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# Review of the genus *Xenoscapa* (Iridaceae: Crocoideae), including *X. grandiflora*, a new species from southern Namibia

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**Keywords**: Iridaceae, new species, southern Africa, taxonomy, *Xenoscapa* (Goldblatt) Goldblatt & J.C.Manning

ABSTRACT

The small genus *Xenoscapa* (Goldblatt) Goldblatt & J.C.Manning, endemic to the southern African winter rainfall region, is reviewed. The new species *X.* **grandiflora** is described from the deeply dissected southern part of the Huib Hoch Plateau in southern Namibia. It differs from the two known species in the genus in its significantly larger, pale lilac flowers. Full descriptions and accounts of all three known species are provided, with distribution maps and illustrations.

## INTRODUCTION

*Xenoscapa* (Goldblatt) Goldblatt & J.C.Manning, one of the smallest genera in Iridaceae, currently comprises two species from the winter rainfall region of southern Namibia and southwestern South Africa. Both are small, deciduous geophytes with two or three, soft-textured, prostrate foliage leaves and unusual, single-flowered, mostly shortly branched spikes (Goldblatt & Manning 1995, 2008). The vegetative similarity between them extends to the flowers, which are long-tubed with relatively small, narrow tepals and shortly exserted, arcuate stamens.

The distinctive combination of single-flowered spikes, tubular flowers, and deeply divided style branches caused a great deal of uncertainty about the taxonomic position of the genus. The slender perianth tube and divided style branches caused the first known species, *Xenoscapa fistulosa* (Spreng. ex Klatt) Goldblatt & J.C.Manning, to be described in the genus *Ovieda* Spreng. (an illegitimate later synonym of *Lapeirousia* Pourr.), from which it was subsequently transferred to *Lapeirousia* (Baker 1877). The rounded corms with fibrous tunics are anomalous there, however, and it was accordingly moved to *Anomatheca* as the monotypic section *Xenoscapa* (Goldblatt 1972). A later morphological cladistic analysis indicated that the species was also misplaced here, combining a unique mix of mainly apomorphic character states, notably the unusual inflorescence, reduced leaf number and cylindrical capsules, containing plesiomorphic, angled seeds. As a result, *Xenoscapa* was recognized as an independent genus, and increased to two species with the addition of a new species from central Namaqualand, *X. uliginosa* Goldblatt & J.C.Manning. The precise relationships of *Xenoscapa* remained uncertain until recent analysis of plastid sequence data placed it as sister to the clade comprising *Devia–Crocosmia–Freesia* (Goldblatt *et al.* 2006). The four genera are currently treated as the tribe *Freesieae* (Goldblatt & Manning 2008).

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The two known species of *Xenoscapa* are distinguished by small differences in perianth size and colour, height of the flowering stems in fruit, and the presence or absence of floral fragrance (Table 1). *X. fistulosa* is relatively widespread, occurring throughout the range of the genus, from the Huib Hoch Plateau in southern Nambia southwards along the Namaqualand escarpment and the interior mountains of the southwestern Cape, with two outlying populations along the West Coast (Goldblatt & Manning 2000a). *X. uliginosa*, in contrast, is a highly local endemic restricted to middle and upper elevations of the Kamiesberg, where it may co-occur with *X. fistulosa* (Goldblatt & Manning 1995). A recent collection from the summit of Hohenzollern Peak in the Hunsberge in southern Namibia, slightly east of the recorded range of *X. fistulosa*, is distinctive in its significantly larger, pale lilac flowers with relatively larger anthers, and represents a third species, described here as *X. grandiflora*. We take this opportunity to provide a review of the genus *Xenoscapa*.

## MATERIALS AND METHODS

This study is based on an examination of living plants in the field and of specimens in the following herbaria: BOL, MO, NBG, PRE and SAM (acronyms according

TABLE 1.—Distinguishing morphological characters in *Xenoscapa*

| Character | *fistulosa* | *grandiflora* | *uliginosa* |
|---|---|---|---|
| Plant height (mm) | (50–)70–200 | 40–100 | 30–50 |
| Floral fragrance | Sweet-spicy | None | None |
| Tube length (mm) | 18–25(–33) | 33–35 | (20–)22–28 |
| Tepal colour | White | Pale lilac with dark nectar guides on lower tepals | Dark pink/ purple with dark nectar guides on lower tepals |
| size (mm) | 4–7 × 1–3 | 12–14 × 4.0–5.5 | 6–7 × 2–3 |
| dorsal orientation | Erect | Erect | Suberect or erect |
| Anther length (mm) | 1.0–2.5 | 3.5–4.0 | ± 2 |
| Capsule length (mm) | (8–)12–20 | 10–13 | ± 10 |

to Holmgren *et al.* 1990). The abbreviation of author names follows Brummitt & Powell (1992).

