

Two new species of *Nemesia* (Scrophulariaceae) from arid areas of the Northern Cape, South Africa

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ABSTRACT

Two new annual species of *Nemesia* Vent. are described from southern Africa. *Nemesia suaveolens* is characterized by magenta and yellow flowers. It differs from the closely related *N. euryceras* by having a lower lip that is yellow rather than white with pale violet margins, an upper lip with a conspicuous yellow rectangular patch just above the corolla opening, a spur that is \pm equal to the length of the lower lip, not half the length, and a hypochile that is yellow rather than dark violet. This new species is known only from the arid Tanqua Karroo east of the Cedarberg Mountains. *N. aurantia* is characterized by orange saccate flowers with a brown and orange bearded palate. It is closest to *N. versicolor*, but differs from that species by its orange corolla, the absence of a spur, and its bearded palate with brown and orange trichomes. It is known from a single locality adjacent to the Swart Doring River in Namaqualand between Nuwerus and Garies.

INTRODUCTION

Nemesia Vent. is a genus of \pm 62 species of annual and perennial herbs endemic to southern Africa (Steiner 1994). It is over a hundred years since the last revision of the genus (Hiern 1904) and many new species have come to light in the intervening years (Steiner 1989, 1994, 2006). A partial revision for species occurring chiefly in KwaZulu-Natal was published by Hilliard & Burt (1986), but most of the new species that remain to be described occur in the Cape Floristic Region and southern Namibia, where \pm 75 % of the species occur. The purpose of this paper is to describe two new species from arid areas in the Northern Cape Province of South Africa. Descriptions are based primarily on living material collected in the field and maintained in cultivation.

***Nemesia suaveolens* K.E.Steiner, sp. nov., *N. euryceras* Schltr. proxima, sed differt lobo inferiore flavido nec blanco et violaceomarginato, hypochilo corolla aureo non atroviolaceo, macula rectangulari citrina conspicua basi labio superioro.**

TYPE.—Northern Cape, 3219 (Wuppertal): Tanqua Karroo, 1.9 km N of entrance to Stompiesfontein (11.1 km N of Elandsvlei turnoff), S32° 14.392' E19° 41.463', 330 m, (–BA), 1 Sept. 2007, *Steiner 4286* (NBG, holo.; CAS, iso.).

Annual herb up to 320 mm tall, simple or branching from base; stems glandular pilose, rectangular in cross section, corners ridged, sides up to 1.8 mm wide, lateral stems up to 160 mm long. *Leaves* simple, opposite, mostly sessile to shortly petiolate; lamina lanceolate to ovate or elliptical, 4–22 \times 2–12 mm, sparsely glandular pilose, apex rounded to acute; base rounded to cuneate; margins entire to shallowly and sparsely dentate; petioles 0–12 mm long, glandular pilose. *Flowers* axillary or in lax, terminal racemes, pleasantly spicy scented; racemes up to 270 mm long; bracts alternate, sessile,

