



Massonia saniensis (Asparagaceae, Scilloideae), a new species from Lesotho, southern Africa

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Dedicated to Prof. Dr. Irntraud Thaler on the occasion of her 90th birthday.

Abstract

As part of a taxonomic revision of the genus *Massonia*, a new species, *M. saniensis* is here described from Lesotho (southern Africa). This species is at first sight similar to both *M. wittebergensis* and *M. jasminiflora*, but it differs in vegetative, floral, and molecular characters as well as by its distribution. A complete morphological description of the new species and data on biology, habitat, and distribution are presented.

Key words: Flora of Southern Africa, Hyacinthaceae, Massonieae, Taxonomy

Introduction

Hyacinthaceae *sensu* APG (2003) comprises ca. 1000 species of bulbous plants distributed through Africa and Europe extending to Asia, with only *Oziroë* Rafinesque (1837: 53) occurring in South America (Speta 1998a, b, APG 2003). Within this family, four monophyletic clades were accepted as the subfamilies Hyacinthoideae, Ornithogaloideae, Oziroëoideae and Urgineoideae (Speta 1998b, Pfosser & Speta 1999, Manning *et al.* 2004, Martínez-Azorín *et al.* 2011). Alternatively, Hyacinthaceae is treated as part of Asparagaceae subfamily Scilloideae, and consequently the former subfamilies are reduced to the tribes Hyacintheae, Ornithogaleae, Oziroëeae and Urgineeae (APG 2009, Chase *et al.* 2009). We favour using Hyacinthaceae at the family rank, based on morphological and evolutionary grounds.

Three tribes—Massonieae, Pseudoprosperae and Hyacintheae—are accepted in subfamily Hyacinthoideae. Massonieae and Pseudoprosperae are distributed throughout sub-Saharan Africa, the Arabian Peninsula to India, while Hyacintheae occur in Eurasia and northern Africa (Speta 1998a, b, Wetschnig *et al.* 2002, Pfosser *et al.* 2003, Manning *et al.* 2004). The generic circumscription within the tribe Massonieae has shown important changes in the last decades. Two new genera—*Namophila* Müller-Doblies & Müller-Doblies (1997: 77) and *Spetaea* Wetschnig & Pfosser (2003: 87)—were recently described and some other genera were lumped into broader generic concepts, e.g. *Brachyscypha* Baker (1870: 393), *Polyxena* Kunth (1843: 294), and *Periboea* Kunth (1843: 292) into *Lachenalia* J. Jacquin ex Murray (1784: 314) (Manning *et al.* 2004); *Drimiopsis* Lindley & Paxton (1851–1852: 73) and *Resnova* Van der Merwe (1946: 46) into *Ledebouria* Roth (1821: 194) (Manning *et al.* 2004); *Androsiphon* Schlechter (1924: 147), *Amphisiphon* Barker (1936: 19) and *Neobakeria* Schlechter (1924: 149) into *Daubenya* Lindley (1835: t. 1813) (Manning & Van der Merwe 2002); and *Whiteheadia* Harvey (1868: 396) into *Massonia* Houttuyn (1780: 424) (Manning *et al.* 2004, 2011). The latter steps, leading to very broadly-conceived taxonomic units, were mainly based on preliminary and incomplete phylogenetic studies. Therefore it appears necessary to evaluate those proposals on the basis of more detailed phylogenies covering most of the species involved in each genus combined with a profound analysis of the morphological characters involved in those groups. Nevertheless, the taxonomy and systematics in the subfamily is far from being well understood, and the taxonomy within the Massonieae still remains poorly resolved.

The genus *Massonia* was described including a single species—*Massonia depressa* Houttuyn (1780: 424). With ongoing exploration of the southern African flora, the number of species in *Massonia* quickly increased. In the late nineteenth century, Baker (1897) accepted 33 species in his treatment of the genus in *Flora Capensis*. However, more recent studies in *Massonia* reduced the number of accepted species to 6 (van der Merwe 2002, Manning & Goldblatt 2003, Summerfield 2004), 8 (Jessop 1976), 12 (Müller-Doblies & Müller-Doblies 1997) or 14 (Species-2000 2014). None of the cited works have studied all the taxa in the group in detail, nor have evaluated all the morphological characters of the genus. Currently ca. 80 species names are published within *Massonia* (IPNI 2014), from which about 60 fit its recent concept, whereas the other species actually belong to the genera *Daubenya*, *Lachenalia*, *Polyxena* and *Whiteheadia*. The genus *Massonia* has so far been confined to southern Africa.

Our previous studies in *Massonia* demonstrated that the taxonomy of the genus is far from being satisfactory and several species concepts have either been overlooked or misunderstood (Pinter *et al.* 2013, Martínez-Azorín *et al.* 2013). A good example of this problem was shown by Wetschnig *et al.* (2012) with the correct identification of *M. pustulata* Jacquin (1791: 177) and the replacement of *M. pustulata* auct. non Jacq. with *M. longipes* Baker (1897: 411). Furthermore, it is evident that the very widely circumscribed species concepts accepted in recent revisions of the genus include several biological entities characterized by clear morphological, ecological and biogeographical differences. In many cases these biological entities correspond to currently described species accepted as synonyms of those widely circumscribed species.

The genus *Podocallis* Salisbury (1866: 17) was described as follows: “Omnia ut in *Massonia* praeter Corollae lacinias basi non replicatas; Filamenta breviora, late cuneata; Stylumque basi in Conum tumidum.” Salisbury based his new genus on a collection by Burchell from “regione fluminis Visch Rivier” with perigone segments not reflexed and conical gynoeceum. Moreover, Salisbury included a single species in *Podocallis* as follows: “Species 1. *Massonia Nivea* Burch.” It is worth mentioning that the name *Massonia nivea* Burch. ex Salisb. was not validly published on the view of the Art. 36.1(a) (cf. McNeill *et al.* 2012) as Salisbury regards “*Massonia Nivea* Burch.” as a species of *Podocallis* and not of *Massonia* (John McNeill *pers. comm.*). Furthermore, the combination *Podocallis nivea* was also not validly published since no explicit indication on that combination was made in the original description (cf. IPNI 2014).



FIGURE 1. *Massonia jasminiflora* Burch. ex Baker. T. 7465 of Curtis's *Botanical Magazine* 122 (Baker 1896).