## TAXONOMY

**Xenoscapa** *(Goldblatt) Goldblatt & J.C.Manning* in Systematic Botany 20: 172 (1995). *Anomatheca* sect. *Xenoscapa* Goldblatt: 88 (1972). Type species: *X. fistulosa* (Spreng. ex Klatt) Goldblatt & J.C.Manning.

Seasonal perennials with small, globose corm, rooting from the base and axial in origin; tunics of finely reticulate fibres. *Cataphylls* 2 or 3, pale and membranous. *Leaves* 2 or 3, unifacial, prostrate, soft-textured, with definite midrib; margins with columnar epidermal cells. *Stem* short or long, erect, terete, often with 1–3 short branches. *Inflorescence* of solitary, sessile flowers terminal on axes; bracts green, leathery, inner bracts slightly shorter or more often slightly longer than outer, often notched apically. *Flowers* zygomorphic, tubular or salver-shaped, either cream-coloured and sweetly scented or pink with contrasting markings on lower tepals and unscented, with nectar from septal nectaries; perianth tube cylindric and elongate; tepals subequal, spreading or dorsal erect, slightly larger, and spoon-shaped. *Stamens* unilateral and arcuate, filaments shortly exserted. *Ovary* globose, sessile; style filiform, with short, deeply divided, recurved branches. *Capsules* oblong to cylindric, cartilaginous. *Seeds* strongly angled, with prominent chalazal crest, slightly wrinkled, matte, surface colliculate-rugulose. *Basic chromosome number x* = 11.

Three species, in the southern African winter rainfall zone of southern Namibia and western South Africa.

*Etymology*: from the Greek, *xenos*, for strange and *scapa*, for flowering stem, because of the inflorescence, unusual for subfamily Crocoideae in bearing solitary flowers on the main and lateral branches instead of spikes of multiple flowers.

### Key to species

1a Flowers white or cream-coloured (rarely very pale pink), without contrasting nectar guides but perianth tube often flushed purple, fragrant; perianth tube 1.0–1.5 mm diam. at mouth; tepals 4–7 × 1–3 mm; anthers 1.0–2.5 mm long; capsules (8–)12–18 mm long . . . . . 3. *X. fistulosa*

1b Flowers lilac to dark pink or purple with contrasting nectar guides on lower tepals, unscented; perianth tube 1.5–2.0 mm diam. at mouth; tepals 6–14 × 2.0–5.5 mm; anthers 2–4 mm long; capsules 10–13 mm long:

2a Flowers dark pink; perianth tube 22–28 mm long; tepals 6–7 × 2–3 mm; anthers ± 2 mm long; plants from Kamiesberg in central Namaqualand . . . . . 2. *X. uliginosa*

2b Flowers pale lilac; perianth tube 33–35 mm long; tepals 12–14 × 4.0–5.5 mm; anthers 3.5–4.0 mm long; plants from Hunsberge in southern Namibia . . . . . 1. *X. grandiflora*

1. **Xenoscapa grandiflora** *Goldblatt & J.C.Manning*, sp. nov.

Haec species quoad folia prostrata oblonga et capsulas oblongo-cylindricas *Xenoscapae fistulosae* et *X. uliginosae* similis, sed ab eis floribus pallide lilacinis inodoris, tepalis inferioribus dilute malvino-suffusis, tubo perianthii 33–35 mm longo, et tepalis 12–14 × 4.0–5.5 mm differt.

TYPE.—Namibia, 2717 (Chamaites): Hunsberge, Hohenzollern Peak, (–CC), 1 July 2007 [fl. in cult. 13 July 2010], *E. van Jaarsveld sub J.C. Manning 3303* (NBG, holo.; MO, iso.).