cordate, reflexed, glandular pilose, lowermost leaf-like up to 12.5 \times 8 mm, uppermost reduced to \pm 3 \times 3 mm, apex acute, base cordate; margins entire; pedicels 4–12 mm long, ascending, glandular pilose. *Calyx* lobes 5, lanceolate to ovate, acute, spreading, densely glandular pilose, central upper lobe lanceolate, 3.0–3.9 \times 0.9–1.2 mm, upper lateral lobes lanceolate, 2.8–3.7 \times 0.8–1.3 mm, lower lateral lobes ovate, 2.8–3.5 \times 1.0–1.6 mm. *Corolla* bilabiate, 11.6–21.8 \times 10.5–10.9 mm, upper lip 4-lobed, 2 inner lobes oblong to obovate, 6.4–6.7 \times 2.6–3.1 mm, apices rounded to acute, bases strongly oblique, 2 outer lobes spreading to revolute, oblong, 3.1–5.1 \times 3.2–4.1 mm, apices rounded to emarginate, bases strongly oblique; upper lip deep magenta at base (greyish magenta reverse) surrounding a bright golden yellow rectangular patch, 1.2–1.6 \times 1.7–1.9 mm, just above corolla opening, becoming greyish white on lobes distally, lower lip widely obovate, 6.0–8.2 \times 6–8 mm, apex emarginate, light yellow with yellowish white reverse, base with a raised palate; palate convex, oblong, cristate, 3.1–4.6 \times 4.7–6.0 mm, divided by a central groove into 2 raised yellow bosses, bosses glabrous or with minute trichomes distally, densely pilose with conspicuous pale yellow or white trichomes basally around corolla opening; hypochile (floor of corolla tube) \pm 3.9–4.1 mm long, central boss low, densely pilose, trichomes white to pale yellow; sides and upper inside surface of corolla tube greyish with magenta to purple lines, base of tube with a narrow spur, 3.5–4.8 \times 0.7–0.8 mm, pale yellow to whitish, deflexed and \pm straight or curving forward slightly in distal third, outside sparsely glandular pubescent, spur opening flanked by 2 greenish yellow to orange patches. *Stamens* 4, usually white, purple flecked distally, lying in a shallow depression (2.5–2.9 \times 0.8–1.0 mm) in upper inside surface of corolla tube; filaments of antecous pair (twisted into posticous position) 2.7–2.8 mm long, sigmoid, \pm straight in middle, glabrous or with a few glandular trichomes below middle; posticous filaments \pm straight except at base, 0.8–1.0 mm long, glandular pubescent; anthers 0.9–1.0 mm long, each pair strongly coherent. *Ovary* oblong-ovoid, 1.2–1.6 \times 1.0–1.6 mm, laterally compressed; style oblong, \pm 0.8 mm long, compressed

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FIGURE 1.—*Nemesia suaveolens*, Steiner 4288 (CAS, NBG). A, habit; B, calyx. C–F, corolla: C, front view; D, side view; E, rear view; F, side view partially cut away. G, stamens, anticus left, posticus right; H, pistil; I, capsule; J, seed. Scale bars: A, 10 mm; B, 3 mm; C–F, 2 mm; G, H, 1 mm; I, 2.5 mm; J, 1 mm. Artists: A–H, John Manning; I, Sarah Adler; and J, Nicole Bollinger.

contrary to ovary, lying between anther pairs and curving slightly away from corolla opening; stigma crescent-shaped, 0.1 × 0.5 mm. *Capsules* ovate to oblong in outline, 3.9–10.6 × 3.6–6.5 mm, laterally compressed contrary to septum, apex emarginate to bilobed, lobes rounded. *Seeds* winged, ovate to widely ovate, ± 1.5 × 1.0–1.5 mm, light brown, verruculate, wing membranous with numerous parallel, brownish veins. *Flowering time*: (May–)July–September. Figures 1; 2A, B.

Diagnostic features: *Nemesia suaveolens* is easily recognized by its yellow and magenta flowers with a ± straight spur and a prominent yellow rectangular spot (nectar guide) at the base of the upper corolla lip. It is most closely related to *N. euryceras*, but differs from

that species by having a lower lip that is yellow rather than white with pale violet margins, an upper lip with a conspicuous yellow rectangular patch, just above the corolla opening, a spur that is ± equal to the length of the lower lip, not half the length of the lower lip, and a hypochile that is yellow rather than dark violet. Schlechter (1899) and Hiern (1904) describe the lower lip of *N. euryceras* as sulphur yellow, but this is apparently based on a single flower on the type specimen (*Schlechter 8126* at K) that became yellowish from drying. The other flowers on the same plant do not look yellowish, but rather are consistent with the author’s observation at the type locality (*Steiner 3686* at NBG) of a lower lip that is white with pale violet margins. Other collections in PRE from the type locality and nearby areas also give



FIGURE 2.—*Nemesia* flowers: A, B, *N. suaveolens*: front and side views; C, D, *N. aurantia*: front and side views.

