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Taxonomic notes on the shrublet species of *Acanthopsis* (Acanthaceae, tribe Acantheae), with two new species from South Africa

HESTER M. STEYN[1,2*] & ABRAHAM E. VAN WYK[2]
[1]*National Herbarium, South African National Biodiversity Institute, Private Bag X101, Pretoria 0001, South Africa.*
[2]*H.G.W.J. Schweickerdt Herbarium, Department of Plant Science, University of Pretoria, Pretoria 0002, South Africa.*
**Author for correspondence. E-mail: h.steyn@sanbi.org.za*

Abstract

The taxonomy of *Acanthopsis* is poorly understood, resulting in great difficulties in distinguishing and identifying infrageneric taxa. In this contribution a taxonomic account of the shrublet members of *Acanthopsis* is provided. Four species are recognized, two of which are newly described, namely *A. dregeana* and *A. erosa* (both confined to the Northern Cape Province, South Africa). *Acanthopsis trispina*, hitherto only known from the orginal collection, is considered a synonym of *A. horrida*. *Acanthopsis spathularis* has been recollected after more than 180 years and its status as a distinct species is confirmed. The names *A. spathularis* and *A. horrida* are lectotypified here. An identification key to the species of the shrublet group in *Acanthopsis* is provided.

Key words: *Acanthodium*, *Acanthus*, *Blepharis*, conservation status, Gariep Centre of Endemism

Introduction

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), molecular evidence suggests a sister relationship between *Acanthopsis* and *Acanthus* (Linneaus 1753: 639), the latter which is not represented in southern Africa (McDade *et al*. 2005). The last complete taxonomic account of *Acanthopsis* is the now largely outdated one by Clarke (1901). Hitherto the taxonomy of *Acanthopsis* has been poorly understood, resulting in great difficulties in distinguishing and identifying infrageneric taxa. Consequently, *Acanthopsis* was identified as the top priority genus of South African Acanthaceae in need of taxonomic revision (Von Staden *et al*. 2013).

Recently, we have published the first detailed taxonomic account of the *Acanthopsis disperma-hoffmannseggiana* species complex, as well as an interim key to other species complexes in *Acanthopsis* in need of further study (Steyn & Van Wyk 2015). In the present contribution we resolve the taxonomy of the so-called "shrublet group" of species, previously referred to by us as the "shrubby group". This group is characterized by the plants being shrublets, with well-developed woody branches and clearly visible internodes; the leaves are scattered (well-spaced) along the stems (for a key to the main infrageneric groups see Steyn & Van Wyk 2015).

In his taxonomic revision of *Acanthopsis*, Clarke (1901: 33) distinguished three "shrublet species" based on branch and internode length ("branches 6–12 in. long; internodes up to 1 in. long"), namely *A. horrida* (Nees in Von Schlechtendal 1841: 363) Nees in Candolle (1847: 278), *A. spathularis* (Nees in Candolle 1847: 277) Schinz (1890: 201) and *A. trispina* Clarke (1901: 35). However, uncertainty regarding the delineation of these species, their geographical distribution and habitats impeded attempts to accurately assess their conservation status. According to the current assessment by the South African National Biodiversity Institute [SANBI], *A. spathularis* and *A. trispina* have a conservation status of respectively Rare and Data Deficient (taxonomically problematic), while the status of *A. horrida* is Least Concern (SANBI 2015). According to Clarke (1901), the main difference between *A. spathularis* and *A. horrida* lies in the shape of their inflorescences, with *A. horrida* having a cylindrical and *A. spathularis* a globose spike. However, this character is not reliable because young inflorescences of *A. horrida* often appear globose. As a result, some specimens of *A. horrida* have been incorrectly identified as *A. spathularis* over the years. When the type

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specimens of *A. trispina* and *A. horrida* were studied, it became clear that these names are synonyms (see treatment of *A. horrida* further on). Until recently, *A. spathularis* was only known from the type material collected in 1830, and it was thought that the unusual (and highly diagnostic) spatulate shape of the central primary spine of the floral bracts may be due to a developmental abnormality. However, during examination of hundreds of herbarium specimens as well as live plants in nature, this type of spine has never been encountered in any other species of *Acanthopsis*. In October 2015, during a botanical collecting trip to the Northern Cape, *A. spathularis* has been recollected after more than 180 years and its status as a distinct species is now confirmed.

The principal aim of the present contribution is to resolve the taxonomy of the shrublet members of *Acanthopsis*. Species concepts are clarified, two new species are described, and an identification key is supplied. In addition, the updated conservation status is given for the relevant taxa.

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 held at BOL, K, KMG, NBG, P, PRE, PRU and SAM (in NBG), together with high resolution images of herbarium specimens from JSTOR (2015) and from the herbaria of S, TCD and Z 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 used follows the definitions in Beentje (2010). Descriptors used to indicate abundance and frequency follow Schmid (1982).

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 are shown in square brackets. 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. However, all specimen localities were 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 so-called shrublet species of *Acanthopsis*, are restricted to the Northern Cape Province, South Africa (Fig. 1). Within *Acanthopsis*, the shrublet group is one of the most readily recognizable entities in a genus otherwise characterized by acaulescent herbs or compact subshrubs. The shrublet group can be distinguished in usually being virgate shrublets up to 25–40(–60) cm tall (*vs*. much more compact plants <25 cm tall), with well-developed branches and clearly visible internodes, the latter usually up to 10–20(–25) mm long (*vs*. acaulescent/rosulate herbs, or compact subshrubs with gnarled stems and reduced—usually not visible—internodes, the latter usually <5(–8) mm long). In the shrublet species the leaves are usually scattered (well-spaced) along the woody stems (*vs*. leaves being tufted or in a basal rosette in the case of herbs and subshrubs).

In *Acanthopsis* the morphology of the bracts is taxonomically important and of all the morphological characters available for species delineation, was found to be particularly informative and reliable. This is the case despite the variability of bract morphology depending on position within a single inflorescence. The morphology and indumentum of bracts from the same position in an inflorescence are relatively constant, hence the emphasis placed on these characters in the revision of the genus. Although great emphasis is placed on bract morphology and pubescence, we always use a combination of several characters to distinguish among infrageneric taxa, e.g. growth form, leaf size and indumentum, and flower colour.

For describing bract morphology, we follow the same definitions as in Steyn & Van Wyk (2015), namely "primary spines" contains an extension of one of the primary veins. Additional spines may be found on the margins of the primary spines, or arise from their bases or sinuses amongst them. These are referred to as "secondary spines"—they are not an extension of one of the bract's primary veins. Except where stated otherwise, the middle to upper bracts within an inflorescence were used in the key and descriptions. Terminology used to describe the spines associated with the bracts is illustrated in Fig. 2.

