-veined*	stipitate glandular; without or (sparsely) bristly hairy; inner *usually 3-veined*	stipitate glandular; with or without few bristle hairs; *not 3-veined*
Distribution	confined to the Cape Peninsula	from Jonkershoek, Elgin and Houhoek in the north southwest to Rooiels and east to Hermanus	Koue and Warm Bokkeveld in Clanwilliam and Ceres Divisions

14. *Zyrphelis pilosella* *(Thunb.) Kuntze, Revisio generum plantarum*: 374 (1891); Goldblatt & Manning: 373 (2000); Manning & Goldblatt: 431 (2012).

(Figures 78–85)

Leys(s)era pilosella Thunb.: 160 (1800); Pers.: 457 (1806/1807); Poir.: 347 (1813); Thunb.: 691 (1823); Spreng.: 570 (1826).

Aster perezioides Less.: 167 (1832).

Mairia perezioides (Less.) Nees: 249 (1833); DC.: 217 (1836); Harv. in Harv. & Sond.: 65 (1865); Bond & Goldblatt: 180 (1984).

Zyrphelis perezioides (Less.) G.L.Nesom: 92 (1994).

Type: [South Africa, Western Cape, Cape Town (3318):] Caput bonae spei, crescit in arenosis Groene kloof et Swartland [Cape of Good Hope, it grows in sandy places in Groenkloof = Mamre and Swartland], (–BA/BB/BC/BD/CB), floret Septembri, Octobri ± 1772/1773 [flowering in September and October], *Thunberg s.n.* UPS-THUNB.20087 (UPS, e holo.; SBT13939, SBT, e iso.). (Date as in Glen & Germishuizen pp. 422, 423 (2010)).

Alairia perezioides (Less.) Kuntze: 374 (1891). This is an orthographical error for *Mairia perezioides*.

Rosulate perennial herb, often several tufts/rosettes from single rootstock. *Leaves* densely set in basal rosette, alternate, imbricate, sessile, erect, flat, margins entire or 1- or 2-dentate, ciliate or eciliate, surfaces glabrous, bristly hairy or glandular. *Capitula* radiate, solitary, on scape-like peduncles/pedunculate (scapose). *Scape* bristly hairy and stipitate glandular, glands with dark heads, bracteate. *Involucre* cup-shaped, campanulate or (broadly) obconical. *Involucral bracts* in (3)4(5) rows, imbricate, outer shorter than inner, often entirely reddish or only apices reddish. *Ray florets* female, fertile. *Style* bifurcate. *Ovary* with dense, long, filiform twin hairs. *Cypsela* obovate or narrowly ovate, laterally compressed, margin slightly thickened, carpopodium small, surface with long, filiform twin hairs, denser along margins, apices of twin hairs acute. *Pappus bristles* plumose or plumose in upper part, barbellate or nude basally, persistent. *Disc florets* bisexual, fertile. *Anthers* with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* with stigmatic areas marginal, not confluent, with deltoid, papillate apical appendages. *Ovary* filiform twin hairy. *Cypsela* obovate, laterally compressed, margin thickened, carpopodium small, surfaces sparsely filiform twin hairy, longer and more dense along margins, apices of twin hairs acute. *Pappus bristles* plumose or plumose in upper part, barbellate or nude basally, persistent.

Two varieties are recognised on the grounds of the presence or absence of glandular hairs on the leaves.

Key to varieties

1a. Surfaces of leaves glabrous or bristly hairy . . . . . 14a. var. *pilosella*
1b. Surfaces of leaves sparsely to densely, rough, minutely stipitate glandular, glands colourless, and sparsely to more densely bristly hairy . . . . . 14b. var. *glandulifolia*

14a. **Zyrphelis pilosella** var. **pilosella**

Rosulate perennial herb, up to 230(360) mm high (including inflorescence), often several tufts/rosettes from single rootstock. *Leaves* densely set in basal rosette, alternate, imbricate, sessile, erect, flat, linear, filiform or very narrowly obovate, (8–)10–95(–100) × (0.5–)1.0–3.0(–3.5) mm, apex acute, mucronate to bluntly acute or obtuse, base broadened and semi-amplexicaul, often 3-veined from base, 2 lateral veins fading soon, margins entire or 1- or 2-dentate, 1 tooth on one side only or 2 teeth, 1 on each side, sometimes more, sometimes more deeply lobed – almost 3-partite at apex, usually ciliate basally, density of cilia decreasing upwards, upper parts of margins often totally without cilia, surfaces glabrous or bristly hairy. *Capitula* radiate, solitary, on scape-like peduncles (scapose). *Scape* (20–)25–190(–290) mm long, often tinged reddish or reddish brown, sparsely to more densely bristly hairy and stipitate glandular, glands with dark heads, bracteate. *Peduncular bracts* 2–13(27?) per peduncle, lower bracts very narrowly obovate or linear, upper linear-triangular to linear or very narrowly ovate, 3–30(–40) mm long, margins ciliate, (sparsely) bristly hairy and stipitate glandular on abaxial surface, glands with dark heads, adaxial surface glabrous, upper bracts often with swollen, often purplish or reddish, bases. *Involucre* cup-shaped, campanulate or (broadly) obconical, 6–12 mm high and (9–)10–20(–25) mm across upper part. *Involucral bracts* in (3)4(5) rows, imbricate, outer shorter than inner, often entirely reddish or only apices reddish; *outer row* narrowly triangular, narrowly ovate or linear-oblong, (3.5–)4.0–6.0 × (0.5–)0.8–1.5(–2.0) mm, apex acute, tinged reddish, margin narrowly membranous, sometimes fimbriate-ciliate, often with tuft of hairs around apex, surface bristly hairy and stipitate glandular, glands with dark heads; *second row* narrowly triangular, narrowly oblong, narrowly elliptic, narrowly obovate or very narrowly ovate, 5–8(–9) × 1–2 mm, apex acute to acuminate, tinged reddish, margin narrowly membranous, fimbriate-ciliate, surface (sparsely) bristly hairy and stipitate glandular, glands with dark heads, sometimes slightly keeled basally, often V-shaped thickened, stereome often fenestrated; *third row* linear-triangular, very narrowly ovate, (very) narrowly elliptic, narrowly oblong or (very) narrowly obovate, (6.2–)7.0–9.0(–10.0) × 1–2 mm, apex acute to acuminate, tinged reddish, margin very narrowly membranous, fimbriate-ciliate, surface with few bristle hairs, stipitate glandular, glands with dark heads, sometimes slightly keeled basally, often V- or Y-shaped thickened basally, stereome fenestrated; *fourth row* narrowly obovate, narrowly oblong, linear-triangular or very narrowly elliptic, (6.2–)7.0–9.0(–9.5) × 1.0–1.8(–2.0) mm, apex acute to acuminate, tinged reddish, margin narrowly membranous in lower part, fimbriate-ciliate, surface with (few) bristle hairs, stipitate glandular, glands with dark heads, keeled and V- or Y-shaped thickened basally, stereome fenestrated; rarely *inner depauperate row* very narrowly elliptic, 8 × 1.4 mm, apex acute, reddish, margin membranous, fimbriate-ciliate, surface with few bristle hairs, stipitate glandular, glands with dark heads, keeled and Y-shaped thickened basally, stereome fenestrated. *Ray florets* female, fertile, corolla pale saxe blue, pale blue, pink, mauve to pale mauve pink, white, white-pink, cream, pale yellow; *tube* 2–3 mm long, with glandular hairs all along or in upper part only, sometimes single longish non-glandular hair as well; *limb* 6–10(–11) mm long,

A



Figures 78. Scans of *Zyrphelis pilosella* var. *pilosella* specimens to show the variation in growth forms; A, *Esterhuysen 13083* (PRE); B, *Boucher/Shepherd 4974* (PRE); C, *Forsyth 31* (SAASVELD in PRE); D, *Koekemoer 643* (PRE) – mixture of var. *pilosella* and var. *glandulifolia*.

B



Figures 78 (continued). Scans of *Zyrphelis pilosella* var. *pilosella* specimens to show the variation in growth forms; A, *Esterhuysen 13083* (PRE); B, *Boucher/Shepherd 4974* (PRE); C, *Forsyth 31* (SAAS-VELD in PRE); D, *Koekemoer 643* (PRE) – mixture of var. *pilosella* and var. *glandulifolia*.

C



Figures 78 (continued). Scans of *Zyrphelis pilosella* var. *pilosella* specimens to show the variation in growth forms; A, *Esterhuysen 13083* (PRE); B, *Boucher/Shepherd 4974* (PRE); C, *Forsyth 31* (SAASVELD in PRE); D, *Koekemoer 643* (PRE) – mixture of var. *pilosella* and var. *glandulifolia*.

D



Figures 78 (continued). Scans of *Zyrphelis pilosella* var. *pilosella* specimens to show the variation in growth forms; A, *Esterhuysen 13083* (PRE); B, *Boucher/Shepherd 4974* (PRE); C, *Forsyth 31* (SAASVELD in PRE); D, *Koekemoer 643* (PRE) – mixture of var. *pilosella* and var. *glandulifolia*.

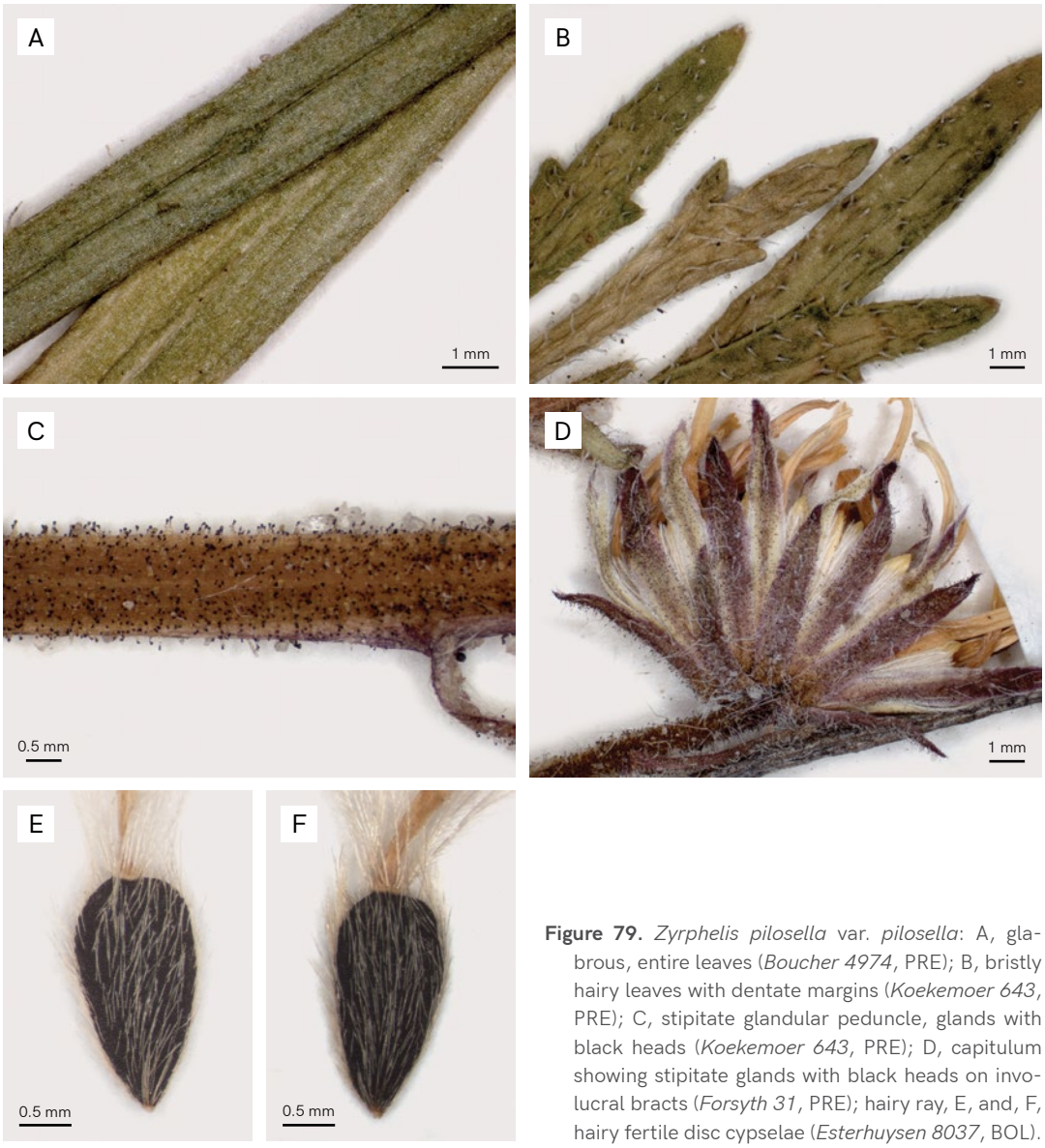


Figure 79. *Zyrphelis pilosella* var. *pilosella*: A, glabrous, entire leaves (*Boucher 4974*, PRE); B, bristly hairy leaves with dentate margins (*Koekemoer 643*, PRE); C, stipitate glandular peduncle, glands with black heads (*Koekemoer 643*, PRE); D, capitulum showing stipitate glands with black heads on involucral bracts (*Forsyth 31*, PRE); hairy ray, E, and, F, hairy fertile disc cypselae (*Esterhuysen 8037*, BOL).

3-lobed, with glandular hairs in lower part. *Style* 1.5–3.5 mm long, bifurcate, *style branches* linear to linear-elliptic, 0.5–1.2(–1.5) mm long, sometimes slightly unequal, stigmatic areas marginal, confluent at apex. *Ovary* (very) narrowly obovate or narrowly elliptic, (1.5–)2.0–3.0(–4.0) mm long, with dense, long, filiform twin hairs. *Cypsela* dark brown or blackish, (narrowly) obovate or narrowly ovate, (2–)3–4 × (1.0–)1.2–2.0 mm, laterally compressed, margin slightly thickened, carpopodium small, surface with

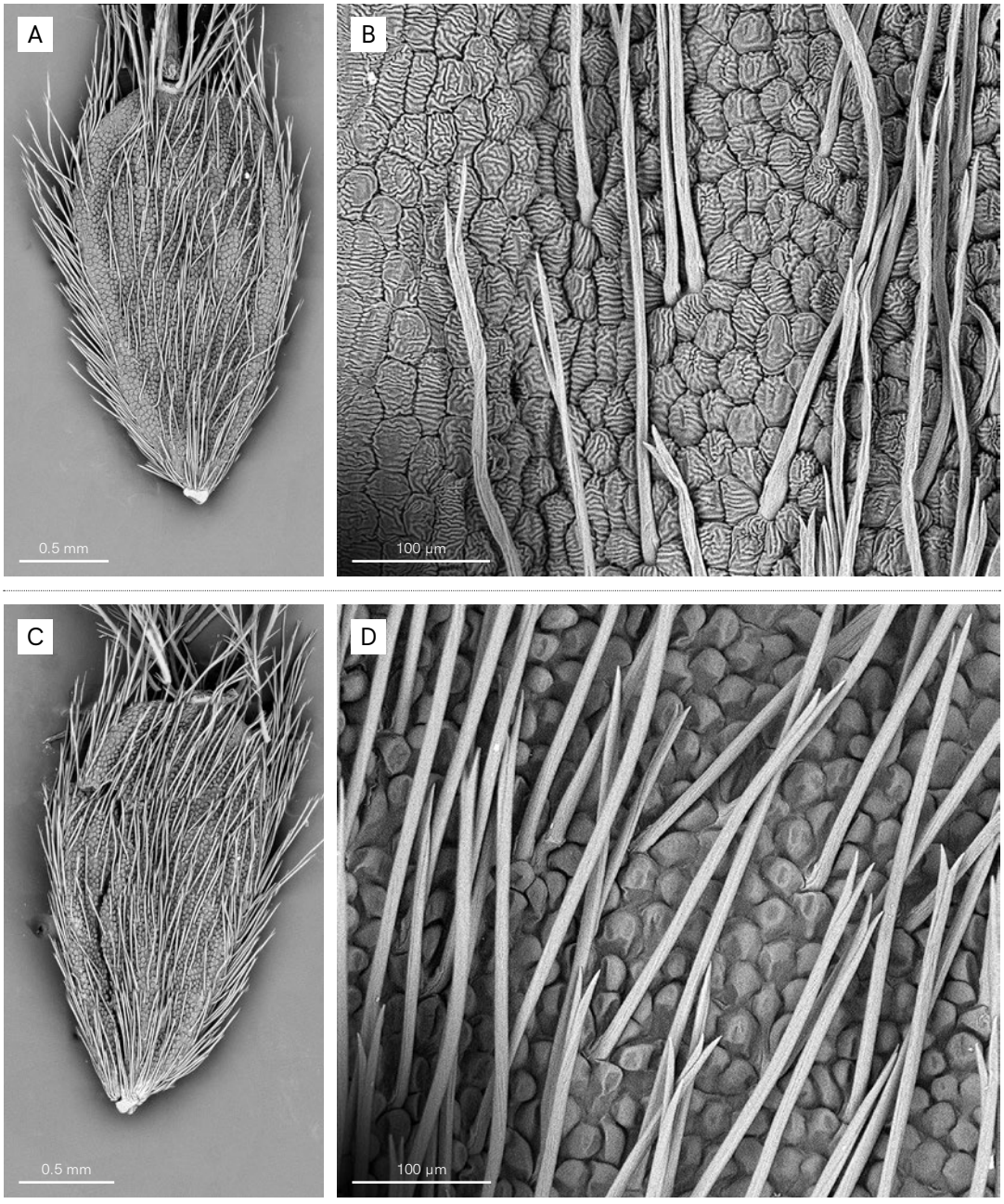


Figure 80. *Zyrphelis pilosella* var. *pilosella*: scanning electron micrographs of A, ray cypsela with filiform twin hairs (*Esterhuysen 8037*, BOL); B, higher magnification of ray cypsela showing filiform twin hairs and colliculate, densely rugose epicarpic cells (*Esterhuysen 20368*, BOL); C, D, fertile outer disc cypselae with filiform twin hairs and smooth, colliculate epicarpic cells (*Esterhuysen 8037*, BOL).

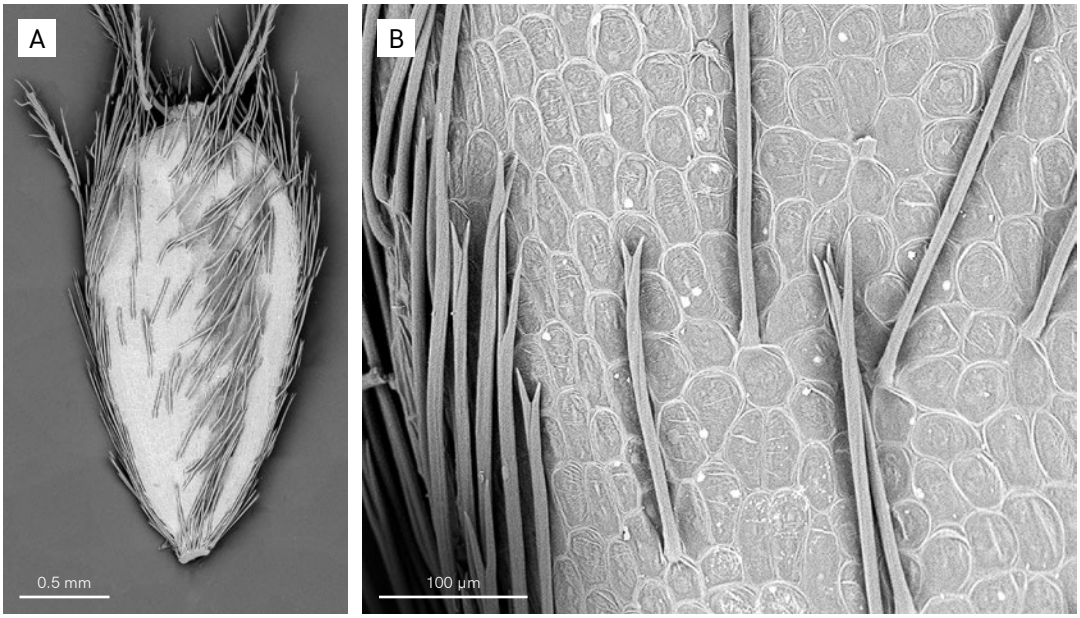


Figure 81. *Zyrphelis pilosella* var. *pilosella*: scanning electron micrographs of A, B, fertile inner disc cypsela with less filiform twin hairs and areolate, smooth epicarpic cells (*Esterhuysen 8037*, BOL).

long, filiform twin hairs, denser along margins, apices of twin hairs acute; epicarpic cells ± colliculate in surface view, densely to rarely faintly rugose. *Pappus bristles* (2–)3–5 mm long, plumose or plumose in upper part, barbellate or nude basally, persistent. *Disc florets* bisexual, fertile; corolla yellow, tubular, *tube* 3–4(–5) mm long, often with glandular hairs on lower part only or all along, 5-lobed; *lobes* 0.5–1.0 mm long, usually with sub-apical glandular hairs, sometimes with few non-glandular hairs as well, sometimes resin ducts along margins. *Anthers* 1.5–2.0(–3.0) mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2–4(–5) mm long, bifurcate; *style branches* linear, 1.0–1.5 mm long, stigmatic areas marginal, not confluent, with deltoid, papillate apical appendages. *Ovary* narrowly elliptic or (very) narrowly obovate, (1.5–)2.0–3.0 mm long, surfaces densely filiform twin hairy. *Cypsela* dark brown to blackish, (narrowly) obovate, 3.0–3.8(–4.0) × 1.8–2.0 mm, laterally compressed, margin thickened, paler, carpopodium small, surfaces sparsely filiform twin hairy, longer and more dense along margins, apices of twin hairs acute; epicarpic cells areolate in surface view, flat and ± smooth; rarely some outer disc cypselae look like transitional forms to those of ray cypsela: epicarpic cells weakly colliculate in surface view, surfaces ± smooth (*Esterhuysen 8037*, BOL); rarely sometimes disc cypselae with ± oblong to areolate epicarpic cells, faintly longitudinally striated or ± smooth (*Boucher & Shepherd 4974*, PRE). *Pappus bristles* 3.0–4.5 (–5.0) mm long, plumose or plumose in upper part, barbellate or nude basally, persistent. *Flowering time*: June–November. Figures 78 to 81.

Diagnostic characters: *Zyrphelis pilosella* var. *pilosella* can be recognised by the rosulate habit, the erect, flat, linear, filiform or very narrowly obovate, glabrous or bristly hairy leaves with entire or 1- or

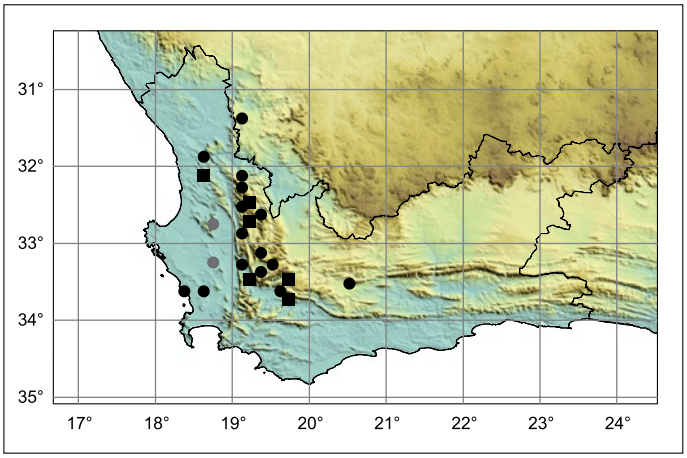


Figure 82. Distribution of *Zyrphelis pilosella* var. *pilosella* ●; and var. *glandulifolia* ■; the grey dots are vague localities.

2-dentate margins, the solitary capitula, the black-headed stipitate glands on the peduncles and involucral bracts, the bisexual, fertile disc florets producing well-developed cypselae, the persistent, plumose pappus bristles and filiform twin hairs on the ray and disc cypselae.

A variable species as far as plant height, length of peduncle and leaf morphology is concerned. It appears as if smaller plants have shorter peduncles and shorter, dentate, often bristly hairy leaves while larger plants have longer peduncles and narrowly obovate, longer leaves with entire margins. Plants at the opposite ends of the extremes look quite different from each other, but the characters grade into each other and no clear-cut distinction could be made to separate well-defined taxa.

Distribution: A widespread species occuring from the sandy flats in the Malmesbury District northwards to the Gifberg, Piketberg and Olifantsrivierberge, the Cederberg, southeast to the Kouebokkeveld- and Hexrivierberge, with one isolated collection from the Anysberg in the east (Figure 82), growing usually in sandy soil.

Conservation status: According to Von Staden (2012) the Red List status of this taxon is 'Data Deficient – Taxonomically Problematic: A widespread species, but large disjunctions within its distribution range and habitat requirements possibly indicates a number of different taxa. Plants occurring on the sandy flats around Malmesbury, if recognised as a separate taxon, is likely to be in danger of extinction.' However, as explained above, this is a very variable species and probably not endangered.

Additional specimens examined:

SOUTH AFRICA. NORTHERN CAPE. **3119 (Calvinia)**: Calvinia District, Glenridge Farm, near Nieuwoudtville, (-AC), 12 August 1961, *Barker 9430* (NBG). WESTERN CAPE. **3118 (Vanrhynsdorp)**: Gift Berg, [Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg and Oliphant's River Mountains, 1911], on stony ground, 1-2000 ft [304-610 m], (-DC), 19 September 1911, *Phillips 7442* (BOL). **3219 (Wuppertal)**: Clanwilliam Division, Cederberg Mountains, between Pakhuis and Heuning Vlei, (-AA), 21 September 1942, *Esterhuysen 8037* (BOL155121, BOL); Cederberg State Forest, Groot Koupoort Vlakte, sandy flats, 3200 ft [975 m], (-AA), 28 August 1979, *Forsyth 31*

(SAASVELD in PRE); N Cederberg, NE of Ribboksberg, in sand, 950 m, (-AA), 2 June 1985, *Taylor 11322* (PRE); Clanwilliam Division, Cederberg(en), near Bushman's Cave, below Tafelberg, 5800 ft [1768 m], (-AC), 23 September 1930, *Barnes s.n.* BOL155110 (BOL); Clanwilliam Division, S Cederbergen, shale band, E side of Sneeuwberg, 4500 ft [1372 m], (-AC), 10 October 1946, *Esterhuysen 13083* (PRE); Cederberg, Sneeukop, slopes behind Sneeukop hut, sand, 1581 m, (-AC), 12 September 2002, *Koekemoer 2412A* (PRE, mixed collection*); Cederberg, shale band near Tafelberg, 5000 ft [1524 m], (-AC), September 1930, *Levyns 2969* (BOL); Cederberg, Elandskloof, top of Middelberg Range, (-CA), 3 September 1938, *Hafström & Acocks 1679* (PRE, S); Summit of Olifants River Mountains behind Warm Baths, [Percy Sladen Memorial Expedition to the Khamiesberg, Giftberg, and Oliphant's River Mountains, 1911], (-CA), 1911, *Stephens 6893* (BOL155111, BOL); Clanwilliam Division, Krom River, S Cederberg, sandy slope above stream, (-CB), 2 October 1952, *Esterhuysen 20539* (BOL); Cederberg, foothills of Bloukop on the Luiperdskloof 4 x 4 route, sand, 1290 m, (-CB), 13 September 2002, *Koekemoer 2427* (PRE); Clanwilliam District, Cardouw Pass [= Dasklip Pass], E slopes, (-CC), 15 September 1953, *Barker 8100* (NBG); Skoongesig (Koue-Bokkeveld), Ceres, sandy flats, (-CC), 27 August 1971, *Hanekom 1540* (PRE, STE in NBG); Porterville Division, top of Cardouw Pass [= Dasklip Pass], (-CC), 15 September 1953, *Lewis s.n. SAM66151 "A"* (PRE) [mounted with *Z. taxifolia*, Lewis 66151B]. **3318 (Cape Town)**: Mamre Commonage, lower site close to entrance gate, 228 m, (-CB), 15 July 2011, *Ebrahim FOT1104/CR15194* (NBG); Malmesbury District, Burgers Post Farm, near Pella, Fynbos Biome Research Site, well-drained sandy soil, veldtype 47, (-DA), 16 July 1980, *Boucher/Shepherd 4974* (PRE, STE in NBG). **3319 (Worcester)**: Ceres Division, Cold Bokkeveld Mountains, foot of Rocklands Peak, (-AB), 30 July 1950, *Esterhuysen 17374* (BOL155118) (BOL); Ceres Division, 2.5 miles [4 km] NW of summit of Gydouw Pass, (-AB), 30 July 1932, *Salter 2627* (BOL155117) (BOL); Ceres District, Elandskloof, (-AC), 29 September 1944, *Compton 16188A* (NBG, mixed collection); Ceres Division, Ezel(s)fontein, W foot of Hex River Mountains, stony slopes above stream, (-AD), 1 September 1952, *Esterhuysen 20368* (BOL); Ceres, Koue Bokkeveld, Waboomberg, SE slopes at road from Merino Farm to top of Waboomberg, 1635 m, (-AD), 23 November 2007, *Mucina 231107/17* (S); Ceres-Worcester Division, NE foot of Matroosberg and Sonklip, sandy flats and lower slopes, (-BC), 6 August 1951, *Esterhuysen 18735* (BOL, PRE); Worcester, Matroosberg, from the farm Erfdeel between the lower and upper ski hut, sandy soil, (-BC), 18 September 1991, *Koekemoer 643* (PRE, mixed collection*); Worcester Division, Keeromsberg, summit, 6600 ft [2012 m], (-DA), 8 November 1943, *Esterhuysen 9252* (BOL155120) (BOL). **3320 (Montagu)**: Ladismith Division, Anysberg, south slopes, in sand near seasonal watercourse, 4000 ft [1219 m], (-DA), 3 June 1956, *Esterhuysen 25979* (BOL).

Without precise locality: Piquetberg District, Piquetberg [Piketberg], 480 m, (3218DB/DC/DD), 9 September 1894, *Schlechter 5256* (PRE).

*with *Z. pilosella* var. *glandulifolia*.

14b. **Zyrphelis pilosella** var. **glandulifolia** *P.P.J.Herman, var. nov.*

Type: South Africa, Western Cape, Wuppertal (3219): Citrusdal, Kleinplaas, along footpath 2 km N (NE) of farmstead, red, stony sandy soil, slight W slope, 780 m, (-CA), 18 July 1998, *Hanekom 3045* (PRE, holo.).

Rosulate perennial herb, up to 240 mm high (including inflorescence), often several tufts/rosettes from single rootstock. *Leaves* densely set in basal rosette, alternate, imbricate, sessile, erect, flat, linear, very narrowly obovate or very narrowly elliptic, (10–)15–45(–65) × 1.0–2.5 mm, apex acute, bluntly acute or obtuse, base broadened and semi-amplexicaul, often 3-veined from base, 2 lateral veins fading soon, margins entire or 1- or 2-dentate, 1 tooth on one side only or 2 teeth, 1 on each side, usually ciliate basally, density of cilia decreasing upwards, upper parts of margins often totally without cilia, surfaces sparsely to densely, rough, minutely stipitate glandular and sparsely to more densely bristly hairy, glands



Figure 83. Scan of the holotype of *Zyrphelis pilosella* var. *glandulifolia* (*Hanekom 3045*, PRE).



Figure 84. *Zyrphelis pilosella* var. *glandulifolia*: A, densely stipitate glandular leaves; B, stipitate glandular peduncle, glands with black heads; C, capitulum with stipitate glandular involucral bracts; D, hairy ray cypsela; E, hairy disc cypsela (all *Hanekom 3045*, PRE).

colourless. *Capitula* radiate, solitary, on scape-like peduncles (scapose). *Scape* (45–)70–140(–210) mm long, often tinged reddish brown, sparsely bristly hairy and (densely) stipitate glandular, glands with dark heads, bracteate. *Peduncular bracts* 3 to 9(10) per peduncle, lower bracts very narrowly obovate or linear, upper linear-triangular or very narrowly ovate, 3–25(–35) mm long, margins ciliate, abaxial surface (sparsely) bristly hairy and stipitate glandular, glands with dark heads, adaxial surface glabrous, upper bracts often with swollen, reddish bases. *Involucre* cup-shaped, campanulate or (broadly) obconical, 6–10(–11) mm high and (10–)12–20 mm across upper part. *Involucral bracts* in (3)4 rows, imbricate, outer shorter than inner, often entirely reddish or only apices reddish; *outer row* narrowly triangular, narrowly ovate or narrowly elliptic, 4.2–5.0(–6.0) × 1.0–1.2(–1.5) mm, apex acute, tinged reddish, margin narrowly membranous, sometimes fimbriate-ciliate, often with tuft of hairs around apex, surface sparsely/occasional bristly hairy and stipitate glandular, glands with dark heads; *second row* narrowly triangular, linear or very narrowly ovate, 6–7(–8) × (1.0–)1.2(–1.8) mm, apex acute to acuminate, tinged reddish, margin narrowly membranous, fimbriate-ciliate, surface sparsely/occasional bristly hairy and stipitate glandular, glands with dark heads, sometimes slightly keeled basally, often V-shaped thickened, stereome often

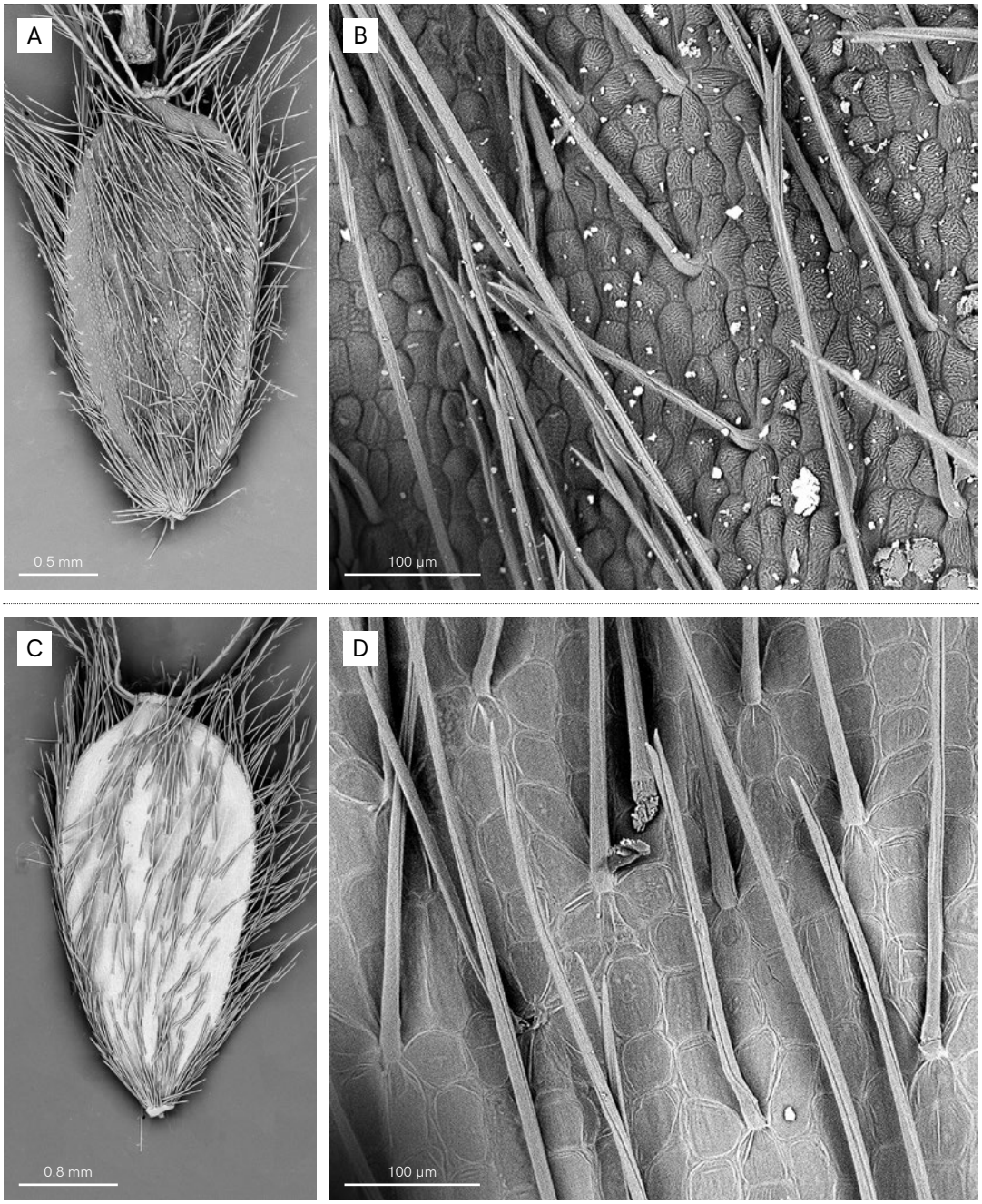


Figure 85. *Zyrphelis pilosella* var. *glandulifolia*: scanning electron micrographs of ray cypsela, A, showing filiform twin hairs and, B, rugose epicarpic cells (*Hanekom 3045*, PRE); C, D, disc cypsela with fewer filiform twin hairs and ± areolate, flat, smooth epicarpic cells (*Helme 4667*, NBG).

fenestrated; *third row* very narrowly ovate, (very) narrowly elliptic, narrowly oblong or (very) narrowly obovate, (7.2–)8.0–8.5 × 1.0–1.2(–2.0) mm, apex acute to acuminate, tinged reddish, margin very narrowly membranous, fimbriate-ciliate, surface with few bristle hairs, stipitate glandular, glands with dark heads, sometimes slightly keeled basally, often V- or Y-shaped thickened basally, stereome fenestrated; *fourth row* narrowly oblong, linear or very narrowly elliptic, 7.0–10.5 × 1.0–1.2(–1.8) mm, apex acute to acuminate, tinged reddish, margin narrowly membranous in lower part, fimbriate-ciliate, surface with (few) bristle hairs, (sparsely) stipitate glandular, glands with dark heads, keeled and V- or Y-shaped thickened basally, stereome fenestrated. *Ray florets* female, fertile, corolla white; *tube* 2–3 mm long, with glandular hairs all along or in upper part only; *limb* (6.0–)7.5(–10.0) mm long, 3-lobed, with glandular hairs in lower part. *Style* (1.2–)2.0–3.5(–4.0) mm long, bifurcate, *style branches* linear to linear-elliptic, 1.0–1.2 mm long, sometimes slightly unequal, stigmatic areas marginal, confluent at apex. *Ovary* (very) narrowly obovate or narrowly elliptic, (2–)3 mm long, with dense, long, filiform twin hairs. *Cypsela* blackish, (narrowly) obovate, (2.8–)3.0 × (1.4–)1.5 mm, laterally compressed, margin slightly thickened, carpopodium small, surface with long, filiform twin hairs, denser along margins, apices of twin hairs acute; epicarpic cells ± colliculate or ± areolate and rugose in surface view. *Pappus bristles* (2–)3–4 mm long, plumose or plumose in upper part, barbellate or nude basally, persistent. *Disc florets* bisexual, fertile; corolla yellow, tubular; *tube* 3–4 mm long, often with glandular hairs on lower part, 5-lobed, *lobes* 0.5–1.0 mm long, usually with sub-apical glandular hairs. *Anthers* 2 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* (2.5–)3.0(–4.2) mm long, bifurcate; *style branches* linear, 1.0(–1.2) mm long, stigmatic areas marginal, not confluent, with deltoid, papillate apical appendages. *Ovary* elliptic or (very) narrowly obovate, 1.5–3.0 mm long, surfaces densely filiform twin hairy. *Cypsela* blackish, (narrowly) obovate, 3 × 1.5–1.6 mm, laterally compressed, margin slightly thickened, carpopodium small, surfaces sparsely filiform twin hairy, longer and more dense along margins, apices of twin hairs acute; epicarpic cells areolate to ± oblong in surface view, flat and ± smooth. *Pappus bristles* 3–4 mm long, plumose or plumose in upper part, barbellate or nude basally, persistent. *Flowering time*: June–November. Figures 78D, 83–85.

Diagnostic characters: *Zyrphelis pilosella* var. *glandulifolia* can be recognised by the sparsely to densely, rough, minutely stipitate glandular and sparsely to more densely bristly hairy leaves, the glands on the leaves are colourless.

Distribution: The var. *glandulifolia* occurs from the Langebergpunt, Olifantsrivierberge and Cederberg in the north to the Elandskloofberge, Hexrivierberge and Keeromsberg in the south (Figure 82), often growing with var. *pilosella* as indicated by the mixed collections *Compton 16188* (NBG), *Koekemoer 2412* (PRE) and *Koekemoer 643* (PRE) but not as often collected.

Conservation status: The Red List status of this taxon will probably be Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3218 (Clanwilliam)**: Zeekoe Vley, 600 ft [Seekoevlei, 183 m], (–BA), 19 August 1896, *Schlechter 8575* (BOL, PRE 2 sheets, S). **3219 (Wuppertal)**: Clanwilliam Division, Ezelbank [Eselbank], 4000 ft [1219 m], (–AC), 3 September 1896, *Schlechter 8831* (BOL, PRE); TvlMus 49a (PRE); Cederberg, Sneeukop, slopes behind Sneeukop hut, sand, 1581 m, (–AC), 12 September 2002, *Koekemoer 2412B* (PRE, mixed collection*); Cederberg, ± 9 km NE of Citrusdal, The Devil's Peak 437, plateau near spot height 681, N aspect, locally

common on deep sandy soil, (-CA), 16 June 2007, *Helme 4667* (NBG); Clanwilliam Div., Elandskloof, 5 miles [8 km] from Citrusdal, sandy-stony veld, (-CA), 8 September 1963, *Nordenstam 3066* (S). **3319 (Worcester)**: Ceres District, Elandskloof, (-AC), 29 September 1944, *Compton 16188B* (NBG, mixed collection*); Hex River Mountains, N slopes of Rooiberg/Conical Peak, 1800 m, (-BC), 19 August 1999, *Oliver & Oliver 11313* (NBG); Worcester Div., Keeromsberg, plateau on summit ridge, N aspect, 6000 ft [1829 m], (-DA), 22 November 1956, *Esterhuysen 26625* (BOL155119, BOL).

*with *Z. pilosella* var. *pilosella*.

15. *Zyrphelis decumbens* (Schltr.) G.L.Nesom, *Phytologia* 76,2: 91 (1994); Goldblatt & Manning: 372 (2000); Manning & Goldblatt: 431 (2012).

(Figures 86–94)

Mairia decumbens Schltr. in Engl.: 199 (1899); Bond & Goldblatt: 180 (1984).
Zyrphelis decumbens (Schltr.) Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand: 1195 (2011), *nom. superfl.*

Type: South Africa, Western Cape Province, Worcester (3319):] In montibus pone Bains Kloof, 4000 ft, [in mountain behind Bains Kloof, ± 1219 m], (-CA), 11 November 1896, *Schlechter 9098* (BOL, holo.; BM, GRA, P 2×, e, PRE 2×, S, E e, HBG e, iso.).

Decumbent, ascending, herb or dwarf shrub, branched from base. *Leaves* herbaceous, alternate, fairly densely set to scattered along branches, sessile or narrowed to petiole-like base, blade flat, erect or sometimes recurved, (narrowly) obovate, rarely linear, apex acute or obtuse, margins entire. *Capitula* radiate, solitary, pedunculate. *Involucre* obconical or cup-shaped. *Involucral bracts* in 3 or 4 rows, imbricate. *Ray florets* female, fertile. *Style* bifurcate; *style branches* with stigmatic areas marginal, confluent at apex. *Ovary* with filiform twin hairs. *Cypsela* obovate, laterally compressed, surface with long filiform twin hairs, apices of twin hairs acute. *Pappus bristles* plumose, barbellate to nude basally, persistent. *Disc florets* functionally male; corolla tubular. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* without or sometimes with marginal stigmatic areas basally. *Outer disc ovaries* sometimes develop in pseudo-cypselae. *Inner ovaries* laterally compressed, margin usually thickened, surface glabrous or with some filiform twin hairs or twin hairs round base. *Pappus bristles* plumose, barbellate to nude basally, persistent.

Key to varieties

1a. Stems and leaves hirsute, leaves up to 15 mm long, involucre up to 6 mm high, ray limb up to 5.5 mm long, cypsela 2.5–3.0 × 1.2–1.4 mm . . . . . 15a. var. *decumbens*
1b. Stems and leaves bristly hairy, leaves up to 37 mm long, involucre up to 7(–8) mm high, ray limb up to 7 mm long, cypsela 3–4 × 1.8–2.0 mm. . . . . 15b. var. *grandis*

15a. **Zyrphelis decumbens** var. **decumbens**

Decumbent, ascending, perennial herb or dwarf shrub, up to 250 mm high, branched from base, woody basally, herbaceous upwards, stems hirsute. *Leaves* herbaceous, alternate, fairly densely set to scattered along branches, sessile or narrowed to petiole-like base, blade flat, erect or sometimes recurved or only apices recurved, obovate, narrowly obovate, upper sometimes narrowly elliptic, rarely narrowly oblong, or sometimes linear to linear-elliptic, (4–)6–15 × 1.0–2.5(–3.5) mm, apex



Figure 86. Scan of *Zyrphelis decumbens* var. *decumbens* specimen (*Esterhuysen 30802*, BOL).



Figure 87. *Zyrphelis decumbens* var. *decumbens*: A, hirsute, obovate, acute leaves; B, stipitate glandular and bristly hairy peduncle; C, capitulum with bristly hairy and sparsely stipitate glandular involucral bracts; D, hairy ray cypsela (all *Esterhuysen 30802*, BOL).

acute or obtuse, margins entire, surfaces densely hirsute on both sides. *Capitula* small, radiate, solitary, pedunculate. *Peduncle* 10–55 mm long, sometimes tinged reddish, bristly hairy, minutely (and sparsely) colourless stipitate glandular, bracteate; *peduncular bracts* (0)2 per peduncle, linear-triangular or filiform, (2.0–)3.5–6.0 mm long, bristly hairy. *Involucre* obconical or narrowly cup-shaped, (4.5–)5.0–6.0 mm high and (5–)6–7(–10) mm across upper part. *Involucral bracts* in 4(5) rows, imbricate, outer shorter than inner; *outer row* linear-triangular, very narrowly ovate, 3.8–4.0 × 0.5–0.6 mm, apex acute, surfaces bristly hairy, usually (sparsely) minutely colourless stipitate glandular, sometimes V-shaped thickened from base, stereome fenestrated; *second row* linear, very narrowly oblong or very narrowly ovate, 4.4–4.5 × 0.5 mm, apex acute to acuminate, surface bristly hairy and (sparsely) minutely colourless stipitate glandular, sometimes keeled and V- or Y-shaped thickened from base, stereome fenestrated; *third row* narrowly to very narrowly ovate, 5 × 1 mm, apex acute, margin sometimes narrowly membranous, fimbriate-ciliate or only few cilia around apex, surface bristly hairy and (sparsely) minutely colourless stipitate glandular, slightly keeled basally and V- or Y-shaped thickened, stereome fenestrated, often with oil glands along main vein; *fourth row*

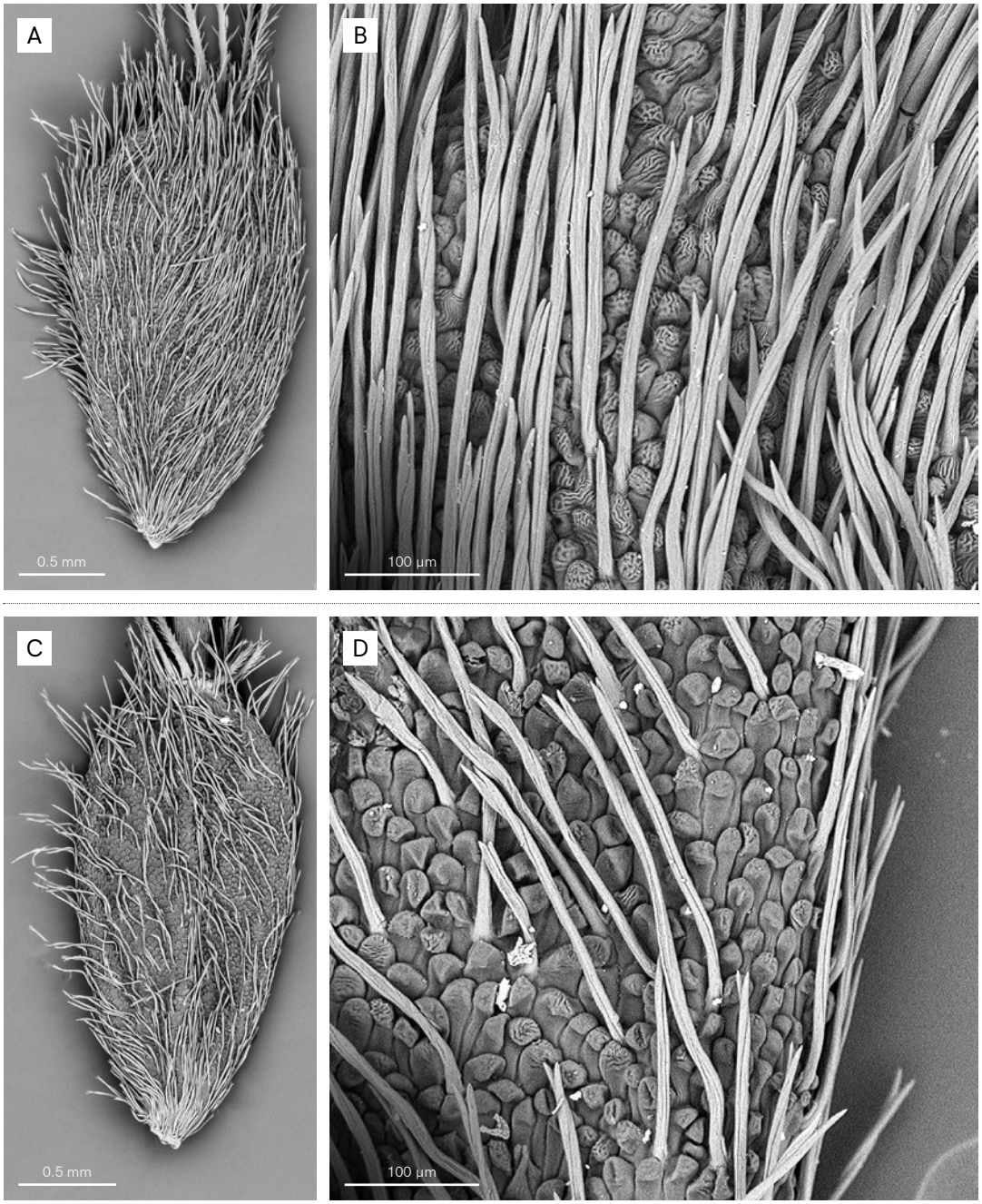


Figure 88. *Zyrphelis decumbens* var. *decumbens*: scanning electron micrographs of ray cypsela, A, showing filiform twin hairs and, B, colliculate, rugose epicarpic cells; C, outer disc pseudo-cypsela with fewer filiform twin hairs and, D, colliculate, faintly rugose epicarpic cells (all *Esterhuysen 30802*, BOL).

