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## A taxonomic review of *Cephalaria* (Dipsacaceae) in the Cape Floristic Region

J.C. Manning<sup>a,b,\*</sup>, P. Goldblatt<sup>b,c</sup>, A. Johns<sup>d</sup><sup>a</sup> Compton Herbarium, South African National Biodiversity Institute, Private Bag X7, Claremont 7735, South Africa<sup>b</sup> Research Centre for Plant Growth and Development, School of Life Sciences, University of KwaZulu-Natal, Pietermaritzburg, Private Bag X01, Scottsville, 3209, South Africa<sup>c</sup> B.A. Krukoff Curator of African Botany, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166, USA<sup>d</sup> Kogelberg Biosphere Reserve, Private X1, Kleinmond 7195, South Africa

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## ABSTRACT

Six species of *Cephalaria* are recorded from the Cape Floristic Region (CFR), with four rare and localised species endemic to the region in the extreme southwest, and two species widely distributed in the east of the country and just entering the CFR region in the extreme east. We review these species, with full descriptions, illustrations and notes on distribution, ecology, and conservation status.

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### 1. Introduction

Dipsacaceae are a small family of some 15 genera and 300 species of sub-shrubs or perennial to annual herbs. Although included in Caprifoliaceae in some classifications ([Angiosperm Phylogeny Group, 2009](#)), Dipsacaceae are retained as distinct in a recent review of the family ([Mayer and Ehrendorfer, 2013](#)). The centre of diversity of the family is in the Mediterranean Basin and adjacent western Eurasia, with species also in Asia and eastern and southern Africa. Phylogenetic analysis of molecular data has resulted in an improved tribal classification of Dipsacaceae ([Mayer and Ehrendorfer, 2013](#)), including the recognition of the new monotypic genus *Pterothamnus* V. Mayer & Ehrend. (previously *Pteroccephalus centenii* M.J. Cannon).

*Cephalaria* Schrad. ex Roem. & Schult., with up to ca. 100 species, is one of the largest genera in the family. Preliminary molecular phylogenetic analysis places it as sister to *Dipsacus* L. ([Avino et al., 2009](#)), from which it is morphologically separated by the softer indumentum on the vegetative parts and by the floral bracts not pungent and more or less as long as the flowers, and anatomically by the more or less continuous subepidermal sclerenchyma layer in the epicalyx ([Mayer and Ehrendorfer, 2013](#)).

The southern and eastern tropical African species of *Cephalaria* have been treated by [Napper \(1968b\)](#) and [Cannon and Cannon \(1983\)](#) but our taxonomic knowledge of Dipsacaceae in southern Africa, a minor centre of diversity for the family, is far from adequate. Two genera are recorded from the region, of which *Scabiosa* L. ( $\pm 9$  spp. in southern Africa) was last revised by [Sonder \(1865\)](#) and is in serious need of study. Our knowledge of *Cephalaria* is somewhat better as a result of the monograph of the genus by [Szábo \(1940\)](#) and the very useful synopsis of the sub-Saharan members by [Napper \(1968a\)](#), which includes a key and listing of all tropical and south temperate African species, with brief notes on distribution and synonymy. Two species described from Swaziland by [Compton \(1967\)](#) were overlooked by [Napper \(1968a\)](#), bringing the total for the region up to 13. All the southern African species are included in subg. *Lobatocarpus* [Szabó \(1926\)](#), endemic to sub-Saharan Africa and characterised by the 4-ribbed and apically 4-toothed epicalyx.

Six species of *Cephalaria* are recorded from the Cape Floristic Region (CFR) ([Manning and Goldblatt, 2013](#)), four endemic in the extreme southwest and two just entering the region from the east. Three of the species are herbaceous perennials with the leaves mostly basal and often  $\pm$  heteromorphic, the lower typically largest and less dissected and grading upward into relatively sparse cauline leaves that are progressively smaller and more dissected along the flowering stem. The stems do not develop axillary shoots. This group is widespread through the aseasonal or summer-rainfall part of southern Africa. The remaining three species have evenly leafy stems with monomorphic foliage showing little or no difference in size, shape and density

\* Corresponding author at: Compton Herbarium, South African National Biodiversity Institute, Private Bag X7, Claremont 7735, South Africa.

E-mail addresses: [J.Manning@sanbi.org.za](mailto:J.Manning@sanbi.org.za) (J.C. Manning), [peter.goldblatt@mobot.org](mailto:peter.goldblatt@mobot.org) (P. Goldblatt).

between the lower and upper leaves. Six species with this foliage type are recognised in southern Africa (Compton, 1967; Napper, 1968a), all endemic to the subregion with the exception of *Cephalaria goetzei* Engl. from Tanzania. The three CFR species in this group, *Cephalaria attenuata* (L.f.) Roem. & Schult., *Cephalaria rigida* (L.) Roem. & Schult. and *Cephalaria scabra* (L.f.) Roem. & Schult., constitute a distinct alliance of evergreen, sclerophyllous shrubs with elliptic stigmas. Their relationship to the other southern African species remains to be established but similar stigmas are also seen in the two remaining southern African species with homomorphic, cauline foliage, *Cephalaria foliosa* Compton and *Cephalaria natalensis* Kuntze.

Four of the species of *Cephalaria* in the CFR are poorly known, highly localised endemics (Manning and Goldblatt, 2013), with *Cephalaria decurrens* (Thunb.) Roem. & Schult. included in the IUCN Red List as Rare (Raimondo et al., 2009). Furthermore, published data on the distribution of *C. attenuata* (Szabó, 1940; Napper, 1968a; Manning and Goldblatt, 2013) and *C. rigida* (Szabó, 1940; Napper, 1968a) are incorrect as a result of some taxonomic confusion. This stimulated us to review the true status and situation of *Cephalaria* in the CFR, and we provide complete descriptions, distribution data, and a key to the species from the region as a partial revision of the genus for southern Africa. The species from the summer–rainfall region form the subject of a separate study (M. Ngwenya in prep.).

## 2. Materials and methods

All relevant types were examined, as well as herbarium material from BOL, NBC, PRE and SAM (acronyms after Holmgren et al., 1990), the primary collections of southern African material.

## 3. Taxonomy

### 3.1. Genus description

***Cephalaria*** Schrad. ex Roem. & Schult. in Syst. veg. 3: 1, 43 (1818), nom. cons. Type species: *Cephalaria alpina* (L.) Roem. & Schult.

Annual or perennial herbs or sub-shrubs. Leaves very variable, entire or toothed to pinnatifid, most species heterophyllous. Inflorescence of terminal, globose or cylindrical capitula with 2–4 rows of involucre bracts. Involucre bracts obtuse, leathery or partly scarious, usually pubescent. Receptacular bracts narrower and obtuse to pungent, partly scarious or pubescent. Epicalyx (involucre) 4-angled, furrowed, crowned with 4 hairy teeth or with a membranous ± glabrous corona, entire or crenate. Flowers 4-partite. Calyx small, patelliform or cupuliform, crenulate or toothed, glabrous or pilose. Corolla funnel-shaped, white to mauve, 4-lobed, outer lobes often larger. Stamens 4, alternating with lobes, inserted near mouth of tube and decurrent down tube, exerted. Ovary ovoid, ribbed; style filiform; stigma oblique, linear or elliptic, longitudinally furrowed. Fruit fusiform, crowned with persistent calyx, 8-ribbed, ± villous, enclosed in persistent epicalyx.

ca. 100 spp., Old World mainly Mediterranean to Asia but also eastern and southern Africa.