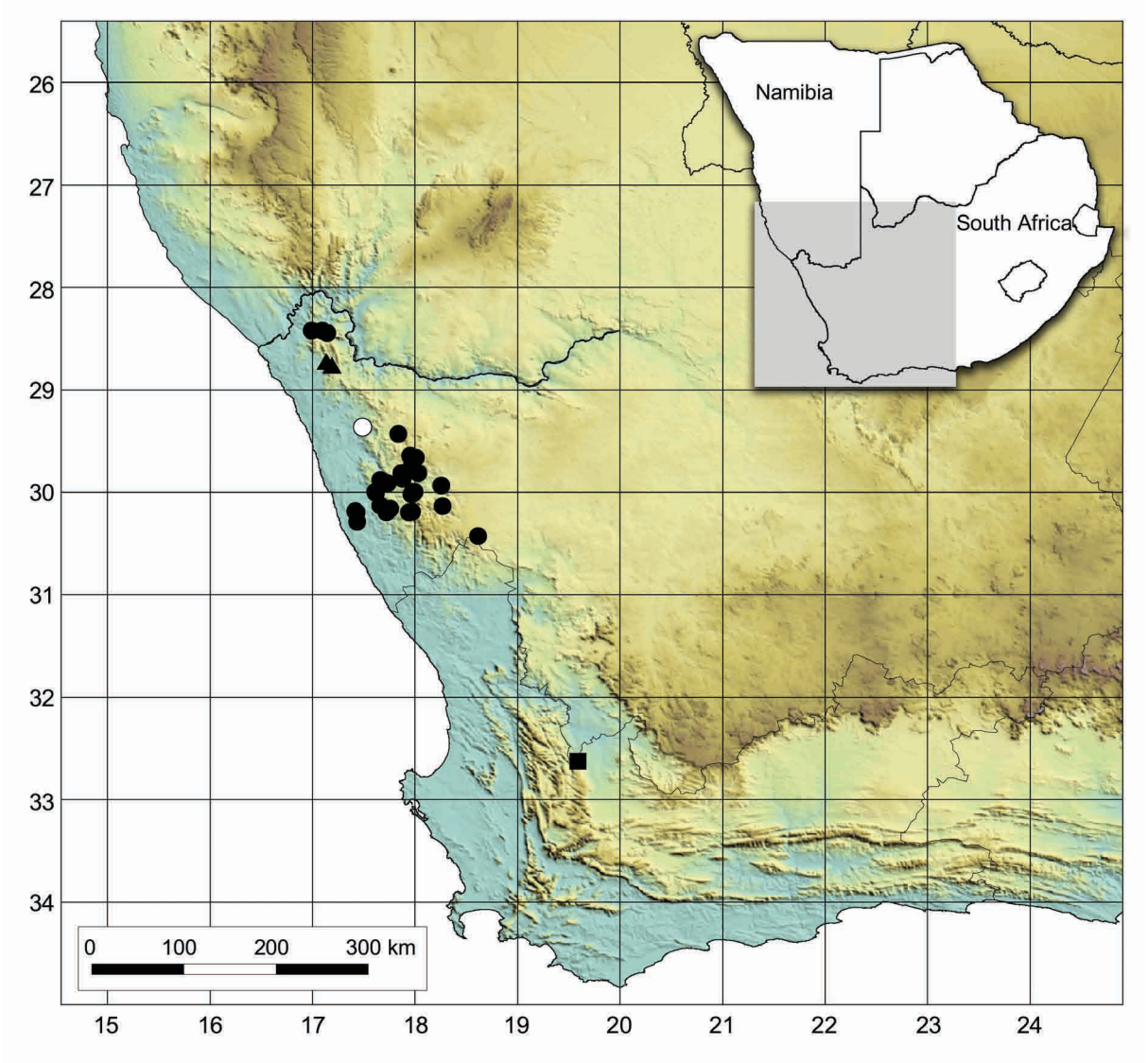


FIGURE 1. Known distribution of the shrublet species of *Acanthopsis*: *A. spathularis* (○), *A. horrida* (●), *A. erosa* (■) and *A. dregeana* (▲).

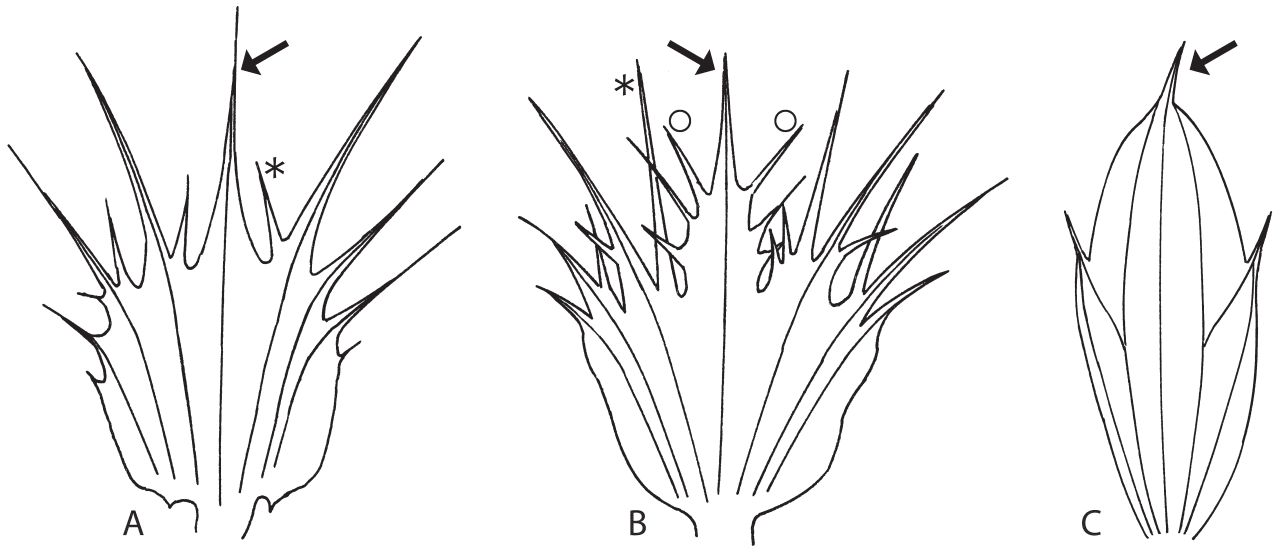


FIGURE 2. Floral bracts illustrating the terminology used. Examples are marked of basal secondary spines (*) and marginal secondary spines (°). A. Bract with simple central primary spine (arrowed). B. Bract with compound central primary spine (arrowed). C. Bract 3-lobed with simple, relatively broad, central primary spine. Artist: Gillian Condy.