Deciduous geophyte, 40–100 mm high, including flowers. *Corm* subglobose, 6–8 mm diam.; tunics of coarse, netted fibres. *Leaves* 3, basal, prostrate, oblong, lower two largest, 45–60 × 15–20 mm, upper leaf ± half as large. *Stem* terete, inclined at base but then stiffly erect, up to 45 mm long, with up to 3 short branches 10–15 mm long, each subtended by a short cauline bract. *Inflorescence* of solitary flowers on main and lateral axes; bracts green, 8–9 mm long, inner slightly longer than outer and often shortly forked apically. *Flowers* zygomorphic with angle widest between upper and lower lateral tepals, tinged pale lilac, darker on tube, lower 3 tepals each with pale creamy yellow patch at base outlined in purple, unscented; perianth tube erect, cylindric, 33–35 mm long, wider and curved just below apex, 2 mm diam. at mouth; tepals subequal but inner slightly wider than outer, 12–14 × 4.0–5.5 mm, weakly cucullate apically, dorsal erect, others spreading horizontally at right angles to tube. *Stamens*: filaments 3–5 mm long, exserted 2–4 mm from tube; anthers 3.5–4.0 mm long, dark purple; pollen grey-blue. *Ovary* ellipsoid; style branching opposite anther bases, branches 4 mm long, deeply forked and apically recurved. *Capsule* oblong-cylindric, 10–13 × 3–4 mm. *Seeds* ± 1 mm diam. *Flowering time*: June–July. Figure 1A–D.

*Distribution and ecology*: known only from the type collection, made on the summit of Hohenzollern Peak at the southern end of the Hunsberge in southern Namibia (Figure 2) on 1 July 2007 by horticulturist Ernst van Jaarsveld. The plants were tightly wedged in crevices in the shelter of rock outcrops immediately below the eastern edge of the summit plateau, and were just past flowering. Corms that were collected then have subsequently flowered in cultivation. Vegetatively, these plants match photographs of wild plants taken at the time and there is no reason to expect that the dimensions derived from the cultivated specimens will differ in any meaningful way from specimens in the wild. The Hunsberge, in the deeply dissected southern part of the Huib Hoch Plateau, are a recognized site of ecological importance in Namibia, known for a high level of endemism among vertebrates (Barnard *et al.* 1998).

*Diagnosis and relationships*: *Xenoscapa grandiflora* is distinguished by its large, unscented, pale lilac flowers marked with purple chevrons on the lower tepals, a perianth tube 33–35 mm long and the tepals 12–14 × 4.0–5.5 mm.

*Xenoscapa grandiflora* is most likely to be confused with *X. uliginosa* from the Kamiesberg, both of which have relatively larger, unscented, generally pink flowers with darker chevrons on the lower tepals but the latter has bright pink or purple flowers with a shorter perianth tube, 22–28 mm long, and smaller tepals, 6–7 mm long, with the dorsal tepal typically suberect or spreading to expose the stamens and style rather than remaining erect


FIGURE 1.—*Xenoscapa* species: A–D, *X. grandiflora, Van Jaarsveld sub Manning 3303*: A, flowering plant; B, flower, front and side views; C, capsules; D, seed. E, F, *X. uliginosa, Goldblatt & Manning 9244*: E, flowering plant; F, capsule. G, H, *X. fistulosa, Goldblatt & Manning 9374*: G, flower and capsule; H, capsule. Scale bar: 10 mm. Artist: John Manning.

after anthesis (Figure 1E). The common and widespread *X. fistulosa* has smaller flowers with uniformly white or cream-coloured (rarely pale pink) tepals (although the tube is usually flushed maroon) and a distinct and noticeable floral fragrance (described as sweetly clove-like).

Both *Xenoscapa fistulosa* and *X. grandiflora* are self-fertile and autogamous, with all flowers setting full capsules of seed that appear well formed (reproductive biology is unknown in *X. uliginosa*). The unscented, lilac flowers with elongate perianth tube and dark purple markings on the lower tepals of *X. grandiflora* are consistent with pollination by long-proboscid flies, the pollination system in *X. uliginosa* (Manning & Goldblatt 1996; Goldblatt & Manning 2000b).

2. **Xenoscapa uliginosa** *Goldblatt & J.C.Manning* in Systematic Botany 20: 173 (1995). Type: South Africa, [Northern Cape], Namaqualand, Farm Modderfontein, lower east-facing slopes of Sneeukop, ± 1 400 m, 18 Sept. 1981, *Goldblatt* [*& Manning*] *9244* (NBG, holo.!; K!, MO!, PRE!, iso.).

