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The genus *Massonia* Thunb. ex Houtt. (Hyacinthaceae: Scilloideae) in the Core Cape Floristic Region

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ABSTRACT

A taxonomic account is presented for the species of *Massonia* recorded from the core Cape Floristic Region. A total of 15 species are recognised, 13 endemic to the region, distributed between sect. *Whiteheadia* and sect. *Massonia*. Several species are local endemics known from a single locality or restricted area, although *M. bifolia* and *M. depressa* are widely distributed through much of the Greater Cape Floristic Region or even beyond into interior South Africa. All published names based on plants known to have been collected within the core CFR are accounted for, and several new synonyms are identified, including two earlier names for more recently described species, with *M. citrina* M.Pinter et al. (2013) considered to be a synonym of *M. triflora* Compton (1931), which is recognised as a species distinct from *M. depressa* Houtt., and *M. dregei* Baker (1879) identified as an earlier name for *Neobakeria visserae* P.E.Barnes (1933). A full description and nomenclature are provided for each species, with notes on distribution and ecology, as well as an identification key to the species. Most species are illustrated.

1. Introduction

Massonia Thunb. ex Houtt. (Hyacinthaceae subfamily Scilloideae tribe Massonieae; alternatively Asparagaceae subfamily Scilloideae tribe Hyacintheae) is one of several geophytic genera centred in the winter-rainfall region of southern Africa (Manning et al., 2002). The circumscription of the genus has undergone significant changes since it was named by Houttuyn (1780). In its narrow sense, *Massonia* is distinguished from allied genera in Massonieae with just two leaves by its contracted, sub-capitate inflorescence with large lower bracts forming a pseudo-involucre in flower. On the basis of emerging data on phylogenetic relationships among the genera of Hyacinthaceae, Manning et al. (2004) broadened the circumscription of *Massonia* to include the small genus *Whiteheadia* Harv., and later *Desertia* Mart.-Azorín et al. (Manning, 2017), which differ from *Massonia* essentially in having an elongate inflorescence. Although an alternative taxonomy for the group has been proposed by Martínez-Azorín et al. (2015c), the relationships among these taxa that informed the taxonomy suggested by Manning et al. (2004) are supported in the available phylogenetic analyses (see Martínez-Azorín et al., 2015b), and the latter taxonomy is retained here, with the relevant new combinations provided at sectional level.

Massonia, in this sense, is recognised by the consistently two foliage leaves, a capitate-corymbose or subspicate inflorescence with the lower bracts at least usually as long as or longer than the flowers, campanulate or tubular flowers with ecaudate tepals, and firm-textured capsules that are exposed by the dry, withered perianth at maturity (Manning et al., 2004). This circumscription of *Massonia* is comparable in its morphological diversity with that of the allied genus *Lachenalia* J. Jacq. ex Murray, in which the inflorescence varies from contacted-subcapitate and borne at ground level to exserted and racemose or spicate, and in which the upper floral bracts may be somewhat enlarged (Duncan, 2012).

Over 90 names have been published in the genus *Massonia* but approximately one-third of these belong in related genera (Wetschnig et al., 2012), primarily *Daubenya* Lindl. and *Lachenalia* J. Jacq. ex Murray. Species of *Massonia* have been circumscribed very differently by different authors, and it is only recently that the circumscription of the species has begun to stablise. Currently some 30 species are accepted in the genus, restricted to southern Africa from southern Namibia through temperate South Africa to Lesotho.

The account of *Massonia* by Baker (1897) for the *Flora capensis* is the most important of the early treatments of the genus. In it, Baker (1897) recognised 32 species, the great majority of which were named by him. Most of the species at this time were represented by very few

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herbarium collections, and some were known only from the type illustration or specimen, or even just the protologue description. Although Baker (1897) considered *Massonia* to be related to Alliaceae and Agapanthaceae on account of the contracted, subcapitate inflorescence surrounded by large bracts, this is an erroneous association based on superficial resemblances only. By the time that Jessop (1976) revised the genus its true relationships in Hyacinthaceae had been established (Jessop, 1975). Although accurate in his assessment of its relationships, Jessop (1976) was less successful in his treatment of the species. Hampered by lack of field experience, he implemented very broad circumscriptions that reduced the number of species to seven, just two of which are still accepted in this way today. The inadequacy of this treatment was partially addressed by Müller-Doblies and Müller-Doblies (1997, 2010), who studied the genus extensively in the field. Their account, although very incomplete, identified some new characters useful in species discrimination, and established more natural circumscriptions for several of the species. Their review, however, focussed very narrowly on the southwestern and western part of South Africa. A more popular treatment by Summerfield (2004), largely following Jessop's (1976) taxonomy, added little to our understanding of the species. Since then the genus has been the subject of instensive field and particularly laboratory study, leading to the description of several new species and the clarification of the application of a number of old names (Martínez-Azorín et al., 2013, 2014a, 2014b, 2015a, 2015b, 2015c, 2018a, 2018b; Pinter et al., 2013, 2015; Wetschnig et al., 2012). These accounts have gone a long way to improving our understanding of the genus, although additional species remain to be decribed from interior South Africa, particularly Namaqualand and the Upper Karoo, and the identity of some names is still unclear, especially in the Eastern Cape.

Although our knowledge of *Massonia* remains incomplete for other parts of the subcontinent, it is substantially complete for the species that occur within the Core Cape Floristic Region (sensu Manning and Goldblatt, 2012), and it is now possible and appropriate to consolidate the partial and incomplete accounts that are available in order that we have a solid basis from which to progress. This is necessary not only for the identification of specimens and the assessment of the conservation status of the CFR species but also to highlight inadequacies in our understanding that require further study.

2. Materials and methods

This work is based on field and herbarium studies in the Core Cape Floristic Region of Northern and Western Cape, South Africa (Manning and Goldblatt, 2012). We examined all relevant herbarium specimens in BOL, GRA, NBG, PRE and SAM (acronyms after Thiers, 2018), the primary holdings of material from the region, as well as all relevant types, either specimens or electronic images. Descriptions and illustrations are based on fresh and/or herbarium material.

Species circumscriptions largely match those accepted by Müller-Doblies and Müller-Doblies (1997) and the later works of Martínez-Azorín and co-authors (see References), supplemented by field studies. These are in almost all instances much narrower than those adopted by Jessop (1976).

3. Results and discussion

A total of 15 species of *Massonia*, or half of those currenty accepted in the genus, are recognised from the core Cape Floristic Region (sensu Manning and Goldblatt, 2012) (Fig. 1), of which 13 are considered to be endemic to the region. Most of the species are local endemics, sometimes known from a single locality or small area, whereas *M. bifolia* and *M. depressa* are widely distributed through much of Greater Cape Floristic Region or even beyond into interior and southeastern South Africa and Lesotho.

Species of *Massonia* are circumscribed here based on consistent albeit sometimes small morphological discontinuities that differentiate among clusters of populations. These differences usually correlate with geographical distribution and sometimes also differences in flowering time and soil preference. Morphological features used to discriminate species include the type of vestiture or ornamentation on the upper surface of the leaves (the lower surface is invariably smooth and glabrous), and the form and dimensions of the flowers, including the length and diameter of the perianth tube, the formation of a sigmoid bend or coil at the base of the open tepals, the development of interstaminal invaginations at the base of the filaments that partially occlude the mouth of the perianth tube, the length of the filaments and their degree of basal connation, the size of the anthers at anthesis before dehiscence, the colour of the anthers and pollen, the dimensions and shape of the ovary, the length of the style, and the size and shape of the capsules. The utility of foliar ornamentation is limited by the frequent occurrence of laevigate or glabrous individuals or even populations in many species that typically have ornamented foliage.

All published names based on plants known to have been collected within the Core CFR are accounted for, and several new synonyms have been identified, including two earlier names for more recently described species. Thus *M. citrina* M.Pinter et al. (2013) is treated as synonym of *M. triflora* Compton (1931), which is recognised as a species distinct from *M. depressa* Houtt. (1780), and *M. dregei* Baker (1879) is identified as an earlier name for *Neobakeria visserae* P.E.Barnes (1933). A full description and nomenclature are provided for each species, with notes on distribution and ecology, as well as an identification key to the species. Most species are illustrated.

3.1. Key to species of Massonia in the Core Cape Floristic Region

1a. Inflorescence subspicate, conical, protruding well above the foliage; bracts spreading, uppermost sterile and forming a small or conspicuous coma . . . . . 1. *M. bifolia.*

1b. Inflorescence corymbose and sub-capitate, scarcely protruding above the foliage; bracts suberect, the lowermost forming an involucre around the inflorescence:

2a. Perianth tube campanulate or broadly cylindric, 3–5 mm diam.; mouth of perianth tube 4–6 mm across, usually exposing ovary:

3a. Filaments (10–)11–28 mm long, connate at base for 1–3 mm; style 14–30 mm long, straight or apically hooked in bud:

4a. Leaves pustulate (rarely smooth); filaments connate at base for (2.0–)2.5–5.0 mm, white with conspicuously contrasting dark green or bluish black basal collar; anthers 2.5–3.0 mm long at anthesis; plants from Overberg and southern coast. . . . . 7. *M. pustulata.*

4b. Leaves smooth or papillate; filaments connate at base for 1–3 mm, cream-coloured to red with pale or reddish basal collar; anthers (2.5–)3.0–4.0 mm long at anthesis; plants from West Coast and interior. . . . . 6. *M. depressa.*

3b. Filaments 3–10 mm long, connate at base for 0.5–1.5 mm; style 6–12 mm long, apically hooked or bent, at least in bud:

5a. Tepals spreading from base and overlapping basally; style remaining hooked after anthesis. . . . . 2. *M. obermeyerae.*

5b. Tepals with sigmoid bend or curve at the base, not overlapping; style straightening after anthesis:

6a. Tepals 7–9 mm long; filaments 8–10 mm long; style 10–12 mm long. . . . . 3. *M. triflora.*

6b. Tepals 4–6 mm long; filaments 3–6 mm long; style 4–8 mm long:

7a. Leaves smooth or papillo-tuberculate, tubercles topped with blunt, spherical or ellipsoid trichome. . . . . 4. *M. latebrosa.*

7b. Leaves scabro- or echino-tuberculate, tubercles pointed or topped with acute, conical or almost uncinate trichome. . . 5. *M. echinata.*

2b. Perianth tube narrowly cylindric, 2–3 mm diam.; mouth of perianth tube 2.0–3.5 mm across with ovary deeply included and concealed:

8a. Tepals patent or with weak sigmoid curvature at base; anthers blue to purple (rarely yellow) with blue or yellow pollen:

Fig. 1. *Massonia* species occurring in the Core Cape Floristic Region. A, *M. bifolia*, Steinkopf, Northern Cape; B, *M. triflora*, Rooihoogte Pass, Western Cape; C, *M. latebrosa*, Klein Roggeveld, Western Cape; D, *M. depressa*, Matjiesfontein, Western Cape; E, *M. depressa*, Ouberg Pass, Roggeveld, Northern Cape; F, *M. pustulata*, Napier, Western Cape; G, *M. tenella*, Nieuwoudtville, Northern Cape; H, *M. dregei*, Lambert's Bay, Western Cape; I, *M. dregei*, Jacobsbaai, Western Cape; J, *M. inaequalis*, Eland's Bay, Western Cape; K, *M. setulosa*, Napier, Western Cape; L, *M. pseudoechinata*, Nieuwoudtville, Northern Cape. Photographer: John Manning.

9a. Perianth tube 2.5–7.0 mm long; filaments equal, 3.5–7.5 mm long; style 6–8 mm long; plants from Bokkeveld Mtns. . . . . 8. *M. tenella.*

9b. Perianth tube 6–20 mm long; filaments unequal, with outer series 2 mm or more longer than inner and (3.5–)5–12 mm long; plants from West Coast to Cederberg:

10a. Tepals remaining erect or slightly recurved distally; perianth tube 15–17 mm long; inner filaments ± half as long as outer, 3.5–5.0 mm long. . . . . 10. *M. inaequalis.*

10b. Tepals spreading; perianth tube 11–18 mm long; inner filaments more than half as long as outer:

11a. Filaments connate below into a short collar or column 1.5–2.5 mm long; ovary conical, tapering into style; plants from coastal rock outcrops. . . . . 9. *M. dregei.*

11b. Filaments connate only basally for 0.5–1.0 mm; ovary oblong, ± contracted into style; plants from West Coast Mountains. . . . . 11. *M. pygmaea.*

8b. Tepals strongly sigmoid-coiled at base:

12a. Anthers blue to purple with blue pollen; ovary conical, tapering into style:

13a. Leaves smooth or echino-tubercled with bristles 0.2–0.5 mm long; bracts glabrous; plants from Bokkeveld Mtns. . . . . 15. *M. pseudoechinata.*

13b. Leaves hirsute with hairs or bristles 0.5–2.0 mm long; bracts distally ciliate-bristly; plants from South Coast. . . . . 14. *M. hirsuta.*

12b. Anthers yellow or pinkish with yellow pollen; ovary ellipsoid, contracted into style:

14a. Leaves scabrid or hispid without pustules; filaments 7–10 mm long, with interstaminal invaginations or swellings at base occluding mouth of tube. . . . . 13. *M. setulosa.*

14b. Leaves densely pustulate; filaments (8–)12–17 mm long, without basal invaginations occluding mouth of tube. . . . . 12. *M. longipes.*

3.2. Taxonomic account

Massonia Thunb. ex Houtt., *Nat.* Hist. 2(12): 424 (1780). Type: *M. depressa* Houtt.

Deciduous geophytes; *bulb* subterranean, subglobose, tunicated; outer tunics brown and papery or thinly leathery, often lightly barred above; roots slender. *Leaves* 2, opposite, contemporary with flowers, prostrate or spreading, oblong to suborbicular, clasping at base, glabrous or variously pustulate-pubescent or bristly, subsucculent or leathery, uniformly green or spotted or streaked purple. *Inflorescence* a several- to many-flowered raceme, either cylindrical and spike-like, protruding well above the foliage, or condensed and corymbose or subcapitate and borne at ground level; peduncle contracted; bracts relatively large, not spurred, in capitate-flowered species lower bracts forming a pseudo-involucre, in spicate species the uppermost bracts sometimes sterile and enlarged to form a leafy coma, lanceolate to transversely ovate, membranous or subsucculent, smooth or papillose to ciliate on margins; bracteoles lacking; pedicels suberect and elongating in fruit, sometimes very short. *Flowers* spreading or suberect, often scented; perianth greenish, white, cream-coloured, yellowish or pink, campanulate to cylindrical; *tepals* united into a short or long tube, either spreading or recurved to recoiled at base and sometimes sharply inflexed in a transverse, sigmoid fold, linear to ovate, acute, persistent. *Stamens* suberect or erect, filaments inserted at mouth of perianth tube, ± united at base into a shallow cup, the inner sometimes shorter, firm-textured, subulate to filiform; anthers versatile. *Ovary* ovoid or obtriangular and contracted above into the style or conical and narrowing imperceptibly into the style; ovules numerous per locule; style terete and firm-textured, erect or weakly declinate, sometimes apically hooked; stigma apical, penicillate. *Capsule* papery, inflated, obtriangular and 3-lobed or 3-winged. *Seeds* numerous per locule, subglobose, dull black, smooth or rugulose, testa tightly adhering. *Chromosome number: 2n* = 18, 22, ?26, 40 (Goldblatt et al., 2012).

