South African Journal of Botany 158 (2023) 461–468

Contents lists available at ScienceDirect

South African Journal of Botany

journal homepage: www.elsevier.com/locate/sajb

Notes on *Eberlanzia schneideriana* and *Scopelogena* (Ruschieae, Aizoaceae)

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ARTICLE INFO

Article History:
Received 19 March 2023
Revised 5 May 2023
Accepted 5 May 2023
Available online 1 June 2023

Edited by: Dr J. Manning

Keywords:
Cape floristic region
Conservation
Namib
Nomenclature
Richtersveld
Succulent karoo
Taxonomy

ABSTRACT

Eberlanzia is a small genus of eight species, which are found from south-western Namibia to Namaqualand. *Eberlanzia schneideriana* is characterized by its distinctly velvety leaves and several names were subsumed under it. We show that two of these, *Ruschia velutina* and *R. pillansii*, are distinct from *E. schneideriana*. Of these, *R. velutina* has the smallest flowers (petals not exceeding 3 mm long; 4–7 mm long in *R. pillansii* and *E. schneideriana*). *Ruschia pillansii* has a low spreading habit, whereas *R. velutina* and *E. schneideriana* are erect shrubs. The leaves are characteristically globose, with a distinct apical mucro in *R. pillansii*, whereas they are trigonous with at least the upper surface flattened in the other two species. The leaves of *R. pillansii* and *E. schneideriana* are typically whitish grey under dry conditions, whereas the leaves remain dirty green throughout the year in *E. velutina*. As a consequence of these differences, we now transfer *R. pillansii* and *R. velutina* to *Eberlanzia*. All three species are threatened by mining and severe overgrazing in the Richtersveld National Park. In a nomenclatural note, we validate the generic name *Scopelogena* L.Bolus.

1. Introduction

Eberlanzia was established by Schwantes (1926: 189), who incorporated 28 species, all with spines. Later, Hartmann and Stüber (1993, 1995) established that *Eberlanzia* was polyphyletic and they transferred most species out of Eberlanzia, keeping only two of the original species, *E. clausa* (Dinter) Schwantes and *E. sedoides* (Dinter & A.Berger) Schwantes, in *Eberlanzia*. A survey of morphological characters, mainly within *Ruschia*, provided a basis for a new concept of *Eberlanzia* (Hartmann, 1998), where only some of the species possess blunt spines. Six additional species were transferred from *Ruschia* to *Eberlanzia*, so that currently eight species are accepted in *Eberlanzia* (Hartmann, 2017). Members of *Eberlanzia* share whitish internodes, inflated leaves with convex sides and a variously papillate epidermis, papillae protruding between the filamentous staminodes which are gathered into a central cone and capsule with a bell-shaped base and broad valve wings (Hartmann, 1998). *Amphibolia* and *Stoeberia* were thought to be the closest relatives of *Eberlanzia* (Hartmann, 2017). Analyses of molecular data for the Ruschieae support the close relationship between *Stoeberia* and *Eberlanzia* (Klak et al., 2013). Relationships amongst the species of *Eberlanzia* remain unknown. When Hartmann (1998) transferred the six additional species from *Ruschia* to *Eberlanzia*, several other names were placed into their synonymy (Hartmann, 1998).

Recent fieldwork in the Northern Cape Province of South Africa suggested that not all this synonymy is correct. In particular, two groups of plants (consisting of several populations) with densely papillate leaves and bell-shaped fruits were found that exhibited constant features of habit, leaf-shape and ecological preference that suggested that they are distinct species. Although these two entities both keyed out as *E. schneideriana*, we found that they differed significantly from it and from each other as well. Examination of the types of the names subsumed under *Eberlanzia schneideriana*, showed that these two entities had been described before but were now synonyms of *Eberlanzia schneideriana*.

According to Hartmann (1998; 2017), *Eberlanzia schneideriana* forms shrubs to 50 cm tall, with leaves ranging widely in shape from trigonous to crescent-shaped, keeled or nearly globose and in length from 10 to 30 mm. It was given as fairly widely distributed, from south-western Namibia to northern Namaqualand. Four validly published names were placed in synonymy under *E. schneideriana*, namely *Ruschia hollowayana* L. Bolus, *Ruschia pillansii* L.Bolus (Fig. 1), *Ruschia spathulata* L.Bolus and *Ruschia velutina* L.Bolus (Fig. 2) (a fifth, *Ruschia sphaerophylla* Dinter, *nom. nud.*, was included as well (Hartmann, 1998, 2017), following Friedrich (1970))

Hartmann (1998) expressed some hesitation whether *R. velutina* was conspecific with *E. schneideriana*, as *R. velutina* differed by its club-shaped leaves narrowing much more gradually to their bases.

Below, we show that two further species should be recognized as distinct from *E. schneideriana*. As these two species belong to *Eberlanzia*, they are now transferred from *Ruschia* to *Eberlanzia*. We provide

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https://doi.org/10.1016/j.sajb.2023.05.008

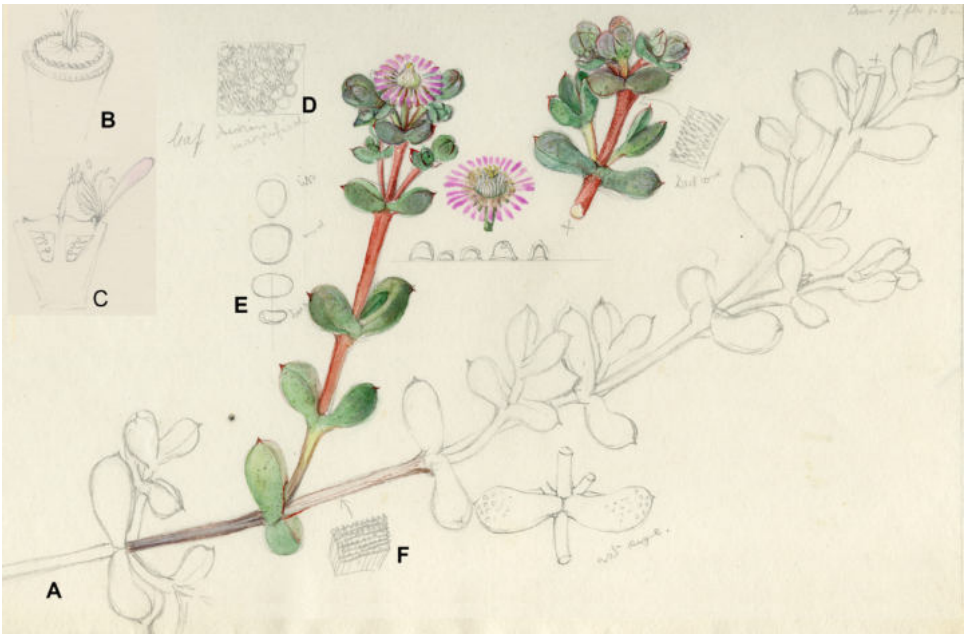

Fig. 1. *Eberlanzia pillansii* (= *Ruschia pillansii, Pillans 5723*). A. Branch, indicating the spreading habit and the globose mucronate leaves; B. Flower with petals removed showing the holonectary, magnification (abbreviated as mag. hereafter) X 3; C. Half-flower, mag. X 3; D. Leaf section magnified to show the densely papillate epidermis; E. Transverse sections of the leaf from tip, mid to lower part of the leaf; F. Magnified portion of the stem showing the hair-like papillae. Artist: M.M. Page. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

revised and improved descriptions, distributions for each of the three species and a revised key to all species of *Eberlanzia*.

