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Occultia (Scilloideae, Asparagaceae), a new genus from Malawi and Mozambique

BRITA STEDJE^{1,4*}, ANTONIUS J.H. RULKENS^{2,5} & ANDREW J. HANKEY^{3,6}

¹Natural History Museum, University of Oslo, PO Box 1172, N-0316 Oslo, Norway

²Akerstraat 161, 6466 HG Kerkrade, The Netherlands

³Walter Sisulu National Botanical Garden, PO Box 2194, Wilro Park, Roodepoort, South Africa

⁴brita.stedje@nhm.uio.no; <https://orcid.org/0000-0003-3892-6784>

⁵ton.rulkens@gmail.com; <https://orcid.org/0000-0003-0910-0000>

⁶A.Hankey@sanbi.org.za; <https://orcid.org/0000-0002-2144-3092>

*Corresponding author

Abstract

A new genus *Occultia* (Scilloideae, Asparagaceae), is described from Malawi and Mozambique. One of the species on which this genus is based, was originally described as *Hyacinthus*. The genus is clearly separated from *Ledebouria* and closely related genera in characters of the flowers and the fruits. In *Occultia* tepals are united for 1/3 to 1/2 their length, the filaments are very short and inserted at the top of the perianth tube. In the fruiting stage, the tepals of the new genus become membranous and detached from their basis, but may form a cap on the developing capsule. In *Ledebouria* the tepals are free or united just at the base, the filaments are of a certain length and inserted at the base of the tepals. If persisting at fruiting stage the tepals are attached to the base of the capsule, and may become fleshy with time. The new genus comprises two species *O. hyacinthoides* and *O. fragrans*.

Keywords: *Hyacinthus*, *Ledebouria*, *Occultia fragrans*, *Occultia hyacinthoides*

Introduction

Subfamily Scilloideae of Asparagaceae comprises 41–70 genera and 800–1025 species mainly occurring in Europe, Asia and Africa, with a few species in South America (Stevens 2001). The subfamily is regarded as a separate family, Hyacinthaceae in some regional flora projects and websites (Flora of Mozambique 2021, Flora of Zimbabwe 2021, PlantZAfrica 2021, Stedje & Kativu in press). In the Flora Zambesiaca area, to which Mozambique belongs, there are so far 15 genera and 40 species recognized (Stedje & Kativu in press). Irrespective of family delimitation preferences, generic delimitation has been a long controversy within the subfamily. The new genus *Occultia*, described here, probably belongs tribe Massonieae (sensu Manning *et al.* 2004) based on morphological characters. Within this tribe there has been a controversy on whether the genera *Drimiopsis* Lindley & Paxton (1851: 73), *Ledebouria* Roth (1821: 194) and *Resnova* van der Merwe (1946: 46) should be regarded as one or three genera (Manning *et al.* 2004, Lebatha *et al.* 2006). *Drimiopsis* and *Ledebouria* have a wide distribution in sub-Saharan Africa, whereas *Resnova* is mostly confined to South Africa, but has also been found in Namaacha district, Mozambique (Flora of Mozambique 2021). The new genus *Occultia* does most likely also belong within or close to this group. The three are certainly closely related, and the latest molecular phylogenetic analyses indicate that *Ledebouria* will be polyphyletic if the two other are regarded as separate genera (Howard *et al.* 2022), but the authors express the need to include more material to fully understand the genomic evolution of the group. Other phylogenetic analyses are so far carried out on a limited number of species and many nodes have low support (Pfosser *et al.* 2003, Manning *et al.* 2004). There are prominent morphological characters which can if analysed alone, or together with DNA sequence data, justify delimitation of three genera (Lebatha *et al.* 2006). As the genus *Resnova* mainly is confined to South Africa we will not discuss it further here, but rather refer to the discussion in Lebatha *et al.* (2006).