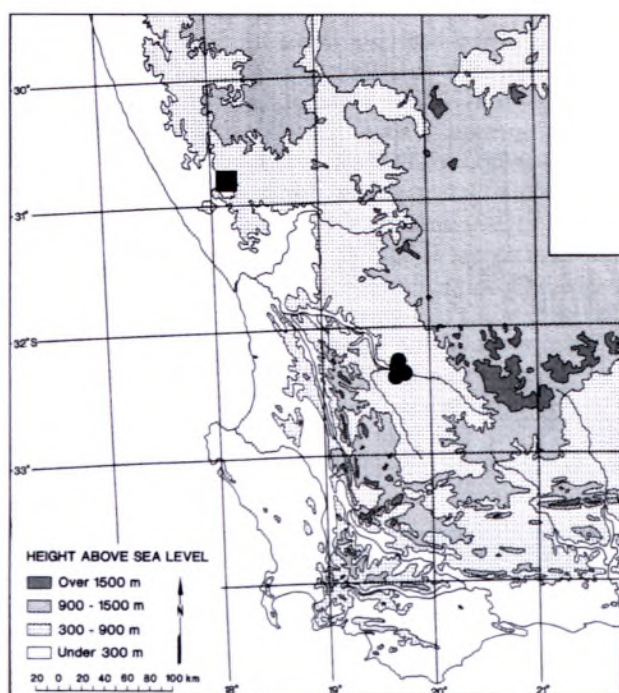


FIGURE 3.—Known distribution of *N. suaveolens*, ●, and *N. aurantia*, ■.

flower colour as white and purple, mauve and white, or pink (e.g. *Grant 4763*; *Hall 3726*; *Le Roux 2167*).

Nemesia suaveolens often grows in close proximity to *N. karroensis* Bond and has been confused with that species. It is similar in coloration to *N. karroensis*, especially when both are pressed and dried, but differs in having a short, straight, downwardly oriented spur instead of a long (8.9–12.3 mm), backwardly projecting one that is usually strongly recurved in its distal half (Bond 1940).

Etymology: the name refers to the pleasant spicy fragrance of the flowers.

Distribution and habitat: *Nemesia suaveolens* is known from a very limited area of the central Tanqua Karoo at elevations between 320 and 445 m (Figure 3). The Tanqua is an arid desert plain situated in the rain shadow of the Cedarberg Mountains that receives only 50 to 70 mm of rainfall in an average year, mostly falling in late autumn or early winter. *N. suaveolens* is an annual that germinates in response to these rains, but in years of no appreciable rainfall, plants remain dormant as seeds.

Breeding systems: in cultivation, where insects are excluded, *Nemesia suaveolens* does not set seed. This suggests that, like many *Nemesia* species, this species is self-incompatible. Although pollinators were not encountered on flowers in the field, the presence of capsules suggests that plants were successfully pollinated. The spurs of *N. suaveolens* do not secrete nectar, so pollinating insects only obtain pollen as a reward.

Other specimens examined

NORTHERN CAPE.—3219 (Wuppertal): Tanqua Karoo, Ceres–Calvinia road (R355), 13.4 km N of turnoff to Elandsvlei, S32° 13.487' E19° 42.086', ± 320 m, (–BA), 23 Aug. 2004, *Steiner 4069* (CAS);