2. Materials and methods

Morphological data were obtained from fresh and pressed material in the herbaria BOL, HBG, NBG, PRE and WIND (abbreviations from Thiers 2020+). Data on the distribution of the species was gathered from herbarium material and the records are listed according to the quarter-degree system of Edwards and Leistner (1971).

3. Taxonomy

1. *Eberlanzia pillansii* (L.Bolus) Klak & P.C. van Wyk, ***comb. nov.***, *Ruschia pillansii* L.Bolus, Notes Mesembryanthemum 2: 92 (1929). *Mesembryanthemum floriferum* N.E.Br., Gard. Chron. 87: 32 (1930), *nom. nov. pro Ruschia pillansii* L.Bolus, *non Mesembryanthemum pillansii* Kensit, in Pl. Nov. Hort. Then. ii. t. 57 (1908). Lectotype (selected by Hartmann (1998): 16): [South Africa, Northern Cape], Little Namaqualand, between Arris and Sendeling's Drift, Oct. 1926, *Pillans 5723*, sheet II (BOL, barcode: BOL132101).

Low spreading, robust shrub, rarely decumbent, 5–30 × 40–80 cm, flowering branches 5–10 cm long, branches to 5 mm diam., internodes 10–35 mm long, grey, covered with hair-like papillae. *Leaves* opposite, club-shaped to globose, keels obscure, light green when young, turning ash grey with suffused pink when drought stressed, densely papillate and velvety, leaf tips rounded with a central prominent mucro, 15–20 mm long, 8–17 mm broad, 10–14 mm thick. *Flowers* in ternate cymes with 15 (–29) flowers, cymes compact, 3–4 cm diam., flowers 12–19 mm diam., pedicels densely papillate, calyx obconical, densely covered with short papillae, lobes 5, subequal, to 4 mm long, petaloid staminodes in 1 row, usually arranged in 5 groups, obtuse, pale pink, with a deeper pink central stripe, 6–7 × ± 1 mm; *filamentous staminodes* few, mauve to lilac becoming lighter towards the base with slightly darker medial stripe, 5–8 × 0.8–1.0 mm, apically recurved, stamens shorter, filaments to 4 mm long, translucent whitish and papillate, pollen white to light yellow, *stigmas* 5, slender, 2–3 mm long; nectaries in a conspicuous crenulated ring. *Capsule* 5-locular, lower part bell-shaped, 8–12 mm diam. when open, keels diverging, closing bodies hook-shaped, with prominent closing ledges below the covering membranes closing exit of locules, valves with broad and translucent wings. *Seeds* light brown, almost smooth, 1.0–1.1 × 0.6–0.7 mm.

Distribution and Ecology:— *Eberlanzia pillansii* is known from north of Rosh Pinah in Namibia to the Richtersveld in South Africa (Fig. 3). Its distribution overlaps with that of *E. schneideriana*, but the species never grow together as their ecological preferences differ. *Eberlanzia pillansii* prefers loamy soils mixed with coarse grit, whereas *E. schneideriana* prefers sandy soils. *Eberlanzia pillansii* is most common in the Orange River valley, on both the Namibian and South African sides of the river. It occurs at low altitudes ranging from 110 to 800 m. Flowering time is from August to October.

Distinguishing features:— *Eberlanzia pillansii* has a low spreading habit, whereas *E. velutina* and *E. schneideriana* are erect shrubs (Fig. 4). In *E. pillansii* the leaves are characteristically globose, with a distinct mucro, whereas they are trigonous with at least the upper surface flattened in the other two species (Fig. 5). Also *E. schneideriana* has a distinct mucro, but there is none in *E. velutina*. During relatively moist periods the leaves are olive, often suffused with pink, while under dry conditions they become ash-grey. In contrast, in *E. schneideriana* the leaves are always ash-grey, whereas in *E. velutina* they are always a dirty green (Fig. 4 & 5). *Eberlanzia pillansii* has seeds ranging from 1.0 to 1.1 mm, whereas they are smaller in the other two species, i. e. 0.8–0.9 mm long (Fig. 4F).

Conservation status:— The populations of *Eberlanzia pillansii* in the southern part of its distribution, i.e. in the Richtersveld, are threatened by mining near Sendelingsdrif. Additional pressure on extant populations comes from extensive grazing by goats within the Richtersveld National Park as well as in the Richtersveld World Heritage Site. As this species has a restricted distribution and in view of the threats of both mining and overgrazing, we recommend a Red List status of vulnerable (VU).

Additional specimens examined: —NAMIBIA. **2716 (Witputz):** Farm Spitskop, LU 111 (-DC), 14 Aug. 1976, *W. Giess 14,637* (WIND);

