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Taxonomic notes on *Acanthopsis* Harv. (Acanthaceae, tribe Acantheae): the group with trifid bracts

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Abstract

In the southern African genus *Acanthopsis*, the morphology of the bracts is taxonomically useful at the species level. This contribution focuses on the taxonomy and conservation status of those members of the genus characterized by inflorescences with trifid bracts, all of which are confined to arid parts of the Northern Cape Province, South Africa. Three species (*A. dregeana*, *A. glauca* and *A. tetragona*) and four subspecies are recognised in this group. One new species (*A. tetragona*) with two subspecies (*A. tetragona* subsp. *tetragona* and *A. tetragona* subsp. *pedunculata*) and one new subspecies (*A. dregeana* subsp. *longispina*) are described. Identification keys to the species and infraspecific taxa of the group with trifid bracts are provided.

Key words: *Acanthodium*, *Acanthus*, *Blepharis*, conservation status, Gariep Centre of Endemism, nomenclature, Richtersveld, South Africa, taxonomic revision

Introduction

The genus *Acanthopsis* was established by Harvey (1842: 28) and is typified by *Acanthopsis disperma* Nees von Esenbeck (1847: 278), originally proposed as *Acanthodium dispermum* E.Mey. in Drège (1837: 2) which was not validly published because no diagnosis or description was provided (Art. 38.1 of Melbourne Code; McNeill *et al.* 2012). Harvey (1842) also noted that another invalidly published name, *Acanthodium plumosum* E.Mey. in Drège (1837: 2) probably belongs to his new genus and further mentioned that the two genera, *Acanthopsis* and *Acanthodium* Delile (1813: 97), differ from each other in "corollas and the insertion and structure of the stamens". *Acanthodium plumosum* was later treated as the synonym of *Acanthopsis horrida* (Nees in Von Schlechtendal 1841: 363) Nees von Esenbeck (1847: 278).

Acanthopsis Harvey (1842: 28) is a morphologically distinct genus confined to South Africa and Namibia (Steyn & Van Wyk 2015). Although superficially resembling *Blepharis* Jussieu (1789: 103), the group is, according to current knowledge (McDade *et al*. 2005), phylogenetically most closely related to *Acanthus* Linneaus (1753: 639). The infrageneric taxonomy of *Acanthopsis* is complex and since 2011 we have extensively studied variation patterns in the group, both in the field and in the herbarium. Hitherto we have resolved the circumscription of species and infraspecific taxa in the *Acanthopsis disperma-hoffmannseggiana* complex (Steyn & Van Wyk 2015), as well as in the "shrublet group" of species (Steyn & Van Wyk 2016). In the present contribution we focus on those members with trifid bracts.

In his treatment of the Acanthaceae, Nees von Esenbeck (1847) recognized two species in *Acanthopsis*, namely *A. disperma* and *A. horrida.* However, in the same publication, he also listed a further five taxa currently classified as *Acanthopsis* under *Acanthodium*, namely *A. carduifolium* (Linnaeus 1782: 294) Nees von Esenbeck (1847: 278), *A. glabrum* Nees von Esenbeck (1847: 278), *A. glaucum* Nees von Esenbeck (1847: 277), *A. hoffmannseggianum* Nees von Esenbeck (1847: 277) and *A. spathulare* Nees von Esenbeck (1847: 277). However, Nees von Esenbeck (1847) did not make it clear what the morphological distinction between these two genera was meant to be. Most of the other species originally attributed by Nees von Esenbeck to *Acanthodium* have since been transferred to *Blepharis*. In his description of *Acanthodium glaucum* (=*Acanthopsis glauca* (Nees) Schinz (1890: 201)), Nees von Esenbeck stated

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that the bracts are "apice trifidis laciniis apice spinosis" (trifid with lobes spiny at the apex) while the other four *Acanthodium* species mentioned above were described as, "quinquespinosis" or "quinque- (vel sex-) spinosis" (having five- or six-spined bracts).

Clarke (1901: 33), in *Flora Capensis*, used the number of bract spines in his key to the species of *Acanthopsis*, namely, "bracts 5-fid at the top" against "bracts 3-fid at the top". He distinguished two species with trifid bracts, namely *A. glauca* and *A. trispina* Clarke (1901: 35). *Acanthopsis trispina* was described by Clarke (1901) based on a single collection (*Mund s.n.*) without the exact locality. The only known sheet of *Mund s.n.* (in K) is a poor specimen with most of the bracts old and damaged (Steyn & Van Wyk 2016). After critical study of the type specimens of *A. trispina* and *A. horrida*, it became clear that these two names apply to the same taxon and *A. trispina* (the younger name) is therefore considered to be a synonym of *A. horrida*, a species with 5-fid bracts (Steyn & Van Wyk 2016). Thus, until now *Acanthopsis glauca* is the only recognized species with trifid bracts.

During the study of herbarium specimens as well as plants in the wild, it was noted that there is indeed more than one species of *Acanthopsis* with trifid bracts. In the present contribution we resolve the taxonomy of those members of *Acanthopsis* with trifid bracts. Species concepts are clarified, one new species and two new subspecies are described, and identification keys are supplied. At present, the trifid group should be seen as one of convenience as it is not at all clear whether the trifid state of the bracts is indicative of a natural relationship.

Materials and methods

Fieldwork was done over three growing seasons to assess the variation of live plants in nature, and to collect spirit material, herbarium specimens, DNA samples and photographic images. Relevant herbarium specimens kept at BOL, NBG, P and PRE, together with high resolution images of herbarium specimens from JSTOR (2016) and from the herbarium of S, were studied; acronyms of herbaria after Holmgren *et al.* (1990). For the demarcation of infrageneric taxa, a classical comparative morphological approach was followed. All measurements were taken from herbarium specimens, or in the case of floral parts, mostly from additional pressed material collected by one of us (HMS). Terminology follows Beentje (2016). Descriptors used to indicate abundance and frequency follow Schmid (1982).

In the sections "Additional specimens examined", locality citations were reproduced as per the specimen labels. The specimens are arranged according to the Degree Reference System proposed by Edwards & Leistner (1971); the quarter degree grid reference is supplied between brackets after each locality cited. All specimen localities were also georeferenced as accurately as possible and these values were used for mapping and conservation assessments. Conservation assessments follow the standard procedure based on IUCN guidelines (Raimondo *et al*. 2009). All cited specimens have been seen by the first author.

Results

The group of *Acanthopsis* species with trifid bracts is restricted to the Northern Cape Province, South Africa (Fig. 1). These taxa are characterised by the middle to upper inflorescence bracts ending in three primary spines or three ovate, mucronate to spinose lobes and include compact subshrubs and shrublets (Fig. 2).

In *Acanthopsis* the morphology of the bracts is taxonomically useful at the species level. For the description of the bracts we follow the same terminology as in Steyn & Van Wyk (2015, 2016). The middle to upper bracts within an inflorescence were used for measurements in the keys and descriptions, unless stated otherwise.

Taxonomic treatment

All three species of *Acanthopsis* recognised here (Table 1) have the following character states in common: inflorescences of erect spikes; bract one; bracteoles two, linear-lanceolate with a bony midrib ending in a spinous tip; calyx 4-partite with the basal parts and veins thickened and bony; dorsal sepal longer and wider than the ventral one with both much wider than the lateral sepals, the dorsal sepal enveloping the other three; ventral sepal 2-fid, ending in spinous tips; lateral sepals lanceolate, broader at the base; corolla tubular at the base, 1-lipped, 5-lobed with the outer lobes reduced

(Figs. 2 & 3), pubescent abaxially, with barb-shaped hairs adaxially; stamens four, anthers densely bearded; filaments hard and bony, outer filaments without an appendage at the tip; style unbranched, filiform, stigma unlobed.

TABLE 1. Diagnostic characters to distinguish the members of the *Acanthopsis* group with trifid bracts. Descriptors used to indicate frequency follow Schmid (1982).

Characters	***A. glauca***	***A. dregeana*** subsp. ***dregeana***	***A. dregeana*** subsp. ***longispina***	***A. tetragona*** subsp. ***tetragona***	***A. tetragona*** subsp. ***pedunculata***
Distribution	South Africa (Richtersveld, Northern Cape)	South Africa (Richtersveld, Northern Cape)	South Africa (Namaqualand, Northern Cape)	South Africa (Richtersveld, Northern Cape)	South Africa (Richtersveld, Northern Cape)
Habit	subshrub	shrublet	shrublet	subshrub	subshrub
Leaf base	attenuate	attenuate to decurrent	auriculate	attenuate	attenuate to decurrent
Inflorescence length and diam. (mm)	(35–)50–75(–90) 8–10	30–55 10–12	(25–)30–40(–45) 10–15	(40–)60–90(–110) 14–16(–20)	(40–)45–60(–70) 12–15(–20)
Peduncle length (mm)	15–30(–50)	(15–)20–40(–70)	up to 5	up to 10	(15–)20–35(–50)
Bract indumentum	puberulent to hirsute with deflexed or spreading, short hairs	puberulent with deflexed to spreading short hairs, becoming more densely pubescent with long, glandular hairs towards the top	puberulent with deflexed to spreading short hairs, becoming more densely pubescent with long, glandular hairs towards the top	hirsute with spreading short, white hairs together with long, viscid glandular hairs, lamina often with long, spreading silky hairs	hirsute with spreading short, white hairs, together with long, viscid glandular hairs, lamina rarely with long, spreading silky hairs
Central primary spine simple	nearly always	always	always	usually	nearly always
Corolla length × width (mm)	27–30 × 11–13	23–25 × 8–10	26–27 × 10–11	26–27 × 9–11	(25–)28–30 × 9–11
Corolla tube length (mm)	9–10	7(–8)	8–9	9–11	8–10

Key to the species of *Acanthopsis* with trifid bracts

1. Middle to upper bracts ending in 3 drawn-out, primary spines (triangular to narrowly triangular, usually with excurrent tips); bracts oblong to obovate, coriaceous, with short, deflexed eglandular hairs..... 1. *A. glauca*
- Middle to upper bracts ending in 3 ovate, mucronate to spinose lobes; bracts oblong, obovate to ovate, chartaceous to coriaceous, always with spreading viscid, glandular hairs.....2
2. Plants shrublets (20–40 cm tall) with well-developed branches and clearly visible internodes; leaves scattered (well-spaced) along woody stem..... 2. *A. dregeana*
- Plants compact subshrubs (12–20 cm tall) with gnarled stems and reduced (usually not visible) internodes; leaves fascicled or in a basal rosette .....3. *A. tetragona*

1. *Acanthopsis glauca* (Nees) Schinz (1890: 201); (Figs. 1, 2A, B, 4A, 5)

Clarke (1901: 34). *Acanthus glaucus* E.Mey. in Drège (1843: 91, 161), *nom. nud*. *Acanthus glaucescens* E.Mey. in Drège (1843: 95), *nom. nud. Acanthodium glaucum* Nees von Esenbeck (1847: 277). *Blepharis glauca* (Nees) Anderson (1864: 36).