Four years later, *Massonia jasminiflora* Burch. ex Baker (1870: 390) was described, explicitly citing *Podocallis nivea* Salisb. The new species was characterised as follows “[...] Perianthium albidum, 6 lin. longum, segmentis lanceolatis reflexis tubo ½ lin. crasso duplo brevioribus. Filamenta 1 lin. longa, basi distincte connata. Cap. B. Spei, Burchell! (v. s. cult.)” Baker (1896) illustrated *M. jasminiflora* (Fig. 1) and provided further data: “The present plant was discovered [...] by the celebrated traveller Burchell, but up till now it has been known from a single specimen dried from his garden at Fulham in 1818, and pressed, [...] in the Kew herbarium.” Baker amended the description as follows “Leaves [...] glabrous, smooth, dull green, with about fifteen distinctly marked vertical ribs. Perianth [...] lobes ovate-lanceolate, spreading [...] filaments linear, connate at the base”. Therefore the perigone lobes were described as spreading, and not reflexed as in the original description. This amendment agrees with the description of *Podocallis* as having “Corollae lacinias basi non replicatas”. The type collection of *M. jasminiflora* (K000257150!) includes a single plant comprising an inflorescence connected to one leaf and a second unconnected leaf. The inflorescence includes several flowers showing perigone segments mostly spreading or slightly reflexed, most probably due to the pressing, filaments connate at the base and blue anthers. The label of the type provides further information: “Herbarium of the late W.J. Burchell, D.C.L. Presented by Miss Burchell, May 1865” and “Collected in Bechuanaland at Jabiru Fontein, on the Pellat Plains near Takun. Ex horto proprio Fulham”.

Just after the description of *M. jasminiflora*, on the same page, *Massonia bowkeri* Baker (1870: 390) was described as new. This species was based on a plant collected by F. Bowker (s.n.) from “Cap. B. Spei (Orange River Free State)” and was characterized as follows: “[...] Perianthium albidum, [...] segmentis lanceolatis erectis [...]. Filamenta [...] basi distincte connata”. The type of *M. bowkeri* (TCD0000385!) includes a single plant showing immature flowers with erect perigone segments and flowers at anthesis with spreading segments. Baker (1897) modified the original description as follows: “[...] leaves round-oblong, thin, glabrous, obtuse [...] perianth white, [...] segments lanceolate, reflexing, [...] filaments [...] connate into a distinct cup [...]”. Phillips (1917) first cited *M. bowkeri* from the Leribe Plateau in Lesotho, mentioning the herbarium specimen *Dieterlen* 724, and later he (Phillips, 1930) illustrated this species based on a plant collected at Maseru in Lesotho.

Massonia greenii Baker (1897: 413) was based on a plant collected by S.W. Green at “Kalahari Region: Griqualand West; stony places near Kimberley” and was characterized as having “leaves [...] glabrous [...] perianth [...] segments lanceolate, half as long as the tube; stamens as long as the segments.” The label of the type (K000257148!) shows “Herbarium MacOwanianum. no. 2842, In campis lapidosis prope Kimberley. Aprili? LXXXVIII legit et vivam misit ad Hort. Bot. C.B.S. S. W. Green”.

Jessop (1976), in his influential publication on *Massonia* and allied genera, treated *M. bowkeri* and *M. greenii* as synonyms of *M. jasminiflora*, providing a morphological description for the latter species including a considerable variation in leaf and flower morphology.

A remarkable new species of *Massonia* was recently described by Müller-Doblies & Müller-Doblies (2010) from the southern Drakensberg in South Africa. *Massonia wittebergensis* Müller-Doblies & Müller-Doblies (2010: 129) was based on the collection *Drège* 3509 (S11-19198!, K000257129!, G00190152!) from the “Wittebergen” in the Eastern Cape Province. It shows unique leaves bearing laterally compressed bristles, 0.3–1 mm long on the upper side, usually curved and sometimes forked, perigone segments reflexed without a strong sigmoid curve, and filaments very shortly connate (Fig. 2). As not mentioned in Müller-Doblies & Müller-Doblies (1997, 2010) we add that Galpin (1909) reported his finding of *M. tenella* Soland. ex Baker (1870: 389) [most probably *M. wittebergensis*] in March 1904 at Ben MacDhui at an elevation of 9500 ft. (Galpin No. 9500 = Galpin No. 6868 fide Phillips 1917). For taxonomical details of *M. wittebergensis* and *M. tenella* see Müller-Doblies & Müller-Doblies (1997, 2010).

On 31st December 1973 Olive M. Hilliard, the renowned explorer of the Drakensberg, collected a *Massonia* species on top of the Sani Pass in Lesotho. She deposited this plant under the name *Massonia bowkeri* under her collecting number *Hilliard* 5410 (NU0023144-0!) (Fig. 3). A short description of the plant was also given on the label of the sheet as “Flowers white, sweetly scented, anthers olive green, bracts and backs of leaves purple, upper leaf surface dull blue green”. Prior to this collection M. Grice had already collected a *Massonia* sp. on the Sani Pass in February 1973 (NU0025719-0!). It is worth mentioning that Jessop (1976) did not cite the latter specimens in his revision of *Massonia*.

On 8th December 1979, L.S. Davis collected an unidentified species of *Massonia* in the Sehlabathebe area in Lesotho, on top of one of the Devil’s Knuckles (NU0025718-0!).

The *Massonia* from the Sani Pass was presented by Hilliard & Burt (1987) in their book on the Southern Natal Drakensberg as *Massonia* sp. with the following remarks: “perhaps a small form of *M. echinata* L.f., but leaves smooth.” Hilliard (1990) also presented an illustration drawn by L.S. Davis of the *Massonia* from the summit plateau of the Natal Drakensberg that she named *M. echinata*. However, the plants from the Drakensberg differ in several respects with “*M. echinata*” *sensu* Müller-Doblies & Müller-Doblies (1997), a plant restricted to the surroundings of Nieuwoudtville in the Western Cape province of South Africa.

We were able to study a wild *Massonia* population at the top of the Sani Pass in Lesotho in February 2011. In the last years, the seeds of *Massonia* from the Sani Pass and other locations in the eastern and north-eastern Lesotho were occasionally made available by the seed trade and by seed exchange. In 2012 we were also able to study *Massonia* plants from the Black Mountains in Lesotho that flowered in culture at the Alpine House of the RHS Garden Wisley under the supervision of Paul Cumbleton. Recently, some photographs of *M. saniensis* became available on the Internet on iSpot, and some other private websites.



FIGURE 2. Flowering specimen of *Massonia wittebergensis* U.Müll.-Doblies & D.Müll.-Doblies in habitat at the top of Naudesnek, South Africa. Photographed: 2013/12/14.

Our morphological and molecular studies led to the conclusion that the *Massonia* populations from eastern and north-eastern Lesotho represent a distinct new species related to *M. wittebergensis* and *M. jasminiflora*, yet readily distinguishable by floral and vegetative characters. Here, we describe this new species as *Massonia saniensis*.