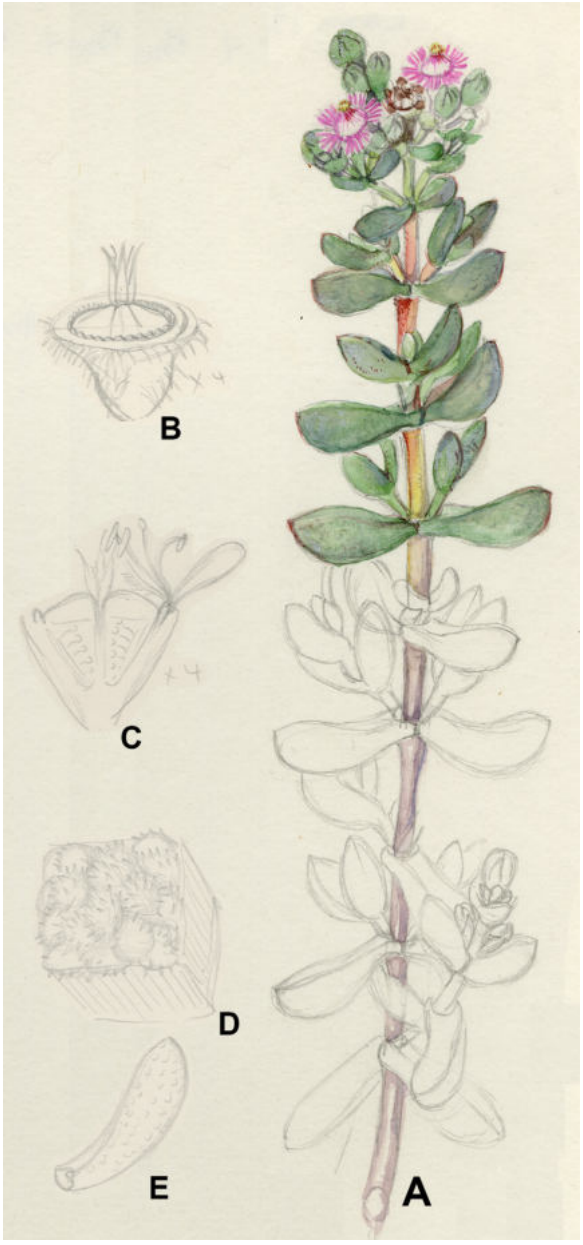

Fig. 2. *Eberlanzia velutina* (= *Ruschia velutina, Pillans 5801*). **A.** Branch, indicating the erect habit and the leaves without a mucro; **B.** Flower with petals removed showing the holonectary and the calyx covered with long hair-like papillae, mag. X 4; **C.** Half-flower, mag. X 4; **D.** Leaf section magnified to show the densely papillate epidermis; **E.** Leaf showing the shape and absence of mucro. Artist: M.M. Page. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

721 m, 4 Aug. 2016, *Rügheimer* et al. *SB3740* (WIND); Koppie next to road north of Rosh Pinah (-DC), 27 Sep. 1999, *C. Mannheimer* et al. *CM 796* (WIND); Scorpion (-DC), 741 m, *A. Burke 98,169* (WIND); MacMillans pass area on Namuskluft (-DD), 573 m, 29 Sep. 2004, *C. Mannheimer & al. CM 2660* (BOL, WIND); Namuskluft (-DD), 756 m, 12 Sep. 2003, *C. Mannheimer CM 2390* (PRE, WIND); Namuskluft farm (-DD), 582 m, 9 Sep. 2002, *C. Mannheimer CM 2224* (WIND); **2816 (Oranjemund):** Schakalsberge, southern Sperrgebiet (-BA), 11 Sep. 2003, *A. Burke 3192* (WIND); Lorelei (-BB), Jun. 1961, *H. Hall s.n.* (BOL); Lorelei mine (-BB), 148 m, 18 Aug. 2012, *M. Koekemoer 4318* (PRE); Lorelei (-BB), 200 m, *H. Kolberg & T. Tholkes 2379* (WIND); Kahanstal (-BB), 4 Dec. 1934, *Dinter 8184* (BOL, WIND); Kahanstal (-BB), 4 Dec. 1934, *Dinter 8183* (B); Kahanstal (-BB), *Rügheimer* et al. *SB3734* (WIND); SOUTH AFRICA. Northern Cape, **2816 (Oranjemund):** Richtersveld National Park, near Halfmenspass (-BB), 221 m, 29 Sep. 2004, *P. Chesselet 497* (NBG); Halfmenspass, 271 m, 18 Feb. 2015, *P. van Wyk PC494* (BOL); Pooitjiespram mountain, gorge south of campsites (-BB), 220 m, 19 Feb. 2014, *P. van Wyk PC203* (BOL); Near Sendelingsdrif, on road to Poortjiespram (-BB), 319 m, 2 Jul. 2011, *Klak 1995* (BOL); Akkedispoort (-BB), 8 Jul. 1995; *S. Pierce 80* (BOL); Swartpoort (-BB), 110 m, *Hartmann & Dehn 19,088* (HBG, WIND); Ostende von Swartpoort (-BB), 11 Mar. 1995, 90 m, *Hartmann & Potgieter 32,643* (HBG); Richtersveld National Park, next to Swartpoort Road (-BB), 5 Jul. 1996, *C. Paterson-Jones 742* (NBG); Swartpoort to Oenas (-BB), 350 m, 5 Feb. 1985, *Hartmann & Dehn 19,096* (HBG); Ca. 2 km southwest of Richtersveld Park Gate (-BD), 350 m, 1 Dec. 2005, *P. Burgoyne 10,372(b)* (PRE); Numeesberg, near bottom of Hellskloof (-BD), 470 m, 26 Sep. 1978, *L. M. Raitt* (NBG); Numees, Hang unterhalb der alten Mine (-BD), 370 m, 8 Feb. 1985, *Hartmann & Dehn 19,155* (HBG); **2817 (Vioolsdrif):** Koamsrivier (-AA), 280 m, 6 Feb. 1985, *Hartmann & Dehn 19,099* (HBG).

Without locality data: Government Gardens Windhoek, Jun. 1937, *Holloway 21* (BOL).

2. *Eberlanzia schneideriana* (A.Berger) H.E.K.Hartmann, *Mesembryanthemum schneiderianum* A.Berger, Bot. Jahrb. Syst. 57: 636 (1922). *Ruschia schneideriana* (A.Berger) L.Bolus, Notes Mesembryanthemum 3: 220 (1950). Type: Namibia, Namus, auf Kiesflächen, 700 m, fruiting and flowering 1912, *Range 1541* (B, holo; BOL, barcode: BOL132106; K, barcode: K000267715, iso).

= *Ruschia hollowayana* L.Bolus, Notes Mesembryanthemum 3: 103 (1937). Type: Without locality, *Holloway 61* (BOL, holo, barcode: BOL132105).

= *Ruschia spathulata* L.Bolus, Notes Mesembryanthemum 3: 103 (1937). Type: Without locality, *Holloway 16* (BOL, holo, barcode: BOL132107).

Erect, much branched robust shrub, 30–50 × 50–90 cm, branches 5–6 mm diam. or more, internodes 7–25 (–40) mm long, grey, covered with hair-like papillae.

Leaves opposite, shortly connate, grey, sometimes suffused with pink, triquetrous, falcately incurved, obtuse, and sharply acuminate to mucronate, 10–20 mm long, 5–9 mm broad, 7–12 mm diam, grey, covered with papillae. *Flowers* in ternate cymes of 3–9 (–14) flowers well projected above the leaves, pedicels densely papillate with bracts at middle, *calyx* obconical, densely covered with short papillae, lobes 5, unequal, 2–3 mm long, petaloid staminodes slightly longer, arranged in 5 groups, 4–6.5 × 0.5–1.1 mm, in 1–2 rows, rose; filamentous staminodes and stamens collected into central cone; *filamentous staminodes* white with magenta recurved tips, with long papillae at bases, filaments in c. 3 rows, to 4 mm long, the inner ones with long papillae to about half their length, *stigmas* 5, slender, ± 3.5 mm long; nectaries in a conspicuous crenulated ring. *Capsule* 5-(6-) locular, lower part bell-shaped, to 10 mm diam. when open, keels diverging, closing bodies hook-shaped, with prominent closing ledges below covering membranes, valves with broad and translucent wings. *Seeds* light brown, almost smooth, 0.8–0.9 × 0.5–0.6 mm.