Type:—SOUTH AFRICA. Northern Cape: [Illegible] zum Goedemanskraal & Kaus, 2500–3000 ft [760–915 m], 8 September 1830, *Drège 2434* (lectotype P04426154 scan! designated here).

Perennial subshrub, 15–20 cm tall. Leaves sessile; lamina oblanceolate, (40–)55–70(–80) × (5–)7–8(–10) mm, glaucous with appressed, densely packed short hairs; base attenuate; margin undulate, coarsely dentate-spinose, spines rigid, (2–)3–5(–7) mm long, yellowish brown or maroon; apex acute to cuspidate. Inflorescences pedunculated, cylindrical to slightly turbinate in fruit, (35–)50–75(–90) mm long (excluding peduncle), 8–10 mm in diameter; peduncle usually 15–30(–50) mm long, with 2 or 3 pairs of peduncular bracts, pubescent with deflexed short, white hairs. Bracts oblong to obovate, coriaceous, (22–)25–35 mm long, lamina 12–18 mm long; lower bracts ending in 3(–5) primary spines, central primary spine always simple and recurved, usually more than twice the length (up to 30 mm) of lateral spines; middle to upper bracts oblong, nearly always with 3 primary spines (when 5, then outer spines very reduced), central primary spines nearly always simple, 5 primary veins very often converging into 3 attenuate spines, central primary spine nearly always with excurrent tip, twice as long (up to 20 mm) as lateral spines, spreading; spines and venation often maroonish, puberulent to hirsute with deflexed or spreading, short hairs, often with long, silky hairs abaxially towards the base and short glandular hairs adaxially. Bracteoles linear, 5 mm long, silky-hairy. Calyx with dorsal sepal ovate, acuminate, 11–13 mm long, silky-hairy, 5–7-veined from the base; ventral sepal ovate, 10–11 mm long, silky-hairy, 5–7-veined from the base; lateral sepals lanceolate, ending in spinous tip, broader at the base, 8–9 mm long, silky-hairy. Corolla lilac to white with dark purple veins and lemon-yellow throat, 27–30 × 11–13 mm long, tube 9–10 mm long; central lobe usually wider than long, constricted at base, truncate. Filaments 7–8 mm long, glandular; anthers orange-brown, 3 mm long. Style with patch of glandular hairs at base. Capsules ovate, flattened, glabrous, shiny, 7 × 3–4 mm. Seeds ovate, 4 × 2 mm, covered with long white hygroscopic hairs.

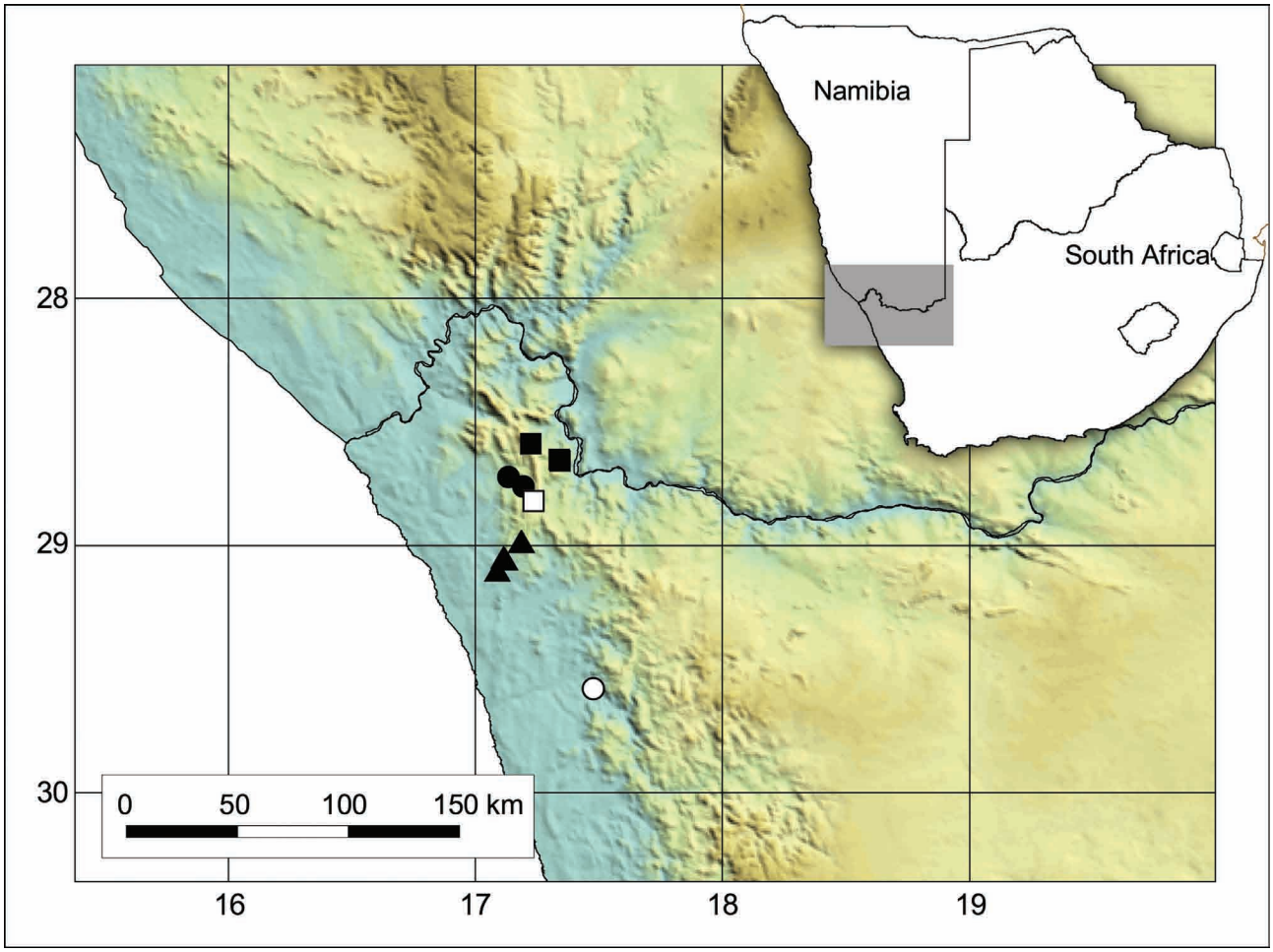

FIGURE 1. Distribution of *Acanthopsis* taxa within the trifid bract group: *A. dregeana* subsp. *dregeana* (●), *A. dregeana* subsp. *longispina* (○), *A. tetragona* subsp. *tetragona* (■), *A. tetragona* subsp. *pedunculata* (□) and *A. glauca* (▲).

Etymology:—The specific epithet "*glauca*" refers to the glaucous appearance of the plants due to an indumentum of densely packed, appressed, short hairs.