### 3.2. Key to species in the CFR

- 1a. Leaves mainly basal, heterophyllous, upper leaves few, smaller and usually more dissected than the lower; stigma linear, scarcely wider than style:
  - 2a. Lower stem leaves soft textured and softly pubescent, margins ± serrate; stem pubescent; epicalyx sharply 4-toothed; plants from Bokkeveld Escarpment ... 3. *C. decurrens*
  - 2b. Lower stem leaves leathery, glabrous or coarsely hairy, margins entire; stem glabrous; epicalyx crenulate or obscurely lobed; plants from southern and eastern areas:
    - 3a. Radical leaves linear to lanceolate, 2–12 mm wide, simple or lobed; receptacle bracts obtuse or acute ... 1. *C. humilis*

- 3b. Radical leaves oblong to broadly ovate, (10–)15–80 mm wide, simple; receptacle bracts acute ... 2. *C. oblongifolia*

- 1b. Leaves all cauline, numerous and all alike, with axillary tufts; stigma elliptic, much wider than style:
  - 4a. Leaves ± bipinnatisect; stems ± sprawling ... 6. *C. scabra*
  - 4b. Leaves simple or lyrate-pinnatisect; stems erect:
    - 5a. Leaf blades linear, 1–4 mm wide, entire ... 5. *C. attenuata*
    - 5b. Leaf blades elliptic to oblanceolate, 5–25 mm wide, toothed ... 4. *C. rigida*

### 3.3. Species accounts

3.3.1. *C. humilis* (Thunb.) Roem. & Schult., Syst. veg. 3: 50 (1818). *Scabiosa humilis* Thunb., Prodr. fl. cap.: 28 (1794). Type: South Africa, [Eastern Cape], 'Krumrivier' [Krommerivier], Thunberg s.n. UPS-THUNB 3133 (UPS-Herb. Thunb.—microfiche!, lecto, designated here).

*C. attenuata* var. β Sond. in Harv. & Sond., Fl. cap. 3: 42 (1865). Type: not designated.

*C. attenuata* var. γ Sond. in Harv. & Sond., Fl. cap. 3: 42 (1865). Type: not designated.

[*C. attenuata* sensu Eckl. & Zeyh., Enum. pl. afric. austral. 3: 371 (1837), non (L.f.) Roem. & Schult. (1818)].

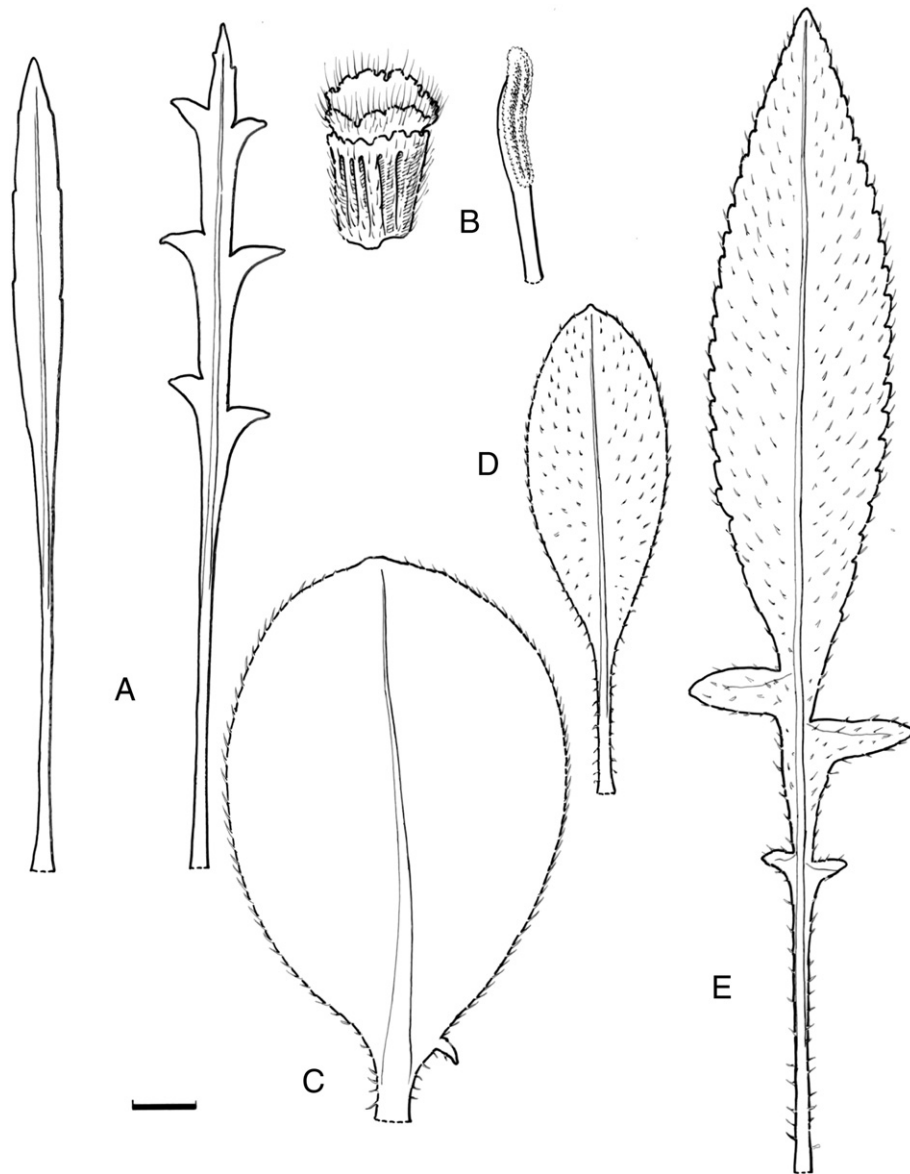
[*C. longifolia* E. Mey. in Drège, Zwei pflanzengeogr. Dokum.: 128 & 152 (1843), nom. nud.]

Herbaceous perennial 50–100 cm high, with woody rhizome. Flowering stems erect, leafy only at base, 2–4 mm diam., glabrous, striate. Leaves radical, ± 6–10, petiolate, blade linear to linear-lanceolate, simple or pinnatifid with up to four linear lobes on each side, 50–300 × 2–12 mm, margins entire, revolute, leathery, glabrous or sparsely appressed-hispid, often more densely so along margin, narrowed gradually into slender petiole 30–130 mm long, ± half as long as or rarely as long as blade, bases shortly connate, puberulous; upper peduncular leaves smaller and narrower and mostly ± linear, occasionally unpaired. Inflorescence solitary or up to three dense, globose capitula 15–20 mm diam., peduncles glabrous. Involucre bracts broadly ovate to suborbicular, 2–5 × 3–5 mm, obtuse or rounded, outermost subglabrous, margins ciliolate, inner appressed sericeous; receptacle bracts oblong, 4–5 × 3 mm, obtuse or acute, densely and shortly appressed-sericeous in distal half, submembranous along margins basally. Epicalyx cupular, ± 2 mm long at flowering, apically crenulate, densely pubescent. Calyx patelliform, crenulate, appressed-puberulous. Corolla creamy white, campanulate, unequally 4-lobed, 10–12 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exerted. Ovary 1.5–2.0 mm long; stigma oblique, linear, scarcely wider than style. Fruit unknown. Flowering time: (Dec)Jan–Feb(May). Fig. 1A, B.

