Two new species of *Spiloxene* (Hypoxidaceae) from the northwestern Cape, South Africa

D.A. SNIJMAN*

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**ABSTRACT**

Newly described are two new species of *Spiloxene Salisb.*: *S. nana* Snijman from the Bokkeveld Escarpment, Northern Cape Province, is a shade-loving plant with narrow, pale green leaves and small, white or rarely cream-coloured flowers; *S. pusilla* Snijman from the Matsikamma, Gifberg and Pakhuis Mountains, Western Cape Province, resembles *S. nana* in habit but the yellow- or white-tipped flowers which are tetrameros or hexameros have darkly coloured stamens and style and an ovary with a short, solid, narrow prolongation at the apex. Inhabiting rock overhangs formed by quartzitic sandstone sheets, both species are close allies of *S. sculvyi* (Baker) Garside from Namaqualand.

With about 30 species, *Spiloxene Salisb.* is the largest genus of the family Hypoxidaceae in the Greater Cape Floristic Region, which corresponds geographically with the winter and all-year rainfall region of southern Africa. The genus, as presently circumscribed, was first separated from *Hypoxis* L. by Williams (1901) who reinstated the name *Ianthe* Salisb. that was originally applied to just three species (Salisbury 1866). Despite its early history, the genus has nevertheless remained one of the most poorly studied groups of Cape geophytes. The most comprehensive review of the genus was that of Nel (1914) who, having taken into account that the letters I and J are interchangeable in the transliteration of the Greek letter 'iota', re-introduced the spelling *Ianthe*, which was first used by Pax (1887) for a section of *Hypoxis*. Fourcade (1932) then changed the name to *Spiloxene* following the discovery that *Ianthe* Salisb. (Salisbury 1866) is a later homonym of *Janthe* Griseb. (Grisebach 1844), which has become a synonym of *Celsia* L. in the family Scrophulariaceae.

In two recent regional treatments, the accounts of *Spiloxene* included an undescribed species, which was referred to as 'sp.1' (Snijman 2000a; Manning et al. 2002). In the short period following the preparation of these publications, however, new material has been collected that clarifies what was proposed as the new species. It has become apparent that what was previously regarded as one species actually comprises two species of shade-loving plants that are separated from one another geographically. The new species are described and illustrated here as *Spiloxene nana* from the Bokkeveld Escarpment near Nieuwoudtville, Northern Cape, and *S. pusilla* from the Matsikamma-Gifberg massif near Vanrhynsdorp and the Pakhuis Mountains in the northern Cederberg, Western Cape.

**Spiloxene nana** Snijman, sp. nov., quoad habitum et floribus parvis ad *S. pusilla* Snijman, sed ab ea differt filamentis e basi libris, antheras et stigmatibus luteolis (haud rubiginosis). Ab *S. sculvyi* (Baker) Garside folsis 1.5—5.0 mm (ne 3—14) mm latis, floribus 2 (ne 2—5), albis raro cremeis (non luteis), ovario triloculare (non uniloculare) et placentatio axilis (non parietali) facile distinguatur. Figura 1.