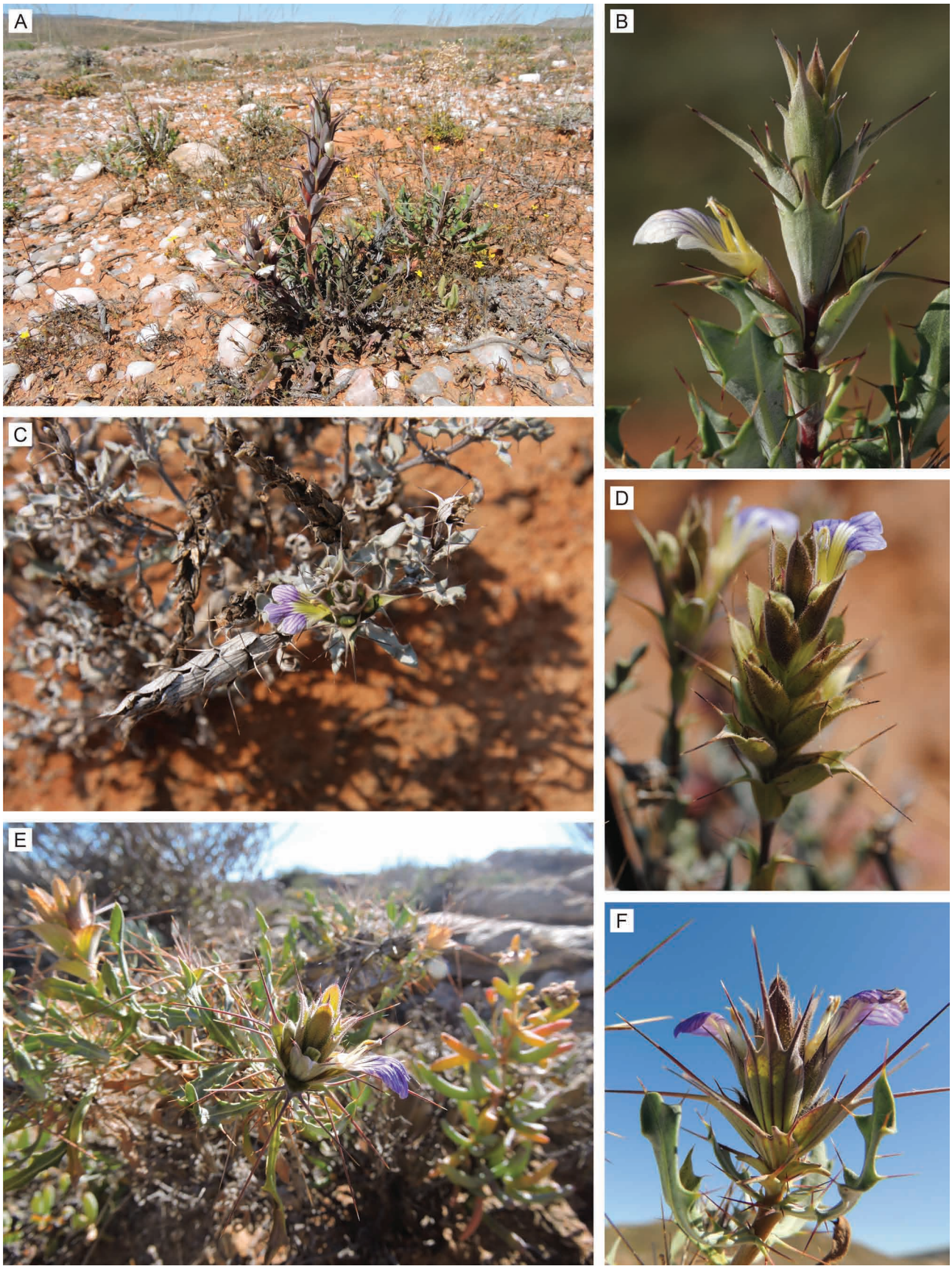

FIGURE 2. Comparison of habit and flowers in members of *Acanthopsis* with trifid bracts. A, B. *A. glauca,* C, D. *A. dregeana* subsp. *dregeana*, E, F. *A. dregeana* subsp. *longispina*. Photographed by: H.M. Steyn (A, C, D, E) and M. Koekemoer (B, F).

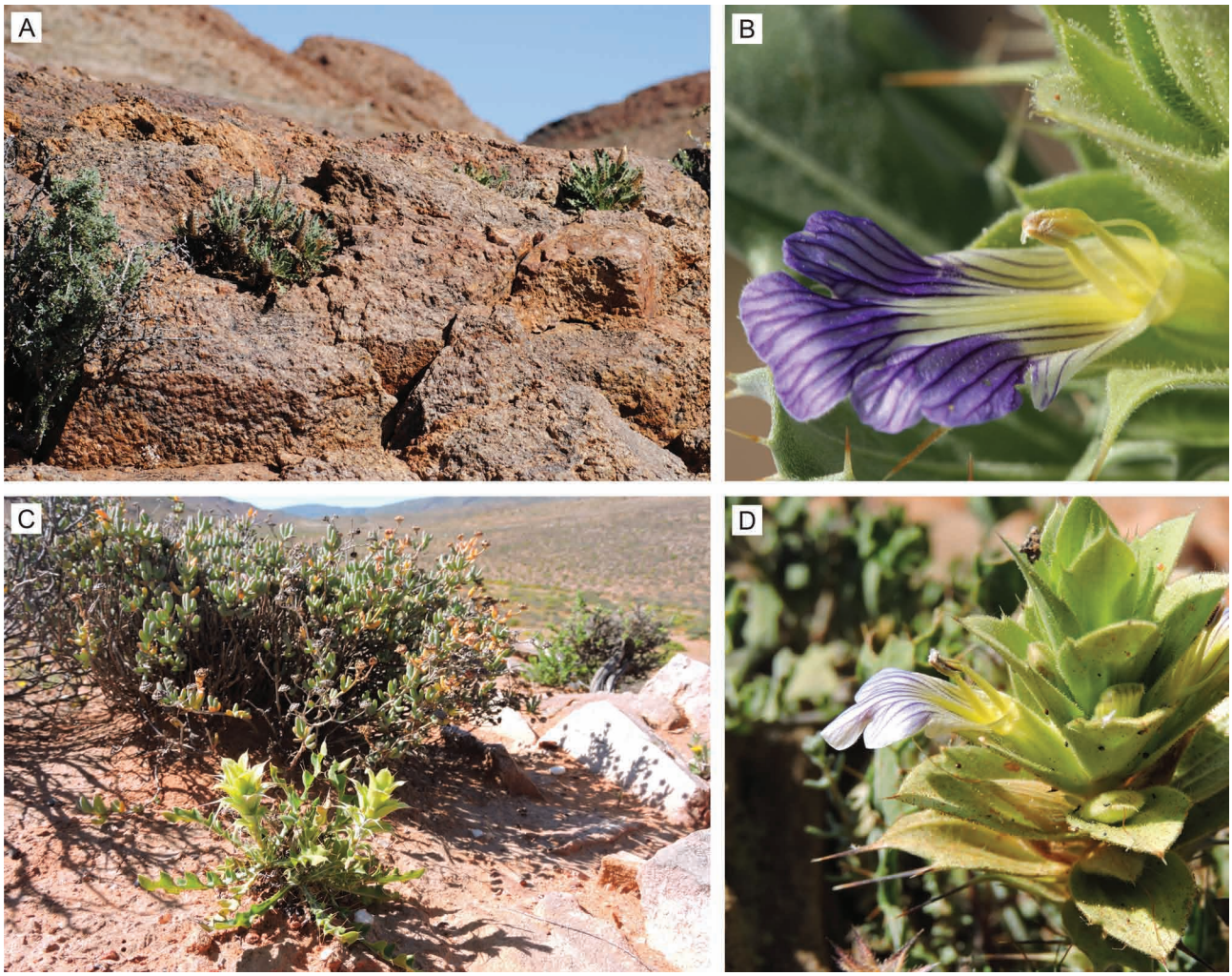

FIGURE 3. Comparison of habit and flowers in members of *Acanthopsis* with trifid bracts. A, B. *A. tetragona* subsp. *tetragona,* C, D. *A. tetragona* subsp. *pedunculata.* Photographed by: S.P. Bester (A), M. Koekemoer (B) and H.M. Steyn (C, D).

Distribution, ecology and phenology:—*Acanthopsis glauca* is restricted to the mountainous areas to the south and east of Lekkersing (Fig. 1), Northern Cape, at elevations between 300–550 m. This area falls within the Gariep Centre of Endemism (Van Wyk & Smith 2001) and in the Succulent Karoo of Rutherford & Westfall (1994), Low & Rebelo (1996) and Mucina & Rutherford (2006). This species is usually associated with fields of white quartz pebbles and prefers shallow, sandy loam soil in Die Plate Succulent Shrubland (SKr 10) and Central Richtersveld Mountain Shrubland (SKr 1) vegetation types (Mucina & Rutherford 2006). Fog is common in Skr1 but of little importance in SKr 10, with the mean annual rainfall between 50–100 mm, but usually less than 90 mm. Specimens with flowers were collected from August to October.

Notes:—The authorship of the name *Acanthopsis glauca* was incorrectly attributed to "(E.Mey.) Schinz" by some authors (e.g.Welman 2003; Snijman 2013). Although *Acanthus glaucus* was first applied by Meyer in Drège (1843) to a Drège collection, it was invalidly published because no description was provided. Nees von Esenbeck (1847) validly published the name *Acanthodium glaucum* by citing *Acanthus glaucus* as a synonym. The authorship of the name *Acanthopsis glauca* is therefore either "(E.Mey. ex Nees) Schinz" or "(Nees) Schinz".

Although the four specimens of Drège's collection were all labelled *Acanthus glaucus* or *Acanthopsis glauca*, the material on the sheets *Drège 2434* (P04426154) and *Drège s.n.* (GZU000250678) differs from the other two in having a more 'closed' inflorescence with much shorter, less spreading spines on the bracts. The latter is, however, considered to be a young inflorescence of the same taxon. Specimens with similar young inflorescences include: *Oliver, Tölken* & *Venter 803* and some inflorescences on *Steyn 1857*, *2143.* There are currently four sheets known in Drège's collections (Drège 1843) collected on at least two different dates and localities, namely *Drège s.n.* (19 August 1830 (P)), *Drège 2434* (8 September 1830 (P)), *Drège 2435* (September 1830 (S-G)) and *Drège s.n.* (no date (GZU)). The Paris specimen (*Drège 2434*) was selected as lectotype as it is annotated with the collector number, date and locality in Drège's handwriting.