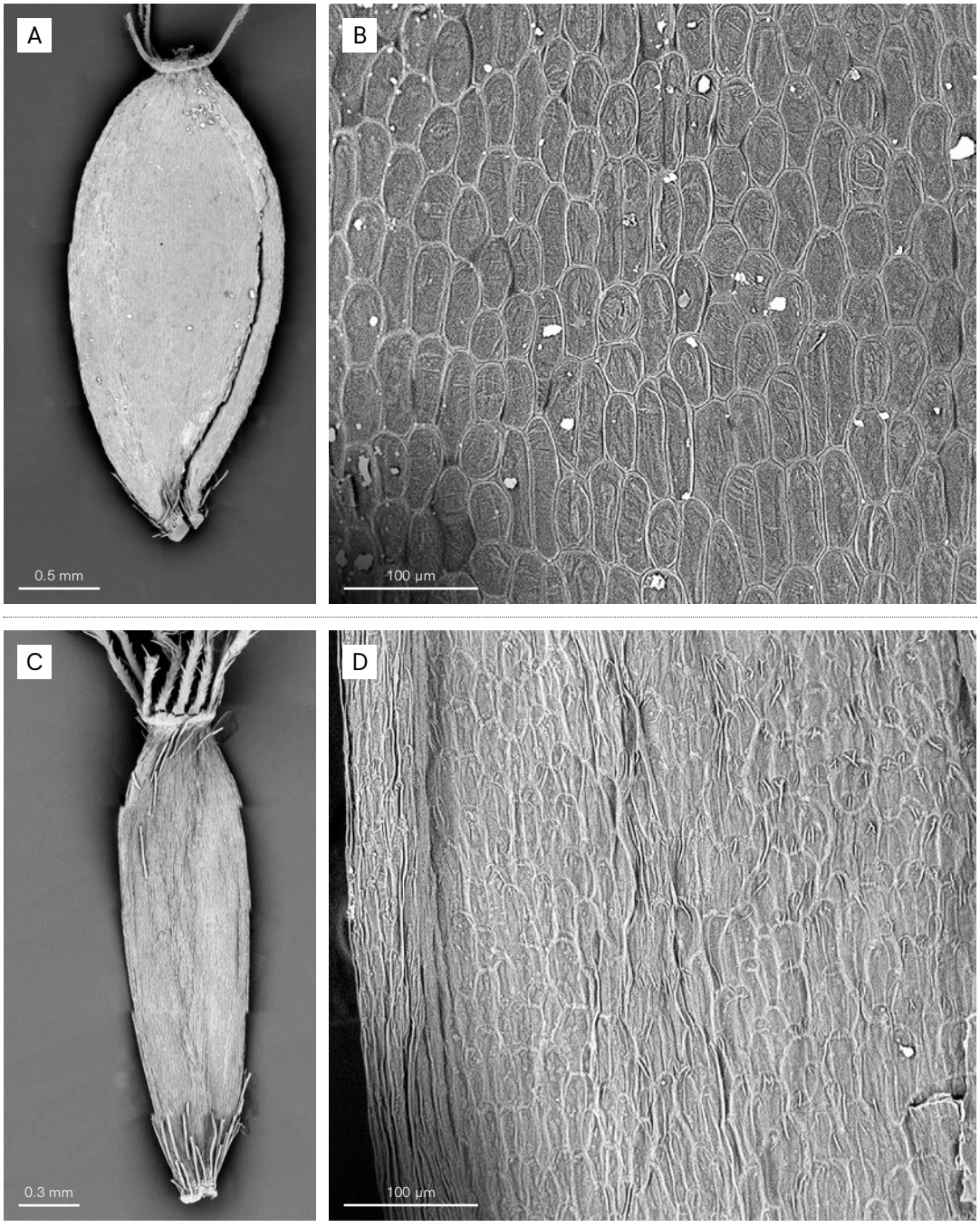


Figure 89. *Zyrphelis decumbens* var. *decumbens*: scanning electron micrographs of glabrous disc pseudo-cypsela, A, with smooth ± areolate epicarpic cells, B; C, D, glabrous inner disc ovary (all *Schlechter 9098*, PRE).

narrowly to very narrowly obovate, 4.5–5.0 × 0.5–1.0 mm, apex acuminate, margin sometimes membranous, fimbriate-ciliate or only few cilia around apex, surface sparsely bristly hairy and (sparsely) minutely colourless stipitate glandular, keeled basally, Y-shaped thickened, stereome fenestrated, often with oil glands along main vein; rarely a few *depauperate inner bracts* very narrowly elliptic, 4 × ± 0.4 mm, apex acute, surface with few bristle hairs and sparsely minutely stipitate glandular, V-shaped thickened, stereome fenestrated. *Ray floret* female, fertile, corolla saxe blue fading to madder brown (rich reddish brown); *tube* 2 mm long, often with few glandular hairs on upper part of tube and around mouth; *limb* 5.0–5.5 mm long, 3-lobed. *Style* 2 mm long, bifurcate; *style branches* linear, linear-elliptic, ± 0.6 mm long, stigmatic areas marginal, confluent at apex. *Ovary* obovate, ± 2.4 mm long, with long filiform twin hairs; epicarpic cells arranged ± in rows, ± elongated in surface view with slight protuberance on pappus side of cells, smooth to rugose. *Cypsela* dark brown, dark reddish brown to blackish, obovate, 2.5–3.0 × 1.2–1.4 mm, laterally compressed, margin slightly thickened, carpopodium small, surface with long filiform twin hairs, apices of twin hairs acute; epicarpic cells colliculate in surface view, rugose. *Pappus bristles* 2.5 mm long, plumose, barbellate to nude basally, persistent. *Disc floret* functionally male; corolla yellow, tubular; *tube* 2.5 mm long, with occasional glandular hair on tube; *lobes* (0.5–)1.0 mm long, with sub-apical glandular hairs and often with resin ducts along margins. *Anthers* 1.5–1.6 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2.5 mm long, bifurcate; *style branches* ovate, 0.5–0.8 mm long, papillate, without or sometimes with marginal stigmatic areas basally, with deltoid, papillate apical appendages. Some *outer ovaries* sometimes develop in pseudo-cypselae: obovate, laterally compressed, margin slightly thickened, carpopodium small, either filiform twin hairy and epicarpic cells like those of ray cypsela but striations not so prominent, or glabrous but with few twin hairs around base and epicarpic cells areolate. *Inner ovaries* very narrowly obovate, oblong or linear-elliptic, 2 mm long, laterally compressed, margin usually thickened, surface glabrous or with some filiform twin hairs or twin hairs round base; epicarpic cells oblong in surface view, flat and seemingly smooth. *Pappus bristles* 3 mm long, plumose, barbellate to nude basally, persistent. *Flowering time*: September to November. Figures 86 to 89.

Diagnostic characters: Easily recognised by the decumbent, ascending habit, the small, obovate, hirsute leaves, the small, solitary capitula on fairly long, bristly hairy and minutely colourless stipitate glandular peduncles, the bristly hairy and minutely colourless stipitate glandular involucral bracts, the filiform twin hairs on the cypsela and the persistent, plumose pappus bristles.

Distribution: Apart from the type specimen, only two other specimens were seen. It occurs in the Voëlvlei-, Limiet- and Slanghoekberge (Figure 90).

Conservation status: According to Herman et al. (2012), the Red List status of this taxon is Rare. It occurs in montane areas where it is not threatened.

Additional specimen examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Tulbagh Division, Ontongskop, rocky slopes, E side, (–AC), 18 October 1964, *Esterhuysen 30802* (BOL); Kapkolonien [Cape Colony], Bains Kloof, (–CA), 27 September 1936, *Hafström & Lindeberg s.n.* (S16-6685), (S13-33297) (S).

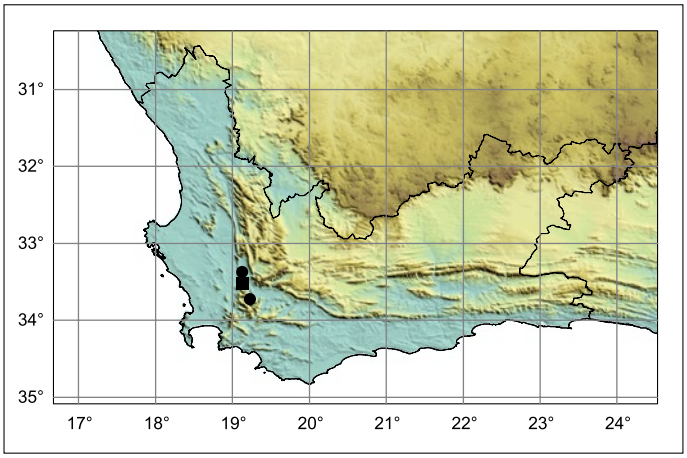


Figure 90. Distribution of *Zyrphelis decumbens* var. *decumbens* ●; and var. *grandis* ■.

15b. **Zyrphelis decumbens** var. **grandis** *P.P.J.Herman, var. nov.*

Type: South Africa, Western Cape, Worcester (3319): Worcester Division, Cossacks, Slanghoek Mountains, 4500 ft [1372 m], (-CA), 26 December 1954, *Esterhuysen 23998* (BOL, holo.; S, iso.).

Note: The S specimen is a mixed collection, there are also two pieces of *Z. leiocarpa* mounted with the *Z. decumbens* var. *grandis*.

Annual or perennial, ascending herb, branched at base, up to 250 mm high. *Stems* tinged reddish, bristly hairy. *Leaves* alternate, sessile, scattered along branches to densely set below inflorescences, erect, flat, herbaceous, obovate, narrowly to very narrowly obovate, rarely linear, 9–37 × 1.5–3.0(–4.5) mm, apex acute, often with blunt mucro, sometimes narrowing to petiole-like base, surfaces bristly hairy. *Capitula* radiate, solitary, pedunculate. *Peduncle* 15–50(–68) mm long, sometimes tinged reddish, bristly hairy, stipitate glandular, glands colourless, bracteate; *peduncular bracts* (0)2(3) per peduncle, linear, linear-filiform, (4–)5–8(–10) mm long, apices often reddish or dark, bristly hairy, sparsely stipitate glandular, glands colourless, bases sometimes swollen. *Involucre* obconical, broadly obconical, cup-shaped, (6–)7(–8) mm high, (7–)8–10 mm broad across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices reddish; *outer row* narrowly triangular, 4.0–4.8 × 0.5–0.6 mm, apex acute or acuminate, surfaces bristly hairy, sometimes also minutely stipitate glandular, glands colourless; *second row* linear, linear-oblong, 5.5–6.0 × 0.4–0.5 mm, apex acute or acuminate, often with tuft of hairs, surface (sparsely) bristly hairy, minute stipitate glandular, glands colourless, V-shaped thickened from base, stereome fenestrated; *third row* narrowly to very narrowly obovate, 6.5 × 1 mm, apex acuminate, margin narrowly membranous, ciliate in upper part and around apex, surface (sparsely) bristly hairy, minutely stipitate glandular, glands colourless, keeled in lower part, Y-shaped thickened, stereome fenestrated; *fourth row* very narrowly obovate, 6 × 0.8 mm, apex acute, margin membranous in upper part, fimbriate-ciliate, tuft around apex, surface sparsely bristly hairy, minutely



Figure 91. Scan of the holotype of *Zyrphelis decumbens* var. *grandis* (*Esterhuysen 23998*, BOL).



Figure 92. *Zyrphelis decumbens* var. *grandis*: A, obovate, acute, bristly hairy leaves; B, stipitate glandular and bristly hairy peduncle; C, capitulum with bristly hairy and stipitate glandular involucral bracts; D, hairy ray cypsela; E, glabrous outer disc pseudo-cypsela (all *Esterhuysen 23998*, BOL).

stipitate glandular, keeled, Y-shaped thickened, stereome fenestrated. *Ray floret* female, fertile; corolla white or pale saxe blue deepening to madder brown or maroon; *tube* 2 mm long, with occasional glandular hair, *limb* 5–7 mm long, with few glandular hairs around mouth, 3-lobed. *Style* 2 mm long, bifurcate, *style branches* linear-elliptic, ± 0.6 mm long, stigmatic areas marginal, confluent at apex. *Ovary* linear-obovate, ± 3 mm long, filiform twin hairy. *Cypsela* brown, dark reddish brown, (narrowly) obovate to elliptic, 3–4 × 1.8–2.0 mm, laterally compressed, carpopodium small, margin slightly thickened, surfaces filiform twin hairy, apices of twin hairs acute, equal or unequal in length; epicarpic cells colliculate in surface view, smooth or rugose. *Pappus bristles* 3 mm long, plumose, nude basally, persistent. *Disc florets* functionally male, corolla yellow, tubular; *tube* 2.5–2.8 mm long, 5-lobed; *lobes* 0.5 mm long, with sub-apical glandular hairs, often with resin ducts along margins. *Anthers* 1.5 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.6–1.8 mm long, bifurcate, *style branches* ± (narrowly) ovate, ± 1 mm long, of outer florets with marginal stigmatic areas basally, not confluent, of inner florets without stigmatic areas, all with deltoid, papillate apical appendages. *Ovary* linear, linear-elliptic, 2.0–3.2 mm long, outer sometimes with filiform twin hairs

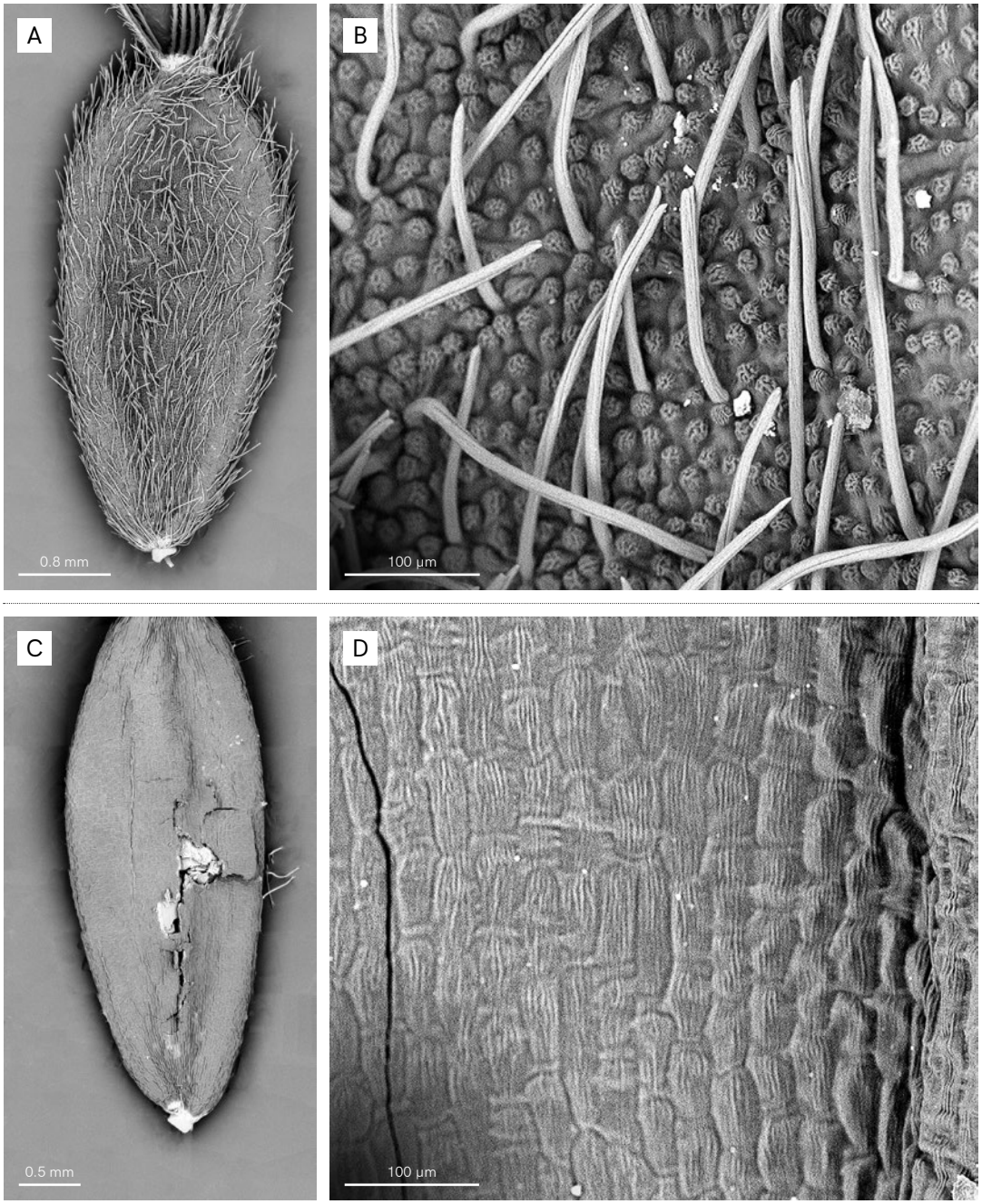


Figure 93. *Zyrphelis decumbens* var. *grandis*: scanning electron micrographs of ray cypsela, A, showing, B, filiform twin hairs and colliculate, rugose epicarpic cells; glabrous outer disc pseudo-cypsela, C, with faintly striated epicarpic cells, D (all *Esterhuysen 23998*, BOL).

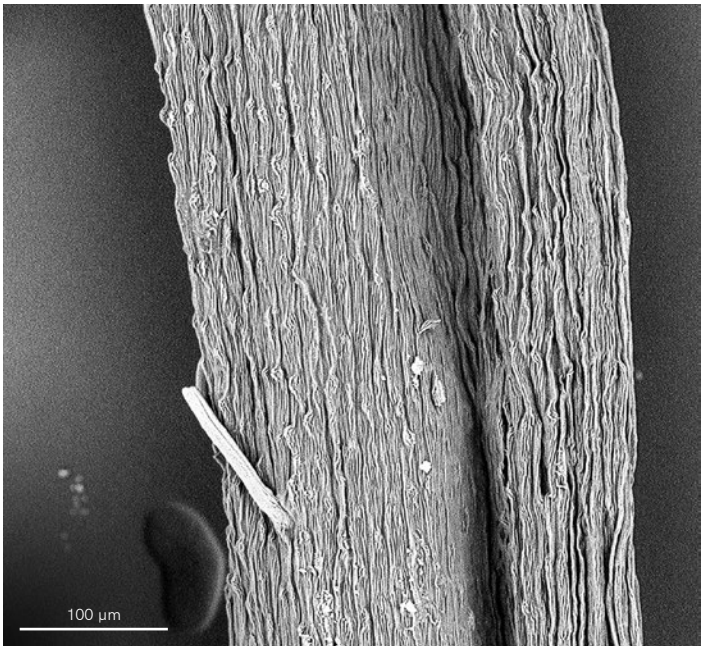


Figure 94. *Zyrphelis decumbens* var. *grandis*: scanning electron micrograph of glabrous, inner disc ovary. (*Esterhuysen 23998*, BOL).

along margin, inner glabrous. Some outer disc ovaries sometimes develop into pseudo-cypselae: ± elliptic, laterally compressed, carpopodium small but distinct, glabrous; epicarpic cells arranged ± in rows, ± oblong, flat in surface view, striated. *Pappus bristles* 3.0(–3.5) mm long, plumose, barbellate to nude basally, persistent. *Flowering time* September and December. Figures 91 to 94.

Diagnostic characters: Recognised by the annual/short lived perennial habit, the longer bristle hairs on the stems and leaves, the spathulate leaves. In all aspects larger than the typical variety.

Distribution: Apparently confined to the Limiet- and Slanghoekberge (Figure 90). Only two specimens seen.

Conservation status: The Red List status of this taxon is probably also Rare. It occurs in montane areas where it is not threatened.

Additional specimen examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Paarl Division, Bains Kloof, sandy rocky slopes, E aspect, common after fire, 1500–2000 ft [457–610 m], (–CA), 28 September 1956, *Esterhuysen 26318* (BOL, S).

16. *Zyrphelis spathulata* *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1198 (2011); Manning & Goldblatt: 431 (2012).

(Figures 95–98)

Type: [South Africa, Western Cape, Caledon (3419):] In saxosis montosis prope Elim, distr. Bredasdorp, 1200 ped. [In rocky places on mountains near Elim, Bredasorp district, 1200 ft (366 m)], (–BD/DB), 8 December 1896, *Bolus 8548* (BOL, holo.; NBG, PRE ×2, iso.).

Suffrutex or perennial herb from underground rootstock, up to 270 mm high. *Stems* woody basally, upper parts sometimes tinged reddish, densely hirsute. *Leaves* alternate, sessile, densely set or scattered along stems, erect, flat, rarely some folded lengthwise, (very) narrowly obovate to obovate, uppermost sometimes linear, 5–25(–35) × (1.0–)1.5–3.5(–4.5) mm, apex acute or obtuse, base tapering to petiole-like base, margin entire, surface densely hirsute. *Capitula* radiate, solitary, pedunculate. *Peduncle* (8–)10–35(–50) mm long, stipitate glandular, shortly bristly hairy, bracteate. *Peduncular bracts* 0 to 4(6) per peduncle, narrowly ovate to linear-triangular, linear, (2.0–)2.5–6.0(–7.0) mm long, stipitate glandular, bristly hairy, often with swollen bases, sometimes with embedded oil glands. *Involucre* obconical to broadly obconical, rarely ± campanulate, 5–7(–9) mm high, (7.5–)8.0–12.0 mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices often tinged reddish; *outer row* narrowly triangular, linear-oblong, (very) narrowly ovate or ovate, 3.0–4.0(–4.5) × (0.5–)0.8–1.0 mm, apex acute to acuminate, margin membranous in lower part, fimbriate but with few longer cilia around apex, surface stipitate glandular, bristly hairy, V-shaped thickened from base, stereome often fenestrated, sometimes with oil glands along main vein; *second row* narrowly triangular, very narrowly ovate, narrowly oblong or narrowly elliptic, 4.0–5.2(–6.0) × (0.6–)1.0 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface stipitate glandular, bristly hairy, sometimes keeled, V-shaped thickened from base, stereome often fenestrated, sometimes with oil glands along main vein; *third row* narrowly oblong, narrowly elliptic, linear-triangular, very narrowly ovate to very narrowly obovate, 5.0–6.5 × 1.0–1.2(–1.4) mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface stipitate glandular, bristly hairy along main vein or in upper part, slightly keeled, V- or Y-shaped thickened from base, stereome fenestrated, usually 3-veined (2 lateral veins not always visible), sometimes with oil glands along vein(-s); *fourth row* very narrowly obovate, very narrowly elliptic or very narrowly ovate, 5(–7) × (0.9–)1.0–1.5(–1.6) mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface stipitate glandular and few bristle hairs along main vein, keeled, Y-shaped thickened from base, stereome fenestrated, usually 3-veined (2 lateral veins not always visible), sometimes with oil glands along vein(-s). *Ray florets* female, fertile, corolla pale mauve or purple; *tube* (2.0–)2.5–3.0(–3.5) mm long, with few glandular hairs in upper part; *limb* (4.0–)6.0–6.5(–7.0) mm long, sometimes with glandular hairs around mouth, 3-lobed. *Style* (2.0–)2.2–3.0(–3.2) mm long, bifurcate; *style branches* linear-ellitic, oblong or narrowly ovate, 0.6–1.0(–1.4) mm long, stigmatic areas marginal, confluent at apex. *Ovary* elliptic or narrowly obovate, 2 mm long, densely filiform twin hairy. *Cypsela* dark brown to blackish, obovate, 2.5–3.2 × 1.5(–1.6) mm, laterally compressed, with small carpopodium, surfaces with filiform twin



Figure 95. Scan of *Zyrphelis spathulata* specimen (*Barker 10860*, NBG).



Figure 96. *Zyrphelis spathulata*: A, obovate, densely hirsute leaves; B, stipitate glandular and bristly hairy peduncle; C, capitulum showing bristly hairy and stipitate glandular, 3-veined involucral bracts; D, hairy ray cypsela (all *Barker 10860*, NBG).

hairs, apices of twin hairs acute; epicarpic cells colliculate in surface view, seemingly smooth to faintly granular. *Pappus bristles* 3.0–4.0(–4.5) mm long, many, plumose, barbellate basally, persistent. *Disc florets* functionally male, corolla yellow; *tube* 2.5–3.5(–4.0) mm long, 5-lobed; *lobes* 0.8–1.0 mm long, with sub-apical glandular hairs, occasional non-glandular hair as well, sometimes with resin ducts along margins. *Anthers* (1.5–)1.8–2.0 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2–3 mm long, bifurcate; *style branches* linear, narrowly deltoid, 1.0(–1.1) mm long, papillate, without stigmatic areas. *Ovary* linear, very narrowly elliptic or very narrowly obovate, (1.8–)2.0–2.5(–4.0) mm long, glabrous, rarely with few long twin hairs, or rarely some outer densely twin hairy, sterile, with distinct carpopodium; epicarpic cells ± oblong in surface view, flat, ± smooth. *Pappus bristles* 3.5–4.5(–5.0) mm long, few, plumose in upper part, barbellate to nude basally, persistent. *Flowering time*: August, November to December and one record for April. Figures 95 to 97.

Diagnostic characters: Easily recognised by its suffrutescent habit, the densely, hirsute stems and leaves, the very narrowly obovate, usually flat leaves with entire margins, the stipitate glandular and

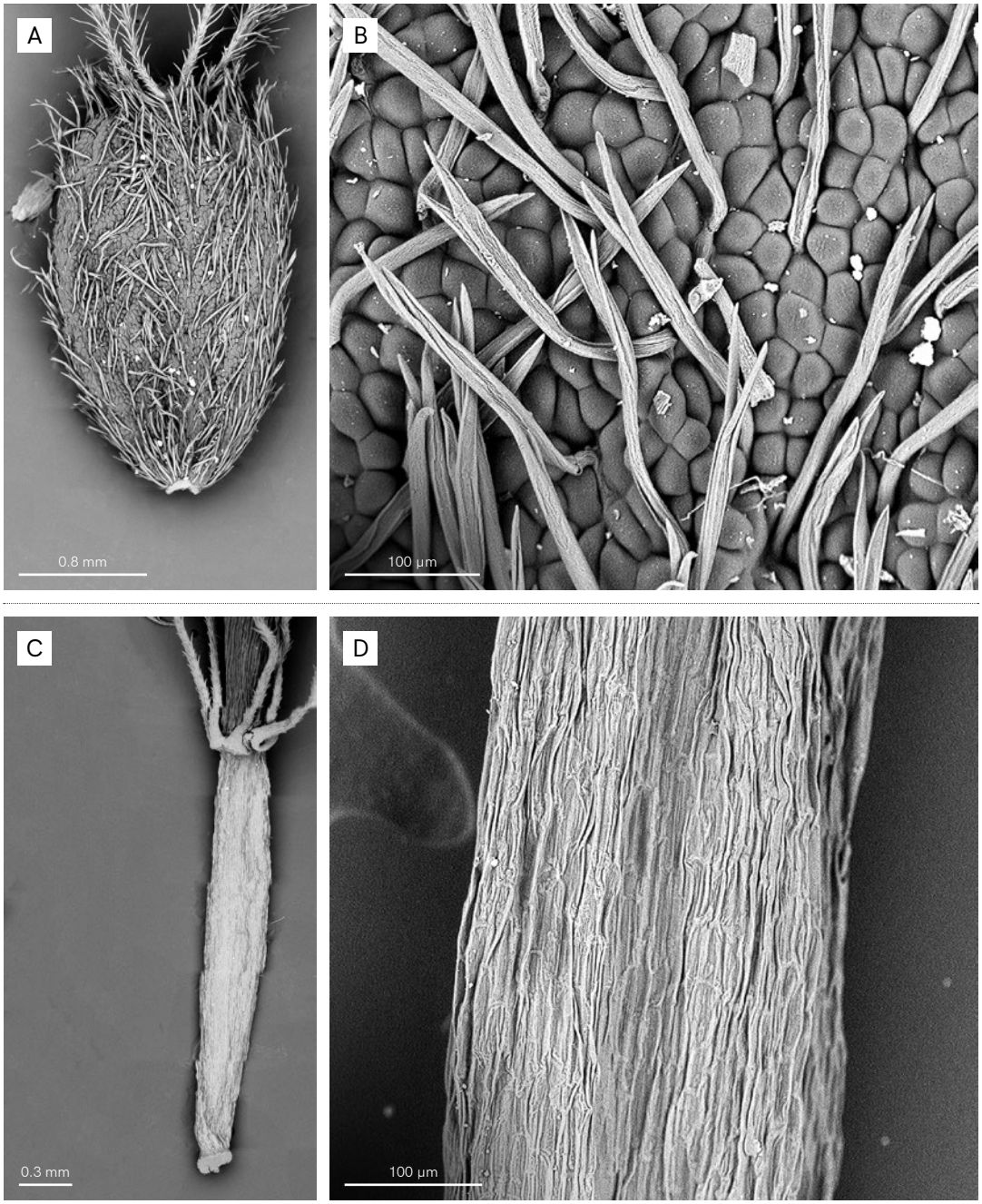


Figure 97. *Zyrphelis spathulata*: scanning electron micrographs of ray cypsela, A, showing filiform twin hairs and colliculate, smooth epicarpic cells, B; C, D, sterile, glabrous disc ovary (A, B, *Schlechter 9751* (PRE); C, *Barker 10860* (NBG); D, *Schlechter 9448* (S)).

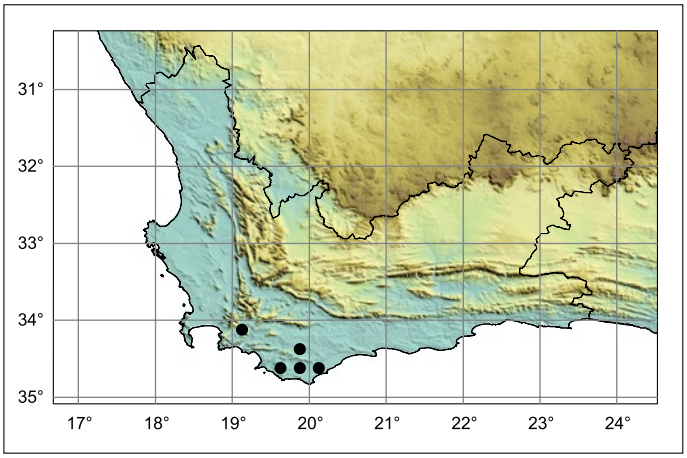


Figure 98. Distribution of *Zyrphelis spathulata*.

bristly hairy peduncles and involucral bracts, the usually 3-veined inner involucral bracts, the filiform twin hairy cypselae and the plumose persistent pappus bristles.

Distribution: Restricted to the Houwhoek Mountains, the Babilonstoringberge, Shaw's Mountain, Elandsberge and Bredasdorpberge (Figure 98).

Conservation status: According to Helme & Von Staden (2012) the Red List status of this taxon is Vulnerable B1ab(iii,v)+2ab(iii,v) due to competition from unmanaged alien invasive plants.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: Caledon Div., SW corner of Babylon's Tower Mts, N of Attaquaskloof [?], sandy gentle slope and stony mountain side, W aspect, mainly on burnt sandy slopes, (-AC), 20 November 1974, *Nordenstam 2288* (S); Caledon Div., SW corner of Babylon's Tower Mts, N of Attaquaskloof [?], sandy gentle slope and stony mountain side, W aspect, sandy places of lower slopes, (-AC), 20 November 1974, *Nordenstam 2289* (S); Caledon Div., Shaw's Mountain, i.e. mountain ridges between Shaw's [Mountain] Pass and Babylon's Tower, 500–600 m s.m., (-AD), 7 August 1962, *Nordenstam 841a* (S); In montibus p[r]ope Elandskloof [in mountains near Elandskloof], 1200 ft [366 m], (-BD), 16 December 1896, *Schlechter 9751* (BOL, PRE 2×, S); Fairfield, on the pass, 1300 ft [396 m], (-BD), 14 November 1962, *Acocks 23048* (PRE); Elim, (-DB), April 1916, *Frowein 1049 (TvlMus.15558)* (PRE). **3420 (Bredasdorp)**: Mountain above Bredasdorp village, on burnt slopes, S side, 1000 ft [305 m], (-CA), 9 November 1971, *Barker 10860* (NBG, STE in NBG).

Without precise locality: Bredasdorp, Mountain side, upper slopes, (3419DA/3420CA), 3 December 1930, *Galpin 11330* (PRE).

Vague locality: Bot Rivier, 2400 ft [732 m], (3419AA – most probably), 27 November 1896, *Schlechter 9448* (K, S).

17. *Zyrphelis montana* (Schltr.) G.L.Nesom, *Phytologia* 76,2: 92 (1994); Goldblatt & Manning: 372 (2000); Manning & Goldblatt: 431 (2012).

(Figures 99–109)

Mairia montana Schltr. in Engl.: 199 (1899); Bond & Goldblatt: 180 (1984).
Zyrphelis montana (Schltr.) Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011), *nom. superfl.*

Type: [South Africa, Western Cape, Caledon (3419):] In montibus pone Bot Rivier, 2400 ped. [in mountains behind Botrivier, 2400 ft (732 m)], (-AA), 27 November 1896, *Schlechter 9448* (BOL138787) (BOL, lecto., designated here; GRA0002947-0, GRA, PRE0587584-0, PRE0162664-0, PRE, isolecto.; non S, K).

Taxonomic notes:

1. Schlechter (1899) quoted two specimens when he described *Mairia montana*: *Schlechter 9448* and *9751*. *Schlechter 9751* was later identified as *Z. spathulata* Zinnecker-Wiegand (1990, 2011). The *Schlechter 9448* collection is a mixed collection: the specimens housed in K and S are *Z. spathulata*; the specimens housed in BOL, GRA and PRE are true *Z. montana*. The BOL specimen is chosen as the lectotype.
2. Although Zinnecker-Wiegand made the combination *Z. montana* (Schltr.) Zinnecker-Wiegand already in her thesis in 1990, it was only effectively published in 2011 by Ortiz & Zinnecker-Wiegand. However Nesom effectively published the combination in 1994, and therefore his combination precedes that of Ortiz & Zinnecker-Wiegand according to ICBN rules.

Erect dwarf shrub. *Stems* woody below, glabrous, hirsute or bristly hairy and sparsely minutely stipitate glandular. *Leaves* alternate, sometimes almost rosette-like at bases of leafy branches, sessile, scattered along stem or densely set, erect or recurved, flat, linear, narrowly obovate or narrowly elliptic, apex acute, margin entire or sometimes with 1, 2 or rarely 3 lobes or small teeth on 1 or both sides of margin in upper part of leaf, ciliate or not, surface glabrous or sparsely to densely hirsute or bristly hairy, densely to sparsely minutely stipitate glandular, young leaves often more densely hairy, sometimes with embedded oil glands. *Capitula* radiate, solitary, terminal, pedunculate. *Peduncle* often flushed reddish, bristly hairy, (minutely) stipitate glandular, bracteate; *peduncular bracts* often with swollen bases, surfaces bristly hairy and stipitate glandular, often with oil glands along main vein. *Involucre* cup-shaped, obconical, or narrowly campanulate. *Involucral bracts* arranged in mostly 3 or rarely 4 rows, imbricate, outer shorter than inner, apices often reddish. *Ray florets* female, fertile; *tube* with glandular hairs in upper part; *limb* with glandular hairs around mouth, 3-lobed, sometimes with few glandular and non-glandular hairs sub-apically. *Style* bifurcate; *style branches* linear to linear-elliptic, stigmatic areas marginal, confluent at apex, rarely with 3 branches. *Ovary* with thickened margin, clavate-like twin hairy or rarely glabrous. *Cypsela* laterally compressed, margin thickened, surface with short clavate-like twin hairs or glabrous. *Pappus bristles* persistent, plumose, barbellate to nude

basally. *Disc florets* functionally male; corolla yellow, tubular; *tube* usually with glandular hairs in lower part, 5-lobed; *lobes* with sub-apical glandular hairs, sometimes occasional non-glandular hair as well, with marginal resin ducts. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* linear, stigmatic areas marginal, not confluent at apex, with deltoid, papillate apical appendages. *Ovary* glabrous or with short twin hairs. *Pappus bristles* persistent, plumose, barbellate to nude below.

Very similar in appearance to *Z. leiocarpa* but with larger capitula and persistent, plumose pappus (See Table 3 for comparison).

Key to varieties

1a. Ray ovaries/cypselae usually clavate-like twin hairy, rarely glabrous; leaves herbaceous, sparsely to densely hirsute or bristly hairy, sparsely to densely minutely stipitate glandular . . . . . 17a. var. *montana*

1b. Ray ovaries/cypselae glabrous; leaves semi-succulent, without cilia, ciliate and/or sparsely stipitate glandular ciliate, cilia short or long, surface glabrous or scattered bristly hairy on both sides, young leaves and leaves in rosettes often more densely hairy . . . . . 17b. var. *grauii*

17a. **Zyrphelis montana** var. **montana**

Erect dwarf shrub, up to 300(–460) mm high; s*tem*s sparsely to much branched, woody below, glabrous or sparsely to densely hirsute or bristly hairy and mostly (sparsely) minutely stipitate glandular. *Leaves* alternate, sometimes almost rosette-like at base of leafy branches or peduncles, sessile, scattered along stem or densely set, herbaceous, erect or sometimes recurved, flat, narrowly to very narrowly obovate, linear or narrowly elliptic in outline, 7–25(–35) × 1.0–3.0(–4.5) mm, apex acute or bristle-tipped acute, margin entire or in upper leaves sometimes 1, 2 or rarely 3-lobed or -dentate on 1 or both sides of margin in upper part of leaf, surface sparsely to densely hirsute or bristly hairy, densely to (very) sparsely minutely stipitate glandular, this mixture of hairs and glands especially obvious along margins, sometimes with embedded oil glands. *Capitula* radiate, solitary, terminal, pedunculate. *Peduncle* (9–)15–80(–110) mm long, sometimes tinged reddish, (sparsely to densely) bristly hairy and sparsely to more densely minutely stipitate glandular, bracteate; *peduncular bracts* 1 to 8 per peduncle, linear, linear-triangular, filiform, (3.5–)4.0–11.0(–12.0) mm long, often with swollen bases, hirsute/bristly hairy and stipitate glandular, sometimes with oil glands along main vein. *Involucre* cup-shaped, obconical, narrowly campanulate, (5.5–)6.0–10.0 mm high, (6.5–)7.0–13.0(–14.0) mm across upper part. *Involucral bracts* in mostly 3 or rarely 4 rows, imbricate, outer shorter than inner, apices often reddish; *outer row* linear or narrowly oblong, linear-triangular, (3.0–)4.0–5.0(–6.2) × (0.4–)0.5–1.0 mm, apex acute, rarely acuminate, with tuft of few cilia, surface (sparsely) bristly hairy and (sparsely) minutely stipitate glandular, V-shaped thickened from base, stereome fenestrated, often with oil glands along main vein; *second row* linear, very narrowly elliptic, very narrowly obovate, narrowly ovate, (4.0–)5.5–7.0(–9.0) × 0.5–1.0(–1.2) mm, apex acute to acuminate, with tuft of few cilia, surface (sparsely) bristly hairy and (sparsely) minutely stipitate glandular, keeled, V- or Y-shaped thickened from base,

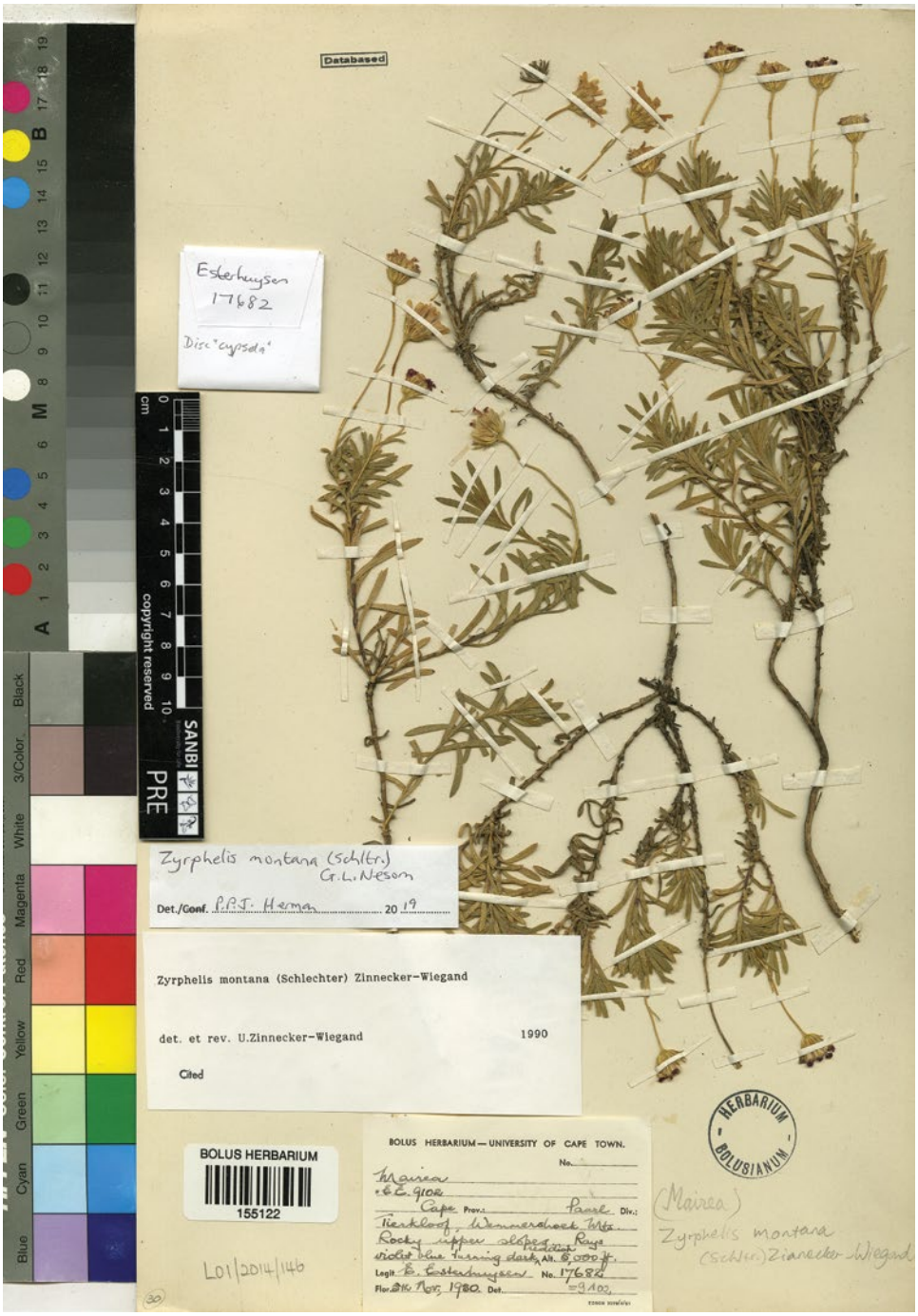


Figure 99. Scan of *Zyrphelis montana* var. *montana* specimen (*Esterhuysen 17682*, BOL).