Provisional molecular analysis (gene regions *rpl32-trnL*, *rbcL*, *matK* and *rps16*) did not show any potential to assist in resolving taxa at infrageneric level (unpublished data). These regions displayed poor or no variation and did not resolve any phylogenetic relationships. Although *Acanthopsis* was proven to be monophyletic, even the combined datasets did not improve the infrageneric resolution. The low level of molecular variation among the samples might suggest a relatively recent diversification in the genus.

TABLE 1. Diagnostic characters to distinguish among species of the shrublet *Acanthopsis* group. Descriptors used to indicate frequency follow Schmid (1982).

Characters	*A. spathularis*	*A. horrida*	*A. erosa*	*A. dregeana*
Distribution	South Africa (Namaqualand, Northern Cape)	South Africa (Richtersveld & Namaqualand, Northern Cape)	South Africa (Edge of Tanqua Karoo, Northern Cape)	South Africa (Richtersveld, Northern Cape)
Leaf margin	coarsely dentate-spinose	very coarsely dentate-spinose	dentate-spinose to erose	coarsely dentate-spinose
Peduncle length (mm)	(6–)10–15	<5	(5–)10–15(–20)	(14–)20–40(–70)
Bract indumentum	base and spines hirsute with deflexed to appressed short hairs and some scattered subsessile glandular hairs, base becoming villose towards the top	base hirsute to pubescent, with deflexed to spreading short hairs; spines with long, silky hairs on the margin	hirsute to velvety, with deflexed to spreading short hairs, also with subsessile glandular hairs	strigose, with appressed short hairs becoming more densely pubescent with long, glandular hairs towards the top
Number of primary spines/lobes	5	5(–7)	5	3
Central primary spine simple	usually	rarely	usually	always
Central primary spine tip	spatulate and attenuate to cuspidate (spoon-shaped and spiny)	attenuate (spiny)	attenuate (spiny)	attenuate to cuspidate (spiny)
Corolla length × width, and tube length (mm)	21–23 × 12–14, tube (5–)7	23–29(–33) × 11–15(–18), tube 8–10	28 × 12, tube 8–10	23–25 × 8–10, tube 7(–8)
Corolla throat (colour)	white	white	white	lemon-yellow

Taxonomic treatment

Key to the shrublet species of *Acanthopsis* (species are also compared in Table 1)

1. Inflorescences <30(–35) mm long; middle to upper bracts with central primary spine spatulate (Namaqualand, Northern Cape) ..... 1. *A. spathularis*
- Inflorescences (25–)30–70(–90) mm long, middle to upper bracts with central primary spine ensiform, narrowly triangular or ovate (but never spatulate) 2
2. Leaves lanceolate to linear, margin very coarsely dentate-spinose; spines rigid, 4–7 mm long, yellow; bract spines silky hairy on margins ..... 2. *A. horrida*
- Leaves lanceolate to oblanceolate, margin coarsely dentate-spinose; spines fine to rigid, 1–4 mm long, orange-brown; bract spines never silky hairy on margins 3
3. Middle to upper bracts ending in 5 drawn-out, narrowly triangular primary spines, corolla throat white ..... 3. *A. erosa*
- Middle to upper bracts ending in 3 ovate, mucronate to spinose lobes, corolla throat lemon-yellow ..... 4. *A. dregeana*

All the species of *Acanthopsis* recognized here (Table 1) have the following character states in common: inflorescences erect spikes; each flower supported by a single bract and two bracteoles; bracteoles 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 (see Fig. 3), pubescent abaxially (outside), with barb-shaped hairs adaxially (inside); stamens 4 per flower with anthers densely bearded; filaments hard and bony, outer stamen filaments without an appendage at the tip; style unbranched, filiform with the stigma a single flattened lobe.

