

## Three new species and a new synonym in *Strumaria* (Amaryllidaceae: Amaryllideae) from southern Africa

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**Keywords:** Amaryllidaceae, Amaryllideae, key, new rare species, southern Africa, *Strumaria* Jacq.

### ABSTRACT

Newly described are three species of *Strumaria* Jacq. subgenus *Strumaria*. *S. prolifera* Snijman from the Kourkammaberg in Namaqualand, South Africa, is a rare species closely allied to *S. barbarae* Oberm. *S. speciosa* Snijman from the Sonberg, southern Namibia and *S. luteoloba* Snijman from Namuskluft, southern Namibia and the Richtersveld in Northern Cape, South Africa, are rare species closely related to *S. phonolithica* Dinter. *S. gigantea* D.Müll.-Doblies & U.Müll.-Doblies is formally presented as a new synonym of *S. phonolithica*. A key to the species in *Strumaria* subgenus *Strumaria* is given.

### INTRODUCTION

*Strumaria* Jacq., a genus belonging to the tribe Amaryllideae subtribe Strumariinae is endemic to the semi-arid areas of southern Africa. Most species are found in the winter rainfall region, whereas only two taxa extend into the summer rainfall karroid areas. Among southern African Amaryllidaceae, *Strumaria* is second only to *Cyrtanthus* Aiton (tribe Cyrtantheae) in terms of the natural rarity of individual species, and as many as 80% of *Strumaria* species have been assessed as rare and threatened (Snijman & Victor 2002).

When last revised, *Strumaria* encompassed 25 species (Snijman 1994), unlike the earlier classification of Müller-Doblies & Müller-Doblies (1985), which presented the group as comprising four small genera: *Strumaria sensu stricto*, *Gemmaria* Salisb., *Bokkeveldia* D.Müll.-Doblies & U.Müll.-Doblies, and *Tedingea* D.Müll.-Doblies & U.Müll.-Doblies. The results of a recent phylogenetic study of the Amaryllideae, using morphology and molecular data from internal transcribed spacer (ITS) sequences (Meerow & Snijman 2001), however, have supported the broad classification of *Strumaria* by Snijman (1994), which recognizes subgenus *Strumaria*, subgenus *Gemmaria* and subgenus *Tedingea*.

More recently, several new collections from underexplored areas of Namaqualand and southern Namibia have come to hand. Some of these were found to represent undescribed species that are described here for the first time. In addition, *S. gigantea* D.Müll.-Doblies & U.Müll.-Doblies, which was published after *Strumaria* was last revised in 1994, is formally presented as a new synonym of *S. phonolithica* Dinter.

*Strumaria phonolithica* and the three new species all belong to subgenus *Strumaria*, bringing the number of species in the subgenus to eight. Like other members of

subgenus *Strumaria* they have strap-shaped, glabrous leaves, dorsifixed anthers and a persistent infructescence. Other features that are not consistently present in all representatives of the subgenus, but which help to characterise the group, are the three or more leaves arranged in a spreading fan, a sheathing cataphyll, and the apparently tubular to hypocrateriform or campanulate flowers. In addition, the pedicels often approximate the length of the flowers and the filaments are mostly fused into a basal tube divided into three nectar wells. A key to the eight species currently placed in subgenus *Strumaria* is given.

***Strumaria prolifera* Snijman, sp. nov., ex affinitate *S. barbarae* Oberm., sed bulbo prolifero, foliis oppositis et humo patentibus, perigonio 18–20 mm difert. Figura 1.**

**TYPE.**—Northern Cape, 2917 (Springbok): Kourkammaberg, (–CD), 11-7-1989, Bruyns 3883 (NBG, holo.; K, PRE).

Deciduous, bulbous herb, 120–200 mm tall in flower. *Bulbs* clumped, producing bulblets, subglobose,  $\pm 25$  diam.; outer tunics pale brown, parchment-like; neck slender, up to 20 mm long. *Leaves* emerging with inflorescence, distichous, 2 or 3, suberect to recurved at first, spreading flat on ground when mature, narrowly lanceolate,  $80\text{--}180 \times 4\text{--}8$  mm, plane, thin-textured, pale green, glabrous; apex subacute; outermost 2 leaves sheathing at base; cataphyll not exerted above ground; seedlings glabrous. *Inflorescence* 2–4-flowered, unilaterally clustered, 15–30 mm across; scape more or less erect, roundish in cross section,  $120\text{--}200 \times 2$  mm, pale pink to pale green, glabrous, withering but remaining attached to bulb when dry; spathe valves 2, narrowly lanceolate,  $10\text{--}20 \times 3$  mm, pink, becoming papery and spreading, persistent; bracteoles linear,  $\pm 5$  mm long; pedicels lax and pendulous at anthesis,  $6\text{--}15 \times 1$  mm, pale pink to pale green. *Perigone* actinomorphic, funnel-shaped, 10–15 mm wide at mouth, delicate shell-pink, drooping, faintly narcissus-scented, collapsing and turning dark pink when old; tepals 6, free to base, both whorls adnate to staminal tube for  $\pm 1$  mm,