While working on the revision of Hyacinthaceae for Flora Zambesiaca one of the authors (B. Stedje) examined the type specimen of a tiny species named *Hyacinthus ledebourioides* Baker (1870: 427). The generic affiliation of this taxon was regarded to be uncertain, and already Baker (1871) questioned its placement in *Hyacinthus* Linnaeus (1753:

316). Since Baker's time, the circumscription of *Hyacinthus* has been further restricted and it is now regarded as a genus confined to three species in the Near East to Turkmenistan and Iran. It is therefore unlikely that this African taxon should be kept in *Hyacinthus*. The type specimen had a superficial resemblance to *Ledebouria*, but did not quite fit. Careful examination of other specimens filed under *Ledebouria* revealed a handful more of similar looking specimens, and the dissection of flowers confirmed floral characters similar to those mentioned by Baker in the protologue for *H. ledebourioides* (Baker 1871). A breakthrough came with request from the other author of this paper (A. Rulkens), for help to identify two taxa of Asparagaceae. Careful examinations made us confident that one of these taxa was identical with the herbarium material studied and that *H. ledebourioides* should form the basis for the description of a new genus based on floral morphology. The other taxon, which had the same flower morphology, but differed in leaf morphology and had other ecological preferences, clearly belong to the same genus, but is a different species.

Material and methods

Material was partly collected by one of the authors (A. Rulkens) in Mozambique, or studied as herbarium material from MAL and K. The specimens of A. Rulken's are deposited at LMA. For the study of floral morphology, flowers were boiled in water for five minutes and studied under a microscope. Herbarium acronyms are according to Thiers (2016). Taxon names, authors and publication details were checked using IPNI (2022).

Description of the new genus

Occultia Stedje & Rulkens *genus nov.* (Figs. 1–3)

Similar to *Ledebouria*, but differing by tepals being united into a tube for 1/3 to half their length (not free); the filaments are adnate to tepals, with the free portions being very short and arising from the tepals tube at two levels (not free and inserted at the base); the developing capsule has a cap composed by the withered tepals that with development detaches from the basis, becomes membranous and finally falls off (no cap formed, tepals fleshy if persistent).

Type:—*Occultia ledebourioides* (Baker) Stedje & Rulkens (holotype, K!, lectotype) ≡

Hyacinthus ledebourioides Baker

Short bulbous herbs. Bulb ovoid to subglobose with pale and papery outer scales, and thick and white inner scales. Leaves one to several, linear to ovate, often with a distinct pseudopetiole; lamina glabrous, green, sometimes spotted darker green adaxially or sometimes with purple markings at base or abaxially. Peduncle erect to slightly curved, usually somewhat longer than the leaves. Inflorescence a short raceme, relatively lax with up to 40 flowers; pedicels patent to erecto-patent, short. Perianth campanulate, white and green to pinkish, about 4 mm long; united into a tube for 1/3 to half its length, free parts spreading. Stamens adnate to tepals and free portions very short making the anthers look as they are almost sessile and arising in two levels from top of tepals tube (Fig 1B). Ovary sessile, subglobose. Fruit a depressed globose and emarginated capsule. When the capsule develops, the perianth is detached from its basis, becomes membranous and falls off early, or sometimes forms a cap on the developing capsule (Figs. 1D, 3C). Seeds mostly one per locule, sometimes two, globose or subglobose, if two in a locule somewhat flattened at one side.

Etymology:—"Occultia" is derived from the Latin verb "occulere", meaning: "to conceal". Plants of this genus are concealed in several ways. Plants are very small and are thus easily overlooked. Also, leaves and other above-ground plant parts are produced for a very short time span every year. Finally, at first sight these plants may easily be confused with *Ledebouria* unless the tiny flowers are carefully examined.

Distribution:—Southern Malawi, central and north-eastern Mozambique. In Mozambique, plants of the genus *Occultia* have been observed by one of the authors (A. Rulkens) in the provinces of Sofala, Zambezia, Nampula and Cabo Delgado. In Malawi, the genus is distributed in the central and southern regions.

Taxonomic and phylogenetic note:—This new genus is clearly separated from *Ledebouria*, *Drimiopsis* and *Resnova* in floral characters. Even if these three genera may show tepals united at the base, the tepals tubes never reach 1/3 to half of the tepals length (measured on softened flowers of herbarium specimens), and the stamens are always inserted at the base of the tepals or very close to the base. The filaments are very short in *Occultia* and have a certain length in *Ledebouria*. Furthermore, the tepals of *Occultia* become membranous and detached from their basis, but may form a cap on the developing capsule. Those of *Ledebouria* and *Drimiopsis* are, if persistent on the developing capsule, always attached to the base of the capsule and may become fleshy with time, never forming a membranous cap.