Note: *Ruschia spathulata* and *R. hollowayana* are kept as synonyms under *E. schneideriana* as both are erect shrubs 30–40 cm tall (Bolus, 1937:103). For both species the petals were said to range between 5 and 6.5 mm, further supporting that they are conspecific with *E. schneideriana*, rather than *E. velutina*, where the petals are only 2–3 mm long (Fig. 2).

Distribution and Ecology:– Found on alluvial terraces along the Orange River, on quartzy flats and outcrops and on low hills, from north of Rosh Pinah in Namibia to Cornellskop in the Richtersveld (Fig. 6). *Eberlanzia schneideriana* occurs at altitudes of 40–760 m and prefers sandy soils, occasionally also growing in loam.

Distinguishing features:– *Eberlanzia schneideriana* forms substantial robust shrubs (30–50 cm tall) and has an erect habit

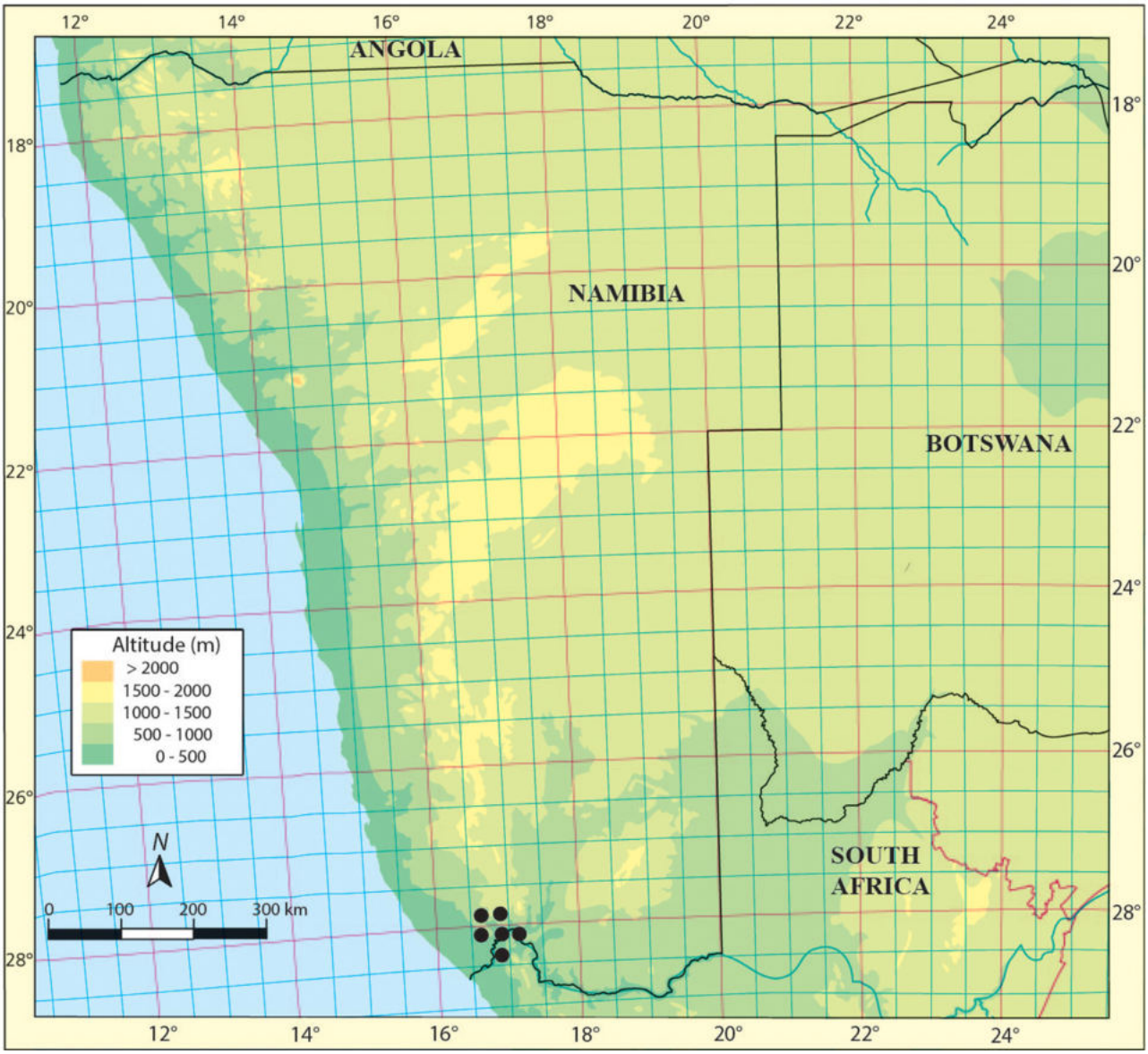

Fig. 3. Distribution of *Eberlanzia pillansii*. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

(Fig. 4E). The leaves are ash-grey, trigonous-clavate and shortly mucronate (Fig. 5C).

Conservation status:— The populations of *Eberlanzia schneideriana* in both South Africa and Namibia are threatened by mining and more than 50% of its habitat has been destroyed on both sides of the Orange River. Furthermore the 2012–2023 drought has caused most populations to collapse. Additional pressure on extant populations comes from heavy grazing within the Richtersveld by goats. We propose a Red List status of endangered (EN).