Materials and Methods

Material from Lesotho and South Africa was studied. Detailed morphological studies of *Massonia saniensis* (from Lesotho), *M. wittebergensis* and *M. jasminiflora* (both from South Africa) were undertaken on natural populations and cultivated specimens as elaborated upon in Martínez-Azorín *et al.* (2007, 2009). Material of *M. saniensis* examined:—LESOTHO. Bushman's Nek (2929CC): basalt slopes in Sehlabathebe N.P., 2700 m, 2011/01/30 fruiting, Nick Helme (Photo! ispot: <http://www.ispot.org.za/node/218283>) [as *Massonia wittebergensis*]; Sani Pass (2929CB): Sani Top, 9400 ft. [approx. 2865 m], in silt patches over wet sheets, very common in places, 1973/12/31 flowering, O. Hilliard 5410 (holotype NU!, isotypes E, K, MO) [as *Massonia bowkeri*]; Sani Pass (2929CB): Sani Top, 2880 m, 2011/02/24 fruiting, Wolfgang Wetschnig & Gerfried Deutsch s.n. (v.v. and Photo!); Sani Pass (2929CB): surroundings of Sani Pass, 2010/01/21 fruiting, Harry de Vries (Photo! <http://www.harriedevries.nl/travels/slid108/web4.htm>) [as *Massonia echinata*]; Giant's Castle (2929AD): Mokhotlong sources (near Redi and Retsane rivers), 2005/12/12 flowering, Khotso Kobisi (Photo!); Giant's Castle (2929AD): Sanqebethu river, 2005/12/07 flowering, Khotso Kobisi (Photo!); Mont-Aux-Sources (2828DD): Mokhotlong Distr., Tlaeng Pass, 3205 m, 2010/01/05 fruiting, Andreas Gröger

(Photo!) [as *Massonia echinata*]; Mont-Aux-Sources (2828DD): Letseng Diamond Mine, *Bongani Ntloko* (personal communication); Mont-Aux-Sources (2828DD): hillslope overlooking Mothae Diamond Mine, ~ 3000 m, 2006/01/15 flowering, *Khotso Kobisi* (Photo!); Black Mountains, (cultivated by Paul Cumbleton at the Alpine house of the RHS Garden Wisley, flowering on 2012/06/15, v.v.) [as *Massonia echinata*]; Black Mountains, 3000 m, *Terry Smale* (Photo! <http://www.smale-conophytum.co.uk/gallery.htm>) [as *Massonia jasminiflora* subsp. *aestivalis* n.n.]. Thaba-Tseka, 2009/01/02 fruiting, *Judd Kirkel W* (Photo! ispot: http://www.ispot.org.za/node/152807?nav=parent_ob) [as *Massonia echinata*]. Specimens of closely related taxa are shown in Table 1. Herbarium specimens were studied from the herbaria GZU, GRA, NU, K and TCD (acronyms according to Thiers 2014) (Table 1). Authorities of the cited taxa follow IPNI (2014). Orthography of geographical names and grid-number system follows Leistner & Morris (1976). Morphological measurements and illustrations of leaves were performed on fresh and on herbarium material from wild plants. Morphological measurements of flower parameters were taken from cultivated plants. It has been shown that cultivated *Massonia* plants retain the size and proportions of wild flowers (Wetschnig *et al.* 2012, Pinter *et al.* 2013). SEM-micrographs of the leaf-surface: an 8 × 5 mm section of one fresh leaf was fixed in 70% ethanol. After substitution of ethanol by acetone critical point drying was performed using a Baltec CPD030. The leaf then was mounted on aluminium stubs and coated with gold in an Agar sputter coater. Electron micrographs were obtained with a Philips XL 30 ESEM scanning electron microscope (SEM) operating at 20 kV.

TABLE 1. List of taxa closely related to *M. saniensis* investigated in the present study, with voucher and locality information. Vouchers are deposited at GRA, GZU, K, MA, SALA and TDC. Abbreviations: WW = Wolfgang Wetschnig; APD = Anthony P. Dold.

Taxon	Voucher	Locality
<i>Massonia bowkeri</i> Baker	Barber s.n. (TDC! type)	ZAF: “Orange Free State“
<i>Massonia greenii</i> Baker	Green s.n. (K! type)	ZAF: “... near Kimberley“
<i>Massonia jasminiflora</i> Burch. ex Baker	Burchell s.n. (K! type)	ZAF: “... near Takun”
	WW 04494 (GZU!)	ZAF: 2926AA, Bloemfontein
	WW 04482 (GZU!)	ZAF: 3026BA, Smithfield
	WW 04948 (GZU!)	ZAF: 2826DB, Winburg
<i>Massonia wittebergensis</i> U.Müll.-Doblies & D.Müll.-Doblies	Drège 3509 (K! type)	ZAF: “Wittebergen“
	WW 04487 (GZU!)	ZAF: 3027DB, Ben Macdhui
	Aedo 15201 <i>et al.</i>	ZAF: “pr. Tiffindell”
	(SALA151172!, MA!)	
	WW 04488 (GZU!)	ZAF: 3028CA, Naudesnek
	APD s.n. (GRA!)	ZAF: 3028CA, Naudesnek

Description of the new species

Massonia saniensis Wetschnig, Mart.-Azorín & M.Pinter, *sp. nov.* (Figs. 3–9)

Planta herbacea perennis. Bulbus ovoideus, tunicatus, ca. 10 × 8 mm, tunicis papyraceis brunneis vestitus. Folia 2, coaetanea, decidua, elliptica, apice acuta vel rotundata breve apiculata (apiculo ca. 1 mm), 1.5–3 cm longa et 0.8–1.3 cm lata, ad solum adpressa, supra glauco-viridula, laxe pustulata (pustulas viridulas 1–1.5 mm diam. et 0.4 mm altis, ad apicem papilla minutissima inconspicua munitas), subtus viridula. Perigonium albidum. Tubus perigonii 6.5–7.5 mm longus et 2–3 mm diam. albidus. Segmenta reflexa, vix sigmoidea 4 mm longa et 1.9–2.1 mm lata, apice macula viridi referta. Filamenta crassiuscula, attenuata, albida, 2.5–3 (4) mm longa, in tubum brevem (0.5–1 mm altum) a basi connata. Antherae statu clauso ca. 1.5 mm longae, oblongae, cyanellae. Ovarium 1.8–2.5 mm diam. et 2.5–4 mm altum, in stylo gradualiter desinente. Capsula 4–6 mm diam. et 5–7.5 mm alta, sectione triangulari. Semina 1.8–2.3 × 1.4–1.8 mm, ellipsoidea, nigra, nitidula, ad chalazam complanata. Species notabilis combinatione unica characterum ab omnibus speciebus Massoniae differt foliis parvis, glauco-viridulis, supra minutas pustulas viridulas (omnes ad apicem papilla minutissima inconspicua munitae) laxe obsitis; segmentis perigonii reflexis vix sigmoideis; filamentis in tubo breve connatis; antheris cyanellis polline flavido; atque ovario in stylo gradualiter desinente.