Deciduous geophyte, 30–50 mm high, including flowers. *Corm* subglobose, 5–8 mm diam.; tunics of fine, netted fibres. *Leaves* 3, basal, prostrate, oblong, lower two largest, 20–40 × 5–18 mm, upper leaf ± half as large. *Stem* terete, inclined at base but then stiffly erect, up to 40 mm long, with up to 3 short branches 5–10 mm long, each subtended by a short cauline bract. *Inflorescence* of solitary flowers on main and lateral axes; bracts

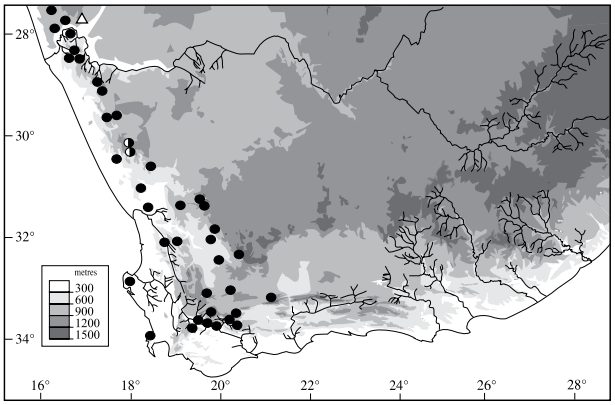


FIGURE 2.—Known distribution of *Xenoscapa fistulosa*, ●; *X. grandiflora*, △; *X. uliginosa*, ○.

green, 6–7 mm long, inner slightly longer than outer and often shortly forked apically. *Flowers* zygomorphic, dark pink or purple, darker on tube, lower 3 tepals each with pale creamy yellow patch at base outlined in purple, unscented; perianth tube erect, cylindric, (20–)22–28 mm long, wider and curved just below apex, 1.5–2.0 mm diam. at mouth; tepals subequal but inner slightly wider than outer, 6–7 × 2–3 mm, weakly cucullate apically, dorsal erect or suberect and exposing anthers. *Stamens*: filaments 3–5 mm long, exserted ± 2 mm from tube; anthers ± 2 mm long, dark purple; pollen grey-blue. *Ovary* ellipsoid; style branching opposite anther bases, branches 2 mm long, deeply forked and apically recurved. *Capsule* oblong, ± 10 × 3–4 mm. *Seeds* ± 1 mm diam. *Flowering time*: mid Sept.–Oct., rarely into early Nov. Figure 1E, F.

*Distribution and ecology*: restricted to the Kamiesberg in central Namaqualand, and known originally only from the Sneeuberg but recently collected in the Langkloof east of Stalberg, at the foot of Rooiberg (Figure 2). *Xenoscapa uliginosa* has a specialized habit along the margins of seasonal seeps and in rock flushes. During the growing season the roots are constantly irrigated by water percolating through the mossy sward in which the corms are anchored.

The long-tubed, bright pink flowers are pollinated by the long proboscid fly *Prosoeca peringueyi* (Nemestrinidae) (Manning & Goldblatt 1996).

*Diagnosis and relationships*: *Xenoscapa uliginosa* is recognized by its moderately large, dark pink or purple, unscented flowers marked with purple chevrons on the lower tepals, perianth tube 22–28 mm long, and tepals 6–7 × 2–3 mm. Plants from the Sneeuberg have the dorsal tepal ± suberect to expose the anthers and style but a recent collection from the Langkoof on the southern flank of the Rooiberg massif (*Goldblatt & Porter 13575*), representing the second known station for the species, has the dorsal tepal erect over the stamens and style, and the length of the perianth tube at the lower end of the range recorded for the species. In other respects, however, including the short, oblong capsules, the Rooiberg plants match those from the type locality and there is at present no reason to suspect that they are not conspecific.

The species might be confused with *Xenoscapa grandiflora* from southern Namibia but that species has larger, pale lilac flowers with a much longer perianth tube, 33–35 mm long, and the dorsal tepal 12–14 mm long. Flowering in *X. uliginosa* is also generally later, in September and October (rarely into November) rather than in mid-winter.