Species ±30; South Africa, southern Namibia and Lesotho; widespread in semi-arid and subalpine areas, especially the winter-rainfall region.

Named for the Kew gardener F. Masson (1741–1805) by his fellow traveller and collector, the Swedish botanist C.P. Thunberg (1743–1828), who were among the first scientists to collect the genus. Masson encountered several species of *Massonia* during his two visits to southern Africa in 1772–1774 and 1786–1795, and was sufficiently intrigued by the plants to mention them in a letter to Thunberg written from the Cape of Good Hope on 21 March 1793 in which he discusses their collections, remarking proudly '…of the Genus Massonia I have discovered four new Species…' (Bradlow, 1994).

3.3. Species treatment

3.3.1. Sect. ***Desertia***

(Mart.-Azorín et al.) J.C. Manning, *stat. et comb. nov*. *Desertia* Mart.-Azorín et al. in Phytotaxa 221: 206 (2015b). Type: *D. etesionamibensis* (U.Müll.-Doblies & U.Müll.-Doblies) Mart.-Azorín et al. = *M. etesionamibensis* (U.Müll.-Doblies & U.Müll.-Doblies) J.C. Manning & Goldblatt.

2 spp., southern Namibia and Richtersveld in Northern Cape, South Africa.

3.3.2. Sect. ***Whiteheadia***

Harvey, The Genera of South African Plants, edn. 2: 396 (1868), *stat. et comb. nov*. Type: *W. latifolia* Harv. = *M. bifolia* (Jacq.) J.C. Manning & Goldblatt.

1 sp., southern Namibia and western South Africa.

1. **Massonia bifolia** (Jacq.) J.C. Manning & Goldblatt in Manning et al. in *Edinb. J. Bot.* 60: 564 (2004); Manning et al.: 324 (2011). *Eucomis bifolia* Jacq.: 215 (1791). *Basilaea bifolia* (Jacq.) Poir.: 591 (1811). *Whiteheadia bifolia* (Jacq.) Baker: 226 (1873); Jessop: 433 (1977); Müller-Doblies and Müller-Doblies: 82 (1997); Martínez-Azorín et al.: 216 (2015b). Type: South Africa, without locality or collector, illustration in Jacquin, Icones plantarum rariorum 2(16): t. 449 (1795), lecto., designated by Jessop: 433 (1976).

Melanthium massoniifolium Andr. [as '*massoniaefolium*']: t. 368 (1804). Type: South Africa: 'Cape', without precise locality or collector, 'in the Hibbertian collection' [no specimen located]; illustration in Andrews: t. 368 (1804), lecto., designated by Manning et al.: 331. (2011)

Whiteheadia latifolia Harv.: 396 (1868); Baker: 418 (1897).Type: South Africa, Northern Cape, Springbok (2917): 'Namaqualand, Modderfontein', (–DB), *Whitehead s.n.* (TCD, holo.).

Deciduous geophyte. *Bulb* subglobose, 20–30 mm diam., outer tunics papery, pale brown. *Leaves* 2, prostrate, elliptic to suborbicular, 80–200 (−240) × 50–170(−200) mm, obtuse to acute, subsucculent and fragile with narrow membranous margins, smooth or minutely denticulate-paillate marginally, pale green with impressed longitudinal veins, smooth. *Inflorescence* a stout, conical, subspicate raceme, few- to many-flowered, protruding 30–110 mm above above leaves; bracts spreading or apically decurved, broadly ovate and concave or cucculate, (15–)20–40(−50) × 8–20(−25) mm, acuminate or attenuate to caudate, subsucculent and persisting in fruit, uppermost bracts sterile and forming a small or conspicuous coma; pedicels stout, up to ±3 mm long. *Flowers* yeast-scented or sour-smelling; perianth pale green; tube campanulate, widening towards mouth, 4–7 × 5–8 mm, mouth 7–10 mm diam., exposing ovary; tepals arising at same level, patent below then incurved-ascending, ovate, 6–9 × 4–6 mm, concave or cucullate, apex penicillate. *Filaments* suberect-arcuate and incurved apically, whitish, subulate to triangular and slightly swollen apically, 8–9 mm long, 3–4 wide at base, shortly connate at base for 1–2 mm in an open fleshy rim, not occluding mouth; anthers dorsifixed, with evident connective on outer surface, 2.5–3.5 mm long at anthesis, pale creamy yellow with pale pollen. *Ovary* obtriangular or angular-obovoid, 3-lobed, green, 3–5 × 3–6 mm, angled above and strongly contracted to style; style green, 4–5 mm long, abruptly differentiated from ovary, ±arcuate and apically hooked or bent, tapering gradually to apex. *Capsule* broadly obovoid and 3-winged or obtriangular, papery, with persistent style, 15–25 mm diam., surrounded at first by persistent, papery perianth. *Seeds* subglobose, ±2 mm diam., smooth. *Flowering time:* June to August. Fig. 1A.

Distribution and ecology: restricted to the higher lying parts of the near-interior West Coast, from southern Namibia along the Namaqualand escarpment and the inselbergs of western Bushmanland in Northern Cape, South Africa, to the Bokkeveld Escarpment, Gifberg and the northern Cederberg in Western Cape, reaching its southerly station on the Pakhuis Pass near Clanwilliam (Fig. 2); in seasonally moist, humic pockets in sheltered rocky sites.

The flowers are adapted to pollination by small ground-dwelling mammals (Wester et al., 2009).

Diagnosis: readily distinguished from the other CFR species of *Massonia* by the subspicate, conical or pagoda-like inflorescence protruding well above the foliage, with characteristic spreading bracts

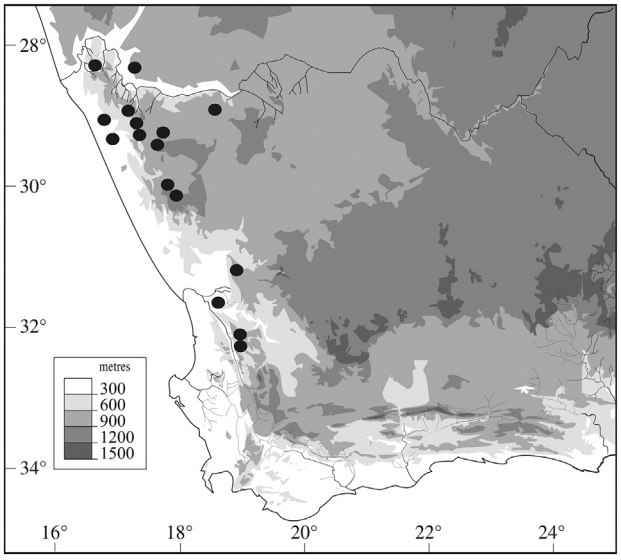

Fig. 2. Distribution of *Massonia bifolia*.

that are cupped or concave at the base where the flowers are situated and acuminate or attenuate apically, the upper bracts sterile and forming a small or conspicuous coma on top of the inflorescence (Fig. 1). The foliage is characteristic in being subsucculent and fragile. The campanulate, greenish flowers with incurved filaments and arcuate, apically hooked style of *M. bifolia* closely resemble those of *M. obemeyerae* from the Great Karoo but that species has a corymbose, subcapitate inflorescence lacking a coma of bracts.

History: one of numerous South African species that were illustrated by N. Jacquin (1781–1795) from plants cultivated at the Schönbrunn Gardens in Vienna, and probably originally collected by the Imperial gardeners G. Scholl and F. Boos, who were despatched to the Cape in 1786.

*Conservation notes:*relatively widely distributed along the western escarpment of Northern and Western Cape, and under no immediate threat through most of its range.

Additional specimens seen

NAMIBIA. **2817 (Vioolsdrif):** Noordoewer, hills W of Marinkas Quellen, (–AB), 800–1000 m, 12 Jul 2005, *P. Bruyns 10,029* (NBG).

South Africa. NORTHERN CAPE. **2817 (Vioolsdrif):** N foot of Rosyntieberg, (–AC), 650 m, 30 Aug 1922 [sic.], *M. Thompson & Le Roux 220* (NBG). **2917 (Springbok):** Vyftienmyl se Berg, (—AA), 1 Sep 1996, *D. Snijman 1548* (NBG); Port Nolloth, Steenbok se Berg, (–AC), 150 m, 9 Aug 2011, *D. Gwynne-Evans 6015* (NBG); Steinkopf (–BD) and Okiep (–DB), Aug. 1925, *R. Marloth 6766* (NBG, PRE); Ratelpoort, (–BD), 19 Jul 1948, *R. Compton 20,613* (NBG); Mesklip, (—DD), without date, *G, Lewis 1396* (SAM). **2918 (Gamoep):** Aggenys Mt., (–BB), 24 Aug 1977, *Oliver, Tölken & Venter 56* (PRE); road from Springbok to Pofadder near Karasberg, (–CB), 16 Jul 1999, *J. Manning 2232* (NBG); E Namaqualand, farm Rietfontein, (–CC), 19 Sep 2007, *D. Snijman 2162* (NBG). **2929 (Pofadder):** Groot Pellaberg, (—AA), 10 Aug 1982, *E. van Jaarsveld & J. Patterson 6778* (NBG). **3017 (Hondeklipbaai):** Brakdam, (–BB), 4 Sep 1945 [fruiting], *R. Compton 17,208* (NBG). **3018 (Kamiesberg):** Studer's Pass, (–AC), 27 Aug 67 [fruiting], *M. Thompson 425* (PRE). **3119 (Calvinia):** Oorlogskloof Nature Reserve, (–CA), 702 m, 17 Aug 2001, *W. Pretorius 742* (NBG).

WESTERN CAPE. **3118 (Vanrhynsdorp):** Gifberg, (–DC), 2 Sep 1948 [fruiting], *R. Compton 20,842* (NBG). **3218 (Clanwilliam):** Pakhuis Pass, (–BB), 29 Sep 1940 [fruiting], *P. Bond 571* (NBG); 19 Sep 1967, *W. Barker 10,324* (NBG); Pakhuis Pass near Leipoldt's Grave, (–BB), 15 Sep 1976 [fruiting], *M. Thompson 2937* (NBG). **3219 (Wuppertal):** Boesmanskloof, (—AA), 22 Aug 1997, *M. van Rooyen, H. Steyn & A. de Villiers 507* (NBG).

3.3.3. Sect. ***Massonia***

±25 spp., southern Namibia and temperate South Africa, mainly winter-rainfall region.

2. **Massonia obermeyerae** Mart.-Azorín et al. in Phytotaxa 205: 42 (2015a). Type: South Africa, Eastern Cape, Graaff-Reinet (3224): 'Pearston, Farm Cranemere', (–DB), Jul 1962, *E. Jenkins s.n.* (PRE [004958: plant on upper half of sheet], holo.; NBG [81957], iso.!).

[*Massonia grandiflora* sensu Oberm.: t. 1451 (1965), non Lindl.]

Deciduous geophyte. *Bulb* subglobose, 15–30 mm diam., outer tunics leathery and dark brown. *Leaves* 2, prostrate, ovate to suborbicular, 60–150 × 40–80 mm, obtuse, leathery with narrow membranous margins, minutely setulose marginally, upper surface green or with purple streaks, smooth. *Inflorescence* a condensed, subcapitate raceme, few- to several-flowered, protruding shortly above leaves; bracts ovate to suborbicular, 10–20 × 10–25 mm, acute or obtuse, margins minutely setulose; pedicels at anthesis 5–12 mm long, lengthening up to 16 mm in fruit. *Flowers* strongly yeast-scented; perianth white flushed green and purple; tube campanulate, widening towards mouth, 3–5 × 4–5 mm, mouth 5–6 mm diam., exposing ovary; tepals arising at same level, outer overlapping inner at base, patent or slightly deflexed at base, spreading or slightly upcurved distally, ovate, 4–6 × 2–4 mm, concave or cucullate, apex penicillate. *Filaments* suberect-arcuate and incurved apically, white to pinkish flushed purple, subulate to triangular and slightly swollen apically, 8–10 mm long, 3–4 wide at base, shortly connate at base for 1.0–1.5 mm in an open fleshy rim, not occluding mouth; anthers dorsifixed, with evident connective on outer surface, 2–3 mm long at anthesis, yellow with yellow pollen. *Ovary* angular-obovoid, 3-lobed, green tinged purple, 5–6 × 3.0–4.5 mm, angled above and strongly contracted to style; style greenish tinged purple, 6–8 mm long, abruptly differentiated from ovary, erect and tapering gradually to apex, apically hooked or flexed. *Capsule* angular obovoid, 3-winged, truncate with persistent style, 11–15 × 14–18 mm. *Seeds* subglobose, apically flattened, 1.5–1.8 mm diam., smooth or slightly rugose. *Flowering time:* July–September.

Distribution and ecology: restricted to the Great Karoo in Eastern Cape between Steytlerville and Graaff-Reinet, apart from an outlying collection said to have been collected near Kimberley in the Northern Cape (Fig. 6); clay flats in open karroid scrubland, often along drainage lines or washes, in the lee of bushes.

There are no verified records of this species from the CFR and its inclusion here is entirely speculative, on the basis of two records from the Core Cape Floristic Region in the Western Cape cited by Martínez-Azorín et al. (2015a), one an online image from the Gamkaberg Nature Reserve near Calitzdorp, and the other a herbarium collection, *Stayner s. n.* (NBG: *NBG81957*), on which the location is doubtfully indicated as '? Hermanus'. The Hermanus locality is incorrect. A mounted photograph (*NBG153632*) of an excavated plant placed on a sheet of white card is an exact match for the herbarium specimen *Stayner s.n.*, showing the same slightly unequal leaves with a diagnostic gash in the larger of the two. The photograph is labelled 'Massonia grandiflora Lindley/ Farm Cranmere [sic.]/Pearston, C.P./Photo from National Herbarium, Pretoria/Coll. Mrs E. Cranmere [sic.]/July 1962, Det. A.A. Mauve/See correspondence Aug 1962'. It is clear, therefore, that the Hermanus locality is an error and that the specimen *NBG 81957* is in fact isotype material from Cranemere Farm near Pearston in Eastern Cape. As for the online images from the Little Karoo, these represent either *M. triflora* or *M. latebrosa* but an exact identification requires floral dimensions.

Diagnosis: distinguished by the campanulate perianth tube, 3–5 mm long and ± as wide, clearly exposing the ovary; rather broad tepals that spread from the base with the outer whorl overlapping the inner at the base; stout, incurved filaments 8–10 mm long; and a broad, apically angled ovary with apically hooked style 8–10 mm long. The capsules are large and three-winged, 11–15 × 14–18 mm. The campanulate flowers with spreading tepals, stout incurved filaments, and the squat ovary with apically hooked style are remarkably similar to those of *Massonia bifolia* (Jacq.) J. C. Manning & Goldblatt from Namaqualand and the

interior West Coast. Both species also have similar capsules with a persistent style but *M. bifolia* has a spicate inflorescence exserted well above the leaves with an apical coma of sterile bracts, and subsessile flowers supported by spreading, acuminate bracts mostly 20–40 mm long that are distinctly cupped at the base (Manning et al., 2011).