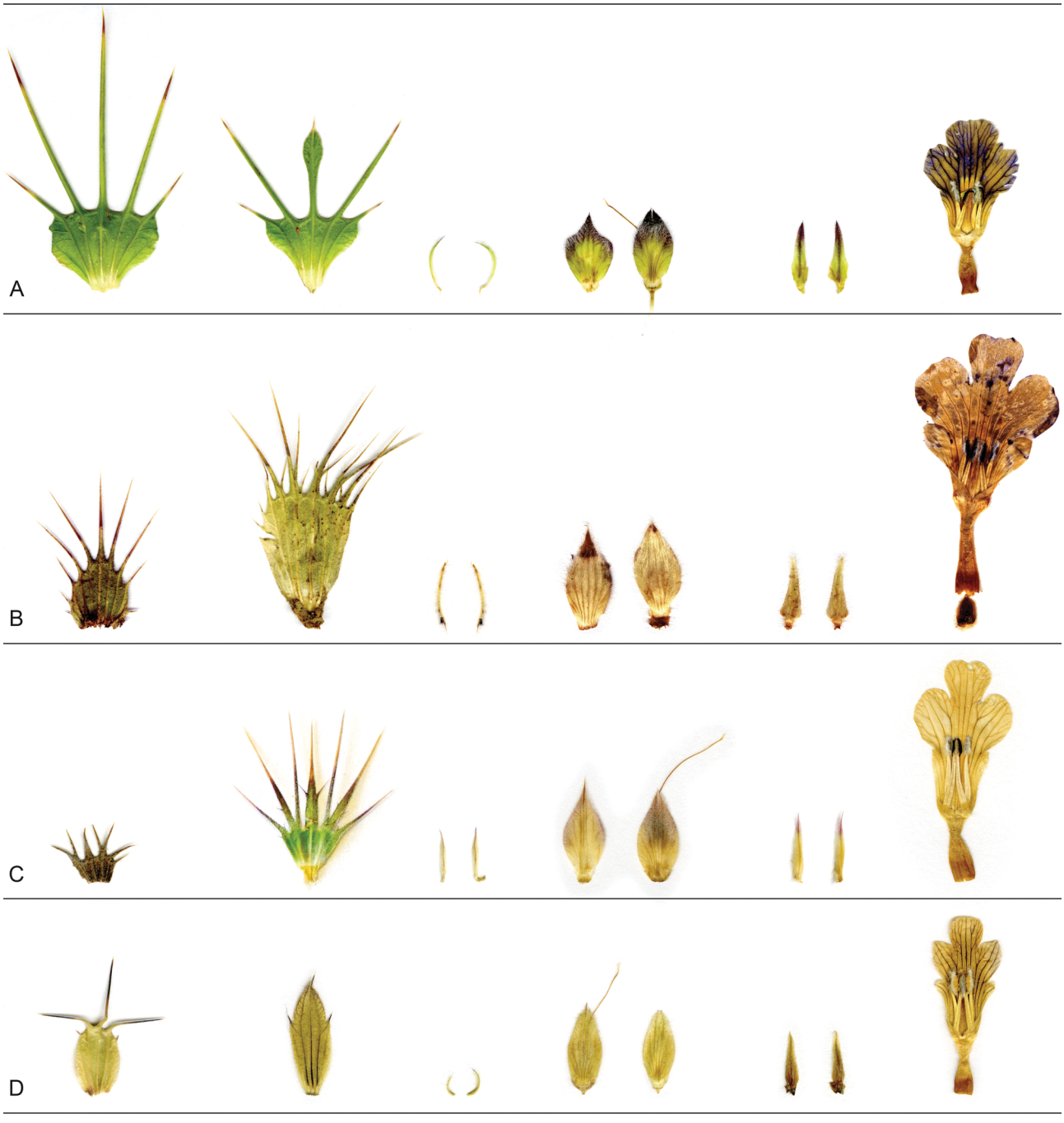


FIGURE 3. Comparison of floral parts in shrublet species of *Acanthopsis* (from left to right): bract(s), bracteoles, calyx (4 sepals: dorsal, ventral and 2 lateral ones) and flower. A. *A. spathularis,* B. *A. horrida,* C. *A. erosa,* D. *A. dregeana*. Note: the bract on the left is from lower down in the same inflorescence. Scale bar = 10 mm. Vouchers: A = *Steyn 2135* (PRE), B = *Koekemoer 4397* (PRE), C = *Steyn 1874* (PRE), D = *Steyn 1822* (PRE).

1. *Acanthopsis spathularis* (Nees) Schinz (1890: 201); Clarke (1901: 35); Snijman (2013: 163) (Figs. 1, 3A, 4 & 7A, a)

Type:—[SOUTH AFRICA, Northern Cape:] [Illegible] zum Goedemanskraal und Kaus 2000–2500 ft [600–750 m], 8 September 1830, *Drège 2440* (lectotype P04426153! designated here; iso-lectotype S-G-47 scan!).

Acanthus spathularis E.Mey. in Drège (1843: 91, 161), *nom. nud.*
Acanthodium spathulare Nees in Candolle (1847: 277).
Blepharis spathularis (Nees) Anderson (1864: 35).

Perennial shrublet, 30–40 cm tall. Stems (young) beige to brown, ribbed, hirsute with deflexed short, white hairs; internodes (6–)10–15 mm long. Leaves lanceolate, 20–25(–40) × 7(–8) mm, glaucous with appressed, densely packed short hairs; margin coarsely dentate-spinose, spines fine to rigid, 2–4(–6) mm long, orange-brown; base attenuate, decurrent with long spines (4–6 mm long). Inflorescences globose to cylindrical, subsessile to shortly pedunculate, with 1 (or 2) pairs of peduncular bracts; ca. 25–30(–35) mm long, (10–)13–15(–20) mm in diameter, peduncle (6–)10–15 mm long, hirsute to pubescent with deflexed to spreading short, white hairs. Bracts hemispherical to broadly wedge-shaped, (20–)30–40 mm long, base 8–12 mm long, ending in 5 primary spines; middle to upper bracts with spatulate central primary spine, usually simple or with 1 (or 2) marginal secondary spines; lateral primary spines simple, often slightly spatulate, occasionally with 1 basal secondary spine; primary spines of lower bracts widely spreading in flower and fruit; bract base and spines with deflexed to appressed short hairs and some scattered subsessile glandular hairs, bract base becoming villose in upper bracts. Bracteoles linear, 7–9 mm long, silky hairy especially towards tip. Calyx with dorsal sepal ovate to obovate, acuminate to cuspidate, 10(–11) mm long, silky hairy adaxially, silky hairy (villose) abaxially especially towards tip, 7–9-veined from base; ventral sepal ovate, 10(–11) mm long, silky hairy adaxially, silky hairy (villose) abaxially especially towards tip, 7-veined from base; lateral sepals lanceolate, ending in spinous tip, broader at base, 9 mm long, silky hairy. Flowers purple with darker veins and white throat; corolla 21–23 × 12–14 mm, tube (5–)7 mm long, pubescent; central lobe wider than long, constricted at the base, truncate. Stamens with purple anthers, 3 mm long; filaments (4–)5 mm long, glandular. Style with patch of glandular hairs at the base. Capsules and seeds not seen.

Etymology:—The epithet *spathularis* refers to the spatulate (spoon-shaped) central primary spine of the middle to upper bracts.

Distribution, ecology and phenology:—Endemic to South Africa; known from the type locality (probably in Springbok area, Northern Cape—precise locality unknown) and rediscovered in October 2015 in two locations in the mountains south-west of the Anenous Pass (Fig. 1). It grows in sandy soils on mountain summits at elevations of 550–650 m in areas receiving a mean annual rainfall (mainly in winter) of 150–200 mm. Its distribution range falls within the ecotone between the Namaqualand Hardeveld and Richtersveld Bioregions (Mucina & Rutherford 2006), within the Succulent Karoo Biome (Rutherford & Westfall 1994, Low & Rebelo 1996, Mucina & Rutherford 2006). The known populations falls within the Gariep Centre of Endemism (Van Wyk & Smith 2001). Flowering time: September and October.

Notes:—The author citation "(E.Mey.) Schinz" (IPNI 2015, Welman 2003, Snijman 2013) is incorrect. Although the name *Acanthus spathularis* was first applied by E.H.F. Meyer in Drège (1843) to a Drège collection (*Drège s.n.*) (probably *Drège 2440*—see P04426153), it was published without a description and hence is a *nomen nudum*. Nees in Candolle (1847) validly published the name *Acanthodium spathulare* Nees with *Acanthus spathularis* as a synonym. The correct author citation of the name *Acanthopsis spathularis* is therefore (Nees) Schinz.

Acanthopsis spathularis appears to be most closely related to *A. horrida* from which it differs in having short inflorescences with a spatulate central primary spine in the middle to upper bracts (*vs*. longer inflorescences with an ensiform central primary spine) and by having relatively small leaves with coarsely dentate-spinose margins and fine to rigid spines (*vs*. larger leaves with very coarsely dentate-spinose margins and rigid spines). Although *A. spathularis* also shares a 5-spined bract with *A. erosa*, it can easily be distinguished from the latter by the short inflorescences with spatulate central, primary spines. For more differences see Table 1.