*Additional material examined*

NORTHERN CAPE.—3017 (Hondeklipbaai): Modderfonteinsberg, (–BB), 4 Nov. 1830, *Drège 2635* (P); Sneeukop, above Modderfontein Farm, (–BB), 15 Sept. 1990, *Rourke & Nelson 1936* (NBG); Sneeukop, Bovlei Farm, (–BB), 28 Sept. 1991, *Bean & Trinder-Smith 2634* (BOL). 3018 (Kamiesberg): Langkloof, Farm Naartjiesdam, (–AC), 23 Sept. 2010, *Goldblatt & Porter 13575* (NBG, MO).

3. **Xenoscapa fistulosa** *(Spreng. ex Klatt) Goldblatt & J.C.Manning* in Systematic Botany 20: 172 (1995). *Ovieda fistulosa* Spreng. ex Klatt: 781 (1863). *Lapeirousia fistulosa* (Spreng. ex Klatt) Baker: 155 (1877). *Anomatheca fistulosa* (Spreng. ex Klatt) Goldblatt: 88 (1972). Type: South Africa, [Western Cape], Olifants River, Clanwilliam, without date, *Ecklon & Zeyher Irid. 254* (B, holo.!; MO!, PRE!, iso.).

Deciduous geophyte, (50–)70–200 mm high, including flowers. *Corm* subglobose, 5–8 mm diam.; tunics of fine to medium-textured, netted fibres. *Leaves* 3, basal, prostrate, oblong, lower two largest, 20–50(–70) × 5–18(–20) mm, upper leaf ± half as large. *Stem* terete, inclined at base but then stiffly erect, up to 180 mm long, with up to 4 short or longer branches 5–30 mm long, each subtended by a short cauline bract. *Inflorescence* of solitary flowers on main and lateral axes, sometimes a second inflorescence developing in axil of upper leaf; bracts green, 5–7 mm long, inner slightly longer than outer and often shortly forked apically. *Flowers* zygomorphic, white or cream-coloured, rarely pale pink, flushed purplish on tube, unmarked, with sweet-spicy fragrance; perianth tube erect, cylindric, 18–25(–33) mm long, wider and curved just below apex, 1.0–1.5 mm diam. at mouth; tepals subequal, 4–7 × 1–3 mm, weakly cucullate apically, dorsal erect but others spreading ± horizontally at right angles to tube. *Stamens*: filaments 3–5 mm long, exserted ± 2 mm from tube; anthers 1.0–2.5 mm long, dark purple; pollen grey-blue. *Ovary* ellipsoid; style branching between base and middle of anthers, branches 2 mm long, deeply forked and apically recurved. *Capsule* oblong to cylindric, (8–)12–20 × 2.5–4.0 mm. *Seeds* ± 1 mm diam. *Flowering time*: mainly Aug.–Sept., rarely in late July. Figure 1G, H.

*Distribution and ecology*: widely distributed along the near interior of the southern African Atlantic coast and the western Karoo, *Xenoscapa fistulosa* extends from Aurusberg and the southern edge of the Huib Hoch Plateau in southern Namibia through the higher-lying parts of the Richtersveld and Namaqualand into Western Cape, where it occurs in the northern Cedarberg and inland onto the Roggeveld Escarpment, thence southwards into the Worcester Valley as far east as Montagu and thence to Laingsburg and the northern foothills of the Klein Swartberg, with two isolated stations along the coast, one at Vredenburg and the other on the lower slopes of Lion's Head on the Cape Peninsula (Figure 2).

The species is mostly restricted to shale or gneiss/granite substrates, rarely on other rock types in the Richtersveld and southern Namibia, from near sea level to almost 1 300 m. It does not occur on sandstone-derived soils of the Cape System and is thus virtually absent from the southwestern Cape mountain systems—the two coastal stations in the southwestern Cape are on granite outcrops.

Plants are invariably restricted to cool, seasonally moist or wet and largely shaded situations in the lee of rocks or boulders, with the corms often anchored in moss pads. The flowering season is substantially lengthened in years of favourable rainfall by the development of a secondary inflorescence from the upper leaf axil. This has not been observed in the other two species.

