

## A new species of *Namaquanula* (Amaryllidaceae: Amaryllideae) from Namibia with notes on the genus

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### ABSTRACT

*Namaquanula bruynsii* Snijman, a rare species of Amaryllidaceae from the Landsberg in southern Namibia described here, is separated from *N. bruce-bayeri* by plane leaves, the absence of a perigone tube and the lack of a short adaxial hook at the base of each filament. Shared specialized characters are brittle, tan-coloured bulb tunics and short papillae at the base of each filament. A revised description of *Namaquanula* D.Müll.-Doblies & U.Müll.-Doblies is given and a key to the genera of Amaryllideae subtribe Strumariinae is provided.

### INTRODUCTION

*Namaquanula* D.Müll.-Doblies & U.Müll.-Doblies, endemic to southern Namibia and the Richtersveld, South Africa, is a genus of small, summer and autumn-flowering plants in the family Amaryllidaceae. The genus belongs to the southern African subtribe Strumariinae *sensu* Meerow & Snijman (2001), in the tribe Amaryllideae. Other genera in the subtribe are *Brunsvigia* Heist., *Crossyne* Salisb., *Hessea* Herb., *Nerine* Herb., and *Strumaria* Jacq. (which includes *Carpolyza* Salisb.), all of which have specialized seeds containing a well-developed, chlorophyllous integument and a stomatose testa.

*Namaquanula* was first described as a monotypic genus in 1985. The type species is *N. bruce-bayeri* D.Müll.-Doblies & U.Müll.-Doblies, an inhabitant of alluvial gravel on flats and low hills in southern Namibia and northern Richtersveld (Müller-Doblies & Müller-Doblies 1985). A second species, *N. etesionamibensis* D.Müll.-Doblies & U.Müll.-Doblies from the same habitat in southern Namibia was described in 1994 (Müller-Doblies & Müller-Doblies 1994) being distinguished from *N. bruce-bayeri* on small, quantitative, floral differences. However, the existence of intermediate specimens (*Williamson 3405* at NBG and *Ward & Seely 10271* at PRE) led subsequent authors to recognize only one variable species, *N. bruce-bayeri* (Snijman 1999; Snijman & Archer 2003).

In 2001, while exploring several inselbergs in arid southwestern Africa, Dr P.V. Bruyns found an isolated population of *Namaquanula* in full flower on Landsberg, a mountain in southern Namibia. This distinct, rare species is described and illustrated here for the first time.

***Namaquanula bruynsii* Snijman, sp. nov.**, ex affinitate *N. bruce-bayeri* D.Müll.-Doblies & U.Müll.-Doblies sed foliis planis, tepalis liberis, absque filamentis hamatis differt. Figura 1.

**TYPE.**—Namibia, 2516 (Helmeringhausen): Landsberg, on flattish granite and quartz gravel patches on top of plateau, (–CD), 4-1-2001, *Bruyns 8105* (NBG, holo.; PRE, WIND).