Conservation status:—*Acanthopsis spathularis* is currently only known from two subpopulations (the exact location of the type locality remains unknown) and therefore has a very restricted distribution range. However, this specific area is botanically poorly explored and it is highly likely that other populations could be found in similar habitats in the area. The specific populations are relatively small (± 100 plants per locality) but are looking healthy with no sign of negative impact at present. However, this area is used for communal grazing and overgrazing could rapidly change the threat status, hence it is categorised as Vulnerable D2 (L. von Staden, pers. comm. 2015).



FIGURE 4. Scanned image of holotype of *Acanthopsis spathularis* (Nees) Schinz (*Drège 2440*, P (MNHN collection-Paris)).

Additional specimens examined:—SOUTH AFRICA. Northern Cape: Namaqualand District, on track SW of Steinkopf, 616 m, (2917BC), 10 October 2015, *Steyn 2135* (NBG!, PRE!); Namaqualand District, on track SW of Steinkopf, 555 m, (2917BC), 10 October 2015, *Steyn 2136* (KMG!, PRE!).

2. *Acanthopsis horrida* (Nees) Nees in Candolle (1847: 278); Anderson (1864: 36); Schinz (1890: 201); Clarke (1901: 35); Snijman (2013: 162) (Figs. 1, 3B & 7B, b)

Type:—[SOUTH AFRICA. Northern Cape:] Namaqualand, Reise nach Kamiesberg, Boschmanland bis zur Mundung des Garip, November, *Zeyher 73.11* (lectotype S09-4255 scan! designated here; iso-lectotypes P04426156!, P04426158!, P04426161!, SAM in NBG!, S-G-42 scan!, TCD scan!, Z scan!).

Dilivaria horrida Nees in Von Schlechtendal (1841: 363).
Acanthodium plumosum E.Mey. in Drège (1837: 2; 1843: 67, 161), *nom. nud.*
Acanthodium plumulosum E.Mey. sensu Nees in Candolle (1847: 278), (*orth. var. et nom. nud.*).
Acanthopsis trispina Clarke (1901: 35), *syn. nov.* Type:—[SOUTH AFRICA] Cape [without precise locality], *Mund s.n*. (holotype K!).

Perenial shrublet, 20–50 cm tall. Stems brown (rarely maroon), ribbed, hirsute with deflexed to spreading short, white hairs; internodes (8–)10–15(–20) mm long. Leaves lanceolate to linear, 35–45(–60) × 8–10(–11) mm, indumentum variable, usually almost glabrous to strigose with appressed short hairs interspersed with subsessile glandular hairs; margin undulate, very coarsely dentate-spinose, spines rigid, 4–7 mm long, yellow; base attenuate, decurrent. Inflorescences globose to cylindrical or conical, sessile to subsessile with short peduncle (nearly always <5 mm long); (25–)40–60 mm long, 9–12(–15) mm in diameter. Bracts ovate, obovate to wedge-shaped, 14–20(–26) mm long, base 4–8(–14) mm long; middle to upper bracts ending in 5(–7) primary spines; central primary spine usually compound with 2(or 3) pairs of marginal secondary spines, lateral spines with 1 (or 2) basal secondary spines and 1–3(–5) marginal secondary spines; lateral primary spines slightly longer than central primary spine or same length; spines spreading, rarely recurved in fruit; bract base usually hirsute to pubescent with deflexed to spreading short hairs, often villose with long, silky hairs; spines almost glabrous to pubescent, with some subsessile glandular hairs in centre, usually with long, silky hairs on margin. Bracteoles lanceolate to linear, 7–9 mm long, silky hairy. Calyx tips tinged brown or maroon; dorsal sepal ovate, cuspidate, 10–14 mm long, silky hairy especially adaxially, often with short, spreading hairs abaxially, 7–9-veined from base; ventral sepal ovate, 10–11 mm long, silky hairy especially adaxially, often with short, spreading hairs abaxially, 5–7-veined from base; lateral sepals lanceolate, 7–8 mm long, silky hairy especially at base and along margins. Flowers blue to blue-purple with white throat; corolla 23–29(–33) × 11–15(–18) mm, tube 8–10 mm long, pubescent; central lobe usually as long as wide, constricted at base, truncate to emarginate. Stamens with purple-black anthers, 2(–3) mm long; filaments 4–5(–7) mm long, glandular. Style with patch of glandular hairs at base. Capsules ovate, flattened, glabrous, shiny, 8 × 4 mm, 2-seeded. Seeds 5 × 4 mm, covered with long white hygroscopic hairs.

Etymology:—The epithet *horrida* refers to the spiny appearance of the plant, *horrida* being the Latin for prickly.

Distribution, ecology and phenology:—*Acanthopsis horrida* is endemic to South Africa and is mainly found in the Kamiesberg area and on the sandy coastal plains near Hondeklip Bay, with a disjunct presence in the Richtersveld (Fig. 1). It grows in areas receiving a mean annual rainfall (mainly in winter) of 100–250 mm (Kamiesberg) and <50 mm (Richtersveld). Its distribution range falls within the Namaqualand Hardeveld and Richtersveld Bioregions (Mucina & Rutherford 2006) respectively, within the Succulent Karoo Biome (Rutherford & Westfall 1994, Low & Rebelo 1996, Mucina & Rutherford 2006). *Acanthopsis horrida* is found at elevations between 170 and 1200 m and is mainly associated with quartzitic sand and soils derived from granitic gneisses. The Richtersveld population falls within the Gariep Centre of Endemism (Van Wyk & Smith 2001). Flowering time: July to September.

Notes:—Specimens from various herbaria were encoded as being collected by Ecklon or Ecklon & Zeyher (JSTOR 2015). Glen and Germishuizen (2010) stated that "it may be difficult to determine whether a given specimen is collected by Ecklon, Zeyher, or both…" These two collectors added to the confusion by having used different methods of numbering. Some specimens have a Zeyher collecting number, others have text from Ecklon and Zeyher's *Enumeratio* and often a specimen would have a double number e.g. 73.11 (see Type collection) (Glen & Germishuizen 2010). This double number consists of a reference to the locality where the plant was collected (first part, 73) and the month of collection (second part, 11). The *Dilivaria horrida* specimens were most probably collected by Zeyher, as Ecklon did not collect in Namaqualand (Glen & Germishuizen 2010). According to Drège (1847) the type locality for *Zeyher 73.11* is "Namaqualand, Reise nach Kamiesberg Boschmanland bis zur Mundung des Garip".

Despite the disjunct distribution and differences in preferred geology, climate (e.g. amount of rainfall) and morphology (shorter internodes and less hairy bracts), the specimens from the Richtersveld are provisionally included in *A. horrida*. Further fieldwork might lead to the recognition of infraspecific taxa in future.