Type:—LESOTHO. Sani Pass (2929CB): Sani Top, 9400 ft. [approx. 2865 m], in silt patches over wet sheets, very common in places, 31/12/1973, *O. Hilliard 5410* (holotype, NU! Fig. 3; isotypes, E, K, MO).



FIGURE 3. Holotype of *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter. Scan of *O. Hilliard* 5410 (NU holotype).

Herbaceous perennial bulbous geophyte. Roots branched, usually present for about two vegetation periods. Bulb ovoid, ca. 10×8 mm, inner scales fleshy and white, outer tunics papery and brownish. Leaves 2, deciduous, leaf blades opposite, spreading and appressed to the ground, $1.5\text{--}3 \times 0.8\text{--}1.3$ cm (up to 5×2 cm in cultivation), synanthous, elliptic with acute to obtuse apex, with a short apicule ca. 1 mm long, narrowed into a subterranean petiole up to 30 mm long that clasps the inflorescence; adaxial side glaucous green with scattered dark green emergences, $64\text{--}112$ per cm^2 , $1\text{--}1.5$ mm in diameter, 0.4 mm high, with one very short papilla on top (visible only through the microscope); abaxial side green, smooth. Inflorescence a dense, subcapitate raceme, up to 0.5–1 cm long, with 4–12(–20) flowers, shortly overtopping ground level. Bracts membranous, green or green with a purplish flush in the upper half and white below (translucent and purplish after flowering), glabrous with entire margins; lower bracts suborbicular $12\text{--}15 \times 10\text{--}11$ mm; upper bracts narrowly ovate, $14\text{--}17 \times 5\text{--}7$ mm. Pedicels about 5 mm long. Flowers proterandrous, tubular, actinomorphic, with a “bowieoid” (smelling like the flowers of *Bowiea volubilis*) or “sperm-like” smell. Perigone white, free segments $4 \times 1.9\text{--}2.1$ mm, white with a greenish tip, first straight and erect, later spreading and finally reflexed with a slight sigmoid curve but not spirally curled in at the base at anthesis. Perigone-filaments tube $6.5\text{--}7.5 \times 2\text{--}3$ mm, cylindrical, white. Filaments white, free portions narrowly triangular, $2.5\text{--}3(4)$ mm long, rather fleshy and thickened, straight, suberect to spreading, connate at the base for ca. 0.5–1 mm above the perigone to form a funnel shaped, white filament tube. Anthers ca. 1.5 mm long when closed, oblong, with blue anther wall, dorsifixed. Pollen yellow. Gynoecium cenocarpous-syncarpous, narrowly obclavate, with septal nectaries; nectar colourless, sometimes yellow when aged. Ovary oblong, green, $2.5\text{--}4 \times 1.8\text{--}2.5$ mm, with ~8 ovules/carpel; style white, $7.5\text{--}10 \times 1\text{--}1.5$ mm, thick, narrowly triangular, erect, gradually tapering to the punctiform stigma, ending at about the same level as the anthers or shortly overtopping them. Capsule loculicidal, $5\text{--}7.5 \times 4\text{--}6$ mm, valves splitting down to the base, ovate-oblong in lateral view and trigonous in apical view. Seeds black, with a greyish overlay (epicuticular wax), somewhat glossy, $1.8\text{--}2.3 \times 1.4\text{--}1.8$ mm, ellipsoidal, flattened at the chalazal region, with an inclined, conical apex at the micropylar region. (Figs. 3–9).



FIGURE 4. Flowering specimen of *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter in habitat at Sanqebethu river, Lesotho (Photo *Khotso Kobisi*; Photographed: 2005/12/07).

Etymology:—The species is named after the famous Sani Pass connecting South Africa and Lesotho. The spectacular Sani Pass route is considered to be one of the steepest mountain passes in the world.

Biology:—Flowering time at the natural localities is spanning December and January, seeds are ripe from February to March. *Massonia saniensis* and *M. wittebergensis* are the only really summer-flowering *Massonia* species. In cultivation in Europe they flower in June so they can be cultivated outside of a greenhouse. The high-elevation provenance of the species enables the cultivated specimens to survive European winters which makes the plant an interesting object for speciality gardeners.