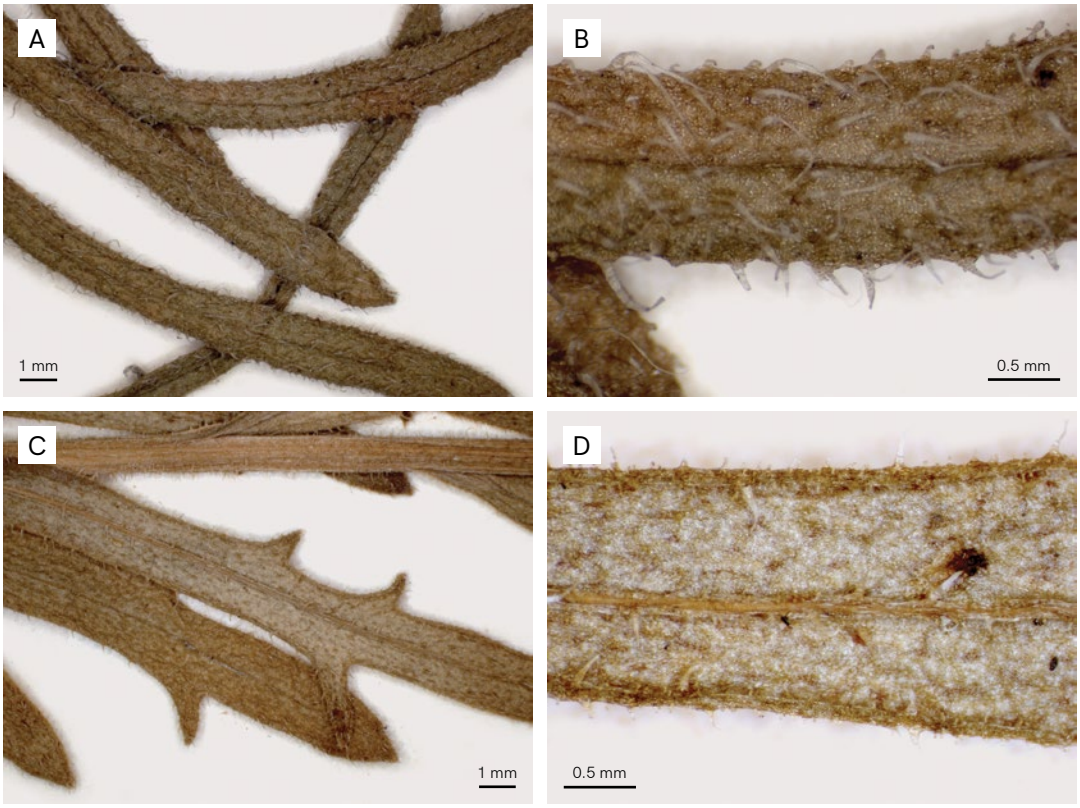


Figure 100. *Zyrphelis montana* var. *montana*: A, B, entire, bristly hairy and minutely stipitate glandular leaves (*Esterhuysen 9102*, BOL); C, D, dentate, bristly hairy and minutely stipitate glandular leaves (*Schlechter 9448*, PRE).

stereome fenestrated, rarely 3-veined, usually with oil glands along vein(-s); *third row* narrowly to very narrowly obovate, 5.0–8.5 × (0.5–)1.0–1.5 mm, apex acute to acuminate, margin membranous, ciliate in upper part, surface (sparsely) bristly hairy and (sparsely) minutely stipitate glandular, keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes 3-veined but not always obvious, with oil glands along vein(-s); *fourth row* narrowly obovate, 6–7 × (1.0–)1.2 mm, apex acute to bluntly acute, margin membranous in upper part, ciliate, surface sparsely bristly hairy and minutely stipitate glandular, keeled, V- or Y-shaped thickened from base, stereome fenestrated, sometimes 3-veined but not always obvious, often with oil glands along veins. *Ray florets* female, fertile, corolla saxe blue, blue, violet blue, mauve, pale lilac, white, often turning reddish; *tube* 2.0–3.0(–3.5) mm long, with glandular hairs all along tube or in upper part only, *limb* (5.0–)6.0–7.5(–10.5) mm long, 3-lobed, lower part of limb with glandular hairs, sometimes also some glandular hairs sub-apically. *Style* 2.0–2.5(–4.5) mm long, bifurcate; *style branches* linear to linear-elliptic, (0.8–)1.0–1.5 mm long, stigmatic areas marginal, confluent at apex, rarely 3 branches. *Ovary* elliptic, linear-elliptic, narrowly obovate, 2–4 mm long, margin thickened, with carpopodium, surface with clavate-like twin hairs. *Cypsela* brown to dark brown, obovate, elliptic, 4 × 2.0(–2.5) mm, laterally compressed, carpopodium small to distinct,

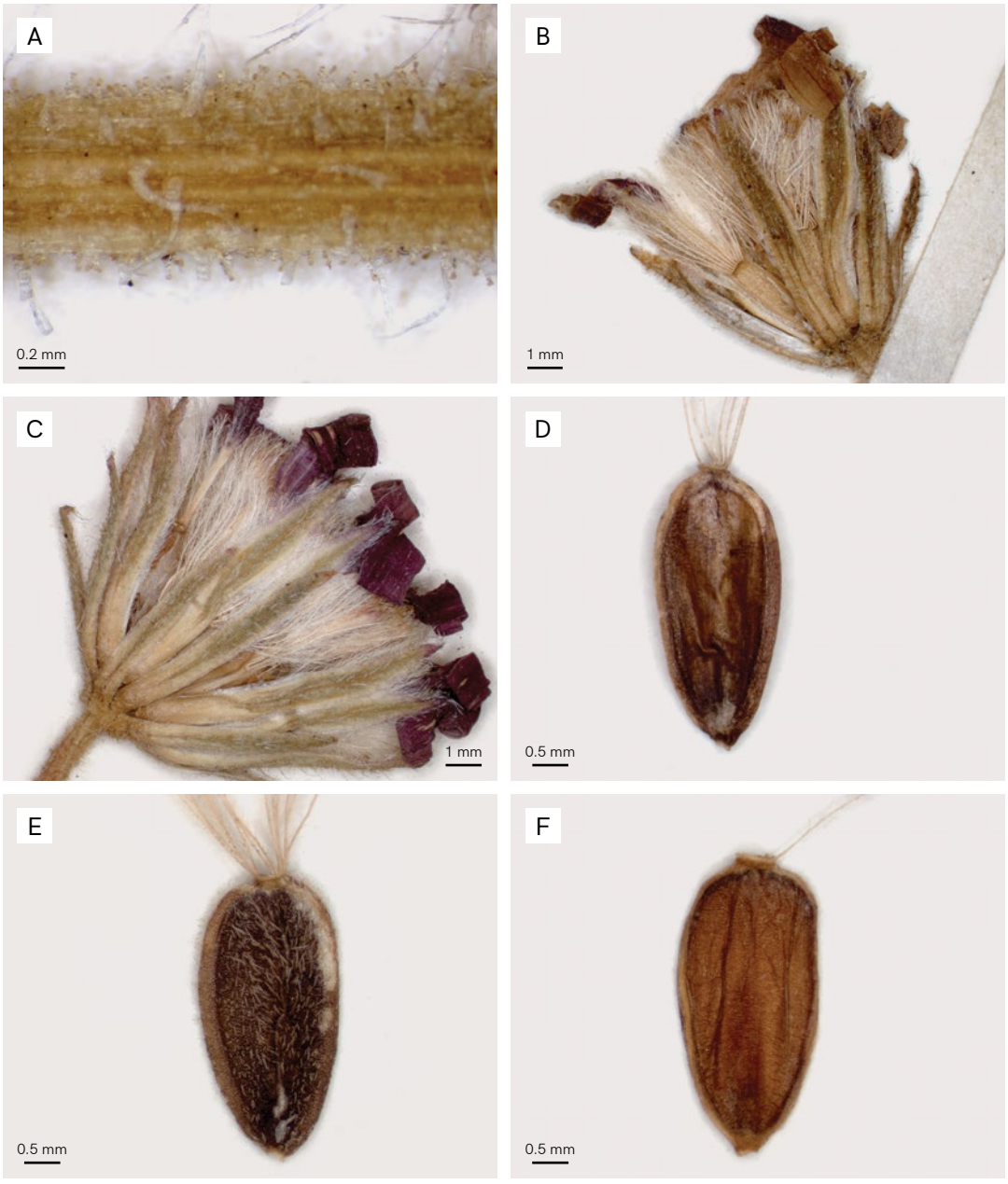


Figure 101. *Zyrphelis montana* var. *montana*: A, bristly hairy and stipitate glandular peduncle (*Esterhuysen 17682*, PRE); B, capitulum showing bristly hairy and stipitate glandular, 3-veined involucral bracts; C, capitulum with bristly hairy and stipitate glandular involucral bracts, not obviously 3-veined (B, C, *Esterhuysen 9102*, BOL); D, glabrous disc pseudo-cypsela with thickened margin; E, hairy ray cypsela with thickened margin (D, E, *Esterhuysen 17682*, PRE); F, glabrous ray cypsela with thickened margin (*Esterhuysen 9102*, BOL).

margin slightly thickened, glabrous or sparsely clavate-like twin hairy, surface with clavate-like twin hairs, apices of twin hairs acute to bluntly acute or obtuse, equal or unequal; epicarpic cells colliculate in surface view, densely rugose or densely striated; rarely some cypselae glabrous (*Esterhuysen 9102*, BOL), in these margin thickened, with carpopodium; epicarpic cells ± oblong in surface view, ± striated (similar to those of disc pseudo-cypsela). *Pappus bristles* persistent, 3.0–4.0(–4.5) mm long, plumose, barbellate to nude basally. *Disc florets* regular, functionally male; corolla yellow, tubular; *tube* (2.8–) 3.0–4.0 mm long, usually with glandular hairs in lower part or glabrous, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, sometimes occasional non-glandular hair as well, with marginal resin ducts. *Anthers* 1.5–2.0 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* (1.5–)2.0–3.0(–3.8) mm long, bifurcate, *style branches* linear, (0.5–)1.0–1.2 mm long, stigmatic areas marginal, not confluent at apex, with deltoid, papillate apical appendages. *Ovary* linear, very narrowly elliptic, narrowly obovate, (2.0–)3.0–3.5(–4.0) mm long, margin thickened, with carpopodium, surfaces mostly glabrous, rarely with (few) short clavate-like twin hairs or few short clavate-like twin hairs along margins; epicarpic cells indistinct to distinct, striated. Rarely some *outer ovaries* develop into pseudo-cypselae: brown, obovate, 4 × 1.8 mm, laterally compressed, margin thickened, carpopodium small, surface glabrous; epicarpic cells distinct, ± in rows, ± oblong in surface view, ± striated or smooth. *Pappus bristles* persistent, 3.0–4.5 mm long, plumose, barbellate to nude basally. *Flowering time*: September to January. Figures 99 to 104.

Diagnostic characters: *Zyrphelis montana* var. *montana* can be recognised by the herbaceous, narrowly to very narrowly obovate, linear or narrowly elliptic, flat leaves with entire or 1-, 2- or rarely 3-lobed or -dentate margins, the sparsely to densely hirsute or bristly hairy and densely to (very) sparsely minutely stipitate glandular leaf surfaces, the fairly large capitula, the bristly hairy and minutely stipitate glandular peduncles and involucral bracts, the inner bracts often 3-veined, the ray ovaries and ray cypselae with clavate-like twin hairs, very rarely glabrous ray cypselae, the densely rugose or densely striated epicarpic cells and the persistent plumose pappus bristles. See Table 3 (pg. 73).

The morphology of the plants follow a west–east gradation similar to their distribution. In the type specimen from the mountains above Botrivier, the leaves are scattered along the branches, the indumentum of the leaves consists of sparse, hirsute [short, ± straight bristle] hairs and dense stipitate glandular hairs, the margins of the leaves are entire but the uppermost leaves are usually 1- to 3-dentate or -lobed and the inner involucral bracts are usually 3-veined. In specimens from the Wemmershoekberge the leaves are also scattered along the branches to more densely set, but there is a definite tendency towards a rosette-like arrangement of leaves at the base of leafy branches, the indumentum of the leaves consists of more dense, longer bristle hairs and sparse minute stipitate glandular hairs, the leaf margins are mostly entire or rarely minutely 1- or 2-dentate and on the inner involucral bracts 3 veins are present or absent. In specimens from the Hexrivierberge, the leaves are scattered along the stems to more densely set but with rosette-like arrangement of leaves at the base of leafy branches, the indumentum consists of longish bristle hairs and very sparse to almost no minute stipitate glandular hairs, the leaf margins are entire and on the inner involucral bracts 3 veins are present or absent. *Esterhuysen 9102 (BOL)* presents a link between the two varieties as the texture of the leaves is herbaceous, the indumentum on the stems and leaves consists of bristle hairs and minute stipitate glands but in some specimens on the sheet the ray ovary and ray cypsela are glabrous like in var. *grauii*.

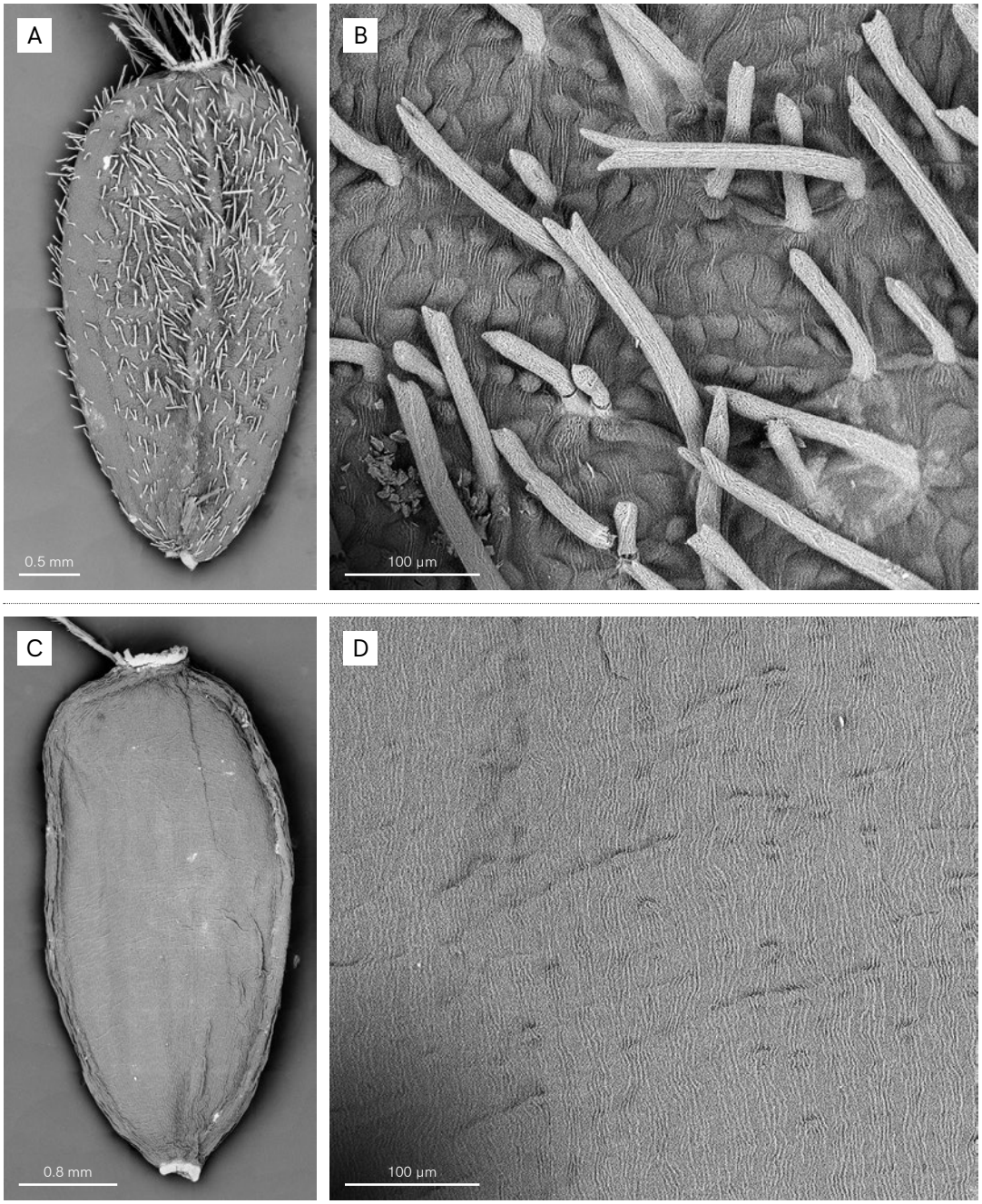


Figure 102. *Zyrphelis montana* var. *montana*: scanning electron micrographs of ray cypsela, A, with clavate-like twin hairs, epicarpic cells ± colliculate in surface view, rugose or striated, B (*Esterhuysen 17682*, PRE); C, D, glabrous ray cypsela, epicarpic cells ± striated (*Esterhuysen 9102*, BOL).

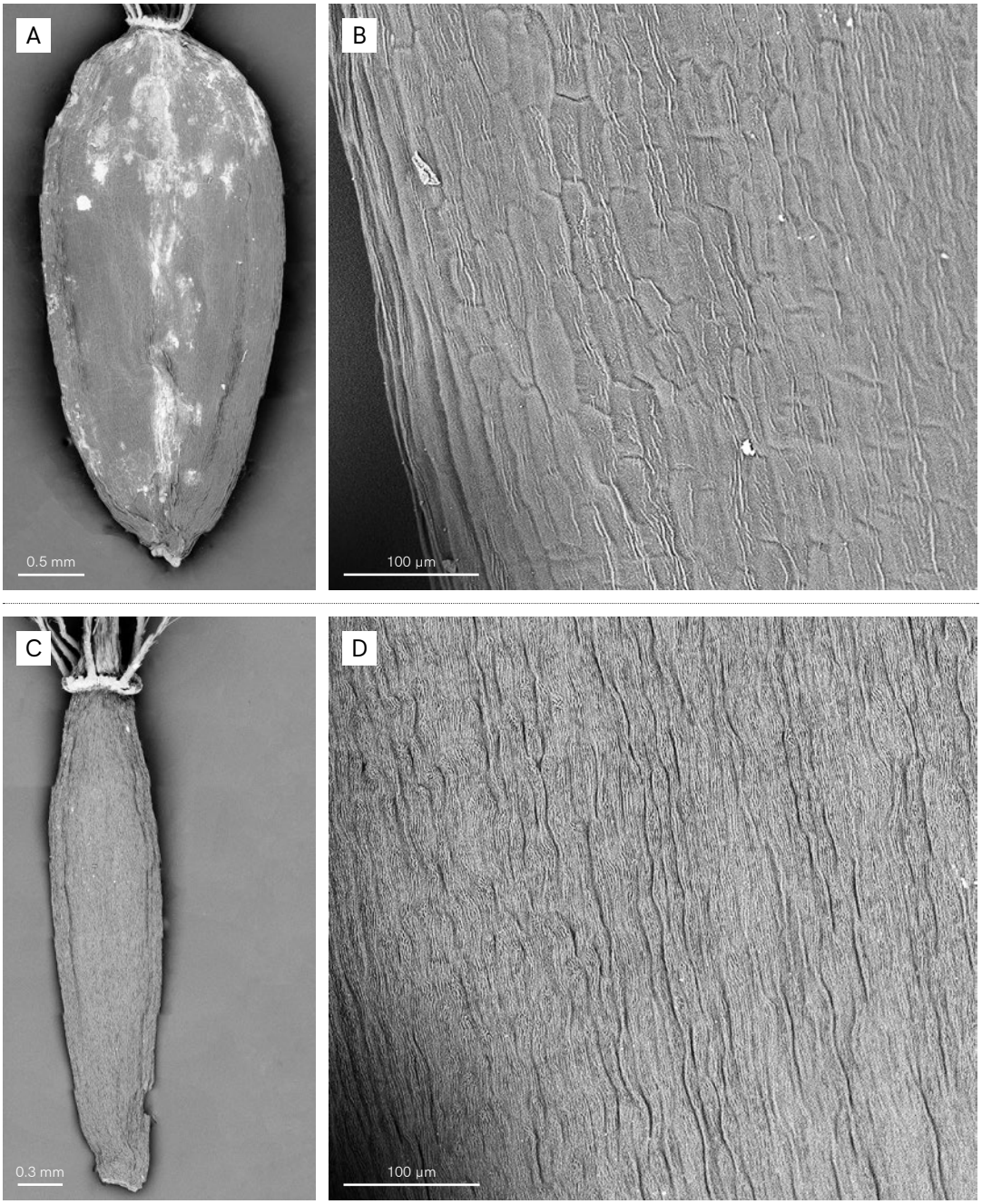


Figure 103. *Zyrphelis montana* var. *montana*: scanning electron micrographs of A, B, glabrous disc pseudocypsela, epicarpic cells distinct, ± in rows, ± oblong in surface view, ± striated or smooth (*Esterhuysen 17682*, BOL); C, D, glabrous inner disc ovary (C, *Esterhuysen 9102*, BOL; D, *Esterhuysen 9086*, BOL).

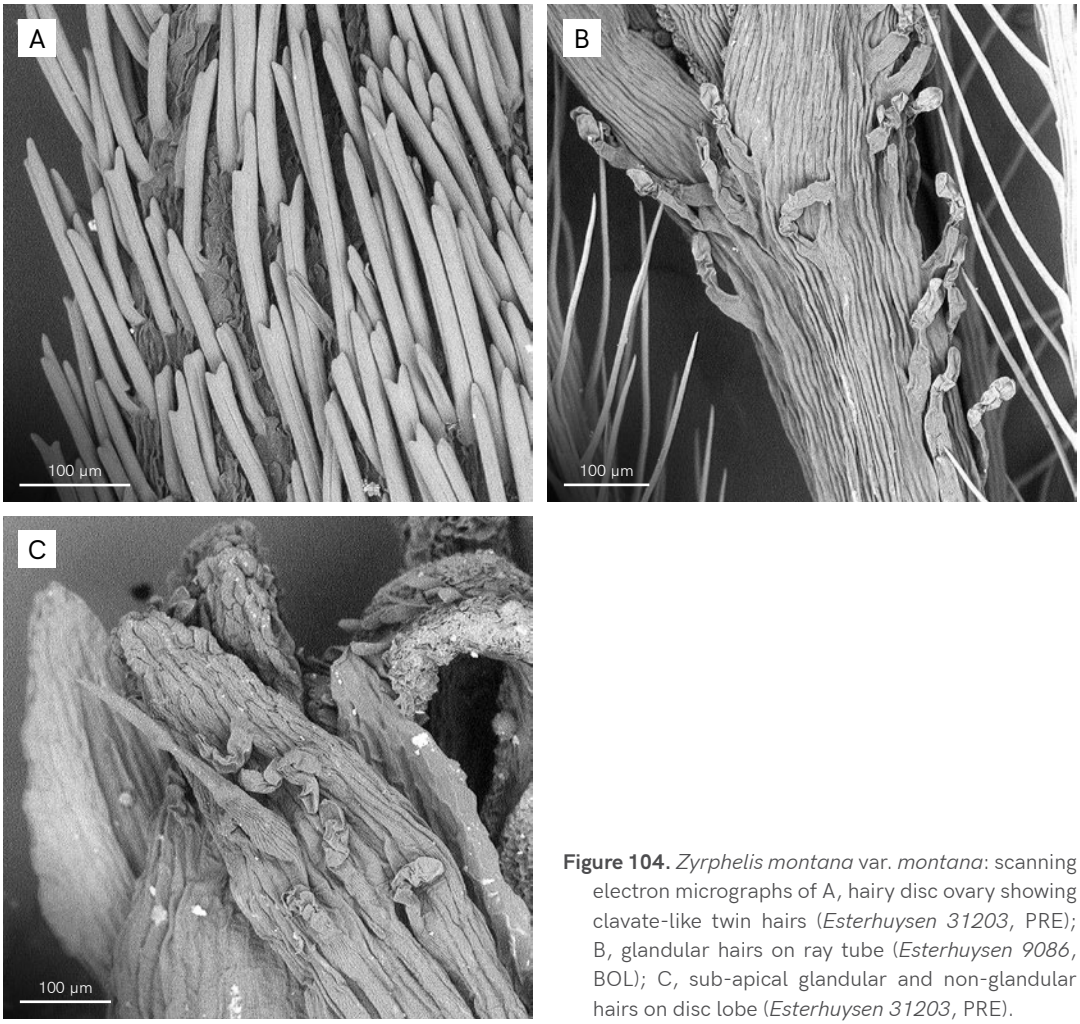


Figure 104. *Zyrphelis montana* var. *montana*: scanning electron micrographs of A, hairy disc ovary showing clavate-like twin hairs (*Esterhuysen 31203*, PRE); B, glandular hairs on ray tube (*Esterhuysen 9086*, BOL); C, sub-apical glandular and non-glandular hairs on disc lobe (*Esterhuysen 31203*, PRE).

Distribution: *Zyrphelis montana* var. *montana* is distributed from the mountains above Botrivier (probably the Groenland- and Houhoekberge) in the west across the Wemmershoek- and Groot Drakensteinberge to the Hexriviersberge in the east (Figure 105).

Conservation status: According to Helme et al. (2012a) the Red List status of *Z. montana sens. str*. is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Worcester Division, Hex River Mountains, shale band, below Milner Peak, 5000 ft [1524 m], (-AD), 11 November 1943, *Esterhuysen 9336* (BOL); Worcester District, lower

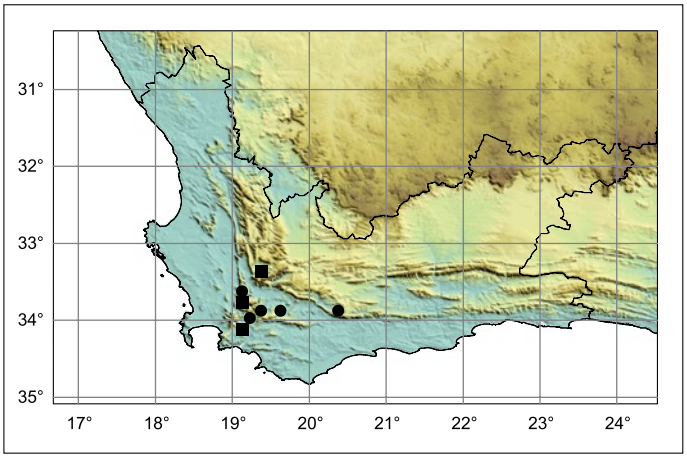


Figure 105. Distribution of *Zyrphelis montana* var. *montana* ■; and var. *grauii* ●.

rugged slopes of Sentinel Peak, above Buffelshoek Kloof in small gully, S aspect, 2000–3000 ft [610–914 m], (–AD), 19 September 1965, *Esterhuysen 31203* (BOL, PRE); Paarl District, mts south of Wemmers Hoek [probably Groot Drakensteinberge], upper part of NW-slopes, apparently rare, 1400m, (–CC), January 1921, *Andreae 772* (PRE); Paarl Division, Wemmershoek Mountains, rocky slope, 3000–4000 ft [914–1219 m], (–CC), 19 October 1943, *Esterhuysen 9086* (BOL); Paarl Div., Wemmershoek Mts, Tierkloof, 3000–4000 ft [914–1219 m], (–CC), 20 October 1943, *Esterhuysen 9102* (BOL); Paarl Division, Wemmershoek Peak, ledges on west side, 4000–5000 ft [1219–1524 m], (–CC), 31 December 1944, *Esterhuysen 11334* (BOL); Paarl Division, Wemmershoek Mountains, Tierkloof, rocky upper slopes, 5000 ft [1524 m], (–CC), 5 November 1950, *Esterhuysen 17682* (BOL, PRE); Paarl District, Wemmershoek Mountains, Turkloof [Tierkloof], 3000 ft [914 m], (–CC), 20 October 1943, *Wasserfall 557* (NBG).

17b. **Zyrphelis montana** var. **grauii** (*Zinnecker-Wiegand*) *P.P.J.Herman, comb. & stat. nov.*

Zyrphelis grauii Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand: 1196 (2011).

Type: South Africa, Western Cape, Worcester (3319): Worcester Division, Du Toits Peak, (–CC), 3500 ft [1067 m], 10 October 1955, *Esterhuysen 24740* (M, holo.; BOL, iso.).

Erect dwarf shrub, up to 420 mm high, not or sparsely branched. *Stems* woody at base, upper parts sometimes tinged reddish, glabrous or sparsely bristly hairy. *Leaves* alternate, sessile, usually densely set, rarely slightly scattered along stems, or rarely rosulate at branch furcations, semi-succulent, erect, usually flat, rarely slightly folded lengthwise, linear, linear-obovate, (very) narrowly obovate, (5–)7–20(–23) × 1.0–2.5(–3.0) mm, apex acute, mucronate, sometimes bristle-tipped mucronate, margin entire or with 1 or 2 small teeth or lobes on one or both sides, without cilia, ciliate all along in lower leaves, ciliate basally in upper leaves, sometimes a mixture of non-glandular and stipitate glandular cilia, cilia short or long, surface glabrous or scattered bristly hairy on both sides, young leaves and leaves in rosettes often more densely hairy; (rarely) sparsely and minutely stipitate glandular as well.



Figure 106. Scan of the isotype of *Zyrphelis montana* var. *grauii* (*Esterhuysen 24740*, BOL).

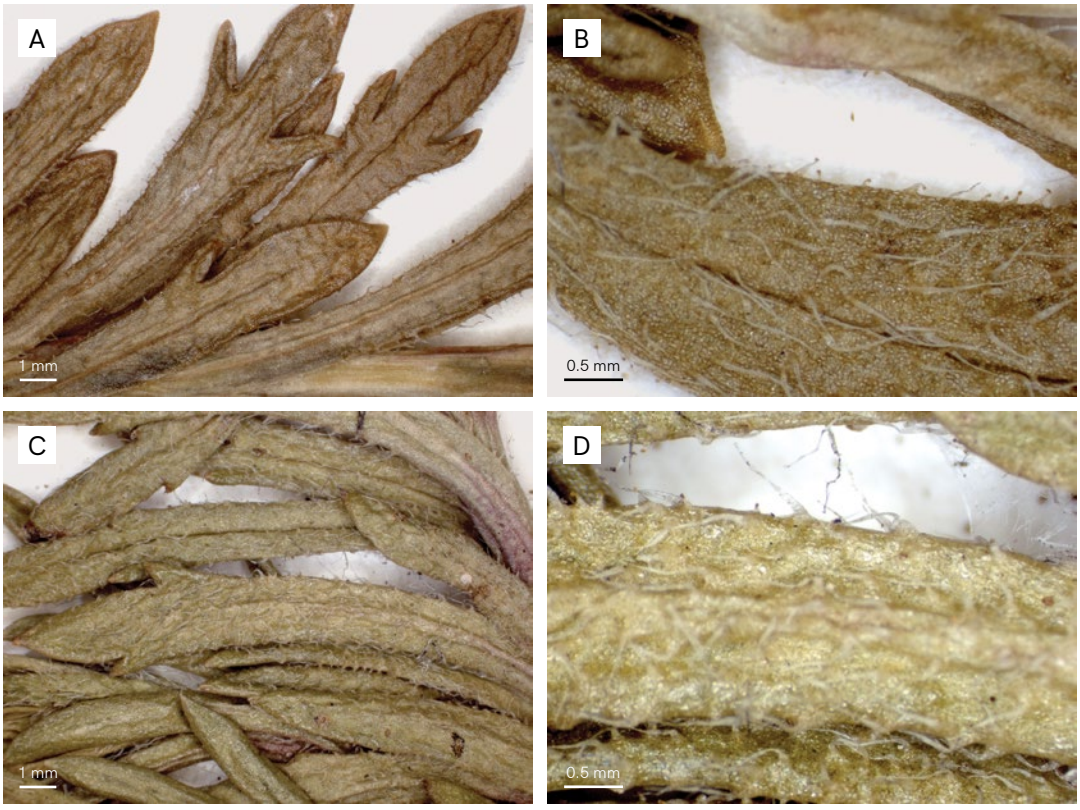


Figure 107. *Zyrphelis montana* var. *grauii*: A, sparsely bristly hairy and stipitate glandular, entire and denticulate leaves; B, bristly hairy and stipitate glandular leaves (A, B, *Esterhuysen 24740*, BOL); C, bristly hairy and stipitate glandular, entire and denticulate leaves; D, bristly hairy and stipitate glandular leaves (C, D, *Helme 5765*, NBG).

Capitula solitary, terminal, pedunculate. *Peduncle* (10–)15–55(–65) mm long, sometimes flushed reddish, bristly hairy and stipitate glandular, bracteate; *peduncular bracts* 1 to 5(19) per peduncle, linear, linear-filiform, linear-ovate, linear-triangular, (4–)5–9(–10) mm long, margins ciliate, sometimes non-glandular and glandular ciliate, surfaces glabrous or with few stipitate glands and some bristle hairs, upper bracts with swollen bases, sometimes oil glands along main vein. *Involucre* (broadly) obconical, narrowly campanulate, cup-shaped, (6.0–)6.5–9.0(–10.0) mm high; 8–14(–15) mm across upper part. *Involucral bracts* arranged in mostly 3 or sometimes 4 rows, imbricate, outer shorter than inner, apices reddish; *outer row* linear-triangular, narrowly elliptic, very narrowly ovate, (4.0–)4.5–5.5 × 0.5–0.8(–1.0) mm, apex acute to acuminate, with tuft of hairs at apex, surface stipitate glandular, (sparsely) bristly hairy, V-shaped thickened from base, stereome fenestrated, with oil glands along main vein; *second row* linear, linear-triangular, linear-ovate, oblong, very narrowly elliptic, very narrowly obovate, 6–7 × (0.6–)0.8–1.0 mm, apex acute to acuminate, with tuft of few hairs, margin (sparsely) ciliate, surface stipitate glandular, (sparsely) bristly hairy, sometimes keeled, V- or Y-shaped thickened from base, stereome fenestrated, oil glands along main vein; *third row* narrowly to very narrowly obovate,



Figure 108. *Zyrphelis montana* var. *grauii*: A, stipitate glandular and bristly hairy peduncle; B, capitulum showing sparsely bristly hairy and stipitate glandular involucral bracts; C, glabrous ray cypsela (all *Esterhuysen 24740*, BOL).

narrowly ovate, (6.5–)7.5–8.0 × 0.8–1.4 mm, apex acute or acuminate, margin narrowly membranous, (sparsely) fimbriate-ciliate, tuft around apex, surface (sparsely) stipitate glandular, (sparsely) bristly hairy, slightly keeled, Y-shaped thickened from base, stereome fenestrated, oil glands along main vein; *fourth row* narrowly obovate, linear-elliptic, 7.5–8.0 × 1.2 mm; apex acute, margin narrowly membranous, ciliate, surface stipitate glandular, few short bristle hairs, keeled, Y-shaped thickened from base, stereome fenestrated, oil glands along main vein. *Ray florets* female, fertile, corolla saxe blue, violet blue, pale blue, mauve, pale mauve, turning purple brown (recorded for 1 specimen), *tube* (2.0–)2.5–3.0(–3.5) mm long, with glandular hairs in upper part; *limb* (6.0–)7.5(–10.0) mm long, with glandular hairs around mouth, 3-lobed, sometimes with few glandular and non-glandular hairs sub-apically. *Style* 2–3(–4) mm long, bifurcate; *style branches* linear or linear-elliptic, 1.0(–1.2) mm long, stigmatic areas marginal, confluent at apex. *Ovary* (narrowly) obovate, oblong, linear, 2–3(–4) mm long, with carpopodium, glabrous; epicarpic cells ± in rows, ± oblong in surface view, densely rugose or striated. *Cypsela* brown, obovate, 3.5 × ± 1.4 mm (only 1 seen), laterally compressed, carpopodium distinct, surface glabrous, epicarpic cells ± arranged in rows, ± oblong in surface view, ± flat, densely rugose or striated. *Pappus bristles* 3.5–4.0(–4.5) mm long, plumose, barbellate to nude basally, persistent. *Disc florets* functionally male; corolla yellow, tubular; *tube* 3–4 mm long, glabrous or with few glandular

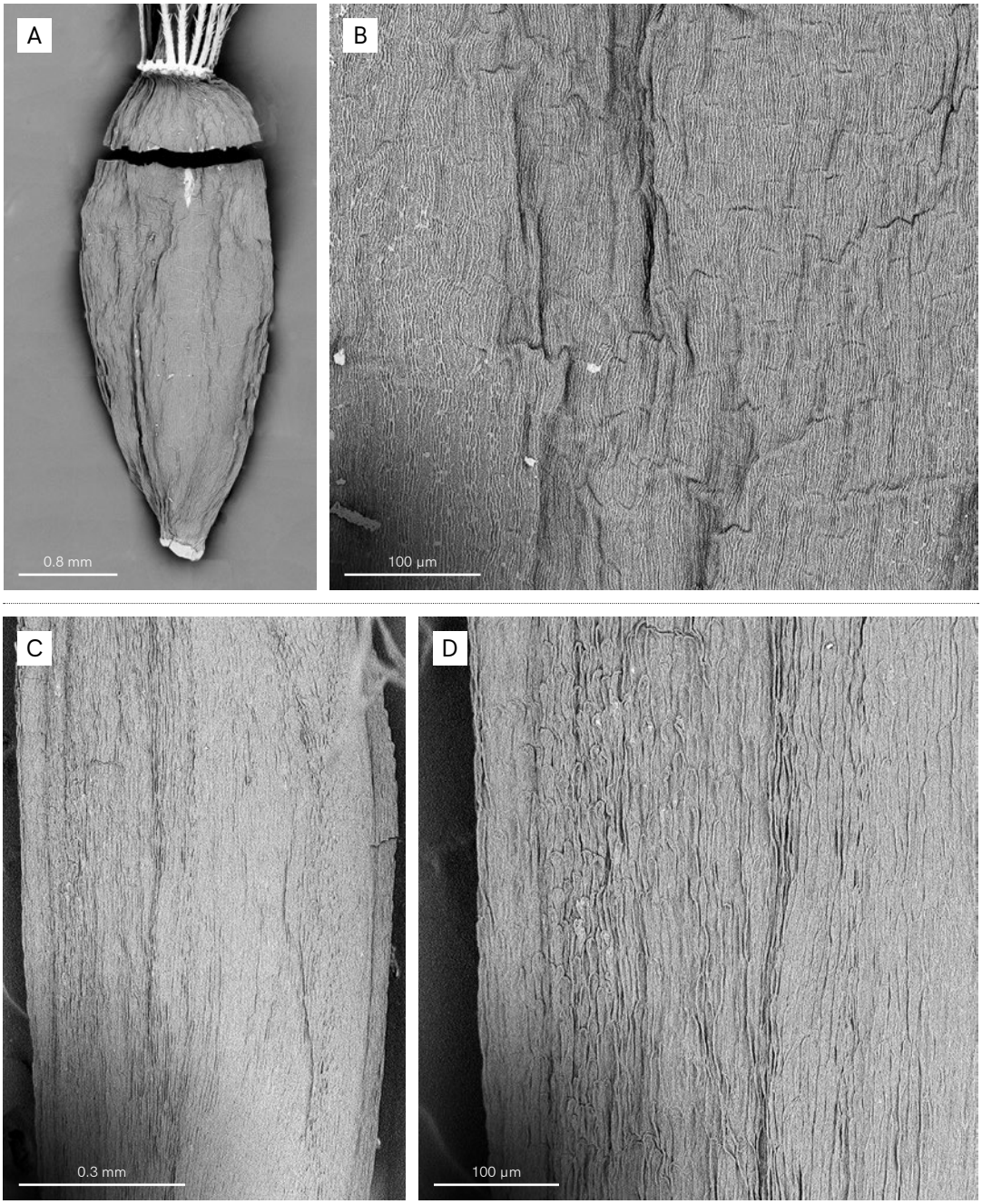


Figure 109. *Zyrphelis montana* var. *grauii*: scanning electron micrographs of A, B, glabrous ray cypsela, epicarpic cells ± arranged in rows, ± oblong in surface view, ± flat, densely rugose or striated (*Esterhuysen 24740*, BOL); C, D, glabrous disc ovary, epicarpic cells ± in rows, ± oblong in surface view (*Esterhuysen 32702*, BOL).

hairs in lower part, 5-lobed; *lobes* (0.8–)1.0 mm long, with sub-apical glandular hairs, sometimes also with resin ducts along margins. *Anthers* (1.5–)1.6–2.0 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 2.5–4.0 mm long, bifurcate; *style branches* linear, 1.0–1.5 mm long, stigmatic areas marginal, not confluent, with (narrowly) deltoid, papillate apical appendages. *Ovary* linear, linear-obovate, narrowly elliptic, 2–3 mm long, margin slightly thickened, with carpopodium, surface glabrous; epicarpic cells ± in rows, ± oblong in surface view, densely to faintly rugose or striated. *Pappus bristles* persistent, (3.0–)4.0–4.5 mm long, plumose, barbellate to nude basally. *Flowering time*: September to November. Figures 106 to 109.

Only one ray cypsela from the type specimen was seen and it is uncertain if it represents a fully developed, fertile cypsela. However, all the ray ovaries studied were glabrous.

Diagnostic characters: *Zyrphelis montana* var. *grauii* can be recognised by the semi-succulent, linear or linear-obovate, usually flat leaves with entire margins or with 1 or 2 small teeth or lobes on 1 or both sides, without cilia, ciliate and/or sparsely stipitate glandular ciliate, cilia short or long, the surfaces glabrous or scattered bristly hairy on both sides, but young leaves and leaves in rosettes often more densely hairy, and the glabrous ray ovaries and ray cypsela. See Table 3 (pg. 73).

Distribution: This taxon occurs in the Dutoitsberge, the Riviersonderendberge, and an isolated collection (*Esterhuysen 24508*, BOL) from the Langeberg. This specimen completely match the circumscription of var. *grauii* (Figure 105).

Conservation status: According to Von Staden (2012) the Red List status of *Zyrphelis grauii* is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Paarl Div., Eastern slopes of Seven Sisters Mountains, 3500–4000 ft [1067–1219 m], (–CA), 24 September 1949, *Esterhuysen 15799* (BOL, PRE); Worcester Division, Du Toits Peak, 5000 ft [1524 m], (–CC), 19 October 1954, *Esterhuysen 23781* (BOL); Worcester Division, Goudini Sneeukop, shale band, 5500 ft [1676 m], (–CD), 30 October 1960, *Esterhuysen 28568* (BOL); Upper southern slopes of Goudini Sneeukop, on shaleband, 1730 m, (–CD), 9 November 2008, *Helme 5765* (NBG); Caledon Distr., ridge near Jonah's Kop (Langberg) between Villiersdorp and Genadental, S aspect, 5000 ft. [1524 m], (–DC), 19 October 1971, *Esterhuysen 32702* (BOL155208, BOL)*. **3320 (Montagu)**: Swellendam-Montagu Div., Goedgeloof Peak, Langeberg, S slopes, (–CD), 3 September 1955, *Esterhuysen 24508* (BOL).

**Esterhuysen 32702* (Barcode 155218, BOL) = mixed collection with *Z. microcephala* subsp. *microcephala* and subsp. *glandulosa* Group B.

18. *Zyrphelis ecklonis* (DC.) Kuntze, *Revisio generum plantarum*: 374 (1891); Nesom: 91 (1994); Goldblatt & Manning: 373 (2000); Manning & Goldblatt: 431 (2012).

(Figures 110–126)

Homochroma ecklonis DC.: 324 (1836).
Mairia ecklonis (DC.) Sond. in Harv. & Sond.: 66 (1865); Bond & Goldblatt: 180 (1984).

Type: [South Africa, Western Cape, Clanwilliam (3218):] In Africa Capensi ad Clam-Williams [Cape in Africa, at Clanwilliam], 1835, *Ecklon 1679* (G-DC, e, holo.; PRE, photo).

Dwarf shrub, suffrutex or perennial herb. *Stems* woody basally, glabrous, bristly hairy or villose, sometimes with tufts of villose hairs in leaf axils, sometimes stipitate glandular. *Leaves* alternate, sessile, scattered along stems or more densely set, erect, flat or folded lengthwise, margins entire, surfaces glabrous, bristly hairy, sometimes stipitate glandular. *Capitula* radiate, pedunculate, solitary or in few-headed open corymbs. *Peduncle* stipitate glandular, occasionally bristly hairy, bracteate. *Involucre* obconical or campanulate, *involucral bracts* in 3 or 4(5) rows, imbricate, apices acute to acuminate, surfaces stipitate glandular, occasionally bristly hairy. *Ray florets* female, fertile; corolla yellow, lemon yellow, cream or white turning reddish or purplish with age. *Style* bifurcate, *style branches* with marginal stigmatic areas, confluent at apex. *Cypselae* surfaces filiform twin hairy. *Pappus* of plumose bristles, barbellate to nude basally, persistent. *Disc florets* functionally male, corolla yellow. *Anthers* with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* bifurcate, *style branches* without stigmatic areas. *Ovary* glabrous or sometimes with few filiform twin hairs along margins or around base. *Pappus* of plumose bristles, barbellate to nude basally, persistent.

Distinguished by the various shades of yellow, cream or white ray florets often turning reddish or purplish with age.

Four subspecies are recognised. It is possible that they grow together in the same habitat as mixed collections are sometimes encountered in herbarium collections.

Key to subspecies

1a. Stems stipitate glandular and bristly hairy, leaves herbaceous, mostly flat, sometimes folded lengthwise, ± densely stipitate glandular and (sparsely) bristly hairy, stipitate glandular hairs on peduncle and inner involucral bracts occasionally/sometimes with reddish transverse walls . . . . . 18a. subsp. *ecklonis*

1b. Stems eglandular, glabrous, bristly or villose hairy, often with tufts of hairs in upper leaf axils, leaves semi-succulent, flat or folded lengthwise, glabrous, bristly hairy and/or stipitate glandular; stipitate glandular hairs on peduncle and inner involucral bracts usually with distinct reddish transverse walls, sometimes fading with age 2

2a. Leaves eglandular, rarely some upper leaves at base of peduncle stipitate glandular – transition to peduncular bracts, totally glabrous or upper surface glabrous, lower surface sparsely to more densely (softly) bristly hairy, margins ciliate, capitula solitary or in few (2- or 3-)headed open corymbs . . . . . 18b. subsp. *oligocephala*

2b. Leaves sparsely to densely stipitate glandular, glabrous or with few villose hairs, margins ciliate or not, capitula solitary. 3

3a. Leaves totally glabrous or sometimes with few bristle hairs on lower surface, often with few stipitate glandular hairs abaxially on upper part and margins of upper leaves, peduncle (15–)20–40(–45) mm long, flowering time September and October . . . . 18c. subsp. *strictifolia*

3b. Surfaces of lower leaves sparsely glandular or eglandular, surfaces of upper leaves densely glandular, with few villose hairs, margins of upper leaves long ciliate basally, peduncle (45–)60–85(–125) mm long, flowering time December and January . . . . . 18d. subsp. *longipedunculata*

18a. **Zyrphelis ecklonis** subsp. **ecklonis**

Erect, dwarf shrub, up to 380 mm high. *Stem* woody basally, stipitate glandular and bristly hairy. *Leaves* alternate, sessile, densely set to scattered along stems, erect, mostly flat, sometimes folded lengthwise, herbaceous and thin textured, linear, oblong, very narrowly obovate or rarely elliptic, (6–)8–23(–35) × (1.0–)1.5–4.0 mm, apex acute, sometimes mucronate, margins entire, surface (densely) stipitate glandular and (sparsely) long bristly hairy, often with long bristle hairs along margin. *Capitula* radiate, solitary, pedunculate. *Peduncle* 10–20(–45) mm long, sometimes tinged reddish, longish bristly hairy, stipitate glandular, all hairs on broad bases and sometimes with reddish transverse walls, bracteate; *peduncular bracts* (0)1 to 3(4) per peduncle, linear, linear-triangular or very narrowly ovate, (2.5–)3.0–4.0(–10.0) mm long, stipitate glandular, (occasional, longish) bristle hairy. *Involucre* obconical, (5–)6–7 mm high, 7–10(–12) mm across upper part. *Involucral bracts* in 4 or 5 rows, imbricate, outer shorter than inner, tips often reddish, stipitate glands occasionally/sometimes with reddish transverse walls; *outer row* narrowly triangular or narrowly to very narrowly ovate, (3.0–)3.2–4.8 × 0.6–0.8(–1.0) mm, apex acute to acuminate, sometimes with tuft of few bristle hairs, margins very narrowly membranous, fimbriate-ciliate, surface stipitate glandular and sometimes with a few bristle hairs, V- or Y-shaped thickened, stereome fenestrated; *second row* narrowly triangular, narrowly to very narrowly ovate or narrowly oblong, (3.8–)4.0(–5.8) × (0.5–)1.0 mm, apex acute to acuminate, sometimes with tuft of few bristle hairs, margin sometimes very narrowly membranous, fimbriate, few cilia in upper part, surface stipitate glandular, V- or Y-shaped thickened, stereome fenestrated; *third row* (narrowly) oblong, very narrowly ovate or very narrowly obovate, (4.4–)5.0(–6.0) × 1 mm, apex acute to acuminate, with tuft of hairs, margin sometimes narrowly membranous, fimbriate, few cilia in upper part, surface stipitate glandular, sometimes occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated; *fouth row* narrowly elliptic, narrowly to very narrowly ovate, 5–6 × 1.0(–1.2) mm, apex acute to acuminate, margin membranous, fimbriate in lower part, ciliate in upper part, surface stipitate glandular, sometimes with occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated; *fifth row* narrowly elliptic to very narrowly ovate, 5.0–5.4 × 0.9–1.0 mm, apex acute to acuminate, margin narrowly membranous, fimbriate in lower part, ciliate in upper part, surface stipitate glandular, slightly keeled, V- or Y-shaped thickened, stereome fenestrated. *Ray florets* female, fertile, corolla yellow, lemon or pale lemon



Figure 110. Scan of *Zyrphelis ecklonis* subsp. *ecklonis* specimen (*Esterhuysen 3289*, BOL).