The pale, mostly white or cream-coloured flowers of *Xenoscapa fistulosa* with their sweet-spicy fragrance suggest that the species is adapted to moth pollination. It co-occurs with long-proboscid fly-pollinated *X. uliginosa* in the Kamiesberg (*Bean & Trinder-Smith 2642 & 2634* respectively), and hybrids between the two (*Goldblatt 9244*A MO) are known (Goldblatt & Manning 1995).

*Diagnosis and relationhips*: *Xenoscapa fistulosa* is recognized by relatively long-tubed, white or cream-coloured (rarely pale pink) flowers with a strong sweet-spicy fragrance. The slender perianth tube is mostly 18–25 mm long, exceptionally 30–33 mm long in plants from Pakhuis Pass and the northern Cedarberg (*Leipoldt s.n.*, *Goldblatt 544*), and only 1.0–1.5 mm in diameter at the mouth. The tepals are mostly smaller and narrower, 4–6(–7) × 1–3 mm, than in pink-flowered *X. grandiflora* and *X. uliginosa* (Table 1). Most collectors remark on the strong floral fragrance, which immediately distinguishes the species from its unscented congeners.

Although the species is typically white-flowered, populations from the Richtersveld and southern Namibia often have pale pink flowers [see Williamson (2000): 127 *Xenoscapa fastuosa* (sic.) for illustration]. The smallest-flowered species in the genus, *X. fistulosa* may grow much taller than the other species, the stem reaching up to 180 mm long, with the lateral branches up to 30 mm long. The capsules are similarly often significantly longer, up to 18 mm long and strongly cylindric. The two outlying coastal populations, from Witteklip at Vredenburg and Lion's Head on the Cape Peninsula, although well separated geographically from the main range of the species, do not evidently differ morphologically from inland populations.

### *Additional material examined*

NAMIBIA.—2716 (Witputz): Karas, Aurusberge, saddle overlooking Roter Kamm, (–CB), 28 Sept. 1996, *Mannheimer & Burke 393* (WIND); Rosh Pinah, Spitskop, (–DC), 25 Sept. 1981, *Müller & Horn 1599* [sic] (WIND); 9 Aug. 2000, *Bruyns 8314* (NBG); Rosh Pinah, Sonberg, (–DD), 3 Sept. 2000, *Bruyns 8855* (NBG); Witputz, Zebrafontein, (–DD), 22 Sept. 1981, *Müller & Horn 1599* [sic] (PRE). 2816 (Oranjemund): Diamond Area No. 1, Obib Mtn Peak, (–BA), 3 Sept. 1989, *Van Wyk 9028* (PRE).

NORTHERN CAPE.—2817 (Vioolsdrif): Langermanskop, (–AA), 29 July 1993, *Van Jaarsveld & Bezuidenhout 13430* (NBG); Rosyntjiesberg, neck north of Lelieshoek, (–AC), 30 Aug. 1977, *Oliver, Tölken & Venter 294* (PRE); Stinkfontein Mtns, Cornellsberg, (–CA), 6 Sept. 1977, *Oliver, Tölken & Venter 710* (PRE); summit of Ploegberg complex, (–CD), 5 Aug. 1979, *Van Berkel 104* (NBG). 2917 (Springbok): Steinkopf, (–AA), Aug. 1925, *Marloth 6769* (NBG, PRE); Spektakelberg, Farm Naries, (–AA), 26 Aug. 1983, *Van Wyk 6452* (PRE); Bulletrap–Nigramoep road, 1 km east of Doringrivier, (–BC), 26 Aug. 1981, *Van Berkel 426* (NBG); Springbok, NE of Platjiesfontein Farm, (–DA), Sept. 1995, *G & F Williamson 5703* (NBG); Concordia, (–DB), Sept. 1883, *Bolus 695* (BOL, SAM). 3017 (Hondeklipbaai): Sneeukop, Bovlei Farm, (–BB), 28 Sept. 1991, *Bean & Trinder-Smith 2642* (BOL); 16 miles [25.6 km] SW of Garies, (–DB), without date, *Hall 3763* (NBG). 3018 (Kamiesberg): granite dome NE of Farm Outuin, (–AA), 21 Aug. 2001, *Goldblatt & Porter 11734* (MO, NBG); Studer's Pass, (–AC), 19 Aug. 1986, *Bean 1717* (BOL); Grasberg, (–CB), 22 Aug. 1999, *Desmet 166* (NBG); Klippoort-se-Berg, (–CB), 21 Aug. 1999, *Desmet 140* (NBG); Langberg, W of Loeriesfontein, (–DB), 5 Sept. 2006, *Goldblatt & Porter 12766* (MO, NBG). 3119 (Calvinia): Menzieskraal Farm, (–AC), Sept. 1899, *Leipoldt 825* (SAM); lower slopes of Hantam Mtns, Akkerendam, (–BD), 22 Jul. 1961, *Lewis 5807* (NBG); Menzieskraal Farm, (–CB), 22 Aug. 1986, *Snijman 1077* (NBG); Keiskie-se-poort, (–DB), 17 Sept. 2008, *Goldblatt & Porter 13134* (MO, NBG). 3220 (Sutherland): Tankwa Karoo National Park, Farm Klipfontein, (–AA), 14 Sept. 2007, *Sachse 554* (PRE); Tankwa Karoo National Park, Farm Kleinfontein, (–AA), 6 Aug. 2006, *Klopper 335* (PRE); Agterkop Farm, (–AA), 5 Aug. 2006, *Steyn 901* (PRE); Soekop Farm, Bohoek, (–AA), 8 Aug. 2006, *Rösch 462* (NBG); Tankwa Karoo National Park, near Paulshoek, (–AC), 27 Aug. 2004, *Steyn 589* (PRE); Kuduberg, Muishondhoogte, (–CA), Sept. 1921, *Marloth 10382* (PRE); Houthoek, (–CA), 15 Aug. 1968, *Hanekom 1092* (PRE); Verlatekloof Pass, (–DA), 25 Aug. 2004, *Steyn 553* (PRE).