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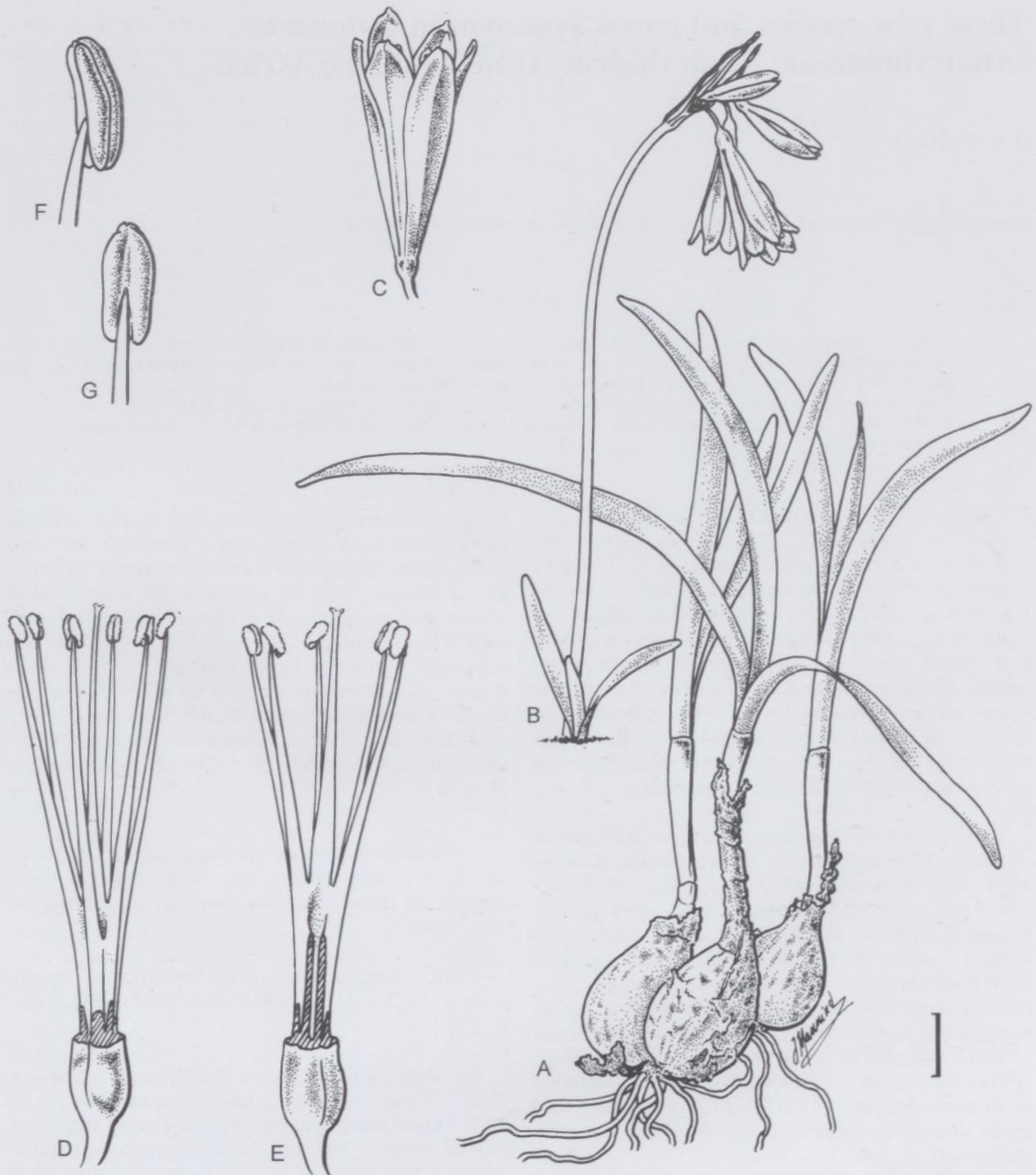


FIGURE 1.—*Strumaria prolifera*: A, clumped bulbs and young leaves; B, inflorescence; C, whole flower; D, flower with tepals removed; E, one inner stamen removed showing fusion of outer stamens with style; F, anther, lateral view; G, anther, dorsal view. Scale bar: A, B, 8.25 mm; C, 6 mm; D, E, 3 mm; F, G, 1 mm. Drawn from Bruyns 3883. Artist: John Manning.

oblanceolate, 18–20 × 4.0–4.5 mm, narrowing to 1.5 mm at base, spreading slightly. *Stamens* 6, slightly shorter than tepals, spreading distally; filaments ± 15 mm long, connate proximally into a 3–5 mm long tube, outer whorl proximally adnate to 3-winged style for ± 3 mm, inner whorl free from style forming ± 3 mm deep nectar wells; anthers dorsifixed, 2 mm long and cream-coloured before opening; pollen pale lemon-coloured. *Ovary* ovoidal, 2–3 mm diam., trilocular with 2 ovules per locule, pinkish green; nectaries septal; style 14 mm long, slightly shorter than stamens, ± 3-winged proximally; stigma trifid, papillate. *Capsule* papery, small,

dehiscing loculicidally. *Seeds* green, fleshy, ± 5 mm diam.; embryo green.