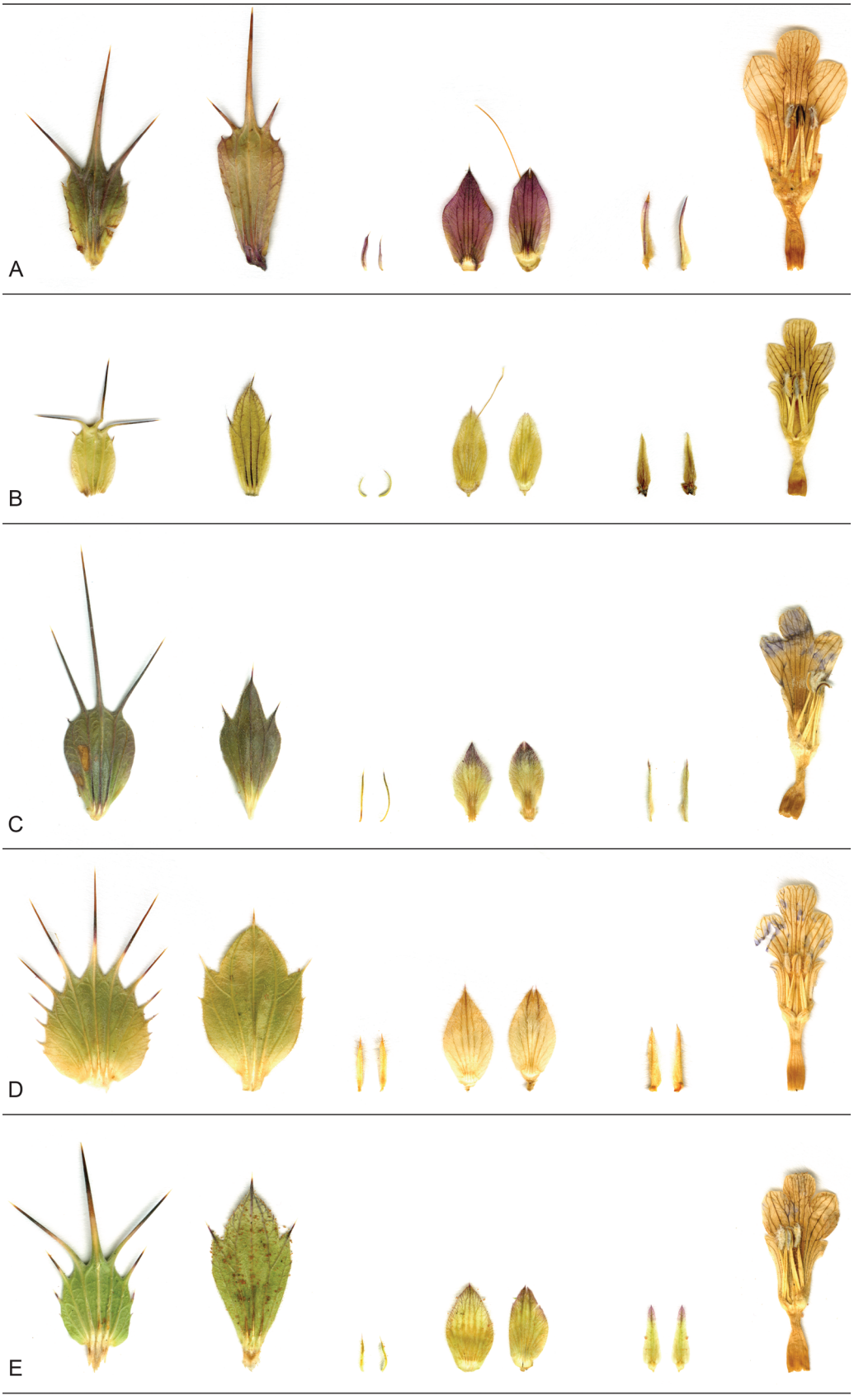

FIGURE 4. Comparison of floral parts in members of *Acanthopsis* with trifid bracts (from left to right): bract(s), bracteoles, calyx (4 sepals: dorsal, ventral and 2 lateral ones) and corolla with anthers. A. *A. glauca,* B. *A. dregeana* subsp. *dregeana,* C. *A. dregeana* subsp. *longispina,* D. *A. tetragona* subsp. *tetragona,* E. *A. tetragona* subsp. *pedunculata.* Note: the bract on the left is from lower down in the same inflorescence. Scale bar = 10 mm. Vouchers: A = *Steyn 1888* (PRE), B = *Steyn 1822* (PRE), C = *Steyn 2141* (PRE), D = *Steyn 1848* (PRE), E = *Steyn 2144* (PRE).

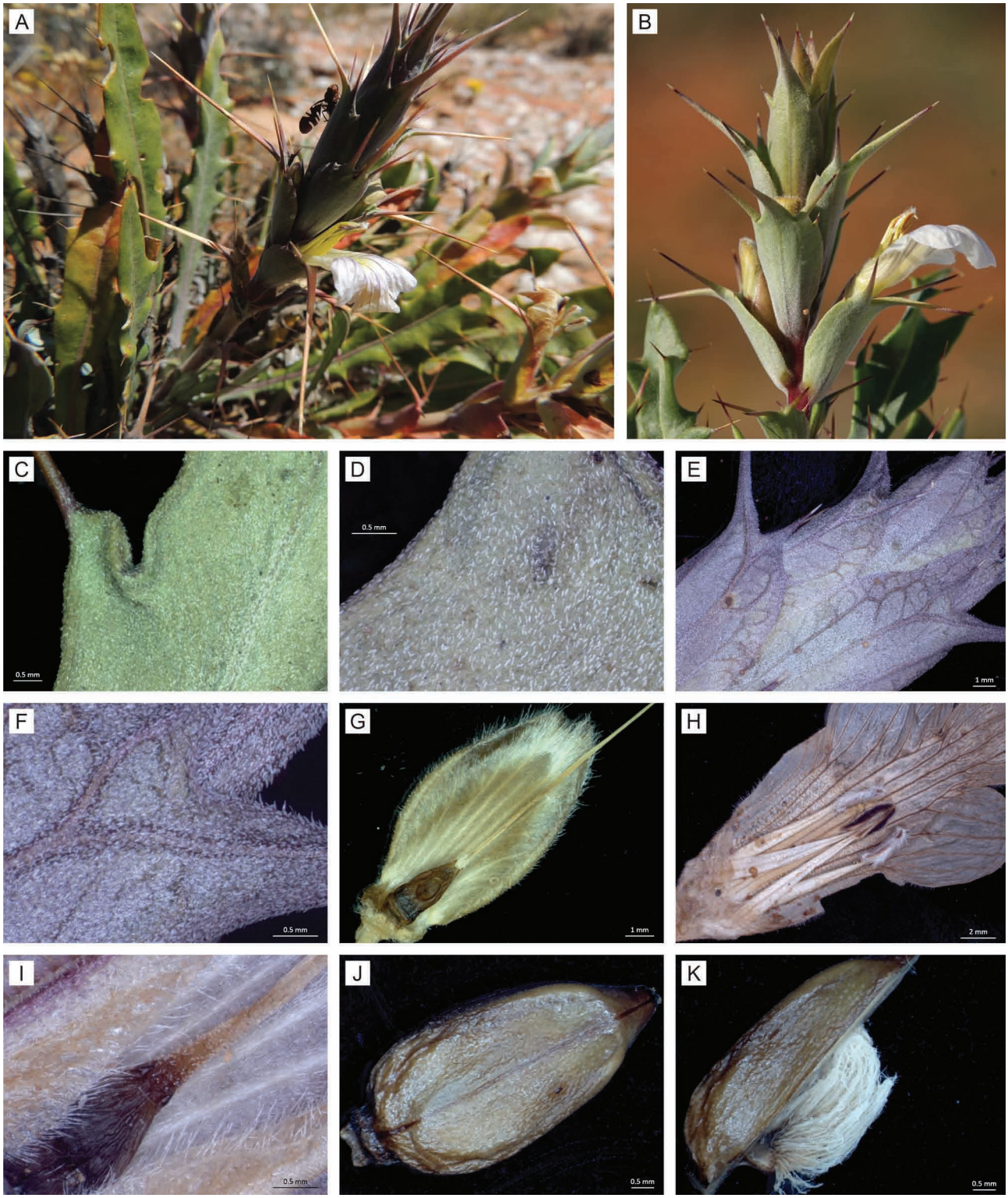

FIGURE 5. *Acanthopsis glauca*. A & B. Habit. C & D. Leaf indumentum (abaxial). E & F. Bract. G. Calyx. H. Corolla lobes lilac to white, throat lemon-yellow. I. Glandular hairs at base of style. J. Capsule. K. Seed. Vouchers: C–H = *Steyn 2146* (PRE), I–K = *Steyn 1888* (PRE). Photographed by: M. Koekemoer (A, B) and H.M. Steyn (C–K).

Conservation status:—*Acanthopsis glauca* has a very limited distribution range and is known from three small subpopulations. Its entire known range falls within communally owned rangelands that are overstocked with livestock, and severely degraded due to overgrazing and erosion, particularly in the lowlands close to settlements. Although this taxon is not browsed, field observations indicate habitat degradation due to trampling by cattle at one of the subpopulations. Because of its localized distribution and potential threat of habitat degradation due to overgrazing and

trampling, it meets the criterion D2 for the category Vulnerable according to the IUCN Red List Category and Criteria (IUCN 2001) (L. von Staden, pers. comm.).

Additional specimens examined:—SOUTH AFRICA. Northern Cape: Richtersveld, Lekkersing, Karuchabpoort, 9 km South of Lekkersing main hills North of poort, 350 m, (2917AA), 8 September 1977, *Oliver, Tölken & Venter 803* (PRE); Namaqualand District, 8 km S of Lekkersing, Karuchabpoort, 346 m, (2917AA), 10 August 2011, *Steyn 1857* (PRE); Namaqualand District, S of Lekkersing, 298 m, (2917AA), 11 October 2015, *Steyn 2143* (PRE); Namaqualand District, on road between Eksteenfontein & Lekkersing, 549 m, (2817CC), 24 August 2012, *Steyn 1888* (PRE); Namaqualand District, between Lekkersing and Eksteenfontein, 556 m, (2817CC), 11 October 2015, *Steyn 2146* (PRE). Without precise locality: [Illegible] Kasparskloof, 2000–3000 ft [610–915 m], III C, 19 August 1830, *Drège s.n*. (P04426152); no locality or date, *Drège s.n.* (GZU000250578 scan); Klein Namaqualand, Inter Olifantsrivier & Kaus, in montibus, September 1830, *Drège 2435* (S-G-44 scan).

2. ***Acanthopsis dregeana*** H.M.Steyn in Steyn & Van Wyk (2016: 155)

Type:—SOUTH AFRICA. Northern Cape: Namaqualand District, NW of Eksteenfontein, 398 m, (2817CA), 16 September 2010, *Steyn 1822* (holotype PRE0861475-0!; isotype NBG!).