Additional specimens examined: — NAMIBIA. **2716** (Witpütz): North of Rosh Pinah, along road to Aus (-CB), 28 Mar. 2000, *C. Mannheimer 861* (WIND); S end of Obibbergen (-DC), 660 m, 4 Feb. 1984, *Hartmann & Dehn 15,068* (HBG); Zwischen Obib und Schlafkuppe (-DC), 660 m, 5 Feb. 1984, *Hartmann & Dehn 15,076* (HBG, WIND); Koppie at proposed Scorpion Mine site, Diamond area 1 (-DC), 3 Nov. 1998, *C. Mannheimer 655* (WIND); *C. Mannheimer 794c* (WIND); **2816** (Oranjemund): Daberas Gorge (-BA), 16 Jul. 1993, *G. Williamson 5042* (WIND); Patrolroad entlang der Obibdüne (-BA), 420 m, 6 Feb. 1984, *Hartmann & Dehn 15,101* (HBG); Obib valley (-BA), 29 Aug. 2003, *A. Burke* et al. *13* (WIND); 1.3 km NE Obib-Wasser (-BA), 17 Sep. 1973, *W. Giess 13,029* (WIND); Gomtsavib (-BB), 3 Apr. 1984, *Hartmann & Dehn 15,032* (HBG); Rocky ridge south west of Sendelingsdrif towards Daberas-Auchas (-BB), 28 Jun. 2010, *C. Mannheimer 4379* (WIND);

SOUTH AFRICA. Northern Cape, **2816** (Oranjemund): Vioolsdrif. Old security entrance to Ochta Diamonds (-BB), 9 Jul. 1993, *E. Van Jaarsveld 13,264* (BOL); Vyfsusters, next to only road going through two of the peaks (-BB), 170 m, 1 Aug 2019, *Richtersveld nursery team 655/021* (BOL); ACE Plant mine, north of Sendelingsdrif Airfield (-BB), 74 m, 4 Jan. 2014, *Richtersveld nursery team 807/021* (BOL); Cornels Kop (-BD), 9 Jul. 1993, *E. Van Jaarsveld 13,265* (BOL);

3. *Eberlanzia velutina* (L.Bolus) Klak & P.C. van Wyk, ***comb. nov.***, *Ruschia velutina* L.Bolus, Notes Mesembryanthemum 2: 76 (1929). *Mesembryanthemum lacunatum* N.E.Br., Gard. Chron. 87: 33 (1930), *nom. nov. pro Ruschia velutina* L.Bolus, *non Mesembryanthemum velutinum* L.Bolus, Ann. Bolus Herb. 3: 124 (1922). Type: South Africa, Northern Cape, Little Namaqualand, between Doornpoort and Brakfontein (2817CA), Oct. 1926, *Pillans 5801* (BOL, holo, barcode: BOL132108).

Dense, rounded shrub, with erect branches, 25–35 × 40–60 cm, branches almost completely hidden by leaves, pinkish when young,

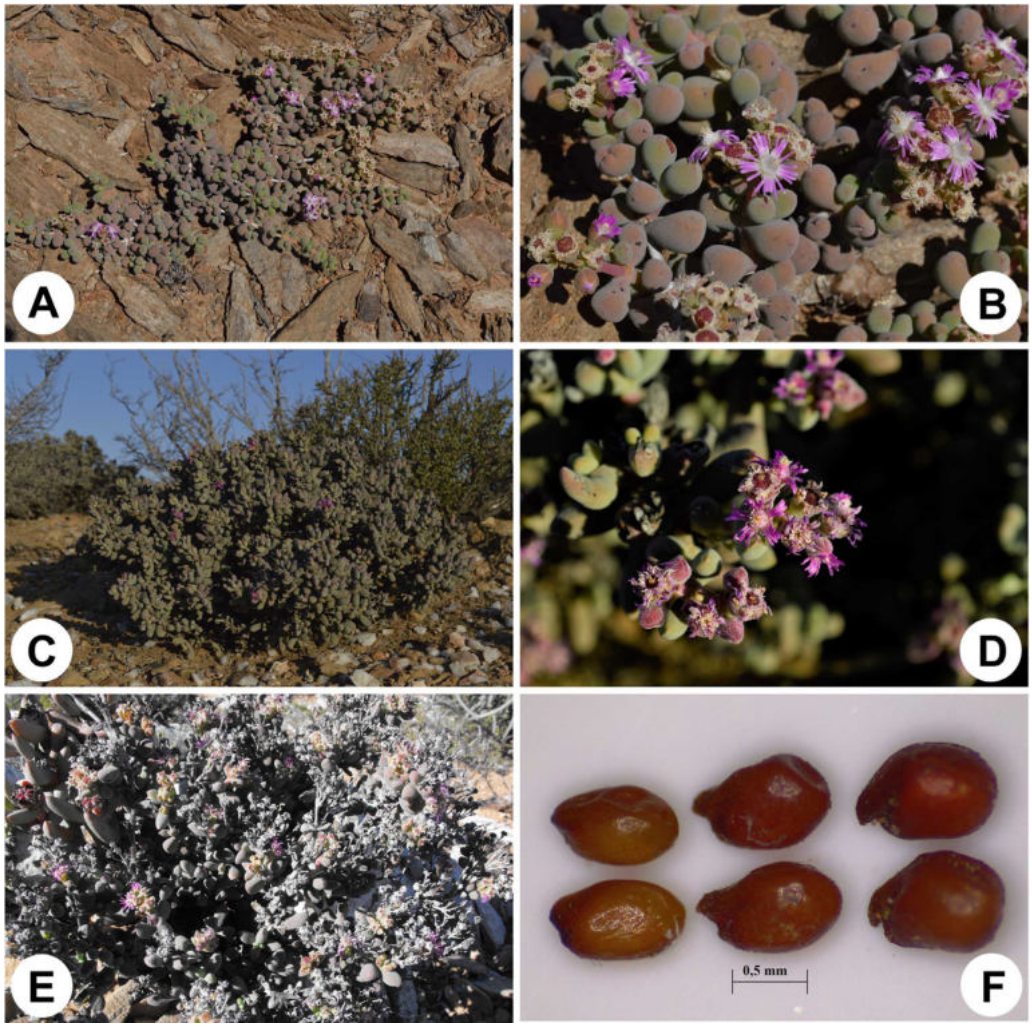

Fig. 4. *Eberlanzia pillansii*: **A.** Habit. **B.** Flowers and leaves. *E. velutina*: **C.** Habit. **D.** Flowers and leaves. *E. schneideriana*: **E.** Habit. **F.** Seeds of *E. velutina* (left), *E. schneideriana* (middle), *E. pillansii* (right). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

becoming grey and woody with age, to 4 mm diam., internodes 5–10 (–20) mm long, covered with hair-like papillae. *Leaves* opposite, olive green with ash-grey and pink tinted, long falcate to boat-shaped, triangular in cross section, keels not conspicuous, two sides convex, upper side flat, densely velvety with papillae, 10–25 (–30) mm long, 5–8 mm broad, 5–8 mm thick, keels and apex blunt. *Flowers* in many-flowered cymes, cymes compact and short to 3.5 cm diam., flowers 8 mm diam., pedicels to 3 mm long, densely papillate, calyx obconical, densely covered with long papillae, lobes 5, subequal, to 3 mm long, *petaloid staminodes* 20–23, in 1 row, usually arranged in 5 groups, obtuse, dark mauve, 2.5–3 × 0.5–1 mm; *filamentous staminodes* few, collected around the stamens, white with light magenta towards recurved tips, long papillae at bases, shorter than stamens, 2–3 × 0.5–0.8 mm, filaments 1–2 mm long, translucent whitish and papillate, pollen white, *stigmas* 5, slender, 1–2 mm long; nectaries in a conspicuous crenulated ring. *Capsule* 5-locular, breaking off before the following flowering season, lower part bell- to funnel-shaped, 6–8 mm diam. when open, keels diverging, closing bodies hook-shaped, with prominent closing ledges below the covering membranes, valves with broad and translucent wings. *Seeds* ochre, very smooth and shiny, c. 0.9 × 0.5 mm.