*Phenology*: in cultivation, *S. prolifera* flowers simultaneously with the bulb's newly emerging leaves in the middle of May. Several attempts have been made to study the species flowering in nature, but despite visits to the Kourkammaberg over three consecutive years in late April and May, the species has not been seen flowering in the wild. This may suggest that the bulbs flower infrequently in nature, possibly only after good autumn rains. The soft, delicate leaves



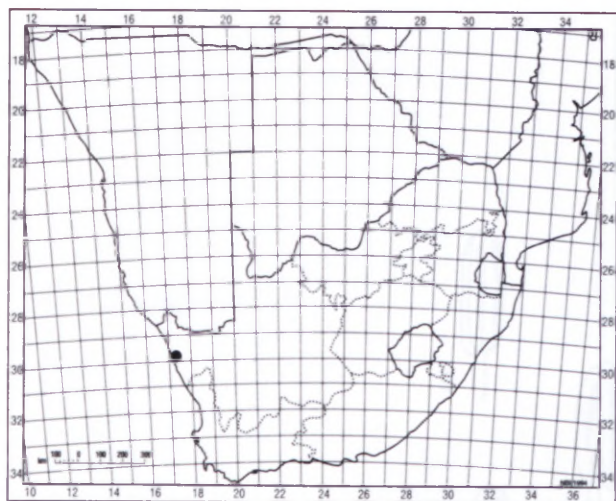


FIGURE 2.—Known distribution of *Strumaria prolifera*.

remain green throughout winter but die off with the onset of hot, dry summer conditions at the end of spring.

**Diagnostic features:** *Strumaria prolifera* is easily recognized by its pink, funnel-shaped flowers, which enclose the stamens. Only two other species have similarly shaped flowers with short, included stamens, namely *S. barbarae* Oberm. from southern Namibia and the eastern Richtersveld, and *S. pubescens* W.F.Barker from the Roggeveld escarpment and Laingsburg District. Based on the stamen and style morphology, *S. prolifera* shows greatest affinity with *S. barbarae*, which belongs to subgenus *Strumaria*. In both species the filaments form a proximal tube up to 3–5 mm long and through the fusion of the outer stamens to the three-winged style base, the tube is divided into three separate hollows, where nectar collects from the peristylar pores on the ovary dome (Figure 1E). Thus insects seeking nectar are forced to probe each hollow consecutively. Moreover, both species have drooping, scented flowers. The perigone in *S. barbarae*, however, is longer (28–38 mm) and mostly white when fresh, unlike the shorter (18–20 mm long), distinctly pink perigone in *S. prolifera*. More divergent is *S. pubescens*, belonging to subgenus *Gemmaria*, that has spreading to erect flowers in which all six stamens are adnate to the narrowly trigonous style base. Nectar therefore discharges and collects as three small droplets in the sinuses between the inner filaments and style.

A noteworthy feature is that all the species belonging to subgenus *Strumaria* (*S. bidentata* Schinz, *S. barbarae*, *S. hardyana* D.Müll.-Doblies & U.Müll.-Doblies, *S. luteoloba* Snijman, *S. phonolithica*, *S. speciosa* Snijman and *S. truncata* Jacq.), except *S. prolifera*, have erect to falcate leaves arranged in a single fan. *Strumaria prolifera* is unique in the subgenus in having straight, soft, opposite leaves, which ultimately spread flat on the ground. The species is furthermore distinguished by the formation of bulblets and extremely thin-textured, pale green leaves.

**Distribution and habitat:** *Strumaria prolifera* is known only from the Kourkammaberg, an isolated, predominantly quartzite mountain on the coastal forelands

of Namaqualand (Figure 2). The bulbs grow on southern slopes near the mountain's summit, where they are confined to partial shade between large rocks (P. Desmet pers. comm.). The population consists of highly localized colonies of up to 100 plants. Low succulent shrubs dominate the surrounding vegetation.

**Etymology:** the species is named *prolifera* for its characteristic proliferation by offsets, which slowly give rise to dense colonies of bulbs and apparently compensate for the bulbs' infrequent flowering and fruiting.

***Strumaria speciosa* Snijman, sp. nov., *S. phonolithicae* Dinter affinis, sed floribus nutantibus, pedicellis 30–50 mm longis, perigonio campanulato et staminibus  $\pm 10$  mm exsertis differt. Figure 3.**

**TYPE.**—Namibia, 2817 (Vioolsdrif): Sonberg, E of Lorelei and Rosh Pinah, (–AA), 7-7-1997, Bruyns 7233 (NBG, holo.; PRE, WIND).