History: this species was first collected in the early twentieth century by members of the clergy from Kimberley in Northern Cape and from Graaff-Reinet in Eastern Cape but only attracted the attention of botanists when a plant that had been collected near Pearston by local farmer Eve Jenkins (née Palmer) flowered in the garden of the then Botanical Research Institute in Pretoria. It was identified and illustrated under the name *M. grandiflora* Lindl. by Obermeyer (1965) but was recently recognised as representing an undescribed species and named after her (Martínez-Azorín et al., 2015a).

Conservation notes: poorly known but likely threatened by overgrazing.

Additional specimens seen

South Africa. NORTHERN CAPE. **2814 (Kimberley):** Kimberley, (−DA), Sep 1912, *Bro J. Moran s.n.* (GRA).

EASTERN CAPE. **3224 (Graaff-Reinet):** Graaff-Reinet, (–BC), Aug 1917, *Sister Francis s.n.* (GRA).

3. **Massonia triflora** Compton in Trans. Roy. Soc. S. Afr. 19: 276 (1931). Type: South Africa, Western Cape, Montagu (3320): 'Whitehill Ridge', (–BA), 12 Aug 1929, *R. Compton 3515* (BOL, holo.!; NBG!, iso.).

Massonia citrina M.Pinter et al.: 52 (2013), *syn. nov*. Type: South Africa, Western Cape, Worcester (3319): 'Rooihogte Pass', (–DB), 22 Jan 2012, fl. ex hort. in Austria from seeds received in Oct 2009 from Cameron McMaster, *G. Deutsch s.n.* (LI, holo.; PRE!, iso.).

Deciduous geophyte. *Bulb* subglobose, 15–25 mm diam., outer tunics papery and purplish but later leathery and dark brown. *Leaves* 2, prostrate, ovate to suborbicular, 30–80 × 30–60 mm, obtuse or apiculate, leathery with narrowly membranous margins, smooth or minutely papillate marginally and submarginally, upper surface green or streaked with purple, smooth. *Inflorescence* a condensed, subcapitate raceme, few- to several-flowered, protruding shortly above leaves; bracts ovate to lanceolate, 15–25 × 5–10 mm, acute to acuminate, margins entire; pedicels at anthesis 3–10 mm long. *Flowers*: perianth whitish to yellowish green; tube obconic or shortly cylindrical, widening slightly towards mouth, 5–7 × 3–4 mm, mouth ±5–6 mm diam., not occluded; tepals arising at same level, ±sigmoid-flexed at base and deflexed or upcurved distally, ovate to lanceolate, 7–9 × 3–4 mm, concave, apex penicillate. *Filaments* suberect and slightly incurved-arcuate, greenish yellow to bright lemon yellow or flushed reddish or mauve, subulate or triangular, 8–10 mm long, 2–3 mm wide at base, shortly connate at base for 0.5–1.0 mm in an open, fleshy rim exposing ovary to view; anthers 2.0–2.5 mm long at anthesis, yellowish with yellow pollen. *Ovary* oblong-obovoid, greenish, 5–6 × 3–4 mm long, abruptly contracted-truncate to style; style yellowish, 10–12 mm long, abruptly differentiated from ovary, erect, tapering to apex, apically curved or hooked. *Capsule* obovoid, 3-winged, 12–15 mm long. *Seeds* subglobose, ± 1.5 mm diam., smooth or rugose. *Flowering time:* August–September. Figs. 1B and 3.

Distribution and ecology: a local endemic of Western Cape, described from Whitehill near Matjiesfontein and now known also from the Rooihoogte Pass near Koo, some 80 km west of the original locality (Fig. 4); loamy soils on sandstone.

Diagnosis: a spring-flowering species recognised by the short, broad perianth tube, 5–7 × 3–4 mm, ovate to lanceolate tepals 7–9 mm long with sigmoid flexure at the base, and subulate or triangular filaments 8–10 mm long, connate at the base for 0.5–1.0 mm in a shallow, open collar that exposes the ovary to view, and the style 10–12 mm long. The filaments and style in the typical populations are yellowish green or bright lemon yellow but are flushed mauve in those from Whitehill. The purple outer bulb tunics and the flowers with apically hooked style in bud suggest a relationship with *M. echinata*, *M. latebrosa* and *M. tenella*, all of which have smaller flowers with tepals 4–6 mm long and style 4–8 mm long, and with *M. depressa*, which has larger, differently proportioned flowers with the perianth tube 8–13 mm long, filaments 11–18(−20) mm long, and style 14–28 mm long.

R.H. Compton (1931), who described *Massonia triflora* from plants collected from the southern side of Whitehill Ridge near Matjiesfontein, distinguished it from *M. depressa* [under the later synonym *M. latifolia*], which he collected on the adjacent flats, by the reduced inflorescence of just three flowers but the flowers are also notably smaller, with the perianth tube ±6 mm long, filaments ±10 mm long, and style 11–12 mm long. Jessop (1976) evidently regarded the plants as representing merely depauperate individuals of *M. depressa*, and synonymised the species. In this context it is possibly significant that *M. depressa* also co-occurs with *M. triflora* on the Rooihoogte Pass, and with the closely allied *M. latebrosa* at Karoopoort.

The flowers of the type of *M. triflora* and later collections from the same locality are anomalous in *M. depressa* in their smaller size but match populations from the Rooihoogte Pass some 80 km to the west that were recently described under the name *M. citrina* by Pinter et al. (2013) (Fig. 1B), differing from them solely in their mauve filaments (yellow or greenish in *M. citrina*). Given the variation in filament colour in both *M. depressa* and the related *M. latebrosa*, this does not appear to be a taxonomically significant difference, and *M. citrina* becomes a later synonym of *M. triflora*.

History: Massonia triflora was first collected in August 1929 by Cape Town botanist R.H. Compton at the site of the former Karoo Botanical Garden at Whitehill at the northern foot of the Witteberg near Matjiesfontein. Although evidently different enough from *M. depressa* to warrant description, and recollected at the type locality a few more times, the species was later included in *M. depressa* by Jessop (1976), where it remained until now. Western populations from Rooihoogte Pass, first collected by Kirstenbosch horticulturist Margaret Thomas in 1971, were recently described under the name *M. citrina* by Pinter et al. (2013).

Conservation notes: a local endemic of the mountains near Koo and Matjiesfontein but currently not threatened.

Additional specimens seen

South Africa. WESTERN CAPE. **3319 (Worcester):** summit of Rooihoogte Pass, (–DB), 25 Aug 2008, *J. Manning 3188* (NBG). **3320 (Montagu):** Whitehill Ridge, (–BA), 17 Aug 1942, *R. Compton 13,388* (NBG); 25 Oct 1943 [fruiting], *R. Compton 15,175* (NBG); Oct 1943 [fruiting], *F. Leighton 272* (BOL); bottom of Rooihoogte Pass, (–CA), 8 Sep 1971, *M. Thomas s.n.* (NBG).

4. **Massonia latebrosa** Masson ex Baker in J. Bot. 24: 336 (1886); Baker: 411 (1897). Type: South Africa, Western Cape, 'hab. in Speluncae Bokefeld', Aug 1792, *F. Masson s.n.* (BM, drawing number 115, icono.–image!). Epitype: South Africa, Western Cape, Worcester (3319): 'Karoo Poort, (–BA), 27 Jul 1941, *E. Esterhuysen 5478* [BOL, epi.!, designated by Martínez-Azorín et al.: 113 (2015c)].

Deciduous geophyte. *Bulb* subglobose, 10–25 mm diam., outer tunics papery and purplish but later leathery and dark brown. *Leaves* 2, prostrate, ovate, 20–80 × 8–20 mm, acute or apiculate, leathery with narrowly membranous margins, smooth or minutely papillate marginally and submarginally, upper surface green or streaked with purple, sparsely to more densely papillo-tuberculate, tubercles topped with blunt, spherical or ellipsoid trichome 0.2–0.3 mm long, or rarely smooth. *Inflorescence* a condensed, subcapitate raceme, few- to several-flowered, protruding shortly above leaves; bracts ovate to lanceolate, 8–20 × 5–15 mm, acute to acuminate, margins smooth; pedicels at anthesis 3–10 mm long. *Flowers*: perianth cream-coloured to greenish; tube obconic or shortly cylindrical, widening slightly towards mouth, 4–6 × 3–4 mm, mouth ±4–6 mm diam., not occluded; tepals arising at same level, ±sigmoid-flexed at base and deflexed or upcurved distally, ovate to lanceolate, 4–6 × 3.0–3.5 mm, concave, apex penicillate. *Filaments* suberect and slightly incurved-arcuate, pale or greenish yellow, with or without reddish flush, or red, subulate, 4–6(−8) mm

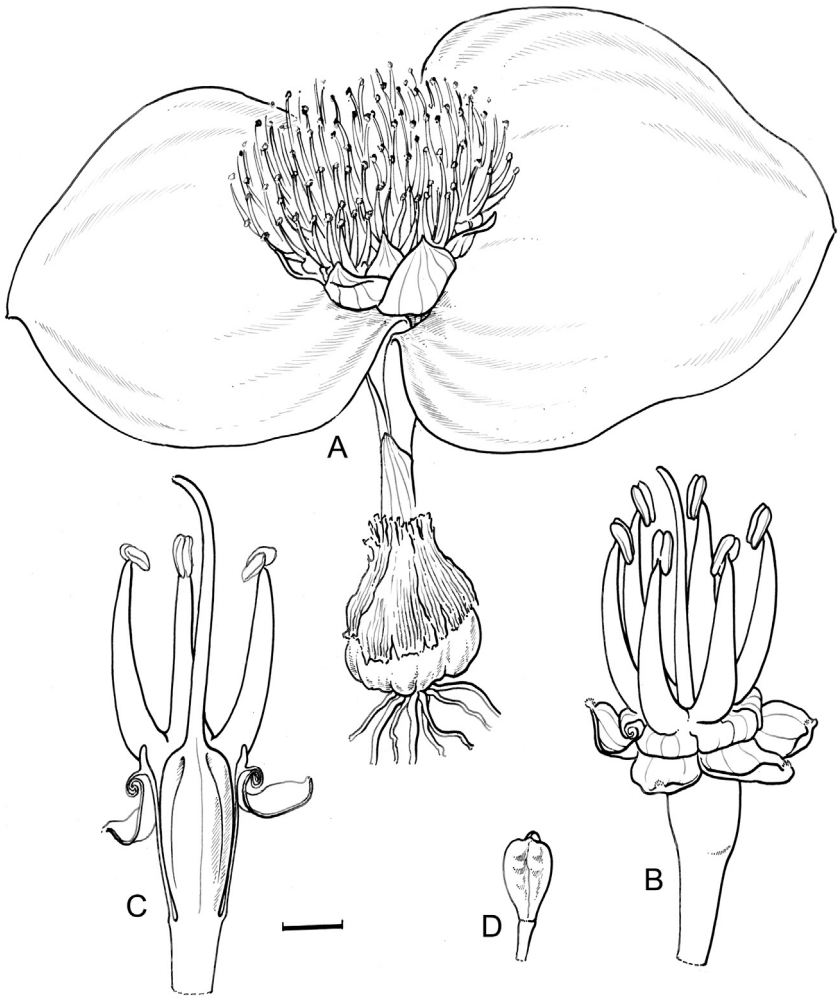

Fig. 3. *Massonia triflora.* A, flowering plant; B, flower; C, half-flower; D, capsule. *Voucher:* Western Cape, Rooihoogte Pass, *Manning 3188.* Scale bar: A, D, 10 mm; C, B, 3 mm. Artist: John Manning.

long, up to 1.5 mm wide at base, shortly connate at base for 0.5–1.5 mm in an open, fleshy rim exposing ovary to view; anthers 2.5–3.0 mm long at anthesis, yellowish green or flushed reddish with yellow pollen. *Ovary* oblong-obovoid, greenish, 3–5 × 2–3 mm, abruptly contracted-truncate to style; style greenish flushed red, 4–8 mm long, abruptly differentiated from ovary, erect, tapering to apex, which is slightly bent or flexed in bud. *Capsule* obovoid-trigonous, truncate, 6–10 × 5–8 mm. *Seeds* globose, 1.0–1.5 mm diam., smooth or slightly rugose. *Flowering time:* (late July) August–September. Fig. 1C.

Distribution and ecology: a local endemic of the southwestern interior of Western Cape, South Africa, where it has been recorded from the Cold Bokkeveld, the Hex River Valley, Karoopoort at the foot of the Swartruggens and on the adjacent Bonteberg, and the western foothills of the Witteberg, with a sight record from the Klein Roggeveld (Fig. 4); loamy soil in shaded situations or crevices among sandstone boulders on S-facing slopes.

Diagnosis: Massonia lateborsa is very similar to *M. echinata* from the Bokkeveld around Nieuwoudtville, with which it shares flowers with a short, broad perianth tube, 4–6 × 3–4 mm, ovate to lanceolate tepals 4–6 mm long with sigmoid flexure at the base, and short, subulate filaments 4–6 mm long, connate at the base for 0.5–1.5 mm in a shallow, open collar that exposes the ovary to view. The anthers are relatively large, 2.5–3 mm long at anthesis. Both species are spring-flowering and are distinguished essentially by the nature of the trichomes on the leaves, those in *M. echinata* sharply pointed and conical or almost uncinate and those of *M. latebrosa* blunt and ellipsoid to globular (see

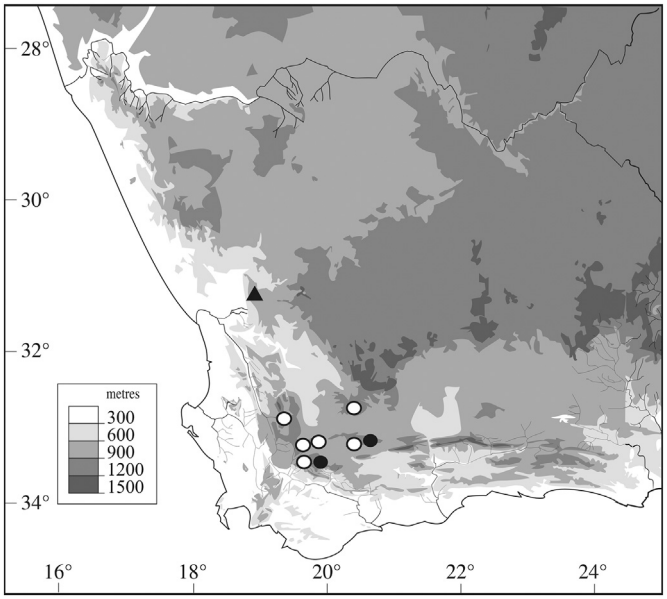

Fig. 4. Distribution of *Massonia triflora*, ●; *M. latebrosa*, ○; and *M. echinata*, ▲.

Martínez-Azorín et al., 2015c for illustrations). A third species in the alliance, *M. triflora*, has slightly larger flowers, with tepals 8–10 mm long, filaments 8–10 mm long, and style 10–12 mm long.

Typical *Massonia latebrosa* with a papillo-tuberculate upper leaf surface has been recorded from the Karoopoort, the adjacent Bonteberg, and the western Witteberg but collections from Orchard in the Hex River Valley have foliage that is either papillo-tuberculate (*Esterhuysen 10,349*) or smooth (*Haynes NBG 607/26*). Only smooth-leaved plants have so far been recorded from the Cold Bokkeveld (*Stokoe s.n.*). All of these populations are florally identical.