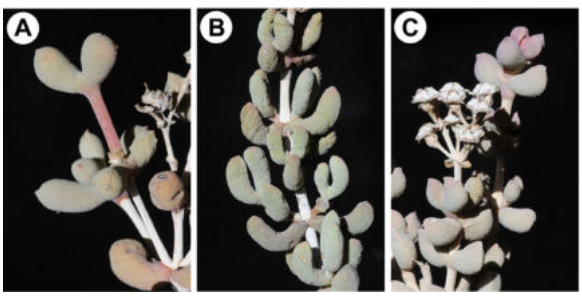

Fig. 5. Leaf shapes in *Eberlanzia*. **A.** *E. pillansii*. **B.** *E. velutina*. **C.** *E. schneideriana*. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Distribution and Ecology:— *Eberlanzia velutina* occurs in a restricted region in the Richtersveld World Heritage Site (Fig. 6). Although Pillans discovered the species already in 1926, it remains relatively poorly known with only few herbarium records. Populations were found at 400–564 m, mostly in white to pale loamy soil with some quartz, on the outer edges of *heuweltjies*.

Distinguishing features:— *Eberlanzia velutina* has the smallest flowers in the genus, with petals not exceeding 3 mm long (Fig. 2& 4) compared to *E. schneideriana* (4–6.5 mm long) and *E. pillansii* (6–7 mm long, Fig. 1). In contrast to *E. schneideriana* and *E. pillansii*, the leaves are not distinctly apiculate but are apically rounded (Fig. 5). In herbarium specimens this is one of the most reliable features distinguishing it from *E. schneideriana* (which has similarly shaped leaves which are apically mucronate).

Conservation status:— The area where it has been recorded is a communal grazing area, which is heavily overgrazed and has with no

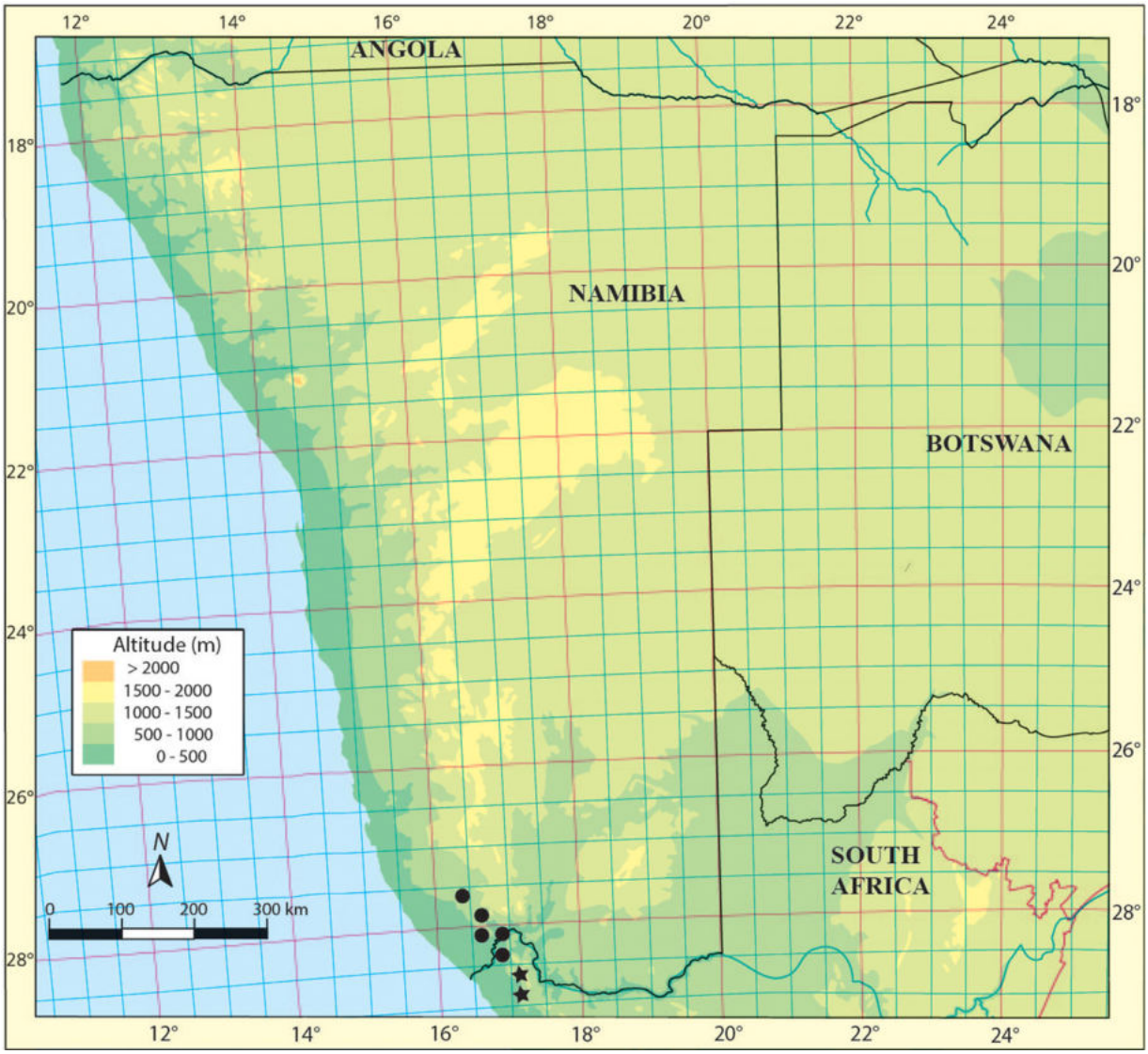

Fig. 6. Distribution of *Eberlanzia velutina* (star) and *Eberlanzia schneideriana* (circle). Note that the distribution of *E. schneideriana* overlaps with *E. pillansii* (Fig. 3). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

formal protection. Due to its restricted range and this problem of overgrazing, we propose a Red List status of vulnerable (VU).