Deciduous, bulbous herb, 230–330 mm tall in flower. **Bulbs** clumped, subglobose, 30–35 mm diam.; outer tunics tough and pale brown; neck stout, 10–15 mm across, reaching up to 100 mm above ground. **Leaves** emerging at flowering, 4–6, erect to falcate, arranged in a single plane, broadly lorate, 90–150  $\times$  17–25 mm, plane, pale green, glabrous; apex subacute; cataphyll unknown. **Inflorescence** 11–14-flowered, widely and evenly spreading, 80–110 mm across; scape straight, recurved at apex during anthesis, becoming erect in fruit, 260–400  $\times$  3.0–4.5 mm, pale green, glaucous, withering and collapsing after fruiting; spathe valves 2, lanceolate, 15–28  $\times$  2–6 mm, papery, spreading, pale pink, persistent; bracteoles linear, up to 15 mm long; pedicels firm, mostly straight, curved downwards at apex when flowering but completely straight when fruiting, 30–50  $\times$  1.5 mm, pale green. **Perigone** actinomorphic, campanulate and  $\pm 11$  mm across in lower half, recurved above, nodding, pure white, honey-scented; tepals 6, free to base, linear-oblong, 11–12  $\times$  2 mm, narrowing to 0.5 mm at base, closely imbricate in lower half, channelled, strongly reflexed about midway along their length, outer whorl reflexing  $\pm 1$  mm below inner whorl. **Stamens** 6, well exserted, slightly spreading; filaments 15–18 mm long, connate proximally into a tube,  $\pm 2$  mm long, outer whorl fused to 3-winged style base for  $\pm 3$  mm, inner whorl free from style, forming  $\pm 2$  mm deep nectar wells; anthers dorsifixed,  $\pm 3$  mm long and maroon before opening; pollen cream-coloured. **Ovary** ovoidal,  $\pm 3$  mm diam., trilocular with 3–5 ovules per locule; nectaries sepal; style  $\pm 19$  mm long, slightly longer than stamens, 3-winged in proximal third, slender and columnar distally; stigma trifid, papillate. **Capsule** small, papery,  $\pm 7.5$  mm diam., dehiscing loculicidally. **Seeds** green, fleshy,  $\pm 5$  mm across.

**Phenology:** in cultivation the species flowers in the middle of May when the new leaves are present. The leaves remain green during winter and die back sometime in late spring at the end of the rainfall season. As yet, the species has not been recorded flowering in nature.