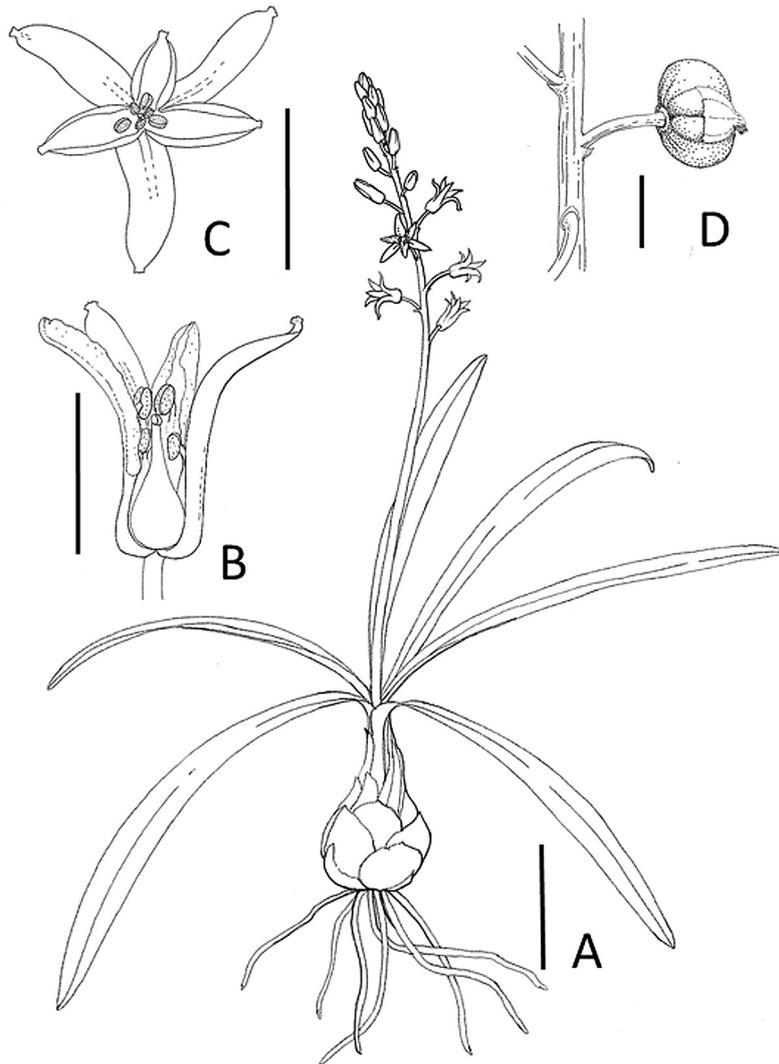


FIGURE 1. *Occultia ledebourioides* (specimen Rulkens 17A). A: Entire plant; B: Flower, side view; C: Flower from above, D: Developing capsule. Scale bars 20 mm (A) and 2 mm (B–D).

Diagnostic key

So far, two species are recognized in *Occultia*. They can be separated based on leaf characters, flower colour and ecology.

1. Leaves 3 or more, narrowly lanceolate, erect, up to 10 mm wide; flowers pinkish; growing on shallow rocky and wet ground 1. *O. ledebourioides*
2. Leaves usually one (rarely 2 or 3), widely lanceolate to ovate, flat on the ground; flowers white, turning greenish towards the base; growing on humus-rich shady underground of Mopane woodland..... 2. *O. fragrans*

1. *Occultia ledebourioides* (Baker) Stedje & Rulkens **comb. nov.** ≡

Hyacinthus ledebourioides Baker in J. Linn. Soc., Bot. 11: 427 (1871), basionym.

Type:—MALAWI. Zomba and E end of Lake Chilwa (Shirwa), October 1861, *Meller s.n.* (K!, lectotype designated here). Figs. 1, 3A–C.