Perennial shrublet, 20–40 cm tall. Stems brown (maroon when young), ribbed, almost glabrous to pubescent with deflexed short, white hairs; internodes (10–)15–30 mm long. Leaves sessile; lamina lanceolate to oblanceolate, 25–45(–50) × (5–)7–10(–12) mm, appear glaucous with appressed, densely packed short hairs; base often decurrent; margin undulate, coarsely dentate-spinose, spines rigid, 2–6(–9) mm long, orange-brown; apex cuspidate. Inflorescences pedunculate, cylindrical, 25–55 mm long (excluding peduncle), 10–12(–15) mm in diameter; peduncle (3–)20–40(–70) mm long, pubescent with short, spreading hairs. Bracts obovate to oblong, (16–)18–30(–38) mm long, lamina 10–13(–15) mm long; lower bracts ending in 3–5 primary spines, central primary spine always simple and spreading to recurved or spreading, spine tips often dark brown or maroon; middle to upper bracts oblong, 5 primary veins converging into 3 mucronate to spinose, ovate to oblong lobes with 2 outer lobes reduced, central primary spine always simple; peduncular bracts strigose with appressed, short hairs; lower bracts with deflexed to spreading short hairs becoming more densely pubescent with long, glandular hairs towards top of inflorescence. Bracteoles linear to sickle-shaped, 3–6(–7) mm long, silky-hairy, also with glandular hairs. Calyx with dorsal sepal oblong to ovate, acuminate, 10–11 mm long, silky-hairy, also with short spreading and glandular hairs abaxially, (5–)7–9-veined from base; ventral sepal ovate, 10–11 mm long, silky-hairy, also with short spreading and glandular hairs abaxially, 5–7-veined from base; lateral sepals 8–9 mm long, silky-hairy, also with isolated glandular hairs. Corolla lilac to purple with lemon-yellow throat, 23–25(–27) × 8–10(–11) mm, tube 7–8(–9) mm long; central lobe constricted at base, truncate to emarginate. Filaments (5–)6–7(–8) mm long, glandular, silky-hairy towards the base; anthers orange-brown, 3 mm long. Style with patch or ring of glandular hairs at base. Capsules narrowly ovate to ovate, 7–8 × 2–3(–4) mm. Seeds ovate, 4–5 × 3 mm, covered with long white hygroscopic hairs.

Notes:—Subsequent to the publication of the name *A. dregeana* (a shrublet species in Steyn & Van Wyk 2016), a distinct form was discovered during field work in the Northern Cape; it is described here as a new subspecies.

Key to subspecies

1. Leaf bases attenuate; inflorescences clearly pedunculate, peduncle (15–)20–40(–70) mm long; lower bracts with spines up to 15 mm long; northwest of Eksteenfontein, Richtersveld ..... 2a. subsp. *dregeana*
- Leaf bases usually auriculate; inflorescences subsessile, peduncle up to 5 mm long; lower bracts with spines 20–25(–30) mm long; northwest of Springbok, Namaqualand ..... 2b. subsp. *longispina*

2a. ***Acanthopsis dregeana*** subsp. ***dregeana*** (Figs. 1, 2C, D, 4B, 6)

Leaves sessile; lamina lanceolate to oblanceolate, 25–45(–50) × 7–10(–12) mm, spines rigid, 2–4 mm long; base attenuate, decurrent. Inflorescences pedunculate, cylindrical, 30–55 mm long (excluding peduncle), 10–12 mm in diameter, peduncle (15–)20–40(–70) mm long, with 2 or 3 pairs of peduncular bracts. Bracts obovate to oblong, 18–24 mm long, lamina 10–13 mm long; lower bracts ending in 3(–5) primary spines, central primary spine always simple and recurved. Corolla 23–25 × 8–10 mm, tube 7(–8) mm long, pubescent; central lobe usually longer than wide, constricted at base, truncate. Filaments 5–6 mm long, glandular; anthers brown.

For notes on distribution, ecology and phenology, see Steyn & Van Wyk (2016).

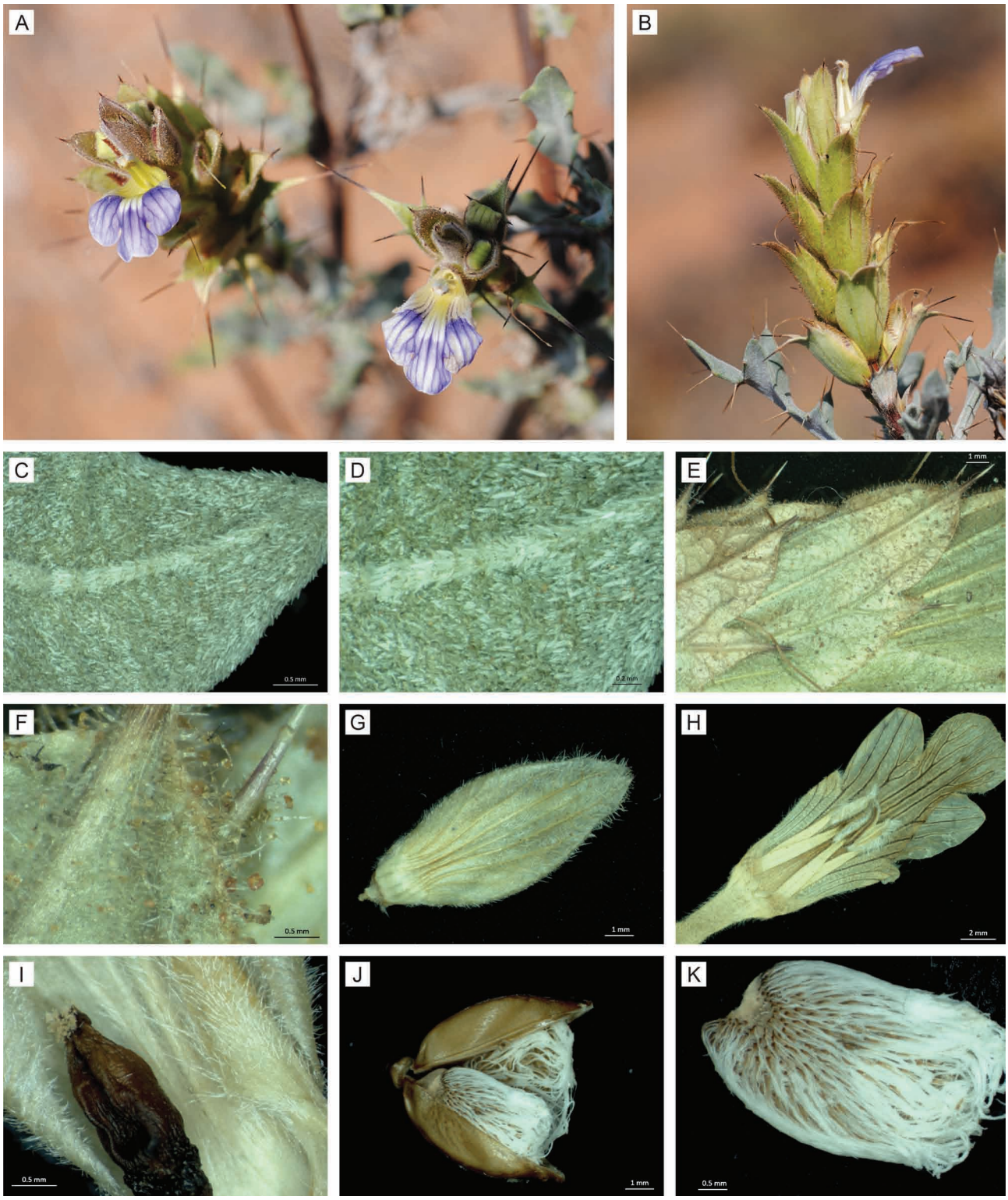

FIGURE 6. *Acanthopsis dregeana* subsp. *dregeana*. A & B. Habit. C & D. Leaf indumentum (abaxial). E & F. Bract. G. Calyx. H. Corolla lobes lilac to purple, throat lemon-yellow. I. Glandular hairs at base of style. J. Capsule with seed. K. Seed. Vouchers: C–K = *Steyn 1822* (PRE). Photographed by: H.M. Steyn (A–K).

2b. *Acanthopsis dregeana* subsp. ***longispina*** H.M.Steyn, *subsp. nov*. (Figs. 1, 2E, F, 4C, 7)

Type:—SOUTH AFRICA. Northern Cape: Namaqualand District, N of Buffelsrivier on dirt road to Wolfberg, 181 m, (2917CB), 11 October 2015, *Steyn 2141* (holotype PRE0866195-0!; isotype NBG!).

Diagnosis:—The new subspecies differs from subsp. *dregeana* in having long spines on lower bracts, 20–25(–30) mm

long (not up to 15 mm long), leaf base auriculate (not attenuate) and inflorescence subsessile to shortly pedunculate up to 5 mm long (not clearly pedunculate with peduncle (15–)20–40(–70) mm long).