History: another of the novelties collected by Kew horticulturist F. Masson (1741–1805), and encountered in August 1792 on his way to the Roggeveld, and thus very likely at Karoopoort, through which he would have passed on his journey. Masson painted the species from a plant that flowered in cultivation in Cape Town and suggested the specific epithet, which was later taken up by Baker (1886), who knew the species solely from Masson's illustration. The species was included in *M. echinata* by Jessop (1976) until resuscitated by Martínez-Azorín et al. (2015c).

Conservation notes: a local endemic of the mountains from the Cold Bokkeveld to the Bonteberg and possibly the Klein Roggeveld, and currently not threatened.

Additional specimens seen

South Africa. WESTERN CAPE. **3219 (Wuppertal):** near the waterfall between Citrusdal and Elandskloof, (–CA), Aug 1940, *T. Stokoe s.n.* (BOL, SAM). **3319 (Worcester):** Karoo Poort, (–BA), 21 Sep 1944, *W. Barker 3066* (NBG); 7 Aug 1945, *Kirstenbosch Expedition NBG402/44* (NBG); Aug 1953 [fl. ex hort.], *T. Stokoe SAM62797* (SAM); Orchard, (–BC),? July 1927 [fl. ex hort.], *M. Haynes s.n. NBG 607/26* (BOL); Orchard, (–BC), clay slopes of small ravine, 25 Jul 1944, *E. Esterhuysen 10,349* (BOL); Kaaimansgat, (–BD), 1 Oct 1965 [fruiting; fl. ex hort. 25 Jun 1964], *H. Hall 2791* (NBG); Bonteberg, farm Karrona, (–BD), 1000 m, humus-rich soil, damp overhang, 15 Sep 1971, *M. Thompson 1251* (NBG). **3320 (Montagu):** Wittebergkloof, (−AD), 5 Aug 1923, *R. Compton 2550* (BOL).

5. **Massonia echinata** L.f., Suppl. Pl.: 193 (1782); Baker: 410 (1897). Type: South Africa, Northern Cape, Calvinia (3119): 'crescit juxta margines montis, dictae Bocklandsberg', (–CA), probably 5 Nov 1774 [fruiting], *Thunberg s.n.* (UPS-THUNB [7988], lecto. [as holo.], designated by Jessop: 414 (1976); S, isolecto.).

Deciduous geophyte. *Bulb* subglobose, 8–25 mm diam., outer tunics papery and purplish but later leathery and dark brown. *Leaves* 2, prostrate, ovate to suborbicular, 20–80 × 8–20 mm, acute or apiculate, leathery with narrowly membranous margins, minutely setulose marginally and submarginally, upper surface green, sparsely to more densely scabro- or echino-tuberculate, tubercles pointed or topped with suberect or deflexed, acute, conical or almost uncinate trichome 0.2–1.0 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to several-flowered, protruding shortly above leaves; bracts ovate to lanceolate, 8–20 × 5–15 mm, acute to acuminate, margins setulose; pedicels at anthesis 5–14 mm long. *Flowers:* perianth cream-coloured to greenish; tube obconic or shortly cylindrical, widening slightly towards mouth, 4–6 × 3–4 mm, mouth ±5–6 mm diam., not occluded; tepals arising at same level, ±sigmoid-flexed at base and deflexed or upcurved distally, ovate to lanceolate, 4–6 × 3.0–3.5 mm, concave, apex penicillate. *Filaments* suberect and slightly incurved-arcuate, white to pale yellowish or flushed pink but reddish basally, subulate or triangular-attenuate, 3–5 mm long, up to 2 mm wide at base, shortly connate at base for 1.0–1.5 mm in an open, fleshy ring exposing ovary to view; anthers 2.5–3.0 mm long at anthesis, yellowish green flushed pink with yellow pollen. *Ovary* oblong-obovoid, green streaked reddish between locules, 4–5 × 3–4 mm, abruptly contracted-truncate to style; style greenish flushed red, 6–8 mm long, abruptly differentiated from ovary, erect, tapering to apex, which is slightly bent or flexed in bud. *Capsule* obovoid-trigonous, truncate, 7–12 × 4–9 mm. *Seeds* globose, 1.0–1.5 mm diam., smooth or slightly rugose. *Flowering time:* August–September.

Distribution and ecology: a poorly collected local endemic of the Bokkeveld Escarpment in Northern Cape, know only from a few collections west of Nieuwoudtville (Fig. 4); in shallow soils or pockets on sandstone in arid fynbos.

Diagnosis: a spring-flowering species recognised by the scabro- or echino-tuberculate leaves with tubercles topped by a minute, acutely pointed, conical trichome, and yellowish green or reddish flowers with short, broad perianth tube, 4–6 × 3–4 mm, ovate to lanceolate tepals 4–6 mm long with a weak sigmoid curvature at the base, and short, subulate filaments 3–5 mm long, connate at the base for 1.0–1.5 mm in a shallow, open collar that exposes the ovary to view. The anthers are relatively large, 2.5–3.0 mm long at anthesis. *Massonia echinata* is closely allied to both *M. triflora* and *M. latebrosa*, all with essentially similar flowers with the style slightly bent at the apex in bud and the outer bulb tunics drying a characteristic purple before turning dark brown. All three species flower in the early spring and constitute a complex of parapatric sister taxa. Within the group, *M. echinata* is distinguished by the sharply pointed foliar trichomes; those in *M. latebrosa* are obtuse or blunt; and *M. triflora* has smooth leaves and slightly larger flowers. Additional collecting may modify this interpretation.

History: evidently the first species in the genus to be collected, *M. echinata*was described from plants collected on the Bokkeveld Escarpment by Swedish botanist C.P. Thunberg (1743–1828), probably in early November 1774 (Müller-Doblies & Müller-Doblies, 1997) but was misunderstood by later authors, most notably Jessop (1976), who circumscribed it very widely to include many species now understood to be distinct. The name was most commonly misapplied to *M. pseudoechinata* another echinate-leaved species that is relatively common around Nieuwoudtville. The matter was clarified by Martínez-Azorín et al. (2015c).

Conservation notes: a highly local endemic of sandstone exposures on the Bokkeveld Mtns around Nieuwoudtville and possibly threatened by agriculture in some of its known localities although others fall within protected areas.

Additional specimens seen

South Africa. NORTHERN CAPE. **3318 (Vanrhynsdorp):** Nieuwoudtville, (–CA), Nieuwoudtville, Aug 1931 [fl. ex hort.] *L. Bolus s.n.* (BOL); Sep 1936, *C. Thorne SAM53120* (SAM); Nieuwoudtville, farm Uitkomst, (–BB), 820 m, *C. van Wyk 1369* (NBG). **3119 (Calvinia):** Oorlogskloof Nature Reserve, (–CA), 15 Aug 2001, *W. Pretorius 741* (NBG).

6. **Massonia depressa** Houtt., Nat. Hist. 2(12): 424, t. 85 Fig. 1 (1780). Type: 'De eenigste sort, mischien, daar van tot heden bekend (Massonia Thunb.)', illustration in Houttuyn: t. 85 Fig. 1 (1780). Epitype: South Africa, 'Cap. bonae Spei', *F. Masson s.n.* LINN 414 (LINN, epi!, designated here).

Massonia latifolia L.f.: 193 (1782); Kunth: 296 (1843); Baker: 416 (1897). Type: South Africa, 'Cap. bonae Spei', *F. Masson s.n.* LINN 414 (LINN, holo.!).

Massonia lanceifolia [as '*lanceaefolia*'] Jacq.: 28 (1804), *syn. nov.*; Kunth: 297 (1843); Baker 415 (1897). Type: Illustration in Jacq.: t. 456 (1804).

Massonia longifolia Jacq.: 29 (1804), *syn. nov.*; Kunth: 297 (1843); Baker: 414 (1897). Type: Illustration in Jacquin: t. 457 (1804).

Massonia obovata Jacq.: 29 (1804); Kunth: 297 (1843); Baker: 416 (1897). Type: Illustration in Jacquin: t. 458 (1804).

Massonia cordata Jacq.: 30 (1804), *syn. nov.*; Kunth: 297 (1843); Baker: 415 (1897). Type: Illustration in Jacquin: t. 459 (1804).

Massonia coronata Jacq.: 30 (1804), *syn. nov*; Kunth: 297 (1843). *M. sanguinea* var. *coronata* (Jacq.) Baker: 415 (1897). Type: Illustration in Jacquin: t. 460 (1804).

Massonia sanguinea Jacq.: 31 (1804); Kunth: 297 (1843); Baker: 415 (1897). Type: Illustration in Jacquin: t. 461 (1804).

Massonia grandiflora Lindl.: t. 958 (1826). Type: Illustration in Lindley: t. 958 (1826) (lecto., designated by Jessop: 409 (1976). Epitype: South Africa, without collector, *Herb. Lindley s.n.* [CGE [00078], epi., designated by Martínez-Azorín et al.: 48 (2015a)].

Massonia namaquensis Baker: 416 (1897). Type: South Africa, Northern Cape, Springbok (2917): 'Little Namaqualand, near Kookfontein', (–BC), 1883, *H. Bolus 6596* (BOL, lecto.!, designated by Jessop: 409 (1976); K, iso.).

Deciduous geophyte. *Bulb* subglobose, 20–35 mm diam., outer tunics papery, at first sometimes purplish but later grey to brown. *Leaves* 2, e, prostrate or spreading, ovate to suborbicular, 50–150(−200) × (20–)40–150(−200) mm, acute or obtuse, leathery with narrowly membranous margins, minutely setulose or papillate marginally and submarginally, upper surface green or variously marked with purple, usually smooth but sometimes papillate or almost echinunlate, sometimes only distally, rarely verruco-papillate with epidermal cells forming fascicles of papillae on the verrucae. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts ovate to lanceolate or oblanceolate, 20–50(−60) × 8–15 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–10 mm long. *Flowers* yeast-scented; perianth white or cream-coloured; tube cylindrical-obconic, widening towards mouth, 8–13 × 4–5 mm, mouth 5–6 mm diam.; tepals arising at same level or inner slightly higher, sharply sigmoid-flexed or -recoiled at base, spreading or incurving distally, lanceolate, 10–14 × 3–6 mm, ± conduplicate, apex penicillate. *Filaments* erect or slightly arcuate, whitish or greenish, sometimes flushed with pink or red below or rarely entirely reddish, with greenish or reddish basal collar, subulate, 11–18(−20) mm long, connate at base for 1–2(−3) mm in a thick collar not occluding mouth; anthers 3.0–4.0 mm long at anthesis, yellow with yellow pollen. *Ovary* oblong-ovoid, green or flushed purple, 5–7 × 3–5 mm long, strongly contracted to style; style white, (14–)20–28 mm long, well-differentiated from ovary, erect, subulate-filiform, apically hooked or bent in bud. *Capsule* obovoid-cuneate, 3-lobed or -winged, obtuse to emarginate, 15–20(−35) × 10–15(−25) mm. *Seeds* subglobose-pyriform, (1.0–)1.5–2.0 mm diam., smooth or rugose. *Flowering time:* as early as June but mainly July—early September, and as late as October at higher altitude. Figs. 1B, E and 5.

Distribution and ecology: widely distributed through the South African winter-rainfall region, from the Richtersveld of Northern Cape through Namaqualand and the western mountains of Western Cape as far south as St Helena Bay on the West Coast and through the n- interior and Little Karoo to the upper Langkloof, extending inland across the Roggeveld and southern Upper Karoo to Hanover and Britstown, and

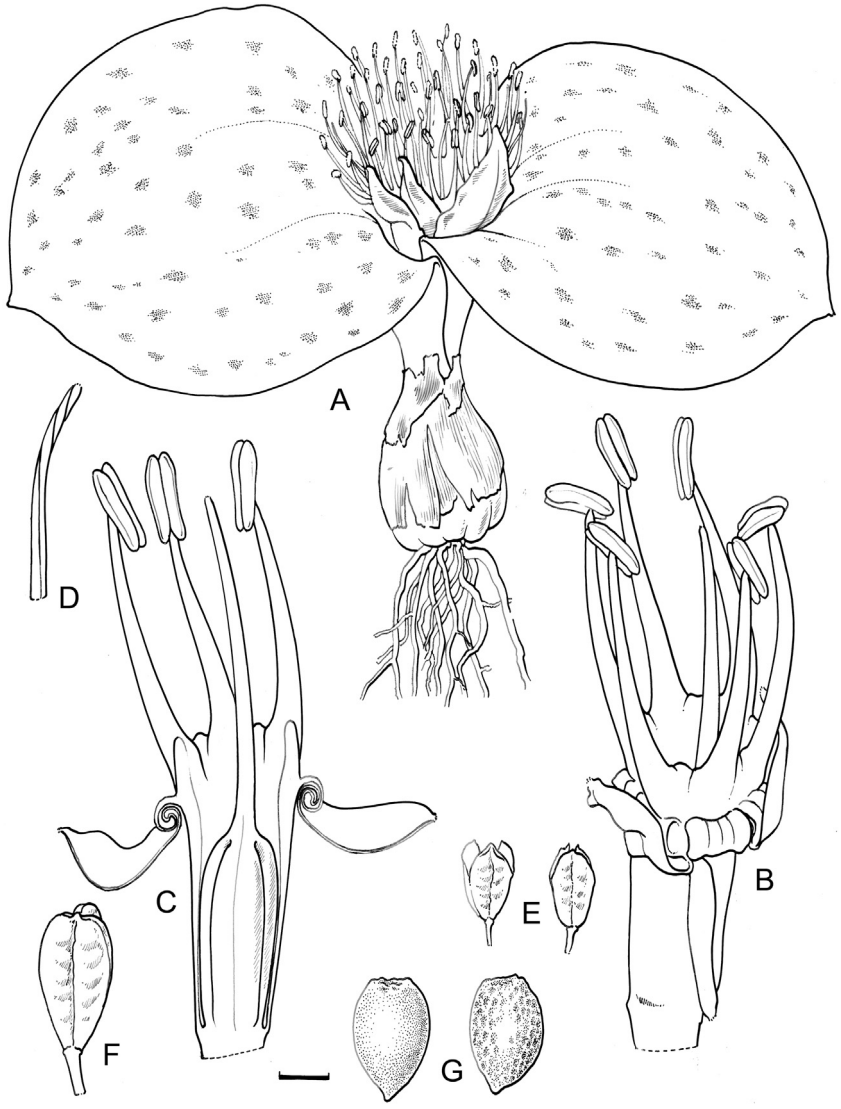

Fig. 5. *Massonia depressa*. A, flowering plant; B, flower; C, half-flower; D, style apex; E, F, capsules; G. seeds. *Vouchers:* A–C, Western Cape, Rooihoogte Pass, *Manning 3188a*; D, Western Cape, Heerenlogement, *Barker 9894*; E, G, Northern Cape, Concordia, *Rourke 811*; F, Western Cape, Montagu, *Mauve & Oliver 212*. Scale bar: A, E, F, 10 mm; B–D, 2.5 mm; G, 1 mm. Artist: John Manning.