Bulbous herb 5–8 cm high; bulb ovoid to subglobose with pale and papery outer scales, up to 3 cm high. Leaves 3–6 or more, often with a distinct pseudopetiole up to 3 cm long; lamina oblong to linear-oblong, green or sometimes with purple markings at base, glabrous, to 6 cm long, 3–10 mm wide. Peduncle erect to slightly curved, 3–6 cm long. Inflorescence usually 2–4 cm long, relatively lax with up to 25 flowers; pedicels patent to erecto-patent, 2–3 mm long in flower. Perianth cylindrical, white to pinkish, 3–4 mm long; tepals with slender dark keel united into a tube for 1/3 to

half its length, free parts spreading. Stamens adnate to tepals and arising in 2 levels, at top of perianth tube, filaments very short. Ovary sessile, subglobose c.1 mm long; style c.1 mm long; stigma capitate. Capsule depressed globose, emarginate, c. 3 mm wide. Seeds mostly one per locule, globose, ca 1,5 mm in diameter.

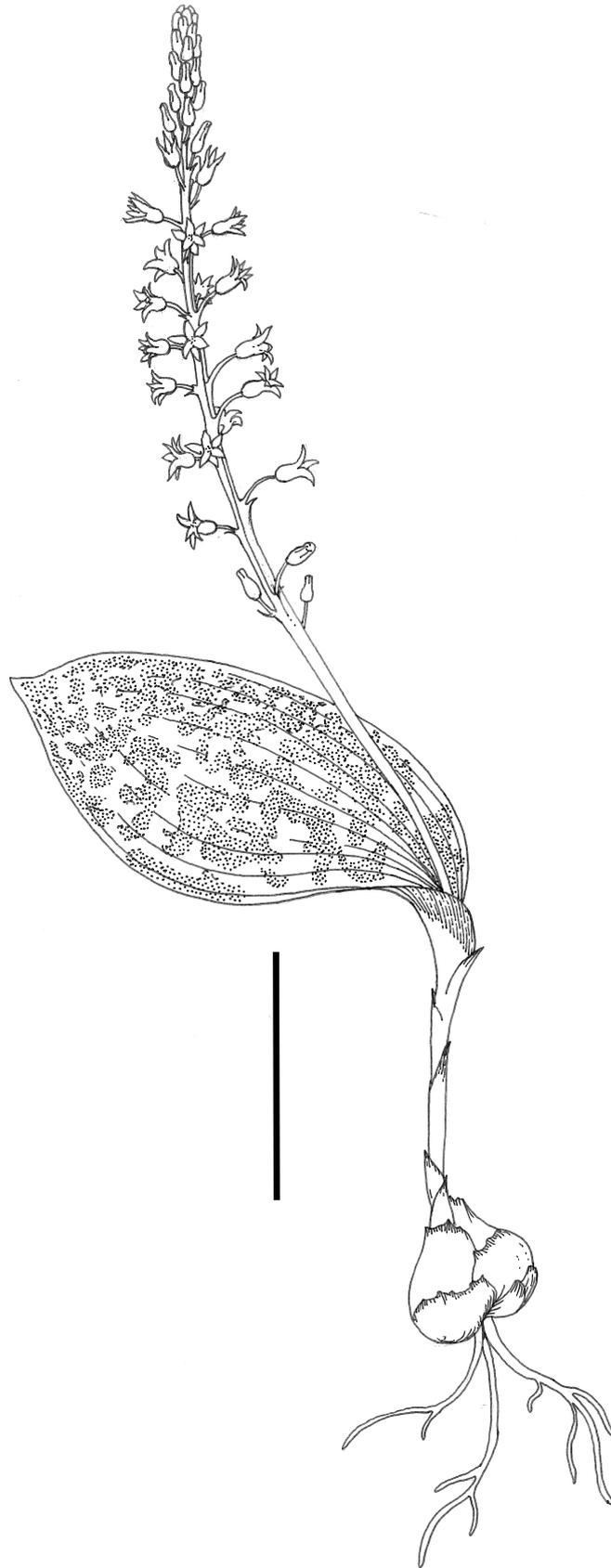


FIGURE 2. *Occultia fragrans*, entire plant (specimen *Rulkens 50*). Scale bar 20 mm.