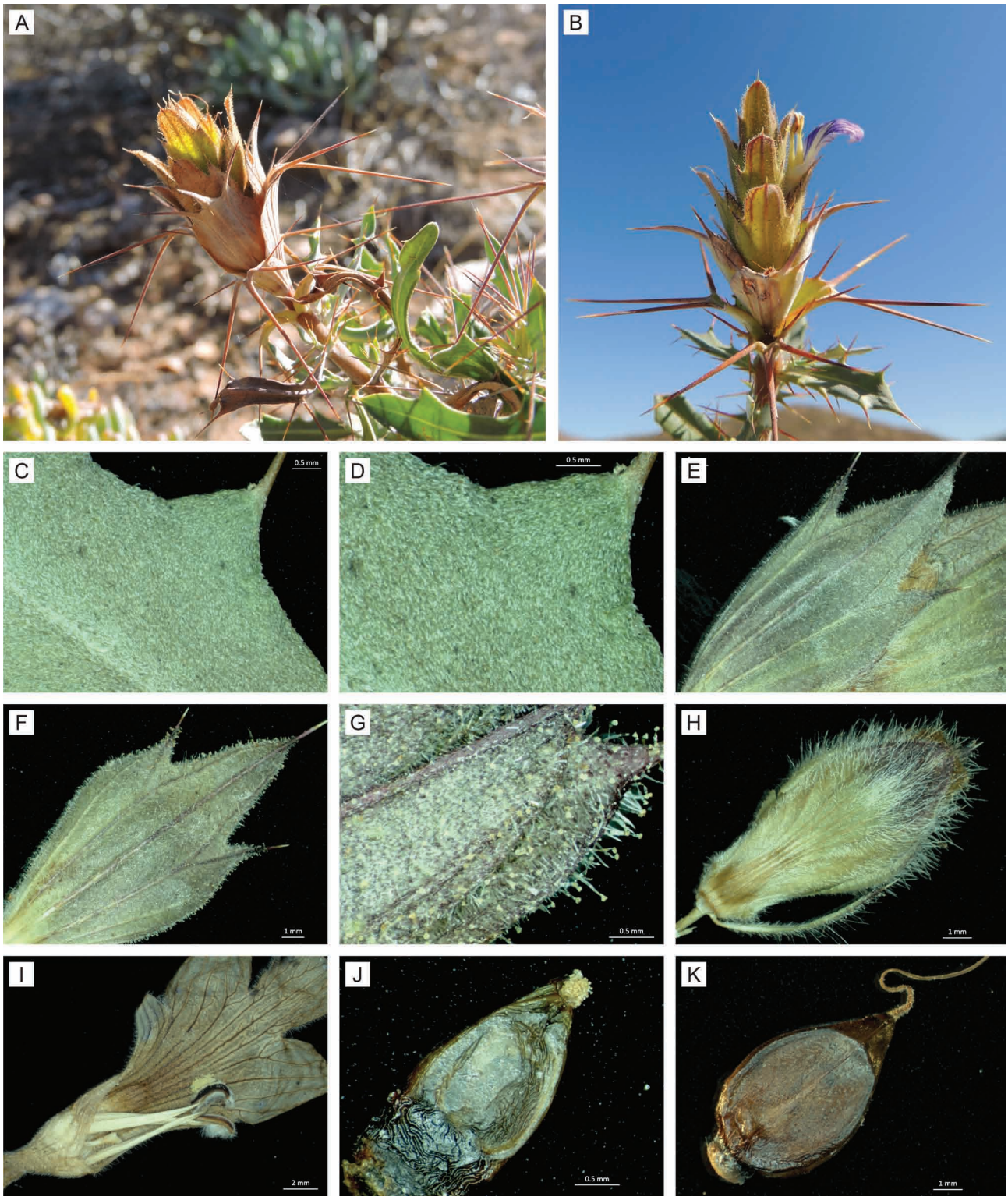

FIGURE 7. *Acanthopsis dregeana* subsp. *longispina*. A & B. Habit. C & D. Leaf indumentum (abaxial). E–G. Bract. H. Calyx and bracteole. I. Corolla lobes lilac to purple, throat lemon-yellow. J. Capsule showing glandular hairs at top of ovary (base of style). K. Capsule. Vouchers: C–K = *Steyn 2141* (PRE). Photographed by: H.M. Steyn (A & C–K) and M. Koekemoer (B).

Leaves sessile; lamina oblanceolate, (25–)35–40(–50) × 5–8(–10) mm, spines rigid, 3–6(–9) mm long; base usually auriculate with long, rigid spines. Inflorescences subsessile to shortly pedunculate, globose to cylindrical or slightly turbinate when in fruit, (25–)30–40(–45) mm long, 10–15 mm in diameter; peduncle up to 5 mm long, with 2(or 3) pairs of peduncular bracts. Bracts obovate, 16–32(–38) mm long, lamina 12–14(–15) mm long; lower bracts

ending in 3–5(–7) primary spines, central primary spine always simple, spreading. Corolla 26–27 × 10–11 mm, tube 8–9 mm long; central lobe usually wider than long, constricted at base, truncate to emarginate. Filaments 6–7(–8) mm long, glandular, hairy towards the base; anthers orange-brown.

Etymology:—The subspecific epithet "*longispina*" refers to the long spines on the bracts, especially the lower bracts.

Distribution, ecology and phenology:—*Acanthopsis dregeana* subsp. *longispina* is endemic to South Africa and only known from the type locality. The distribution falls within the Succulent Karoo Biome (Rutherford & Westfall 1994; Low & Rebelo 1996; Mucina & Rutherford 2006) and within the Namaqualand Heuweltjieveld (Skn 4) (Mucina & Rutherford 2006) with a mean annual rainfall of 50–100 mm, received mainly in winter. The specimen was collected at an elevation of approximately 180 m, on a granite hill slope in well-drained, stony sandy loam. Specimens with flowers were collected in October.

Conservation status:—This taxon is known from a single subpopulation (ca. 70 individuals) within an area that is extensively mined for minerals using severely destructive open-cast mining. The population occurs within 10 km of mining areas and is potentially vulnerable to mining expansion, which would lead to an increased risk of extinction within a very short time frame. It therefore qualifies for the criterion D2 in the category Vulnerable according to the IUCN Red List Category and Criteria (IUCN 2001) (L. von Staden, pers. comm.).

3. ***Acanthopsis tetragona*** H.M.Steyn, *sp. nov.*

Type:—SOUTH AFRICA. Northern Cape: Namaqualand District, Richtersveld, S of Sunvalley camp site, 588 m, (2817CB), 8 August 2011, *Steyn 1848* (holotype PRE0861471-0!; isotype NBG!).

Diagnosis:—*Acanthopsis tetragon*a differs from *A. glauca* in bracts being short-spined (not with excurrent spines up to 20 mm long), long, viscid glandular hairs (not short, eglandular hairs), inflorescences thicker, (12–)14–16(–20) mm (not 8–10 mm) in diameter and from *A. dregeana* in being a compact subshrub 12–20 cm tall (not a shrublet 20–40 cm tall).

Perennial subshrub, (8–)12–20 cm tall. Leaves sessile; lamina oblanceolate, 40–70(–75) × (8–)10–15 mm, with appressed to strigose short, white hairs and subsessile glands; base attenuate, often decurrent; margin undulate, dentate-spinose to coarsely dentate-spinose, spines rigid (2–)4–6(–8) mm long, yellowish or maroonish brown; apex cuspidate. Inflorescences subsessile to shortly pedunculate, cylindrical to turbinate, 40–110 mm long (excluding peduncle), (12–)14–16(–20) mm in diameter. Bracts ovate to obovate, (22–)23–28(–30) mm long, lamina (12–)13–18 mm long; lower bracts ending in 5(–7) primary spines, central primary spine nearly always simple; middle to upper bracts with 3(–5) primary spines, usually ending in 3 broadly triangular to ovate, mucronate lobes with 3 main central veins usually converging towards tip of central primary spine, central primary spine usually to nearly always simple or with 2 pairs of very short, marginal secondary spines, primary spine tips usually recurved in fruit; lower bracts hirsute with deflexed to spreading short, white hairs; middle to upper bracts with spreading short, white hairs together with long, viscid glandular hairs, lamina often with long, spreading silky hairs, usually also with glandular hairs adaxially. Bracteoles narrowly lanceolate to linear, (5–)6–7 mm long, silky-hairy, also with glandular hairs. Calyx with dorsal sepal ovate, acuminate to cuspidate, (11–)12–13 mm long, silky-hairy, also with long, glandular hairs abaxially, especially towards tip, 5–7-veined from base; ventral sepal ovate, (11–)12–13 mm long, silky-hairy, also with long, glandular hairs abaxially, especially towards tip, 5–7-veined from base; lateral sepals lanceolate, ending in spinous tip, broader at base, 7–8 mm long, densely silky-hairy, also with glandular hairs. Corolla blue-purple or lilac with lemon-yellow throat, (25–)26–27(–30) × 9–11 mm, tube (8–)9–11 mm long; central lobe broader than long or equal, constricted at base, truncate to emarginate. Filaments 5–7(–8) mm long, glandular; anthers beige, 2–3 mm long. Style with patch of glandular hairs at base. Capsules ovate, flattened, glabrous, shiny, 7(–9) × 3(–4) mm. Seeds ovate, 6 × 5 mm, covered with long white hygroscopic hairs.

Etymology:—The specific epithet "*tetragona*" refers to the regular decussate arrangement of the bracts that gives the inflorescence a distinctly "four-angled" appearance when viewed from above.

Key to subspecies

1. Inflorescences subsessile or with peduncle <10 mm long; bracts divergent at floral anthesis; occurring mainly in cracks of rocks or on coarse sand derived from granitic gneisses ..... 3a. subsp. *tetragona*
- Inflorescences with peduncle (15–)20–35(–50) mm long; bracts divaricate at floral anthesis; associated with fine, red sand on quartzite ridges ..... 3b. subsp. *pedunculata*

3a. ***Acanthopsis tetragona*** subsp. ***tetragona*** (Figs. 1, 3A, B, 4D, 8)