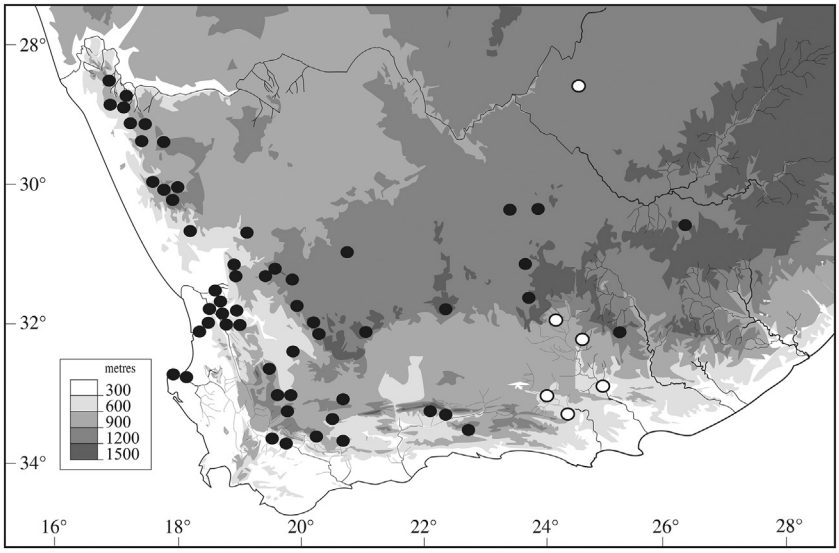

Fig. 6. Distribution of *Massonia depressa*, ●; and *M. obermeyerae*, ○.

along the Sneeuberg in Eastern Cape (Fig. 6), from near sea level to 1500 m elevation; gravelly (rarely sandy) or clay flats in open, mainly karroid shrubland, usually on shale, dolerite or granite but rarely on sandstone substrates in humic situations, including hyrax middens.

The large, yeast-scented flowers produce unusually viscous nectar and are adapted to pollination by rodents (Johnson et al., 2001).

Diagnosis: widely distributed through the western interior of South Africa, *Massonia depressa* is recognised by its yeast-scented flowers with broadly funnel-shaped perianth tube 8–13 mm long with a wide mouth 5–6 mm diam. and tepals that are sigmoid-flexed or -recoiled at the base, and relatively long filaments, 11–18(−20) mm long and connate at the base for 1–3 mm in a pale or reddish collar, with diagnostic large anthers 3–4 mm long at anthesis. The leaves are either smooth or sparsely to more densely papillate or even echinulate, sometimes only distally. Rarely the leaves may be verrucose with the epidermal cells forming fascicles of papillae on each verruca. There is some geographical pattern to this variation, with distally scabridulous leaves in some plants from Namaqualand, and papillate leaves characteristic of populations from the southern Bokkveld Mtns though the Cederberg to the Cold Bokkeveld. The species varies also in flower colour, most populations with the filaments whitish flushed pink or red towards the base and on the staminal collar but those from the Little Karoo and also around Sutherland characteristically with entirely pink or red filaments. As pointed out by Compton (1931), however, the colour of the filaments can vary even on the same plant, sometimes greenish and sometimes red. The fruits are similarly variable in size, ranging from 15 to 35 mm long.

Variation in leaf shape and filament colour in this widespread species led Jacquin (1804) to describe a plethora of taxa based on cultivated specimens. These include *M. coronata* Jacq. (leaves not longitudinally grooved, filaments red), *M. sanguinea* Jacq. (leaves longitudinally grooved, filaments red), *M. cordata* Jacq. (filaments yellow flushed pink below), *M. lanceifolia* Jacq. (leaves lanceolate, filaments pink), *M. longifolia* Jacq. (leaves oblong, filaments pale yellow) and *M. obovata* Jacq. (leaves obovate, filaments yellow). Some of these names were synonymised by Jessop (1976) but several others were not, and we do so here.

The flowers of *M. depressa* resemble those of *M. triflora* and *M. latebrosa* in shape, including the style that is hooked or bent at the tip in bud, but are larger in all respects, including the length of the perianth tube, filaments and anthers. The collection *Levyns 1501* (BOL) from the top of Theronsberg Pass has flowers with filaments that are shorter than is typical for the species, ± 10 mm long, but both the perianth tube and filaments are too long for *M. latebrosa*. Field work is required to clarify the situation.

Massonia depressa has also been confused with *M. pustulata* from the Overberg and southern coast but that species has conspicuously pustulate leaves (not merely papillate/echinulate or verrucose) and flowers of similar form but with a diagnostic dark green or blackish filament collar and slightly smaller anthers 2.5–3.0 mm long at anthesis.

History: Massonia depressa, the type of the genus, was first collected by Swedish botanist C.P. Thunberg (1743–1842) and his travelling companion, the Kew horticulturist Francis Masson (1741–1805), during their expedition to South Africa in the early 1770s. The species was probably also collected at much the same time by the Austrian gardener and collector Franz Boos (1753–1832), who sent many Cape plants to Schönbrunn gardens, where they were cultivated and figured. Several accessions of *M. depressa* are included among Jacquin's (1804) illustrations and it is probable that they were based on Boos's collections. The species was treated under the later name *M. latifolia* L.f. (1782) by Baker (1897) and identified as such in herbaria until Jessop (1976) restored the priority of Houttuyn's (1780) name.

Nomenclatural note: Although Houttuyn (1780) published both the genus and the species name *Massonia depressa*, he makes it quite clear that the choice of the generic name was Thunberg's, and this is accordingly reflected in the authority of the name. The type illustration, presumably based on the material collected by Thunberg and Masson, depicts only an isolated complete and dissected flower without a scale, and the protolgue description gives little indication of dimensions other than that the inflorescence is the size of half a clenched fist '*een halven Vuist groot*'. Other potentially valuable information includes the evidently glabrous foliage, the reddish filaments '*Roozekleurige Meeldraadjes*' and style '*Roozekleurigen Styl*', the elongate anthers '*langwerpige Meeldradjes*', and the copious nectar that fills '*met een helder, soet, Vogt gevuld*' the perianth tube and staminal collar. Thunberg (1782, 1800, 1823) himself, and other comtemporary authors, ignoreed Houttuyn's *M. depressa* but later authors from Kunth (1843) onward have consistently asssociated it with *M. latifolia* L.f. (1782), which is based on a collection of Masson's in the Linnaean Herbarium (LINN414). Although the available evidence gives us no reason to doubt the identity of *M. depressa*, it seems prudent to designate an epitye to fix its application in the current sense, and the Masson collection in the Linnaean Herbarium is an appropriate choice as it likely represents the orginal material collected by Thunberg and Masson.

Conservation notes: widely distributed through the southwestern and central interior South Africa and not currently threatened across its range although local threats in the Breede River and Hex River valleys include urbanisation and agriculture.

Additional specimens seen

South Africa. NORTHERN CAPE. **2817 (Vioolsdrif):** 2 km W of Eksteenfontein, (–CD), 9 Jul 1988, *G. Williamson 3902* (NBG). **2917 (Springbok):** Kleinzee Kaa Vlakte [Flats], (—AD), 200 m, 22 Jun 1997, *P. Desmet & A. Ellis 1007* (NBG); Richtersveld, 3 km SE of Ariebies, between Vioolsdrif and Steinkopf, (–BB), June 1993, *G. Williamson 4718* (NBG); top of Spektakelberg 1 mile [1.6 km] S of Naries, (—DA), 9 Sep 1970, *J. van der Merwe 184b* (NBG); Nigramoep, (—DA), Jun 1953 [fl. ex hort.], *R. Wikner SAM62798* (SAM); Nababiep, (–DB), 20 Aug 1980, *A. le Roux 2681* (BOL); 2 miles [3 km] N of Concordia, (–DB), 6 Aug 1967, *J. Rourke 811* (NBG); Ezelsfontein, 14 miles [22.4 km] W of Springbok, (–DB), 30 Jun 1965, *H. Hall 3058* (NBG); 2 miles [3.2 km] E of Springbok, (–DB), Jul 1950, *G. Lewis 2075* (SAM); Springbok, along N7 at Pofadder offramp, (–DB), 7 Aug 2000, *Goldblatt & Manning s.n.* (NBG). **2918 (Gamoep):** Springbok-Gamoep Road, (–CD), 20 Aug 1996, *G. Duncan 382* (NBG). **3017 (Hondeklipbaai):** 3 miles [5 km] E of Soebatsfontein, (–BA), 26 Jul 1966, *H. Hall 2901* (NBG); Kookfontein, 5 km N of Soebatsfontein, (–BA), *C. Hilton-Taylor 1266* (NBG); Grootvlei, W of Kamieskroon, (–BB), 5 Aug 1968, *J. Rourke 797* (NBG); Darter's Grave, 22 miles [35.2 km] N of Garies, (–BD), 4 May 1963, *L. Booysen 14* (NBG). **3018 (Kamiesberg):** Leliefontein, (–AC), 5 May 1981, *N. van Berkel 335* (NBG); Aalwynsfontein, (–BC), May 1949, *H. Herre s.n.* (BOL); Groot Nieuwe Fontein, 5 km NW of Kliprand, (—DA), 10 Sep 1976 [fruiting], *M. Thompson 2848* (NBG). **3019 (Loeriesfontein):** 4 miles [6.4 km] N of Loeriesfontein (–CD), 30 Jul 1954, *H. Hall s.n.* (NBG). **3023 (Britstown):** Britstown, (—DA), Jul 1936, *J. Loots s.n.* (NBG). **3024 (De Aar):** De Aar, (–CA), Apr 1916, *Miss Friedlander s.n.* (GRA); Hanover, (–DC), Jul 1906 [fl. ex hort.], *Cronwright-Schreiner s.n.* (GRA). **3119 (Calvinia):** Nieuwoudtville Waterfall, (–AC), 23 Aug 1950, *B. Maguire 271* (NBG); Nieuwoudtville Wild Flower Reserve, (–AC), 10 May 1983 [in bud], *P. Perry & D. Snijman 2086* (NBG); 25 Jul 1983, *P. Perry & D. Snijman 2145* (NBG); 5 miles [8 km] SW of Calvinia, (–BD), Jul 1948, *T. Stokoe SAM63685* (SAM); Hantam, Vanrhynshoek farm, (–BD), 3700′ [1130 m], 18 Aug 1975, *M. Thompson 2365* (NBG); between Hantam Peak and Akkerendam, (–BD), Jul 1948, *G. Lewis 2973* (SAM); Akkerendam Nature Reserve, (–BD), 6 Aug 1993, *J. Anthony 27* (NBG); top of Botterkloof Pass, (–CD), Jul 1948, *G. Lewis 2979* (SAM); 24 Aug 1950, *A. Middlemost 1607* (NBG). **3120 (Williston):** 14.5 miles [23 km] E of Calvinia, (–AC), 27 Jul 1953, *J. Acocks 16,823* (BOL, PRE); Roggeveld, Dröekloof, (–CC), 1273 m, 28 Jul 2005, *H. Rosch 337* (NBG). **3123 (Victoria West):** Richmond, Vlakplaats, (–BD), Oct 1914, *H. Bolus 13,831* (BOL). **3220 (Sutherland):** Roggeveld, Soekop, (—AA), 5 Aug 2006, *H. Rosch 454* (NBG); Sutherland, (–BA), 8 Jul 1968, *F. Stayner s.n.* (NBG); Sutherland, farm Elandsfontein, (–BA), 1538 m, 8 Oct 2008 [fruiting], *V. Clark & G. Coombs 748* (NBG); Sutherland, farm Vöelfontein, (–BC), 15 Jul 1970, *L. Hall 207* (NBG).

WESTERN CAPE. **3118 (Vanrhysdorp):** Vanrhynsdorp, (—DA), 22 Jul 1946, *G. Smith s.n.* (NBG); Vanrhynsdorp graveyard [cemetery], (—DA), 5 Sep 2007 [fruiting], *A. Hitchcock* et al. *3434* (NBG); Widouw River, 6 miles [9.6 km] S of Vanrhysndorp, (—DA), 28 Jul 1950, *W. Barker 6347* (NBG); Jul 1950, *G. Lewis 2976* (SAM); Vredendal road from Vanrhynsdorp, (—DA), 8 Sep 1949 [fruiting], *W. Barker 5698* (NBG); 16 km E of Vredendal, (—DA), 17 Jul 1971, *H. Hall 4010* (NBG); between Vanrhysndorp and Klawer, (—DA), 24 Jul 1948, *R. Compton 20,713* (NBG); Klawer, (–DC), 30 Jul 1920, *H. Andreae 438* (NBG); Gifberg, (–DC), 31 Jul 1942, *L. Leipoldt 3857* (BOL); 2 Sep 1948, *R. Compton 20,840* (NBG); Heerenlogement flats, (–DC), 21 Jul 1941, *R. Compton 10,983* (NBG); 6 Aug 1970, *H. Hall 3708* (NBG); Heerenlogement-Toringberg, W slope, (–DC), 27 Jul 1963, *W. Barker 9894* (NBG). **3123 (Victoria West):** Murraysburg, (—DD), Sep 1879, *W. Tyson 361* (SAM); 1914, *Miss Earpe s.n.* (BOL). **3217 (Vredendal):** Stompneus, (–DB), 14 Jul 1964, *H. Hall s.n.* (NBG). **3218 (Clanwilliam):** Lambert's Bay, (–AB), Jul 1932, *Visser s.n.* (BOL); hill above Graafwater, (–BA), 18 Aug 1966, *J. Pamphlett 99* (NBG); 5 miles [8 km] W of Clanwilliam on Lambert's Bay road, (–BB), Jul 1948, *G. Lewis 2978* (SAM); Clanwilliam, (–BB), 20 Jul 1941, *R. Compton 10,972* (NBG); 8 miles [13 km] N of Clanwilliam, (–BB), Jul 1950, *G. Lewis 2977* (SAM; 10 miles [16 km] N of Clanwilliam, (–BB), 1 Sep 1945, *R. Compton 1711* (NBG), *F. Leighton 1379* (BOL); Steenberg Cove, (–CD), 7 Aug 1962 [fl. ex hort. 3 Jul 1963], *W. Barker 9720* (NBG). **3219 (Wuppertal):** 15 miles [24 km] S of Doring River bridge, (—AA), 25 Aug 1950, *A. Middelmost 1623* (NBG); Middelberg, (–AC), 4500′ [1371 m], Sep 1967, *O. Kerfoot 5932* (NBG); Tankwa National Park, Bo-Stompiesfontein, (–BA), 25 Jul 2006, *H. Rosch 412* (NBG); northern Cederberg at Boontjieskloof, (–BB), 25 Oct 1945, *E. Esterhuysen 12,199* (BOL, NBG); Pakhuis Peak, (–BB), Sep 1936, *C. Thorne SAM52510* (SAM); Pakhuis Pass, (–BB), 7 Sep 1949, *W. Barker 9177* (NBG); Tanqua Guest Farm, (–BD), 2 Aug 2006, *H. Steyn 845* (NBG); Swartruggens, Knolfontein, (–DC), 1185 m, 19 Jul 2006, *I. Jardine & C. Jardine 330* (NBG); 27 Jul 2010, *I. Jardine & C. Jardine 1331* (NBG). **3221 (Merweville):** Nuweveldberge, plateau near edge of escarpment, (—AD), 1742 m, 25 Sep 2007, *V. Clark* et al. *113* (NBG). **3222 (Beaufort West):** Karoo National Park, Puttervlei farm, (–BC), 6 Nov 2007 [young fruit], *V. Clark* et al. *72* (NBG). **3319 (Worcester):** Hex River Valley near De Doorns, (–BC), Apr 1907 [bud], *H. Bolus 13,213* (BOL); main road passing De Doorns, (–BC), 16 Sep 1974 [fruiting], *A. Mauve & I. Oliver 151* (NBG); Karoopoort, (–BC), 27 Sep 1944, *W. Barker 3055* (NBG); 8 miles [12.8 km] NW of Karoopoort, (–BC), 3 Aug 1933, *T. Salter 3472* (NBG); Ceres, top of Tronsberg [Theronsberg] Pass, (–BC), 1 Sep 1926, *M. Levyns 1501* (BOL); Matroosberg Station, (–BD), 24 Jul 1969, *D. McMurtry s.n.* (NBG); Worcester, (–CB), 17 May 1944 [fl. ex hort.], *E. Esterhuysen 10,129* (BOL); 5 Aug 1963, *F. Stayner s.n.* (NBG); Worcester, Langerug Koppie, (–CB), 7 Aug 1976, *I. Walters 313* (NBG); Worcester, Aan de Doorns, Reiers Rus, (–CB), 19 Jul 1982, *I. Walters 2585* (NBG); Over Hex, (—DA), 4 Aug 1949, *W. Barker 5380* (NBG); 10 miles [16 km] from Worcester on Robertson Road, (—DA), 10 Jul 1954, *W. Barker 8259* (NBG); Koo, Rooihoogte Pass, (–DB), 23 Aug 2008, *J. Manning 3188a* (NBG); flats S of Robertson, (—DD), 31 May 1954, *M. Levyns 10,152* (BOL); Cannaboschvlakte, W of Robertson, (—DD), 8 Jul 1980, *L. Hugo 2386* (NBG). **3320 (Montagu):** Whitehill Karoo Garden, (–BA), 15 Jul 1923, *R. Compton 2859* (NBG); near Matjiesfontein, (–BA), 22 Aug 1932, *R. Compton 3972* (BOL, NBG); flats between Bloutoring and Withhoogte, NE of Montagu, (–CB), 17 Sep 1974 [fruiting], *A. Mauve & I. Oliver 212* (NBG); Montagu, near the Baths, (–CC), Aug 1924, *M. Page s.n.* (BOL); Zorgvliet farm, SW slopes of Touwsberg, (–DB), 5 Oct 1993 [young fruit], *D. Snijman 1364* (NBG); Barrydale, Warmwaterberg, (—DD), 1 Aug 1955, *G. van Niekerk 571* (BOL). **3321 (Ladimsith):** hills N of Huis River Pass, (–BC), 13 Aug 1958, *T. Wurts 1632* (NBG). **3322 (Oudshoorn):** foot of Swartberg Pass, Malvadraai hiking trail, (—AA), 9 Sep 2001, *P. Goldblatt & L. Porter 11,856* (MO, NBG); Boomplaas, Cango Valley, (–AC), 1 Sep 1974, *R. Moffett 330* (NBG); De Rust, (–BC), 17 Jul 1960, *J. Marais s.n.* (NBG); Meiring's Poort, (–BC), Oct 1949, *T. Stokoe SAM63686* (SAM); George Dist., Ganze Kraal [upper Langkloof], (–DC), Aug 1931, *C. Thorne SAM51699* (SAM).