**Distribution and ecology:** distributed along the southern coast and through the Langkloof from George eastwards into Eastern Cape and southern KwaZulu-Natal (Fig. 2), on damp, stony slopes in grassy vegetation. Flowering is not reliant on fire.

**Diagnosis:** closely allied to *Cephalaria pungens* Szabó and *C. oblongifolia* in the ± crenulate epicalyx and distinguished by the linear or narrowly pinnatisect lower leaves, 2–12 mm wide with revolute margins, and by the relatively broader and blunter receptacular bracts, suborbicular to ovate obtuse or sometimes acute. Collections of *C. humilis* from the CFR are clearly identifiable but further east the distinction between the three species, especially between *C. humilis* and *C. pungens*, becomes less clear-cut. As currently understood, *C. pungens* is characterised by the broader basal leaves, oblanceolate to elliptic, 10–25 mm wide and plane, and by the sharply pointed receptacle bracts, ovate to lanceolate and acuminate or cuspidate.

**Conservation notes:** the distribution of the species along the lowlands of the southern Cape places it at risk from afforestation and urbanisation in the region, and its conservation status here should be assessed.



**Fig. 1.** Herbaceous species of *Cephalaria*. A, *C. humilis* basal leaves, Humansdorp, *Basson 10* (NBG); B, *C. humilis* epicalyx plus calyx (left) and stigma (right), Knysna, *Bayliss 4127* (NBG); C, *C. oblongifolia* basal leaf, Krantzklouf, *Haygarth 44* (NBG); D, *C. oblongifolia* basal leaf, Komga, *Flanagan s.n.* (NBG); E, *C. decurrens*, basal leaf, Kobee, *Manning s.n.* (NBG). Scale bar: 10 mm. Artist: John Manning.

#### Additional specimens

KwaZulu-Natal.—**3029** (Kokstad): Clydesdale, (–BD), Dec 1884, *W. Tyson 2101* (BOL).

Western Cape.—**3322** (Oudshoorn): George, (–CD), Jan [without year], *Zeyher s.n.* (SAM); 13 Jan 1897, *F. Guthrie 4323* (NBG); Portland, (–DD), Feb 1925, *A. Duthie 922a* (NBG). **3323** (Willowmore): Knysna, Prince Alfred's Pass, (–CC), rocky grassland, 15 Jan 1968, *R. Bayliss 4127* (NBG). **3423** (Knysna): Knysna, (–AA), Feb 1921, *J. Keet 674* (NBG); Noetzie, (–AA), coastal plateau, burnt veld, Feb 1921, *J. Keet s.n.* (NBG).

Eastern Cape.—**3029** (Kokstad): Kokstad, (–CB), Feb 1883, *W. Tyson 1409* (BOL). **3129** (Port St. Johns): Mlengani [Mgwenyana] valley between Umtata and Omgazi [Mngazi] River, (–CA), Feb 1896, *H. Bolus 10085* (BOL). **3323** (Willowmore): Ratelsbosch, (–DC), Feb 1910, *H. Fourcade 579* (BOL); Langkloof, Lauterwater, (–DC), 2 Jan 1953, *R. Compton 23876* (NBG); N foot of Outeniquas near Joubertina, (–DD), 15 Jan 1947, *E. Esterhuysen 13653* (BOL). **3324** (Steytlerville): Kareedouw Pass, (–CD), Jan 1909, *H. Fourcade 401* (BOL). **3325**

(Port Elizabeth): Van Stadens River Mtns, (–CD), Feb [without year], *Ecklon & Zeyher 698* (SAM); Jan 1867, *H. Bolus 1586* (BOL). **3424** (Humansdorp): Humansdorp, (–BB), May [without year], *Zeyher s.n.* (SAM); Humansdorp Commonage, (–BB), 28 Dec 1955, *F. Basson 10* (NBG).

3.3.2. *C. oblongifolia* (Kuntze) Szabó in *Magy. Bot. Lap.* 1925: 9 (1925). *C. attenuata* var. *oblongifolia* Kuntze, *Revis. gen. pl.*: 126 (1898). Type: South Africa, [Eastern Cape], 'Perie-Wald' [Pirie Forest], [9 Mar 1894], Kuntze s.n. K000252318 (K, lecto.—digital image!, designated here). [Syntype: South Africa, [KwaZulu-Natal], 'Krantzklouf', Kuntze s.n. (not located).]

*C. attenuata* var.  $\alpha$  Sond. in *Harv. & Sond., Fl. cap.* 3: 42 (1865). Type: not designated.

[*C. decurrens* sensu Eckl. & Zeyh., *Enum. pl. afric. austral.* 3: 371 (1837), non (Thunb.) Roem. & Schult. (1818)].

[*C. rigida* sensu Krauss, *Beitr. Fl. Cap.*: 71 (1846), non (L.) Roem. & Schult. (1818)].

Herbaceous perennial 50–100 cm high, with woody rhizome. Flowering stems erect, leafy only at base, 2–4 mm diam., glabrous, striate. Leaves radical,  $\pm 6$ –10, petiolate, blade oblanceolate to broadly obovate, simple, 50–150  $\times$  (10–)15–60(–80) mm, margins entire, leathery, coarsely-pubescent, at least near edges, often more densely so along margin, hairs sometimes weakly bulbous-based, narrowed into slender petiole 10–50 mm long, up to  $\pm$  half as long as blade, coarsely pubescent along margins, bases shortly connate, puberulous; peduncular leaves smaller and linear-pinnatisect, rarely simple, occasionally unpaired. Inflorescence solitary or rarely up to five dense, globose capitula 15–20 mm diam., peduncles glabrous. Involucral bracts ovate to broadly ovate, 2–5  $\times$  3–5 mm, obtuse or rounded, outermost subglabrous, margins ciliolate, inner appressed sericeous; receptacle bracts oblong, 4–5  $\times$  3 mm, acute, densely and shortly appressed-sericeous in distal half, submembranous along margins basally. Epicalyx cupular,  $\pm 2$  mm long at flowering, shortly 4-lobed, lobes  $\pm$  tridentate, densely appressed-pubescent. Calyx patelliform, crenulate or fimbriate, pubescent. Corolla creamy white, 10–12 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exserted. Ovary 1.5–2.0 mm long; stigma oblique, linear, scarcely wider than style. Fruit unknown. Flowering time: Oct–Apr. Fig. 1C, D.

**Distribution and ecology:** distributed throughout the wetter south-eastern parts of South Africa, from Uitenhage (Fig. 2) through the Eastern Cape to KwaZulu-Natal and the eastern Free State, occurring in grassland.