Tanqua Karoo, 13.4 km N of Elandsvlei turnoff (4.2 km N of entrance to Stompiesfontein), S32° 13.279' E19° 42.195', 324 m, (–BA), *Steiner 4288* (CAS, NBG); Tanqua Karoo, Ceres–Calvinia road (R355), 13.9 km N of turnoff to Elandsvlei, S32° 13.311' E19° 42.189', ± 320 m, (–BA), 23 Aug. 2004, *Steiner 4070* (CAS); Tanqua Karoo, Stompiesfontein, (–BA), 26 July 1941, *Bond 1181* (NBG); Tanqua National Park, Bo Stompiesfontein and Varsfontein, S32° 12' 56" E19° 43' 02.1", 368 m, (–BA), 25 July 2006, *Rosch 415* (NBG); 4.8 km NNE of Kommando Drift, ± 375 m, (–BC), 30 Aug. 1957, *Acocks 19477* (PRE); near Eendjies Kraal [Uintjieskraal] on road to Hottentots Kloof, (–BD), 28 Sept. 1929, *Grant 4909* (PRE); Tanqua Karoo, 6.1 km S of Papkuil on Ceres–Calvinia road, [± 442 m], (–DA), 17 May 1983, *Snijman 1274* (NBG); Coega Kamma, 70 miles [112 km] from Ceres (–DA), 25 Aug. 1968, *Stayner s.n.* (NBG). 3220 (Sutherland): south of Tanqua National Park on Middlepos–Ceres road, after Platfontein turnoff, Farm No. 10, 390 m, (–AC), 11 July 2006, *Rosch 353* (NBG).

***Nemesia aurantia* K.E.Steiner, sp. nov., *N. versicolori* Drège proxima, sed differt floribus aurantis, corolla saccato, non calcarato, palato barbato brunneo et aurantio.**

TYPE.—Northern Cape, 3018 (Kamiesberg): Farm Stinkfontein, ± 160 m, (–CC), 20 Aug. 2001, *Steiner 3640* (NBG, holo.; CAS, iso.).

Annual herb up to 410 mm tall, simple or branching; stems glandular pilose, rectangular in cross section, corners ridged, sides up to 2 mm wide, lateral stems up to 265 mm long. *Leaves* simple, opposite, glabrous, apices acute, bases cuneate to truncate, margins sparsely dentate; basal leaves ovate to elliptical, 10.8–18.4 × 3.1–8.4 mm; petioles up to 7 mm long; upper leaves sessile, lanceolate to linear, 9.0–39.6 × 1.3–9.4 mm, glabrous. *Inflorescence* terminal, racemose, up to 190 mm long, or flowers axillary; bracts alternate, sessile, reflexed, narrowly lanceolate to deltoid, 1.1–2.4 × 0.9 mm, glabrous above, sparsely glandular puberulent below, apex acute, base truncate; margins entire; pedicels ± 8–24 mm long, ascending, glandular pilose. *Calyx* lobes 5, spreading, acute, densely glandular pilose, upper and lateral lobes oblong, ± 2.5 × 0.8 mm, lower lobes shorter, lanceolate, ± 2.1 × 0.8 mm. *Corolla* bilabiate, 13.1–18.8 × 11.1–16.0 mm, upper lip 4-lobed, 2 inner lobes oblong to obovate, 5.1–6.2 × 1.9–3.2 mm, apices rounded to acute, bases strongly oblique, 2 outer lobes spreading, oblong, 4.7–6.5 × 3.4–4.1 mm, apices emarginate, bases strongly oblique; all lobes orange distally and pale yellow with brownish streaks at base, lower lip widely obcordate, 9.2–12.3 × 10.5–16.0 mm, deep orange, basal portion inflated into a dark brown, convex palate, 4.1–8.0 × 4.5–5.2 mm long; bosses 2, oblong, divergent, orange, 0.5–1.7 × 1.3–1.4 mm, densely villous, trichome stalks pale yellow or brown, translucent, simple or branched below head, heads capitate or discoid; hypochile (floor of corolla tube) ± 3.7–4.1 × 4 mm, ± flat, streaked with reddish brown, sparsely to densely pilose, especially on inner lateral walls, outer surface glandular pilose; upper inside surface of corolla tube pale yellow with brown lines, base shallowly saccate, 0.7–1.0 × 4.7–4.9 mm, pale yellow, lower outside portion pilose. *Stamens* 4, lying in a shallow depression in upper inside surface of corolla tube; filaments of anticus pair (twisted into posticus position) ± 2.2 mm long, sigmoid, ± straight in middle, glabrous; posticus filaments ± 1.5 mm long, straight except at base, glabrous; anthers ± 1.1–1.2 mm long, each pair strongly coherent, opening downward. *Ovary* oblong-ovoid, ± 1.0–1.2 × 0.9–1.0 mm, later-