Deciduous, bulbous herb, 80–130 mm tall in flower, up to 180 mm tall in leaf. *Bulb* solitary, ovoidal, ± 30 mm diam., covered by several thick, tan-coloured, brittle tunics; neck slender, up to 30 mm long. *Leaves* appearing shortly after flowering, 3 or 4, suberect in lower half, spreading to recurved above, narrowly loriate, 120–280 × 2.5–4.5 mm, plane, green, glabrous, dying back from apex after maturity, both surfaces alike, outer leaves sheathing at base; cataphyll absent. *Inflorescence* 12–18-flowered, ultimately subhemispherical, 40–70 mm across; scape erect, 30–65 × 1.5–3.0 mm, strongly compressed in cross section, pale green, glabrous, remaining attached to bulb when dry; spathe valves 2, lanceolate, 20–25 × 4–5 mm, membranous; bracteoles linear, up to 5 mm long; pedicels radiating, somewhat downwardly curved near ovary at anthesis, becoming straight thereafter, 18–30 × 1 mm, obscurely triangular in cross section, pale green. *Perigone* actinomorphic, star-shaped, 10–20 mm across, without a tube, pale pink, somewhat hyaline and glistening with a darker pink or greenish median stripe on each tepal, unscented, remaining outspread and turning brown when old; tepals 6, free to base, oblong-lanceolate, 9–12 × 2 mm, spreading to recurved. *Stamens* 6, prominent; filaments free to base, 9–10 mm long, close set at base for 2.5–3.0 mm, otherwise spreading, delicate pink, covered with minute papillae for up to 3 mm on adaxial surface; anthers dorsifixed, ± 2 mm long before opening, maroon; pollen whitish. *Ovary* 3 mm across, trilocular, each locule filled with 1 large ovule; style up to 11 mm long, more or less equalling stamens, slender throughout; nectar collecting around style base; stigma very shortly trifid. *Capsule* papery, dehiscent, containing 3 seeds at most; seeds ovate, 5 mm across, fleshy, pinkish; embryo green.

**Phenology:** *Namaquanula bruynsii* flowers briefly in January, while the leaves are still dormant. The foliage emerges a few weeks after flowering and becomes fully developed during favourable conditions in autumn. In

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FIGURE 1.—*Namaquanula bruynsii*, Bruyns 8105. A, bulb and mature leaves. B, inflorescence. C–E, flower: C, viewed from above; D, viewed from side; E, with one tepal and stamen removed. F–H, anther: F, dorsal view; G, lateral view; H, ventral view. I, capsule containing mature seeds. Scale bar: A, B, 20 mm; C–E, 5 mm; F–H, 1 mm; I, 10 mm. Artist: J.C. Manning.

cultivation the leaves remain green throughout winter but die off from the tips as soon as water is withheld at the end of spring. In nature they probably remain green only as long as conditions remain suitable.

*Diagnostic features:* in comparison with other species in the subtribe *Strumariinae*, the floral morphology of

this new species is unspecialized. The flowers are star-shaped, regular, and lack a perigone tube, whereas the filaments are free to the base and the anthers are dorsifixed. The only specialized feature is the presence at the base of the filaments of distinct papillae on the adaxial surface. Thus on floral morphology alone the taxonomic position of this new species is not readily apparent.



When first described, *Namaquanula* was recognized as having flowers with a perigone tube, filaments covered with papillae and each bearing a short incurved hook near the base of the adaxial surface. Superficially, the star-shaped flowers of *Namaquanula* resemble those of *Hessea* and on this basis Snijman (1994) treated *Namaquanula* as a subgenus of *Hessea*. However, in a recent molecular phylogenetic analysis using internal transcribed spacer (ITS) sequences, *Hessea* and *Namaquanula* resolved as sister to each other (Weichhardt-Kulesa *et al.* 2000). Moreover, in an extended phylogenetic analysis of the entire tribe Amaryllideae using morphology and ITS sequences (Meerow & Snijman 2001), *Namaquanula* resolved as sister to *Brunsvigia* with *Hessea* sister to them both.

In assessing the taxonomic position of *N. bruynsii*, the open, star-shaped flowers, and the absence of both a perigone tube and the inwardly curved hooks at the base of the filaments suggested its possible inclusion in *Hessea*. The dorsifixed anther attachment, rather than centrifixed to subcentrifixed anthers as in *Hessea*, and the conspicuous papillae at the base of the filaments, however, also indicated that the species might belong to *Namaquanula*. Nevertheless, when the bulbs produced leaves, the vegetative characters (the presence of specialized, brittle, tan-coloured bulb tunics, 3 or 4 foliage leaves, and the absence of a cataphyll) were typical of *Namaquanula*. *Hessea*, in contrast, always has parchment-like bulb tunics, 2 foliage leaves and a subterranean cataphyll. Although plants of *N. bruce-bayeri* that have been cultivated in Europe have occasionally produced only 1 or 2 leaves per season (Müller-Doblies & Müller-Doblies 1985; Weichhardt-Kulesa *et al.* 2000) the absence of a cataphyll remains constant.