**Diagnostic features:** in its vegetative state, *Strumaria speciosa* is almost indistinguishable from the southern



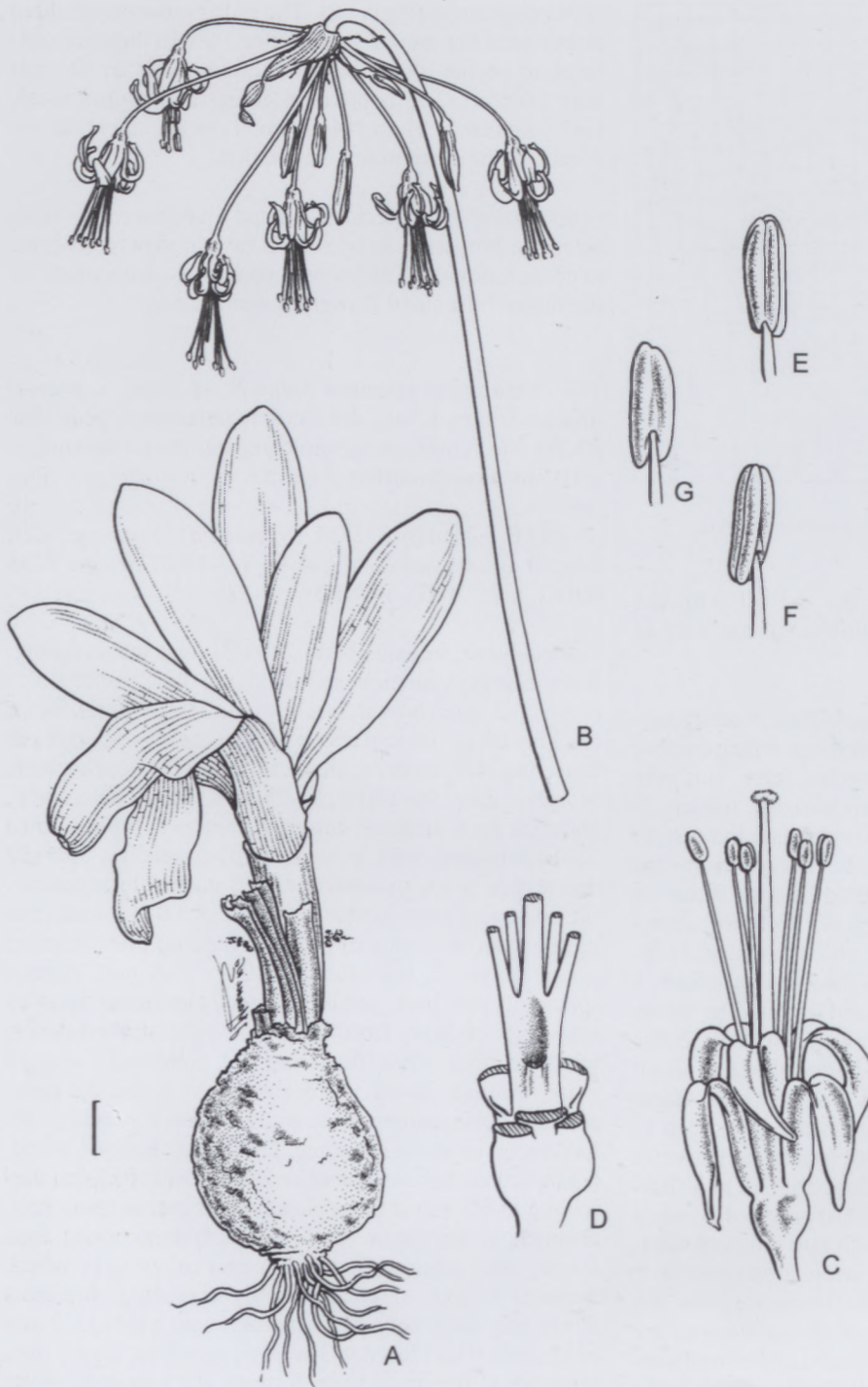


FIGURE 3.—*Strumaria speciosa*: A, bulb and new leaves; B, inflorescence; C, whole flower; D, flower with tepals and one inner stamen removed showing fusion of outer stamens with style. E–G, anther: E, ventral view; F, lateral view; G, dorsal view. Scale bar: A, B, 8.25 mm; C, 3 mm; D, 1.5 mm; E–G, 1.5 mm. Drawn from Bruyns 7233. Artist: John Manning.

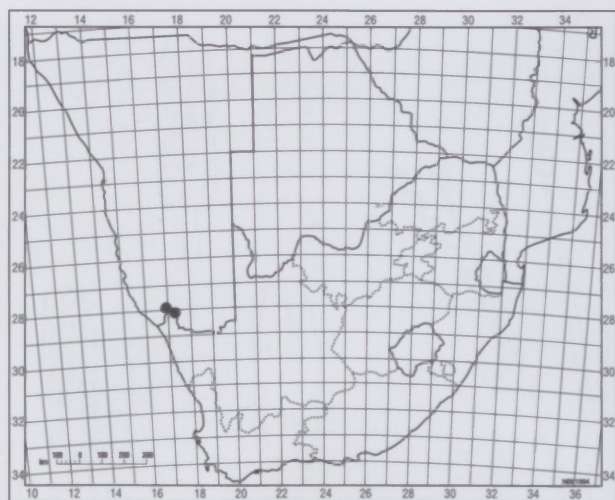
Namibian endemic, *S. phonolithica* Dinter. Both species have a stout bulb neck that extends well above ground level (up to 100 mm long in *S. speciosa* and 160 mm long in *S. phonolithica*). The leaves are broad, 17–25 mm wide in *S. speciosa* and 12–50 mm wide in *S. phonolithica*, and they curve laterally to form an outspread, erect fan which is arranged in a single plane. *S. speciosa*, however, is easily distinguished when flowering. The scape is recurved apically and the 30–50 mm long pedicels are firm, outspread and straight, but deflexed distally so that the campanulate flowers are nodding. Furthermore, the tepals are strongly recurved in the distal half so that the stamens protrude by almost 10 mm. In contrast, the firm, outspread pedicels in *S. phonolithica* never exceed 25 mm long so that the flower cluster remains compact. The tepals also remain imbricate for about three-quarters of their length and only recurve

near the tips, thus only the tips of the stamens protrude from the perigone throat. Although *S. phonolithica* and *S. speciosa* are easily distinguished, their strong morphological similarities, nevertheless, emphasize a close alliance.

**Distribution and habitat:** *Strumaria speciosa* is known from only two collections on the Sonberg, a mountain range in the semi-arid, winter rainfall region of southern Namibia (Figure 4). The small, localized populations are found on south-facing slopes below dolomite outcrops at about 900 m. The bulbs grow in soft, loamy soil among stones and low, predominantly succulent shrubs (P.V. Bruyns pers. comm.).

**Etymology:** this new species is named *speciosa* since its splendid head of flowers is unrivalled in the genus.



FIGURE 4.—Known distribution of *Strumaria speciosa*.*Other specimen examined*

NAMIBIA.—2716 (Witputz): Sonberg, (–DD), 3-9-2001, Bruyns 8856 (NBG).