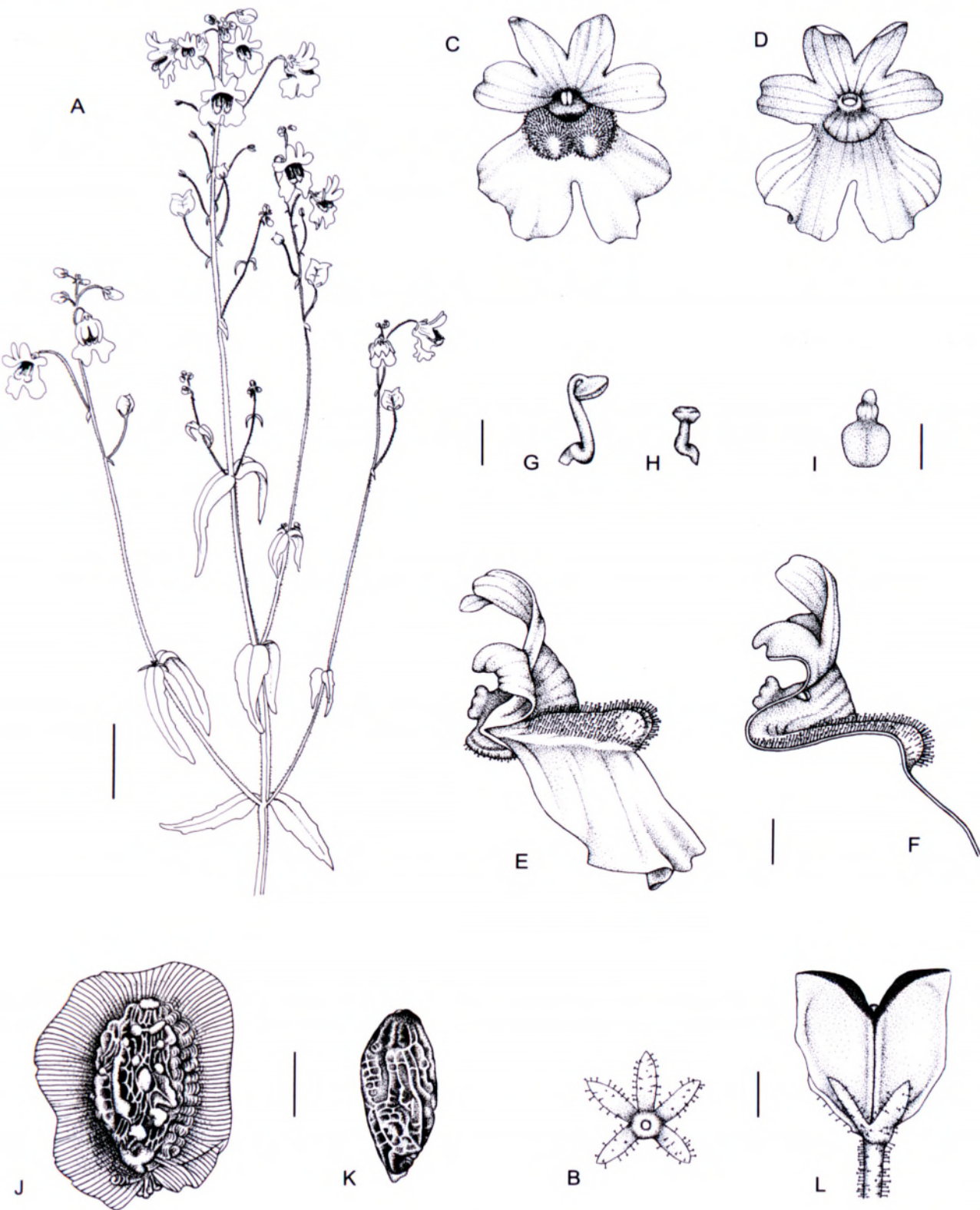


FIGURE 4.—*Nemesia aurantia*, Steiner 3640 (CAS, NBG). A, habit; B, calyx. C–F, corolla views: C, front, D, rear; E, corolla intact; F, corolla partially cut away. G, H, stamens: G, anticus, H, posticus. I, pistil. J, K, seed: K, with outer coat and wing removed. L, mature capsule. Scale bars: A, 20 mm; B, E, F, L, 2 mm; C, D, 5 mm; G, H, J, K, 0.5 mm; I, 1 mm. Artists: A, Inge Oliver¹; C–K, Nicole Bollinger.

ally compressed; style ± 0.5 mm, deflected away from corolla opening, oblong, truncate, lying between anther pairs; stigma deltoid $\pm 0.3 \times 0.5$ mm. *Capsules* ovate to oblong in outline, $\pm 3.8\text{--}8.3 \times 4.5\text{--}7.0$ mm, compressed contrary to septum, apex emarginate to bilobed, lobes acute to rounded. *Seeds* winged, ovate to widely

ovate, $1.7\text{--}2.4 \times 1.3\text{--}2.1$ mm, outer layer of testa white, lacey, verruculate, enveloping inner seed at maturity, wing membranous with numerous parallel white veins, internal portion of seed narrowly elliptical, dark brown, $1.0\text{--}1.2$ mm long, surface alveolate. *Flowering time*: August–September. Figures 2C, D; 4.

Diagnostic features: *Nemesia aurantia* is most closely related to *N. versicolor*, but has orange rather than blue or yellow flowers, lacks a conspicuous spur, and has a bilobed palate on the lower lip that is less prominent. The only other saccate *Nemesia* species with orange flowers is *N. strumosa* Benth. Plants of *N. aurantia* are typically shorter than *N. strumosa* (up to 410 