Deciduous, entirely glabrous, softly herbaceous, com­mous plant, 95—350 mm high. *Corms* growing horizontally or geotropically; new corms somewhat globose, 4—10 mm diam., loosely covered by brown tunics; old corms persisting for a few seasons as withered, flattened discs; innermost tunics papery, outermost softly fibrous; fibres fine, reticulate and free from corm base; roots dimorphic, arising from near base of new corm, slender and spreading, contractile and geotropic. *Shoot* arising laterally, surrounded at base by a membranous cataphyll up to 45 mm long. *Foliage leaves* synanthenous, 2—6, 3-ranked in a basal tuft, sheathing from ± 10—30 mm at base; blades suberect to slightly arched, narrowly lanceolate, V-shaped in t/s, 35—350 × 1.5—5.0 mm, the innermost narrowest, pale green, soft and thin-textured, keeled abaxially almost to apex; margins entire. *Inflorescences* 2 or more, erect, a 2-flowered umbel-like raceme; scape 30—150 × 0.5—2.0 mm, laterally compressed, pale green with membranous lateral edges; bracts 2, opposite, partially sheathing pedicels proximally, lanceolate, 10—40 × 3—4 mm, foliaceous, shallowly keeled, inconspicuously nerved, pale green, with translucent margins. *Flowers* stellate, usually opening sequentially, unscented; pedicels suberect at anthesis thereafter spreading horizontally, triangular in t/s, 35—80 × 1 mm, slender, pale green; tepals 6, reflexed when fully open, narrowly lanceolate, 2.5—7.0(—12.0) mm long, white or rarely cream-coloured, occasionally flushed pink, backed with pale green in outer whorl, outer tepals 1.5—2.5 mm wide and mucronate, inner tepals 1—2 mm wide and minutely mucronate. *Stamens* 6, slightly spreading, unequal, outer whorl slightly shorter than inner; filaments inserted at base of tepals and joined to sinus between anther lobes, filiform, 0.5—1.5 mm long, yellow; anthers latrorse, oblong, 1.5—2.0 mm long before opening, yellow, apical and basal lobes slightly spreading and ± 0.05 mm long; pollen yellow. *Ovary* inferior, narrowly tubular to ellipsoidal, 2.5—8.0(—11.0) × 0.7—2.0 mm, 3-locular with axile placentaion, narrowed distally.
FIGURE 1.—*Spiloxene nana*: A, B, Pretorius 589; C–F, Rourke 2218. A, whole plant, including t/s leaf; B, corm; C, flower; D, stamens, style column and stigmatic branches; E, capsule; F, seed. Scale bars: A, 5 mm; B, 2 mm; C, 2.5 mm; D, 1 mm; E, 3 mm; F, 0.2 mm. Artist: John Manning.
into an inconspicuous, solid, ± 0.5 mm prolongation that sometimes extends up to 1 mm after anthesis; ovules 15–20 per locule; style column cylindrical, 0.3–0.5 mm long, white; stigmatic branches 3, erect but eventually spreading, 1.2–3.0 mm long, tapering upwards from broad base, with edges of abaxial surface slightly folded together, densely papillate on margins and edges of adaxial surface, white. Capsule narrowly ellipsoidal, 2.5–11.0 × 1.0–2.0 mm, thin-walled, shedding withered ovary beak and perigone; dehiscence loculicidal, irregularly longitudinal; placental ridges remaining contiguous axially; septa disintegrating. Seeds depressed-ellipsoidal, 0.53 × 0.43 mm; funicle stout, attached in chalazal axially; septa disintegrating. Figure 1.

Diagnostic features: as the epithet suggests, Spiloxene nana is characterized by slender leaves, 1.5–5.0 mm wide, and relatively small flowers ranging from 5–12(–20) mm across. In addition, the flowers are inconspicuously coloured—white or rarely cream-coloured with a pink flush, but always with pale green on the backs of the outer tepals—and the tepals usually reflex downwards when fully mature. Although the leaves are fairly long (up to ± 350 mm) they are characteristically soft and pale green with a delicate appearance.

Its affinities seem to lie primarily with Spiloxene pusilla, which closely resembles S. nana in habit. Furthermore, the somewhat membranous leaves and the thin-textured, pale green foliaceous bracts suggest that S. nana and S. pusilla are allied to S. scul lyi (Baker) Garside, a species found in the granite hills of Namaqualand and which belongs to Nel’s Aquaticae group (Nel 1914). Although Nel described the corms of the five species in this group as lacking persistent fibres and the disc-like remnants of old corms, those of S. scul lyi may sometimes be softly fibrous towards the apex and may retain a few old discoid corms laterally. Both these features are shown, for example, in Pearson 6585 (BOL) and Scully s.n. (Herbarium Normale Austro-Africanum 1381 in SAM). S. scul lyi differs from S. nana and S. pusilla, however, in generally being more robust. It has broader leaves, 3–9(–14) mm wide, and considerably larger flowers, 14–28(–38) mm across, which are plain yellow above. Most importantly, the ovary in S. scul lyi is unilocular with parietal placentation. Like most other Spiloxene species, the ovary in S. nana or S. pusilla is trilocular with axile placentation.