WESTERN CAPE.—3118 (Vanrhynsdorp): Mauwerskop, (–DB), 20 Aug. 1986, *Snijman 1058* (NBG). 3217 (Vredenburg): Witteklip, near Vredenburg, (–DD), 1 Sept. 1944, *Lewis 890* (SAM). 3218 (Clanwilliam): Olifants River, (–BB), 25 Aug. 1894, *Schlechter 5024* (BOL); east bank of lower Clanwilliam Dam, (–BB), 8 Sept. 1976, *Thompson 2819* (NBG). 3219 (Wuppertal): Clanwilliam, Alpha Farm, (–AA), 20 July 1941, *Bond 1054* (NBG); Pakhuis Pass, (–AA), 3 Sept. 1933, *Leipoldt s.n. BOL45054* (BOL); near top of Bidouw Pass, (–AA), 14 Sept. [without year], *Goldblatt 544* (BOL). 3220 (Sutherland): Farm Thyskraal, (–CC), 7 Sept. 1986, *Cloete & Haselau 292* (NBG). 3318 (Cape Town): Lion's Head, (–CD), Aug. 1924, *Rennie & Giffen s.n. SAM27416* (SAM); slopes of Lion's Head, (–CD), Aug. 1940, *Lewis 4293* (SAM). 3319 (Worcester): Karoopoort, (–BA), 18 Sept. 1938, *Hafström & Acocks 315* (PRE); 16 Sept. 1971, *Thompson 1261* (NBG); Hex River Pass, near top, (–BD), 2 Sept. 1992, *Goldblatt & Manning 9374* (PRE); Worcester, Karoo Garden, (–CB), 28 July 1975, *Dobay 21* (NBG); 13 Aug. 1970, *Bayer 2* (NBG); Stettyn area, Farm Kleindoorn, (–CD), 1971 [without precise date], *Oliver 3280* (NBG, PRE); N end of Farm Alfalfa, near Moordkuil, (–DA), 26 Sept. 1983, *Goldblatt & Snijman 6971A* (MO, NBG). 3320 (Montagu): Whitehill Ridge, (–BA), 17 Aug. 1942, *Compton 13377* (NBG); Oudeberg, NE of Montagu, (–CB), 27 July 1959, *Acocks 20533* (PRE); 8 km SE of Montagu, Farm Amanzi, (–CD), 15 Aug. 1993, *Manning 2028* (NBG); S foothills of Voetpadsberg, Farm Doringkloof, (–DB), 23 Aug. 1985, *Van der Kooy 30* (NBG). 3321 (Ladismith): Kleinswartberg foothills, road to Seweweekspoort, Farm Modderfontein, (–AC), 21 Sept. 2003, *Goldblatt & Porter 12327* (MO, NBG).

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