mm vs up to 730 mm) with smaller flowers (corolla limb 13–19 mm vs 17–35 mm long). The sac of the corolla in *N. aurantia* is less than half the length, on average, of *N. strumosa* and the raised palate and divergent bosses on the lower lip of *N. aurantia* are absent in *N. strumosa*.

Etymology: the name refers to the bright orange flowers.

Distribution and habitat: *Nemesia aurantia* is known only from the Northern Cape, just north of its boundary with the Western Cape, ± 31 km S of Garies. It occurs with *Arctotis fastuosa* in a very localized area of loose sand near the Swart Doring River on the Farm Stinkfontein (Figure 2).

Conservation status: until other populations have been located, this species should be considered rare. The intensity of sheep grazing on the Farm Stinkfontein is currently unknown, but may represent a threat to the long-term survival of this population.

Pollination and breeding systems: nothing is known about the pollination biology of *Nemesia aurantia*, but because of its open saccate flowers, bright orange colour, and densely pubescent palate, it may be pollinated by small monkey beetles. Based on the absence of capsule formation in cultivation, *N. aurantia* is probably self-incompatible.

Other specimens examined

NORTHERN CAPE.—3018 (Kamiesberg): Farm Stinkfontein, 950 feet [± 300 m], (–CC), 21 Sept. 1929, *Grant & Theiler 4778* (BOL, K). Locality uncertain: Namaqualand, along road, Garies to O’Okiep, Aug. 1925, *Marloth 6742* (NBG).

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