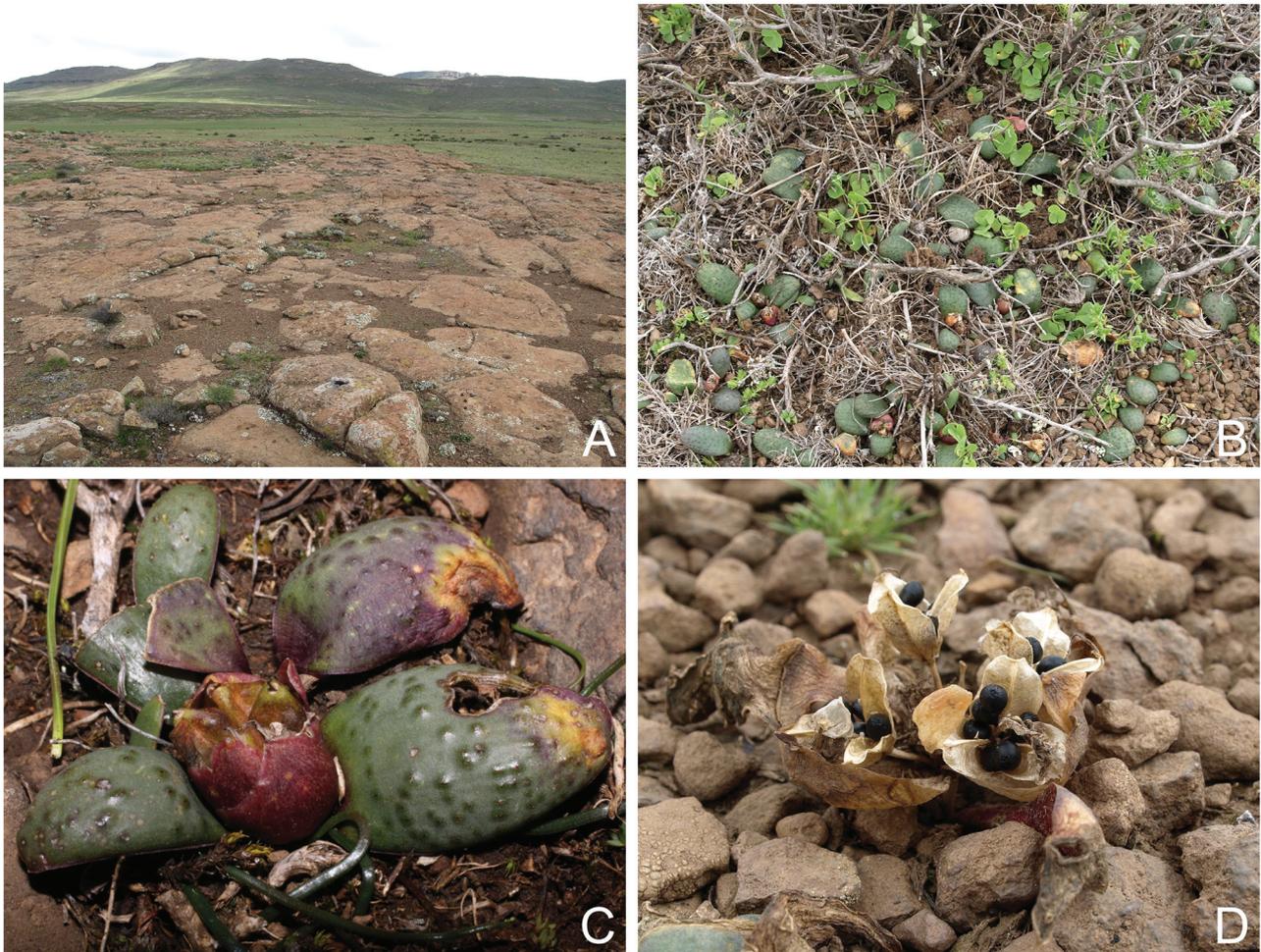


FIGURE 5. *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter in habitat at the top of the Sani Pass, Lesotho. A. Habitat; B. Fruiting plants; C. Fruiting plant with unripe fruits; D. Inflorescence showing ripe loculicidal capsules and seeds. Photographed: 2011/02/24.

Habitat:—The new species occurs at high-elevated plateaus from approximately 2700 to 3200 m above sea level. It grows in seasonally wet basaltic silt and in gravel patches over rock sheets or short damp turf covering the sheets (Hilliard 1990). The known populations are found in vegetation classified as part of the Lesotho Highland Basalt Grassland vegetation unit (Grassland Biome; Mucina & Rutherford 2006). This region shows mainly summer rainfall with little rain in winter, with a mean annual rainfall of only 575 mm in the rain-shadow areas of the interior (e.g. Mokhotlong) and some more along the eastern edge (e.g. 928 mm at Qacha's Nek; cf. Mucina & Rutherford 2006).

Distribution:—Known to us from Sehlabathebe, Sani Pass, Redi, Retsane and Sanqebethu rivers and Tlaeng Pass in eastern Lesotho (Fig. 10).

Taxonomic relationships:—*Massonia saniensis* can be easily distinguished from all other species of the genus by the characteristic small, glaucous green leaves with scattered dark green emergences with a minute papilla on top, the reflexed perigone segments, not spirally curled in at the base at anthesis, the short filaments-tube, the blue anthers with yellow pollen, and the style gradually tapering from the ovary (Figs. 3–9). Its closest known relative appears to be *M. wittebergensis* that shares the small leaves, reflexed perigone segments, short filaments-tube and yellow pollen, but the latter differs by the unique emergences on the upper side of the leaves bearing laterally compressed bristles, 0.3–1 mm long, usually curved and sometimes forked, and the yellow to orange anthers with purplish flush, among other characters (Table 2). *Massonia jasminiflora* differs from the new species by the much larger leaves lacking emergences, larger and spreading perigone segments, longer perigon-filaments tube and blue pollen (Table 2).

Specimens of *Massonia saniensis* have erroneously been named *M. bowkeri* and *M. echinata* in herbarium collections, books and on photographs published on the internet. However, *M. bowkeri* has been regarded as a synonym of *M. jasminiflora* based on their very similar flower and leaf morphology, and therefore, differing from *M. saniensis* in the same respects. “*Massonia echinata*” *sensu* Müller-Doblies & Müller-Doblies (1997) clearly differs from *M. saniensis* by the longer perigone-filaments tube, the longer filaments, the strongly sigmoid and spirally curled in perigone segments, and its allopatric distribution.