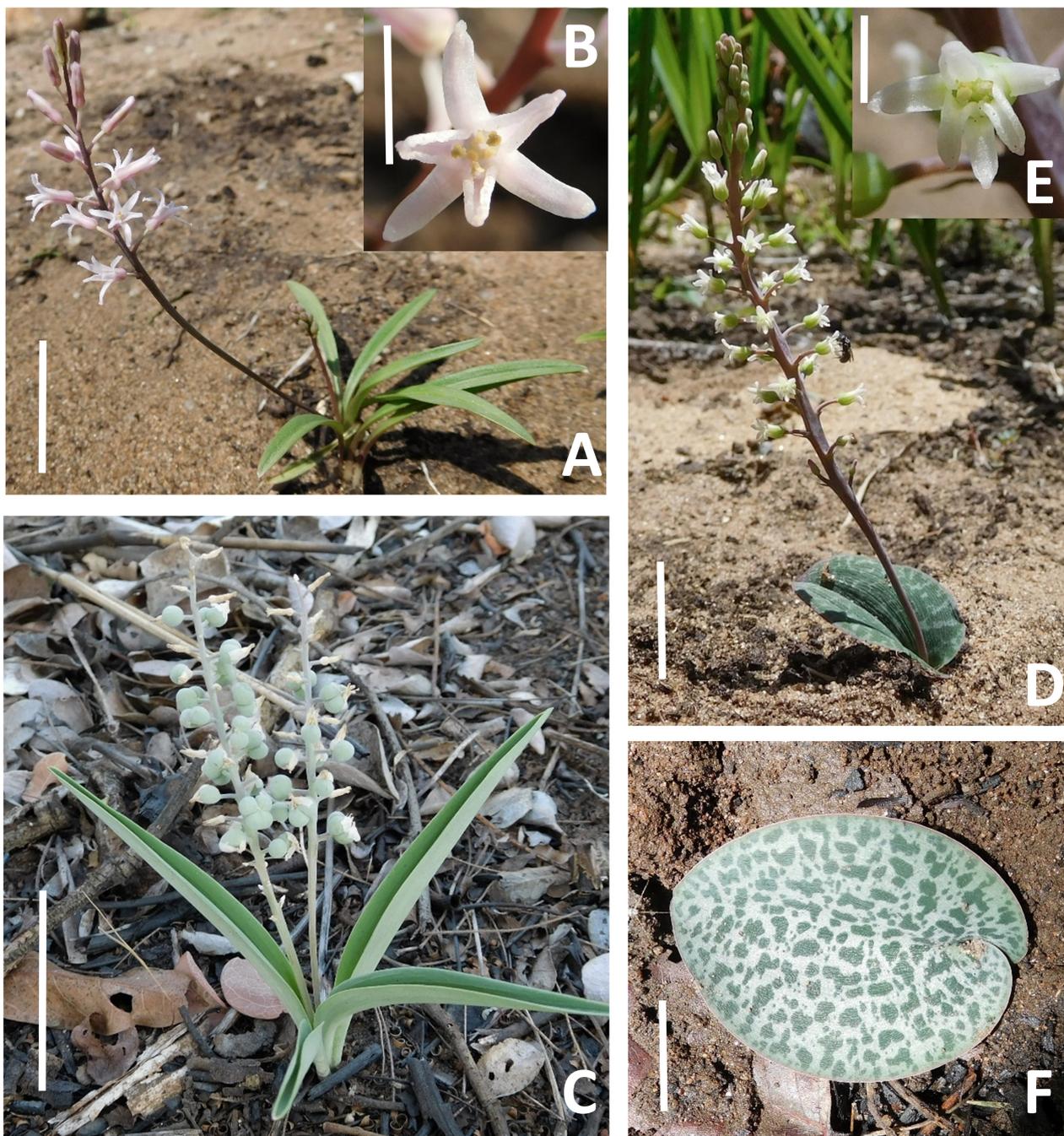


FIGURE 3. A–B: *Occultia ledebourioides* (specimen *Rulkens* 17A). A: Entire plant in flower; B: Close up of flowers where one whorl of stamens can be seen in the mouth of the perianth tube, the other partly hidden in the perianth tube. C: *O. ledebourioides*, (specimen *Rulkens* 106), entire plant in fruit. D–F: *O. fragrans*, (specimen *Rulkens* 50). D: Entire plant in flower; e: Close up of flower; F: Leaf. All photos: A.J.H. Rulkens. Scale bars 20 mm (A, C and F) and 2 mm (B and E).