Additional specimens examined: —SOUTH AFRICA. Northern Cape, **2817 (Vioolsdrif):** Road from Kuboes to Eksteenfontein, Emmersdrif area (-CA), 564 m, 24 Aug. 2019, *P. van Wyk 2195* (BOL); From Koubank soutwards to Black Mountains (-CA), loamy bank in riverbed, 400 m, 12 Feb. 1985, *Hartmann & Dehn 19,250* (HBG); Vlakmyn (-CC), 350 m, 23 Feb. 1984, *Hartmann & Dehn 15,356* (HBG).

Key to the species of *Eberlanzia* (adapted from Hartmann (2017) and expanded here to incorporate the two additional species):

1. Flowers with few (<5) or no petals **2**
1.' Flowers with > 20 petals **3**
2. Plants rich in spines . . . . . **E. clausa**
2.' Plants with only some spines deep inside the plants. . . . . **E. sedoides**
3. Calyx with several large papillae visible to the naked eye. . . . . **E. dichotoma**
3.' Calyx smooth or papillae small and not visible to the naked eye. **4**
4. All parts covered uniformly with low papillae or superficially smooth **5**
4.' All parts of the plants covered uniformly in long papillae **7**
5. Inflorescences enriched by serial additional buds in the dichasia in a plane, thus forming a two-dimensional candelabrum. . . . . **E. ebracteata**
5.' Inflorescences enriched basally by additional storeys of further dichasia **6**
6. Leaves 20–25 mm long, elongate with rounded tip, keel and margins . . . . . **E. cyathiformis**
6.' Leaves 7–12 mm long, short, fat and roundish, apiculate when young . . . . . **E. parvibracteata**
7. Fruit at most 6–8 mm diam.; leaves 23–35 mm long, to 10 mm broad . . . . . **E. gravida**
7.' Fruit at most 5 mm diam.; leaves 10–30 mm long, 5–6 mm broad **8**
8. Plants low-spreading; leaves globular, without distinct keels and margins, with apical mucro . . . . . **E. pillansii**
8.' Plants erect; leaves trigonous, keels distinct, with apical mucro or tips rounded **9**
9. Leaves dirty green, trigonous, keels rounded, tips blunt. . . . . **E. velutina**
9.' Leaves ash-grey, crescent-shaped, sharply keeled, tips distinctly apiculate. . . . . **E. schneideriana**

4. *Scopelogena* L. Bolus ex Klak

Louisa Bolus (Bolus, 1962) established *Scopelogena* with a description of the genus and included two species in it, *S. verruculata* (L.) L. Bolus and *S. gracilis* L.Bolus. However, she specified no type for the new genus, which rendered both it, as well as the species names placed in it invalid (ICN ***Art. 40.1;*** Turland et al., 2018). A third species was added later, *S. bruynsii* Klak (2000), which is consequently also invalid. Although lectotypes were selected by Hartmann (2001) for species of *S. verruculata* and *S. gracilis*, the invalid publication of the genus and species names had been overlooked. To allow the correct use of the names, they are validated here. Following Klak (2000), we recognize only two species in *Scopelogena*. As more information has been gathered on the distribution of the two species since Klak (2000), the known distribution is shown here (Fig. 7).

Scopelogena L.Bolus ex Klak, **gen. nov.** *Scopelogena* L.Bolus, J. S. African Bot. 28: 9 (1962), nom. inval. (no type selected). Type: *Scopelogena verruculata* (L.) L.Bolus ex Klak.

Diagnosis: Differs from *Lampranthus* by its flowers being arranged in rich terminal dichasia (solitary or in few flowered cymes in *Lampranthus*) and from *Ruschia* by its moderately xeromorphic leaves (xeromorphic in *Ruschia*).

Woody shrubs, 300–600 mm tall, to 2 m diam., the branches decumbent with age. *Leaves* terete, acuminate, whitish grey or rarely grass green, stomata not sunken, epidermis smooth, outer epidermis walls without crystal layer, 20–45 mm long, 4–8 mm broad. *Flowers* in rich terminal dichasia enlarged by additional cymes below, petaloid staminodes yellow, salmon or pink, rarely white, filamentous staminodes collected into a central cone around the stamens, nectary in a ring. *Fruits* persistent on the plant for at least one season or fruits dropping off easily once mature, top with low rims, base elongate and funnel-shaped, covering membranes nearly straight, expanding keels diverging, valve wings as narrow ledges, without closing body, locules 5, valves remain open after the first opening or open and close repeatedly. *Seeds* dark brown, tuberculate, 1.0–1.1 mm long.

Distribution and Ecology:—On sandstone rocks, either on cliffs or on sandstone outcrops.

The genus is found from Kamieskroon, Namaqualand to the Cape Peninsula and eastwards as far as the Gamkaberg near Calitzdorp, South Africa (Fig. 7).

Species: 2

Key to the species:

1. Leaves glaucous or grass green; flowers yellow, salmon or pink; fruits opening and closing repeatedly, dropping off easily once mature . . . . . ***S. bruynsii***

1.' Leaves glaucous; flowers yellow or rarely white; fruits remaining open after first opening and persisting on the plant for at least one season . . . . . ***S. verruculata***

1. *Scopelogena verruculata* (L.) L.Bolus ex Klak, **comb. nov.** *Scopelogena verruculata* (L.) L.Bolus, J. S. African Bot. 28: 10 (1962), *nom. inval.* ((ICN ***Art. 35.1***): no type selected for genus). *Mesembryanthemum verruculatum* L., Sp. Pl. 1: 486 (1753). *Ruschia verruculata* (L.) G. D.Rowley, Cact. & Succ. J. Gr. Brit. 19: 7 (1957). Lectotype (designated as iconotype by Klak (2000): 39): Dill., Hort. Eltham. t. 203, fig. 259 (1732).

Scopelogena gracilis L.Bolus, J. S. African Bot. 28: 10 (1962), *nom. inval.* (ICN ***Art. 35.1***: no type selected for genus). *Ruschia scopelogena* G.D.Rowley, Natl. Cact. Succ. J. 33: 9 (1978), *non Ruschia gracilis* L. Bolus (1929). Lectotype (designated by Hartmann 2001: 295): *Hall 1506* sheet I (BOL, barcode: BOL60189)

Additional specimens examined: —SOUTH AFRICA. Western Cape, **3318 (Cape Town):** rocks west of Lion's Head (-CD), *Hall s.n.* (BOL); Table Mountain (-CD), *Marloth 2851* (BOL); **3319 (Worcester):** Near farm Sandberg, Droogerivierberg (-DC), *Klak 2450* (BOL);

3320 (Montagu): Rooiberg (-BD), *Bruyns 13,495* (BOL); **3321 (Ladismith):** Waterfall, 2 km west of Keurboschfontein (-CB), *Helme 1951* (BOL); Gamkaberg Nature Reserve, view point on road to Oukraal (-DB), *Klak 2714* (BOL); **3418 (Simonstown):** Kalk Bay Mountain (-AB), *Bean 776* (BOL); **3419 (Caledon):** 10 km north of Napier, farm Karsrivier (-BD), *Klak 278* (BOL); **3420 (Bredasdorp):** 7 km west of Swellendam (-AB), *Klak 177* (BOL); Boskloof, Potberg (-BC), *Burgers 1627* (NBG); **3421 (Riversdale):** Glen Leith (-AA), *Muir 4320* (BOL).