Clarke (1901) described *A. trispina* from a single collection (*Mund s.n.*) without a specific locality. According to Clarke (1901), *A. trispina* differs from *A. spathularis* in having cylindrical spikes and from *A. horrida* in having sparingly hairy bracts ending in three primary spines as opposed to five. However, *Mund s.n.* is a poor specimen with most of the bracts old and damaged. When the type specimens of *A. trispina* and *A. horrida* were critically studied, 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*.

Conservation status:—*Acanthopsis horrida* is a widespread species and is classified as Least Concern (IUCN 2001) (L. von Staden, pers. comm. 2015).

Additional specimens examined:—SOUTH AFRICA. Northern Cape: Richtersveld National Park, Sebraskloof, SW of Gannakouriep Wilderness Camp, 464 m, (2817AC), 29 June 2013, *Steyn 1902* (PRE!); Richtersveld National Park, Sebraskloof, SW of Gannakouriep Wilderness Camp, 446 m, (2817AC), 2 July 2013, *Steyn 1903* (PRE!); Richtersveld, Bababaddens, inside gorge below Bababaddens, (2817AC), 8 February 2014, *Van Wyk s.n*. (PRE!); Little Namaqualand, near top Rattelpoort, (2917BD), 30 December 1909, *Pearson 2961* (BOL!); Namaqualand, Buffels River Kloof, (2917DB), September 1945, *Lewis 1739* (SAM in NBG!); Little Namaqualand. Copperberg, (2917DB), October 1926, *Pillans 5674* (BOL!); Namaqualand, Springbok Dist., Hester Malan Wild Flower Reserve, mountain range SE of houses, (2917DB), 29 May 1975, *Rösch & Le Roux 1204* (PRE!, PRU!); Namaqualand District, Buffels River, (2917DC), 6 September 1945, *Compton 17247* (NBG!); Namaqualand District, Namaqua National Park, on 4x4 track from Kykokeis to Kookfontein, 389 m, (2917DC), 12 August 2009, *Steyn 1564* (PRE!); Namaqualand District, Wildeperdehoek Pass, 562 m, (2917DC), 13 August 2009, *Steyn 1567* (PRE!); Namaqualand District, Wildeperdehoek Pass, 492 m, (2917DC), 11 August 2011, *Steyn 1858* (PRE!); Namaqualand Dist. Mi[e]sklip, (2917DD), 25 August 1941, *Compton 11529* (NBG!); Namaqualand, Droëdap, (2917DD), 27 August 1941, *Compton 11561* (NBG!); Little Namaqualand, Mesklip, (2917DD), 24 August 1941, *Esterhuysen 5833* (BOL!); Namaqualand District, Farm Theunis se dam, 560 m, (2917DD), 2 September 2010, *Steyn 1770* (PRE!); Namaqualand, Springbok area, Goegap Nature Reserve, (2918CA), August 2006, *Broodryk 145* (PRU!); Namaqualand District, Springbok, Goegap Nature Reserve, SE of workers' houses, 850 m, (2918CA), 17 September 2010, *Steyn 1825* [*collected by Geldenhuys*] (KMG!, NBG!, PRE!); Farm Silwerfontein, turn-off about 12 km from Springbok on the road to Gamoep, about 15 km after the turn-off to the farmhouse, 728 m, (2918CC), 29 August 2012, *Koekemoer 4360* (PRE!); Little Namaqualand, common on dry mountain slopes south of Tweefontein, 3000 ft, [915 m] (2918CD), 25 December 1908, *Pearson 3783* (BOL!); Namaqua National Park, track to the SW of dam N of Jantjieskop, Roodelaagte Farm, 172 m, (3017AB), 17 August 2009, *Steyn 1625* (PRE!); Namaqua National Park, between Jantjieskop and Riethuis, Farm Roodelaagte, 170 m, (3017AB), 18 August 2009, *Steyn 1629* (PRE!); Namaqua National Park, between Taaibosduin and Hondeklipbaai road, dune fynbos near soil dam, 160 m, (3017AD), 12 August 2006, *Sachse 222* (PRE!); Namaqualand, 14 mi. [22.5 km] W of Kamieskroon, 1500 ft [457 m], (3017BA), 23 September 1952, *Acocks 16445* (PRE!); Namaqua National Park, secondary track leading to right from 4x4 track between Kykokeis and Kookfontein, 344 m, (3017BA), 14 August 2009, *Steyn 1585* (PRE!); Namaqua National Park, 4x4 track between Kykokeis and Kookfontein, 294 m, (3017BA), 14 August 2009, *Steyn 1589* (PRE!); Namaqua National Park, between Soebatsfontein and Skilpad, 318 m, (3017BA), 16 August 2009, *Steyn 1619* (PRE!); Little Namaqualand, Kamieskroon, near Kamieskroon, (3017BB), 24 July 1941, *Esterhuysen 5464* (BOL!, PRE!); Namaqualand, Kamieskroon, Skilpad Wildflower Reserve, (3017BB), 6 August 1993, *Grobler 22* (PRU!); Namaqua National Park, on cement road section between Skilpad and Soebatsfontein at foot of koppie, 553 m, (3017BB), 29 December 2010, *Koekemoer 3999* (PRE!); Namaqualand District, Boesmanplaat, along a turn-off to the west of the road between Gamoep and Platbakkies, 936 m, (3017BB), 16 August 2013, *Koekemoer 4401* (PRE!); Namaqualand District, Kamiesberg, at the first large granite rocks along the road between Kamieskroon to Pedroskloof, 847 m, (3017BB), 16 August 2013, *Koekemoer 4397* (PRE!); Namaqualand District, No Heep road N of Kamieskroon, 744 m, (3017BB), 2 September 2010, *Steyn 1768* (PRE!); Namaqualand District, between No Heep road & Bloupoort turn-off, 672 m, (3017BB), 2 September 2010, *Steyn 1769* (PRE!); Namaqualand District, Namaqua National Park, 1 km S of look-out point on track to Soebatsfontein, 558 m, (3017BB), 11 August 2011, *Steyn 1859* (PRE!); Namaqualand District, Namaqua National Park, 1 km S of look-out point on track to Soebatsfontein, 558 m, (3017BB), 11 August 2011, *Steyn 1859b* (PRE!); Namaqualand District, Namaqua National Park, on road between Skilpad and Soebatsfontein, 558 m, (3017BB), 26 August 2012, *Steyn 1892* (PRE!); Namaqualand, Kamieskroon, Skilpad Wildflower Reserve of southern African Nature Foundation, Relevé: 22, (3017BB), 13 July 1993, *Van Rooyen 2472* (PRE!, PRU!); Kamieskroon, Bloupoort, 900 m, (3017BB), 4 September 2001, *Venter JV9612(JV-46)* (KMG!,

PRE!); southeast of Hôsabees in 'Pypmaker se Poort', road to Goraap, 950 m, (3018AB), 26 August 1987, *Hilton-Taylor 2241* (NBG!); Upper Namaqualand & Karoo, gneiss ridges west of outspan, Alewyn's Fontein, (3018BC), 23 December 1908, *Pearson 3490* (BOL!).