**Diagnosis and relationships:** closely allied to both *C. humilis* and *C. pungens*, with which it shares a similar lobed or crenulate epicalyx, *C. oblongifolia* is recognised by its relatively broad, usually simple, oblanceolate to obovate basal leaves, mostly 15–60 mm wide, always coarsely pubescent, at least towards the edges of the blades. The leaves in *C. humilis* are linear to narrowly lanceolate, 2–12 mm wide, and often pinnatifid, and the species has distinctive ovate, obtuse receptacle bracts. Both *C. humilis* and *C. oblongifolia* have glabrous stems and peduncles. The distinction between *C. oblongifolia* and *C. pungens* is more problematic. Generally the relatively broader, coarsely hairy leaf blades abruptly narrowed into the petiole serve to separate

*C. oblongifolia* from *C. pungens*, which typically has oblanceolate leaves narrowed gradually into a petiole-like base although there are forms with distinctly petiolate leaves. Vestiture in the species varies from glabrous to pubescent, both on the foliage and on the stem and peduncles. Another useful character is provided by the leaf margins in the lower leaves, which in *C. pungens* are typically crenate or obscurely serrate but quite entire in *C. oblongifolia*. The two species appear to intergrade somewhat and their status requires further investigation.

**Nomenclatural note:** although Kuntze (1898) attributes the epithet *oblongifolia* to E. Meyer, this is incorrect as Meyer's account (Drège 1843–1844) includes only the name *C. longifolia* and we therefore assume that Kuntze erred in his spelling. The epithet is thus correctly attributed to Kuntze alone, as has been accepted in the past.

**Conservation notes:** the species is widely distributed and currently under no immediate threats except general habitat degradation.

#### Selected specimens

Kwazulu-Natal.—**2930** (Pietermaritzburg): Krantzklouf, (–DD), Oct 1921, W. Haygarth 44 (NBG). **2931** (Stanger): Inyoni, (–AB), 30 Dec 1951, S. Johnson 336 (NBG). **3029** (Kokstad): Weza Forest, (–DA), 2 Jan 1957, L. Taylor 5256 (NBG). **3030** (Port Shepstone): Alexandra [Dumisa], Umgai, (–AD), 25 Apr 1980, H. Rudatis 423 (NBG). **3028** (Matatiele): Quacha's Nek, (–AB), 26 Feb 1938, M. Fawkes 338 (NBG).

Free State.—**2829** (Harrismith): Van Reenen, (–AD), Apr 1908, J. Thode s.n. (NBG); Oliviershoek Pass, (–CA), May 1905, J. Thode s.n. (NBG); 12 Jan 1982, M. Jacobsz 3530 (NBG).

Eastern Cape.—**3227** (Stutterheim): Komga, (–DB), [without date], H. Flanagan s.n. (NBG); Kingwilliamstown, Berlin, (–DC), 5 Jan 1944, W. Barker 2848 (NBG). **3228** (Butterworth): Gonubie, (–CC), open grassland, Oct 1961, H. Bokelmann 3P118 (NBG). **3325** (Port Elizabeth): Uitenhage, Thornhill, (–CC), 12 Apr 1952, R. Compton 23402 (NBG). **3326** (Grahamstown): Governor's Kop, (–BC), 30 Dec 1939, W. Barker 581 (NBG). **3327** (Peddie): East London, (–BB), 26 Dec 1941, W. Barker 1281 (NBG); west of East London, (–BB), 29 Nov 1950, B. Martin 683 (NBG).

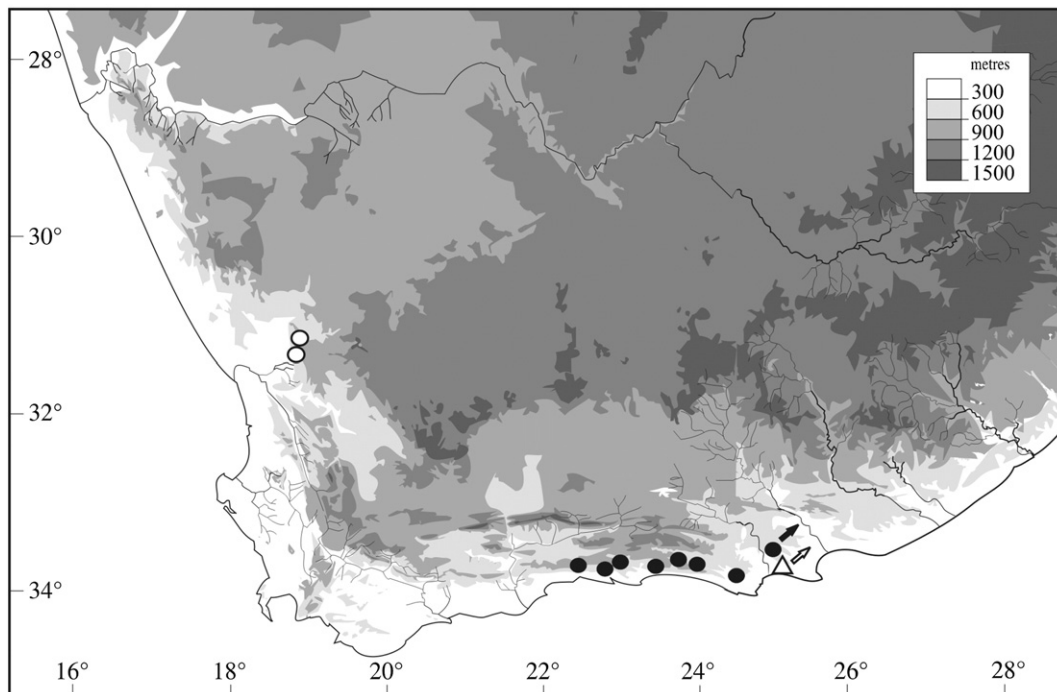


Fig. 2. Distribution of *Cephalaria humilis*, ●; *C. oblongifolia* in the CFR, △ [arrow indicates that range extends eastwards beyond CFR]; and *C. decurrens*, ○ [arrow indicates that range extends eastwards beyond CFR].



3.3.3. *C. decurrens* (Thunb.) Roem. & Schult., Syst. veg. 3: 50 (1818). *Scabiosa decurrens* Thunb., Prodr. fl. cap.: 28 (1794). *Succisa decurrens* (Thunb.) Spreng., Syst. veg. 1: 379 (1825). *C. attenuata* var. *decurrens* (Thunb.) Kuntze, Revis. Gen. pl.: 126 (1898). Type: South Africa, without precise locality, Thunberg s.n. UPS-THUNB 3124 (UPS-Herb. Thunb.—microfiche!, lecto., designated here).

*Scabiosa ustulata* Thunb., Prodr. fl. Cap.: 29 (1794). *C. ustulata* (Thunb.) Roem. & Schult., Syst. veg. 3: 43 (1818). *Succisa ustulata* (Thunb.) Spreng., Syst. veg. 1: 379 (1825). Type: South Africa, [Northern Cape], 'Bocklands Berg' [Bokkeveld], Thunberg s.n. 3200 (UPS-Herb. Thunb.—microfiche!, lecto., designated here).