2. *Scopelogena bruynsii* Klak, **sp. nov.** *Scopelogena bruynsii* Klak, Bothalia 30(1): 39 (2000), *nom. inval.* (ICN ***Art. 35.1***: no type selected for genus). Type: *Klak & Bruyns 462* (BOL, holo, barcode: BOL135050; K, iso).

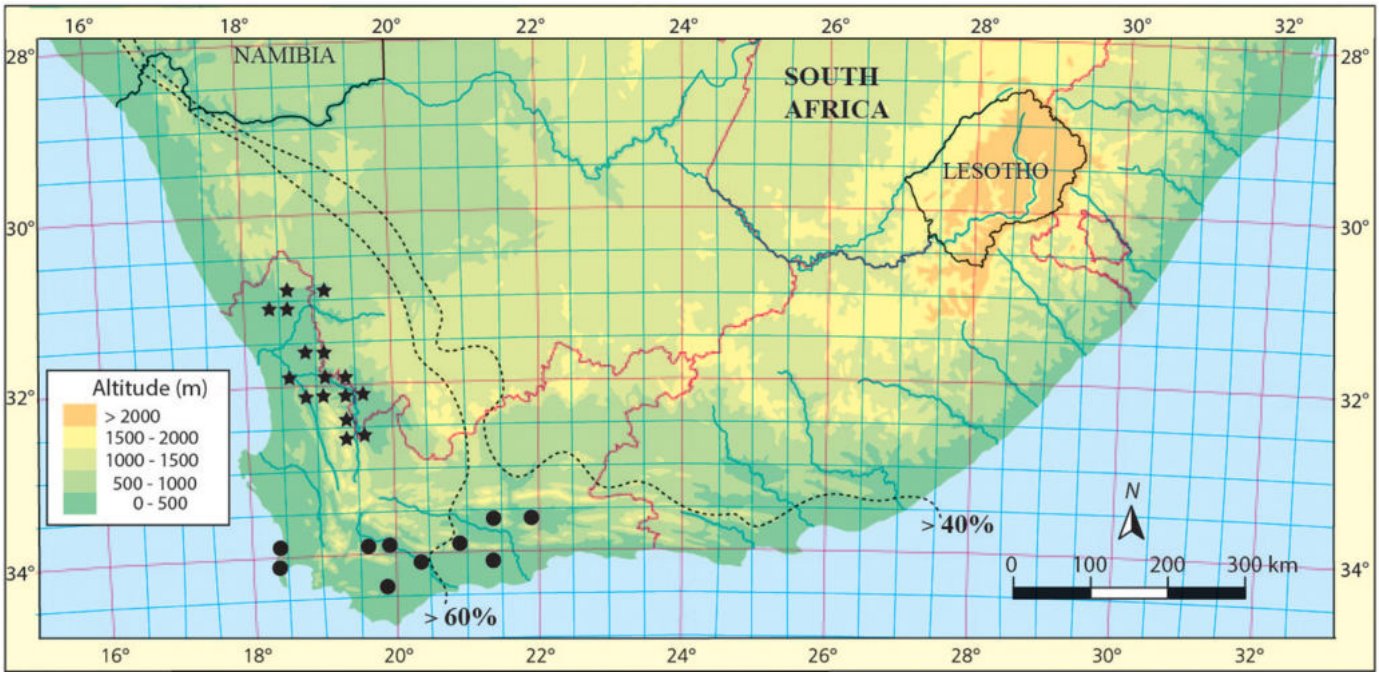

Fig. 7. Distribution of *Scopelogena bruynsii* (star) and *S. verruculata* (circle). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Note: the description and diagnosis for this name were provided in Klak (2000: 39).

Additional specimens examined: —SOUTH AFRICA. Northern Cape, **3018 (Kamiesberg):** Near Leeukuil, (-DC), *Bruyns 5267a* (BOL); Farm Tafelberg 64, mountain west of Rietkloof homestead (-DC), *National Geographic IPC tour sub Klak 81* (BOL); **3019 (Louriesfontein):** Farm Donkiedam (-CC), *Klak 1294* (BOL); **3119 (Calvinia):** Farm Lokenburg (-CA), *Acocks 17,245* (BOL); Farm Hamelkraal, long track to Doring River (-CC), *Klak 2882* (BOL); *Soutpan* (-CD), *Klak 568* (BOL);

Western Cape, **3118 (Vanrhynsdorp):** 10 km north of Nuwerus (-AB), *Klak & Bruyns 462* (BOL, K); Farm Vinkelskolk, Bleskop (-AB), *Klak 2102* (BOL); eastern slopes of Kareebergen (-BA), *Bruyns 12,555* (BOL); Nuwerus, Rooiberg (-BA), *Bruyns 7919* (BOL); Matsikamma (-DB), *Helme 1656* (BOL); Doorn River bridge, farm De Brug (-DC), *Klak 1894* (BOL); Trawal, Klawer (-DC), *Bruyns 9522* (BOL); **3218 (Clanwilliam):** About 50 km north of Citrusdal (-BB), *Kurzweil 1194* (BOL); **3219 (Wuppertal):** Elandsvlei, along Tra Tra River (-AB), *Klak 2879* (BOL); Dassiekloof (-BA), *Klak 424* (BOL); Cederberg, Farm Ramkraal (-AD), *Klak 961* (BOL); Cederberg, Mount Ceder (-CB), *Klak 1375* (BOL); south of Elandsvlei (-DA), *Klak 565* (BOL); Farm Die Mond (-DA), *Klak 1033* (BOL); *Van Jaarsveld 13,579* (BOL).

Declaration of Competing Interest

The authors declare that there is no conflict of interests.

Acknowledgements

The curator of NBG is thanked for permission to examine specimens. The curators and staff of HBG, PRE and WIND are thanked for photographs of selected herbarium specimens. Our thanks go also to Cape Nature, the Northern Cape for granting collecting permits. Field work was funded in part by a block grant from the University of Cape Town. We also would like to thank the Richtersveld National Park manager, Mr Brent Whittington, for transport and other support, as well as staff of the Kimberley SANParks Herbarium and SANParks Scientific Services for the arid parks. Mr Pieter Jacobs provided information about species on his farm Spitzkoppe, northeast of Rosh Pinah.

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