Figure 111. *Zyrphelis ecklonis* subsp. *ecklonis*: A, densely, long bristly hairy and densely stipitate glandular, entire leaves (*Esterhuysen 3289*, PRE); B, long bristly hairy and stipitate glandular peduncle (*Esterhuysen 3289*, PRE); C, capitulum with stipitate glandular involucral bracts (*Esterhuysen 3289*, PRE); D, hairy ray cypsela (*Compton 9615*, NBG).

yellow, rarely white, turning reddish with age; *tube* 2.0–2.5 mm long, with few glandular hairs, more around mouth; *limb* (3.0–)5.0(–6.5) mm long, sometimes with glandular hairs. *Style* (2.2–)2.5(–3.2) mm long, bifurcate; *style branches* linear to linear-elliptic, 1 mm long, stigmatic areas marginal, confluent. *Ovary* (very) narrowly obovate, 2(–3) mm long, densely filiform twin hairy. *Cypsela* brownish or blackish, (narrowly) obovate to elliptic, 3 × 1.2–1.5 mm, laterally compressed, mostly with thickened margin, with carpopodium, surfaces densely filiform twin hairy, apices acute; epicarpic cells ± colliculate in surface view, smooth or slightly rugose. *Pappus bristles* persistent, 3.5–4.0(–5.0) mm long, plumose, barbellate basally. *Disc florets* functionally male, corolla yellow, tubular; *tube* (3.0–)3.5(–3.8) mm long, often with few glandular hairs ± in ring in lower part; *lobes* 5, 0.5–1.0 mm long, with sub-apical glandular hairs, sometimes also with single non-glandular hair. *Anthers* (1.5–)1.8–2.0 mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2.0–2.5(–3.0) mm long, bifurcate; *style branches* linear, linear-triangular, (very) narrowly ovate, 1 mm long, with deltoid, papillate apical appendages, stigmatic areas absent. *Ovary* linear, 2.0–2.5(–3.0) mm long, with carpopodium, glabrous,

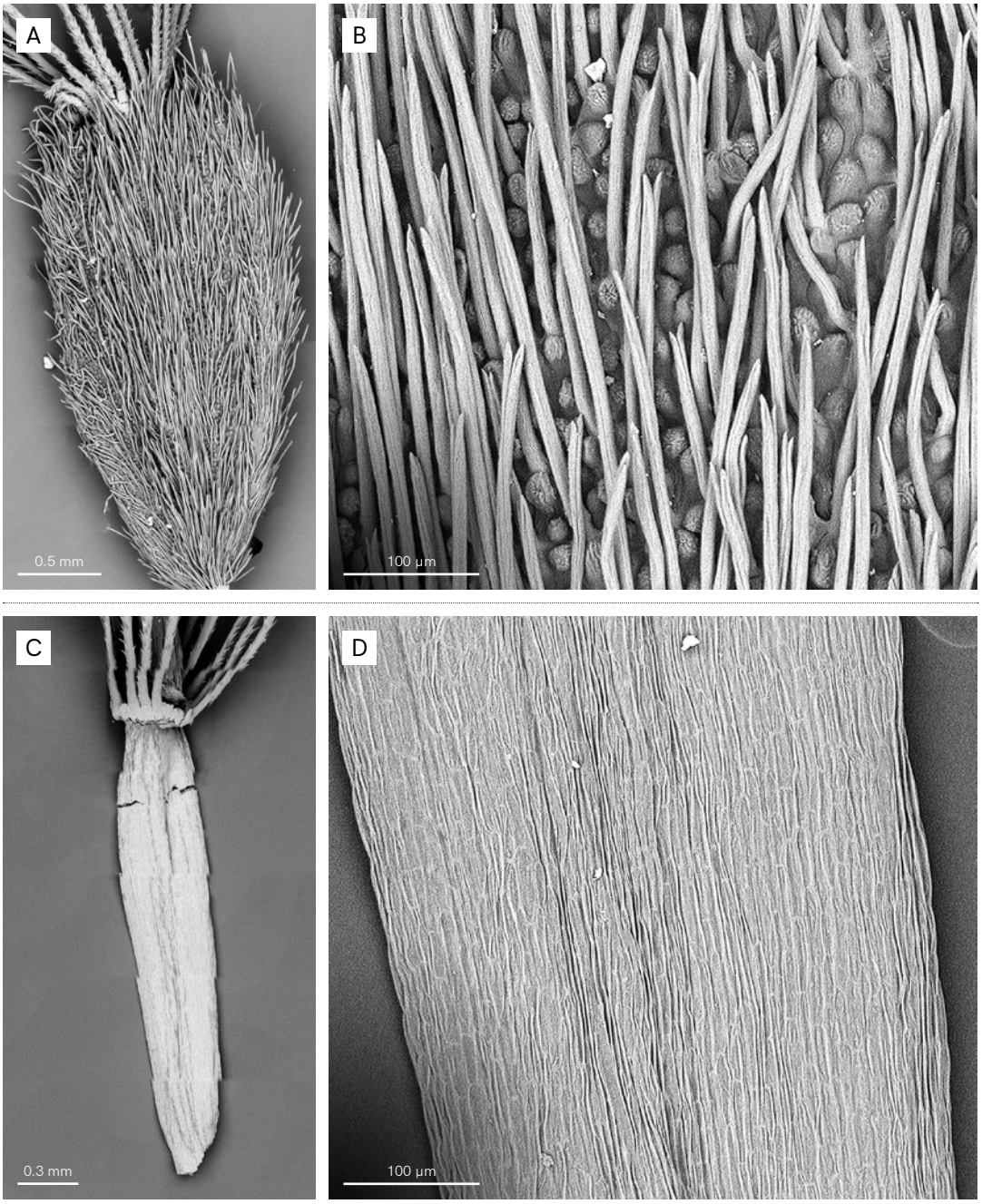


Figure 112. *Zyrphelis ecklonis* subsp. *ecklonis*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs, epicarpic cells ± colliculate in surface view, smooth or slightly rugose; C, D, glabrous, sterile disc ovary (all *Compton 9615*, NBG).

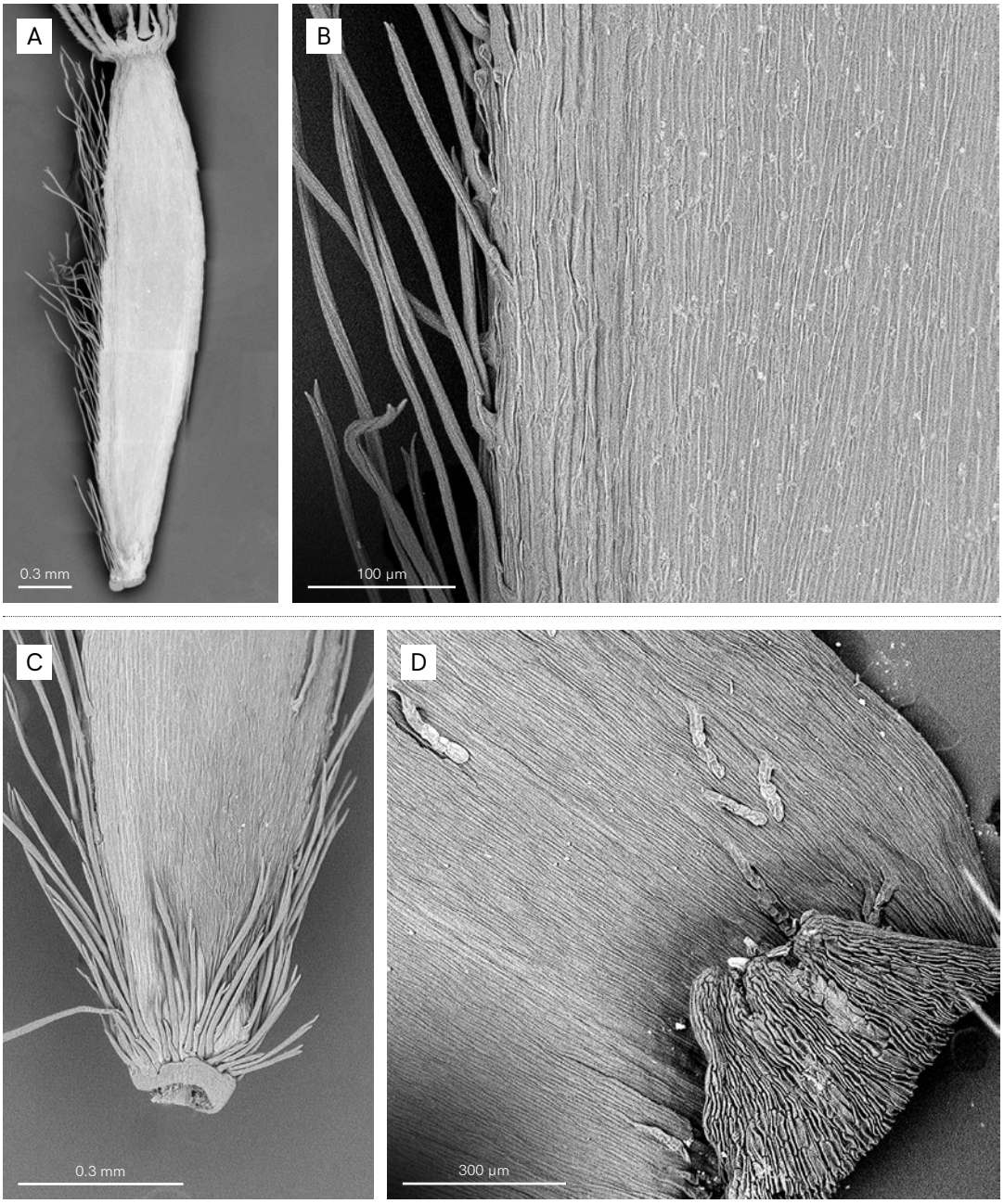


Figure 113. *Zyrphelis ecklonis* subsp. *ecklonis*: scanning electron micrographs of A, B, sterile disc ovary with filiform twin hairs along the margin and few small pappus bristles among longer pappus bristles (*Acocks 19829*, PRE); C, twin hairs at base of sterile disc ovary and prominent carpopodium (*Taylor 11038A*, PRE); D, glandular hairs on ray limb (*Hafström & Acocks 1569*, PRE).

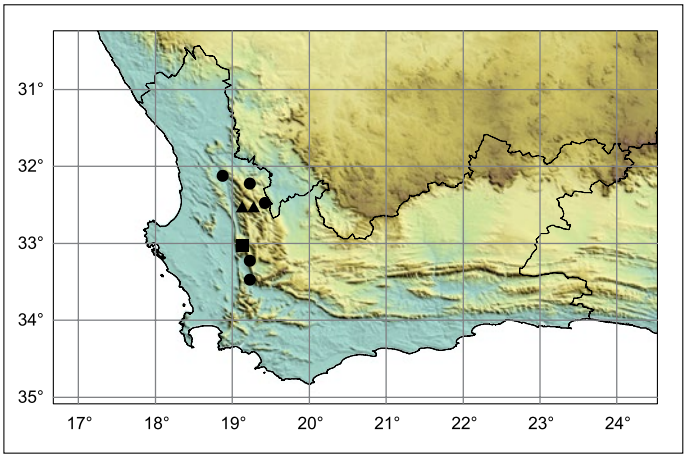


Figure 114. Distribution of *Zyrphelis ecklonis* subsp. *ecklonis* ●; subsp. *strictifolia* ▲; and subsp. *longipedunculata* ■.

rarely with few short filiform twin hairs at base and along one or both margins; epicarpic cells elongated in surface view, flat, ± smooth. *Pappus bristles* persistent, 3.5–4.0(–5.0) mm long, plumose, barbellate basally. *Flowering time*: September. Figures 110 to 113.

Diagnostic characters: *Zyrphelis ecklonis* subsp. *ecklonis* can be recognised by the stipitate glandular and bristly hairy stems, the mostly flat, sometimes folded lengthwise, herbaceous and thin textured, linear, oblong, very narrowly obovate or rarely elliptic, stipitate glandular and (sparsely) long bristly hairy leaves, the solitary capitula, the longish bristly hairy and stipitate glandular peduncle, the acute to acuminate, stipitate glandular and sparsely bristly hairy involucral bracts, the yellow, lemon or pale lemon yellow, rarely white, ray florets turning reddish with age, the densely filiform twin hairy ray cypselae, the functionally male disc florets and the persistent, plumose pappus bristles.

Distribution: Distributed in the north in the Cederberg, southwards to the Witsenberg and Voëlvleiberge (Figure 114).

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3218/3219 (Clanwilliam/Wuppertal)**: Clanwilliam Distr., Pakhuis Pass, (–BB/–AA), 30 September 1940, *Compton 9615* (NBG); Clanwilliam Division, Pakhuis, (–BB/–AA), 29 September 1940, *Esterhuysen 3289* (BOL, PRE). **3219 (Wuppertal)**: Clanwilliam District, Nieuwoudt Pass, Cedarbergen, (–AC), 4 September 1938, *Hafstrom & Acocks 1569* (PRE, S (S16-6684))*. **3319 (Worcester)**: Tulbagskloof (Nieuwekloof), [Tulbaghsthal, am Fuss des Winterhoeksberges, am Witsenberg und bei Vogelvalei, 1835 (77:9)], (–AA/AC), ?September, *Ecklon & Zeyher 204?/ s.n*. (PRE, S (S16-6680), STE in NBG).

**Hafstrom & Acocks 1569* (S): there is another *Z. ecklonis* subsp. *ecklonis* specimen in S (S13-33304) with the same collector's number and date but collected at Elandskloof, Cederbergen.

18b. **Zyrphelis ecklonis** subsp. **oligocephala** *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1196 (2011).

Type: South Africa, Western Cape Province, Wuppertal (3219): Clanwilliam Div., Cederberg Mountains, Middelberg, (-CA), 14 December 1941, *Esterhuysen 7250* (BOL, holo.).

Dwarf shrub, suffrutex or perennial herb, up to 510 mm high, but usually much smaller, branched from base or sparsely branched in upper part. *Stems* woody basally, sometimes tinged reddish, older parts glabrous or glabrescent, upwards softly woolly hairy, often also tufts of silky hairs in especially upper leaf axils. *Leaves* alternate, sessile, scattered along stems or more densely set, rarely in tufts, stiff, erect, flat or folded lengthwise, or flat basally, folded lengthwise in upper half, or lower leaves flat, upper leaves folded lengthwise, ± semi-succulent, obovate to narrowly or very narrowly obovate, very narrowly elliptic, narrowly oblong or linear, 5–30 × 0.5–2.5(–3.5) mm, apex sometimes reddish and sometimes recurved, acute, mucronate, sometimes bristle-tipped mucronate, margin entire, leaves totally glabrous or surfaces glabrous but margin of older (lower) leaves shortly ciliate basally or all along, margin of middle and upper leaves ± long ciliate basally, decreasing upwards, upper part of margin without cilia or ciliate all along or upper surface glabrous, lower surface sparsely to more densely softly bristly hairy; rarely some uppermost leaves sometimes stipitate glandular – transition to peduncular bracts. *Capitula* radiate, solitary, or in few (2- or 3-)headed open corymbs, pedunculate; *peduncle* (5–)10–100(–105) mm long, often tinged reddish, basally sparsely bristly hairy, upwards occasional bristle hair or sparsely villose, basally sparsely stipitate glandular, upwards more densely stipitate glandular, glands usually with reddish transverse cell walls, but sometimes glands not so obviously reddish – fading with age; bracteate; *peduncular bracts* (0)1 to 10(13) per peduncle, linear-triangular, narrowly triangular, linear to very narrowly ovate, 1.5–10.0(–12.0) mm long, usually ciliate, not or (sparsely) bristly hairy, stipitate glandular, sometimes with swollen bases. *Involucre* obconical or campanulate, 4–7 mm high, 5–10(–12) mm across upper part. *Involucral bracts* in 3 or 4(5) rows, imbricate, outer shorter than inner, apices usually tinged reddish; *outer row* narrowly triangular, linear-triangular or (very) narrowly ovate, 2.0–4.0(–4.2) × 0.4–1.0 mm, apex acute to acuminate, margin (very) narrowly membranous, sparsely fimbriate-ciliate, with tuft of few hairs at apex, surface stipitate glandular, glands with red transverse walls, fading with age, sometimes with occasional bristle hair, V-shaped thickened, stereome fenestrated; *second row* linear, narrowly oblong, narrowly obovate, very narrowly elliptic, very narrowly ovate or narrowly triangular, (2.4–)3.0–5.0(–6.0) × (0.4–)0.5–1.0(–1.2) mm, apex acute to acuminate, margin (narrowly) membranous, fimbriate-ciliate, tuft of few hairs at apex, surface stipitate glandular, glands with red transverse walls, fading with age, sometimes with occasional bristle hair, slightly keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *third row* narrowly elliptic, narrowly oblong, (very) narrowly obovate or narrowly ovate, (3.4–)3.5–6.0 × 0.5–1.2 mm, apex acute to acuminate, margin (narrowly) membranous, fimbriate-ciliate, with tuft of few hairs at apex, surface stipitate glandular, glands with red transverse walls, fading with age, sometimes with occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *fourth row* narrowly to very narrowly elliptic, narrowly oblong, narrowly obovate or very narrowly ovate, (3.5–)4.0–5.5(–6.0) × 0.5–1.0(–1.2) mm, apex acute to acuminate, margin (narrowly) membranous, fimbriate-ciliate, surface stipitate glandular, glands with red transverse walls, fading with age, sometimes with occasional bristle hair, keeled, Y-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; rarely *fifth row* narrowly obovate, 5.8 × 1 mm, apex acuminate, margin membranous, ciliate in upper part, surface keeled, Y-shaped thickened, stereome

A



Figures 115. Scans of *Zyrphelis ecklonis* subsp. *oligocephala* specimens to show the variation in growth forms: A, *Esterhuysen 7250*, holotype (BOL); B, *Esterhuysen 21136* (BOL); C, *Esterhuysen 22506* (BOL); D, *Esterhuysen 18191* (PRE).

B



Figures 115 (continued). Scans of *Zyrphelis ecklonis* subsp. *oligocephala* specimens to show the variation in growth forms: A, *Esterhuysen 7250*, holotype (BOL); B, *Esterhuysen 21136* (BOL); C, *Esterhuysen 22506* (BOL); D, *Esterhuysen 18191* (PRE).

C



Figures 115 (continued). Scans of *Zyrphelis ecklonis* subsp. *oligocephala* specimens to show the variation in growth forms: A, *Esterhuysen 7250*, holotype (BOL); B, *Esterhuysen 21136* (BOL); C, *Esterhuysen 22506* (BOL); D, *Esterhuysen 18191* (PRE).

D



Figures 115 (continued). Scans of *Zyrphelis ecklonis* subsp. *oligocephala* specimens to show the variation in growth forms: A, *Esterhuysen 7250*, holotype (BOL); B, *Esterhuysen 21136* (BOL); C, *Esterhuysen 22506* (BOL); D, *Esterhuysen 18191* (PRE).

fenestrated, with oil glands along main vein. *Ray florets* female, fertile; corolla yellow, (pale) lemon yellow, pale yellow, cream or white, drying reddish, maroon-red or dark maroon-brown; *tube* (1.0–)1.8–3.0 mm long, glabrous or with (few) glandular hairs in upper part and/or around mouth, sometimes with few glandular hairs along tube; *limb* 2.5–5.5(–7.0) mm long, 3-lobed, rarely with few glandular and non-glandular hairs on lobes. *Style* (1.0–)1.5–3.0 mm long, bifurcate; *style branches* oblong, linear or linear-elliptic, 0.5–1.0(–1.5) mm long, stigmatic areas marginal, confluent at apex. *Ovary* (very) narrowly obovate, narrowly elliptic, oblong, (1.5–)2.0–3.0 mm long, small carpopodium, densely (longish) filiform twin hairy, twin hairs with acute apices, rarely glabrous; in surface view epicarpic cells (when visible) with globose protuberances, smooth or rugose. *Cypsela* (dark) brown, reddish brown or blackish, obovate, ovate or elliptic, 2.0–3.5(–4.0) × 1–2 mm, laterally compressed, margin slightly thickened, carpopodium small, surfaces densely (longish) filiform twin hairy, apices of twin hairs acute; in surface view epicarpic cells colliculate or with globose protuberance centrally or towards pappus side of cells, smooth, faintly granular or rugose. *Pappus bristles* 2–4 mm long, plumose, barbellate or nude basally, persistent. *Disc florets* functionally male; corolla yellow, pale yellow or cream, tubular; *tube* 2.0–3.5 mm long, glabrous or sometimes with glandular hairs in lower part, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, occasionally also non-glandular hair, sometimes with resin ducts along margins, drying/tinged reddish. *Anthers* 1–2 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* (1.0–)1.5–3.0(–3.5) mm long, bifurcate; *style branches* (broadly/narrowly) ovate, linear-triangular or linear, (0.5–)0.8–1.2(–1.5) mm long, with deltoid, papillate apical appendages, without or very rarely with short marginal stigmatic areas basally. *Ovary* linear, linear-elliptic or very narrowly obovate, 1.5–3.0 (–3.5) mm long, margin thickened, carpopodium small, glabrous or sometimes with few filiform twin hairs around base and/or along margins, apices of twin hairs acute; epicarpic cells arranged in ± rows, oblong in surface view, smooth, flat. *Pappus bristles* 2.5–4.0(–4.5) mm long, plumose, barbellate to nude basally, persistent. *Flowering time*: September to April with a peak in October to January. Figures 115 to 118.

In the following specimens [*Esterhuysen 16713* (BOL), *Hugo 2503* (PRE), *Taylor 4546* (PRE, STE in NBG)] some of the uppermost leaves at the base of the peduncle are somewhat stipitate glandular and seems to be transitional to the peduncular bracts. They were kept in subsp. *oligocephala* rather than in subsp. *longipedunculata*.

Diagnostic characters: *Zyrphelis ecklonis* subsp. *oligocephala* is a variable taxon but can be recognised by the glabrous, ciliate or sparsely to more densely softly bristly hairy, not glandular, leaves, often with tufts of long silky hairs in the upper leaf axils, the few-headed open corymbs or solitary capitula, the stipitate glands on the peduncles and involucral bracts usually with reddish transverse walls, fading with age, the yellow to white ray florets fading to red with age, the densely (longish) filiform twin hairy cypselae, the epicarpic cells which are, in surface view, colliculate or with globose protuberances centrally or towards pappus side of cells, smooth, faintly granular or rugose, the style branches of the disc florets usually without, rarely with, stigmatic areas and the persistent, plumose pappus bristles. It was previously confused with *Z. lasiocarpa* and *Z. microcephala*. *Zyrphelis lasiocarpa* has mauve or blue ray florets, the glands and hairs on the involucral bracts are mostly colourless and the inner involucral bracts are usually 3-veined. *Zyrphelis microcephala* has mostly blue, saxe blue or white ray florets, drying dark reddish, the apices of the involucral bracts are often reddish and the inner involucral bracts are usually 3-veined but not always so clear.

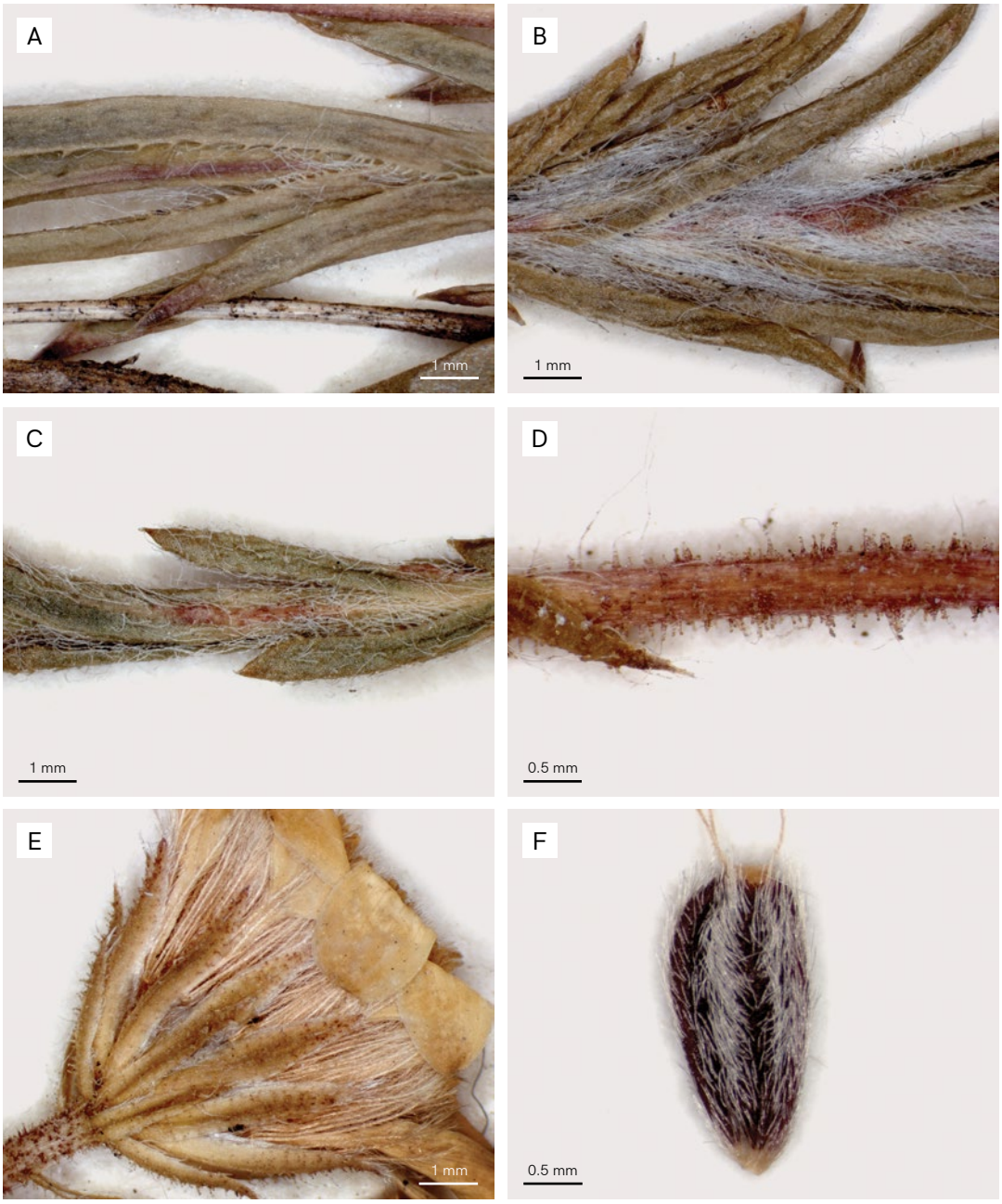


Figure 116. *Zyrphelis ecklonis* subsp. *oligocephala*: A, glabrous but ciliate leaves (*Esterhuysen 8318*, BOL); B, leaves with tufts of silky hairs in axils (*Esterhuysen 22506*, PRE); C, bristly hairy leaves (*Emdon 138*, PRE); D, stipitate glandular and sparsely bristly hairy peduncle (*Esterhuysen 7250*, BOL); E, capitulum with stipitate glandular involucral bracts (*Esterhuysen 7250*, BOL); F, hairy ray cypsela (*Esterhuysen 21136*, (BOL).

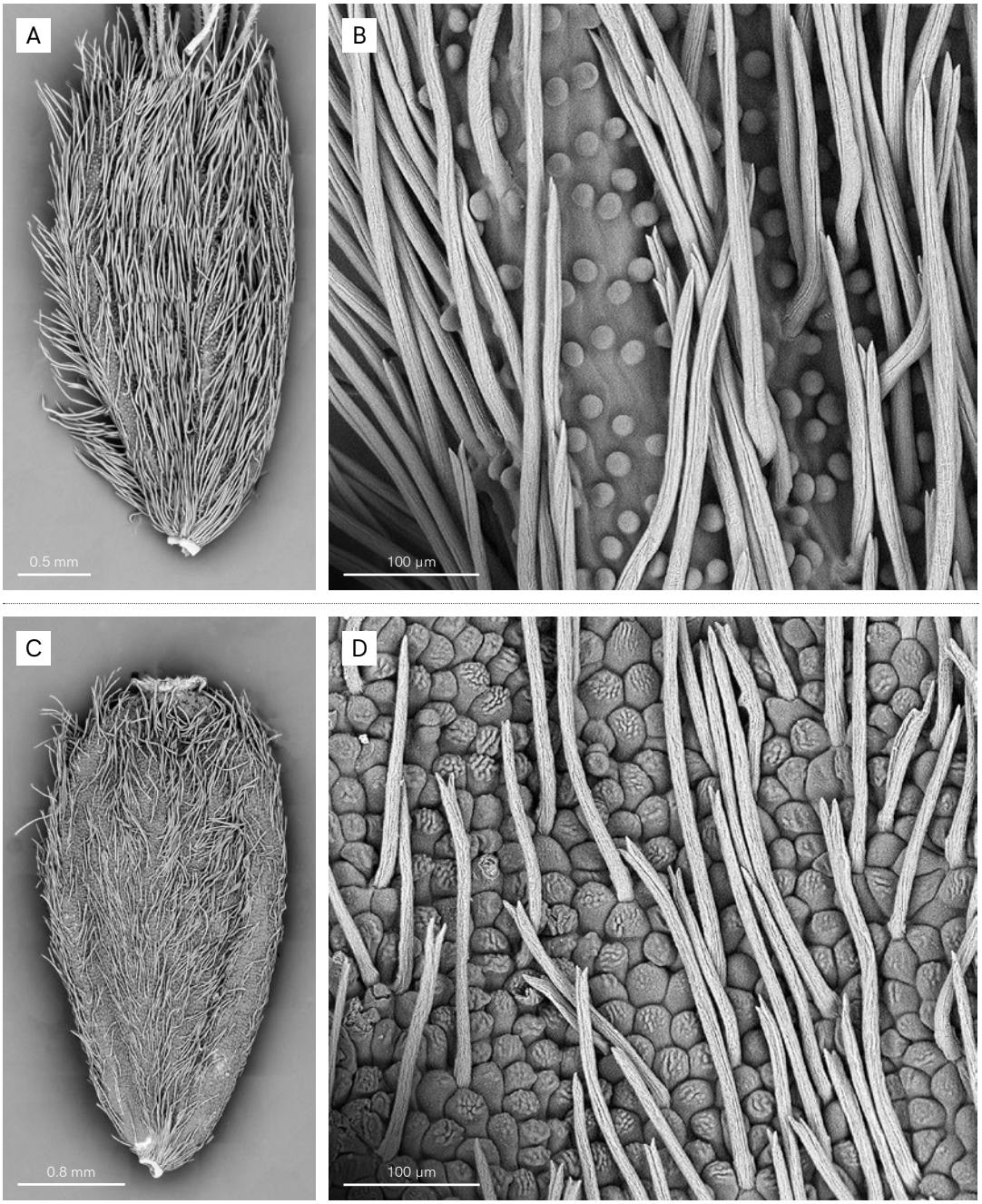


Figure 117. *Zyrphelis ecklonis* subsp. *oligocephala*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs and epicarpic cells with central, smooth protuberances (*Helme 5067*, NBG); C, D, ray cypsela with filiform twin hairs and colliculate epicarpic cells with rugose surfaces (*Esterhuysen 22588*, PRE).

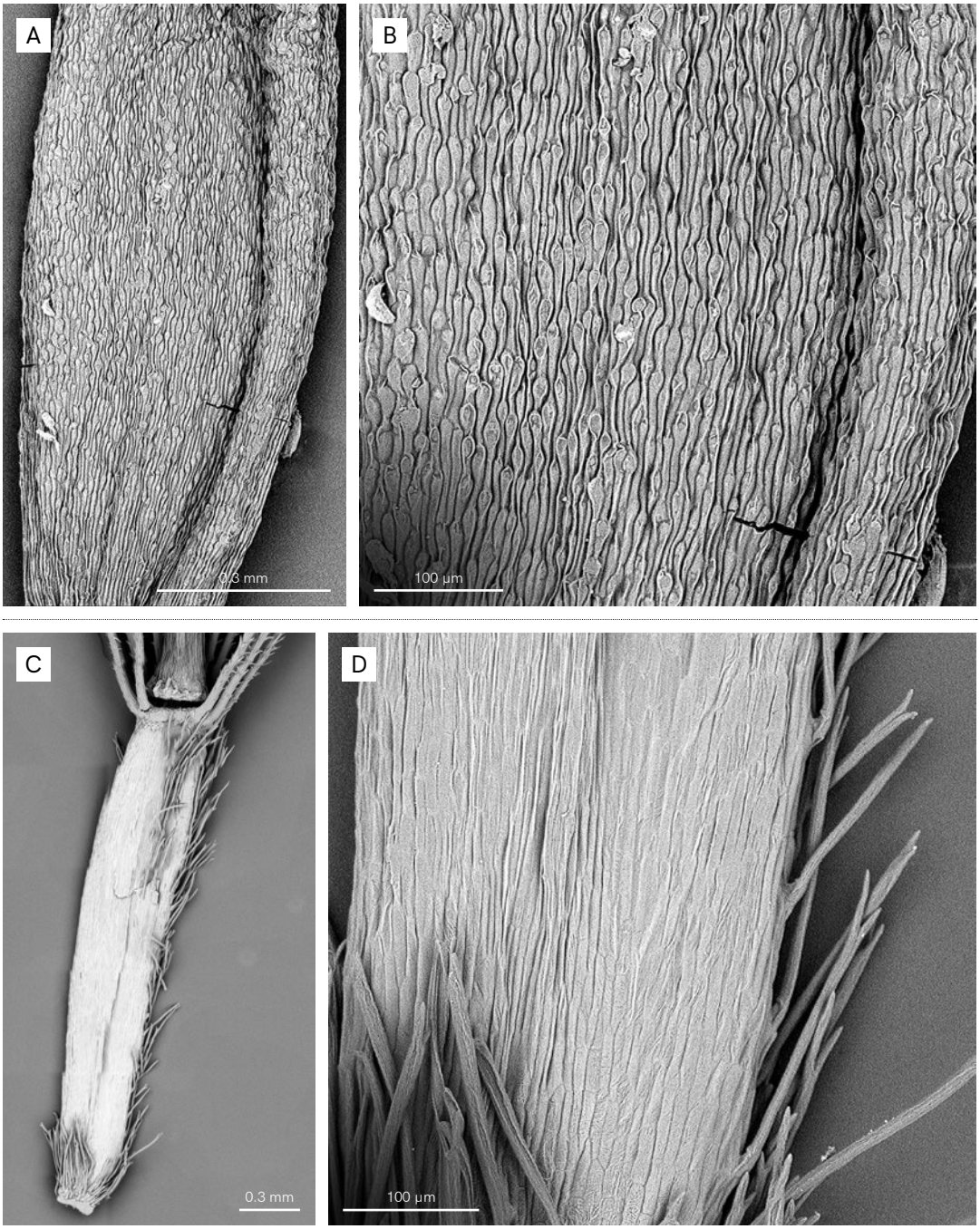


Figure 118. *Zyrphelis ecklonis* subsp. *oligocephala*: scanning electron micrographs of A, B, glabrous ray ovary (*Esterhuysen 21304*, BOL); C, D, sterile disc ovary with twin hairs along margin and around base (*Van Zyl 3528*, PRE).

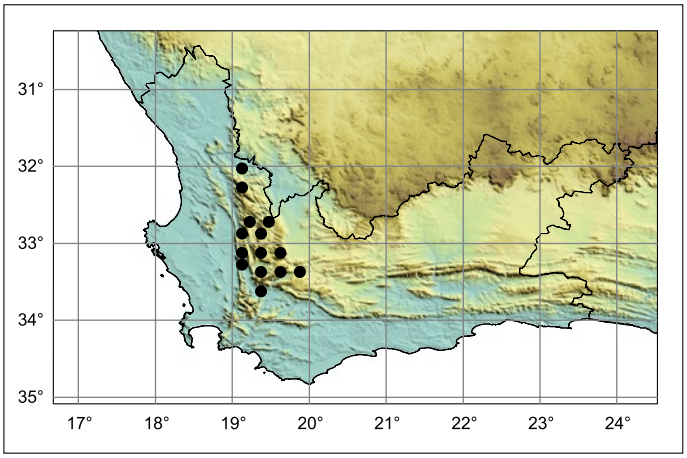


Figure 119. Distribution of *Zyrphelis ecklonis* subsp. *oligocephala*.

Distribution: This taxon was originally thought to have a restricted distribution in the Cederberg (Zinnecker-Wiegand 1990; Von Staden 2012), but with this revised circumscription it has a much wider distribution. It occurs from the Cederberg and Koue Bokkeveld Mountains in the north southwards along the Witzenberg and Skurweberg to the Waaihoek- and Hexrivierberge in the south (Figure 119).

Conservation status: According to Von Staden (2012) the Red List status of this taxon as circumscribed by Zinnecker-Wiegand (1990) is Least Concern as it grows in montane areas where it is not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3219 (Wuppertal)**: Heuningvlei Forest Station, on road to Groenberg, (-AA), 26 October 1977, *Emdon 138* (PRE, STE in NBG); Clanwilliam Div., Heuningvlei, N Cederberg, sandy slopes, (-AA), 16 January 1953, *Esterhuysen 21136* (BOL); Clanwilliam, Pakhuis Pass, amongst rocks on summit of main range, (-AA), 3 November 1930, *Galpin 11218* (PRE); Clanwilliam Division, between Groot Rivier & Eland's Kloof, (-CB), October 1939, *Leipoldt 3322* (BOL); Skoongesig, Ceres (Koue Bokkeveld), (-CC), 1 October 1969, *Hanekom 1276* (PRE); Clanwilliam Division, middle east slopes of Grasruggens Mountain, (-CC), 26 November 1938, *Pillans 8796* (BOL); Porterville, close to Ratelriver, Grootfontein, slightly sloping sandy valley floor, (-CC), 17 September 1983, *Van Zyl 3528* (PRE); Ceres District, De Keur, (-CD), 11 November 1946, *Compton 18790* (BOL); Koue Bokkeveld Tafelberg, moderate S slopes, 1350–1500 m, (-CD), 26 November 2010, *Helme 6645* (NBG). **3319 (Worcester)**: Ceres Division, stony east slopes of Witzenberg Range, near North Peak, (-AA), 11 January 1960, *Esterhuysen 28394* (BOL, PRE); Ceres Division, near road between Rosendalfontein and Visgat, (-AA), 25 November 1941, *Pillans 9646* (BOL, NBG, PRE); Ceres Division, Visgat, dry, hot, stony TMS plateaus and koppies along the Olifantsrivier, ± 15 mls [± 24 km] N of Die Vlakte at the foot of Skurfteberg Pass beyond Gydo Pass, ± 2000 ft [610 m], (-AA), 30 December 1962, *Taylor 4546* (PRE, STE in NBG); Gydoberg, road to Driefontein on Driefontein 327, gentle E slope, 1050 m, (-AB), 1 December 2007, *Helme 5067* (NBG); Rocklands farm, ± 30 km N of Ceres, rocky outcrop, steep slope, 1200 m, (-AB), 10 March 1981, *Hugo 2503* (PRE); Koude Bokkeveld, Skurfde Bergen, pone Klyn Vley, 5000 ft [Koue Bokkeveld, Skurfteberg, behind Klein Vlei, 1524 m], (-AB), 30 January 1897, *Schlechter 10209* (PRE 2×, S); Ceres Division, Neethlingsberg, Witzenberg, summit slopes, 5000 ft [1524 m], (-AC), 2 January 1954, *Esterhuysen 22506* (BOL, PRE); Worcester Division, Waaihoek Mountains, Mosterts Hoek Twins, 5000 ft [1524 m], (-AD), 8 January 1944, *Esterhuysen 9850* (BOL); Ceres Division, W slopes of Michell's Peak, Waaihoek Mountains, 5000 ft [1524 m], (-AD), 10 December 1948,

Esterhuysen 14749 (PRE); Worcester Division, Waaihoek Peak, on slopes, 5500 ft [1676 m], (-AD), 24 December 1950, *Esterhuysen 18191* (BOL, PRE); Worcester Division, Waaihoek Peak, lower SW slopes, (-AD), 4 November 1953, *Esterhuysen 22231* (PRE); Worcester Division, Waaihoek Peak, slopes, 4000-6000 ft [1219-1829 m], (-AD), 12 January 1954, *Esterhuysen 22588* (sheet II, BOL155174) (BOL, PRE); Worcester Division, Waaihoek Peak, stony shale band slopes, after fire of Jan. 1959, 5500 ft [1676 m], (-AD), 22 January 1961, *Esterhuysen 28750* (S); Ceres Division, Koekoedouw Kloof, banks near stream, (-AD), 3 January 1954, *Esterhuysen 22547* (BOL, PRE); Worcester Division, E slopes of Mosterts Hoek Twins, 5000-5500 ft [1524-1676 m], (-AD), 26 February 1961, *Esterhuysen 28911* (BOL, PRE); Ceres, slopes, 2500 ft [762 m], (-AD), 2 October 1933, *Levyns 4665* (BOL); Ceres District, Baviaansberg, 5500 ft [1676 m], (-BA), 2 January 1942, *Compton 12840* (NBG); Ceres Division, Baviaansberg, Cold Bokkeveld, E slopes, in bush, 5000 ft [1524 m], (-BA), 4 November 1962, *Esterhuysen 29860* (BOL); Worcester Division, shale band on W side of Matroosberg, 5000 ft [1524 m], (-BC), 2 December 1947, *Esterhuysen 14205* (BOL); Worcester District, Bonteberg, (-BD), 3 November 1940, *Compton 9990* (BOL, NBG); Worcester Division, Bonteberg, Eikenbosch Hoek, S slopes, rocky crevices, 3500 ft [1067 m], (-BD), 3 November 1940, *Esterhuysen 3649* (BOL, PRE); Worcester Division, Mountain slopes east of Fonteintjiesberg, 3000-4000 ft [914-1219 m], (-CB), 2 January 1950, *Esterhuysen 16713* (BOL); Worcester Division, Waaihoek Mountain, 5000 ft [1524 m], (-CB), 16 December 1942, *Esterhuysen 8318* (BOL).

Without precise locality: Witzenberg, (3319AA/AC/AD), no date, *Zeyher s.n.* (S07-14761) (S).

18c. **Zyrphelis ecklonis** subsp. **strictifolia** *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1196 (2011).

Type: South Africa, Western Cape, Wuppertal (3219): Rocky hill behind the homestead of Krommerivier [Krom River], in the Cederberge, (-CB), 27 September 1934, *Acocks 3136* (S, holo.).

Dwarf shrub, up to 300 mm high. *Stems* woody basally, usually glabrous, rarely bristly hairy. *Leaves* alternate, sessile, scattered along stems or more densely set, sometimes tufted, erect, flat or slightly folded lengthwise, semi-succulent, (narrowly) obovate, (narrowly) elliptic, oblong, linear, (4-)5-10(-18) × 1.5-2.0 mm, apex acute, mucronate to bristle-tipped mucronate, margin entire, ciliate or not, surface totally glabrous or sometimes with few bristle hairs on lower surface, often with few stipitate glandular hairs abaxially on upper part and margins of upper leaves, in some specimens leaves more bristly hairy. *Capitula* radiate, solitary, pedunculate; *peduncle* (15-)20-40(-45) mm long, sometimes tinged reddish, stipitate glandular, glands usually with red transverse walls, sparsely bristly hairy, in some specimens finely stipitate glandular with transverse walls not so obviously red and more bristly hairy, bracteate; *peduncular bracts* 2 to 5 per peduncle, linear, linear-triangular to very narrowly ovate, (2-)3-5 mm long, often with swollen bases, stipitate glandular, usually ciliate. *Involucre* obconical, 5-7 mm high, 7-10(-11) mm across upper part. *Involucral bracts* in (3)4 rows, imbricate, outer shorter than inner, stipitate glandular hairs usually with reddish transverse cell walls; *outer row* narrowly triangular or narrowly to very narrowly ovate, 3.5(-3.8) × 0.5-0.6(-1.0) mm, apex acute to acuminate, with tuft of hairs at apex, margin membranous, fimbriate, surface stipitate glandular, V- or Y-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *second row* (narrowly) oblong, narrowly elliptic, very narrowly ovate or narrowly triangular, 4-5 × (0.5-)1.0 mm, apex acute to acuminate, with tuft of hairs at apex, margin narrowly membranous, fimbriate, surface stipitate glandular, occasional bristle hair, sometimes keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes with oil glands along main vein; *third row* very narrowly ovate, narrowly elliptic or very narrowly obovate, 4.5-6.2



Figure 120. Scan of the holotype of *Zyrphelis ecklonis* subsp. *strictifolia* (*Acocks 3136*, S).

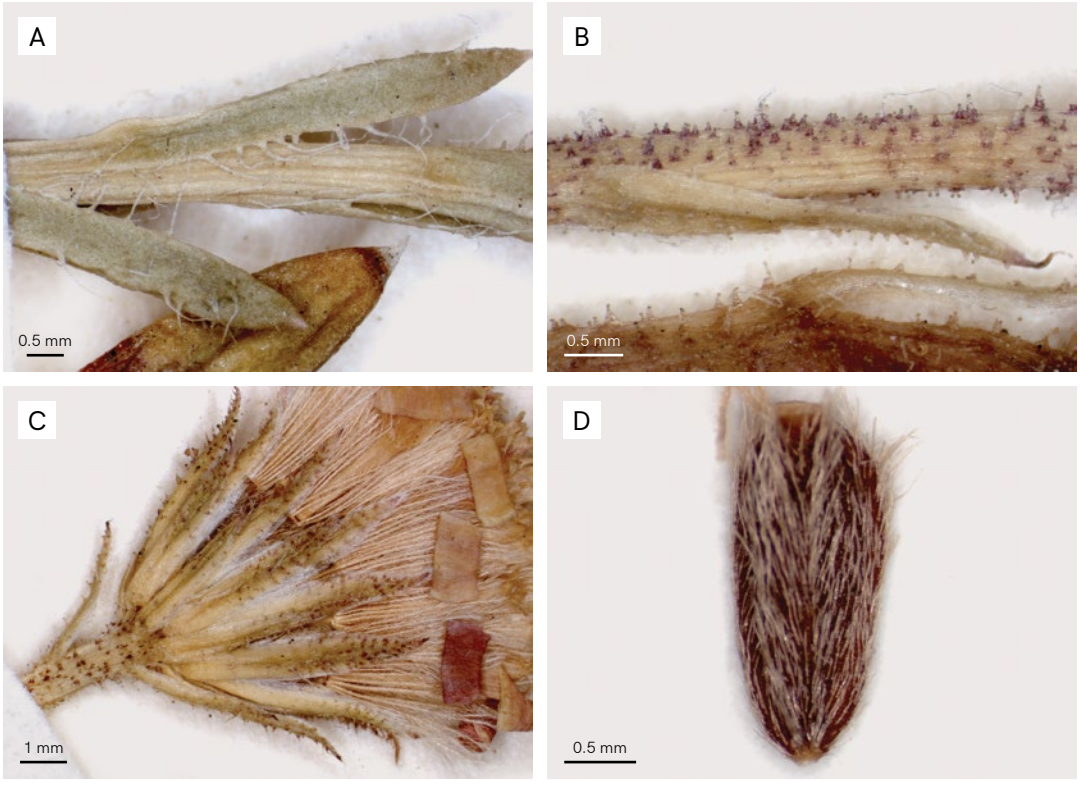


Figure 121. *Zyrphelis ecklonis* subsp. *strictifolia*: A, sparsely bristly hairy and ciliate leaves; B, stipitate glandular hairy and sparsely bristly hairy peduncle, hairs with reddish transverse walls; C, capitulum, involucral bracts sparsely bristly hairy and stipitate glandular, hairs with reddish transverse walls; D, hairy ray cypsela (all *Acocks 3136*, S).