*C. ustulata* var.  $\alpha$  Sond. in Harv. & Sond., Fl. cap. 3: 42 (1865). Type: not designated.

Herbaceous perennial 70–100 cm high, with woody rhizome. Flowering stems erect, leafy only at base, 6-angled, striate, 3–6 mm diam., densely puberulous with short deflexed hairs and sparse, longer hairs. Leaves radical, 6–10, sometimes becoming dry at flowering time, petiolate, blade oblanceolate, usually lyrate-pinnatifid with 1 or 2 lobes on each side or more rarely simple, 100–200  $\times$  15–50 mm, margins closely serrate or rarely entire, soft-textured, densely or more sparsely pubescent, narrowed gradually into slender petiole  $\pm$  as long as blade and 70–150 mm long, bases shortly connate, hispid; upper leaves smaller and narrower but otherwise similar. Inflorescence solitary or up to three dense, globose capitula 20–30 mm diam., peduncles puberulous basally but otherwise glabrous. Involucral bracts ovate, 5–7  $\times$  3–4 mm, obtuse to acute, densely appressed-sericeous, margins ciliate; receptacle bracts elliptic-lanceolate, 7–15  $\times$  2 mm, acute to apiculate and apically recurved, densely and shortly appressed-sericeous in distal half, submembranous along margins basally. Epicalyx cupular,  $\pm$  2 mm long at flowering, with four subulate teeth 0.8–1.0 mm long, densely appressed-pubescent. Calyx patelliform, minutely toothed or with four larger teeth alternating with epicalyx teeth, densely pubescent. Corolla creamy white, 10–13 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exserted. Ovary 1.5–2.0 mm long; stigma oblique, linear, scarcely wider than style. Fruit oblong, 4-ribbed and 8-furrowed, 7  $\times$  3 mm, appressed-pubescent. Flowering time: Oct–Nov. Fig. 1E.

**Distribution and ecology:** a local endemic of the Bokkeveld Escarpment known from two localities, one just east of Nieuwoudtville on the plateau and the other from the Kobee Valley along the scarp itself (Fig. 2). It is likely to occur in other suitable locations along the escarpment but probably not elsewhere.

Like other species, *C. decurrens* favours richer, clay soils. Along the escarpment it is restricted to cooler, S-facing slopes on shale bands as an element of dense scrub, often above seasonal watercourses but on the plateau itself it occurs on tillite soils in relatively open renosterveld. Flowering is not reliant on fire.

**Diagnosis:** distinguished from other herbaceous perennials by its relatively soft-textured, lyrate-pinnatifid or rarely simply oblanceolate basal leaves with shortly puberulous,  $\pm$  serrate blade. The epicalyx is sharply 4-toothed and the stigma is scarcely wider than the style. Napper's (1968a) description of the leaves as glabrous is incorrect.

**Conservation notes:** known only from two locations, one of which is formally protected and the other under no immediate threat. The current IUCN status of Rare (Raimondo et al., 2009) is appropriate.

#### Additional specimens seen

Northern Cape.—**3119** (Calvinia): Nieuwoudtville reserve, (–AC), on flats in Dwyka tillite, 27 Oct 1983, P. Perry & D. Snijman 2439 (NBG); between dolerite and Dwyka tillite flats, 6 Dec 1983 [fruiting], P. Perry & D. Snijman 2469 (NBG).

Western Cape.—**3118** (Vanrhynsdorp): pass up to Kobee, (–DA), 18 Nov 1970, M. Strauss 62 (NBG); mountain pass to Kobee, (–DB), SE slopes in thick vegetation, 8 Oct 1973, H. Hall 4465 (NBG); E slope of

pass into Kobee Valley, (–DB), local in scrub along stream, 20 Oct 2007, J. Manning s.n. (NBG).

3.3.4. *C. rigida* (L.) Roem. & Schult. in Syst. veg. 3: 44 (1818). *Scabiosa rigida* L., Pl. rar. afr.: 8 (1760). Type: 'Habitat in Aethiopia', without collector or date, [G–Herb. Burman, lecto., designated by Wijnands: 94 (1983)].

*Scabiosa leucantha* var. *spuria* L., Sp. pl.: 98 (1753). Type: 'Scabiosa Afric. frutesc. fol. rigidis splendentibus et serratis flore albicantes' in Commelin, Horti medici amstelodamensis 2: 185, t. 93 (1701), lecto., designated by Wijnands: 93 (1983).

*Scabiosa verbenacea* Lam., Tabl. encycl.: 250 (1791). Type: 'Cap. bonae spei', Sonnerat s.n. P00308829 (P, holo.—digital image!).

*C. rigida* var. *glabra* Sond. in Harv. & Sond., Fl. cap. 3: 42 (1865), syn. nov. Type: not designated.

*C. rigida* var. *scabra* Sond. in Harv. & Sond., Fl. cap. 3: 42 (1865), syn. nov. Type: not designated.

Multi-stemmed subshrub, 70–100 cm high, resprouting from thickened, woody rootstock. Flowering stems erect, leafy throughout, 6-angled, softly woody at base and 3–4 mm diam. at base, minutely hispid in longitudinal bands between leaf bases with short spreading or deflexed hairs mixed with scattered bristle-like hairs but subglabrous along angles. Leaves cauline, decussate, suberect or spreading to deflexed, sessile or narrowed to petiole-like base, all upper leaves with axillary shoots, blade elliptic or lanceolate to oblanceolate, sometimes lyrate with an additional spreading, lanceolate lobe on each side near base, 30–90  $\times$  (5–)10–20 mm, acuminate, margins shallowly to deeply serrate with 4–15 primary teeth on each side, teeth apically decurved and tipped with short bristle, margins weakly revolute, densely or sparsely appressed-hispid to subglabrous adaxially and along margins, hispid along midrib beneath (sometimes only towards base), leathery, glossy dark green above when fresh and paler beneath, leaf bases shortly connate, hispid. Inflorescence solitary or up to three dense, globose capitula 15–25 mm diam., peduncles hispid basally but otherwise glabrous. Involucral bracts broadly ovate, 4–6  $\times$  4 mm, obtuse to acute, densely appressed-sericeous, margins ciliate; receptacle bracts elliptic-lanceolate,  $\pm$  7  $\times$  2 mm, apically acute or recurved-attenuate, densely and shortly appressed-sericeous in distal half, submembranous along margins basally. Epicalyx cupular,  $\pm$  3 mm long at flowering, with four subulate teeth 0.5–1.0 mm long, densely appressed-pubescent. Calyx patelliform, minutely  $\pm$  16-toothed, densely pubescent. Corolla creamy white, 8–12 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exserted. Ovary  $\pm$  2 mm long; stigma oblique, elliptic and much wider than style. Fruit oblong, 4-ribbed and 8-furrowed, 6  $\times$  4 mm, appressed-pubescent. Flowering time: Dec–Mar (–Aug), after fire. Figs. 3, 5B.