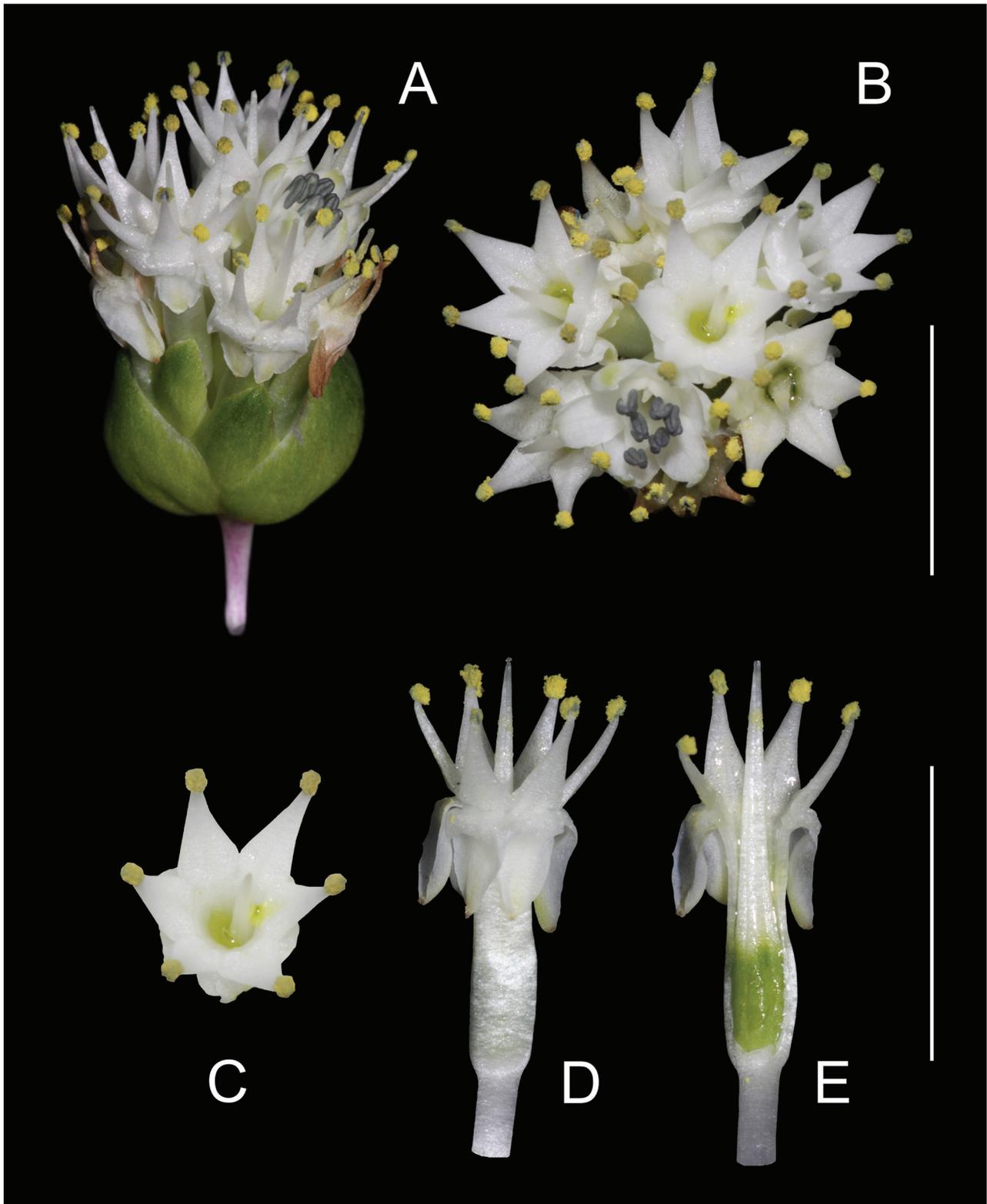


FIGURE 6. Inflorescence and flower morphology of *Massonia saniensis* Wetschnig, Mart.-Azorin & M.Pinter. A. Inflorescence in lateral view; B. Inflorescence in apical view; C. Flower in apical view; D. Flower in lateral view; E. Flower in lateral view, frontal parts of perigone and androecium removed. Scale bars: 1 cm.

In our preliminary phylogenetic studies *Massonia saniensis*, *M. wittebergensis* and *M. jasminiflora* form a well-supported clade within the genus *Massonia*. *Massonia saniensis* is sister to a clade formed by the other two species. A more complete sampling of *Massonia* including a higher number of taxa and additional markers is in preparation (Wetschnig *et al.* in preparation).

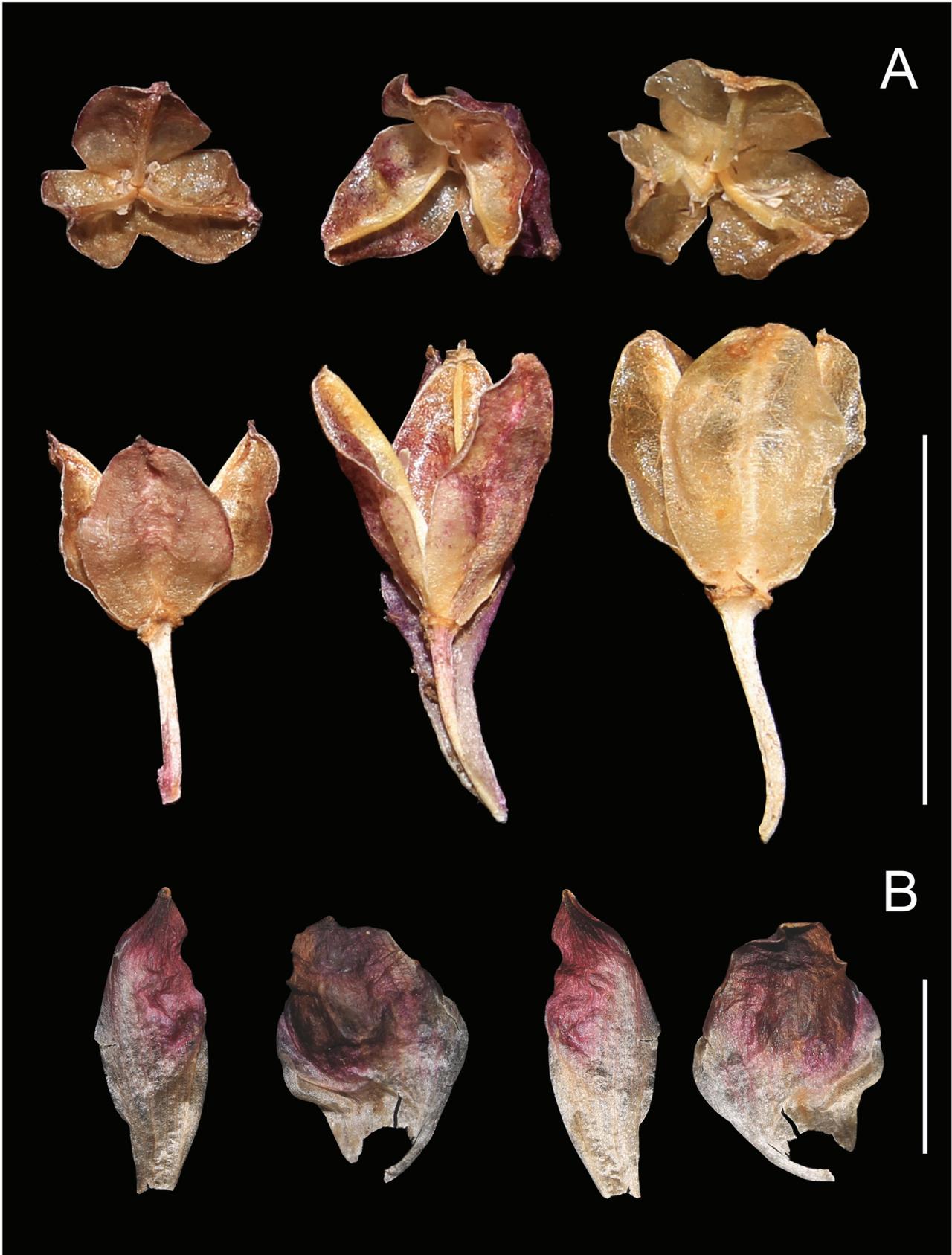


FIGURE 7. Fruit morphology and bracts of fruits of *Massonia saniensis* Wetschnig, Mart.-Azorin & M.Pinter. A. Three ripe fruits in apical and lateral view; B. Bracts: upper and lower bract—abaxial view, upper and lower bract—adaxial view (from left to right). Scale bars: 1 cm.