EASTERN CAPE. **3026 (Aliwal North):** Burgersdorp, (–CD), Oct 1935 [fruiting], *C. Thorne SAM51960* (SAM). **3225 (Somerset East):** near Mortimer, (–BC), Jan 1901, *L. Kensit 9251* (BOL).

7. **Massonia pustulata** Jacq., Collectanea 4: 177 (1791); Ker Gawler : t. 642 (1803); Baker: 411 (1897); Jessop: 417 (1976). Type: South Africa, illustration in Jacquin: 454 (1804), lecto., designated by Jessop: 417 (1976).

Massonia scabra Thunb.: Appendix (1800); Andrews: t. 220 (1802). Type: South Africa, 'Cap. b. Spei', *Thunberg s.n.* (UPS-THUNB [7992], holo.).

Massonia muricata Ker Gawl.: t. 559 (1802), *syn. nov.*; Baker: 410 (1897).Type: South Africa, illustration in Ker-Gawler: t. 559 (1802) 'our drawing was made in the garden of Ed. Woodward, Esq., lecto., designated by Jessop: 414 (1976).

Deciduous geophyte. *Bulb* subglobose, 15–35 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate or spreading, ovate to suborbicular, 50–120 × 50–110 mm, acute or obtuse, leathery with narrowly membranous margins, minutely setulose or papillate marginally and submarginally, upper surface bright green, longitudinally depressed-veined, usually murico-pustulate or tuberculo-pustulate, pustules ±0.5–0.8 mm diam., topped with an obtuse tubercle ±0.2 mm long, or rarely smooth. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts lanceolate, 20–50 × 10–15 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–15 mm long. *Flowers* unscented; perianth white with inside of tube flushed blue and filament cup dark obsidian-green or bluish black; tube cylindrical-obconic, widening slightly towards mouth, 10–12 × 4–5 mm, mouth 4–5 mm diam.; tepals arising at same level, sharply sigmoid-recoiled at base, spreading or incurving distally, lanceolate, 8–10 × 3–4 mm, ±conduplicate distally, apex penicillate. *Filaments* erect, white with dark green or bluish black basal collar, filiform, (10–)15–22 mm long, connate at base for (2.0–)2.5–5.0 mm in a thick, longitudinally ribbed collar not occluding mouth; anthers 2.5–3.0 mm long at anthesis, greyish yellow to yellow with yellow pollen. *Ovary* ovoid to obovoid, whitish flushed blue, 5–7 × 4–5 mm, strongly contracted to style; style white, 19–30 mm long, well-differentiated from ovary, erect, filiform. *Capsule* obovoid-cuneate, 3-winged, emarginate, 20–30 × 10–20 mm. *Seeds* subglobose-pyriform, 1.25–1.5 mm diam., smooth. *Flowering time:* July–early August. Figs. 1F and 7.

Distribution and ecology: a local endemic of the Overberg in Western Cape, recorded from Napier east to Swellendam and Heidelberg and

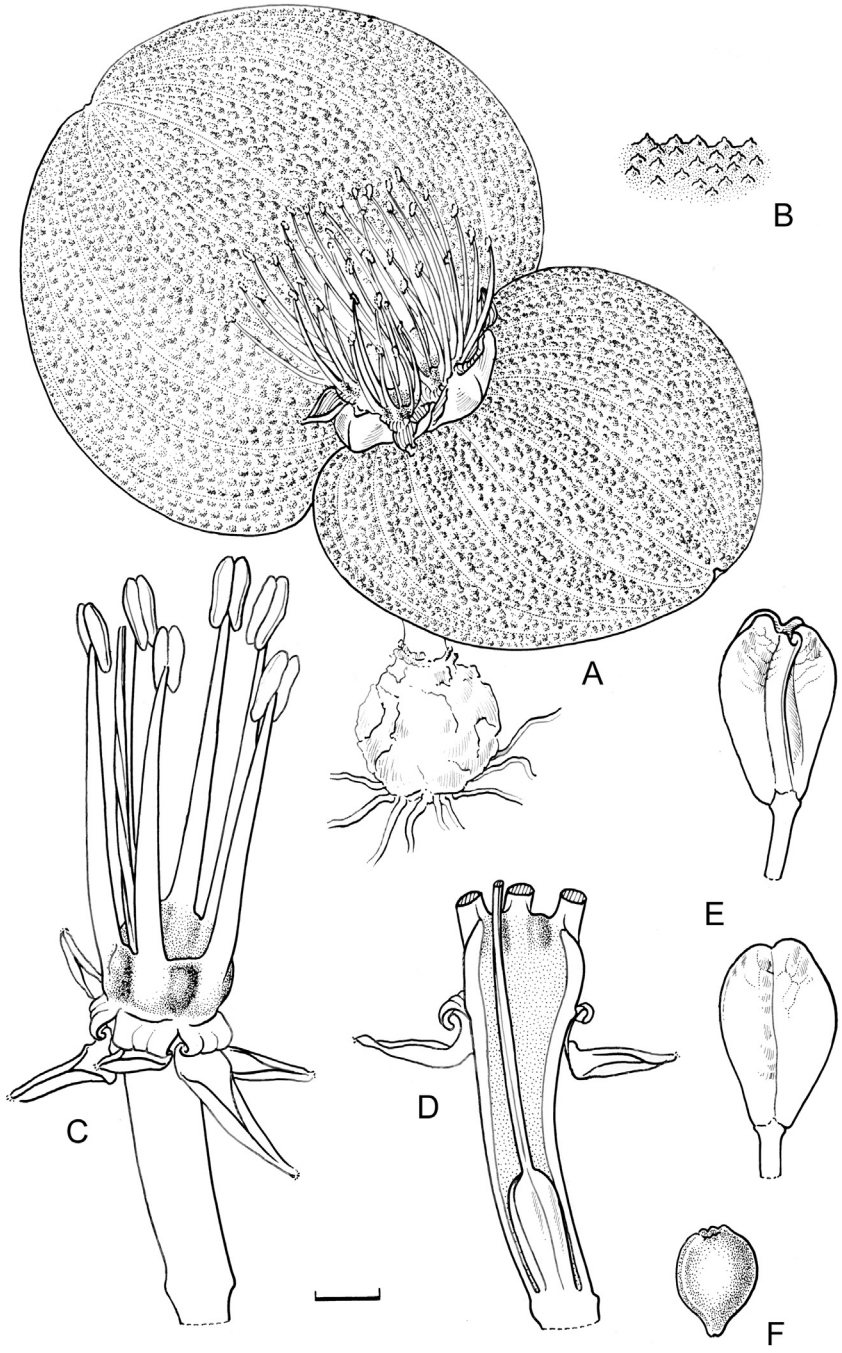

Fig. 7. *Massonia pustulata.* A, flowering plant; B, detail of leaf surface ornamention; C, flower; D, half-flower (stamens and style distally excised); E, capsules; F, seed. *Voucher:* Western Cape, Napier, *Manning 3449.* Scale bar: A, E, 10 mm; C, D, 3 mm; F, 1 mm. Artist: John Manning.

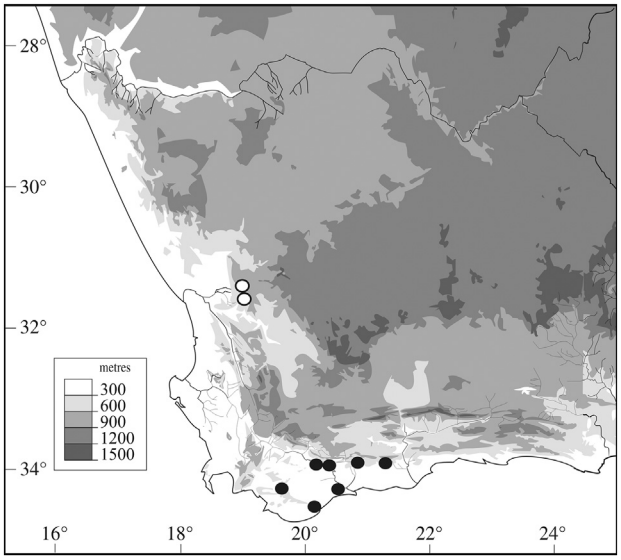

Fig. 8. Distribution of *Massonia pustulata*, ●; and *M. tenella*, ○.

south to Bredasdorp (Fig. 8); on stony clay flats and shale outcrops in renosterveld shrubland.

Diagnosis: readily diagnosed by the ±obconic perianth tube 10–12 mm long with an open mouth 4–5 mm diam. and tepals that are sigmoid-recurved basally, and particularly by the strikingly bicoloured filaments, (11–)15–22 mm long and whitish for most of their length but connate at the base in a thick, obsidian-green or bluish black collar 2–5 mm long, and with relatively large anthers, 2.5–3.0 mm long at anthesis. The leaves are usually tuberculate-pustulate but are smooth in some collections, eg. *Barker 10819* from Arniston and *Davidson s.n.* from Heidelberg, the latter also with shorter filaments than usual, 10–12 mm long, connate for ±2 mm, although other plants from the same area (*Morrison s.n.*) are typical in their pustulate leaves and longer filaments, ±20 mm long and connate 2.5 mm. The pustules usually collapse in herbarium specimens, leaving just the apical papillae evident, and in such instances the leaves appear then merely sparsely tuberculate-papillate. The large, obovoid-cuneate, emarginate, 3-winged capsules 20–30 mm long, are also diagnostic, resembling those of *M. longipes* in both size and form. The two species also share similar tuberculate-pustulate leaves but *M. longipes* is distinguished by fragrant, uniformly white or pinkish flowers with narrower perianth tube lacking the dark filament collar that is diagnostic of *M. pustulata*, and smaller anthers 1.5–2.0 mm long at anthesis.

Plants of *Massonia pustulata* have been misidentified as *M. depressa* on account of the superficial similarity in their flowers, both species having relatively wide, open-mouthed perianth tubes and long filaments with relatively large anthers, but *M. depressa* has smooth or papillate leaves, pale or red filaments with the filament collar also pale or flushed greenish or red but never the striking dark green or blackish blue characteristic of *M. pustulata*, and larger anthers, 3–4 mm long. In addition, *M. depressa*, although widespread through the western interior of Western and Northern Cape, is absent from the Overberg and southern coast.

History: the species was described (Jacquin, 1791) and illustrated (Jacquin, 1804) from cultivated plants that flowered at the Schönbrunn gardens in Vienna, whence they had been brought from South Africa in 1788 by the Austrian gardener and collector Franz Boos (1753–1832). Bulbs were also collected for Kew by the Scottish plant collector Francis Masson (1741–1805) and herbarium specimens by the Swedish botanist C.P. Thunberg (1743–1842), likely at the same time and place as the plants imported to Europe by Boos as the three men are known to have travelled together (Glen and Germishuizen, 2012). Thunberg's collection formed the basis for his *M. scabra* Thunb. (1800), under which name Masson's plants, which flowered in England, were illustrated by Andrews (1802). *Massonia muricata* Ker Gawl. (1802), another species described from material cultivated in England, was included in a broadly circumscribed *M. echinata* by Jessop (1976) but is clearly conspecific with *M. pustulata*, displaying the muricate-pustulate foliage, funnel-shaped perianth tube, long filaments with diagnostic dark green basal ring, and moderately large anthers that are all characteristic of the species. We synonymise the name here. Although the origin of the type material of *M. muricata* was not given in the protologue, Baker (1897: 410) states that it was introduced into cultivation by Masson in 1790, strongly suggesting that it was from the same original wild population as *M. scabra* and likely also *M. pustulata*.

Massonia pustulata has been much misunderstood by later authors following its treatment by Baker (1897), the name being misapplied to *M. longipes* on account of their similar pustulate foliage, and herbarium collections misidentified as *M. depressa* on account of the similarity between these two species in the form and dimensions of their flowers. Müller-Doblies and Müller-Doblies (1997) were also unclear of the circumscription of the species but their description of the very long filaments (reaching 17–24 mm) and the single locality cited (Arniston Flats) are both consistent with true *M. pustulata.* Its circumscription and the application of the name were clarified by Wetschnig et al. (2012).