Further support for the placement of this new species in *Namaquanula* has also come from the molecular phylogenetic analysis of Amaryllideae by Meerow & Snijman (2001). In the results of this study, *N. bruynsii* (Bruyns 8105) resolved as sister to *N. bruce-bayeri* (Williamson 3405 NBG), suggesting their shared ancestry.

Morphologically *N. bruynsii* is distinguished from *N. bruce-bayeri* mainly by its leaves, which are flat in cross section, the absence of a perigone tube, and the lack of short, adaxial hooks at the base of the filaments. In contrast, *N. bruce-bayeri* has somewhat succulent leaves that are elliptical in cross section, the flower has a 1.8–2.2 mm long perigone tube, and each filament bears a short, adaxial hook near the base.

**Distribution and habitat:** the species is known from a highly localized, small population on the high plateau of Landsberg, southern Namibia (P.V. Bruyns pers. comm.) (Figure 2). The plants grow in somewhat flat patches of granite and quartz gravel in association with winter-growing succulent plants of the families Aizoaceae, Apocynaceae: Asclepiadoideae, Crassulaceae, and Euphorbiaceae. The specimen Hall 1967 (NBG), comprising a bulb and leaves, collected from Gamochas, ± 60 miles [96 km] north of Aus in the quarter-degree grid 2616BA, may represent another population of *N. bruynsii*. But until flowering specimens from this locality become available this cannot be confirmed.

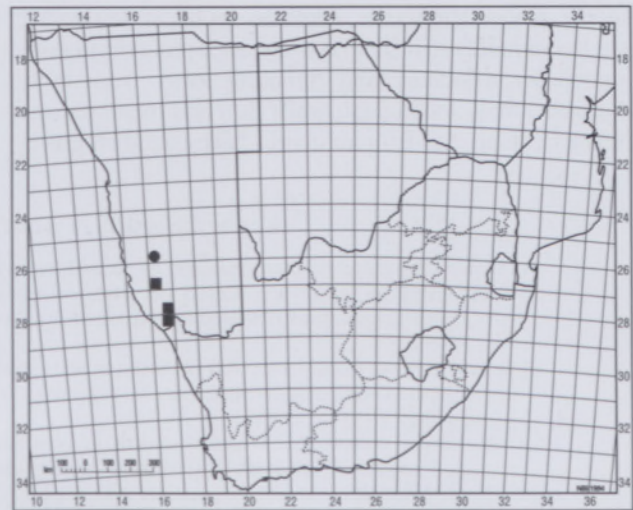


FIGURE 2.—Known distribution of *Namaquanula bruynsii*, ●, in southern Namibia; and *N. bruce-bayeri*, ■, in southern Namibia and Richtersveld, South Africa.

**Etymology:** the specific epithet honours Dr P.V. Bruyns whose tireless botanical exploration in southern Africa's arid areas has led to the discovery of this and three other species of *Hessea* and *Strumaria* over the past 10 years (Snijman 1999, 2005).

#### *Namaquanula* re-circumscribed

To augment the description of *Namaquanula* published by Müller-Doblies & Müller-Doblies (1985) with the new morphological data derived from the discovery of *N. bruynsii*, an amplified description of the genus is provided. Furthermore, to assist the identification of *Namaquanula* from other genera in Amaryllideae subtribe Strumariinae, as currently circumscribed by Meerow & Snijman (2001), a key is given below.

***Namaquanula* D.Müll.-Doblies & U.Müll.-Doblies**, Botanische Jahrbücher 107: 20 (1985). Type: *Namaquanula bruce-bayeri* D.Müll.-Doblies & U.Müll.-Doblies.