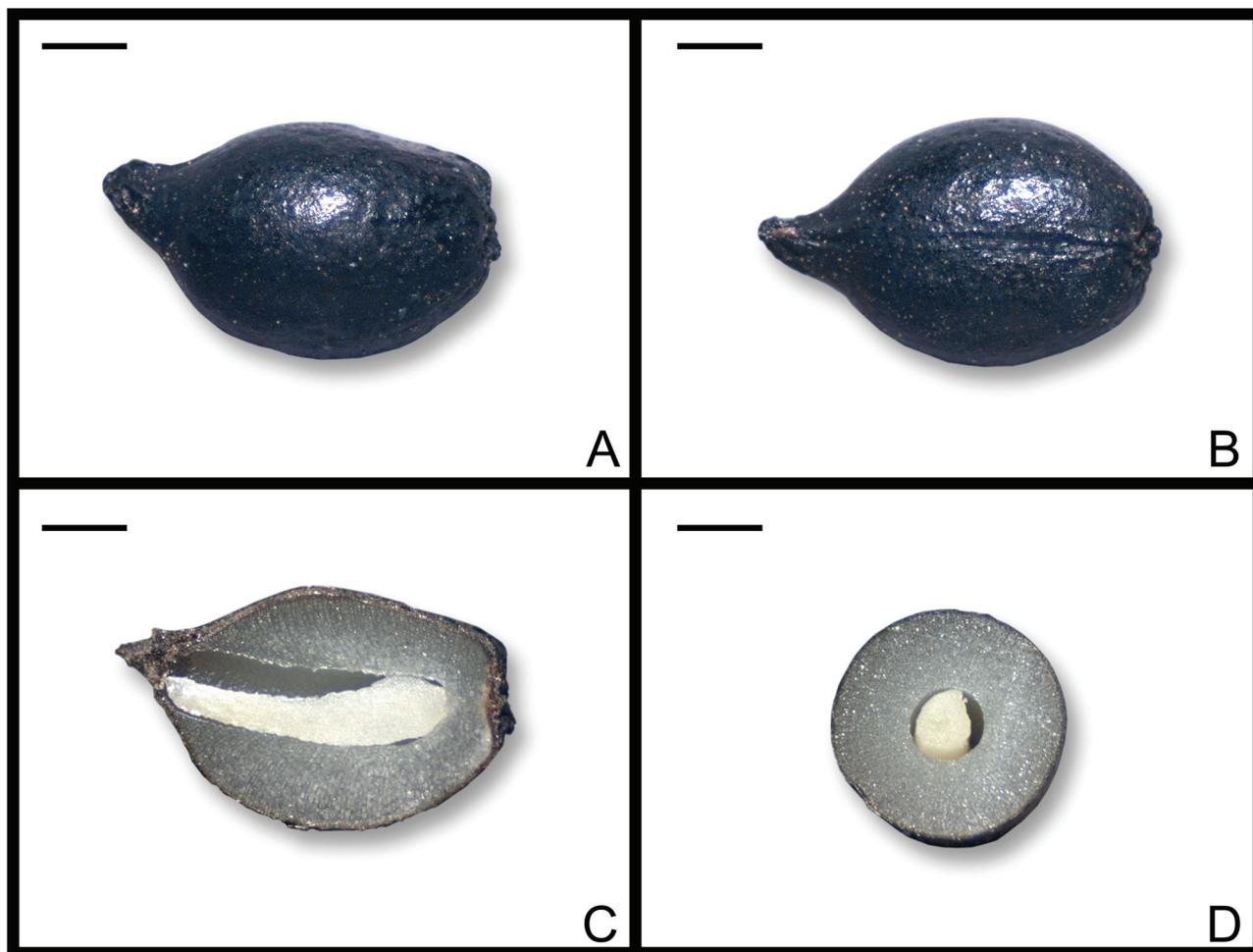


FIGURE 8. Seed morphology of *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter. A. Seed, lateral view; B. Seed, raphal view; C. Seed, longitudinal section; D. Seed, transversal section. Scale bars: 0.5 mm.

TABLE 2. Comparison of main characters of *Massonia saniensis* and related species. Abbreviations: ECP = Eastern Cape Province; LES = Lesotho; OFS = Orange Free State; ZAF = Republic of South Africa.

	<i>M. saniensis</i>	<i>M. wittebergensis</i>	<i>M. jasminiflora</i>
Leaf blade size (cm)	1.5–3 × 0.8–1.3	2–2.5 × 1–1.5	4–10 × 2.5–9
Leaf emergences size (mm)	1–1.5, 0.4 mm high	0.3–0.4 × 0.2–0.4, 0.3–1 mm high	-
Leaf emergences/cm ²	64–112	176–256	-
Leaf emergences type	pustule with a minute papilla on top	bristle-like, laterally compressed, usually curved and sometimes forked with up to 6 minute trichomes on top	absent or with scattered hairs of ca. 0.1 mm length
Perigone segments at anthesis	3–4 × 1.9–2.1 reflexed	3–4 × 1.5–1.7(–3) reflexed	5–8 × 3–4 spreading
Perigone-filaments tube (mm)	6.5–7.5 × 2–3	5–7 × 2	10–21 × 3–4
Free portion of filaments length (mm)	2.5–3(–4)	1.5–2	2–3
Filaments-tube length (mm)	0.5–1	0.3–0.5	2–3
Anther colour	blue	yellow to pale purple	blue
Pollen colour	yellow	yellow	blue
Ovary (mm)	2.5–4 × 1.8–2.5	3–4 × 1–2	4–6 × 1.5–3
Style (mm)	7.5–10	5–7	7–15
Distribution	LES	ZAF: ECP	ZAF: OFS