The similarities and differences between Spiloxene nana and S. pusilla are fully discussed below under S. pusilla.

Other specimens examined

NORTHERN CAPE.—3119 (Calvinia): stream feeding waterfall ± 10 miles out of Nieuwoudtville, (–AC), L Bolus (BOL19597); Oorlogskloof tail near Nieuwoudtville, (–AC), Esterhuyzen s.n. (NBG); 9 km SW of Nieuwoudtville on Groot Tuin 653, near hinging tail, (–AC), Helme 3075 (NBG), Oorlogskloof Nature Reserve, (–AC), W.A. Pretorius 279 (NBG), near Eland se Kliphuis, Rou Alec 2218 (NBG, PRE), Snijman 1865a (NBG, PRE); Annex Uitkomst 797, ± 425 m NE of Dollfontein camp, on a steep SSW-facing slope under a thorny bush, R.C. Turner 1374 (NBG, PRE); Lokenburg, under overhanging rocks, (–CA), Acocks 19725 (NBG, PRE); Uitkomst Farm, SW of Nieuwoudtville, (–CA), W.F. Barker 10730 (NBG); Farm Driefontein, 18 km S of Nieuwoudtville, (–CA), Goldblatt & Manning 19725 (NBG, PRE).

Spiloxene pusilla Snijman, sp. nov., habitu et textura S. nanae Snijman similis, praecipue differt filamenti ad stilum connatis, ovario breviter rostrato, antherae connectivo et stylo rubiginoso. Figura 3.


Delicate, deciduous, entirely glabrous, cormous herb, 70–190(–300) mm high. Corms growing horizontally or geotropically, new corms somewhat globose, 4–7 mm diam., loosely covered by dark brown tunics, withering after fruiting and persisting for a few seasons as flat-
FIGURE 3.—Spiloxene pusilla. Snijman 1623. A, whole plant; B, corm; C, t/s leaf; D, flower; E, t/s ovary; F, stamens, style column and stigmatic branches; G, capsule; H, seed. Scale bars: A, 5 mm; B, 2 mm; C, D, G, 1 mm; E, F, 0.5 mm; H, 0.2 mm. Artist: Claire Linder Smith.
tended discs; innermost tunics papery, outermost softly fibrous; fibres reticulate and free from cork base; roots dimorphic, arising from base of new corm, slender and spreading, contractile and geotropic. Shoot arising laterally, surrounded at base by a membranous cataphyll up to 10 mm long. Foliage leaves symmetrical, 2-6, 3-ranked in a basal sheath, sheathing for up to 10 mm at base; blades suberect to slightly arched, narrowly lanceolate, V-shaped in t/s, 45-160(-300) x 1.0-2.5 mm, pale green, soft and thin-textured, keeled abaxially almost to apex; margins entire. Inflorescences 2 or more, erect, a 2(3)-flowered umbel-like raceme; scape 20-100 x 0.5-1.5 mm, laterally compressed, sharp-edged, pale green; bracts 2(3), opposite, partially sheathing pedicels proximally, lanceolate, 15-25 x 1-3 mm, foliaceous, shallowly keeled, inconspicuously nerved, pale green, with translucent margins. Flowers stellate, usually opening sequentially; pedicels suberect at anthesis and thereafter, terete, 20-50(80) mm long, slender, pale green; tepals 4 or 6, rarely 5, reflexed when fully open, narrowly lanceolate, 3-4 mm long, yellow or white, backed with pale green mostly in outer whorl, outer tepals 1.5 mm wide and mucronate, inner tepals 1.0-1.2 mm wide and minutely mucronate. Stamens as many as tepals, suberect proximally to slightly spreading distally, unequal, outer whorl slightly shorter than inner; filaments joined to sinuses between anther lobes, filiform, 1.4-2.2 mm long, yellow, maroon-tipped, outer whorl adnate to style base for up to ± 0.5 mm, inner whorl adnate to style for up to ± 1 mm; anthers latrorse, oblong, 1.0-1.4 mm long before opening, apical and basal lobes ± 0.17 mm long and slightly spreading; thecae and pollen yellow; connective dark red. Ovary inferior, narrowly ellipsoidal, 2.3-3.0 x 0.8-1.2 mm, 2-3-locular with axile placentation, narrowed distally into a solid, 0.5-1.0 mm prolongation that lengths up to 1.5 mm after anthesis; ovules 15-20 per locule; style column cylindrical, 1.5 mm long, yellow; stigmatic branches 2 or 3, erect, 0.9-1.5 mm long, slightly broader than style column, with edges of abaxial surface slightly folded together, densely papillate on margins and edges of adaxial surface, dark red. Capsule narrowly ellipsoidal, 2.5-5.0 x 1.0-1.5 mm, thin-walled, partially topped with withered, persistent ovary beak and perigone; dehiscence irregularly apical and longitudinal; placentals ridges remaining contiguous axially; septa disintegrating. Seeds ovate, ± 0.5 x 0.4 mm; raphe continuous with a short, straight, persistent funicle attached in chalazal hemisphere; micropyle slightly raised; testa brittle, shiny black, of transversely widened cells, ornamented with ± 12 widely spaced, longitudinal ribs; outer periclinial walls each with a central, blunt, raised papilla; papillae closely aligned giving ribbed appearance. Figure 3.