Without precise locality: *Mund s.n*. (K!); *Drège s.n*. (*2437*) (K!, P!, S!, TCD scan!).



FIGURE 5. Scanned image of holotype of *Acanthopsis erosa* H.M.Steyn (*Steyn 1874*, PRE).

3. *Acanthopsis erosa* H.M.Steyn, *sp. nov.* (Figs. 1, 3C, 5 & 7C, c)

Acanthopsis erosa differs from A. dregeana in having middle to upper floral bracts ending in 5 drawn-out primary spines (vs. ending in 3 ovate, mucronate to spinose lobes) and the corolla throat being white (vs. lemon-yellow) and from all other shrublet members of Acanthopsis in having dentate-spinose to erose leaf margins (vs. coarsely dentate-spinose) and inflorescences 50–80(–100) mm long (vs. (14–)20–60(–70) mm long).

Type:—SOUTH AFRICA. Northern Cape: Calvinia District, SW of Kaggakammaskloof, (3219DA), 20 August 2011, *Steyn 1874* (holotype PRE0861469!; isotype KMG!).

Perennial shrublet, 20–30 cm tall. Stems brown, ribbed, pubescent with white, spreading hairs; internodes 8–10 mm long. Leaves lanceolate, 40–45(–55) × 4–6 mm, appear glaucous, strigose with densely packed, short hairs, also with scattered subsessile glandular hairs; margin undulate, dentate-spinose to erose, spines fine 1–2 mm long, yellow; base attenuate, decurrent. Inflorescences cylindrical, subsessile to pedunculate with 2 (or 3) pairs of peduncular bracts; 50–80(–100) mm long (excluding peduncle), 8–10 mm in diameter, peduncle (5–)10–15(–20) mm long, pubescent with short, spreading hairs. Bracts wedge-shaped, 15–20 mm long, base 4–7 mm long; ending in 5 primary spines, central primary spine usually simple, occasionally with 1 (or 2) pairs of marginal secondary spines, lateral spines usually with 1 long, basal secondary spine (usually as long or longer than primary spines) and 1 short, marginal secondary spine; hirsute to velvety with deflexed to spreading short hairs, occasionally also with subsessile glandular hairs. Bracteoles linear, 7–9 mm long, silky hairy. Calyx with dorsal sepal ovate, attenuate, 13 mm long, silky hairy especially adaxially, often short, spreading hairs abaxially, 7–9-veined from base; ventral sepal ovate, 10–12 mm long, silky hairy especially adaxially, often with short, spreading hairs abaxially, 5–7-veined from base; lateral sepals lanceolate, ending in spinous tip, broader at base, 9 mm long, silky hairy especially along margins. Flowers lilac to purple with darker veins and white throat; corolla 28 × 12 mm, tube 8–10 mm long, pubescent; corolla limb recurved, central lobe usually wider than long, constricted at base, truncate to emarginate. Stamens with purple-black anthers, 2 mm long; filaments 7(–8) mm long, glandular, hairy towards the base. Style with patch of glandular hairs at base. Capsules ovate, flattened, glabrous, shiny, 7 × 4 mm, 2-seeded. Seeds 4 × 4 mm, covered with long white hygroscopic hairs.

Etymology:—The specific epithet, *erosa* (the Latin meaning "irregularly toothed, appearing as if nibbled"), refers to the leaf margins of this species.

Distribution, ecology and phenology:—*Acanthopsis erosa* is endemic to South Africa, only known from the type locality near the border of the Northern and Western Cape (Fig. 1). The distribution of *A. erosa* falls within the Swartruggens Quartzite Karoo (SKv2) vegetation type in the Rainshadow Valley Karoo Bioregion (Mucina & Rutherford 2006), within the Succulent Karoo Biome (Rutherford & Westfall 1994, Low & Rebelo 1996, Mucina & Rutherford 2006). This species is found at an elevation of 500 m and is associated with deep sandy soils and grows in an area receiving a mean annual rainfall (mainly in winter) of 100–150 mm. Flowering time: August.

Conservation status:—*Acanthopsis erosa* is currently only known from the type locality and is possibly a Swartruggens Quartzite Karoo endemic with a limited distribution range. However, this area is botanically underexplored and more populations can be expected in suitable habitats. As the population is currently not exposed to any potential threat, a preliminary status of Rare (Raimondo *et al*. 2009) is assigned to this species (L. von Staden, pers. comm. 2015).

4. *Acanthopsis dregeana* H.M.Steyn, *sp.nov*. (Figs. 1, 3D, 6 & 7D, d)

Acanthopsis dregeana differs from all other shrublet members of Acanthopsis in having middle to upper floral bracts ending in 3 ovate, mucronate to spinose lobes (vs. ending in 5(–7) drawn-out primary spines), middle to upper bracts with long, glandular hairs (vs. subsessile glandular hairs—when present) and a lemon-yellow (vs. white) corolla throat.

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

Perennial shrublet, 15–40 cm tall. Stems brown (maroon when young), ribbed, almost glabrous to hirsute with deflexed short, white hairs; internodes (10–)15–30 mm long. Leaves lanceolate to oblanceolate, 25–45(–50) × 7–10(–12) mm, appears glaucous with appressed, densely packed short hairs; margin undulate, coarsely dentate-spinose, spines rigid, 2–4 mm long, orange-brown; base attenuate, decurrent. Inflorescences cylindrical, clearly pedunculate, with 2 or 3 pairs of peduncular bracts; 30–55 mm long (excluding peduncle), 10–12 mm in diameter, peduncle (14–)20–40(–70) mm long, pubescent with short, spreading hairs. Bracts obovate to oblong, 18–24 mm



FIGURE 6. Scanned image of holotype of *Acanthopsis dregeana* H.M.Steyn (*Steyn 1822*, PRE).