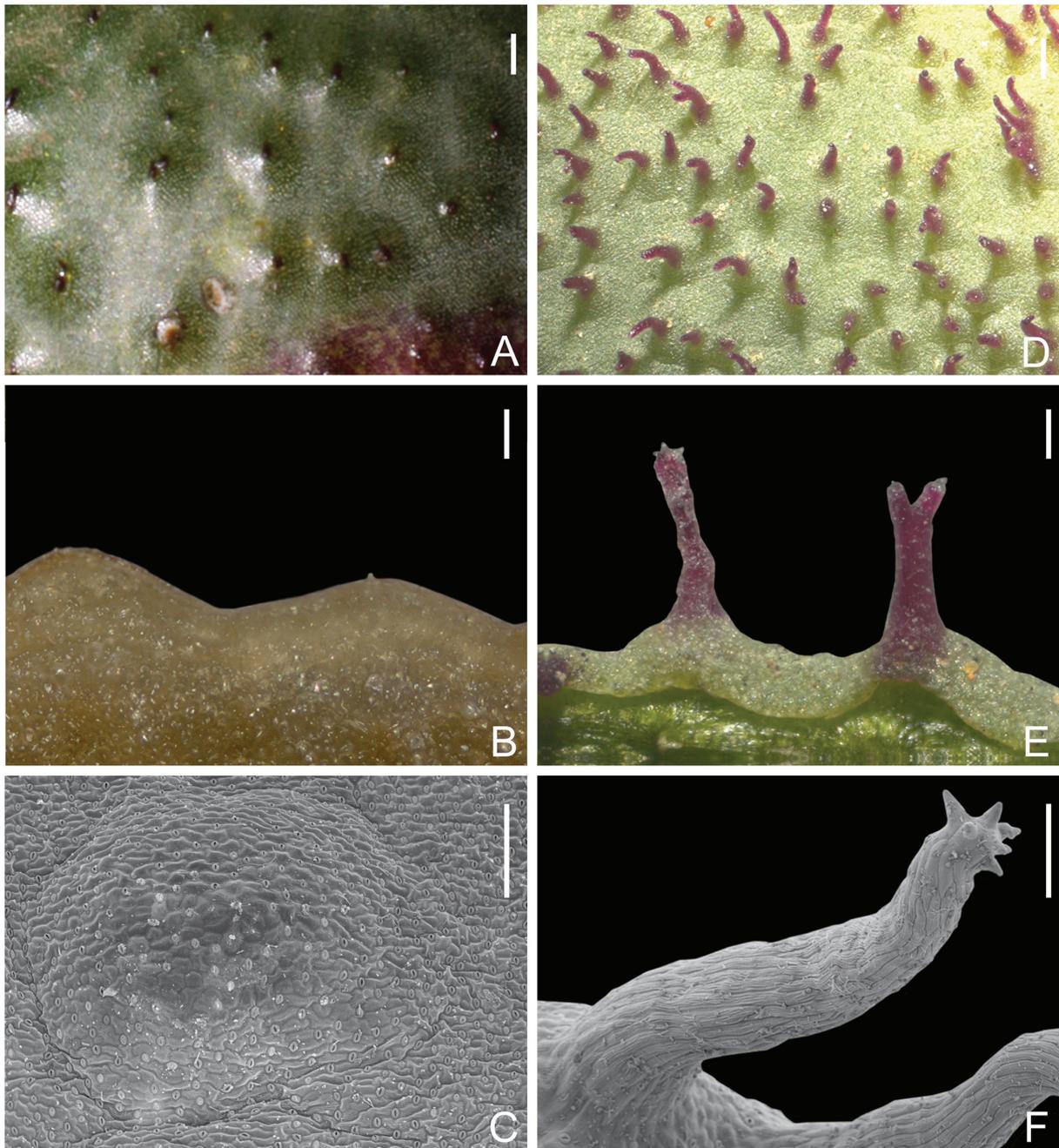


FIGURE 9. Leaf surface and emergence morphology of *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter. (A–C), and *Massonia wittebergensis* U.Müll.-Doblies & D.Müll.-Doblies (D–F). A, D. Leaf surface in apical view; B, E. Section of leaf showing emergence morphology in lateral view (B fixed material, E fresh material); C, F. SEM micrographs of leaf surface showing emergence morphology. Scale bars: A, D 0.5 mm, B, C, E, F 0.2 mm.

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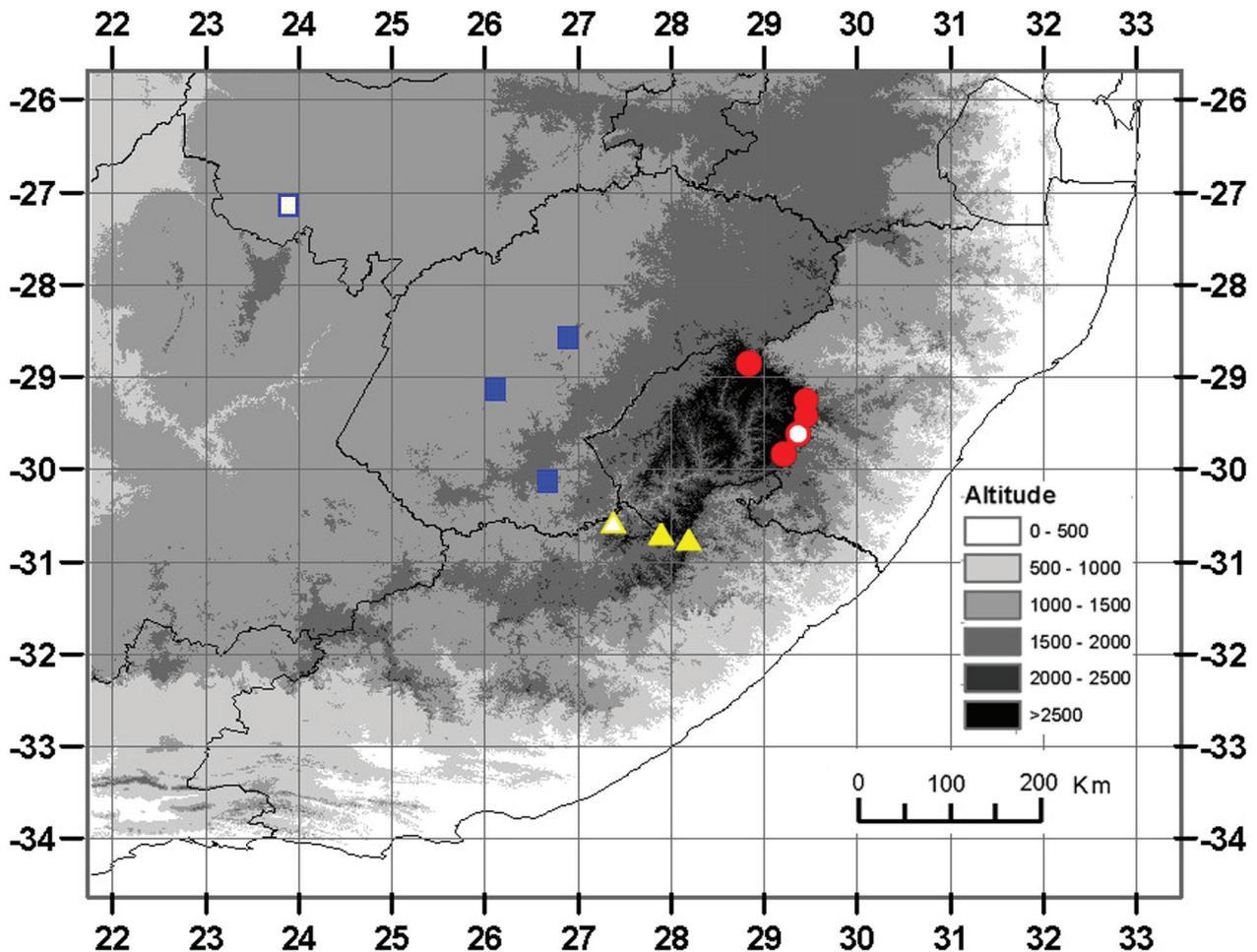


FIGURE 10. Known distribution of *Massonia saniensis* Wetschnig, Mart.-Azorín & M.Pinter (red circles), *Massonia wittebergensis* U.Müll.-Doblies & D.Müll.-Doblies (yellow triangles) and selected localities of *Massonia jasminiflora* Burch. ex Baker (blue squares). Type localities are indicated by symbols with white centres.

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