**Distribution and ecology:** restricted to the coastal mountain ranges of Western Cape in the extreme southwest, from Du Toits Kloof to Sir Lowry's Pass, on the southern slopes of Table Mtn on the Cape Peninsula, and recently from the Kleinrivier Mtns near Stanford (Fig. 4). Material collected by Krauss in KwaZulu-Natal was mistakenly cited under the species by Sonder (1865), followed by Napper (1968a), but the species is restricted to the Western Cape.

*C. rigida* favours damp, shallow gullies and cooler, south-facing foothills in richer, loamy soils on granite or on shale bands in various fynbos communities. Flowering is closely tied to burning, with plants resprouting rapidly after a summer fire. Plants are multi-stemmed, forming clumps up to 40 cm across at the base. Each clump may have up to ten flowering stems produced among numerous smaller non-flowering shoots.

**Diagnosis and relationships:** allied to *C. attenuata* and *C. scabra* in its subshrubby habit with cauline leaves and elliptic stigma, *C. rigida* is distinguished by its elliptic to oblanceolate, toothed leaves,  $\pm$  hispid on the upper surface, at least along the margins. Plants from the Kleinrivier Mountains, a recent easterly range-extension for the species, are characterised by their smaller, spreading, subglabrous leaves with

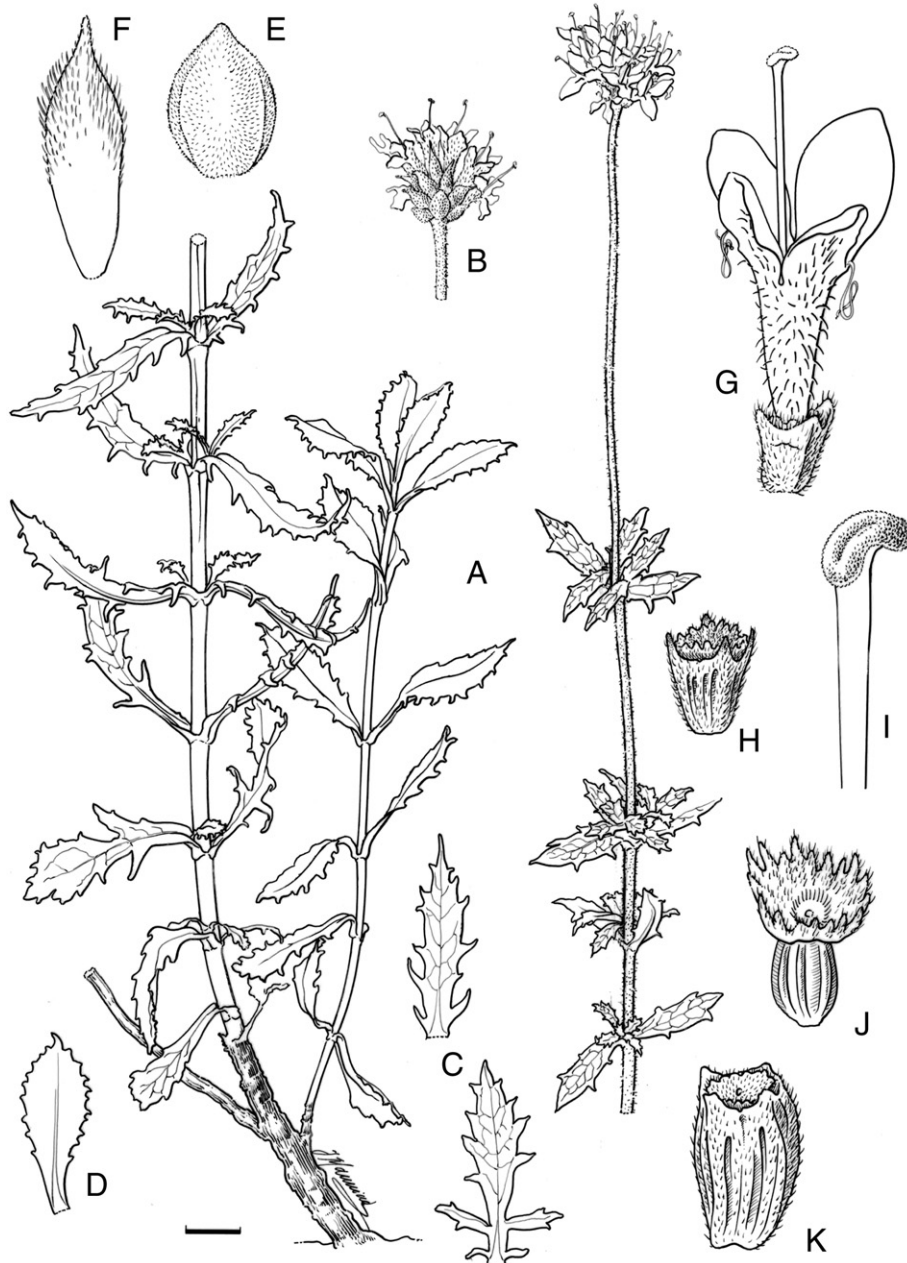
more coarsely and deeply serrated margins. Flowering in this population also appears to be later than usual, July or August rather than January to March.

**Conservation notes:** a locally endemic montane species well represented in formal conservation areas and under no immediate threats.

#### Additional specimens

Western Cape.—**3318** (Cape Town): Devil's Peak, (–CC), Jan–Feb [without year], *Ecklon & Zeyher 2331* (SAM); Devil's Peak, (–CC), Jan 1898, *J. Thode s.n.* (NBG); Table Mountain above Kirstenbosch, (–CC), 16 Feb 1929, *J. Gillett s.n.* (NBG); 7 Dec 1939, *R. Compton 8084* (NBG); Jonkershoek, Biesjevlei, (–DD), 2 Feb 1941, *M. Levyns 7538* (BOL); Jonkershoek, Jakkalsvlei, (–DD), granite soil with TMS overlay, 3 Jan

1963, *H. Taylor 4589* (NBG); Jonkershoek, (–DD), W slopes, regenerating after fire, 13 Mar 1966, *J. Rourke 731* (NBG); Jonkershoek, Langrivier Catchment; damp areas on S aspect, (–DD), flowering after fire, 6 Mar 1975, *R. Haynes 1018* (NBG). **3319** (Worcester): Du Toits Kloof, [without date], *Drège s.n.* (SAM). **3418** (Simonstown): near Wynberg, (–AB), Feb [without year], *Zeyher s.n.* (SAM); Orange Kloof, (–AB), 17 Jan 1956, *G. Lewis s.n.* (NBG); Witteboom above Constantia, (–AB), 27 Dec 1919, *N. Pillans 3798* (BOL); Steenberg, (–AB), 19 Jan 1896, *A. Wolley Dod 810* (BOL); Sir Lowry's Pass, (–BB), 18 Jan 1896, *R. Schlechter 7295* (BOL); Helderberg Nature Reserve, (–BB), SE shale slopes, 22 Feb 1995, *R. Runnalls 788* (NBG). **3419** (Caledon): Klein River Mtns between Hermanus and Stanford, (–AD), burned slope in valley, 15 Aug 2000, *P. Goldblatt & J.C. Manning 11394* (MO, NBG); Kleinrivier Mtns, Farm Oudebosch off R44 to Stanford, (–AD), [without date], *A. Johns 236* (NBG).