***Strumaria luteoloba* Snijman, sp. nov.**, speciei subgeneris *Strumariae* affinis, sed tepalis angustis canaliculatis biseriatis roseis et citrinis, filis libris differt. Figura 5.

TYPE.—Namibia, 2716 (Witputz): Namuskluft just SE of Rosh Pinah, (–DD), collecting date unknown, *Lavrano* s.n. (NBG167717, holo.; PRE, WIND).

Deciduous, bulbous herb, 180–280 mm tall in flower. *Bulb* solitary, subglobose,  $\pm 17.5$  mm diam., tunics parchment-like, brown; neck of short, loose, dry, broken tunics. *Leaves* emerging shortly after flowering, 2 or 3(4), erect to slightly falcate, outermost sheathing at base,  $\pm$  arranged in a single plane,  $25\text{--}40 \times 4\text{--}9$  mm, oblong, glabrous, dark green, glaucous or shiny; apex  $\pm$  obtuse; cataphyll unknown. *Inflorescence* 4–7-flowered, secund, drooping, slightly spreading, 30–40 mm across; scape  $\pm$  straight, recurved near apex while flowering,  $200\text{--}280 \times 1.5\text{--}2.0$  mm, glaucous, green, withering and collapsing after fruiting; spathe valves 2, narrowly lanceolate,  $15\text{--}20 \times 2\text{--}3$  mm, papery, parchment-coloured, tinged with pink, spreading, persistent; bracteoles few, linear, up to 9 mm long; pedicels lax, straight to slightly curved,  $8\text{--}25 \times 1$  mm, green. *Perigone* actinomorphic, narrow and rose-pink in lower half,  $\pm 2.5$  mm across, recurved and pale lemon- to cream-coloured above, nodding, becoming increasingly pink with age, heavily scented of fresh coriander; tepals 6, free to base, linear-oblong,  $16\text{--}19 \times 1.5\text{--}2.0$  mm, narrowing to 1 mm at base, imbricate in lower half, strongly recurved and channelled in distal half, outer whorl curving backwards 2–4 mm before inner whorl. *Stamens* 6, well exerted, slightly spreading; filaments 22–25 mm long, free to base, free from style, outer and inner approximately equally long at anthesis; anthers dorsifixed,  $\pm 3$  mm long and maroon before opening; pollen whitish. *Ovary* ovoidal,  $\pm 3$  mm diam., trilocular with 4 or 5 ovules per locule; nectaries septal; style up to 28 mm long, slightly exceeding stamens, slender throughout; stigma trifid, inner surface papillate. *Capsule* unknown. *Seeds* unknown.

*Phenology*: in cultivation the bulbs flower in May, before the new leaves appear. The leaves emerge shortly after flowering and remain green throughout winter until September, when they die back and the bulbs become dormant over the hot, dry summer.

*Diagnostic features*: the erect, fan-shaped leaf arrangement and dorsifixed anthers of *S. luteoloba* are sufficiently distinctive to place the species in subgenus *Strumaria*, but unlike most species in the subgenus, the filaments of *S. luteoloba* are not proximally fused into a tube. Like *S. phonolithica* the new species has narrow, closely imbricate tepals. However, *S. luteoloba* is easily recognized by the tepals being deeply channelled and sharply reflexed from  $\pm$  halfway along their length, and by the outer tepal whorl reflexing 2–4 mm below the inner whorl so that the perigone has a distinctive biseriate appearance. The flower colour is also unique in the genus. The perigone is pinkish red near the base and pale lemon- to cream-coloured in the distal half. *S. gemmata* Ker Gawl., belonging to subgenus *Gemmaria*, is the only other species with lemon- or cream-coloured flowers but these are stellate and concolorous.

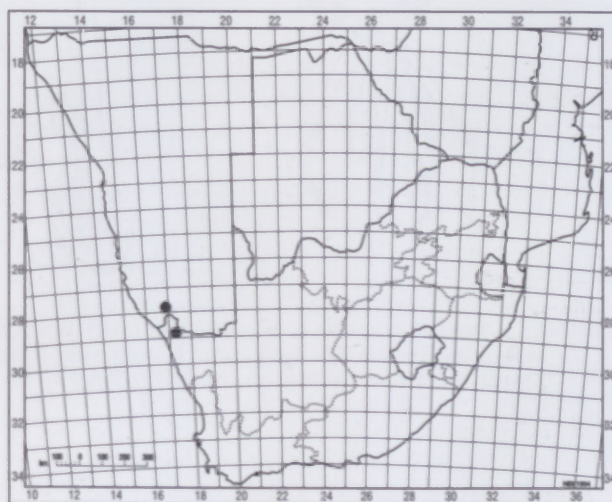
*Distribution and habitat*: *Strumaria luteoloba* is known only from the winter rainfall region of southern Namibia and the Richtersveld, South Africa (Figure 6). At Namuskluft, southern Namibia the plants are found in dolomite-derived soil, whereas the only other known population is on the Rooiberg (D. Hannon pers. comm.), a granite mountain massif in the Richtersveld.