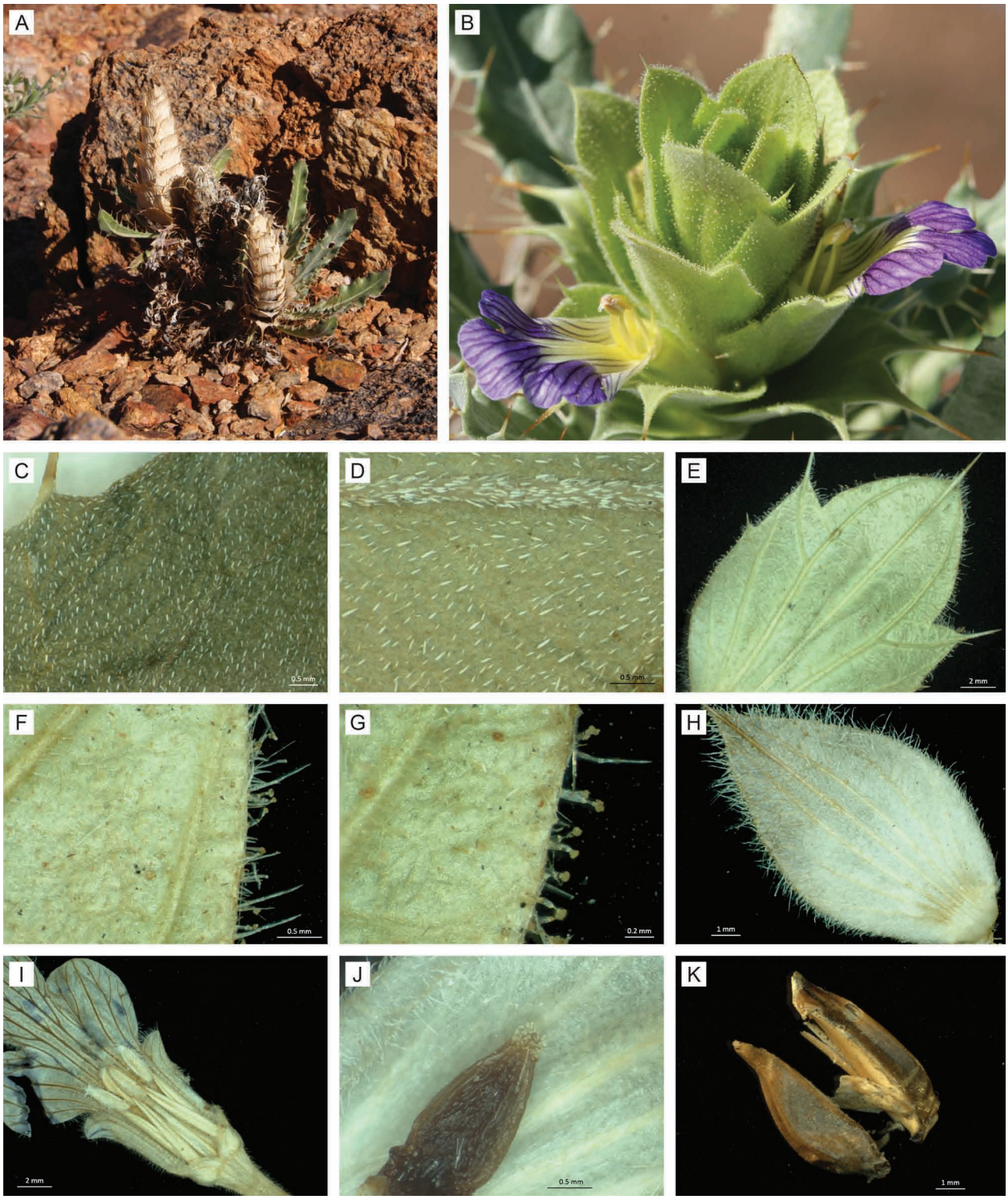

FIGURE 8. *Acanthopsis tetragona* subsp. *tetragona*. A & B. Habit. C & D. Leaf indumentum (abaxial). E–G. Bract. H. Calyx. I. Corolla lobes purple, throat lemon-yellow. J. Glandular hairs at top of ovary (base of style). K. Capsule. Vouchers: C–G = *Steyn 1853* (PRE), H–K = *Steyn 1848* (PRE). Photographed by: S.P. Bester (A), M. Koekemoer (B) and H.M. Steyn (C–K).

Perennial subshrub, 15–20 cm tall. Lamina oblanceolate, 40–70 × (8–)10–15 mm; spines rigid (2–)4–6 mm long, yellowish brown. Inflorescences subsessile, cylindrical, (40–)60–90(–110) mm long (excluding peduncle), 14–16(–20) mm in diameter, peduncle nearly always <10 mm. Bracts ovate to obovate, 23–28 mm long, lamina 13–18 mm long; divergent in flower; central primary spine usually simple or with 2 pairs of very short, marginal secondary spines; middle to upper bracts with spreading short, white hairs together with long, viscid glandular hairs, lamina often with

long, spreading silky hairs, usually also with glandular hairs adaxially. Corolla light blue (*Jürgens 23033*) to purple, 26–27 × 9–11 mm, tube 9–11 mm long. Capsules ovate, 7 × 3 mm. Seeds not seen.

Distribution, ecology and phenology:—*Acanthopsis tetragona* subsp. *tetragona* is endemic to the Northern Cape and known from an area to the north and northeast of Eksteenfontein (Fig. 1). It is centred in the core part of the Gariep Centre of Endemism (Van Wyk & Smith 2001). This distribution falls within the Succulent Karoo Biome according to Rutherford & Westfall (1994) and Low & Rebelo (1996) and in the Desert Biome according to Mucina & Rutherford (2006) within the Kahams Mountain Desert (Dg 5) vegetation type (Mucina & Rutherford 2006). This vegetation type is in the transition between winter and summer rainfall areas with a mean annual rainfall of 50–100 mm; fog is absent. The specimens were collected at elevations of 530–590 m on mountain slopes, often wedged between rocks or on coarse sand derived from granite. Specimens with flowers were collected between August and October.

Conservation status:—*Acanthopsis tetragona* subsp. *tetragona* has a limited distribution range (EOO 20 km²) and is known from two subpopulations. Its entire known range falls within communally owned rangelands that are overstocked with livestock, and severely degraded due to overgrazing and erosion, particularly in the lowlands close to settlements. This taxon is not browsed and its particular microhabitat however provides it protection against trampling and erosion, and it is therefore not considered threatened and the population is not suspected to be declining. It is therefore assessed as Least Concern (LC) according to the IUCN Red List Category and Criteria (IUCN 2001).

Additional specimens examined (paratypes):—SOUTH AFRICA. Northern Cape: Richtersveld, Doringrivier, on lower slope, 530 m, (2817CD), 3 October 1987, *Jürgens 23033* (PRE); Namaqualand District, mountain slope NE of Sunvalley camp site, 551 m, (2817CB), 9 August 2011, *Steyn 1853* (PRE).

3b. *Acanthopsis tetragona* subsp. ***pedunculata*** H.M.Steyn *subsp. nov*. (Figs. 1, 3C, D, 4E, 9)

Type:—SOUTH AFRICA. Northern Cape: Namaqualand District, NW of Eksteenfontein on track to Khubus, 640 m, (2817CC), 11 October 2015, *Steyn 2144* (holotype PRE0866198-0!; isotype NBG!).

Diagnosis:—*Acanthopsis tetragona* subsp. *pedunculata* differs from *A. tetragona* subsp. *tetragona* in having clearly pedunculate inflorescences with peduncle (15–)20–35(–50) mm long (not subsessile to shortly pedunculate with peduncle nearly always <10 mm long).

Perennial subshrub, (8–)12–15 cm tall. Lamina oblanceolate, (40–)55–75 × (8–)10–12 mm; spines rigid, 4–6(–8) mm long, yellowish or maroonish brown. Inflorescences pedunculate, cylindrical to turbinate, (40–)45–60(–70) mm long (excluding peduncle), 12–15(–20) mm in diameter, with peduncle (15–)20–35(–50) mm long and 2(or 3) pairs of peduncular bracts. Bracts obovate, 22–25(–30) mm long, lamina 12–17 mm long; divaricate in flower; central primary spine nearly always simple; spines of lower bracts recurved to spreading; middle to upper bracts covered with spreading short, white hairs, also with long, viscid glandular hairs, lamina rarely with long, spreading silky hairs, usually also with glandular hairs adaxially. Corolla lilac, (25–)28–30 × 9–11 mm, tube 8–10 mm long. Capsules ovate, 9 × 4 mm. Seeds ovate, 6 × 5 mm, covered with long white hygroscopic hairs.

Etymology:—The epithet "*pedunculata*" refers to the well-developed peduncle in comparison to subsp. *tetragona* with subsessile inflorescences.

Distribution, ecology and phenology:—*Acanthopsis tetragona* subsp. *pedunculata* is only known from one subpopulation northwest of Eksteenfontein, Northern Cape (Fig. 1). It is centred in the core part of the Gariep Centre of Endemism (Van Wyk & Smith 2001). This distribution falls within the Succulent Karoo Biome (Rutherford & Westfall 1994, Low & Rebelo 1996, Mucina & Rutherford 2006) and within the Central Richtersveld Mountain Shrubland (SKr 1) vegetation type (Mucina & Rutherford 2006). The mean annual rainfall in this area is 50–100 mm, received mainly in winter. The specimens were collected at an elevation of ±650 m on hill slopes in well-drained sandy loam, stony soils. Specimens with flowers were collected from August to October.

Conservation status:—*Acanthopsis tetragona* subsp. *pedunculata* has a limited distribution range (EOO and AOO <10 km²), and is known from one subpopulation of about 100 mature individuals, but historical records suggest that there may be more subpopulations. Its entire known range falls within communally owned rangelands that are overstocked with livestock, and severely degraded due to overgrazing and erosion, particularly in the lowlands close to settlements. This taxon is not browsed, but since it occurs in open places on slopes, it is potentially vulnerable to habitat loss as a result of erosion. In areas where overgrazing has severely reduced shrub cover, sandy soils on hillslopes become unstable and are prone to erosion during heavy rainfall. Due to its localized distribution and the potential threat of habitat loss and degradation, it meets the criterion D2 in the category Vulnerable according to IUCN Red List Category and Criteria (IUCN 2001) (L. von Staden, pers. comm.).