Perennial, deciduous, bulbous herbs, ranging from 150–180 mm high. *Bulb* 15–40 mm diam., solitary or occasionally forming bulblets, ovoidal, covered by several, brittle, tan-coloured, cartilaginous tunics; neck up to 80 mm long. *Leaves* (1–)3 or 4, distichous, absent at flowering, all but innermost sheathing at base, suberect to spreading, narrowly lorate, plane or elliptical in cross section, glabrous, curved or recurved distally; cataphyll absent. *Inflorescence* a 6–18-flowered, umbel-like cluster, up to 70 mm diam.; scape erect, glabrous, solid; spathe valves 2, narrowly lanceolate, membranous; bracteoles filiform. *Flowers* actinomorphic, spreading, stellate, pale pink, remaining open and turning brown with age; pedicels stiff, distinctly longer than perigone. *Tepals* shortly connate into a basal tube or free to base, oblong-lanceolate, spreading to recurved, plane or with slightly undulate edges. *Stamens* 6, free from style; filaments connate proximally into a short tube or free to base, adaxial surface covered with short papillae for a short distance above base, sometimes each bearing a small, adaxial hook shortly above base, spreading above; anthers oblong, dorsifixed, latrorse, opening by longitudinal slits. *Ovary* trilocular with 1 bitegmic ovule per



locule, placentation axile, nectaries septal; style slender; stigma minutely trifold. *Infructescence* rapidly drying off, sometimes detaching and tumbling away from bulb. *Capsule* small, loculicidal, walls thin and membranous. *Seeds* ovoidal, 2.5–5.0 mm diam., fleshy, reddish green,

rapidly outgrowing capsule; testa stomatose; embryo green. *Chromosome number*:  $x = 11$ .

Species two, endemic to southwestern Africa: southern Namibia and the Richtersveld, Northern Cape.

#### Key to the genera of Amaryllideae subtribe Strumariinae

- 1a Flowers zygomorphic (sometimes only by the deflexed style):
- 2a Leaves narrow, usually less than 25 mm wide, and subsucculent; pedicels slender, rarely longer than perigone; tepal margins usually  $\pm$  undulate; capsules subglobose and membranous, without conspicuous, transversal veins ..... *Nerine*
- 2b Leaves broad, usually more than 25 mm wide, and leathery; pedicels stout, usually much longer than perigone; tepal margins rarely crisped; capsules trigonous to subfusiform and papery, with conspicuous, transversal veins:
- 3a Leaves immaculate; margins smooth or shortly fringed with branched cilia; pedicels obscurely 3-angled in cross section; filaments tightly clustered; capsules prominently ribbed, often tardily dehiscent ..... *Brunsvigia*
- 3b Leaves speckled with red; margins fringed with long, straight bristles; pedicels sharply triangular in cross section; filaments  $\pm$  separate; capsules not ribbed, readily dehiscent ..... *Crossyne*
- 1b Flowers actinomorphic:
- 4a Leaves 2–6, glabrous or softly hairy; perigone collapsing after anthesis; filaments free or if fused then filament tube trilobular; usually at least one filament whorl adnate to style base; anthers subcentrifixed to dorsifixed; style columnar, winged or swollen basally ..... *Strumaria*
- 4b Leaves 2–4, glabrous or rarely minutely pilose; perigone drying and remaining open after anthesis; filaments free or connate into a short to long tube, never trilobular, free from style; anthers centrifixed to subcentrifixed or dorsifixed; style slender throughout:
- 5a Outer tunics of bulb soft and parchment-like, greyish to pale brown; leaves 2, glabrous or rarely minutely pilose; cataphyll present, mostly subterranean but sometimes exposed; filaments smooth at base; anthers centrifixed to subcentrifixed ..... *Hessea*
- 5b Outer tunics of bulb firm and brittle, tan-coloured; leaves (1–)3 or 4, glabrous; cataphyll absent; filaments papillate basally on adaxial surface; anthers dorsifixed ..... *Namaquanula*

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