*Other specimen examined*

NORTHERN CAPE.—2817 (Vioolsdrif): Richtersveld, Rooiberg, about 6 km NE of Eksteenfontein, (–CD), collecting date unknown, *Lavrano* s.n (NBG barcode 0197778, picture only).

*A new synonym*

Described in 1994, *S. gigantea* was distinguished from *S. phonolithica* by several quantitative characters: the width of the leaves, the number of flowers per inflorescence, the length of the perigone and the size of the unopened anthers (Müller-Doblies & Müller-Doblies

FIGURE 6.—Known distribution of *Strumaria luteoloba*.



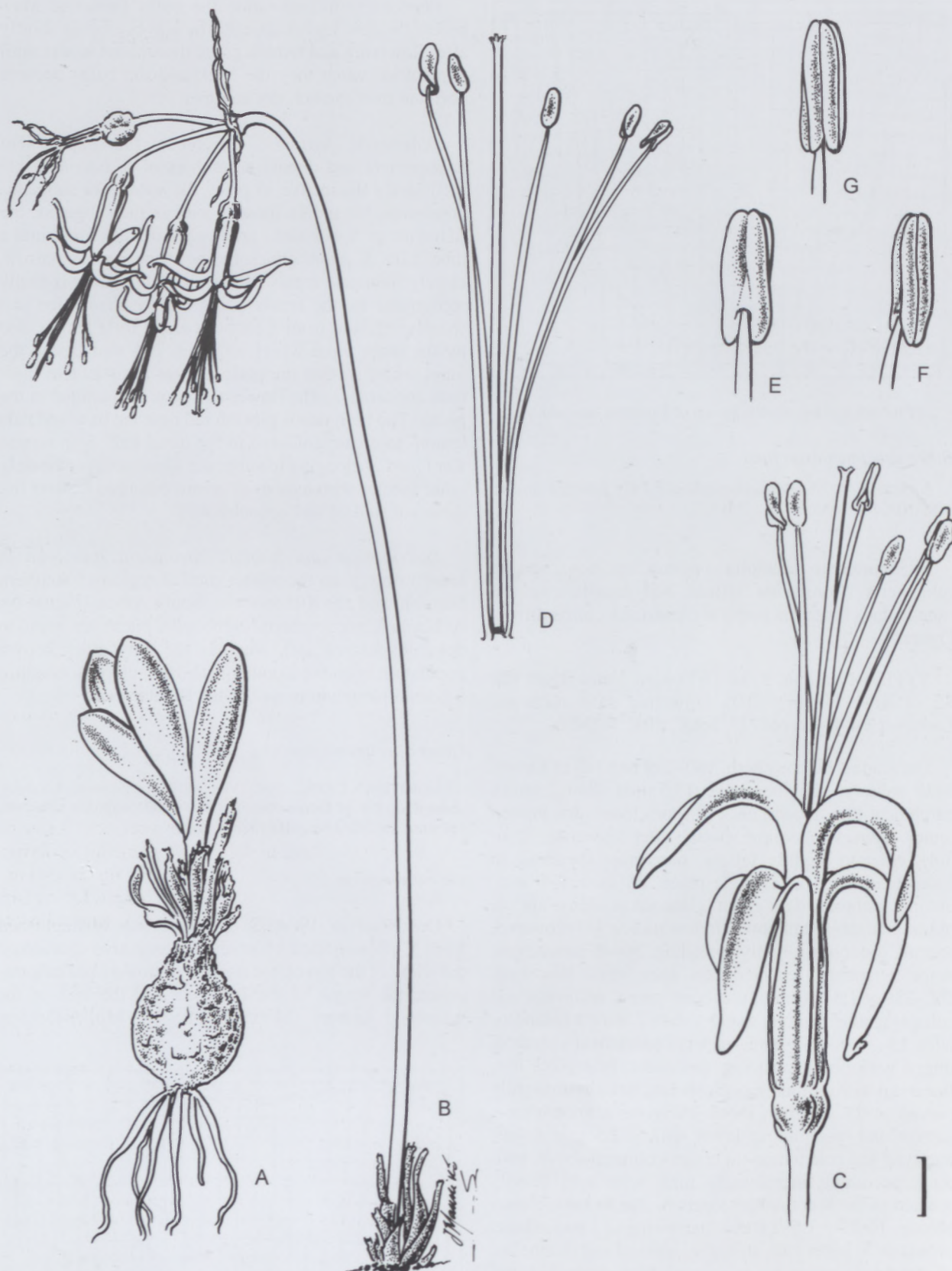


FIGURE 5.—*Strumaria luteoloba*: A, bulb and mature leaves; B, inflorescence; C, whole flower; D, one inner stamen removed showing that outer stamens are free from style. E–G, anther: E, dorsal view; F, lateral view; G, ventral view. Scale bar: A, B, 8.25 mm; C, D, 2.5 mm; E–G, 1.5 mm. Drawn from Lavranos s.n. (NBG167717). Artist: John Manning.