**Fig. 3.** *Cephalaria rigida*, Johns 236 (NBG). A, flowering stem; B, detached capitulum; C, simple and lyrate leaves from flowering stem; D, leaf from sterile shoot; E, involucral bract; F, receptacle bract; G, flower; H, epicalyx and enclosed calyx; I, stigma; J, ovary and calyx; K, fruit. Scale bar: A–D, 10 mm; E, F, 5 mm; G, H, K, 2 mm; I, 0.5 mm; J, 1 mm. Artist: John Manning.

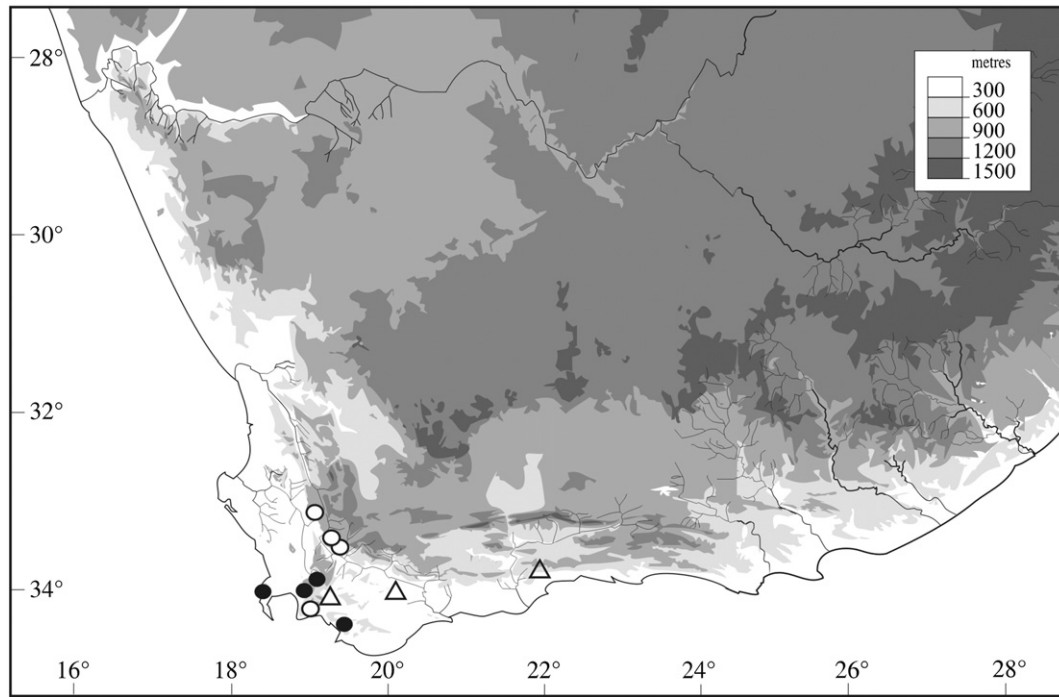


Fig. 4. Distribution of *Cephalaria rigida*, ●; *C. scabra*, ○; and *C. attenuata*, ▲.

3.3.5. *C. scabra* (L.f.) Roem. & Schult. in Syst. veg. 3: 44 (1818). *Scabiosa scabra* L.f., Suppl. pl.: 119 (1782). Type: South Africa, [Western Cape], 'Caput Bonae Spei' ['Zoetemelksvlei'], Thunberg '581' LINN120.9 (LINN—JSTOR image!, lecto., designated here). [LINN120.9 is selected as lectotype over the duplicate in UPS—Herb. Thunb. 3171 as being unquestionably available to Linnaeus f.].

[*Scabiosa incisa* Thunb. ms: Thunberg s.n. (LUND)].

Sprawling or decumbent subshrub to 70 cm high, resprouting from woody rootstock. Flowering stems suberect when young but later decumbent, leafy throughout, weakly 6-angled, softly woody at base and 2–3 mm diam., densely pubescent with a mix of short and longer hairs, sometimes only in longitudinal bands between leaf bases. Leaves cauline, decussate, suberect, all upper leaves with axillary shoots, blade oblong to oblanceolate in outline and bipinnatisect or pinnatisect with segments toothed or pinnatifid, axillary leaves sometimes linear and deeply toothed or lobed, 15–70 × 5–40 mm, segments acute or bristle-tipped, margins revolute, glabrous or sparsely to more densely hispid or strigose, leathery, leaf bases shortly connate, hispid. Inflorescence solitary or up to three dense, globose capitula 10–20 mm diam., peduncles glabrous or sparsely hispid. Involucral bracts broadly ovate or suborbicular, 3–4 × 3–4 mm, obtuse, outermost puberulous on outer edges near base, inner densely appressed-sericeous, margins ciliate; receptacle bracts elliptic-lanceolate, ± 6 × 2 mm, acute or obtuse, densely and shortly appressed sericeous in distal half, submembranous along margins basally. Epicalyx cupular, ± 2 mm long at flowering, with four subulate teeth 0.5–1.0 mm long, densely appressed-pubescent. Calyx patelliform, crenulate, densely pubescent. Corolla creamy white, 8–12 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exserted. Ovary 1.5–2.0 mm long; stigma oblique, elliptic and much wider than style. Fruit unknown. Flowering time: Dec–Apr. Fig. 5C, D.

**Distribution and ecology:** a poorly collected local endemic recorded from the foothills and lower slopes of the mountains in extreme south-western Western Cape, from Grootwinterhoek in the upper Breede River Valley along the western Hex River Mtns to the Palmiet River Valley and Riviersonderend (Fig. 4).

Available habit records for *Cephalaria scabra* are from clay soils in transitional renosterveld-fynbos communities, probably in seasonally moist situations as indicated by its association with the hygrophyte *Psoralea pinnata* (Esterhuysen 36193). There is no evidence that flowering is limited by seasonal fires.

**Diagnosis:** distinguished from *C. attenuata* and *C. rigida* by its pinnatisect or bipinnatisect leaves and sprawling or decumbent stems. The lobing of the leaves is very variable, with the upper leavers sometimes linear and lobed as in *C. attenuata*. We owe much of our knowledge of this rare species to the efforts of botanist Elsie Esterhuysen, who is responsible for the majority of the collections.

The collection from the Klein Winterhoek Mtns near Tulbagh (Esterhuysen 36221) matches the type in its small, closely bipinnatisect leaves but populations from the mid Breede River Valley at Waaihoek and Brandwacht (Esterhuysen 36225, 36209, 36193) have larger, more sparsely lobed leaves. In addition, the Tulbagh plants have the stems densely hispid around the entire circumference with a mix of long and short hairs but the Breede River Valley populations have the stems densely puberulous only in longitudinal bands running down between the leaf bases, the angles glabrous as in *C. attenuata* and *C. scabra*. The single collection from the Palmiet Valley by Stokoe 8648 is similar to the Tulbagh plants. It is surprising that the species has not been collected here again as the valley falls within the Kogelberg Biosphere Reserve, which has been extensively collected, and confirmation of its occurrence here is required.