Ecology:—On shallow soil on rocks / On rocky mountain soils, wet ground in *Acacia* or *Combretum–Bauhinia* woodland; between 100–900 m of elevation.

Conservation note:—Data Deficient, probably overlooked.

Distribution:—Southern Malawi and central Mozambique.

Examined specimens:—MALAWI. Central Region: Dedza Dist, Lifidizi Breeding Centre, 16 November 1985, *Patel & Kwatha* 2885 (MAL!). Southern Region: Mangochi Dist, Nankumba Hills, 21 November 1954, *Banda* 59 (MAL!). Southern Region: Matope, *A.J. Rix s.n.* (K); Southern Region: Monkey Bay, two miles out on Mangochi Road, 17 December 1978, *Blackmore* 51 (MAL!). MOZAMBIQUE. Sofala Province: Caia Dist, Sena, November 1859, *Kirk* s.n. (K!). Zambesiaca Province: Mocuba District, Monte Pozo, 16.478975 S 37.264767 E, 305 m of elevation, 26

December 2014, *Rulkens 17A* (O!, photo, O-V-2295940). Zambesiaca Province: Milange Dist, Monte Ithulo, 16.3257° S 35.9516° E, 538 m of elevation, 14 December 2015, *Rulkens 103* (O!, photo, O-V-2295941). Zambesiaca Province: Mopeia Dist, Cua Cua Lodge, North of Zambezi River, 17.7951° S 35.4178° E, 44 m of elevation, 12 December 2015, *Rulkens 106* (O!, photo, O-V-2295942).

2. *Occultia fragrans* Rulkens & Stedje *sp. nov.* Figs. 2, 3D–F

Similar to *O. ledebourioides* in general appearance of the flowers, but it differs in flowers being white and green, and fragrant. The leaves are usually solitary, ovate, spotted dark green and lying flat at the ground.

Type:—MOZAMBIQUE. Cabo Delgado Province: Ancuabe district, Mopane woodland at base of Mount Yokolo, 13.2098° S 40.1094° E, 223 m of elevation, collected in nature on 14 December 2015, *Rulkens 110*, the herbarium specimen prepared from the living cultivated plant on 7 January 2016 (LMA!, holotype).

Bulbous herb up to 14 cm high; bulb ovoid to subglobose with thick white scales, up to 3 cm high. Leaves 1 (rarely 2 or 3) with a distinct, usually subterranean, pseudopetiole to 2.5 cm long; lamina ovate, to 8 cm long and 6 cm wide, flat on the ground, glabrous, pale green with darker green irregularly shaped spots adaxially, often dark purple abaxially. Inflorescence relatively lax with up to about 40 flowers; pedicels patent to suberect, about 2 mm long in flower. Perianth cylindrical, white, green towards the base at the outer side, about 4 mm long; united into a tube for 1/3 to half its length, free parts spreading. Stamens adnate to tepals and arising in two levels from the top of perianth tube, filaments very short. Ovary sessile, subglobose c.1 mm long; style c.1 mm long; stigma capitate. Flowers fragrant at late afternoon and night. Capsule and seeds not seen.

Ecology:—Underground of small patches of mopane woodland, or on gneiss inselbergs, soil mainly dark and humus-rich; between 200–900 m of elevation.

Conservation note:—Data Deficient, probably overlooked.

Distribution:—Northwestern and central Mozambique.

Examined specimens:—MOZAMBIQUE. Niassa Province: Mandimba; 06 November 1941, *Hornby 3476* (K!). Zambezia Province: Mocuba District, Mopane woodland on Mount Pozo, 16.4848° S 37.2925° E, 470 m of elevation, collected 5 May 2015, flowered 25 October 2018 in garden at Xai-Xai, Mozambique, *Rulkens 50* (LMA!). Niassa Province: Near Lake Nyassa, 1902, *Johnson 525* (K!).

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