× (0.6–)1.0(–1.2) mm, apex acute to acuminate, margin membranous, fimbriate, ciliate in upper part and around apex, surface stipitate glandular, occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated; *fourth row* narrowly obovate, narrowly to very narrowly elliptic, (5.2–)5.5(–6.2) × 1 mm, apex acute to acuminate, margin membranous, fimbriate, ciliate in upper part, surface stipitate glandular in upper part, occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated. *Ray florets* female, fertile; corolla yellow becoming purplish or reddish; *tube* (2.5–)3.5 mm long, with glandular hairs in upper part, sometimes also some twin hairs along tube; *limb* (5–)6 mm long, 3- or 4-lobed. *Style* 2–4 mm long, bifurcate; *style branches* linear, 1.0(–1.5) mm long, stigmatic areas marginal, confluent at apex. *Ovary* (narrowly) obovate, 2–3 mm long, densely filiform twin hairy. *Cypsela* brown, obovate, 2.5–3.2 × 1.4–1.5 mm, laterally compressed, margin thickened, with carpopodium; surface filiform twin hairy, apices of twin hairs acute; epicarpic cells colliculate in surface view or elongated and one end with globose protuberance, ± smooth or faintly granular. *Pappus bristles* (3.8–)4.0(–5.0) mm long, plumose, barbellate basally, persistent. *Disc florets* functionally male, corolla yellow, tubular; *tube* 3–4 mm long, sometimes with few glandular hairs in ring in lower part, 5-lobed; *lobes* (0.6–)1.0 mm long, with sub-apical glandular hairs. *Anthers* 2 mm long, with ovate apical appendages,

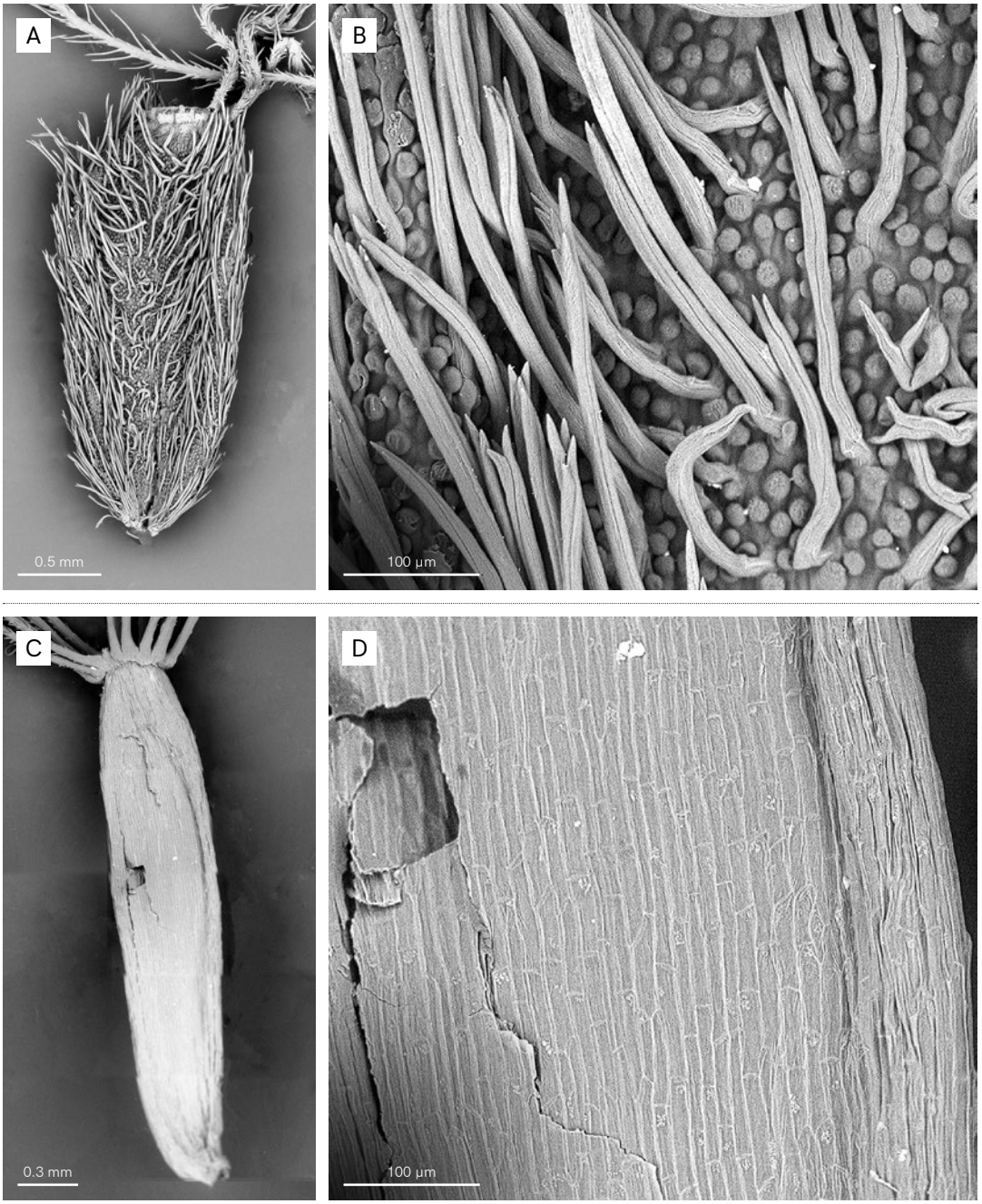


Figure 122. *Zyrphelis ecklonis* subsp. *strictifolia*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs and colliculate epicarpic cells, smooth or faintly granular (*Acocks 3136*, S); C, D, glabrous sterile disc ovary (*Esterhuysen 20536*, PRE).

minutely caudate, filament collars thickened. *Style* 1.5–3.5 mm long, bifurcate; *style branches* linear to (very narrowly) ovate, (0.5–)1.0(–1.2) mm long, with deltoid papillate apical appendages, without stigmatic areas. *Ovary* linear to linear-elliptic, (2.2–)2.5–3.0(–3.5) mm long, with carpopodium, glabrous or sometimes sparsely to densely filiform twin hairy along (one) margin(-s) and/or around base; epicarpic cells oblong in surface view, smooth, flat. *Pappus bristles* 4(–5) mm long, plumose, barbellate to nude basally, persistent. *Flowering time*: September to October. Figures 120 to 122.

Diagnostic characters: In general the subsp. *strictifolia* can be distinguished from subsp. *ecklonis* by the smaller, semi-succulent, glabrous or sparsely stipitate glandular, often ciliate, leaves. Some subsp. *strictifolia*-specimens display characters of subsp. *ecklonis* and/or subsp. *oligocephala* e.g., in some specimens on the same sheet the stems and branches have bristle hairs but not as dense as in subsp. *ecklonis*. Also, the stipitate glandular hairs on the peduncles and involucral bracts do not always have the very distinct reddish transverse cell walls, but are rather of a finer stature like in subsp. *ecklonis* e.g. *Stokoe 7595* (BOL): this specimen displays characters of both subsp. *strictifolia* and subsp. *ecklonis*. In stature it looks very similar to subsp. *strictifolia*: it has the small, narrowly ovate to narrowly oblong, semi-succulent leaves, in which the leaves are almost glabrous or with a few bristle hairs along the main vein on the lower surface like in subsp. *strictifolia*, but the lower surfaces are more stipitate glandular than in subsp. *strictifolia* and tends towards subsp. *ecklonis*. The stipitate glandular hairs on the peduncle and on the involucral bracts do not have the characteristic reddish transverse walls as in subsp. *strictifolia* but look rather more like those in subsp. *ecklonis*.

Distribution: Distributed in the Cederberg (Figure 114).

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Rare, as it is localised but not threatened.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3219 (Wuppertal)**: Clanwilliam Distr., Kromrivier, Cederberg, 2500 ft [762 m], (–CA/CB), 27 September 1934, *Compton 5129* (NBG); Clanwilliam Div., Krom River, southern Cederberg, sandy rocky slopes in kloof, (–CA), 2 October 1952, *Esterhuysen 20536* (BOL, PRE); Cederberg, Kromrivierkloof above The Oak, dry N-aspect, stony-bouldery slope, (–CA), 940 m, 14 September 1983, *Taylor 10641* (PRE).

18d. **Zyrphelis ecklonis** subsp. **longipedunculata** *P.P.J.Herman, subsp. nov.*

Type: South Africa, Western Cape, Worcester (3319): Ceres Division, steep rocky slopes below nek at head of 24 Rivers Kloof (between Great Winterhoek and Witzenberg Peaks), 4800 ft [1463 m], (–AA), 16 December 1962, *Esterhuysen 29945* (BOL, holo.).

Sparsely branched dwarf shrub or suffrutex, up to 300 mm high. *Stems* woody basally, villose or glabrous but with tufts of hairs in upper leaf axils. *Leaves* alternate, sessile, densely set, erect, rarely some recurved, flat or (some) folded lengthwise, semi-succulent, linear or very narrowly obovate, (8–)10–23(–30) × (1.0–)1.5–2.5(–3.0) mm, apex acute, mucronate or bristle-tipped mucronate, margins of lower leaves with few, short cilia basally or eciliate, margins of upper leaves long ciliate basally, surfaces



Figure 123. Scan of the holotype of *Zyrphelis ecklonis* subsp. *longipedunculata* (*Esterhuysen 29945*, BOL).

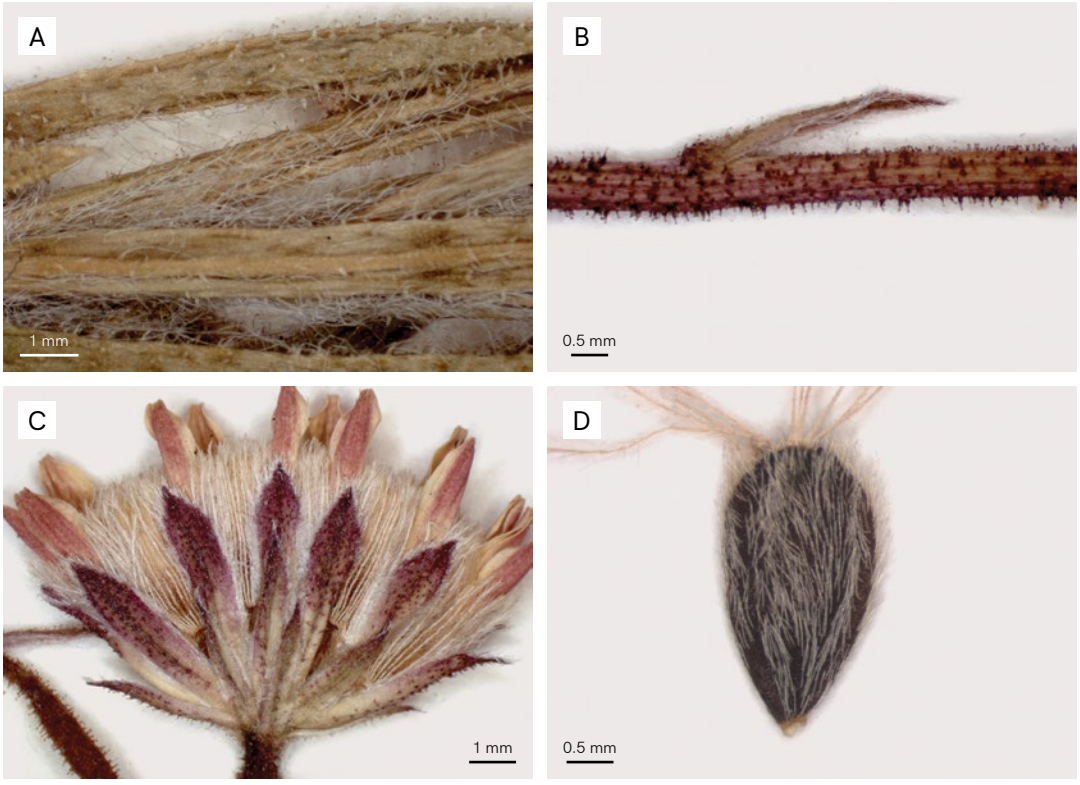


Figure 124. *Zyrphelis ecklonis* subsp. *longipedunculata*: A, densely stipitate glandular and bristly hairy, ciliate, upper leaves; B, stipitate glandular and sparsely bristly hairy peduncle, hairs with reddish transverse walls; C, capitulum showing involucral bracts with reddish stipitate glandular hairs; D, hairy ray cypsela (all *Esterhuysen 29945*, BOL).

of lower leaves sparsely glandular or eglandular, of upper leaves densely stipitate glandular, few villose hairs. *Capitula* solitary, radiate, pedunculate; *peduncle* (45–)60–85(–125) mm long, sometimes tinged reddish, stipitate glandular, glands with reddish transverse walls, with occasional bristle hair, bracteate; *peduncular bracts* (1)2 to 5(6), narrowly ovate, linear-triangular, linear, 3–6(–10) mm long, bases often swollen, ciliate, stipitate glandular, sometimes with few bristle hairs. *Involucre* cup-shaped, campanulate, (broadly) obconical, 5.5–6.5 mm high, (8–)10–11 mm broad across upper part. *Involucral bracts* arranged in 3 or 4 rows, imbricate, outer shorter than inner, surfaces stipitate glandular, glands with reddish transverse walls, fading with age; *outer row* linear, linear-oblong, linear-triangular, very narrowly ovate, 3.5–4.2 × 0.5 mm, apex acute to acuminate, often tinged reddish, margin narrowly membranous, sparsely fimbriate-ciliate, surface stipitate glandular, V-shaped thickened, stereome fenestrated; *second row* narrowly triangular, very narrowly ovate, linear-obovate or linear, 4.5–5.4 × (0.5–)0.6 mm, apex acute to acuminate, margin narrowly membranous, fimbriate, ciliate in upper part, surface stipitate glandular, Y-shaped thickened, stereome fenestrated; *third row* narrowly oblong, (very) narrowly obovate, 6 × 1 mm, apex acute, often tinged reddish, margin narrowly membranous,

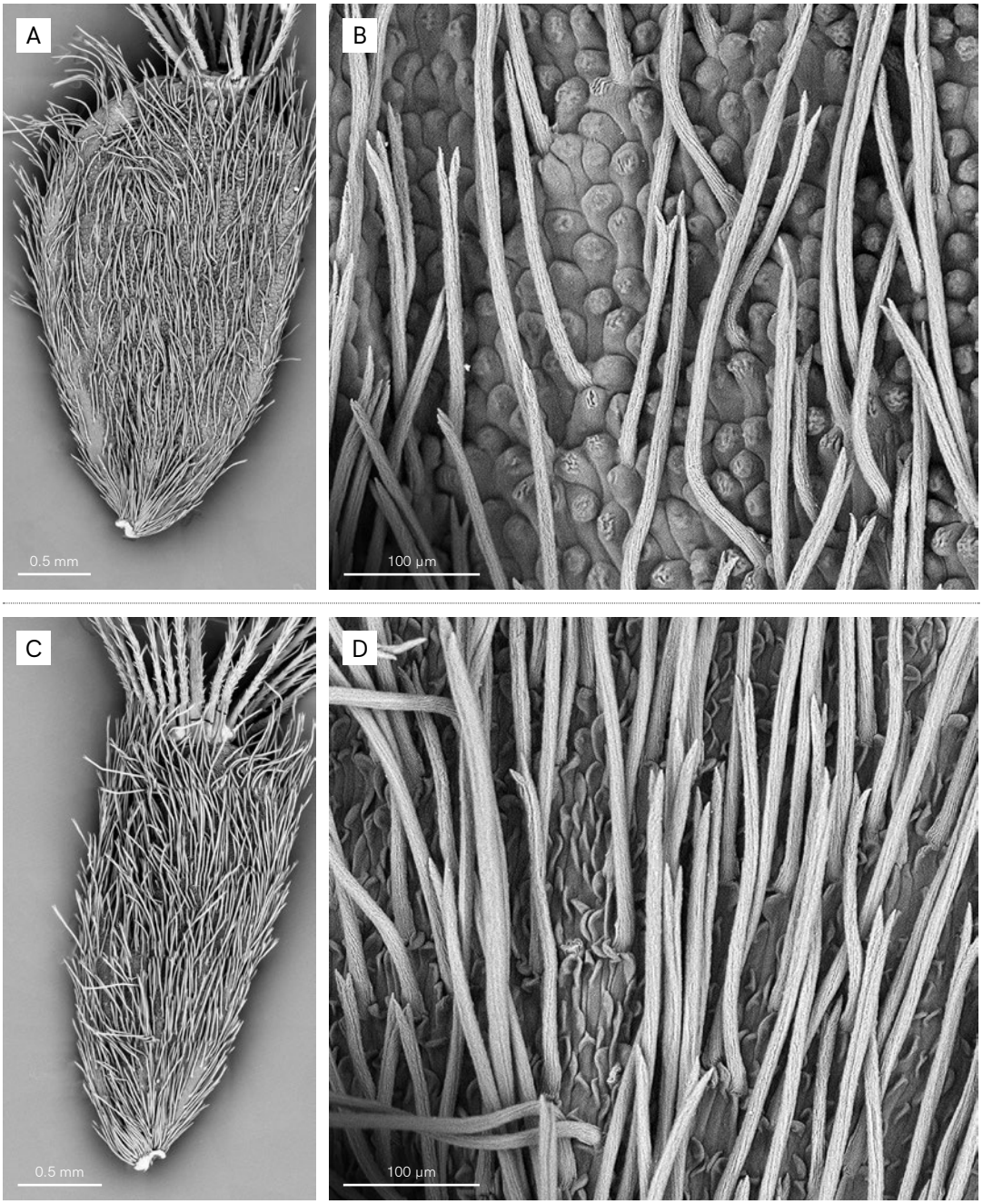


Figure 125. *Zyrphelis ecklonis* subsp. *longipedunculata*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs and colliculate epicarpic cells, slightly rugose; C, D, outer disc pseudo-cypsela with filiform twin hairs, epicarpic cells in rows, ± colliculate in surface view, but 'collapsed', smooth (all *Esterhuysen 27024*, BOL).

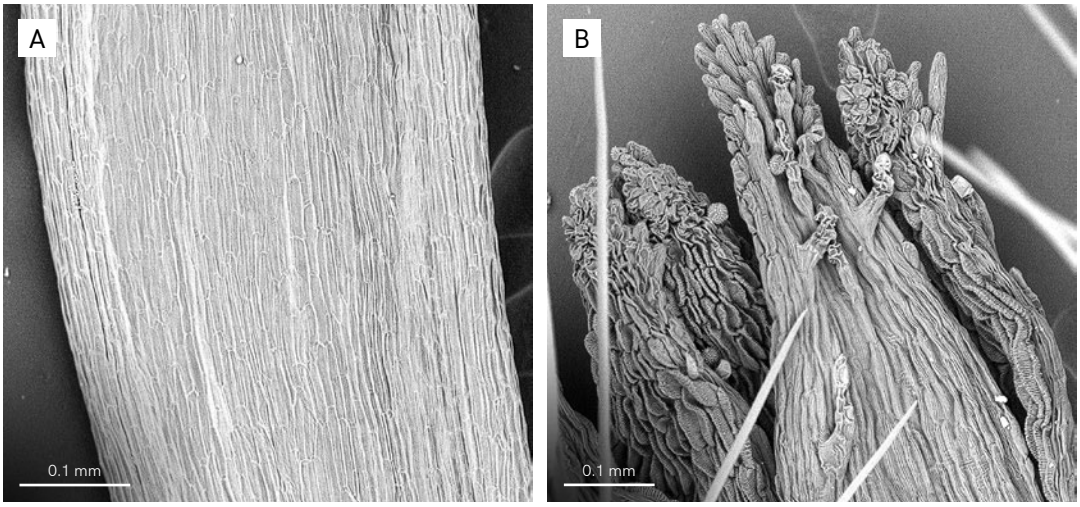


Figure 126. *Zyrphelis ecklonis* subsp. *longipedunculata*: scanning electron micrographs of A, glabrous, sterile disc ovary; B, sub-apical glandular hairs on disc lobes (all *Esterhuysen 29945*, BOL).

fimbriate, ciliate in upper part and around apex, surface stipitate glandular, keeled, Y-shaped thickened, stereome fenestrated; *fourth row* narrowly to very narrowly obovate, 6 × 0.6–1.0 mm, apex acute, often tinged reddish, margin narrowly membranous, ciliate, surface (sparsely) stipitate glandular in upper part, keeled, Y-shaped thickened, stereome fenestrated. *Ray florets* female, fertile, corolla pale yellow, pale lemon yellow, cream; *tube* 2.5(–3.0) mm long, with few glandular hairs around mouth; *limb* (4–)6 mm long. *Style* (2.0–)2.5 mm long, bifurcate, *style branches* narrowly ovate, linear, 1.2 mm long, stigmatic areas marginal, confluent at apex. *Ray ovary* narrowly obconic, elliptic, narrowly obovate, 1.5–3.0 mm long, densely filiform twin hairy. *Cypsela* reddish brown, blackish, obovate, 3 × 1.6–2.0 mm, laterally compressed, margin slightly thickened, carpopodium small, surface long and densely filiform twin hairy, apices acute; epicarpic cells colliculate in surface view, smooth or sparsely rugose. *Pappus bristles* 3.0–4.5 mm long, plumose, barbellate basally, persistent. *Disc florets* functionally male, corolla cream, deep yellow, tubular, *tube* (2.8–)3.0 mm long, with glandular hairs ± in middle or lower part of tube, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs, drying pinkish. *Anthers* 1.5(–2.0) mm long, with ovate apical appendages, bases minutely caudate, filament collars thickened. *Style* 2(–3) mm long, bifurcate, *style branches* (narrowly) ovate, linear-triangular, 1.0(–1.2) mm long, with deltoid papillate apical appendages, without stigmatic areas. *Ovary* linear, very narrowly obovate, 2.5(–2.8) mm long, carpopodium small, glabrous; epicarpic cells oblong in surface view, smooth, flat. Rarely some outer disc florets produce pseudo-cypselae: ± narrowly obovate, carpopodium small, filiform twin hairy, apices of twin hairs acute; epicarpic cells in rows, ± colliculate in surface view, but 'collapsed', smooth. *Pappus bristles* 3.5(–5.0) mm long, plumose, barbellate or nude basally, persistent. *Flowering time* December and January. Figures 123 to 126.

Diagnostic characters: *Zyrphelis ecklonis* subsp. *longipedunculata* can be distinguished from the other varieties by the densely stipitate glandular upper leaves with few villose hairs and the long peduncles.

Distribution: Only three specimens seen. Seemingly restricted to the Groot Winterhoek Mountain (Figure 114).

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Tulbagh Division, Great Winterhoek, stony burnt slopes, 5000 ft [1524 m], (–AA), 27 January 1957, *Esterhuysen 27024* (BOL); Groot Winterhoek, big NW gulley 1.5 km NW of peak, 1835 m, (–AA), 9 December 2007, *Helme 5107* (NBG).

19. *Zyrphelis foliosa* *(Harv.) Kuntze*, *Revisio generum plantarum*: 374 (1891); Nesom: 92 (1994); Goldblatt & Manning: 373 (2000); Manning & Goldblatt: 431 (2012).

(Figures 127–132)

Mairia foliosa Harv. in Harv. & Sond.: 66 (1865); Bond & Goldblatt: 180 (1984).

Type: [South Africa, Western Cape, Simonstown (3418):] Stellenbosch, Berge bei Grietjesgat, zwischen Lowryspas und Palmietrivier, 2000–4000 ft. [Mountains at Grietjesgat, between Lowry's Pass and Palmiet River, [Hottentotten Hollandsberg], 610–1219 m], (–BB), December ± 1830, *Zeyher 2752* (S lecto., designated here; PRE 2×, SAM, isolecto.). (Info for Zeyher's localities: Drège 1847a & b; Glen & Germishuizen 2010).

Taxonomic notes:

1. Harvey quoted two specimens in FC 3: 66 (1865): *Ecklon & Zeyher s.n.* collected at Seekuvallei [Seekoeivlei] and *Zeyher 2752*. Therefore, it is necessary to designate a lectotype.
2. The PRE specimen with barcode PRE0162881-0 is a mixed collection. The lower two specimens are *Z. foliosa* proper, but the upper fragment is probably *Felicia muricata*.

Erect, semi shrub, perennial herb or suffrutex, branched from the base. *Stem* usually woody at base, often flushed reddish, glabrous or sparsely to densely bristly hairy, densely leafy, up to base of capitula; often with tufts of hairs in axils but not always visible. *Leaves* alternate, sessile, densely set to more scattered along stems, erect, margins entire, surfaces totally glabrous, with occasional long bristle hair along margin and/or along main vein on lower surface or sparsely to densely longish, rarely short, bristly hairy. *Capitula* small, mostly solitary, rarely 2 or 3 together, at tips of branches, almost sessile to shortly pedunculate; *peduncle* stipitate glandular, glands often with dark heads, (sparsely) bristly hairy or glabrous, bracteate. *Involucre* obconical, campanulate or cup-shaped; *involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices often tinged reddish. *Ray florets* female, fertile; *tube* glabrous or with few glandular hairs on upper part; *limb* sometimes with glandular hairs at base, 3- or 4-lobed/-dentate. *Style* bifurcate; *style branches* with marginal stigmatic areas, confluent at apex. *Ovary* densely filiform twin hairy, rarely glabrous but with few twin hairs around base. *Cypselae* dark brown to blackish, laterally compressed, with thickened margin, carpopodium small, surfaces densely filiform twin hairy, rarely glabrous but with few twin hairs around base; apices of twin hairs acute, equal to slightly unequal. *Pappus bristles* persistent, plumose, barbellate to nude basally. *Disc florets* functionally male; *lobes* with sub-apical glandular hairs, occasionally also 1 or 2 non-glandular hairs on a lobe, with resin ducts along margins. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* without stigmatic areas, with deltoid papillate apical appendages. *Ovary* sterile, glabrous but sometimes few twin hairs around base, with distinct carpopodium; epicarpic cells ± oblong in surface view, ± smooth. *Pappus bristles* persistent, plumose, barbellate to nude basally, fewer than in ray florets. *Flowering time*: September to February and April.

Similar to *Z. capensis* and *Z. microcephala* subsp. *foliosa*. See Table 4 (pg. 114) for comparison.

The indumentum on the stems and leaves is very variable – glabrous to sparsely or densely bristly hairy. Harvey (1865) described the leaves as 'ciliate and pilose'. There are some specimens that are almost totally glabrous. Based on the differences in the indumentum of the leaves and stems, two varieties are recognised.

Key to varieties

1a. Leaves and stems sparsely to densely bristly hairy . . . . . 19a. var. *foliosa*
1b. Leaves and stems glabrous, rarely with occasional bristle hair on leaf margin or on main vein on lower surface . . . . . 19b. var. *glabra*

The two varieties occur in the same distribution area and even close to each other. On five sheets [*Levyns 3849* (BOL), *Orchard 375* (PRE) and *Williams 3863* (PRE)] a mixed collection of var. *foliosa* and var. *glabra* were found. The *Nordenstam & Lundgren 2201* specimens in NBG and S (S16-6666) are var. *glabra* but the specimen S16-6658 (S) is var. *foliosa* and also a mixed collection of var. *glabra* and var. *foliosa* on *Wall s.n*. (S16-6661) (S).

19a. **Zyrphelis foliosa** var. **foliosa**

Erect perennial herb or suffrutex, up to 300 mm high. *Stems* sparsely to densely bristly hairy. *Leaves* flat or slightly folded lengthwise, linear, very narrowly obovate, (4–)5–30(–35) × 0.5–2.0 mm, apex obtuse, acute, mucronate, surfaces sparsely to densely bristly hairy. *Capitula* small, solitary, almost sessile or shortly pedunculate; *peduncle* 4–20 mm long, stipitate glandular, (sparsely) bristly hairy, rarely without bristle hairs, bracteate; *peduncular bracts* 0 to 5(or 6) per peduncle, linear, linear-triangular, very narrowly ovate, 1.5–4.0(–4.5) mm long, stipitate glandular, (sparsely) bristly hairy, sometimes with oil glands along main vein, bases sometimes swollen. *Involucre* obconical, campanulate or cup-shaped, 3.5–6.0(–7.0) mm high, 4–9 mm across upper part; *involucral bracts* in (mostly) 3 or 4 rows; *outer row* narrowly ovate, narrowly triangular or oblong, (2.0–)2.5–3.5(–4.0) × 0.5–1.0 mm, apex acute to acuminate, with tuft of hairs at apex, margin often membranous, fimbriate, surface stipitate glandular, (sparsely) bristly hairy or not, usually V-shaped thickened from base, stereome fenestrated, sometimes 3-veined, sometimes with oil glands along vein(-s); *second row* narrowly oblong, very narrowly obovate, very narrowly ovate, (narrowly) elliptic, (2.8–)3.2–5.0(–5.5) × (0.5–)0.8–1.2 mm, apex acute, margin narrowly membranous, ciliate in upper part, surface stipitate glandular, (sparsely) bristly hairy or not, keeled, V- or Y-shaped thickened, stereome fenestrated, usually 3-veined, with oil glands along vein(-s); *third row* narrowly obovate or narrowly oblong, 3.5–5.2(–5.4) × (0.6–)1.0–1.2(–1.5) mm, apex acute to acuminate, margin membranous, ciliate, surface stipitate glandular, sparsely bristly hairy or not, keeled, V- or Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins; *fourth row* narrowly obovate, narrowly elliptic or linear-ovate, (3.8–)4.0(–4.5) × (0.5–)1.0(–1.6) mm, apex acute, margin narrowly membranous, ciliate in upper part, surface stipitate glandular, with occasional bristle hair or not, keeled, Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins. Corolla of *ray florets* white, white with purple tinge, white and reddish below, pink, mauve, pale mauve, purple, pale purple, drying pinkish purple, purple-blue; *tube* 1.2–2.0 mm long, with few glandular hairs

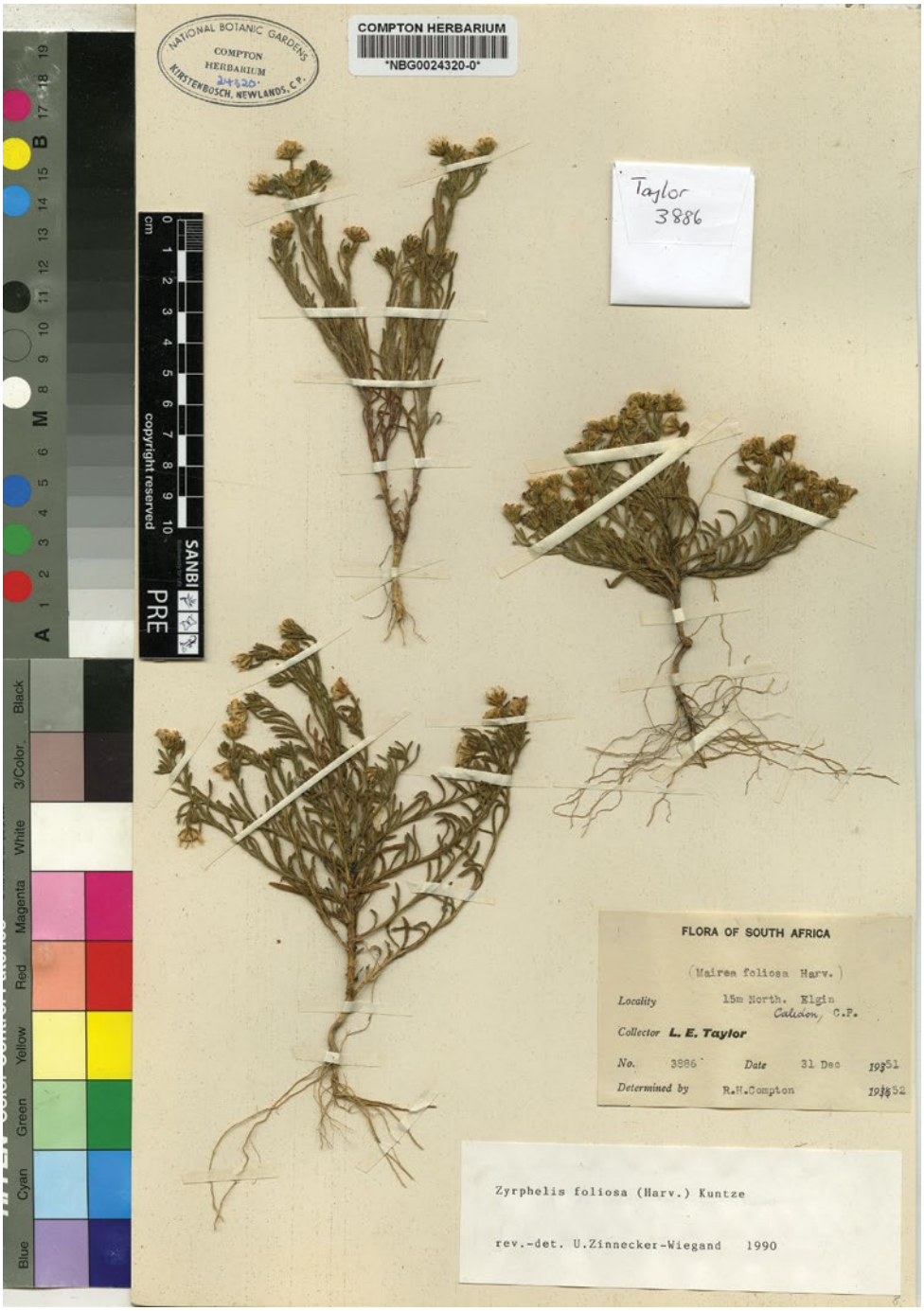


Figure 127. Scan of *Zyrphelis foliosa* var. *foliosa* specimen (*Taylor 3886*, NBG).

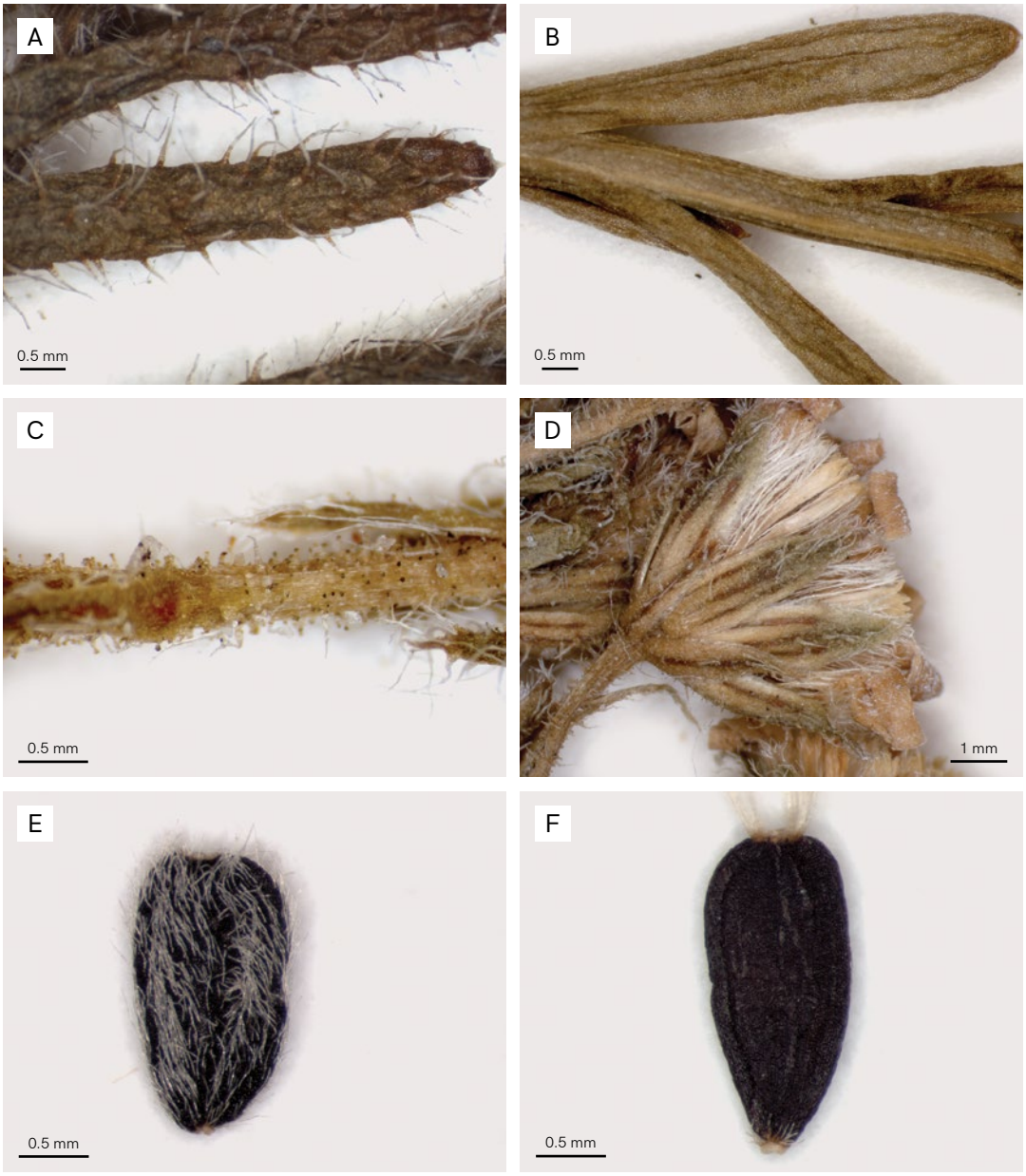


Figure 128. *Zyrphelis foliosa* var. *foliosa* and var. *glabra*: A, bristly hairy leaves of *Z. foliosa* var. *foliosa* (*Flynn & Davis APF575*, STE in NBG); B, glabrous leaves of *Z. foliosa* var. *glabra* (*Esterhuysen 29419*, BOL); C, stipitate glandular and sparsely bristly hairy peduncle (*Flynn & Davis APF575*, STE in NBG); D, capitulum showing 3-veined, stipitate glandular and sparsely bristly hairy involucral bracts (*Taylor 3886*, NBG); E, hairy ray cypsela (*Schlechter s.n.* TvlMus428, PRE); F, glabrous ray cypsela (*Schlechter s.n.* TvlMus428, PRE). A, C–F: *Z. foliosa* var. *foliosa*; B: *Z. foliosa* var. *glabra*.

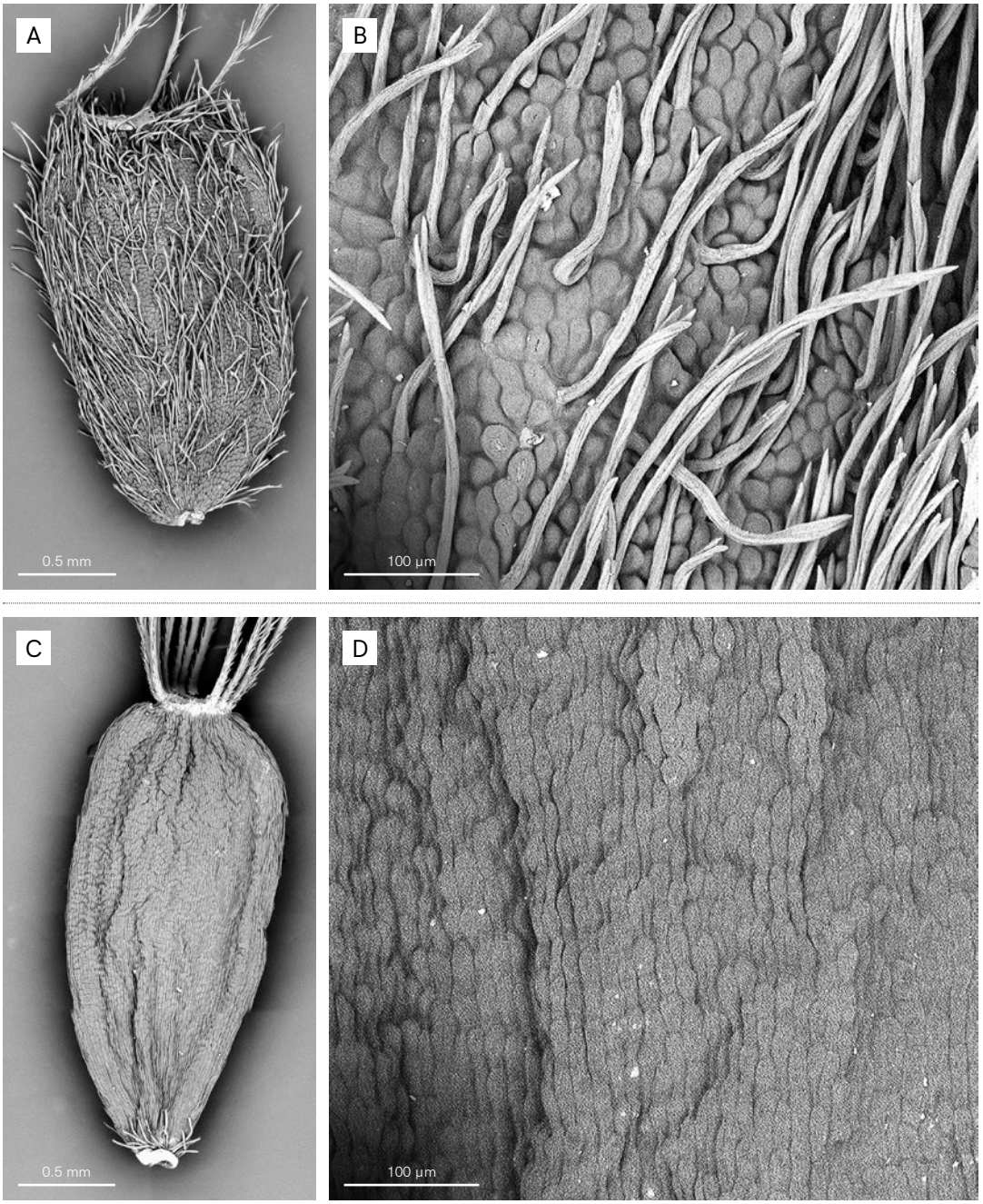


Figure 129. *Zyrphelis foliosa* var. *foliosa*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs and colliculate, smooth epicarpic cells (*Schlechter s.n.* TvlMus428, PRE); C, D, glabrous ray cypsela with colliculate epicarpic cells arranged ± in rows (*Schlechter s.n.* TvlMus428, PRE).

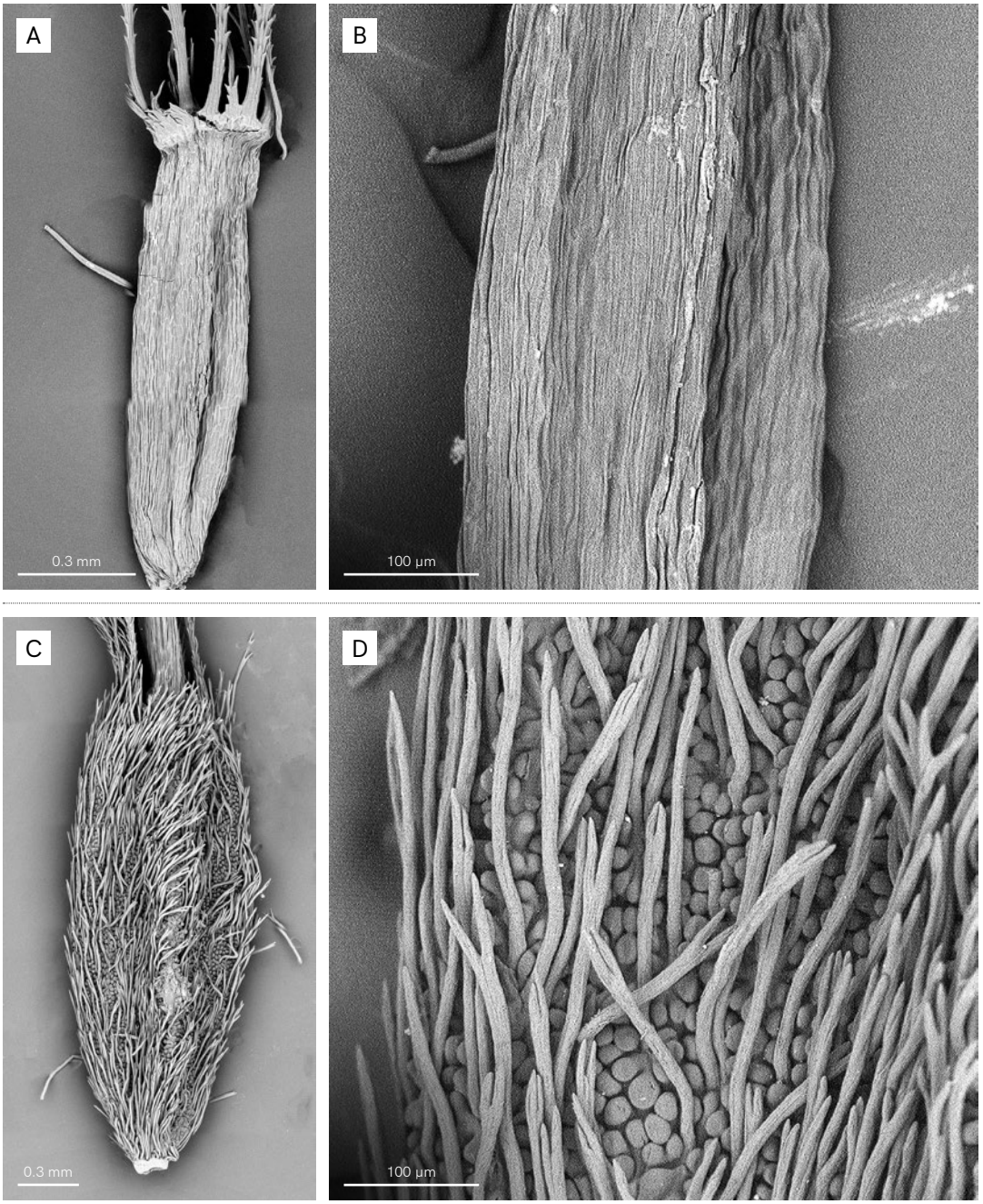


Figure 130. *Zyrphelis foliosa* var. *foliosa* and var. *glabra*: scanning electron micrographs of A, B, sterile, glabrous disc ovary in *Z. foliosa* var. *foliosa* (*Levyns 3849*, BOL); C, D, of ray cypsela showing filiform twin hairs and colliculate, smooth epicarpic cells in *Z. foliosa* var. *glabra* (*Pillans 8210*, BOL).

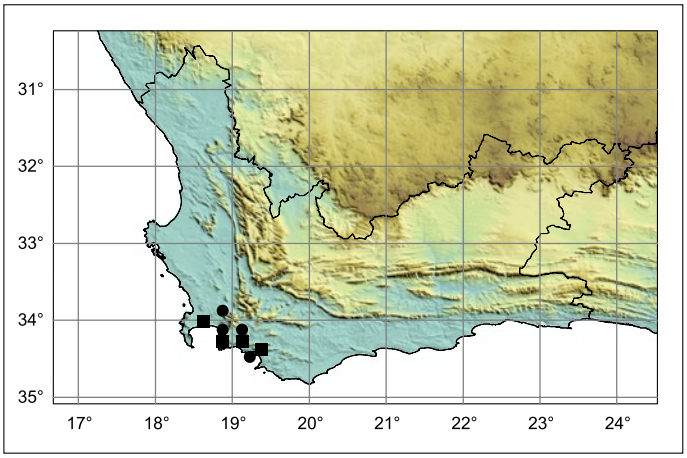


Figure 131. Distribution of *Zyrphelis foliosa* var. *foliosa* ●; and var. *glabra* ■.

on upper part; *limb* 3–6(–7) mm long, 3- or 4-lobed. *Style* (1.0–)1.5–2.0(–2.8) mm long; *style branches* oblong, linear, narrowly elliptic or (narrowly) ovate, (0.2–)0.4–0.5(–0.8) mm long. *Ovary* narrowly elliptic, ovate, (narrowly) obovate, 1.5–2.0(–2.2) mm long, carpopodium small, densely filiform twin hairy, rarely glabrous but then with few twin hairs around base. *Cypsela* dark brown to blackish, obovate, ovate or elliptic, 2(–3) × 1.0(–1.5) mm, laterally compressed, margin thickened, carpopodium small, surfaces densely filiform twin hairy, rarely glabrous but with few twin hairs around base; epicarpic cells in twin hairy cypselae colliculate in surface view, smooth; in glabrous cypselae also ± colliculate in surface view but arranged in rows. *Pappus bristles* (1.8–)2.0–2.5 mm long. *Disc floret* yellow, *tube* 2.0–2.5 mm long; *lobes* 0.5–1.0 mm long. *Anthers* 0.5–1.5 mm long. *Style* (1.0–)1.5–2.0(–3.0) mm long; *style branches* narrowly ovate, linear-triangular or linear, 0.5–1.0 mm long, without stigmatic areas. *Ovary* linear, linear-elliptic or very narrowly obovate, 1.0–1.8 mm long, glabrous, with obvious carpopodium; epicarpic cells ± oblong in surface view, ± smooth. *Pappus bristles* 2–3 mm long, fewer than in ray florets. *Flowering time* August to February and April to May. Figures 127 to 130.