TABLE 1.—Diagnostic features of *Strumaria* plants from the Klinghardt and Aurus Mountains, southern Namibia

	<i>S. phonolithica</i> *	<i>Bruyns 3081</i> +	<i>S. gigantea</i> *	<i>S. phonolithica</i> †
Leaf arrangement	Fan-shaped	Fan-shaped	Fan-shaped	Fan-shaped
Maximum leaf width	12–28 mm	23–26 mm	27–50 mm	12–50 mm
Flower form	hypocrateriform	hypocrateriform	hypocrateriform	Hypocrateriform
Flowers per inflorescence	2–6	8	7–16	2–16
Perigone length	28–36 mm	35 mm	45–55 mm	28–55 mm
Unopened anther length	3.0–3.7 mm	3.0 mm	4.0–6.5 mm	3.0–6.5 mm
Distribution	Klinghardt Mtn	Aurus Mtn	Aurus Mtn	Klinghardt & Aurus Mtns

\* Data for *S. phonolithica* and *S. gigantea* given by Müller-Doblies & Müller-Doblies (1994).

+ Data for *Bruyns 3081* (NBG) not referred to by Müller-Doblies & Müller-Doblies (1994).

† Data for *S. phonolithica* as amplified in this study.

1994). In all other respects, however, the two species were regarded as the same, being distinguished from all other *Strumaria* species by their flowers, in which the tepals remain erect and overlapping for most of their length, and only recurve near the apex. When *S. gigantea* was first described, the two species were considered to be allopatric, each being known from a separate inselberg in southern Namibia. *Strumaria gigantea* was described from the Aurus Mountains (Müller-Doblies & Müller-Doblies 1994), whereas *S. phonolithica* was described from the Klinghardt Mountains (Dinter 1923), ± 60 km to the northwest. In the apparent absence of intermediate material, *S. gigantea* was thus separated from *S. phonolithica* on size alone. However, Müller-Doblies & Müller-Doblies overlooked a specimen at NBG (*Bruyns 3081*), collected on the Aurus Mountains in 1988, which indicates that the two taxa overlap geographically and intergrade morphologically. *Strumaria gigantea* is thus formally placed into synonymy under *S. phonolithica* based on the data given in Table 1.

***Strumaria phonolithica* Dinter** in Feddes Repertorium 19: 178 (1923). Type: Klinghardtgebirge, Aug. 1922, *Dinter s.n.* (B, lecto!), designated by Müller-Doblies & Müller-Doblies (1985).

*Strumaria gigantea* D.Müll.-Doblies & U.Müll.-Doblies: 346 (1994). Type: Namibia, Aurus Mountains, 18-9-1988, *Müller-Doblies 88144c* (WIND, holo.; B, BOL, BR, BTU, K, M, MO, PRE, S, STE), not yet deposited at BOL, PRE, STE, WIND; syn. nov.

Key to species of *Strumaria* subgenus *Strumaria*

- 1a Flowers ascending; tepals less than 8 mm long; style broad in lower half, abruptly narrowed into a slender column above ..... *S. bidentata*
- 1b Flowers pendulous to spreading, rarely ascending; tepals longer than 8 mm; style at most 3-angled below but slender throughout:
  - 2a Tepals linear-oblong, less than 5 mm wide, channelled and strongly recurved in upper parts:
    - 3a Tepals closely imbricate for at least two thirds of their length, recurved towards their tips; stamens exerted from perigone throat for less than a quarter of their length ..... *S. phonolithica*
    - 3b Tepals closely imbricate in lower half, recurved in upper half; stamens exerted from perigone throat for ± half their length:

- 4a Perigone narrow and rose pink in lower half, ± 2.5 mm across at throat; tepals pale lemon- to cream-coloured above at anthesis ..... *S. luteoloba*
- 4b Perigone slightly expanded in lower half, ± 11 mm across at throat; tepals usually pure white at anthesis ..... *S. speciosa*
- 2b Tepals oblanceolate, more than 5 mm wide, ± plane, erect to spreading, not strongly recurved:
  - 5a Stamens included in perigone at anthesis, shorter than tepals by 3 mm or more:
    - 6a Leaves firm and shiny green; perigone more than 25 mm long, white at anthesis, flushing delicate pink when old ..... *S. barbarae*
    - 6b Leaves soft and pale green; perigone less than 25 mm long, shell pink at anthesis, turning dark pink when old ..... *S. prolifera*
  - 5b Stamens exerted from perigone at anthesis, exceeding tepals by up to 3 mm or more:
    - 7a Leaves plane or slightly undulate, margin hyaline, apex emarginate; cataphyll subterranean ..... *S. hardyana*
    - 7b Leaves twisted or rarely plane, apex entire; cataphyll reddened and exerted above ground ..... *S. truncata*

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