Phenology: flowering extends throughout spring from early September to mid-October. The leaves remain green for slightly longer until the onset of the summer dry period, when they are shed. New leaves emerge each year with the onset of winter rain which often starts to fall in autumn. Most species of Spiloxene depend on sunshine to open their flowers (lasting from ± 11:00 to ± 16:00), but those of S. pusilla are able to open in the shade and to remain open throughout the day.

Distribution and habitat: Spiloxene pusilla is restricted to the northwestern Cape Fold Mountains (Figure 2), where populations are found on the relatively moist, cool summit of the Gifberg and Matzikamma massif, near Vanrhynsdorp, and on the Pakhuis Mountains east of Clanwilliam, at 460-760 m. These mountains have large areas of exposed, flat, quartzitic sandstone sheets that are often waterlogged in winter and are extremely dry in summer. The plants shelter under south-facing, overhanging rocks in shallow, sandy soil, where they escape the severe conditions of the exposed rock sheets. S. pusilla is often the sole inhabitant of these cool, shady, shelf-like habitats, where it forms dense mats having the appearance of soft, pale green turf.

Diagnostic features: one of the most unusual features of this species, and perhaps the most important reason why it has remained unnamed for so long, despite several collections having been made since its discovery by E.P. Phillips in 1911, is the fusion of the inner filaments to the style. Handwritten notes by the late Ms M.F. Thompson (Mrs Rand), author of several papers on Cape Hypoxidaceae (Thompson 1969, 1976a, b, 1978, 1979), suggest that she regarded the fusion of the filaments to the style to be sufficiently significant to delay formally describing the species until its relationships were more clearly understood. Fortunately, the availability of many more collections of the newly described and apparently closely related S. nana has made this description possible.

Morphologically Spiloxene pusilla bears a striking resemblance to S. nana. Both are shade-loving plants with delicate, narrow, pale green, extremely soft-textured leaves and small flowers, often only 10 mm in diameter. In addition, both species inhabit rock overhangs where the plants form dense, turf-like patches.