Diagnostic characters: *Zyrphelis foliosa* var. *foliosa* plants are perennial herbs or suffrutices with sparsely to densely bristly hairy stems and leaves, solitary, almost sessile or shortly pedunculate, small capitula, stipitate glandular and (sparsely) bristly hairy peduncles and involucral bracts, the stipitate glands on the peduncles often have dark heads, the inner involucral bracts are 3-veined, the style branches of the disc florets are without stigmatic areas, the persistent plumose pappus bristles and the filiform twin hairs on the cypselae.

Distribution: The distribution of *Z. foliosa* var. *foliosa* extends from Jonkershoek, to the Hottentots-Hollandberge, Kogelberg, Houhoekberge, Palmietberge and the western end of the Kleinriviersberge (Figure 131).

Conservation status: According to Von Staden (2012) the Red List status of *Zyrphelis foliosa sensu* Zinnecker-Wiegand is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3318 (Cape Town)**: Jonkershoek State Forest: Langrivier catchment, W of Langrivier, 700 m, (-DD), 19 December 1979, *Le Maitre 21* (SAASVELD in PRE). **3418 (Simonstown)**: Caledon Div., Mountain slopes near Palmiet River Mouth, (-BD), 21 January 1946, *Esterhuysen 12552* (BOL); Caledon Distr., Palmiet River mouth, Paardeberg [Perdeberg], 300 ft [91 m], (-BD), 16 January 1962, *Grobler 0472* (NBG); Southern Hottentots Holland Mountains, Kogelberg State Forest [Kogelberg Nature Reserve], E slope, grey-brown sandy loam soil, seepage area, 60 m, (-BD), 17 February 1992, *Kruger 387* (PRE, STE in NBG); Southern Hottentots Holland Mountains, Kogelberg State Forest [Kogelberg Nature Reserve], ± 1.4 km from Dwars River, S slope, 80 m, (-BD), 14 October 1992, *Kruger 855* (PRE, STE in NBG); Southern Hottentots Holland Mountains, Kogelberg State Forest [Kogelberg Nature Reserve], ± 250 m NW and upstream of Stokoe Bridge on edge of Palmiet River, S slope, 80 m, (-BD), 3 December 1992, *Kruger 946* (PRE); Kogelberg Experimental Site between plots 4 and 5, 110 m, (-BD), 30 April 1980, *Le Maitre 81* (SAASVELD in PRE); Rooi Els, slopes, 800 ft [244 m], (-BD), 31 October 1948, *Levyns 9284* (BOL); Caledon Distr., Bettys Bay, (-BD), 21 January 1964, *Wild 6299* (NBG). **3419 (Caledon)**: Caledon Div., Houw Hoek, top of pass, S side, (-AA), 29 September 1928, *Gillett 889* (STE in NBG); Caledon, Houw Hoek, sandy slopes, 1800 ft [549 m], (-AA), 16 September 1962, *Levyns 11336* (BOL); Caledon, Howhoek [Houw Hoek], (-AA), 15 May [?] 1894, *Penther 1124* (S); Houwhoek, 2000 ft [610 m], (-AA), 8 February 1896, *Schlechter s.n.* TvlMus428 (PRE), *Schlechter 7424* (S); Caledon, 15 m [mile, 24 km] N, Elgin, (-AA), 31 December 1951, *Taylor 3886* (NBG); Caledon Distr., Kleinmond, voet van berg onder reservoir [foot of mountain below reservoir], (-AC), 6 November 1948, *De Vos 1114* (STE in NBG); Heuningklip farm [Honingklip] (Gibson), W slope, mesic mountain fynbos, leached coarse soil, 110 m, (-AC), 25 November 1987, *Flynn & Davis APF 575* (STE in NBG); Hermanus District, Kleinmond, 200 m NE of Old Cemetry on West bank Palmiet River, 40 m, (-AC), 16 December 1997, *Mostert 311* (PRE); Caledon, Berg vid Palmiet river, (-AC), 24 December 1937, *Wall 133* (S), *Wall s.n.* (S16-6661) (S) (mixed collection); Caledon Division, 15 km NE of Onrus on road to Caledon, stony-sandy slope, (-AC), 13 November 1974, [*Nordenstam &*] *Lundgren 2201* (S); Hermanues [Hermanus], Fernkloof, along the river towards the sea, (-AD), 30 October 2008, *Emanuelsson 3655* (S).

Without precise locality: Palmiet River, 100-200 ft [30-61 m], (3418BD/3419AC), 14 February 1932, *Levyns 3849* (BOL) [both vars]; Caledon Div., Palmiet River Valley, (3418BD/3419AC), January 1943, *Stokoe 8737* (PRE).

No locality: Cape Province, 1940, *Stokoe s.n. PRE41995* (PRE).

19b. **Zyrphelis foliosa** var. **glabra** *P.P.J.Herman, var. nov.*

Type: South Africa, Western Cape, Simonstown (3418): Caledon Division, slopes at base of Platteberg [Platberg], near Oudebos, (-BD), 3 December 1961, *Esterhuysen 29419* (BOL, holo.).

Erect dwarf shrub or suffrutex, up to 300 mm high. *Stems* glabrous, rarely with few axillary hairs. *Leaves* flat or slightly folded lengthwise, linear or very narrowly obovate, 4-14(-22) × 0.5-1.5 mm, apex acute, mucronate, surface glabrous, rarely with occasional bristle hair on leaf margin or on main vein on lower surface. *Capitula* small, solitary, almost sessile or shortly pedunculate; *peduncle* 5-15(-25) mm long, stipitate glandular, occasional bristle hair, bracteate; *peduncular bracts* (0)1 to 3(to 10) per peduncle, linear-triangular to very narrowly ovate, 1.5-4.0 mm long, stipitate glandular, with dark heads, sometimes ciliate or with tuft of hairs at apex, sometimes with few bristle hairs, usually with oil glands along main vein. *Involucre* cup-shaped, narrowly campanulate or (narrowly) obconical, (3.5-)4.0-5.5 mm high, 4-8 mm across upper part; *involucral bracts* in 3, rarely 4, rows; *outer row* narrowly ovate or narrowly triangular, (2.0-)2.5-3.0(-3.4) × 0.5-0.8 mm, apex acute, with tuft of hairs around



Figure 132. Scan of the holotype of *Zyrphelis foliosa* var. *glabra* (*Esterhuysen 29419*, BOL).

apex, margin sparsely ciliate, surface (minutely) stipitate glandular, sparsely bristle hairy or not, V-shaped thickened from base, stereome fenestrated, often with oil glands along main vein; *second row* narrowly oblong, narrowly obovate, narrowly elliptic or very narrowly ovate, 3–4 × 0.5–1.0 mm, apex acute, often with tuft of hairs around apex, margin fimbriate-ciliate, surface (minutely) stipitate glandular, sparsely bristly hairy or not, keeled, V- or Y-shaped thickened, stereome fenestrated, often 3-veined, with oil glands along vein(-s); *third row* (narrowly) obovate or narrowly oblong, 3.5–5.0(–5.2) × 1.0–1.2(–1.4) mm, apex acute, margin (narrowly) membranous, ciliate, surface (minutely) stipitate glandular, with or without occasional bristle hair, keeled, V- or Y-shaped thickened, stereome fenestrated, 3-veined, sometimes not so obvious, usually with oil glands along veins; *fourth row* (only 1 specimen) (very) narrowly obovate or narrowly elliptic, 5 × 1.0–1.2 mm, apex acute, margin (narrowly) membranous, ciliate, surface stipitate glandular, keeled, Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins. *Ray floret* white, mauve or blue, fading to madder brown or drying pinkish red; *tube* (1.5–)2.0(–2.2) mm long, with glandular hairs in upper part or glabrous; *limb* 3.0–5.0(–7.5) mm long, 3- or 4-lobed. *Style* 1.5–2.0(–2.8) mm long; *style branches* linear-elliptic, narrowly ovate or oblong, 0.5(–0.8) mm long. *Ovary* (very) narrowly obovate, linear-elliptic or linear-ovate, 1.8–2.0 mm long, densely filiform twin hairy. *Cypsela* dark brown to blackish, obovate or elliptic, 2 × (0.8–)1.0 mm, laterally compressed, carpopodium small, margin (slightly) thickened, surfaces filiform twin hairy; epicarpic cells ± colliculate in surface view, smooth. *Pappus bristles* (1.5–)2.0(–3.0) mm long. *Disc florets* yellow; *tube* 2.0–2.5 mm long; *lobes* 0.5 mm long. *Anthers* 1.0–1.5 mm long. *Style* (1.0–)1.5–2.0(–2.5) mm long; *style branches* narrowly ovate, 0.5–0.8(–1.0) mm long, without stigmatic areas. *Ovary* linear, (1.0–)1.5(–1.8) mm long, glabrous. *Pappus bristles* (2.2–)2.5–3.0 mm long, fewer than in ray florets. *Flowering time* November to February. Figures 128B, 130C, D, 132.

Diagnostic characters: *Zyrphelis foliosa* var. *glabra* differs from the typical variety by the glabrous stems and leaves. The plants seem to be more woody – dwarf shrubs or suffrutices – than those of var. *foliosa* (perennial herbs or suffrutices).

Distribution: Kogelberg, Palmiet- and Kleinriviersberge (Figure 131).

Conservation status: The Red List status of var. *glabra* is probably the same as that of var. *foliosa*: Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3418 (Simonstown)**: Feuchte Stellen bei Seekuhvallei in der Fläche [damp places at Seekoeivlei in plains], (–BA), 16 February 1827, *Ecklon 80 (112* olim) (S07-8219, S); Palmiet River mouth, open places, 100 ft [30 m], (–BD), 18 February 1939, *Levyns 7043* (BOL); Caledon Div., Palmiet River mouth, sandy patches on mountain slope, (–BD), 9 November 1974, *Nordenstam & Lundgren 2155* (S), *Nordenstam & Lundgren 2156* (S); Caledon Division, base of hills near Palmiet River mouth, (–BD), 25 January 1936, *Pillans 8210* (BOL). **3419 (Caledon)**: Caledon District, Palmiet River, mountain ridges, near bridge, (–AC), 3 January 1948, *De Vos 792* (PRE, STE in NBG); Caledon Division, 15 km NE of Onrus on road to Caledon, stony-sandy slope, (–AC), 13 November 1974, *Nordenstam & Lundgren 2201* (NBG, S (S16-6666); Fernkloof Nature Reserve, Hermanus, S facing stony slope, 200 m, (–AD), 16 November 1976, *Orchard 375* (PRE, STE in NBG); Maanskyn Reserve, Padda's Gat, N facing, dry stony soil, fynbos vegetation, 500 m, (–AD), 11 December 1991, *Williams 3863* (PRE).

20. *Zyrphelis microcephala* *(Less.) Nees*, *Genera et Species Asterearum*: 252 (1833); Nesom: 92 (1994); Goldblatt & Manning: 372 (2000); Manning & Goldblatt: 431 (2012).

(Figures 133–149)

Elphegea microcephala Less.: 184 (1832).

Mairia microcephala (Less.) DC.: 218 (1836); Harv. in Harv. & Sond.: 66 (1865); Bond & Goldblatt: 180 (1984).

Type: South Africa, Western Cape, Riversdale (3421): Kamnarivier (–BA?), *Mundt & Maire legerunt prope Kamnariv. Septbr. 1820* (B, holo. †).

Taxonomic notes:

1. Lessing (1832) quoted *Mundt & Maire legerunt prope Kamnariv. Septbr. 1820* in his original description of *Elphegea microcephala*. Candolle (1836) and Harvey (1865) also quoted this specimen as well as *Burchell 8159*, *Drège* (Zeederberg), *Ecklon & Zeyher* (Zwellendam). A request to various herbaria (A, B, E, FI, G, HAL, K, P, S) about the *Mundt & Maire* specimen was fruitless, and it is assumed that the *Mundt & Maire* specimen was destroyed in World War II.
2. Zinnecker-Wiegand (1990) selected *Drège 1732* (G-DC) as the holotype for *Z. microcephala*. However *Drège 1732* (barcode G00495683) (G-DC, e), collected in 1835(?) in the Cederberg Mountains (annotation on specimen), is the specimen named as *Aster nanus* E.Mey. which Candolle sank under *Z. microcephala* (see below). Drège did collect a *Z. microcephala* (= Mairia microcephala) specimen at Blaauwberg, 3000–4000 Fuss, [Blouberg (3218DB), 3000–4000 ft], 24 November 1828, but did not assign a collectors' number to the specimen (Drège 1843). The specimen in G with barcode G00426177 is most likely this specimen, but the Paris specimen with barcode P028902 clearly shows the date and the locality.

Aster nanus E.Mey. ex DC., fide DC.: 218 (1836).

Zyrphelis monticola (Compton) Zinnecker-Wiegand in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1198 (2011), *syn. nov*.

Felicia monticola Compton: 312 (1931).

Type: South Africa, Western Cape, Montagu (3320): Laingsburg Div., top of Witteberg, 5000 ft [1524 m], (–BC), 31 October 1924, *Compton 2724* (BOL, lecto., designated here).

Note: Compton (1931) quoted three of his specimens under the description of his new species *Felicia monticola*, none of which he designated as the holotype.

As Zinnecker-Wiegand already assigned type status to *Compton 2724* (Ortiz & Zinnecker-Wiegand 2011; JSTOR 2018/2019), this specimen is chosen here as the lectotype.

Erect perennial herb, suffrutex or dwarf shrub. *Stem* woody basally, sometimes tinged reddish, glabrous or variously hairy, sometimes stipitate glandular. *Leaves* small, alternate, sessile, scattered along stems or sometimes more densely set, erect or sometimes recurved, flat or slightly folded lengthwise, sometimes ± semi-succulent, margins entire, rarely with 1 minute tooth on one or both sides, ciliate or eciliate, surfaces totally glabrous or variously hairy, sometimes stipitate glandular. *Capitula* small, radiate, solitary, rarely in few-headed corymbs, terminal, almost sessile to shortly or distinctly pedunculate; *peduncle* sometimes tinged reddish, (sparsely) stipitate glandular and variously hairy, often with reddish transverse walls, bracteate. *Involucre* obconical to broadly obconical, campanulate or rarely (broadly) cup-shaped. *Involucral bracts* arranged in 3 or 4 rows, imbricate, outer shorter than inner, apices often tinged reddish, surface stipitate glandular, with or without bristle hairs, 3-veined or not. *Ray florets* female, fertile. *Style* bifurcate; *style branches* with marginal stigmatic areas, confluent at apex. *Ovary* densely filiform twin hairy. *Cypsela* laterally compressed, sparsely to densely longish filiform twin hairy, apices of twin hairs acute, rarely occasional ones glabrous. *Pappus bristles* persistent, plumose, barbellate to nude basally, sometimes with few, microscopically small bristles in between but usually covered by upper twin hairs of cypselae and not readily visible. *Disc florets* functionally male or rarely bisexual, fertile; corolla tubular, 5-lobed. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Style* bifurcate, rarely with 3 branches; *style branches* mostly with marginal stigmatic areas basally, or inner without stigmatic areas or (rarely) all without stigmatic areas, with deltoid, papillate apical appendages. *Ovary* glabrous or glabrous but with occasional filiform twin hairs along margin and around base, rarely some outer sparsely to ± densely filiform twin hairy. Some *peripheral disc florets* sometimes develop *cypsela*: laterally compressed, glabrous or sparsely to densely filiform twin hairy. *Pappus bristles* persistent, plumose, barbellate to nude basally; sometimes with few, microscopically small bristle hairs in between.

Key to subspecies

1a. Capitula very shortly pedunculate, involucral bracts not 3-veined . . . . . .20b. subsp. *foliosa*
1b. Capitula usually distinctly pedunculate, inner involucral bracts 3-veined 2

2a. Stems and leaves bristly hairy and minutely stipitate glandular . . . . . 20c. subsp. *glandulosa*
2b. Stems and leaves glabrous or (sparsely) bristly hairy, not glandular . . . .20a. subsp. *microcephala*

20a. **Zyrphelis microcephala** subsp. **microcephala**

Erect dwarf shrub or suffrutex, up to 400 mm high, branched at base into several erect stems and (sparsely) branched upwards, with single stem and (sparsely) branched upwards or sometimes branching at the base into spreading or decumbent, ascending stems, sparsely branched upwards. *Stem* woody at base, sometimes flushed reddish, glabrous or (sparsely) bristly hairy. *Leaves* small, alternate, sessile, scattered along stems or sometimes more densely set, erect or sometimes recurved, flat or

A



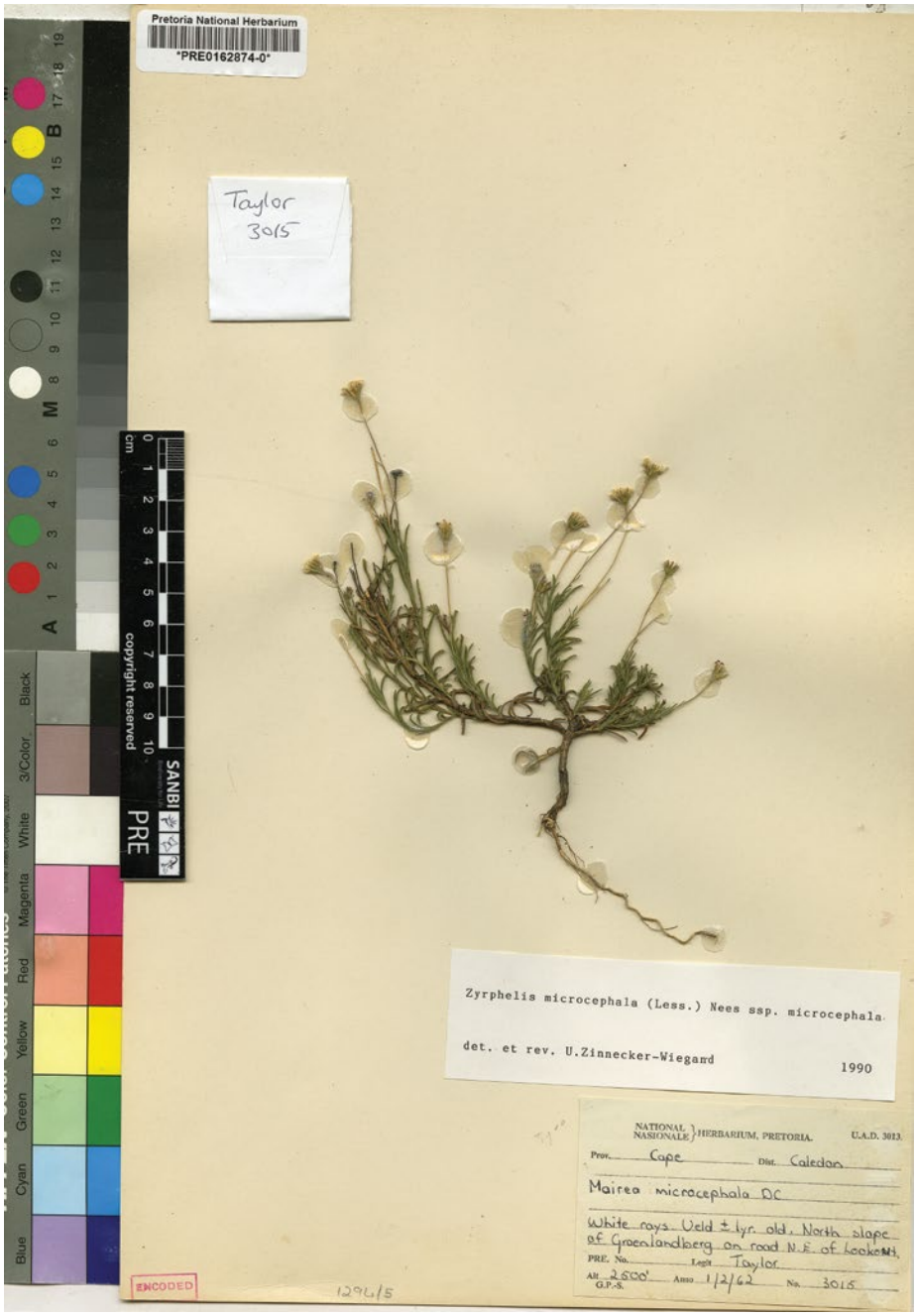
Figures 133. Scans of *Zyrphelis microcephala* subsp. *microcephala* specimens to show the variation in growth form: A, *Esterhuysen 26838* (BOL); B, *Compton 16270* (NBG); C, *Taylor 3015* (PRE); D, *Vlok 1230* (PRE).

B



Figures 133 (continued). Scans of *Zyrphelis microcephala* subsp. *microcephala* specimens to show the variation in growth form: A, *Esterhuysen 26838* (BOL); B, *Compton 16270* (NBG); C, *Taylor 3015* (PRE); D, *Vlok 1230* (PRE).

C



Figures 133 (continued). Scans of *Zyrphelis microcephala* subsp. *microcephala* specimens to show the variation in growth form: A, *Esterhuysen 26838* (BOL); B, *Compton 16270* (NBG); C, *Taylor 3015* (PRE); D, *Vlok 1230* (PRE).

D



Figures 133 (continued). Scans of *Zyrphelis microcephala* subsp. *microcephala* specimens to show the variation in growth form: A, *Esterhuysen 26838* (BOL); B, *Compton 16270* (NBG); C, *Taylor 3015* (PRE); D, *Vlok 1230* (PRE).

slightly folded lengthwise, or flat basally, folded lengthwise upwards, sometimes ± semi-succulent, linear, narrowly oblong, (very) narrowly obovate or very narrowly elliptic, 3–25(–40) (mostly 5–15) × 0.5–2.0 mm, apex acute, rarely acuminate, mucronate, sometimes bristle-tipped mucronate, margins entire, rarely with 1 minute tooth on one side or 1 on both sides, surfaces totally glabrous or in lower leaves glabrous but shortly ciliate basally or all along margin, or in upper leaves glabrous but long ciliate basally, cilia decreasing in length towards apex of leaf, apically often without cilia, or surfaces sparsely to more densely short or long bristly hairy on both surfaces, or abaxial surface only, sometimes with embedded oil glands. *Capitula* small, radiate, solitary, rarely in few-headed corymbs, terminal, pedunculate; *peduncle* 10–100 mm long, often tinged reddish, (sparsely) stipitate glandular and (sparsely to densely) pilose/villose, rarely eglandular, all hairs usually on broad, (reddish) bases and often with reddish transverse walls, bracteate; *peduncular bracts* 0 to 5(11) per peduncle, filiform, linear, linear-triangular, very narrowly oblong or very narrowly ovate, (1.0–)1.5–6.0(–8.0) mm long, margin ciliate, surface glabrous or (sparsely) pilose/villose, (sparsely) stipitate glandular or rarely eglandular, often with oil glands along main vein or scattered over surface, bases often swollen. *Involucre* obconical to broadly obconical, campanulate or rarely (broadly) cup-shaped, 3–6 mm high, (3–)4–12 mm across upper part. *Involucral bracts* in 3 or mostly 4 rows, imbricate, outer shorter than inner, apices often reddish; *outer row* narrowly to (very) narrowly ovate, narrowly triangular, narrowly oblong, linear, rarely very narrowly obovate or (very) narrowly elliptic, (1.5–)2.0–3.5 × 0.2–0.6(–0.8) mm, apex acute to acuminate, margin usually narrowly membranous, fimbriate-ciliate, cilia longer in upper part and around apex, surface (sparsely) pilose/villose, (sparsely) stipitate glandular or rarely eglandular, V- or Y-shaped thickened basally, stereome fenestrated, sometimes with oil glands along main vein; *second row* linear, (narrowly) oblong, narrowly triangular, (very) narrowly ovate, narrowly to (very) narrowly elliptic or narrowly obovate, (2.0–)2.5–5.0 × 0.2–1.0 mm, apex acute to acuminate, margin usually narrowly membranous, fimbriate-ciliate, cilia longer and denser in upper part and around apex, surface (sparsely) pilose/villose, (sparsely) stipitate glandular or rarely eglandular, sometimes slightly keeled, V- or Y-shaped thickened basally, stereome fenestrated, sometimes faintly 3-veined, often with oil glands along vein(-s); *third row* obovate to (very) narrowly obovate, sometimes narrowly elliptic or narrowly oblong, 3.2–5.2(–5.4) × 0.5–1.2 mm, apex obtuse, acute or bluntly acute, rarely acuminate, margin membranous, fimbriate, ciliate around apex, surface (sparsely) pilose/villose, (sparsely) stipitate glandular or rarely eglandular, keeled, V- or Y-shaped thickened, stereome fenestrated, usually 3-veined but not always so clear, with oil glands along vein(-s); *fourth row* obovate to narrowly obovate, rarely (narrowly) ovate or narrowly elliptic, (3.0–)3.2–5.5 × 0.5–1.0(–1.5) mm, apex acute or bluntly acute to obtuse, rarely acuminate, margin membranous, fimbriate in lower part, ciliate in upper part, surface (sparsely) pilose/villose, rarely glabrous, (sparsely) stipitate glandular or rarely eglandular, keeled, V- or Y-shaped thickened, stereome fenestrated, usually 3-veined but not always so clear, with oil glands along vein(-s). *Ray floret* female, fertile; corolla mostly blue, saxe blue, pale saxe blue, mauve-purple, pale mauve-blue, white to pale saxe blue but white, white on both surfaces or sometimes tinged violet-pink on lower surface, cream, pale yellow and pink also recorded, drying violet-pink maroon, maroon-red, red-brown or madder brown; *tube* 1.0–2.5 mm long, with glandular hairs all along or in upper part and around mouth; *limb* (2.5–)3.0–8.0 mm long, 4-veined, 3-lobed, rarely with glandular hairs on lobes. *Style* 1.0–2.0(–2.5) mm long, bifurcate; *style branches* linear, linear-elliptic or narrowly ovate, 0.5–1.0 mm long, stigmatic areas marginal, confluent at apex. *Ovary* obovate, narrowly obovate, ovate, elliptic or linear, 1.5–2.5(–3.0) mm long, laterally compressed, margin slightly thickened, with prominent carpopodium, surface usually (longish) densely filiform twin



Figure 134. *Zyrphelis microcephala* subsp. *microcephala*: A, totally glabrous leaves (*Esterhuysen 31168*, BOL); B, glabrous but ciliate leaves (*Compton 6464*, NBG); C, long bristly hairy leaves (*Esterhuysen 4397*, BOL); D, leaves bristly hairy on both surfaces (*Esterhuysen 9280*, BOL).

hairy, epicarpic cells (where visible) ± colliculate in surface view or cells with central globular protuberances. *Cypsela* (dark) brown, reddish brown or black, obovate, elliptic or ovate, 2–3 × 1.0–1.6(–2.0) mm, laterally compressed, margin thickened, with (prominent) carpopodium, surfaces sparsely to densely longish filiform twin hairy, apices of twin hairs acute, epicarpic cells ± colliculate in surface view, ± smooth or cells with central globose protuberance, or with globose protuberance towards pappus side of cells; sometimes some ray cypselae glabrous but with marginal twin hairs or sparsely twin hairy, their epicarpic cells arranged ± in rows, oblong, flat and smooth in surface view (*Compton 2724*, BOL) – seemingly transitional to disc cypselae. *Pappus bristles* 2.0–3.0(–3.5) mm long, plumose, barbellate to nude basally, persistent; sometimes with few, microscopically small bristles in between but usually covered by upper twin hairs of cypselae and not readily visible. *Disc florets* bisexual or functionally male; corolla yellow to pale yellow, lobes often drying pinkish red; *tube* 1.8–3.0 mm long, with few glandular hairs on lower part, 5-lobed; *lobes* 0.5–1.0 mm long, sometimes tinged reddish, with sub-apical glandular hairs, sometimes also occasional eglandular hair, with resin ducts along margins. *Anthers* 1–2 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1–2(–3) mm long, bifurcate, rarely with 3 branches; *style branches* linear, (narrowly) ovate,



Figure 135. *Zyrphelis microcephala* subsp. *microcephala*: A, stipitate glandular and sparsely bristly hairy peduncle, hairs with reddish transverse walls (*Esterhuysen 9280*, BOL); B, capitulum showing obovate, 3-veined, stipitate glandular and bristly hairy involucral bracts (*Esterhuysen 9280*, BOL); C, capitulum showing 3-veined involucral bracts clasping ray cypsela; D, hairy ray cypsela; E, outer fertile hairy disc cypsela; F, inner fertile ciliate disc cypsela (C–F *Van Wyk et al. 3543*, PRE).

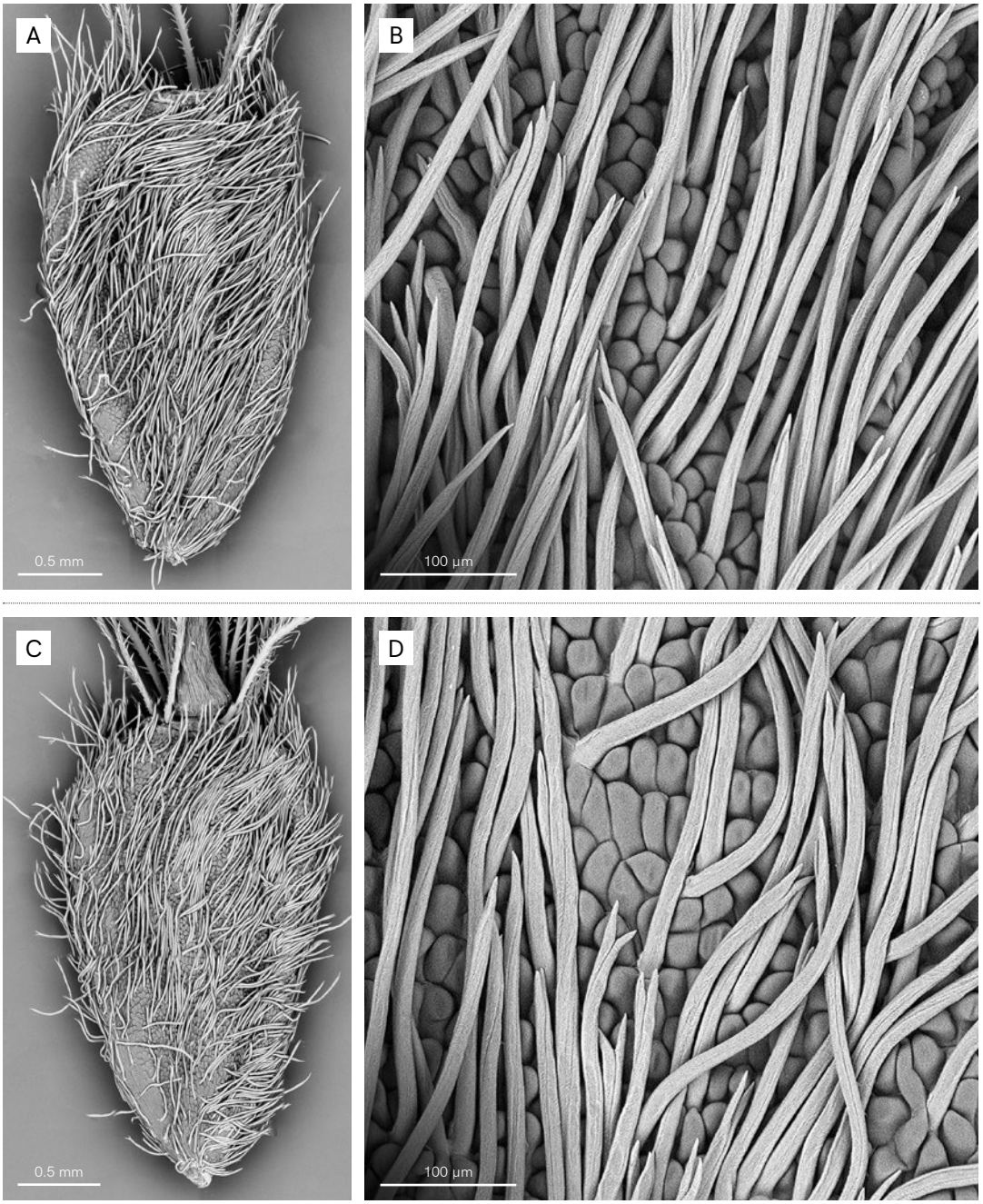


Figure 136. *Zyrphelis microcephala* subsp. *microcephala*: scanning electron micrographs of A, B, ray cypsela with filiform twin hairs and colliculate, smooth epicarpic cells; C, D, outer fertile disc cypsela with filiform twin hairs and colliculate, smooth epicarpic cells (all *Van Wyk et al. 3543*, PRE).

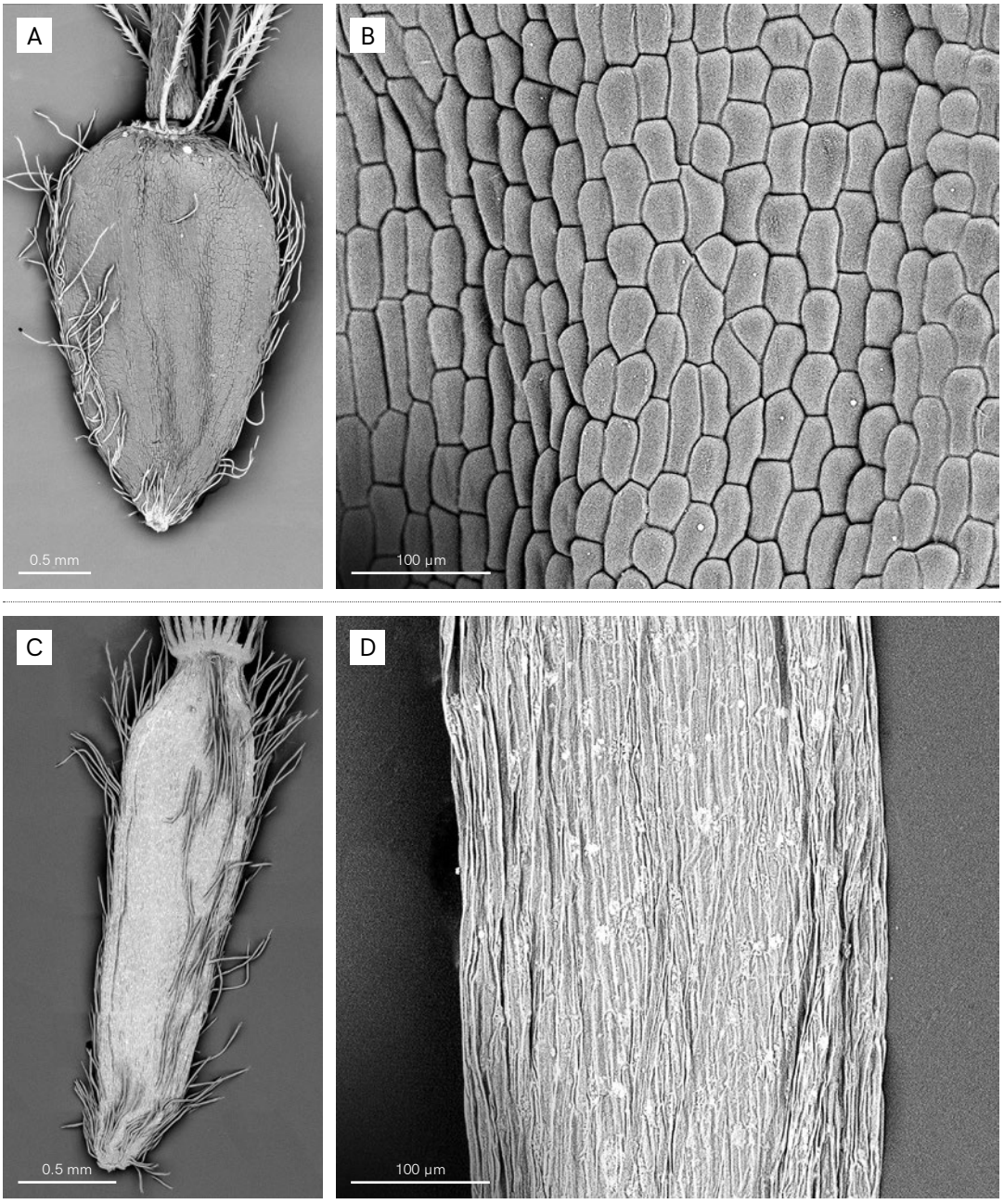


Figure 137. *Zyrphelis microcephala* subsp. *microcephala*: scanning electron micrographs of A, B, fertile inner disc cypsela with twin hairs along the margin and around the base and areolate, smooth epicarpic cells (*Van Wyk et al. 3543*, PRE); C, inner disc ovary with few twin hairs on surface and around base (*Esterhuysen 33669*, STE in NBG); D, glabrous inner disc ovary (*Taylor 3015*, PRE).

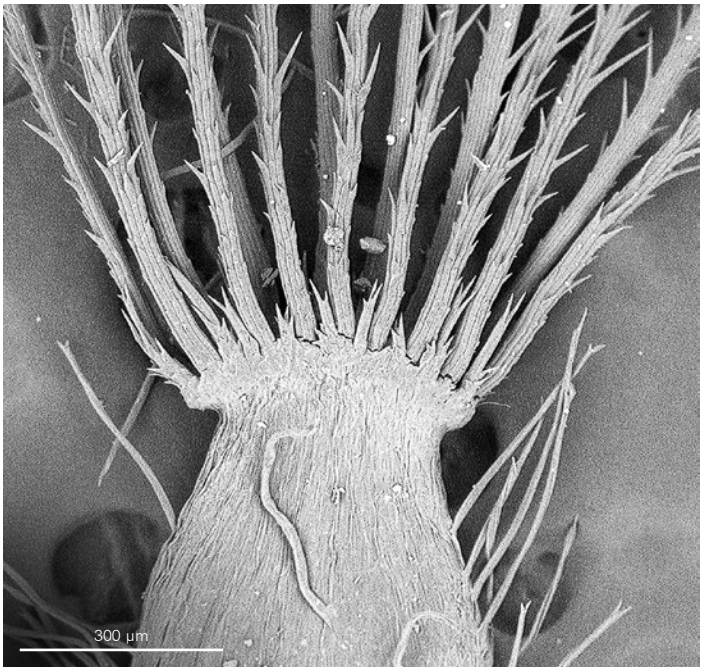


Figure 138. *Zyrphelis microcephala* subsp. *microcephala*: scanning electron micrographs of disc pappus showing minute bristles among longer bristles (*Esterhuysen 30483*, BOL).

linear-triangular or elliptic, 0.5–1.0 mm long, mostly with marginal stigmatic areas basally, or inner without stigmatic areas or (rarely) all without stigmatic areas, with deltoid, papillate apical appendages. *Ovary* (narrowly) obovate, linear-obovate, narrowly elliptic, linear, oblong or ovate, (1.2–)1.5–2.5 mm long, margin thickened (more obvious in inner, glabrous ovaries), with small or obvious carpopodium, outer sparsely to densely filiform twin hairy, epicarpic cells (where visible) with central ± globose protuberance in surface view, similar to ray ovaries; those towards centre of capitulum progressively less hairy: glabrous but densely filiform twin hairy along margins and with ring of twin hairs around base, glabrous but sparsely filiform twin hairy along margin and ring around base, glabrous but with ring around base or innermost totally glabrous; epicarpic cells arranged ± in rows, oblong in surface view, those with twin hairs along margins rarely also with somewhat central globose protuberance or globose protuberance towards pappus end of cells, surfaces of cells smooth. Some *peripheral disc florets* sometimes develop fertile *cypsela*: (dark) brown, obovate, narrowly obovate or narrowly elliptic, 2.0–2.5(–3.0) × 1.0–1.2(–1.5) mm, laterally compressed, margin thickened, with small to obvious carpopodium; some sparsely to more densely filiform twin hairy, epicarpic cells ± colliculate in surface view, or with central globose protuberance or with globose protuberance towards pappus end of cells, smooth (similar to ray cypselae) – seemingly transitional form to ray cypsela; some glabrous but with twin hairs along margin and around base, epicarpic cells arranged ± in rows, ± oblong in surface view, flat, smooth; some totally glabrous, epicarpic cells areolate in surface view and smooth. *Pappus bristles* persistent, 2–4 mm long, plumose, barbellate to nude basally; sometimes with few, microscopically small bristles in between. *Flowering time*: recorded from September to May with a peak from September to January. Figures 133 to 138.

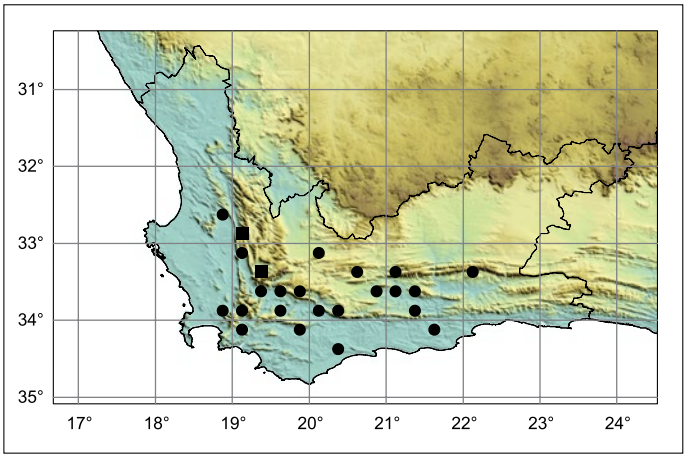


Figure 139. Distribution of *Zyrphelis microcephala* subsp. *microcephala* ●; and subsp. *foliosa* ■.

Diagnostic characters: A variable taxon as far as habit and leaf indumentum are concerned but can be recognised by the glabrous or (sparsely) bristly hairy, not glandular stems and leaves, the small capitula, usually on long peduncles, the (sparsely) stipitate glandular and (sparsely to densely) pilose/villose, rarely eglandular peduncles with all the hairs usually on broad, (reddish) bases and often with reddish transverse walls, the (sparsely) pilose/villose, (sparsely) stipitate glandular or rarely eglandular involucral bracts, the inner rows of involucral bracts mostly 3-veined and obovate in the upper part, the persistent plumose pappus bristles and filiform twin hairs. There is a tendency for the leaves of specimens towards the eastern end of the distribution to be glabrous or glabrous but ciliate and the capitula with only three rows of involucral bracts. I could find no reason to keep *Z. monticola* as a separate species. It was described as having decumbent branches and occuring in the Witteberg and Swartberg, but some specimens scattered over the distribution range also displayed this feature.

Distribution: *Zyrphelis microcephala* subsp. *microcephala* has a fairly wide distribution: from the Blouberg in the northern end of the Olifantsrivierberge, southwards to the Wemmershoek-, Franchhoek-, Jonkershoek-, Groenland- and ?Koeëlberge, eastwards along the Hexrivierberge, Kwadousberg, the Riviersonderendberge, the Bontberg, Witteberg, the Langeberg, Touwsberg and Rooiberg to the Klein Swartberge and the eastern part of the Groot Swartberg (Figure 139).

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3218 (Clanwilliam)**: Blaauwberg, 3000–4000 Fuss, [Blouberg, 914–1219 m], (–DB), November 1830, *Drège s.n.* (barcode G00426177) (G, e, P, P028902, e). **3318 (Cape Town)**: Jonkershoek, ± halfway between Haelkop and the lookout tower, NE slope, 860 m, (–DD), 23 May 1990, *Buys 198* (STE in NBG). **3319 (Worcester)**: Tulbagh Distr., Roodesandberg, 1000 ft [Roodezandsberg, 305 m], (–AA), 22 September 1936, *Compton 6464* (NBG); Ceres, slopes of Ceres Peak, (–AD), October 1933, *Acocks 1836* (S); Matroosberg, rocky mountain slope, (–BC), 1 December 2007, *No Collector, M1343* (S10-36959) (S); Worcester Division, Hex River Mts, Audensberg, burnt slopes, 3000–5000 ft [914–1524 m], (–CB), 15 February 1959, *Esterhuysen 28184* (BOL, PRE); Mountains S

of Wemmershoek, near summit, common, 1400 m, (-CC), January 1921, *Andreae 690* (PRE); Paarl District, Mountains south of Wemmershoek, burnt area on SW side of summit, numerous, 1450 m, (-CC), January 1921, *Andreae 796* (PRE); Franchhoek Pass, SE side, (-CC), 1 January 1934, *Galpin 12347* (PRE); Bakkerskloof, (-CC), 1 February 1978, *Van Wilgen 224* (SAASVELD in PRE); Worcester Division, Keeromsberg, shale band, W side, 3000-4000 ft [914-1219 m], (-DA), 8 November 1943, *Esterhuysen 9280* (BOL); Worcester District, Keerom, slopes at base of Keeromsberg, 2000-3000 ft [610-914 m], (-DA), 5 September 1965, *Esterhuysen 31139a* (BOL); Worcester District, Keerom, N side of Keeromsberg, in stony sand at base of Sawedge Peak, 2000-3000 ft [610-914 m], (-DA), 6 September 1965, *Esterhuysen 31168* (BOL); Worcester Division, on the shale band above Boskloof, Keeromsberg, 5500 ft [1676 m], (-DA), 2 November 1974, *Esterhuysen 33669* (S, STE in NBG); Caledon District, Jonas Kop, Boschesveld Mts, east of Villiersdorp, in a small open Kloof on the N slopes, 3000 ft [914 m], (-DC), 19 October 1971, *Esterhuysen 32702* (BOL155218) (BOL, PRE, S)*. **3320 (Montagu)**: Ceres Division, Poort N of Pienaarskloof, 3300 ft [1006 m], (-AA), 13 September 1965, *Acocks 23722* (PRE); Laingsburg District, Whitehill, Witteberg [Witberge], 5000 ft [1524 m], (-BC), 10 October 1944, *Compton 16270* (NBG); Robertson Division, Langeberg near Montagu, lower N rocky slopes, (-CC), 28 October 1954, *Esterhuysen 23849* (BOL); N slopes of Langeberg, N of Leeurivierberg, on farm 182, along Swellendam hiking trail, 780 m, (-CD), 26 April 2008, *Helme 5442* (NBG); FRD Touwsberg Expedition, upper slopes, in moist spots, damp soil, stony, rocky, (-DB), 6 October 1993, *Esterhuysen 37362* (PRE). **3321 (Ladismith)**: Ladismith Division, S slopes of Swartbergen, below Toverkop, rocky, 5000 ft [1524 m], (-AC), 23 April 1951, *Esterhuysen 18531* (BOL, NBG, PRE); Ladismith Division, Toverkop, Swartberg, rocky S slopes, 4000 ft [1219 m], (-AC), 17 December 1956, *Esterhuysen 26838* (BOL, PRE); Ladismith District, slopes below Toverkop, steep and rocky, 5000 ft [1524 m], (-AC), 30 March 1964, *Esterhuysen 30674* (PRE, S); Klein Swartberg, Towerkop, rocky mountain slope, 1331 m (-AC), November 2007, *No Collector, T182* (S10-36958) (S); Touwsberg, upper S slopes, (-CA), 5 October 1993, *Van Wyk, Winter & Tilney 3543* (PRE); Rooiberg State Forest, summit of Rooiberg Peak, ± 1490 m, (-CB), 28 October 1976, *Taylor 9500* (PRE); Riversdale Division, Waterval, 1500 ft [457 m], (-CD), 1 October 1923, *Muir 2899* (PRE). **3322 (Oudtshoorn)**: Prince Albert, In saxosis in summo monte Zwartberg pass, in dit, 5400 ped [among rocks near top of Swartberg Pass, 1646 m], (-AC), December 1904, *Bolus 11526* (PRE); In montibus Zwartebergen prope Prince Albert, 6100 ped [in Swartberg Mountain, near Prince Albert, 1859 m], (-AC), December 1905, *Bolus 11954* (BOL, PRE); Oudtshoorn Division, Swartberg, near Swartberg Pass, S side of summit, after fire, (-AC), 29 January 1961, *Esterhuysen 28820* (BOL); Swartberg Mountains, near top of Swartberg Pass, moist, rocky, sandy soil, steep S facing slope, 5200 ft [1585 m], (-AC), 5 November 1985, *Vlok 1230* (PRE). **3419 (Caledon)**: Caledon Division, Low ridges SW of Grabouw, (-AA), December 1924, *Pillans 4784* (BOL); Caledon District, North slope of Groenlandberg, on road NE of Lookout, 2500 ft [762 m], (-AA), 1 February 1962, *Taylor 3015* (PRE); Robertson Division, Boesman's Kloof Pass, at McGregor, (-BB?), October 1940, *Esterhuysen 4397* (BOL). **3420 (Bredasdorp)**: Protem area, Goereesoe 432 NW of Beacon, WNW of Spitzkop, silcrete hills, main kloof on S side, (-AD), 7 September 2000, *Oliver & Oliver 11617* (NBG, PRE).