**Conservation notes:** a poorly collected, locally endemic montane species that appears to be under no immediate threat.

#### Additional specimens

Western Cape.—**3319** (Worcester): Winterhoek Peak, path up to Sneeuat, (–AA), clayish slopes but not renosterveld, 21 Apr 1985, E. Esterhuysen 36221 (BOL); 31 May 1985, E. Esterhuysen 36225 (BOL); NE of Breërvier at base of Waaihoek Peak and Mostertshoek Peak, (–AD), stony clay slope, sprawling-spreading, ± woody at base, 18 Dec 1985, E. Esterhuysen 36288 (BOL); Brandwag Valley, (–BD), in renosterveld area but with other elements, 3 Jan 1985, E. Esterhuysen



36209 (BOL); 10 Nov 1984, E. Esterhuysen 36193 (BOL). **3418** (Simonstown): Palmiet River Valley, (–BD), Jan 1943, T. Stokoe 8648 (BOL).

3.3.6. *C. attenuata* (L.f.) Roem. & Schult. in *Syst. veg.* 3: 44 (1818). *Scabiosa attenuata* L.f., *Suppl. pl.*: 119 (1782). Type: ‘Caput Bonae Spei’, without date, Thunberg s.n. LINN120.11 (LINN, lecto.—JSTOR image!, designated here). [LINN120.11 is selected as lectotype as the only original material under this name].

*Scabiosa trifida* Thunb., *Prodr. fl. cap.*: 28 (1794). *Succisa trifida* (Thunb.) Spreng., *Syst. veg.* 1: 379 (1825). Type: South Africa, [Western Cape], ‘villa du Prè’, Thunberg s.n. 3197 (UPS-Herb. Thunb.—microfiche!, lecto., designated here).

*C. lavandulacea* Sond. in Harv. & Sond., *Fl. cap.* 3: 41 (1865). Type: ‘Houhoeksbergen [Houwhoek], Stellenbosch’, July [without year], Ecklon s.n. S12-6776 (S, holo.—digital image!).

[*C. attenuata* var. *decurrens* sensu Kuntze, *Revis. gen. pl.*: 126 (1898), non *C. attenuata* var. *decurrens* (Thunb.) Kuntze (1898). [Kuntze (1898) mistakenly associated his collection of this species from near Swellendam with Thunberg’s (1794) *Scabiosa decurrens*. His combination thus applies to the latter although his conception of the taxon belongs here].

Subshrub 70–100 cm high, resprouting from woody rootstock. Flowering stems erect, leafy throughout, 6-angled, softly woody at base and  $\pm 3$  mm diam., minutely puberulous in longitudinal bands between leaf bases but subglabrous along angles. Leaves cauline, decussate, suberect or spreading, all upper leaves with axillary shoots, blade linear or sometimes trilobed to lyrate-pinnatifid with one or two additional spreading, linear lobes on each side in basal half, 30–90  $\times$  1–4 mm, acute, margins entire, revolute, glabrous or with a few hispid bristles along midrib beneath, leathery, leaf bases shortly connate, hispid.

Inflorescence solitary or up to three dense, globose capitula 10–20 mm diam., peduncles hispid basally but otherwise glabrous. Involucral bracts broadly ovate or suborbicular, 4–5  $\times$  4–5 mm, obtuse, outermost puberulous on outer edges near base, inner densely appressed-sericeous, margins ciliate; receptacle bracts elliptic-lanceolate,  $\pm 7 \times 2$  mm, acute or obtuse, densely and shortly appressed sericeous in distal half, submembranous along margins basally. Epicalyx cupular,  $\pm 2$  mm long at flowering, with four subulate teeth 0.5–1.0 mm long, densely appressed-pubescent. Calyx patelliform, crenulate, densely pubescent. Corolla creamy white, 8–12 mm long, densely pubescent externally, tube villous in distal half within, otherwise glabrous. Stamens 4, exserted. Ovary 1.5–2.0 mm long; stigma oblique, elliptic and much wider than style. Fruit unknown. Flowering time: Dec–Mar(–Aug), after fire. Fig. 5E.

*Distribution and ecology*: a poorly collected species restricted to the coastal mountain ranges in the extreme southwest and south of Western Cape, and best known from Houw Hoek but also recorded near Stormsvlei and then much further east on Robinson’s Pass in the Outeniqua Mtns inland from Mossel Bay (Fig. 4).

Habitat data are scarce but where recorded *C. attenuata* has been collected in seasonally waterlogged situations, either along streams or in marshy soils. Associated plant communities are unknown except in a single instance, where plants were recorded from renosterveld vegetation. Flowering is evidently stimulated by burning but will continue without fire.

*Diagnosis and relationships*: *C. attenuata* is allied to *C. rigida* and *C. scabra* by its subshrubby habit, cauline leaves and elliptic stigma but distinguished from them by its narrow, mostly linear leaves, essentially glabrous or at most sparsely hispidulous along the midrib beneath. There is a significant variation in the lobing of the leaves, with the foliage in the western populations from Houw Hoek and Stormsvlei mostly



Fig. 5. Sub-shrubby species of *Cephalaria*, foliage. A, *C. rigida*, Orange Kloof, Lewis s.n. (NBG); B, *C. rigida*, Table Mt., Gillet s.n. (NBG); C, *C. scabra*, Palmiet River Valley, Stokoe 8648 (BOL); D, *C. scabra*, Brandwag, Esterhuysen 36193 (BOL); E, *C. attenuata*, Robinson Pass, Compton 23059 (NBG). Scale bar: 10 mm. Artist: John Manning.



simple or sometimes with a single spreading lobe near the base (the basis for *S. trifida* Thunb.) whereas plants from Robinson Pass have lyrate-pinnatisect leaves with two or even three lobes in the basal half.

The species was understood by **Sonder (1865)** to include only plants with trilobed or pinnatisect leaves (those with strictly simple leaves being described as the new species *C. lavandulacea* Sond.) and was treated very broadly to include (at varietal level) both *C. decurrens* (Thunb.) Roem. & Schult. (= *C. ustulata* Thunb.) and *C. humilis* (Thunb.) Roem. & Schult. It was on this basis that the distribution was erroneously recorded as extending into Eastern Cape by **Manning and Goldblatt (2013)** rather than restricted to Western Cape.

**Conservation notes:** a poorly collected, locally endemic species of richer soils that is likely to be under significant threat in the western part its range from agriculture. Its conservation status needs reassessment.

#### Additional specimens

Western Cape.—**3419** (Caledon): Houw Hoek Mtns, (–AA), Apr 1892, F. & F. Guthrie s.n. (BOL, NBG); Dec 1894, H. Bolus 6939 (BOL, NBG); 14 Apr 1896, R. Schechter 7589 (BOL). **3420** (Bredasdorp): ± 3 km NE of Stormsvlei along dirt road NW of Remhoogte, (–AA), seasonally wet silts along stream in renosterveld, 8 Feb 2007, N. Helme 4615 (NBG). **3322** (Oudshoorn): Robinson Pass, (–CC), marshy burned slope, 2 Dec 1951, R. Compton 23059 (NBG), E. Esterhuysen 19313 (BOL).

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