Conservation notes: a local endemic of clays soils in the Overberg and severely threatened by agriculture throughout its range.

Additional specimens seen

South Africa. WESTERN CAPE. **3419 (Caledon):** Caledon 58.8 [Kleinrivierberge], (−AD), Aug. without year, *Ecklon No. 19* (BOL); ±14 km NW of Napier, Fairfield Farm, (–BC), 27 Jul 1995, *J. Kemper 822* (NBG); Napier, northern edge of town, (–BD), 20 Jul 2014, *J. Manning 3449* (NBG). **3420 (Bredasdorp):** Ratel River, (−AA), 3 Sep 1943, *R. Compton 14,768* (NBG); near Swellendam, Farm Witkop, (–AB), 30 Aug 1962 [fruiting], *R. Bayliss 639* (NBG); De Hoop-Potberg Nature Reserve, Dronkvlei, (−AD), 2 Aug 1979, *C. Burgers* (NBG); near Cape Infanta, (–BD), Jun 1939, *G. Linley comm. V. Peers s.n.* (BOL); Arniston Flats, (–CA), 6 Jul 1971, *W.F. Barker 10,819* (NBG); Heidelberg, (–BB), Jul 1930, *S. Morrison s.n.* (NBG); Heidelberg, Palmyra Farm, (–BB), 28 Aug 1968, *I. Davidson s.n. (comm. J. Loubser)* (NBG).**3421 (Riversdale):** Albertinia Commonage, (–BA), Jun 1913, *J. Muir 918a* [mixed with *M. setulosa*] (BOL).

8. **Massonia tenella** Sol. ex Baker in *J. Linn. Soc.*, Bot. 11: 389 (1870). Type: South Africa: 'loco natali Buckland, Fl. in Hort. Massoni Julio 1794', *Masson s.n.* [BM, drawing number 112, lecto., designated by Müller-Doblies & Müller-Doblies: 129(2010)]. Epitype: South Africa, Northern Cape, Calvinia (3119): '4 km S of Nieuwoudtville', (–AC), 720 m, 1987, *Wetschnig 1145* [GZU, epi., designated by Martínez-Azorín et al.: 117] (2015c).

Massonia bokkeveldiana Poelln.: 384 (1946). Type: South Africa, Northern Cape, Calvinia (3119): 'Onder Bokkeveld, Oorlogskloof, 2200ft [670 m]', (–CA), 21 Aug 1897, *R. Schlechter 10,935* (WRSL, holo.; BOL!, E, G, GRA, K, MO, US, Z, iso.).

Deciduous geophyte. *Bulb* subglobose, 10–20 mm diam., outer tunics papery and purplish but later leathery and dark brown. *Leaves* 2, prostrate, ovate to suborbicular, (10–)20–50(−100) x (8–)10–50 mm, acute or apiculate, leathery with narrowly membranous margins, minutely setulose marginally and submarginally, upper surface green, smooth or usually sparsely to more densely echino-tuberculate, tubercles topped with suberect or deflexed, acute, conical, transversely rugulose trichome 0.4–1.0 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts ovate to oblanceolate, 7–20 × 4–7 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–13 mm long. *Flowers* honey-scented; perianth white or flushed pink with age; tube obconic, widening slightly towards mouth, 2.5–7.0 × 2–3 mm, mouth ±3.5 mm diam.; tepals

arising at same level, patent or slightly deflexed at base, spreading or slightly upcurved distally, lanceolate, 3–7 × 2.0–2.5 mm, concave, apex penicillate. *Filaments* suberect, white, subulate to triangular, 3.5–7.5 mm long, up to 2 mm wide at base, free or shortly connate at base up to 0.5 mm, not occluding mouth; anthers ±2 mm long at anthesis, dark purple with yellow pollen. *Ovary* oblong, green, 3–4 × 1.5–2.0 mm, strongly contracted to style; style white, 6–8 mm long, abruptly differentiated from ovary, erect, tapering gradually to apex. *Capsule* oblong-trigonous, truncate, 5–8 × 4–6 mm. *Seeds* globose, 1.0–1.5 mm diam., smooth. *Flowering time:* late May–early July. Figs. 1G and 9.

Distribution and ecology: a local endemic of the Bokkeveld Escarpment in Northern Cape, where it is known from Grasberg and the top of Van Rhyn's Pass through the Oorlogskloof Nature Reserve to the adjacent farm Papkuilsfontein in the south (Fig. 8); on sandy loam flats or pockets of shallow soil on sandstone rock sheets in open arid fynbos, from 600 to 900 m a.s.l.

Diagnosis: a distinctive species recognised by the usually echinotuberculate leaves with declinate, rugulose trichomes, and small flowers with short, obconic perianth tube 2.5–7.0 mm long, lanceolate tepals without a sigmoid flexure at the base, and short, subulate or triangular filaments 3.5–7.5 mm long. The filaments are free or shortly connate at the base for up to 0.5 mm, the anthers are purple with yellow pollen, and the ovary is sharply contracted above into the style. The rugulose trichomes appear to be unique to the species (Martínez-Azorín et al., 2015c).

The tunics in *M. tenella* become leathery and are initially purplish on drying, later turning dark brown. In most species of *Massonia* the dry tunics are initially pale, and purplish tunics are characteristic of a small group of species of the Western Mountains that also includes *M. triflora*, *M. echinata* and *M. latebrosa*, suggesting a possible relationship among them (Martínez-Azorín et al., 2015c), although the tepals in *M. tenella* lack the sigmoid-curvature characteristic of the other three species.

History: another of the species first collected by Kew gardener F. Masson (1741–1805), presumably in the late spring and summer of 1774 during the second of his collecting trips into the interior when he visited the Bokkeveld in the company of C. Thunberg. At this time the species would have been in fruit, and the type is an illustration that Masson made from a plant that flowered in his greenhouse in July 1794. The species was only formally described by Baker (1870). It was included in a broadly circumscribed *M. echinata* by Jessop (1976) until resuscitated by Müller-Doblies and Müller-Doblies (1997), and later fully treated by Martínez-Azorín et al. (2015c).

Conservation notes: a highly local endemic of sandstone exposures on the Bokkeveld Mtns around Nieuwoudtville and possibly threatened by agriculture in some of its known localities although others fall within protected areas.

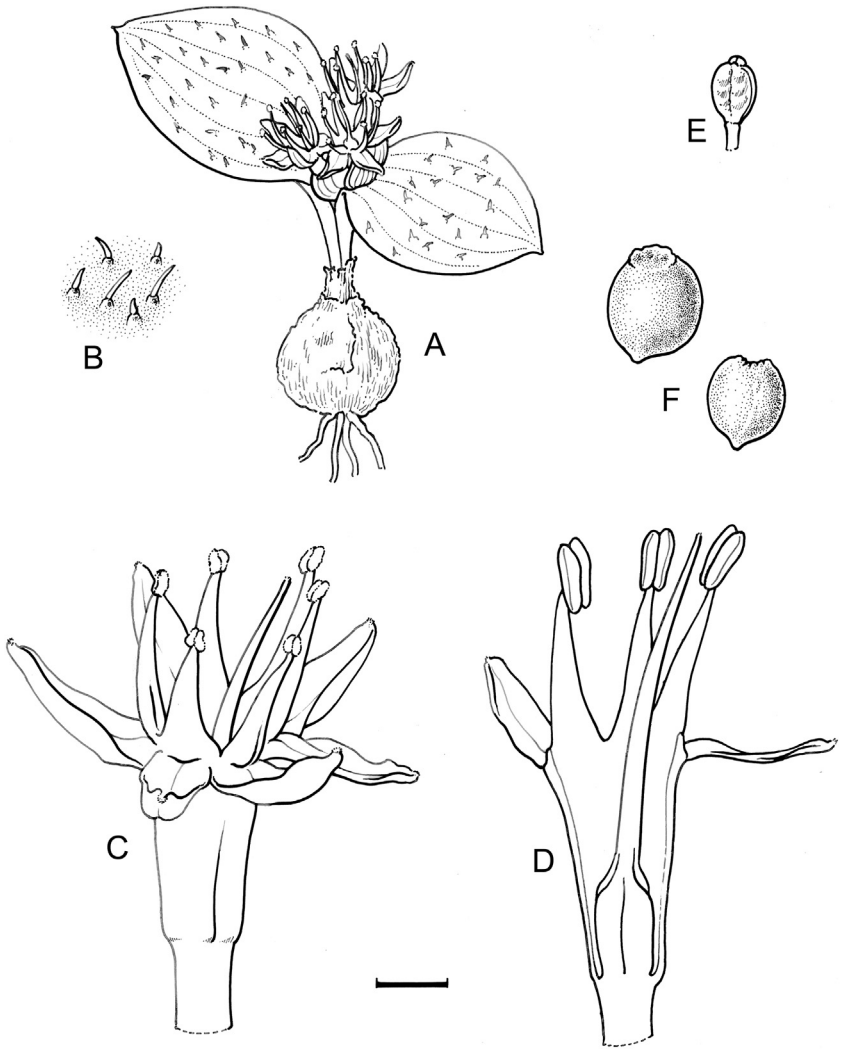

Fig. 9. *Massonia tenella.* A, flowering plant; B, detail of leaf surface ornamentation; C, flower; D. half flower; E. capsule; F. seeds. *Voucher:* Northern Cape, Nieuwoudtville: Groenrivier, *Manning s.n.* Scale bar: A, E, 10 mm; C, D, 2 mm; F, 1 mm. Artist: John Manning.

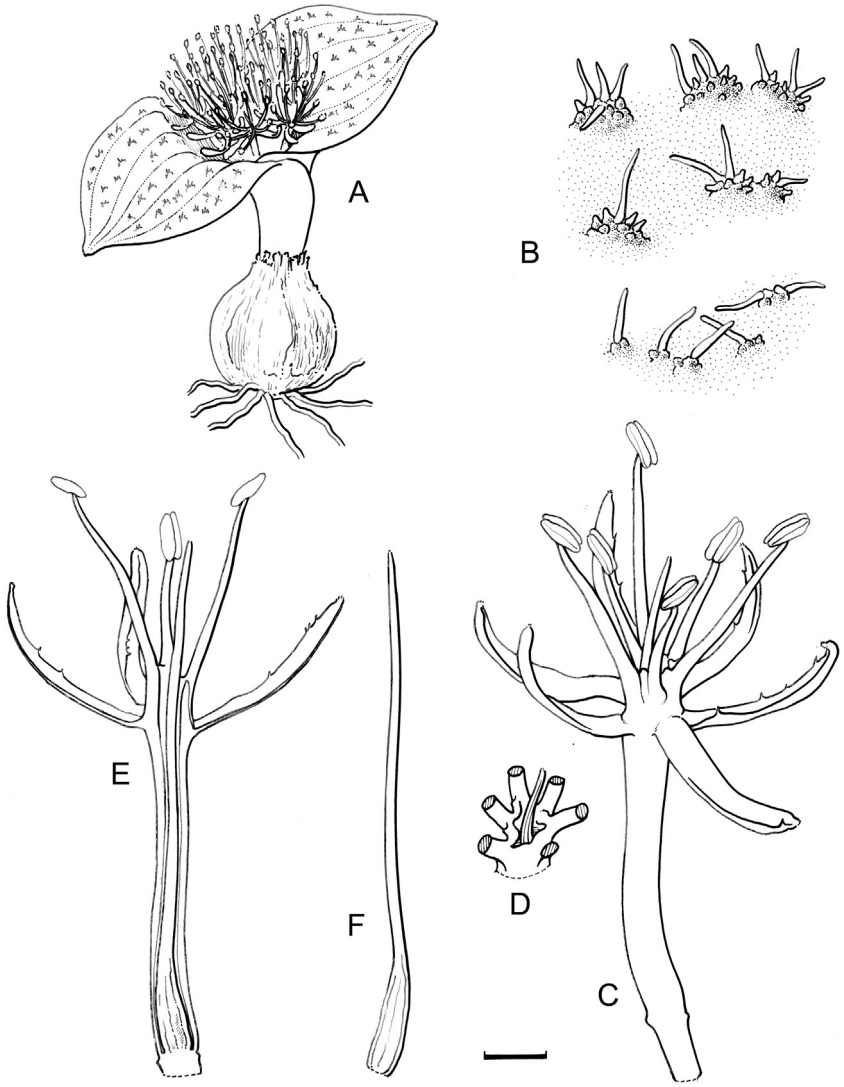

Fig. 10. *Massonia dregei*. A, flowering plant; B, detail of intra-population variation in leaf surface ornamentation; C, flower; D, mouth of perianth tube (stamens distally excised); E, half-flower; F, gynoecium. *Voucher:* Western Cape, Lambert's Bay, *Manning 3582*. Scale bar: A, 10 mm; C–F, 3.5 mm; F, 1 mm. Artist: John Manning.

Additional specimens seen

South Africa. NORTHERN CAPE. **3119 (Calvinia):** Grasberg, (–AC), 5 Jun 1938, *B. Martin s.n.* (NBG); 4 Jun 1943, *B. Martin s.n.* (NBG); 20 Aug 1960 [fruiting], *W. Barker 9236* (NBG); 2 Sep 1984 [fruiting], *E. Oliver 8578* (NBG); top of Van Rhyn's Pass, (–CA), 25 Jul 1941, *R. Compton 11,167* (NBG), *E. Esterhuysen 5367* (BOL); summit of Vanrhynspas [Van Rhyn's Pass], (–CA), 11 Jul 1932, *T. Salter 2487* (BOL); 7 Jun 1956, *H. Hall s.n.* (NBG); 12 Aug 1961 [fruiting; fl. ex hort. 1 Jun 1962], *W. Barker 9440* (NBG); 31 May 1970, *H. Hall 3583* (NBG); Ooorlogskloof Nature Reserve, (–CA), 3 Jul 2001, *W. Pretorius 728* (NBG); Papkuilsfontein, waterfall parking area, (–CA), 10 Jul 1998, *B. Orthen s.n.* (NBG).

9. **Massonia dregei** Baker in Fl. Cap. 6: 412 (1897). Type: South Africa, Western Cape, Clanwilliam (3218): S of Olifants River, Langevalei/Lange Vallei, (–BC), under 1000′ [300 m], Jul, *Drège 2688* (K [000257135], holo.–image!; G, HAL, L, S [1014151]–image!, iso.).

Neobakeria visserae [as '*visseriae*'] P.E.Barnes: 72 (1933), *syn. nov. Massonia visserae* (P.E.Barnes) Mart.-Azorín et al.: 71 (2018a). Type: South Africa, [Western Cape], Clanwilliam (3218): 'Lambert's Bay, on Klip Koppies about 5 miles [8 km] from Bay', (–AB), May 1931, *Visser sub R. Broome s.n.* (BOL [19616], holo.!). *Note:* Although originally spelled '*visseriae*', the species epithet is to be corrected to '*visserae*' (Turland et al., 2018: Art. 60.8a).