Vague locality: Montagu Distr., Eendracht, 4300 ft [1311 m], (3319DB/3320CC), 23 September 1946, *Compton 18407* (NBG, BOL).

**Esterhuysen 32702*: In BOL there are 2 specimens with this collecting number: the specimen with barcode BOL155218 is a mixed collection of *Z. microcephala* subsp. *microcephala* and subsp. *glandulosa* Group B (also in PRE and S) while the specimen with barcode BOL155208 is *Z. montana* var. *grauii*.

20b. **Zyrphelis microcephala** subsp. **foliosa** *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011).

Type: South Africa, Western Cape, Worcester (3319): Ceres Division, North slopes of Skurfteberg range between Bertsberg and Buffelshoek Peak, lower sandy slopes, frequent after fire, 2000-3000 ft [610-914 m], (-AD), 10 October 1956, *Esterhuysen 26401* (M, holo.; BOL, PRE, iso.).

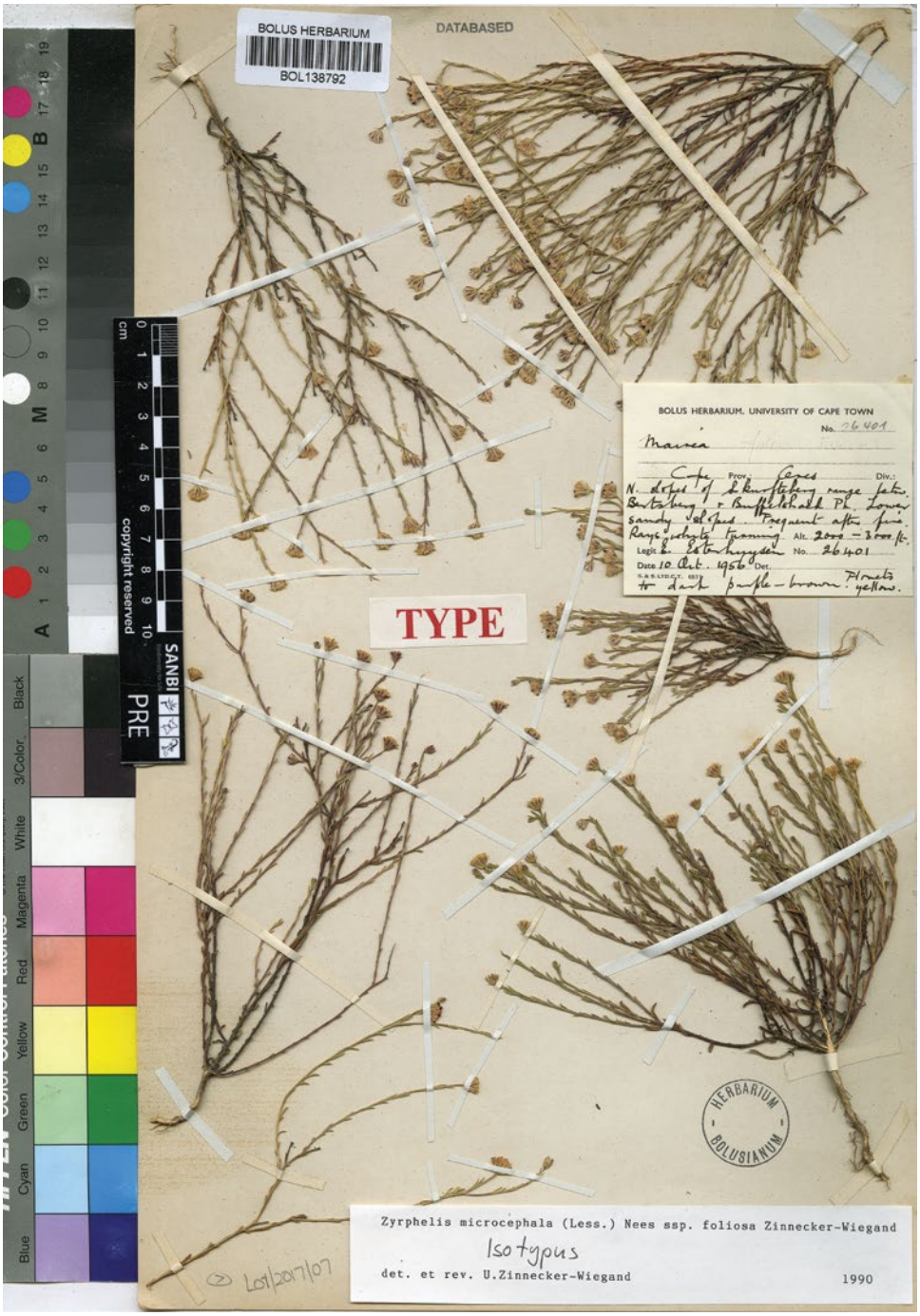


Figure 140. Scan of the isotype of *Zyrphelis microcephala* subsp. *foliosa* (*Esterhuysen 26401*, BOL).

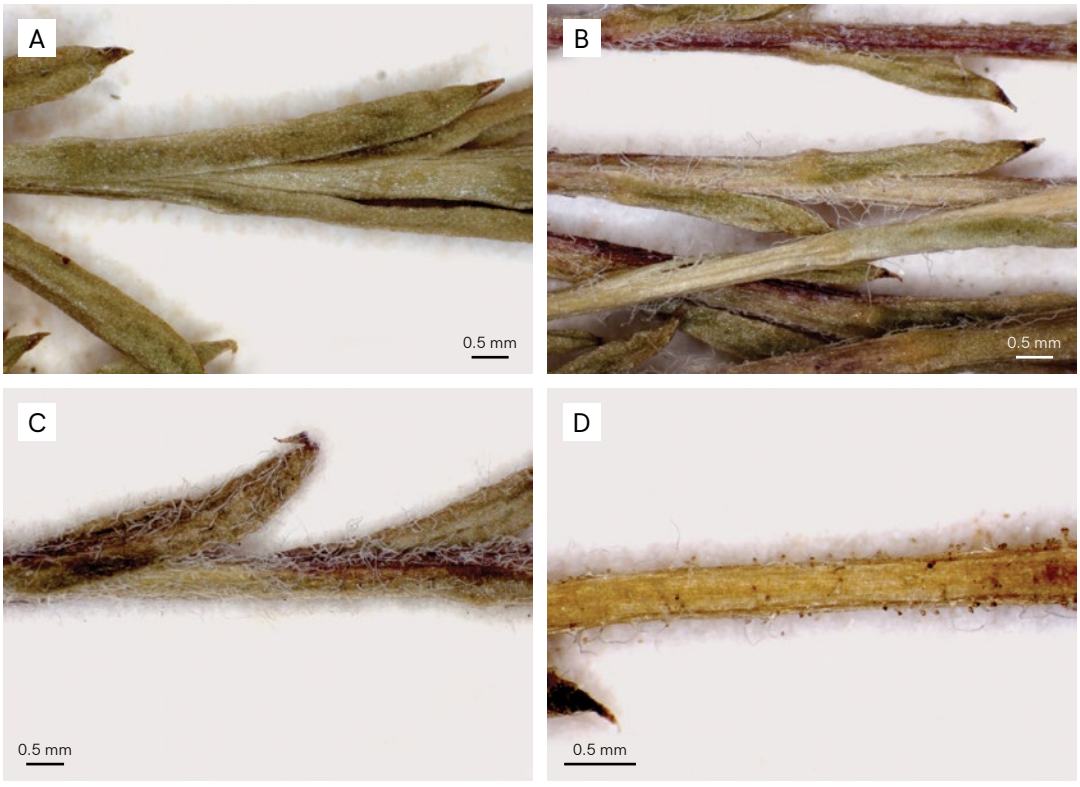


Figure 141. *Zyrphelis microcephala* subsp. *foliosa*: A, glabrous leaves (*Esterhuysen 21870*, PRE); B, glabrous but ciliate leaves (*Esterhuysen 26401*, PRE); C, bristly hairy leaves (*Esterhuysen 26401*, PRE); D, stipitate glandular and sparsely bristly hairy peduncle (*Esterhuysen 26401*, PRE).

± Caespitose, rarely more virgate, perennial herb, suffrutex or dwarf shrub, up to 350 mm high. *Stems* woody basally, often with old leaf-base remains, sometimes tinged reddish, glabrous or sparsely to more densely, (softly) bristly hairy. *Leaves* small, alternate, sessile, scattered along stems to more densely set, erect, appressed to stems or at a sharp angle, slightly folded lengthwise, ± semi-succulent, linear, linear-oblong, occasionally very narrowly obovate, 3.5–20.0(–22.0) × 0.5–1.5 mm, apex acute to acuminate, mucronate, often bristle-tipped mucronate, often recurved and often tinged reddish, margins short or long ciliate basally, ciliate all along or eciliate, surfaces glabrous, with few short bristle hairs along main vein abaxially or shortly bristly hairy all over abaxial surface, adaxial surface, when visible, glabrous. *Capitula* small, solitary, shortly pedunculate or almost sessile; *peduncle* (3–)5–15(–30) mm long, sometimes tinged reddish, (sparsely) stipitate glandular, (sparsely) bristly hairy, both often with reddish transverse walls, bracteate; *peduncular bracts* 0 to 3(5) per peduncle, linear, linear-triangular or very narrowly ovate, 1.5–4.0(–5.0) mm long, stipitate glandular and bristly hairy or glabrous, ciliate, sometimes with swollen bases, sometimes with oil glands along main vein. *Involucre* (narrowly) obconical, 3–5(–6) mm high, 4–7 mm across upper part. *Involucral bracts* arranged in 3 or 4 rows, imbricate, outer shorter than inner, apices often tinged reddish, usually with very characteristic row of ± torulose

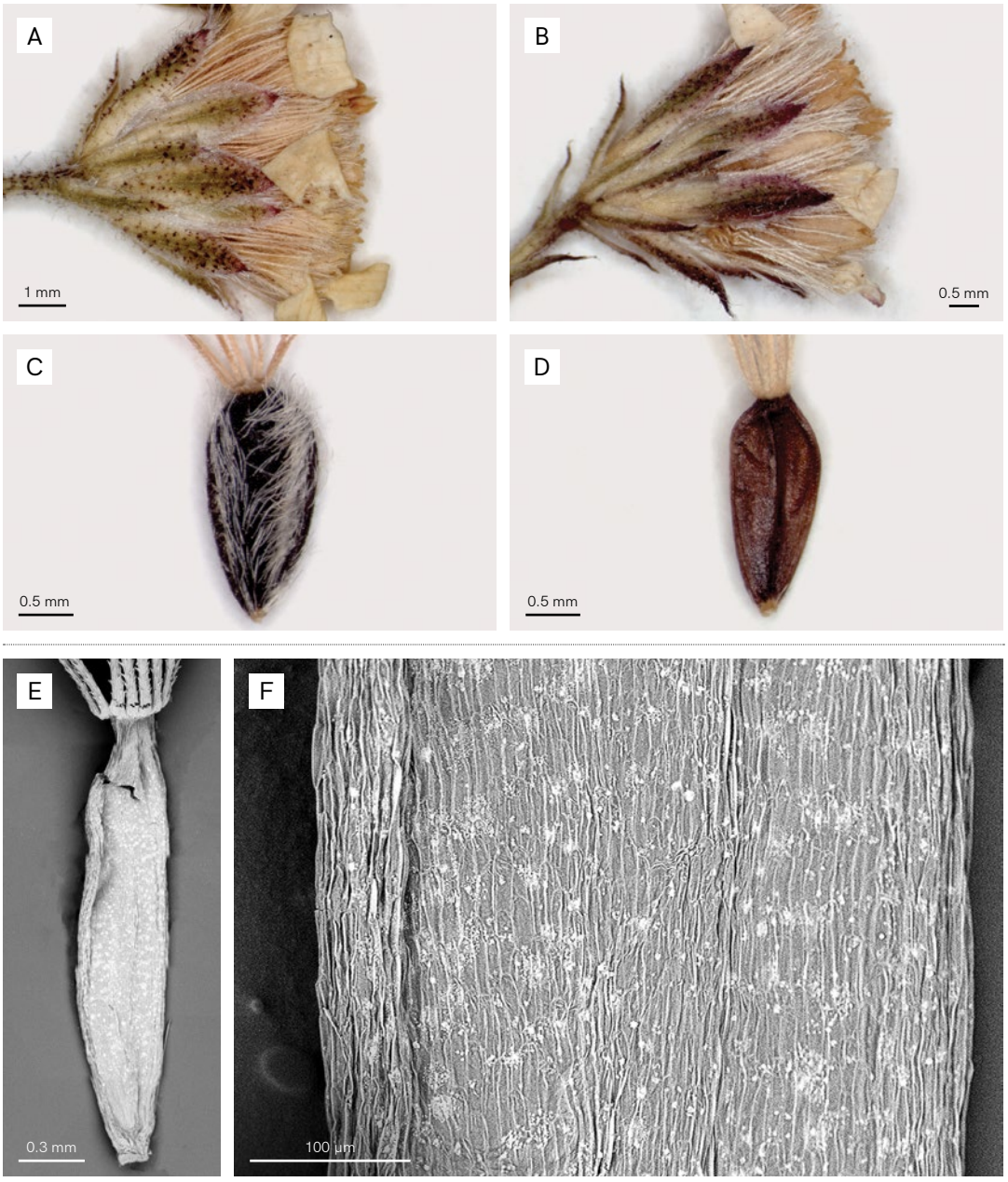


Figure 142. *Zyrphelis microcephala* subsp. *foliosa*: A, capitulum with reddish stipitate glandular hairs on narrowly obovate involucral bracts and torulose oil glands along main veins (*Thompson 1491*, PRE); B, capitulum with reddish stipitate glandular hairs on narrowly obovate involucral bracts (*Esterhuysen 26401*, PRE); C, hairy ray cypsela (*Esterhuysen 26401*, PRE); D, glabrous ray cypsela (*Esterhuysen 26401*, PRE); E, F, scanning electron micrographs of glabrous, sterile disc ovary (*Esterhuysen 26401*, PRE).

oil glands along main veins; *outer row* (very) narrowly ovate to ovate, narrowly triangular or rarely very narrowly elliptic, 2.0–3.0 × 0.4–1.0 mm, apex acute to acuminate, often with tuft of hairs, margin very narrowly membranous, with few longish cilia or fimbriate-ciliate, rarely eciliate, surfaces stipitate glandular, with or without few bristle hairs, sometimes slightly keeled, V-shaped thickened from base, stereome fenestrated; *second row* very narrowly ovate or narrowly triangular, narrowly elliptic to narrowly oblong or rarely narrowly obovate, (2.5–)3.2–3.5(–4.0) × (0.5–)0.6–1.0 mm, apex acute to acuminate, often with tuft of hairs, margin very narrowly membranous, ciliate or fimbriate-ciliate, surface stipitate glandular, with or without few bristle hairs, sometimes slightly keeled basally, V- or Y-shaped thickened from base, stereome fenestrated; *third row* narrowly oblong, narrowly obovate or narrowly elliptic, (3.0–)3.5–4.2 × (0.5–)1.0(–1.4) mm; apex acute to acuminate, often with tuft of hairs, margin (very) narrowly membranous, ciliate or fimbriate-ciliate, surface stipitate glandular, with or without few bristle hairs, (slightly) keeled, V- or Y-shaped thickened from base, stereome fenestrated; *fourth row* narrowly obovate or narrowly elliptic, (3.5–)3.8–4.0(–4.2) × 1.0–1.2(–1.4) mm, apex acute, margin (narrowly) membranous, ciliate in upper part or fimbriate-ciliate, surface stipitate glandular, with or without few bristle hairs, keeled (clasping ray cypsela), V- or Y-shaped thickened, stereome fenestrated. *Ray florets* female, fertile; corolla white or cream, turning dark purple brown, reddish purple or pink-reddish; *tube* 1.5–2.5 mm long, sometimes with glandular hairs below mouth; *limb* (2.5–)3.0–4.0 mm long, 4-veined, 3-lobed. *Style* 1.5–2.5(–3.0) mm long, bifurcate; *style branches* narrowly ovate, linear-triangular or linear-elliptic, 0.5–1.0 mm long, stigmatic areas marginal, confluent at apex. *Ovary* obovate or elliptic, 2.0(–2.5) mm long, densely filiform twin hairy. *Cypsela* blackish, reddish brown or dark brown, obovate, 2.0–2.5 × 1.0–1.2 mm, laterally compressed, margin thickened, with carpopodium, surfaces (densely) longish filiform twin hairy, apices of twin hairs acute; epicarpic cells ± colliculate in surface view or with globose protuberance towards pappus side of cypsela, smooth or slightly granular. One specimen on type sheet with glabrous ray cypselae: obovate, brown, margin slightly thickened, with carpopodium; epicarpic cells arranged ± in rows, ± oblong in surface view, ± smooth; with ring of filiform twin hairs at base. *Pappus bristles* 2–3 mm long, plumose, barbellate basally, persistent. *Disc florets* functionally male; corolla yellow, tubular; *tube* 2–3 mm long, sometimes with few glandular hairs, 5-lobed; *lobes* 0.5(–1.0) mm long, with few sub-apical glandular hairs, rarely also non-glandular hair. *Anthers* 1.0–1.5(–1.8) mm long, with (narrowly) ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.5–2.0(–2.4) mm long, bifurcate; *style branches* narrowly ovate or linear-triangular, 0.8–1.0 mm long, with deltoid, papillate apical appendages, without stigmatic areas. *Ovary* linear, very narrowly elliptic or very narrowly obovate, (1.0–)2.0–2.5 mm long, margin thickened, with carpopodium, glabrous or sometimes with few short filiform twin hairs at base and/or few longer twin hairs along margin; epicarpic cells ± elongated in surface view, smooth, flat. *Pappus bristles* 2.5–3.0 mm long, plumose, barbellate basally, persistent. *Flowering time*: September to December. Figures 140 to 143.

Diagnostic characters: *Zyrphelis microcephala* subsp. *foliosa* is characterised by the caespitose or rarely more virgate habit, the small, mostly appressed leaves, the small, almost sessile or shortly pedunculate capitula, the inner involucral bracts not 3-veined and the style branches of the disc florets without stigmatic areas. See Table 4 (pg. 114) for comparison with *Z. capensis* and *Z. foliosa*.

Distribution: The subsp. *foliosa* occurs on the Grasberg and in the Olifants River valley in the north to the southern end of the Skurweberg and the western end of the Hexrivierberge in the south (Figure 139).

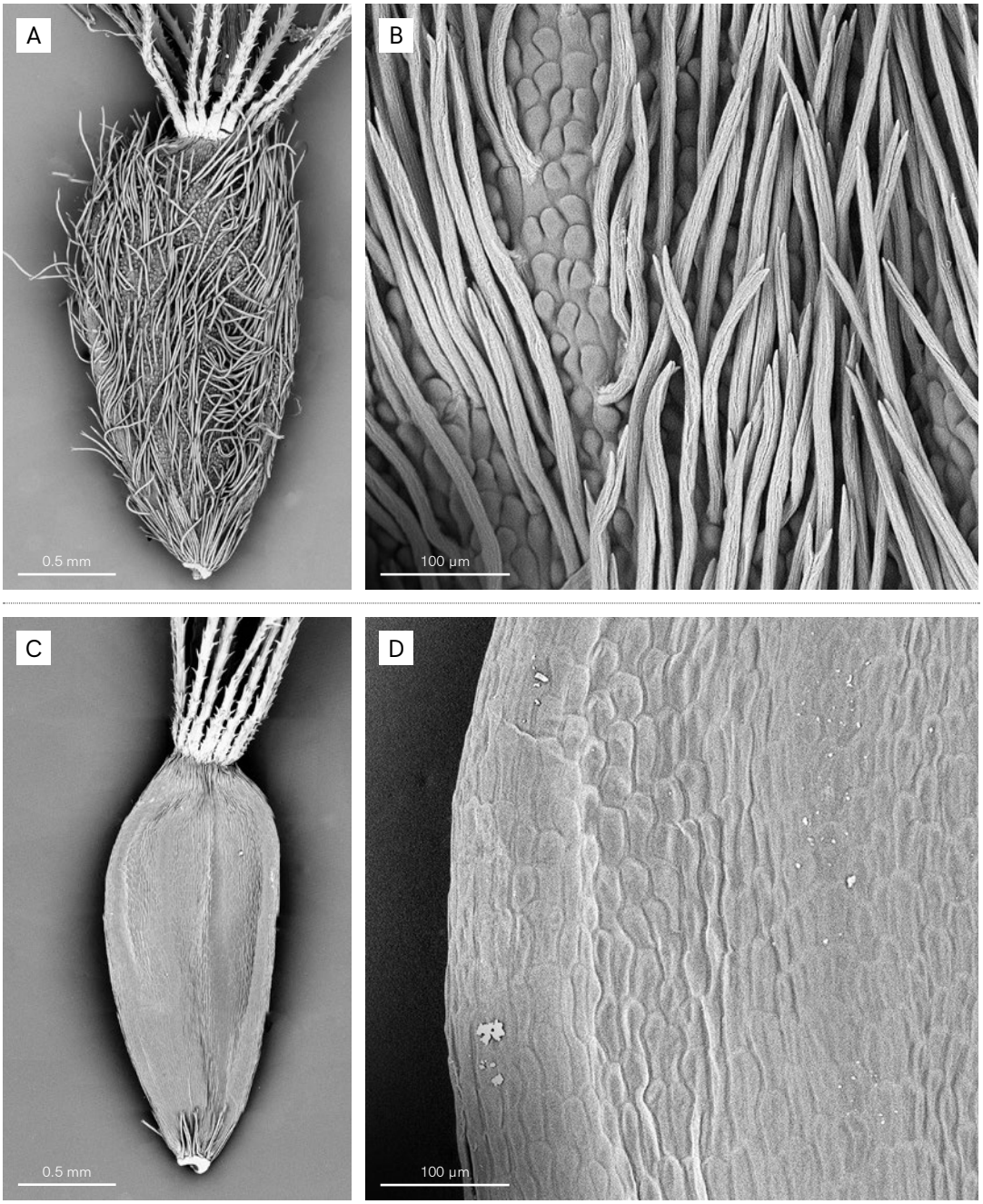


Figure 143. *Zyrphelis microcephala* subsp. *foliosa*: scanning electron micrographs of A, B, hairy ray cypsela showing the filiform twin hairs and colliculate, smooth epicarpic cells; C, D, glabrous ray cypsela with ± smooth, ± oblong epicarpic cells arranged in rows (all *Esterhuysen 26401*, PRE).

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Least Concern.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3219 (Wuppertal)**: Olifants River Valley: Grootfontein above Toorgat, sandy stony flat area, 1800 ft [549 m], (-CC), 29 September 1972, *Thompson 1491* (PRE); Clanwilliam Division, Middle east slopes of Grasruggens Mt, (-CC), 26 November 1938, *Pillans 8786* (BOL, PRE); Ceres Div., Cold Bokkeveld, Lindeshof, between De Keur and Boskloof, sandy-stony veld, (-CC/CD), 4 December 1974, *Nordenstam 7055* (S). **3319 (Worcester)**: Ceres Division, Mitchell's Pass, (-AD), 5 October 1941, *Esterhuysen 6196* (PRE); Mitchels Pass, (-AD), 1300 ft [396 m], 10 September 1896, *Schlechter 8939* (BOL, PRE ×2, S); Ceres Division, rocky lower north slopes of Schurfteberg, 5 miles [8 km] SE of Ceres, (-AD), 8 October 1953, *Esterhuysen 21870* (BOL, PRE).

20c. **Zyrphelis microcephala** subsp. **glandulosa** *Zinnecker-Wiegand* in Ortiz & Zinnecker-Wiegand, *Taxon* 60,4: 1197 (2011).

Type: South Africa, Western Cape, Simonstown (3418): Caledon Division, Steenbras river mouth, (-BB), 8 April 1946, *Parker 4046* (BOL, holo.; NBG, iso.).

Dwarf shrub, suffrutex or perennial herb, up to 300 mm high. *Stems* woody basally, sometimes tinged reddish, often with old leaf base remains, usually minutely stipitate glandular, densely hirsute or pilose to villous. *Leaves* alternate, sessile, scattered along stems to more densely set, erect or rarely apices slightly recurved, flat or rarely slightly folded lengthwise, linear, (linear-)oblong, (very) narrowly elliptic or very narrowly obovate, (4–)5–20(–23) × 0.5–2.0(–3.0) mm, apex acute or obtuse, often mucronate to bristle-tipped mucronate, margin entire or rarely with 1 minute tooth on some leaves, of upper leaves sometimes ciliate basally, surfaces on both sides minutely stipitate glandular, sparsely to densely hirsute or sparsely to densely pilose to villous, rarely without non-glandular hairs. *Capitula* small, radiate, solitary or rarely in few-headed open corymbs, pedunculate; *peduncle* 10–50 mm long, sometimes tinged reddish, hirsute or pilose to villous, minutely stipitate glandular, sometimes with slightly reddish transverse walls, bracteate, rarely ebracteate; *peduncular bracts* (0)1 to 9 per peduncle, upper leaves and lower bracts difficult to separate, very narrowly ovate, linear-triangular, linear or oblong, 1.5–5.0 mm long, hirsute or pilose to villous, minutely stipitate glandular, sometimes with embedded oil glands, sometimes with swollen bases. *Involucre* (narrowly) obconical, rarely ± cup-shaped, 3.0–4.5(–5.0) mm high, (3–)4–7(–10) mm across upper part. *Involucral bracts* arranged in 3 or 4 rows, imbricate, outer shorter than inner, apices often tinged reddish; *outer row* ovate to narrowly ovate, linear-triangular or narrowly oblong, 2.0–3.0(–3.4) × 0.2–0.6 mm, apex acute to acuminate, with tuft of hairs, margin very narrowly membranous, fimbriate, surface hirsute or pilose to villous, minutely stipitate glandular, V-shaped thickened, stereome fenestrated, rarely 3-veined, with oil glands along vein(-s); *second row* (very) narrowly ovate, (very) narrowly elliptic or very narrowly obovate, 2.5–4.0(–4.8) × (0.4–)0.5–1.0(–1.2) mm, apex acute to acuminate, with tuft of hairs, margin narrowly membranous, fimbriate-ciliate, surface hirsute or pilose to villous, minutely stipitate glandular, sometimes slightly keeled, V- or Y-shaped thickened, stereome fenestrated, sometimes 3-veined, with oil glands along vein(-s); *third row* (very) narrowly obovate, oblong to narrowly elliptic, rarely narrowly ovate, 3.2–3.6(–4.8) × (0.6–)0.8–1.0(–1.4) mm, apex acute to acuminate, margin narrowly membranous, fimbriate, ciliate around apex, surface not or sparsely hirsute or pilose to villous, minutely stipitate glandular, keeled, V- or Y-shaped thickened, stereome

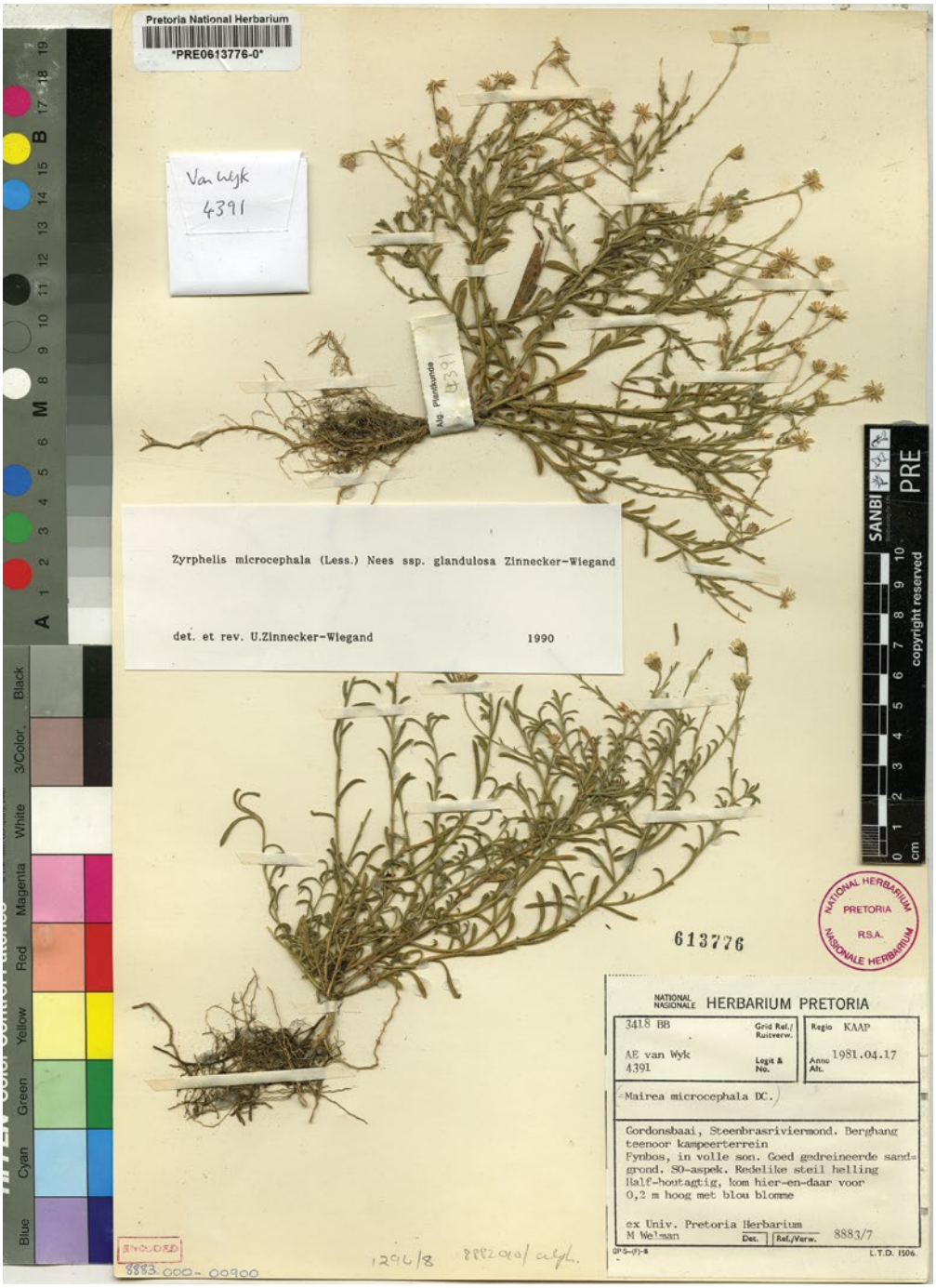


Figure 144. Scan of *Zyrphelis microcephala* subsp. *glandulosa* Group A specimen (*Van Wyk 4391*, PRE).



Figure 145. Scan of *Zyrphelis microcephala* subsp. *glandulosa* Group B specimen (*Esterhuysen 15596*, BOL).

fenestrated, 3-veined, with oil glands along veins; *fourth row* (very) narrowly obovate or narrowly elliptic to elliptic, 3.5(–4.2) × (0.5–)1.0(–1.4) mm, apex acute or obtuse, margin membranous, ciliate in upper part, surface minutely stipitate glandular, sometimes sparsely hirsute or pilose to villous, keeled, V- or Y-shaped thickened, stereome fenestrated, 3-veined, with oil glands along veins. *Ray florets* female, fertile; corolla white, mauve to pale mauve, blue, saxe blue, pale saxe blue, violet to violet-pink, drying purplish mauve or reddish purple; *tube* 1–2 mm long, with few glandular hairs in upper part and around mouth; *limb* 2.5–4.0(–6.0) mm long, 4-veined, 3-lobed. *Style* 1.0–1.8 mm long, bifurcate; *style branches* linear, linear-elliptic, linear-ovate or ovate, 0.4–1.0 mm long, stigmatic areas marginal, confluent at apex. *Ovary* narrowly obovate or elliptic, 1.5–2.0(–2.8) mm long, margin thickened, densely filiform twin hairy. *Cypsela* brown, reddish brown, dark reddish brown or dark brown to blackish, obovate, 2–3 × 1.0–1.2(–1.8) mm, laterally compressed, margin slightly thickened, with carpopodium, surfaces (densely) filiform twin hairy, apices of twin hairs acute; epicarpic cells ± colliculate in surface view or with globose protuberance towards pappus side of cells, smooth or sparsely granular. *Pappus bristles* 1.5–3.0 mm long, plumose, barbellate to nude basally, persistent. *Disc florets* functionally male; corolla yellow, *tube* (1.5–)2.0–2.5(–3.0) mm long, sometimes with occasional glandular hair in lower part, 5-lobed; *lobes* 0.5(–1.0) mm long, with sub-apical glandular hairs, rarely with single non-glandular hair on some lobes, resin ducts along margins. *Anthers* 1.0–1.5(–1.8) mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.0–2.0(–2.5) mm long, bifurcate; *style branches* linear or (narrowly) ovate, deltoid, 0.5–1.0 mm long, all without or all with stigmatic areas basally and deltoid, papillate apical appendages or some outer with short marginal stigmatic areas basally, inner without stigmatic areas. *Ovary* linear, elliptic or narrowly obovate, 1.0–2.0(–2.5) mm long, margin thickened, with carpopodium, glabrous or glabrous but with occasional filiform twin hair along margin and around base, rarely some outer sparsely to ± densely twin hairy. *Pappus bristles* 2–3 mm long, plumose, barbellate to nude basally, fewer than in ray florets, persistent. *Flowering time*: July, September, October, December, January and April. Figures 144 to 148.

Diagnostic characters: *Zyrphelis microcephala* subsp. *glandulosa* is characterised by the stems and leaves which are minutely stipitate glandular. It can be confused with some specimens of *Z. foliosa* with almost sessile capitula, but that taxon does not have glandular leaves.

Two informal groups are recognised

Group A occurs on the mountains near the sea. They have dense hirsute stems and leaves, the leaves are slightly longer and broader: 5–15(–23) × (0.5–)1.0–2.0(–3.0) mm, shorter peduncles: (10–)15–35 mm, more peduncular bracts: (1)2 to 9 per peduncle, involucral bracts hirsute, a shorter ray limb: 2.5–3.0(–3.5) mm, the disc style branches are without stigmatic areas and flowering occurs later in the season: December, January and April.

Gillett 1482 (STE in NBG) probably belongs to this group, but it has an almost virgate growth form.

Group B occurs on the mountains further inland. They have sparsely to densely, pilose to villous stems and leaves, slightly shorter and narrower leaves: (4–)5–14(–20) × 0.5–1.0(–2.0) mm, longer peduncles: 10–50 mm, fewer peduncular bracts: 0 to 3 per peduncle, involucral bracts pilose or villous, a longer

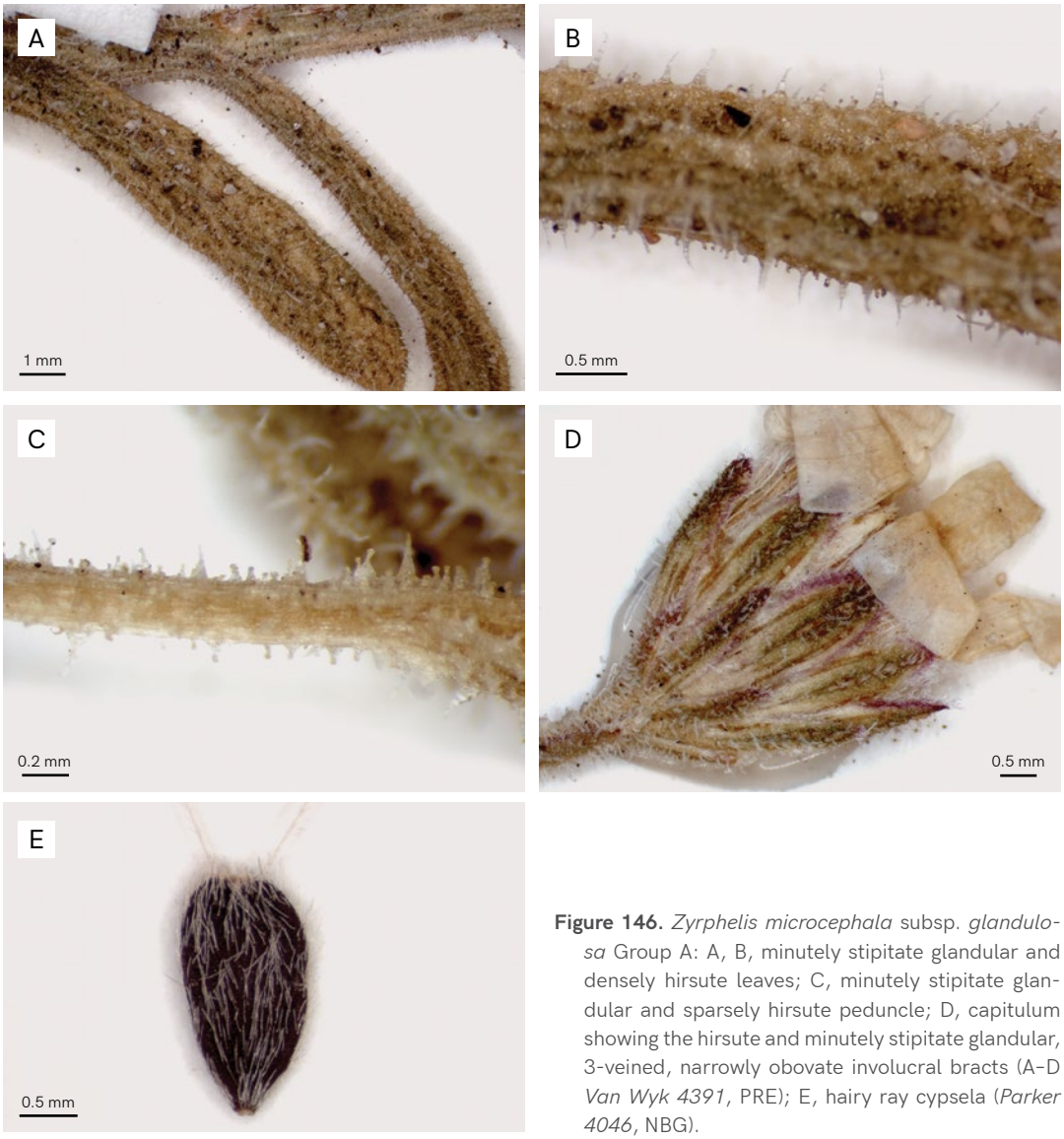


Figure 146. *Zyrphelis microcephala* subsp. *glandulosa* Group A: A, B, minutely stipitate glandular and densely hirsute leaves; C, minutely stipitate glandular and sparsely hirsute peduncle; D, capitulum showing the hirsute and minutely stipitate glandular, 3-veined, narrowly obovate involucral bracts (A–D *Van Wyk 4391*, PRE); E, hairy ray cypsela (*Parker 4046*, NBG).

ray limb: (3–)4(–6) mm and the disc style branches have stigmatic areas, rarely innermost florets without stigmatic areas and flowering occurs earlier in the season: July, September and October.

Esterhuysen 32702: In BOL there are two specimens with this collecting number: the specimen with barcode BOL155218 is a mixed collection of *Z. microcephala* subsp. *microcephala* and subsp. *glandulosa* (also in PRE) while the specimen with barcode BOL155208 is *Z. montana* var. *grauii*. *Esterhuysen*

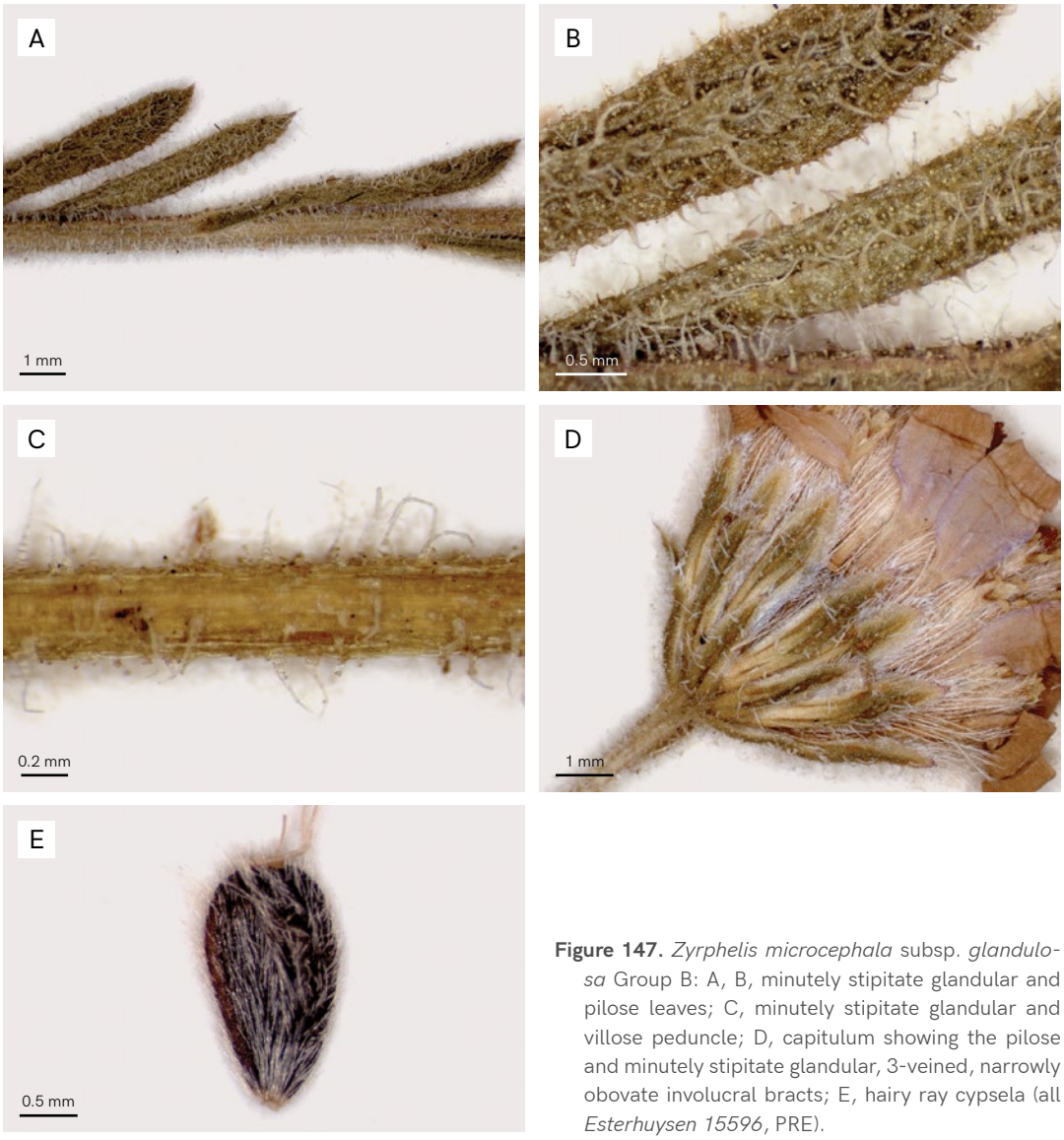


Figure 147. *Zyrphelis microcephala* subsp. *glandulosa* Group B: A, B, minutely stipitate glandular and pilose leaves; C, minutely stipitate glandular and villose peduncle; D, capitulum showing the pilose and minutely stipitate glandular, 3-veined, narrowly obovate involucral bracts; E, hairy ray cypsela (all *Esterhuysen 15596*, PRE).

32702 (BOL, PRE) is a mixed collection consisting of both *Z. microcephala* subsp. *microcephala* and subsp. *glandulosa* Group B specimens.

Compton 3474 (BOL): This specimen represents a transitional form between the two groups. It has hirsute stems, leaves and involucral bracts, short peduncles (5–8 mm long) and disc style branches without stigmatic areas – characters of Group A. The leaves are 4–10 × 1.0–1.2 mm, up to 3 peduncular

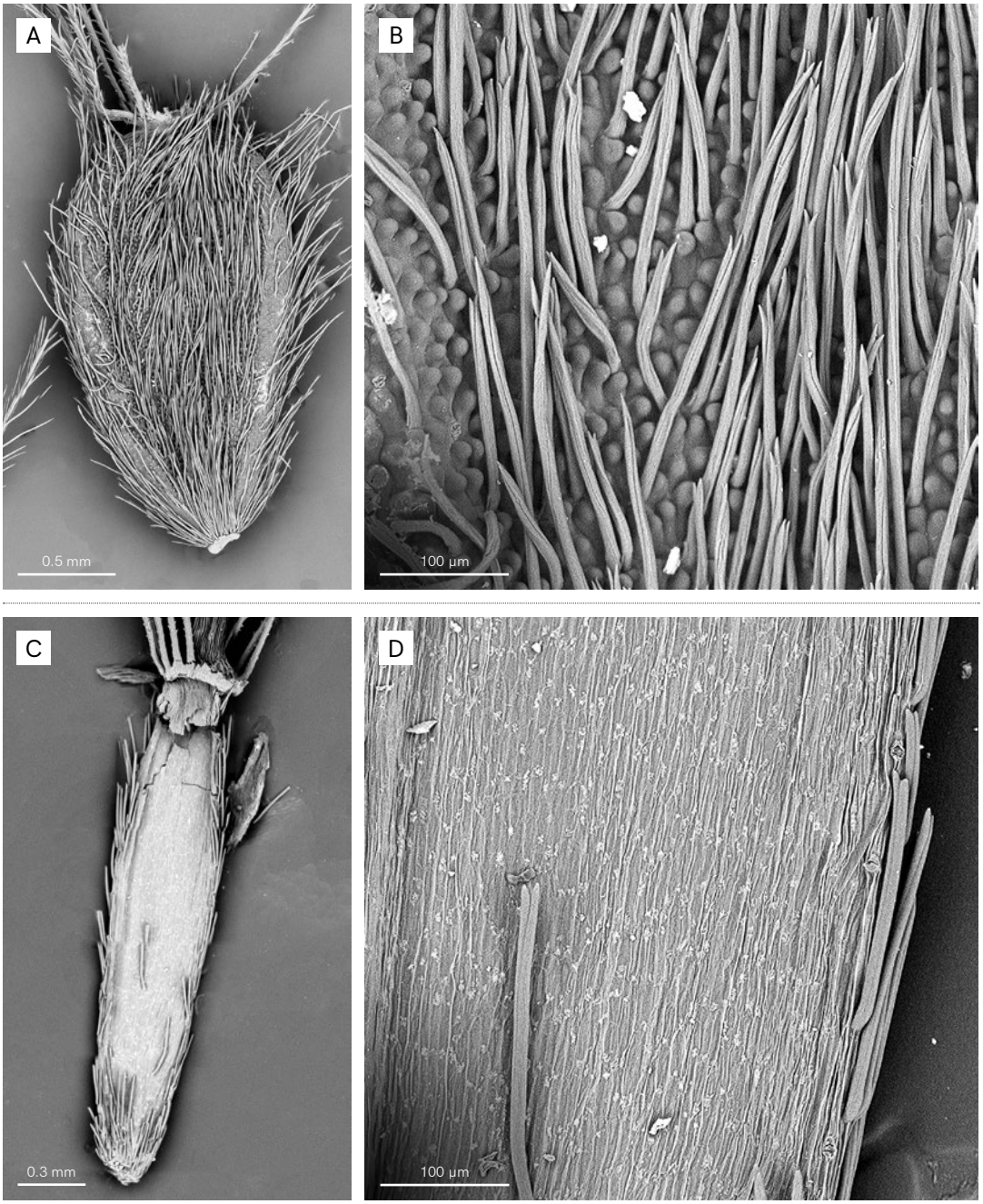


Figure 148. *Zyrphelis microcephala* subsp. *glandulosa* Group B: scanning electron micrographs of A, B, hairy ray cypsela showing the filiform twin hairs and smooth epicarpic cells with acentric protuberances (*Esterhuysen 15596*, PRE); C, D, disc ovary with few twin hairs (*Esterhuysen 18903*, PRE).