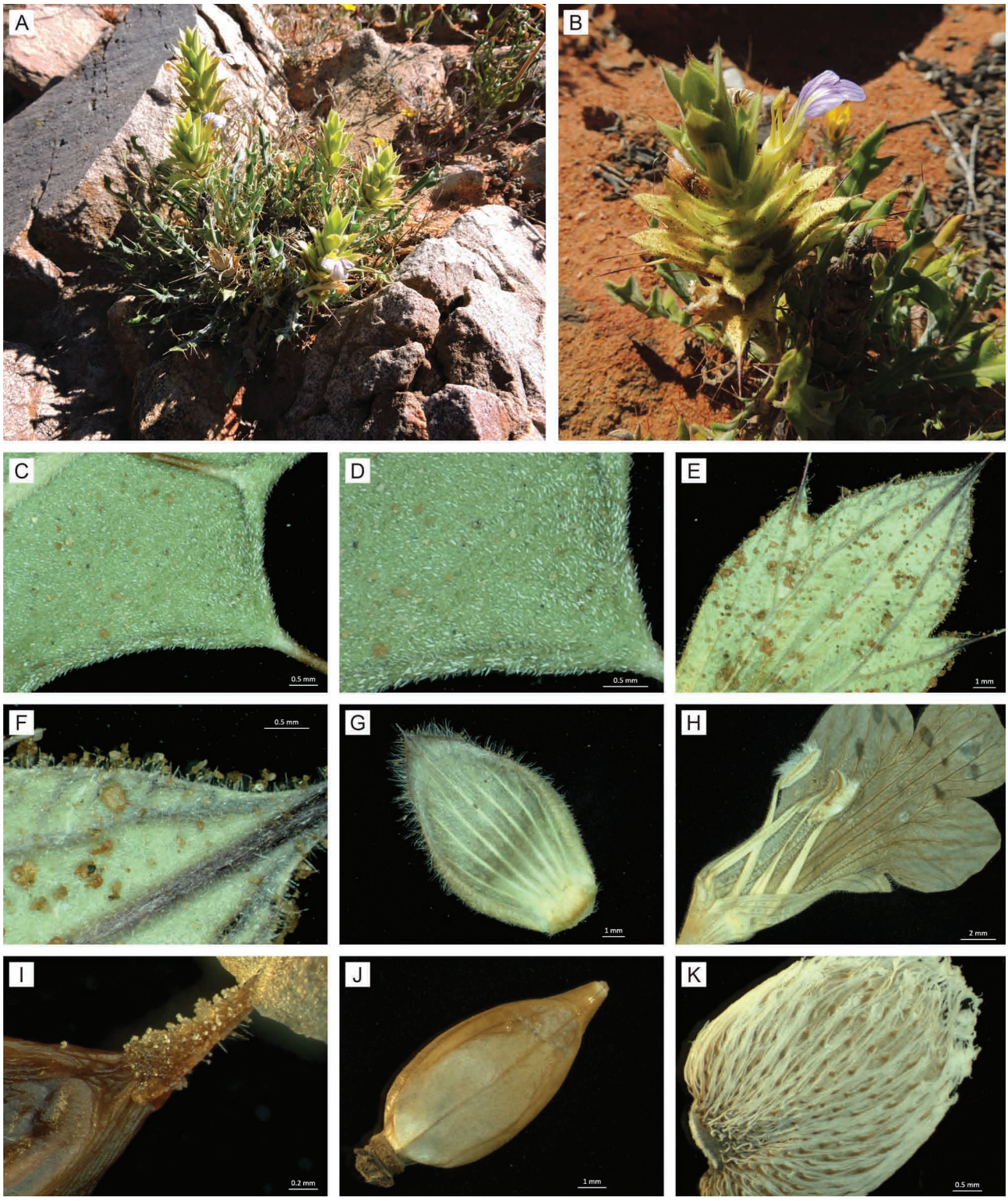

FIGURE 9. *Acanthopsis tetragona* subsp. *pedunculata*. A & B. Habit. C & D. Leaf indumentum (abaxial). E & F. Bract. G. Calyx. H. Corolla lobes lilac, throat lemon-yellow. I. Glandular hairs at base of style. J. Capsule. K. Seed. Vouchers: C–H, J, K = *Steyn 2144* (PRE), I = *Steyn 1887* (PRE). Photographed by: H.M. Steyn (A, C–K) and M. Koekemoer (B).

Additional specimens examined (paratypes):—SOUTH AFRICA. Northern Cape: Namaqualand, quartzite slopes north of Modderfontein, (2817CC), 3 January 1911, *Pearson 6159* (BOL); Namaqualand District; 16 km NW of Eksteenfontein on road to Khubus, 646 m, (2817CC), 23 August 2012, *Steyn 1887* (PRE).

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References

Anderson, T. (1864) An enumeration of the species of Acanthaceae from the continent of Africa and the adjacent islands. *Journal of the Proceedings of the Linnean Society* 7: 13–54.

Beentje, H. (2016) *The Kew plant glossary, an illustrated dictionary of plant terms*, 2nd ed. Kew Publishing, Kew, 184 pp.

Clarke, C.B. (1901) Acanthaceae. *In*: Thiselton-Dyer, W.T. (Ed.) *Flora Capensis* 5, 1. Lovell Reeve & Co., London, pp. 1–92.

Delile, A.R. (1813) *Description de l'Egypte, histoire naturelle* 2. Imprimerie Impériale, Paris, pp. 1–241, t. 33.

Drège, J.F. (1837) *Catalogus plantarum exsiccatarum Africae australioris* 2. Regiomonti Borussorum, (place unknown), pp. 13–32.

Drège, J.F. (1843) *Zwei Pflanzengeographische Documente, nebst einer Einleitung von Dr. E. Meyer*. Regensburg, Leipzig, 230 pp.

Edwards, D. & Leistner, O.A. (1971) A degree reference system for citing biological records in southern Africa. *Mitteilungen der Botanischen Staatssammlung München* 10: 501–509.

Harvey, W.H. (1842) *Acanthopsis*. *In*: Hooker, W.J. (Ed.) *London Journal of Botany* 1. Hippolyte Baillière, London, 28 pp.

Holmgren, P.K., Holmgren, N.H. & Barnett, L.C. (1990) Index herbariorum, Part I. The herbaria of the world, 8th ed. [*Regnum Vegetabile* Vol. 120]. The New York Botanical Garden, Bronx, New York, 704 pp.

IUCN (2001) *IUCN red list categories and criteria*: Version 3.1. IUCN Species Survival Commission, Gland, Switzerland and Cambridge UK, iv + 32 pp.

JSTOR (2016) *Global Plants*. Available from: http://plants.jstor.org/search?asf (accessed July 2016)

Jussieu, A.L. de (1789) *Genera plantarum secundum ordinares naturales disposita*. Viduam Herissant et Theophilum Barrois, Paris, 499 pp.

Linnaeus, C. (1753) *Species Plantarum*. Salvius, Stockholm, 1200 pp.

Low, A.B. & Rebelo, A.G. (Eds.) (1996) *Vegetation of South Africa, Lesotho and Swaziland.* Department of Environmental Affairs & Tourism, Pretoria, 85 pp.

McDade, L.A., Daniel, T.F., Kiel, C.A. & Vollesen, K. (2005) Phylogenetic relationships among Acantheae (Acanthaceae): major lineages present contrasting patterns of molecular evolution and morphological differentiation. *Systematic Botany* 30: 834–862. https://doi.org/10.1600/036364405775097734

McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W. Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (2012) International Code of Nomenclature for Algae, Fungi, and Plants (Melbourne Code) [*Regnum Vegetabile* 154]. Koeltz Scientific Books, Königstein, 240 pp.

Mucina, L. & Rutherford, M.C. (Eds.) (2006) *The vegetation of South Africa, Lesotho and Swaziland*. [*Strelitzia* 19]. South African National Biodiversity Institute, Pretoria, 807 pp.

Nees von Esenbeck, C.G.D. (1847) Acanthaceae. *In*: A. de Candolle (Ed.) *Prodromus systematis naturalis regni vegetabilis* 11. Treuttel & Würtz, Paris, pp. 46–519.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (Eds.) (2009) *Red List of South African plants*. [*Strelitzia* 25]. South African National Biodiversity Institute, Pretoria, 668 pp.

Rutherford, M.C. & Westfall, R.H. (1994) Biomes of southern Africa: an objective categorization. [*Memoir* 63]. National Botanical Institute, Pretoria, 94 pp.

Schinz, H. (1890) Beiträge zur Kenntnis der Flora von Deutsch-Südwest-Afrika und der angrenzenden Gebiete. *Verhandlungen des Botanischen Vereins für die Provinz Brandenbrug und die Angrenzenden Länder* 31: 179–230.

Schmid, R. (1982) Descriptors used to indicate abundance and frequency in ecology and systematics. *Taxon* 31: 89–94.

https://doi.org/10.2307/1220593

Snijman, D.A. (2013) *Acanthopis. In*: Snijman, D.A. (Ed.) *Plants of the Greater Cape Floristic Region, Vol. 2: the extra Cape flora*. [*Strelitzia* 30]. South African National Biodiversity Institute, Pretoria, pp. 162–163.

Steyn, H.M. & Van Wyk, A.E. (2015) Taxonomic notes on the *Acanthopsis disperma-hoffmannseggiana* complex (Acanthaceae, tribe Acantheae), with an interim key to members of the genus. *Phytotaxa* 219: 1–26. https://doi.org/10.11646/phytotaxa.219.1.1

Steyn, H.M. & Van Wyk, A.E. (2016) Taxonomic notes on the shrublet species of *Acanthopsis* (Acanthaceae, tribe Acantheae), with two new species from South Africa. *Phytotaxa* 244: 145–160. https://doi.org/10.11646/phytotaxa.244.2.3

Swedish Museum of Natural History Herbarium (2016) (S) Database. Available from: http://www.nrm.se/english.16_en.html (accessed 16 June 2016)

Van Wyk, A.E. & Smith, G.F. (2001) *Regions of floristic endemism in southern Africa: a review with emphasis on succulents*. Umdaus Press, Pretoria, 160 pp.

Von Schlechtendal, D.F.L. (1841) Acanthaceae africae australioris. *Linnaea* 15: 351–376.

Welman, W.G. (2003) Acanthaceae. *In*: Germishuizen, G. & Meyer, N.L. (Eds.) *Plants of southern Africa: an annotated checklist*. [*Strelitzia* 14]. National Botanical Institute, Pretoria, pp. 92–106.