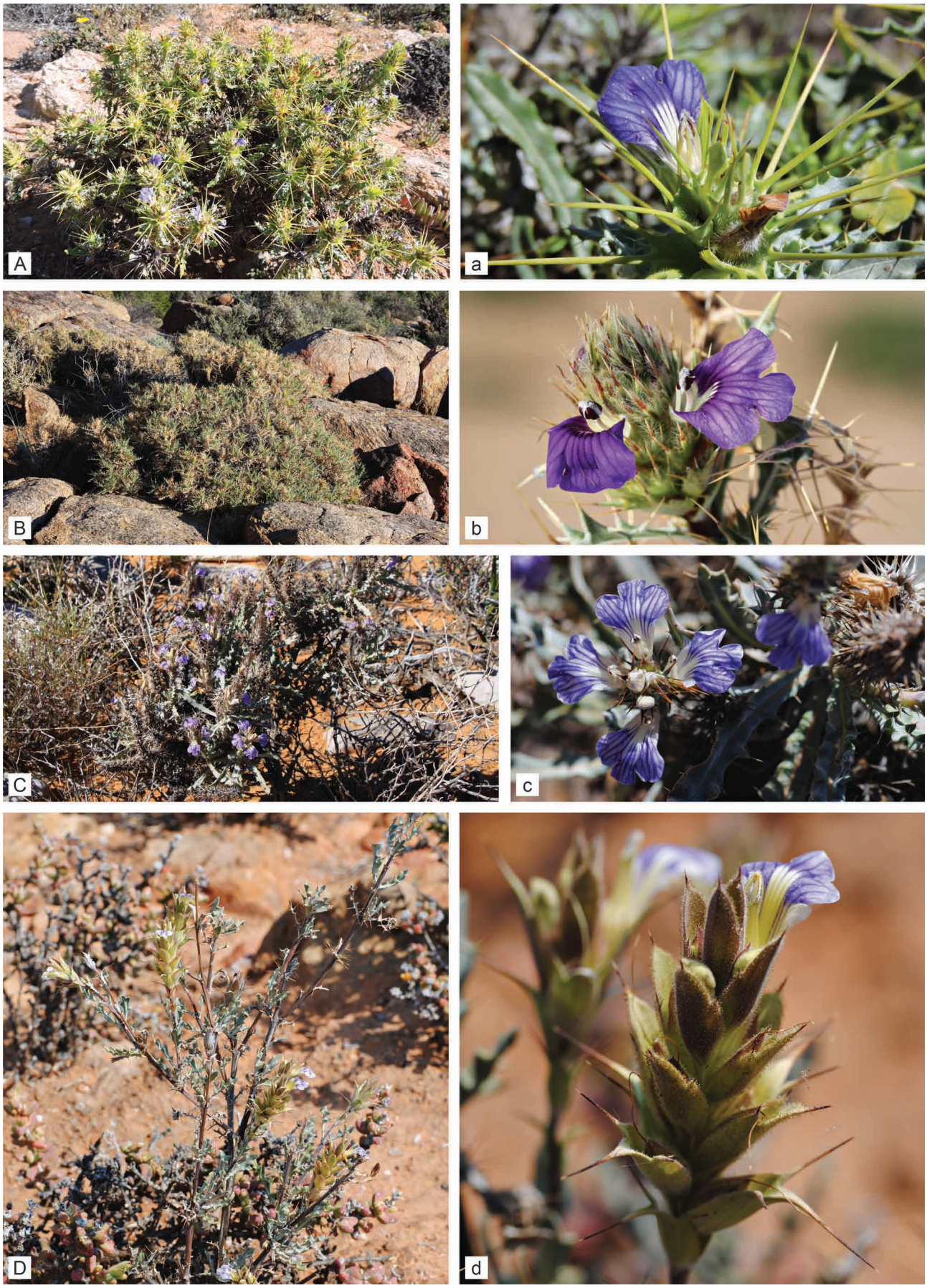


FIGURE 7. Habit and flowers of A, *A. spathularis,* B. *A. horrida*, C. *A. erosa*, D. *A. dregeana.* Photographs: H.M. Steyn (A, a, B), M. Koekemoer (b, C, d), S.P. Bester (c, D).

long, base 10–13 mm long; lower bracts ending in 3(–5) primary spines, central primary spine always simple and recurved; middle to upper bracts oblong, 5 primary veins converging into 3 mucronate to spinose, ovate lobes with 2 outer lobes reduced, central primary spine always simple, spine tips often dark brown or maroon; peduncular bracts strigose with appressed, short hairs, lower fertile bracts strigose with appressed short hairs becoming more densely pubescent with long, glandular hairs towards the top of inflorescence. Bracteoles linear to sickle-shaped, unequal in length, 3–6 mm long; silky hairy, also with glandular hairs. Calyx with dorsal sepal oblong, acuminate, 10–11 mm long, silky hairy especially adaxially, also with short spreading and glandular hairs abaxially, 7–9-veined from base; ventral sepal ovate, 10–11 mm long, silky hairy especially adaxially, also with short spreading and glandular hairs abaxially, 5–7-veined from base; lateral sepals lanceolate, ending in spinous tip, broader at base, 8 mm long, silky hairy especially along margins, also with isolated glandular hairs. Flowers lilac to purple with lemon-yellow throat; corolla 23–25 × 8–10 mm, tube 7(–8) mm long, pubescent; central lobe usually longer than wide, constricted at base, truncate. Stamens with brown anthers, 3 mm long; filaments 5–6 mm long, glandular. Style with patch or ring of glandular hairs at base. Capsules narrowly ovate, flattened, glabrous, shiny, 7 × 2 mm, 2-seeded. Seeds 5 × 3 mm, covered with long white hygroscopic hairs.

Eponymy:—Named after Johann Fran(t)z Drège (1794–1881), horticulturalist, botanical collector and traveller, who collected most of the *Acanthopsis* type specimens. Drège collected about 200 000 specimens (representing ca. 8 000 species) in South Africa between 1826–1834 (Glen & Germishuizen 2010).

Distribution, ecology and phenology:—*Acanthopsis dregeana* is endemic to South Africa, and only known from two localities north-west 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 elevations of 400–440 m on hill slopes in well-drained sandy loam, stony soils. Flowering time: August and September.

Notes:—Plants observed in nature were heavily grazed and most of the fruit were parasitized, apparently by insects.

Conservation status:—*Acanthopsis dregeana* is only known from two sublocalities in the vicinity of Eksteenfontein, an area where severe overgrazing and trampling by domestic livestock are causing continuing loss and degradation of the habitat. Should grazing pressure continue to increase, the population is potentially at risk. The species therefore qualifies for Critically Endangered B1ab(iii,v) (IUCN 2001) (L. von Staden, pers. comm. 2015).

Additional specimens examined:—SOUTH AFRICA. Northern Cape: Namaqualand District, 19 km NW of Eksteenfontein on road to Khubus, (2817CA), 23 August 2012, *Steyn 1886* (PRE!).

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