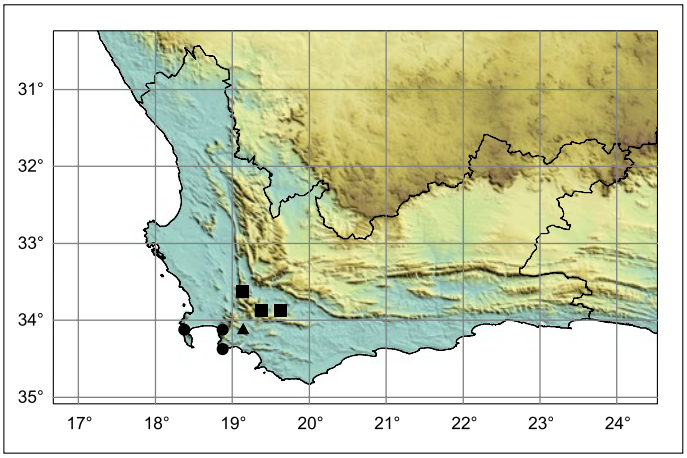


Figure 149. Distribution of *Zyrphelis microcephala* subsp. *glandulosa* Group A ●; and Group B ■; in between specimen – link ▲.

bracts, the ray limb is 5 mm long and flowering was recorded for September – characters of Group B. It grows on inland mountains.

Distribution: Group A occurs on Constantiaberg and the Kogelberg. Group B occurs in the Slanghoek-, Dutoitskloof-, Wemmershoek-, Stettyns- and western end of the Riviersonderendberge (Figure 149).

Conservation status: According to Von Staden (2012) the Red List status of this taxon is Least Concern.

Additional specimens examined:

Group A (coastal mountains): SOUTH AFRICA. WESTERN CAPE. **3418 (Simonstown)**: Simonstown, West of and below old manganese mine, Plot 281/24 [Constantiaberg], Table Mountain Sandstone scree slope, very steep, 80 ft [24 m], (-AB), 5 December 1969, *Boucher 954* (PRE); Caledon Division, Steenbras, (-BB), January 1936, *Gillett 1481* (BOL); Gordonsbaai, Steenbras River Mouth, mountain slope (berghang) opposite camping area, SE aspect, steep slope, (-BB), 17 April 1981, *Van Wyk 4391* (PRE); 8 km N of Rooi Els, dry western slope, (-BD), 16 April 1974, *Goldblatt & Gentry 1621* (PRE, S).

Group B (inland mountains): SOUTH AFRICA. WESTERN CAPE. **3319 (Worcester)**: Worcester Division, Du Toits Kloof, sandy slopes at N end, N aspect, (-CA), 6 October 1951, *Esterhuysen 18903* (PRE); Worcester Division, Du Toits Kloof, slopes, W aspect, (-CA), 7 September 1958, *Esterhuysen 27893* (BOL); Wellington, Bains Kloof, roadside, 900 ft [274 m], (-CA), 25 October 1944, *Levyns 7633* (BOL); Worcester Division, Rocky lower slopes on eastern side of Stettynsberg, 3000 ft [914 m], (-CD), 31 July 1949, *Esterhuysen 15596* (BOL, NBG, PRE); Caledon District, Boschesveld Mountains, E of Villiersdorp en route to Jonas Kop, in a small open kloof on the N slopes, 3000 ft [914 m], (-DC), 19 October 1971, *Esterhuysen 32702* (BOL, PRE, S) [see note on pg. 222].

Transitional form: SOUTH AFRICA. WESTERN CAPE. **3419 (Caledon)**: Caledon Div., Houw Hoek Pass, (-AA), 3 September 1924, *Compton 3474* (BOL).

21. *Zyrphelis lasiocarpa* (DC.) Kuntze, *Revisio generum plantarum*: 374 (1891); Nesom: 92 (1994); Goldblatt & Manning: 372 (2000); Manning & Goldblatt: 431 (2012).

(Figures 150–159)

Mairia lasiocarpa DC.: 218 (1836); Harv. in Harv. & Sond.: 65 (1865); Bond & Goldblatt: 180 (1984).

Felicia lasiocarpa (DC.) Compton: 312 (1931), non Felicia lasiocarpa DC.: 221 (1836).

Type: South Africa, Western Cape, Caledon (3419): Zwarteberg und Umgegend des Bades (51:8), 1000–2000 ft [Swartberg and in the neighbourhood of the Baths, 305–610 m], (-AB), August 1837, *Ecklon & Zeyher s.n.* or 273 (S-G-3917) (S lecto., designated here; (G00495686) G-DC e, P, e; S (S07-14751), isolecto.). [*Ecklon & Zeyher* locality as given in Glen & Germishuizen (2010)]

Taxonomic notes:

1. Candolle (1836) did not refer to a specific *Ecklon & Zeyher* specimen – he quoted: Cap Bonae-Spei in distr. Caledon leg. cl. Ecklon! et Zeyh. As there were several *Ecklon & Zeyher* specimens collected from the Caledon district, *Ecklon & Zeyher* as indicated above is chosen as the lectotype.
2. *Ecklon & Zeyher* 227/51.7 (SAM0037779-0) (SAM in NBG), *Ecklon & Zeyher* 1167/51.7 (1835) (G00495666) (G-DC e): these specimens cannot be quoted as isotypes as they were apparently collected in July (51.7).

Mairia caledonica Hutch., *ined*. (name written in pencil on K specimen).

Felicia caledonica Hutch. ex Compton: 312 (1931), *nom illeg*.

Type: South Africa, Western Cape, Caledon (3419): Houw Hoek [Houwhoek], (-AA), 3000 ft [914 m], 4 February 1896, *Schlechter 7338* (K, P e; PRE).

Taxonomic note: Hutchinson seemed to be of the opinion that *Mairia caledonica* is different from *Mairia lasiocarpa*, and wrote the name *Mairia caledonica* in pencil on the Kew sheet but did not formally describe it. Compton (1931) seemed to agree that this was a different species and listed the name as a synonym under *Felicia*, but also did not formally describe it.

Dwarf shrub, suffrutex, annual or perennial herb. *Stems* woody basally, sometimes tinged reddish, glabrous or bristly hairy. *Leaves* alternate, sessile, densely set to scattered along stems, margins entire, surfaces glabrous or bristly hairy. *Capitula* radiate, solitary, pedunculate. *Peduncle* stipitate glandular, bristly hairy, bracteate. *Involucre* obconical, campanulate or rarely cup-shaped. *Involucral bracts* in 3 or 4 rows, imbricate, outer shorter than inner, apices acute to acuminate, surfaces stipitate glandular, bristly hairy, inner usually 3-veined. *Ray florets* female, fertile. *Style* bifurcate; *style branches* with marginal stigmatic areas, confluent at apex. *Cypselae* obovate or elliptic, with long filiform twin

hairs. *Pappus bristles* persistent, plumose, barbellate to nude basally. *Disc florets* functionally male. *Anthers* with ovate apical appendages, minutely caudate, filament collars thickened. *Style* bifurcate; *style branches* with short marginal stigmatic areas basally, not confluent, with deltoid papillate apical appendages, or without stigmatic areas. *Ovaries* glabrous or sparsely twin hairy. *Pappus bristles* persistent, plumose, barbellate to nude basally.

Key to varieties

1a. Virgate or caespitose dwarf shrubs up to 400 mm high, branches woody . . . 21a. var. *lasiocarpa*
1b. Annual or perennial herbs or suffrutices, up to 250 mm high, branches herbaceous . . . . . 21b. var. *minor*

21a. **Z. lasiocarpa** var. **lasiocarpa**

Erect virgate or caespitose dwarf shrub or suffrutex, up to 400 mm high, branches woody basally, upper parts sometimes tinged reddish, glabrous or sparsely to densely bristly hairy. *Leaves* alternate, sessile, densely set or scattered along stems, erect, rarely slightly curved, flat or slightly folded lengthwise, or flat basally, folded upwards, linear, linear-triangular, linear-elliptic, or rarely very narrowly obovate, 7–35(–40) × 1–2 mm, apex acute, mucronate or bristle-tipped mucronate, margins entire, margins of lower leaves eciliate, with remnants of broken-off cilia, shortly ciliate towards leaf base or shortly ciliate all along, margins of middle and upper leaves long and sometimes densely ciliate all along or towards leaf base, cilia fewer and shorter towards leaf apex, apical part of leaf margin eciliate or sometimes margins without any cilia, surfaces glabrous or lower surface (sparsely) bristle hairy, upper surface, where visible, with occasional long bristle hair near apex, or bristly hairy all over on both sides, often with embedded oil glands. *Capitula* radiate, solitary, rarely few corymbosely arranged, terminal, pedunculate; *peduncle* (20–)25–100(–150) mm long, sparsely to densely stipitate glandular, sparsely or densely bristly hairy, mostly all with reddish transverse walls, sometimes only faintly red/pink transverse walls or glands and hairs colourless, bracteate; *peduncular bracts* (0)1 to 4(5) per peduncle, linear, linear-triangular, narrowly ovate to linear-ovate, 2–10 mm long, (sparsely) stipitate glandular, (sparsely) bristly hairy or not, bases often swollen, often with embedded oil glands, margins usually ciliate. *Involucre* broadly obconical or campanulate, 5–8 mm high, 6–13 mm across upper part. *Involucral bracts* in 3 or 4 rows, imbricate, apices often reddish, glands and hairs colourless, rarely some with reddish transverse walls; *outer row* linear-triangular, narrowly triangular, linear, very narrowly ovate, very narrowly obovate, (2.5–)3.0–4.5(–4.6) × 0.5–1.0 mm, apex acute to acuminate, with tuft of hairs, margins narrowly membranous, ciliate-fimbriate, surface (sparsely) stipitate glandular or rarely eglandular, (sparsely) bristly hairy or sometimes few thickish white hair sub-apically or glabrous, often V-shaped thickened basally, stereome fenestrated, sometimes with oil glands along main vein; *second row* linear, linear-triangular, very narrowly ovate, narrowly elliptic or narrowly oblong, (3.5–)3.8–5.0(–6.2) × (0.4–)0.5–1.0 mm, apex acute or acuminate, usually with tuft of hairs, margin narrowly membranous, fimbriate-ciliate, surface (sparsely) stipitate glandular or rarely eglandular, (sparsely) bristly hairy or sometimes few thickish white hair sub-apically, sometimes slightly keeled, V-shaped thickened, stereome fenestrated, sometimes 3-veined, with oil glands along vein(-s); *third row* narrowly oblong, linear, very narrowly obovate, very narrowly elliptic or very narrowly ovate, 5.0–7.2 × (0.5–)0.8–1.0(–1.4) mm,

A



Figures 150. Scans of *Zyrphelis lasiocarpa* var. *lasiocarpa* specimens to show the variation in growth form: A, *Leighton 2040* (BOL); B, *Van der Merwe 2202* (PRE); C, *Kruger 1789* (SAASVELD in PRE).

B



Figures 150 (continued). Scans of *Zyrphelis lasiocarpa* var. *lasiocarpa* specimens to show the variation in growth form: A, *Leighton 2040* (BOL); B, *Van der Merwe 2202* (PRE); C, *Kruger 1789* (SAASVELD in PRE).

C



Figures 150 (continued). Scans of *Zyrphelis lasiocarpa* var. *lasiocarpa* specimens to show the variation in growth form: A, *Leighton 2040* (BOL); B, *Van der Merwe 2202* (PRE); C, *Kruger 1789* (SAASVELD in PRE).

apex acute to acuminate, margin membranous, ciliate-fimbriate, more densely so towards apex, surface (sparsely) stipitate glandular or eglandular, (sparsely) bristly hairy, keeled, Y-shaped thickened, stereome fenestrated, usually 3-veined but not always very clear, with oil glands along vein(-s); *fourth row* narrowly oblong, very narrowly obovate or narrowly elliptic, (5.0–)5.5–7.0 × 0.6–1.2(–1.5) mm, apex acute to acuminate, margin membranous, ciliate-fimbriate, more densely so towards apex, surface usually (sparsely) stipitate glandular or rarely eglandular, (sparsely) bristly hairy or glabrous, keeled, Y-shaped thickened, stereome fenestrated, 3-veined but not always clear, oil glands along veins. *Ray florets* female, fertile, corolla purple, mauve or blue; *tube* 2–3(–4) mm long, with glandular hairs all along tube or upper part only and around mouth; *limb* (3–)4–8 mm long, 4-veined, 3-dentate/-lobed. *Style* 1.5–2.5(–4.0) mm long, bifurcate; *style branches* linear or linear-elliptic, (0.5–)0.8–1.0(–1.4) mm long, stigmatic areas marginal, confluent at apex. *Ovary* (narrowly) obovate, (2.0–)2.5(–3.0) mm long, densely, longish filiform twin hair sericeous; epicarpic cells (where visible) arranged ± in rows, with small protuberance ± in centre of cell or towards pappus side of cells, smooth. *Cypsela* brown, reddish brown, (narrowly) obovate or (broadly) elliptic, 2.5–4.0 × (1.0–)1.5–2.0 mm, laterally compressed, margin thickened, with carpopodium, surface sparsely to densely (long) filiform twin hairy, apices of twin hairs acute, rarely glabrous; epicarpic cells in surface view areolate to slightly colliculate, flat or sometimes with slight protuberance, smooth or faintly granular; in glabrous cypsela epicarpic cells arranged ± in rows, flat, smooth. *Pappus bristles* persistent, 2.5–4.0 mm long, plumose, barbellate basally; often with minute bristles alternating with the long bristles but hidden by twin hairs and not easily observed. *Disc florets* functionally male; corolla yellow, tubular; *tube* 2.5–3.0 mm long, glabrous or often with glandular hairs in lower part, 5-lobed; *lobes* 0.5–1.0 mm long, with sub-apical glandular hairs and occasional non-glandular hair, mostly with resin ducts along margins. *Anthers* 1–2 mm long, with ovate apical appendages, minutely caudate, filament collars thickened. *Style* 1.5–3.0(–3.2) mm long, bifurcate; *style branches* linear, elliptic or narrowly ovate, 0.8–1.0 mm long, stigmatic areas marginal, basally, with deltoid papillate apical appendages, or without stigmatic areas. *Ovary* linear, narrowly elliptic or (very) narrowly obovate, (1.8–)2.0–3.0 mm long, margin thickened, with carpopodium, surface glabrous or glabrous but with longish filiform twin hairs along margins and/or around base or surfaces sparsely to densely twin hairy; epicarpic cells ± oblong in surface view, flat, ± smooth or ± faintly striated. Some *outer disc ovaries* develop into pseudo-cypselae: brownish, obovate or elliptic, 3.0(–3.5) × (1.0–)1.2(–1.4) mm, laterally compressed, margin thickened, with carpopodium, surface usually glabrous, sometimes sparsely filiform twin hairy along margin and/or around base; epicarpic cells ± oblong in surface view, flat, ± smooth. *Pappus bristles* persistent, (2.5–)3.0–4.0 mm long, plumose, barbellate to nude basally; often with minute bristles alternating with the long bristles. *Flowering time*: (January, March) April to December. Figures 150 to 154.

Diagnostic characters: *Zyrphelis lasiocarpa* var. *lasiocarpa* are virgate or caespitose dwarf shrubs up to 400 mm high with woody branches and can be recognised by the flat or slightly folded lengthwise, glabrous or (sparsely) bristle hairy and ciliate, linear, linear-triangular or linear-elliptic leaves, the sparsely to densely stipitate glandular and bristly hairy peduncles, all the hairs mostly with reddish transverse walls, the (sparsely) stipitate glandular and (sparsely) bristly hairy, narrow involucral bracts with acute to acuminate apices in both the inner and outer involucral bracts, the inner involucral bracts usually 3-veined, the glands and hairs on the involucral bracts usually colourless, the purple, mauve or blue ray florets, the sparsely to densely (long) filiform twin hairy cypselae and the persistent plumose pappus bristles. It can be distinguished from *Z. taxifolia* by the stipitate glandular hairs and



Figure 151. *Zyrphelis lasiocarpa* var. *lasiocarpa*: A, bristly hairy leaves (*Leighton 2040*, PRE); B, glabrous but ciliate leaves (*Schlechter 5582*, PRE); C, stipitate glandular and bristly hairy peduncle (*Leighton 2040*, PRE); D, capitulum showing the narrow, acuminate, stipitate glandular and bristly hairy, 3-veined involucral bracts (*Leighton 2040*, PRE); E, hairy ray cypsela (*Leighton 2040*, PRE); F, glabrous disc pseudo-cypsela with thickened margin (*Leighton 2040*, PRE).

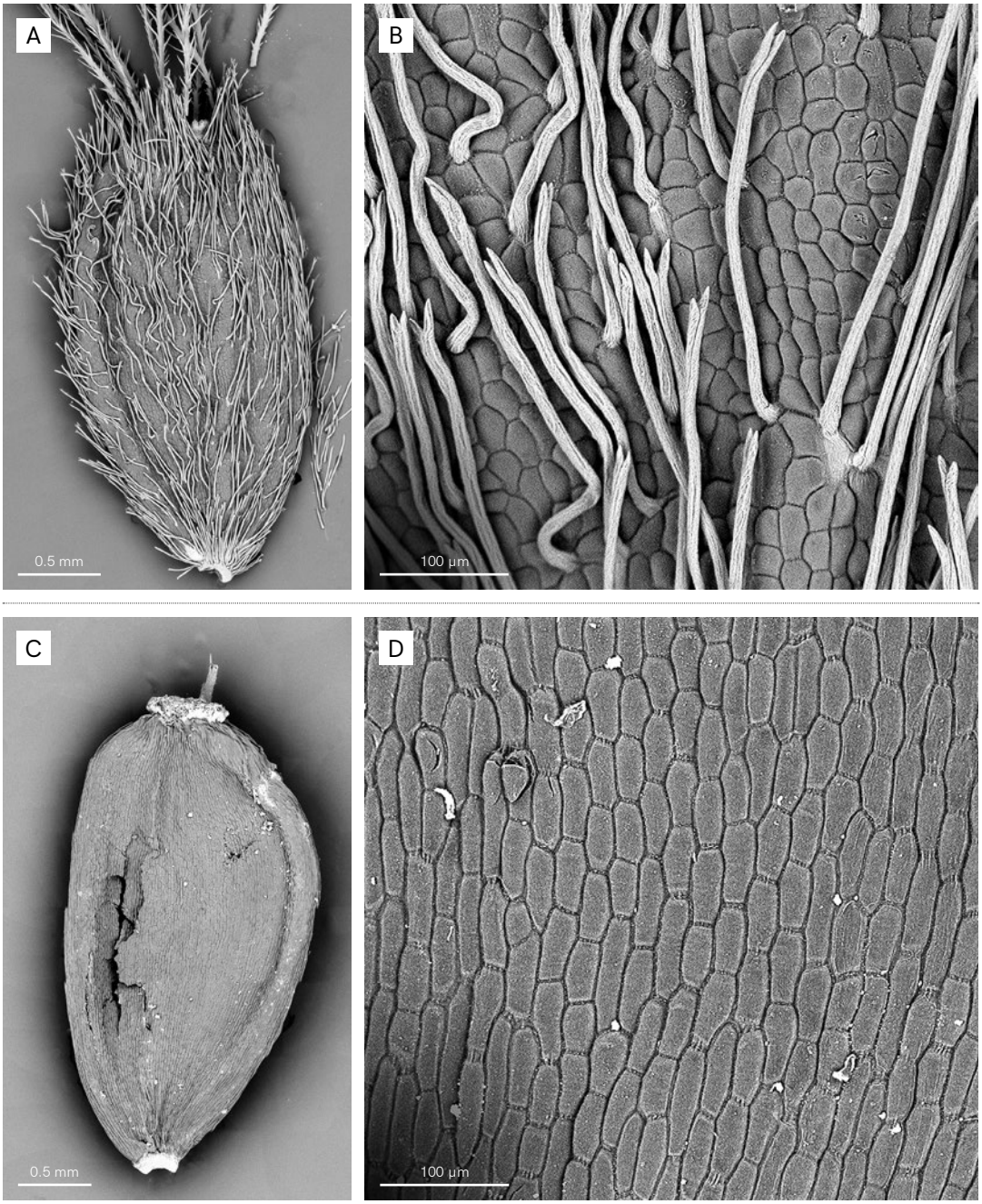


Figure 152. *Zyrphelis lasiocarpa* var. *lasiocarpa*: scanning electron micrographs of A, B, hairy ray cypsela showing the filiform twin hairs and areolate, ± flat, smooth epicarpic cells (*Leighton 2040*, PRE); C, D, glabrous ray cypsela with epicarpic cells arranged ± in rows, flat, smooth (*Schlechter s.n.* TvlMus405, PRE).

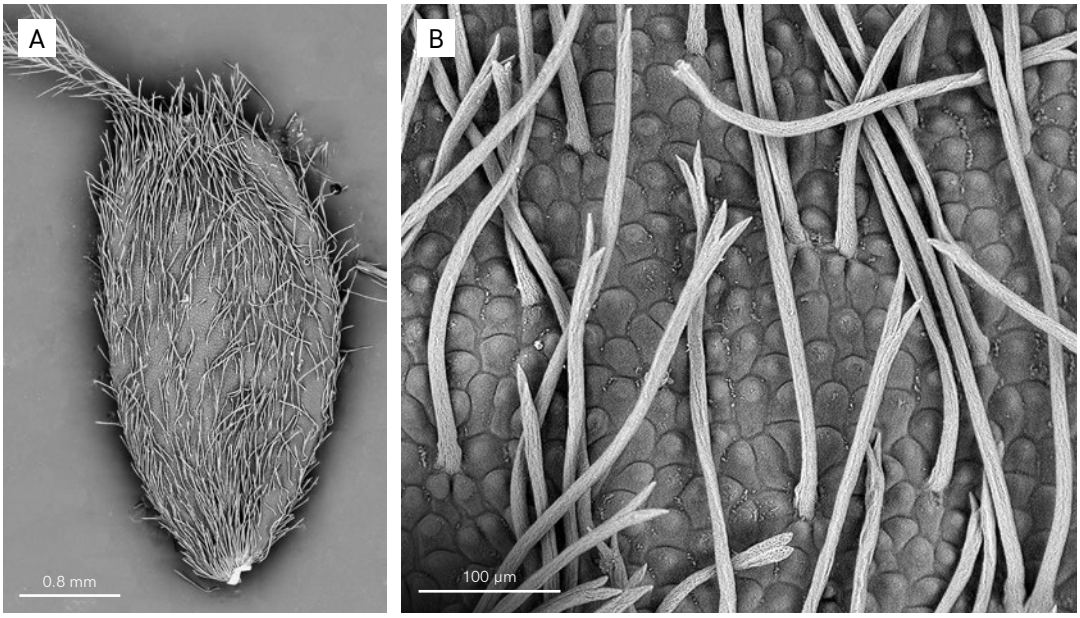


Figure 153. *Zyrphelis lasiocarpa* var. *lasiocarpa*: scanning electron micrographs of A, B, hairy ray cypsela showing the filiform twin hairs and smooth epicarpic cells with central or acentric protuberances (*Strey 909*, PRE).

bristle hairs on the peduncles and the dense, (long) filiform twin hairy ray cypselae. In *Z. taxifolia* the peduncles are clothed by soft, woolly hairs and the ray cypselae are sparsely, (microscopically small) very shortly clavate-like twin hairy or glabrous.

Distribution: The var. *lasiocarpa* is distributed in the Jonkershoekberge, Stellenbosch Mountain, Franchhoek Mountains, Houhoek Mountain, the Swartberg (Caledon) and the Steenboksberg (Figure 155).

Conservation status: According to Von Staden (2012) the Red List Status of *Z. lasiocarpa sens. lat.* is Least Concern as it is widespread and common. However her assesment was based on a broad, heterogenous group, including specimens identified here-in as *Z. ecklonis* subsp. *oligocephala*. The distribution of *Z. lasiocarpa* var. *lasiocarpa sens. strict*. is much smaller.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3318 (Cape Town)**: Swartboschkloof: adjacent to Boland Hiking Trial path, Jonkershoek, Stellenbosch, 450 m, (-DD), 21 May 1981, *McDonald 654* (PRE, STE in NBG), Jonkershoek District, (-DD), 13 July 1946, *Strey 909* (PRE), Stellenbosch Distr., Swartboskloof, grows on dry mountain slopes, (-DD), 2 June 1960, *Van der Merwe 22-02* (PRE, STE in NBG), Stellenbosch Distr., Swartboskloof, on sandstone soil, 1700 ft [518 m], (-DD), 13 October 1960, *Van Rensburg 2011* (BOL, PRE). **3319 (Worcester)**: Paarl District, Berg River Hoek, 3000 ft [914 m], (-CC), 3 October 1942, *Compton 13815* (NBG); Zachariashoek Exp. Catchment: Upper Zachariashoek, 760 m (-CC), 28 December 1978, *Kruger 1789* (SAASVELD in PRE); Paarl Division, Berg River Hoek, (-CC), 19 September 1946, *Leighton 2040* (BOL, PRE). **3418 (Simonstown)**: Caledon Division, Somerset Sneeuwkop, gully on SE side of shale band, 4000 ft [1219 m], (-BB), 30 December 1945, *Esterhuysen 12493* (PRE),

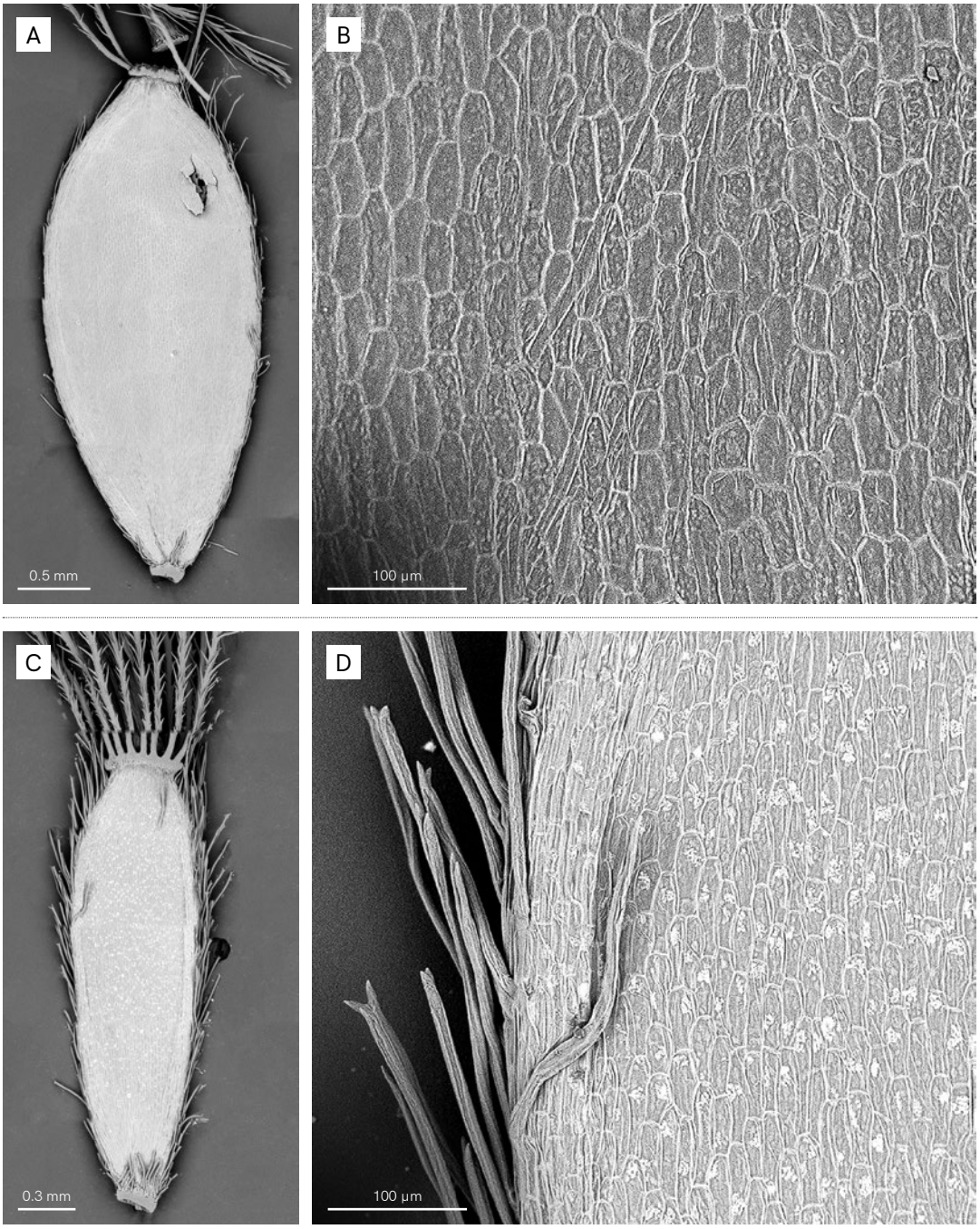


Figure 154. *Zyrphelis lasiocarpa* var. *lasiocarpa*: scanning electron micrographs of A, B, glabrous disc pseudo-cypsela; C, D, disc ovary with twin hairs along the margin and around the base (all *Leighton 2040*, PRE).

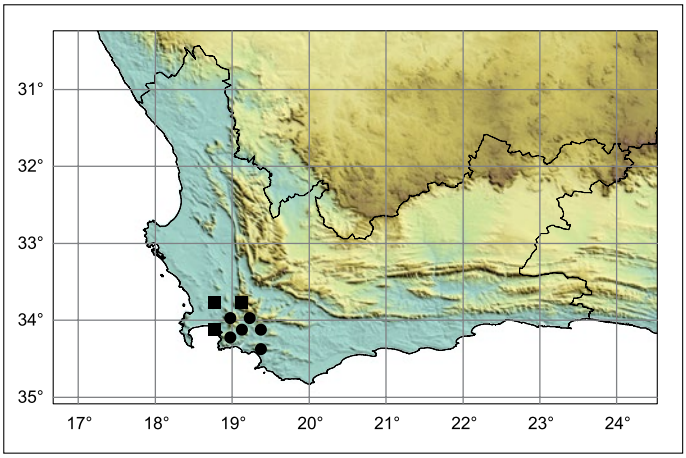


Figure 155. Distribution of *Zyrphelis lasiocarpa* var. *lasiocarpa* ●; and var. *minor* ■.

Stellenbosch Distr., Swartboskloof, grows on top of mountain at Sneeukop, 5000 ft [1524 m], (-BB), 4 May 1960, *Van der Merwe 2118* (PRE). **3419 (Caledon)**: Paarl, Bosjesmans Kloof [Boesmanskloof], La Motte Forest Reserve, (-AA), 4 July 1935, *Acock 4687* (S, 2×); Jonkershoek State Forest: Dwarsberg plateau, 4000 ft [1219 m], (-AA), 12 April 1983, *Forsyth 242* (SAASVELD in PRE); Lebanon Catchment 1, moderate mountain slopes, rather dry, 2400 ft [732 m], (-AA), March 1968, *Kruger 688* (PRE); Lebanon State Forest, Jakkalsrivier Catchment Ia, fairly steep cool slopes, 3100 ft [945 m], (-AA), 8 January 1971, *Kruger 1114* (SAASVELD in PRE); Lebanon: Catch 1a, Grabouw, moderately dry steep mountain slopes, 3200 ft [975 m], (-AA), 12 January 1967, *Kruger KR 324* (PRE); Swellendam Distrikt, in saxosis, Zwarteberg [Swellendam District, in stony places, Swartberg], 900 m, (-AB), 18 October 1894, *Schlechter 5582* (PRE 2×); Caledon, Fairfield Farm, on the foot of Steenberg Mountain [Steenboksberg], gentle N aspect, sandstone, (-AD), 9 September 2007, *Ebrahim CR2262* (NBG); Caledon Division, Fernkloof Nature Reserve, Hermanus, deep sand, S slope, 120 m, (-AD), 19 February 1982, *Woodvine 94* (PRE).

Uncertain localities:

Ecklon & Zeyher 51.8 [also written on label 273.DC] (S07-14751) (S): according to Glen & Germishuizen (2010) this locality is in the 'Caledon District, *Zwarteberg* (Swartberg) at the Baths', and collected in August.

Ecklon & Zeyher 55.7 [also written on label 1508. DC] (S07-14754) (S): according to Glen & Germishuizen (2010) this locality is in the 'Caledon District, *Potrivier* (Bot River?), *Langehoogde*, *Bontjeskraal* (Boontjieskraal) to Swartberg' and collected in July.

Ecklon & Zeyher 51.7 [also written on the label 227] (SAM 0037779-0) (NBG): according to Glen & Germishuizen (2010) this locality is in the 'Caledon District, *Zwarteberg* (Swartberg) at the Baths', and collected in July.

?*Ecklon & Zeyher 2751* (SAM0037780-0) (NBG): some undecipherable notes including the word 'Zwarteberg', collected in September.

21b. **Z. lasiocarpa** var. **minor** *P.P.J.Herman var. nov*.

Type: South Africa, Western Cape, Worcester (3319): Paarl District, Franchhoek Forest Reserve, (-CC), 28 September 1935, *Compton 5845* (NBG, holo.).

Annual or perennial herb or suffrutex, up to 250 mm high, branched from the base, branches woody basally, herbaceous upwards, (densely) bristly hairy or glabrous. *Leaves* alternate, sessile, densely set to scattered along stems, flat or slightly folded lengthwise, sickle-shaped or erect, linear, very narrowly elliptic, (occasionally) very narrowly obovate, (7–)9–27(–30) × 1.0–2.0(–2.5) mm, apex acute, mucronate or bristle-tipped mucronate, margin entire, of lower leaves eciliate or with remnants of broken-off cilia or shortly and distinctly ciliate, margins of upper leaves usually distinctly long ciliate basally, fewer upwards, lower surfaces glabrous, bristly hairy all over or only few bristles, upper surface, when visible, glabrous, often with embedded oil glands. *Capitula* radiate, solitary, pedunculate; *peduncle* (15–)20–80(–100) mm long, (sparsely) bristly hairy, (sparsely) stipitate glandular, both hair types colourless or often with reddish transverse walls, bracteate; *peduncular bracts* 1 to 3(6) per peduncle, linear-triangular, narrowly triangular, linear-filiform or very narrowly ovate, 2.5–10.0(–15.0) mm long, margins ciliate, abaxial surfaces glabrous or (sparsely) bristly hairy and with few stipitate glands basally, bases often swollen, sometimes with oil glands scattered over surface or along main vein. *Involucre* (broadly) obconical to campanulate or rarely cup-shaped, 5–7(–9) mm high, 8–11(–15) mm across upper part. *Involucral bracts* in 3 or 4, very rarely 5, rows, imbricate, outer shorter than inner, apices often reddish, glands and hairs colourless; *outer row* very narrowly ovate or linear-triangular, 3.5(–4.0) × 0.5–1.0 mm, apex acute to acuminate, margin narrowly membranous, fimbriate-ciliate, with tuft of hairs at apex, surface with (few) bristle hairs, rarely almost glabrous, (few) (minute) stipitate glands, narrowly V-shaped thickened, stereome fenestrated, usually with oil glands along main vein; *second row* very narrowly ovate, narrowly oblong, 4–5 × (0.5–)0.6(–1.0) mm, apex acute, margin narrowly membranous, ciliate-fimbriate, with tuft of hairs at apex, surface (sparsely) bristly hairy, rarely almost glabrous, (sparsely) (minutely) stipitate glandular, keeled, narrowly V- or Y-shaped tickened, stereome fenestrated, sometimes 3-veined, usually with oil glands along vein(-s); *third row* very narrowly obovate, linear-oblong or narrowly elliptic, 5.2–7.0 × 1 mm, apex acute to acuminate, margin narrowly membranous, fimbriate-ciliate, surface (sparsely) bristly hairy, rarely almost glabrous, (minutely) stipitate glandular, keeled, narrowly Y-shaped thickened, stereome fenestrated, often 3-veined, usually with oil glands along vein(-s); *fourth row* (very) narrowly obovate, (5–)7 × (1.0–)1.2 mm, apex acute to acuminate, margin membranous, fimbriate-ciliate, surface with few bristle hairs, rarely almost glabrous, (minutely) stipitate glandular, keeled, narrowly Y-shaped thickened, stereome fenestrated, 3-veined, usually with oil glands along veins; sometimes a *fifth row*: narrowly obovate, 6 × 1 mm, apex acute, margin membranous, ciliate, surface glabrous but with minute stipitate glands, slightly keeled, Y-shaped thickened basally, stereome fenestrated, with oil glands along main vein. *Ray florets* female, fertile, corolla mauve, pale or deep blue; *tube* (1.5–)2.0(–3.0) mm long, with glandular hairs all along tube or in upper part only and around mouth; *limb* 4.5–8.0 mm long, 4-veined, 3-lobed. *Style* (1.5–)2.0(–2.5) mm long, bifurcate; *style branches* linear or linear-elliptic, 0.6–0.8(–1.0) mm long, stigmatic areas marginal, confluent apically. *Ovary* obovate, oblong, 2–3 mm long, margin thickened, surfaces densely filiform twin hairy. *Cypsela* brown to reddish brown, obovate or elliptic, 3.0–3.5 × 1.0–1.5(–1.8) mm, laterally compressed, margin usually thickened, with carpopodium; surface longish filiform twin hairy, apices of twin hairs acute; epicarpic cells areolate, colliculate or more globose in surface view, smooth, faintly granular or rugose. *Pappus bristles* 2.5–3.0 mm long, plumose, barbellate to nude basally, persistent. *Disc florets* functionally male; corolla yellow, tubular; *tube* (2.0–)2.5(–3.0) mm long, sometimes with few glandular hairs on lower part of tube, 5-lobed; *lobes* 0.5–0.8 mm long, with sub-apical glandular hairs, occasionally non-glandular hair as well, with resin ducts along margins. *Anthers* 1.5(–2.0) mm long, with ovate apical appendages, minutely caudate,



Figure 156. Scan of the holotype of *Zyrphelis lasiocarpa* var. *minor* (*Compton 5845*, NBG).



Figure 157. *Zyrphelis lasiocarpa* var. *minor*: A, bristly hairy leaves; B, stipitate glandular and bristly hairy peduncle; C, capitulum showing the acute to acuminate, 3-veined involucral bracts; D, hairy ray cypsela; E, glabrous disc pseudo-cypsela with thickened margin (all *Compton 5845*, NBG).

filament collars thickened. *Style* 2.0–2.5 mm long, bifurcate; *style branches* linear or (narrowly) ovate, 0.8–1.0 mm long, stigmatic areas marginal, basally, short, not confluent, with deltoid, papillate apical appendages or sometimes without stigmatic areas. *Ovary* linear or linear-obovate, (2.5–)3.0 mm long, margins thickened, with carpopodium, surfaces glabrous or with few filiform twin hairs along margins and ring of twin hairs around base, epicarpic cells ± oblong in surface view, flat, ± smooth.

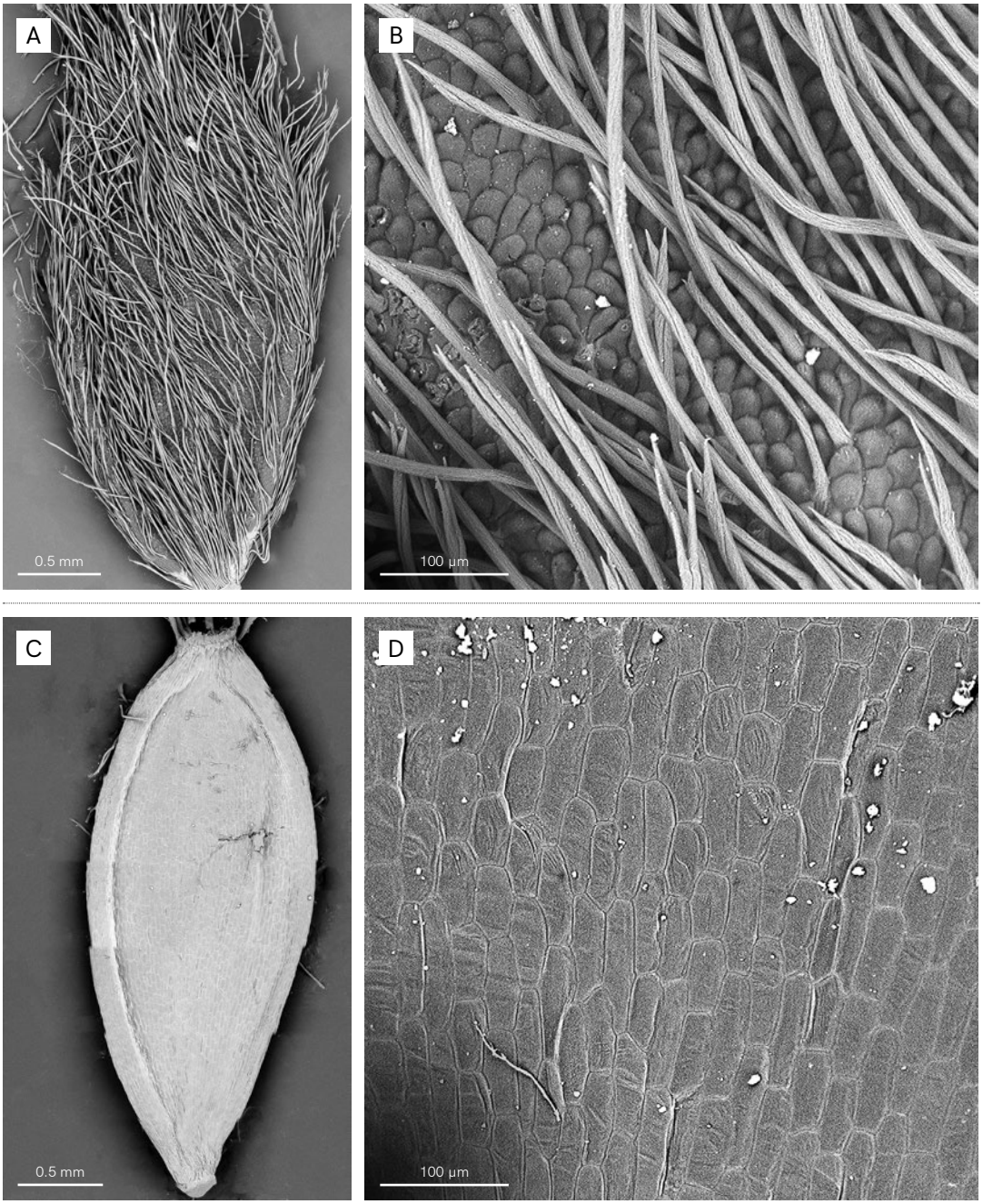


Figure 158. *Zyrphelis lasiocarpa* var. *minor*: scanning electron micrographs of A, B, hairy ray cypsela showing the filiform twin hairs and colliculate, smooth epicarpic cells; C, D, glabrous disc pseudo-cypsela, epicarpic cells ± oblong in surface view, flat, ± smooth (all *Compton 5845*, NBG).

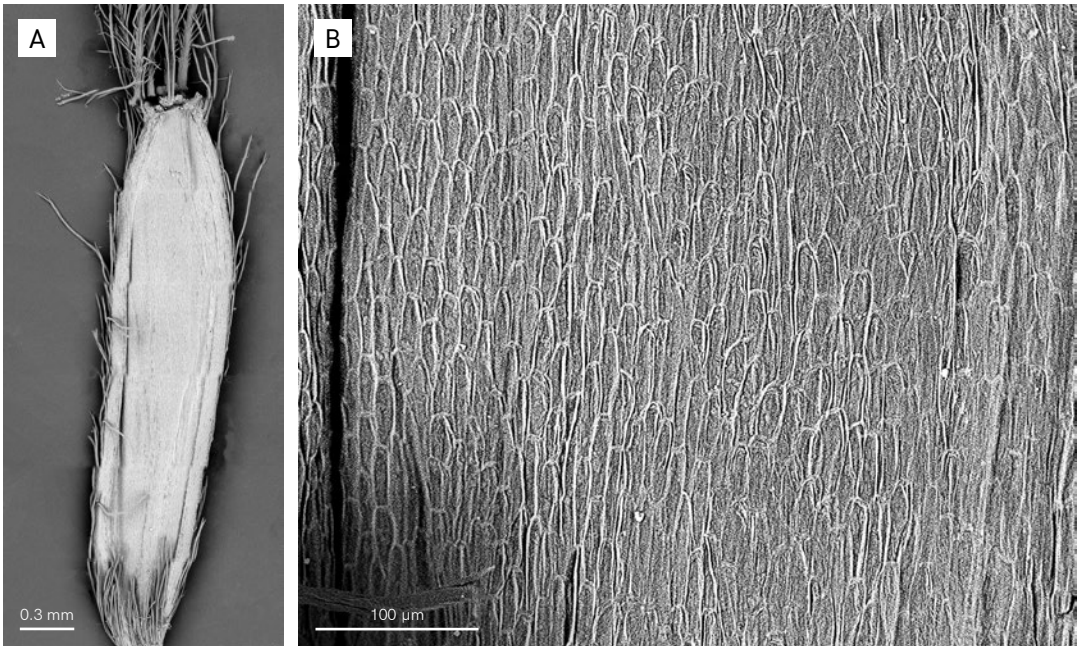


Figure 159. *Zyrphelis lasiocarpa* var. *minor*: scanning electron micrographs of A, B, disc ovary showing filiform twin hairs along the margin and around the base, epicarpic cells ± oblong in surface view, flat, ± smooth (all *Compton 5845*, NBG).

Some *outer ovaries* sometimes developing pseudo-cypsela: brown, obovate-elliptic or elliptic, 3(–4) × 1.0(–1.4) mm, laterally compressed, margin (pale), thickened, with carpopodium, surfaces glabrous or with few long filiform twin hairs along margins and sometimes around base, epicarpic cells ± oblong in surface view, flat, ± smooth. *Pappus bristles* (2.5–)3.0–3.5(–4.0) mm long, plumose, barbellate to nude basally, persistent. *Flowering time*: June and September, October and December. Figures 156 to 159.

Diagnostic characters: *Zyrphelis lasiocarpa* var. *minor* can be distinguished from the typical variety as an annual or perennial herb or suffrutex, up to 250 mm high with herbaceous branches.

Distribution: The var. *minor* occurs in the Franschhoek, Jonkershoek and Stellenbosch mountains (Figure 155). Apart from the type specimen only four other specimens were studied.

Additional specimens examined:

SOUTH AFRICA. WESTERN CAPE. **3318 (Cape Town)**: Stellenbosch Distr., Jonkershoek, Bosboukloof, 1000 ft [305 m], (–DD), October 1967, *Kerfoot 6032* (STE in NBG). **3319 (Worcester)**: Paarl Division, Fransch Hoek Peak, lower slopes, (–CC), 6 June 1954, *Esterhuysen s.n.* BOL155195 (BOL); Paarl Division, Franchhoek Forest Reserve, (–CC), 28 September 1935, *Lewis s.n.* BOL155194 (BOL). **3418 (Simonstown)**: Stellenbosch Division, Somerset West Sneeukop, shale band, ± 5000 ft [1524 m], (–BB), 4 December 1960, *Esterhuysen 28675* (BOL).

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A taxonomic account of the endemic genus *Zyrphelis* in South Africa is presented. The genus *Gymnostephium* is sunk under *Zyrphelis* and some taxa previously listed under *Mairia* moved to *Zyrphelis*. Twenty-one species (total 35 taxa) are recognised. *Zyrphelis ciliaris* subsp. *hirsuta* is elevated to species level, *Z. gracilis* is reduced to varietal level under *Z. fruticosa*, *Z. grauii* is reduced to varietal level under *Z. montana*, *Z. monticola* is sunk under *Z. microcephala* subsp. *microcephala*. The following new subspecies and varieties are described: *Z. decumbens* var. *grandis*, *Z. ecklonis* subsp. *longipedunculata*, *Z. foliosa* var. *glabra*, *Z. fruticosa* var. *pilosa*, *Z. lasiocarpa* var. *minor*, *Z. pilosella* var. *glandulifolia* and *Z. taxifolia* var. *robusta*. The following names are lectotypified here: *Felicia monticola*, *Gymnostephium leve*, *Mairia foliosa*, *M. lasiocarpa* and *M. montana*. Keys to the species, subspecies and varieties, full descriptions of all the taxa, distribution maps and illustrations are provided.



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