The particular features that separate Spiloxene pusilla from S. nana are those of the flower. The inner filaments are shortly fused to the style (versus free from the style); the anther connectives and stigmatic branches are dark red (as opposed to yellow); and the ovary is constricted into a short (0.5-1.0 mm) but distinct solid, neck-like prolongation at anthesis (compared with an indistinct prolongation of up to ± 0.5 mm that sometimes lengthens slightly after anthesis).

Elsewhere in the family a solid prolongation of the ovary, most often referred to as the ovary beak, is found in Empodion Salisb., Curculigo Gaertn., Molineria Colla, Rhodohypoxis Nel and Saniella Hilliard & B.L.Burtt (Hilliard & Burtt 1978), and although infrequent in Spiloxene, it is well developed in S. alba (Garside 1950). Moreover, the darkly coloured stamens and style, in otherwise yellow or white flowers, are only known in Spiloxene, particularly in the southwestern Cape species, S. canaliculata Garside, S. capensis (L.) Garside and S. serrata (Thum.) Garside, which belong to a guild of beetle pollinated plants (Steiner 1998). Undoubtedly the flowers of S. pusilla are too small to support monkey beetles, but their dark filaments and stigmas may attract specific, albeit tiny, pollinators—an aspect which is yet to be studied. Records show that this dark coloration is constant throughout the distribution range but that populations on the Matsikamma Mountain and Gifberg consistently have yellow tepals, whereas those in the northern Cederberg have white or cream-coloured tepals.
Although Figure 3 shows a plant with tetramerous flowers, this is not constant in the populations, and hexamerous flowers also frequently occur, occasionally even on the same plant. Only very rarely has a pentamerous flower been noted. This variation in the number of floral parts is not unique and is also known in species of Hypoxis and Empodium.

Lastly, the only other member of Hypoxidaceae that has parts of the androecium fused to the style is Pauridia Harv., a small Western Cape genus of two species. Pauridia, however, is characterized by tepals that are joined below to form a cup-shaped or tubular perigone; an inner whorl of fertile stamens which is inserted in the perigone throat; and an outer whorl of staminodes that is fused to the style. Moreover, the stigmatic branches are slender and distinctly shorter than the style column. This is in contrast to Spiloxene pusilla, in which all six stamens are fertile, the flowers are stellate, and the stigmatic branches are distinctly broader and longer than the style column. These features, together with the cormous habit, are common to all the currently known species of Spiloxene, which suggests that this northwestern Cape species is best placed within Spiloxene.

Despite clear evidence from leaf anatomy and rbcL sequence data that Spiloxene and Pauridia are closely related (Thompson 1976a; Hilliard & Burtt 1978; Nold 1998; Rudall et al. 1998; Burtt 2000; Judd 2000), both genera have been consistently retained in local floras (Garside 1950; Snijman 2000a, b). Should future studies reveal, however, that Spiloxene and Pauridia comprise one monophyletic genus, it nevertheless seems likely, given the different relative positions of the structures involved, that the fusion of filaments to style is not homologous with the fusion of staminodes to style in P. minuta (L.f.) Durand & Schinz and P. longistigma M.F.Thomps.

Other specimens examined

WESTERN CAPE.—3118 (Vanrhynsdorp): Matsikamma Mt., Op de berg 314, Dreyers Kloof, (-DB), Helme 1358 (NBG); Matsikamma, Farm Sewefontein, (-DB), Snijman 1623 (NBG, PRE), Snijman 1860 (NBG); Gilberg, (-DD), Compton 20847 (NBG), Esterhayzen 22042 (BOL, NBG, PRE), E. P. Phillips 7559 (SAM), summit of Gifberg Pass, near De Kom, (-DD), Snijman 1864 (NBG), 3219 (Wuppertal): Pakhuis, N Cederberg, (-AA), Esterhayzen 21722 (BOL, NBG), Esterhayzen 21910 (BOL, NBG, PRE); N Cederberg, Diagonal Kloof, N of Ribbokberg, (-AA), H.C. Taylor 1889 (NBG).

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