Deciduous geophyte. *Bulb* subglobose, 15–35 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate or spreading to suberect, ovate to suborbicular, 20–80(−140) × 20–80 mm, acute or obtuse, leathery with narrowly membranous margins, minutely setulose marginally and submarginally, upper surface bright green, longitudinally depressed-veined, either smooth or echino-pustulate then pustules usually with 2 to 6 erect, acute, conical primary trichomes plus several smaller secondary trichomes forming short longitudinal crests or fascicles along and between main veins, rarely trichomes solitary without secondary trichomes, primary trichomes conical or slender, obtuse or subacute to acute, 0.2–1.0 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts lanceolate to oblanceolate, 12–30 × 2–6 mm, acute to acuminate, margins minutely setulose, sometimes with scattered antrorse denticles; pedicels at anthesis 8–13 mm long. *Flowers* narcissus-scented; perianth white; tube narrowly cylindrical, widening slightly towards mouth, (6–)12–15(−20) × 1 mm, mouth 1.5 mm diam.; tepals arising at same level or inner series adnate to filament column for 0.5 mm, patent to deflexed at base, incurving distally, linear-oblong, 9–16 × 1.0–1.5 mm, conduplicate, margins occasionally with a few scattered trichomes, apex penicillate. *Filaments* suberect, white, filiform, of two lengths, outer 10–12 mm long, inner 8–10 mm long (thus

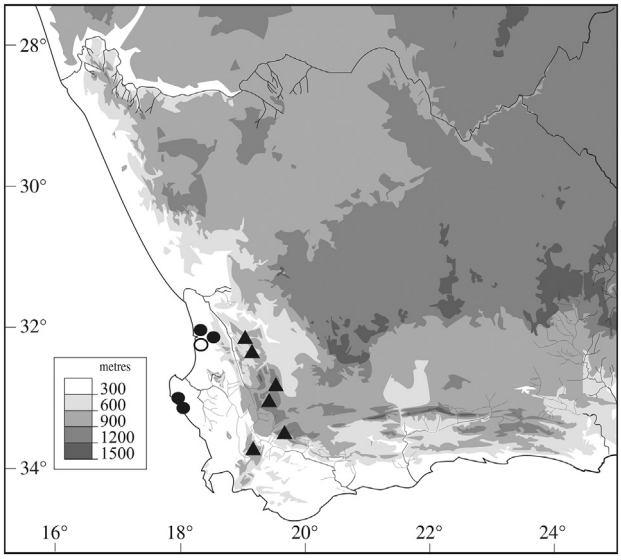

Fig. 11. Distribution of *Massonia dregei*, ●; *M. occulta*, ○; and *M. pygmaea*, ▲.

±2 mm shorter than outer), connate at base for 1.5–2.5 mm in a longitudinally ribbed column partially occluded at mouth by interstaminal gibbosities; anthers 1.5–1.8 mm long at anthesis, usually dark blue to purple with lilac pollen, rarely yellow or flushed turquoise with yellow pollen. *Ovary* oblong-conical, greenish yellow, 4–5 x ± 1 mm, tapering and weakly contracted to style; style white, 12–18 mm long, weakly differentiated from ovary, erect, tapering gradually to apex. *Capsule* ovoid-trigonous, apiculate, ±8–10 × 6–8 mm. *Seeds* globose, 1.5–1.8 mm diam., smooth. *Flowering time:* May–June. Figs. 1H, I and 10.

Distribution and ecology: a narrow endemic of the West Coast of Western Cape, South Africa, known from one or two populations inland of Lambert's Bay and another few around Saldanha Bay to the south (Fig. 11); in shallow soils on sandstone or granite rock outcrops near the coast.

Diagnosis: very similar to *Massonia pygmaea*, with which it shares linear tepals not sigmoid-recoiled at the base, and outer and inner filaments of different lengths with blackish anthers, but differing in the fusion of the filaments into a short collar or column 1.5–2.5 mm long, whereas the filaments in typical *M. pygmaea* are fused only at the base for 0.5–1.0 mm. In addition, the ovary in *M. dregei* tapers imperceptibly into the style whereas the transition from ovary to style in *M. pygmaea* is more abrupt. The type of *M. dregei* and other collections from Lambert's Bay have the upper surface of the leaf mostly ornamented with distinctive pustules topped with several (rarely one) obtuse to acute trichomes, forming fascicles or short longitudinally elongated crests running along and between the main veins, typically with several shorter secondary trichomes or papillae on the crests as well. Investigation of wild plants at Lambert's Bay shows that there is variation in the leaf surface, however, with most plants developing the characteristic crests or fascicles of papillae or setae but others with mostly a solitary seta per pustule and a few with completely smooth leaves lacking any excrescences or pubescence (Fig. 1H). These smooth-leaved forms are morphologically indistinguishable from populations around Saldanha Bay (Fig. 1I), which are evidently uniformly smooth-leaved, and we accordingly treat them as conspecific. All of these coastal populations have the filaments fused into a well-developed collar 1.5–2.5 mm long. This distinguishes them from inland populations of *M. pygmaea*, which consistently have solitary leaf trichomes on conical pustules, without secondary trichomes or papillae.

Baker (1897) described the leaves of *Massonia dregei* as smooth but he was misled into this error by the fact that both specimens on the Kew type are mounted to expose only the lower, unornamented surface of the leaves. The isotype at Stockholm, however, is mounted to expose the upperside of the leaves and these, as fully noted on the specimen by the German botanists D. and U. Müller-Doblies, show '… the characteristic indumentum of groups of irregular papillae, arranged in rows (evidently following the veins).' The flowers on the type of *M. dregei* are withered and difficult to measure accurately but the distinctive foliar indumentum, combined with the slender flowers with unequal filaments and lacking sigmoid coiling of the tepals, the locality near Lambert's Bay, and the winter-flowering time are all consistent with *Neobakeria visserae*, which is accordingly reduced to synonymy.

History: the species was first collected in the valley of the Langevlei River near Leipodtville on the West Coast between Eland's Bay and Lambert's Bay by the German botanical collector and traveller J.F. Drège (1794–1881), probably in July 1830, at which time he is known to have collected around Clanwilliam en route to the north. This collection was named for him by Baker (1897). Plants collected just inland of Lambert's Bay in May 1931 by a Miss H.A. Visser, about whom nothing further is known, were passed on to Dr. Robert Broome (1866–1951), itinerant medical practitioner and later famous palaeontologist, who in turn took them to the Bolus Herbarium at the University of Cape Town, where they were described as *Neobakeria visserae* by P.E. Barnes in 1933. Both names were included in a broadly circumscribed *M. echinata* by Jessop (1976), until *N. visserae* was resuscitated by Martínez-Azorín et al. (2018a). The species was considered until now to be restricted to the type locality near Lambert's Bay but populations from around Saldanha Bay previously identified as *M. pygmaea* are included here.

Conservation notes: a highly local endemic of the West Coast restricted to two or three rocky outcrops around Lambert's Bay and Saldanha, the latter of which are threatened by urbanisation.

Additional specimens seen

South Africa. WESTERN CAPE. **3218 (Clanwilliam):** Lambert's Bay, (–AB), 15 May 1963, *H. Hall s.n.* (NBG); Van Puttensvlei, 5 km E of Lambert's Bay, (–AB), 13 May 2016, *J. Manning 3582* (NBG). **3317 (Saldanha):** Langebaan, Donkergat, (–BB), 7 Sep 1967 [fruiting; fl. in cult. 27 May 1968 and 21 May 1968], *J. Rourke 754* (NBG).

10. **Massonia inaequalis** W.F.Barker ex Mart.-Azorin et al. in *Phytotaxa* 343: 94 (2018b). Type: South Africa, Western Cape, Clanwilliam (3218): 'Eland's Bay on hill near school', (−AD), 3 Jun 1968 [fl. Ex hort.], *W. Barker 10435a* (NBG, holo.!)

Deciduous geophyte. *Bulb* subglobose, 15–25 mm diam., inner tunics reddish, outer tunics papery to leathery, greyish to reddish brown. *Leaves* 2, prostrate or spreading to suberect, ovate, 30–70 × 15–50 mm, acute or obtuse, leathery with narrowly membranous margins, minutely setulose marginally and submarginally, upper surface bright green, longitudinally depressed-veined, sparsely echinoverrucose with erect or inflexed, acute, conical or cylindrical trichomes 0.1–0.5 mm long on small basal cushion. *Inflorescence* a condensed, subcapitate raceme, few-flowered, protruding shortly above leaves; bracts lanceolate to oblanceolate, 15–20 × 4–8 mm, acute to acuminate, margins minutely setulose; pedicels at anthesis 5–10 mm long. *Flowers* unscented; perianth white; tube narrowly cylindrical, widening slightly towards mouth, 15–17 × 2–3 mm, mouth 3 mm diam.; tepals inserted unequally, inner series adnate to filament column for 0.5 mm, erect below and suberect or weakly spreading in distal half, lanceolate, 8–9 × 2.5–3.0 mm, plane or weakly concave, apex penicillate. *Filaments* erect, ±connivent, white, subulate, of two lengths, outer 7–9 mm long, inner 3.5–5.0 mm long (thus ±3.5–4 mm shorter than outer), connate at base for 1.0–1.5 mm in a thin-textured collar occluded by small interstaminal or coronal flaps; anthers 1.5–1.8 mm long at anthesis, dark blue or black with purple pollen. *Ovary* oblong-ellipsoid, greenish yellow, 4–5 –1.5–2.0 mm, weakly contracted to style; style white, 16–19 mm long, differentiated from ovary, erect, tapering gradually to apex, reaching top of shorter filaments. *Capsule* ovoid, 3-angled, apiculate, ±8–10 × 6–8 mm. *Seeds* globose, 1.2–1.5 mm diam., smooth. *Flowering time:* May–June. Figs. 1J and 12.

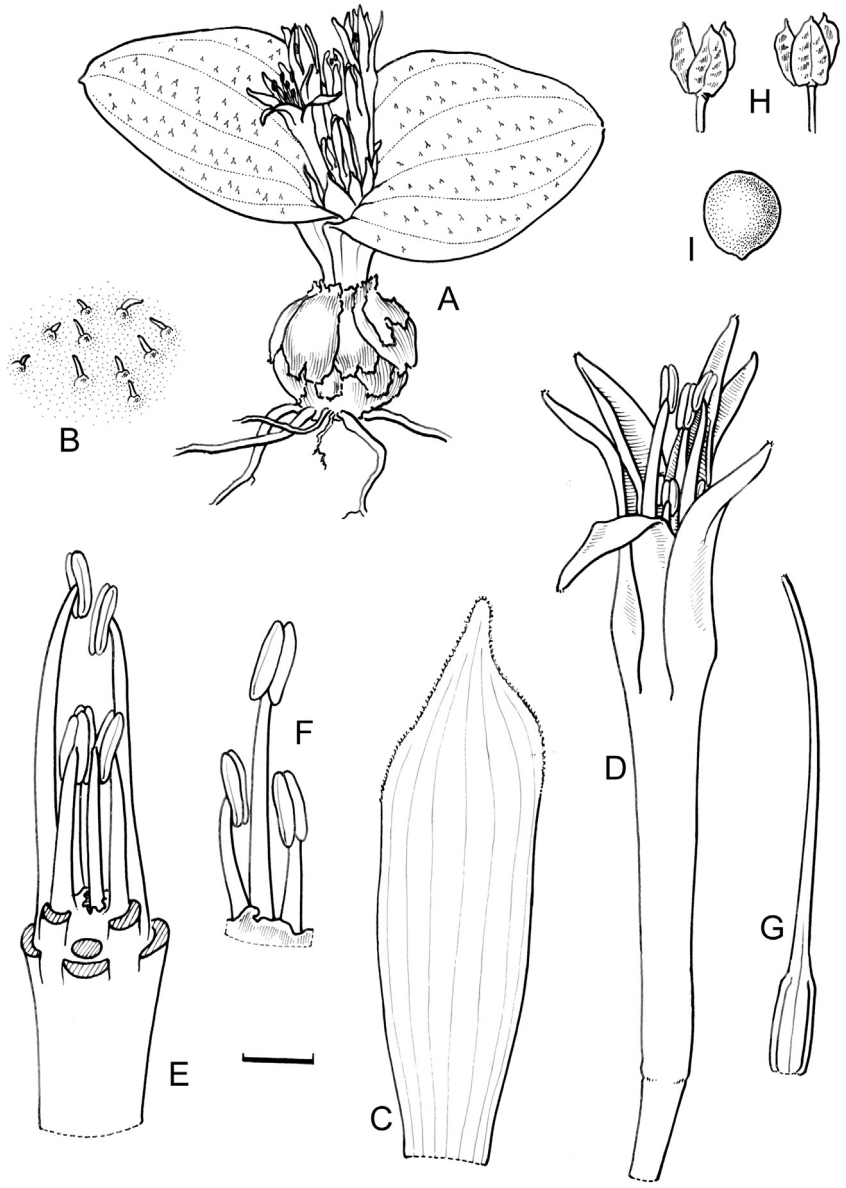

Fig. 12. *Massonia occulta*. A, flowering plant; B, detail of leaf surface ornamentation; C, bract; D, flower; E, stamens; F, detail of three detached stamens showing basal flaps on inner surface; G, gynoecium; H, capusles; I, seed. *Voucher:* Western Cape, Eland's Bay, *Manning 2361a*. Scale bar: A, H, 10 mm; C, D, G, 3.5 mm; E, F, 5 mm; I, 1 mm. Artist: John Manning.

Distribution and ecology: known only from the type locality at Eland's Bay on the West Coast of Western Cape (Fig. 11); in loamy pockets in cracks and shallow pockets on sandstone boulders on S-facing slopes.

Diagnosis: a very distinct species with sparsely echino-pustulate leaves and diagnostic flowers, the tepals remaining erect or spreading slightly only distally, and markedly unequal filament whorls, the inner filaments 3.5–4.0 mm shorter than the outer and ± half as long. The stamens are erect and clustered around the style, which reaches only to the level of the lower anthers, and the filaments are connate below for 1.0–1.5 mm into a shallow tube that develops small flaps or coronal lobes between the bases of the filaments that occlude the mouth of the tube. The unequal filament whorls and dark blue or black anthers with purple pollen suggest a relationship with *M. dregei* and *M. pygmaea* but the unique flowers make confusion with any other species impossible.

History: first collected in fruit in August 1966 by Cape Town botanist W. Barker (1907–1994) and flowered in cultivation two years later but overlooked until now. At the time that she collected the plants, Miss Barker was unsure whether they represented a species of *Massonia* or *Polyxena* but later autographed her photographs with the manuscript name *Massonia inaequalis*.

Conservation notes: a highly local endemic of the West Coast restricted to a single rocky outcrop at Eland's Bay although currently facing no threats.

Additional specimens seen

South Africa. WESTERN CAPE. **3218 (Clanwilliam):** Eland's Bay on hill near school, (−AD), 16 Aug 1966 [fruiting], *W. Barker 10,435* (NBG); 5 June 2012, *J. Manning 3361a* (NBG).

11. **Massonia pygmaea** Schlecht. ex Kunth, Enum. Pl. 4: 298 (1843). *Poyxena bakeri* T.Durand & Schinz: 366 (1894) [non *P. pygmaea* (Jacq.) Kunth (1843)]. Type: South Africa, Western Cape, Worcester (3319): 'Koude Bokkeveld, Geitouw [Gydo]', (–AB), 17 May without year, *Mund & Maire s.n.* (B [100168399]–image!, holo.; G–image!, HAL, iso.).

Neobakeria heterandra Isaac: t. 729 (1939). *Massonia heterandra* (Isaac) Jessop: 426 (1976). Type: South Africa, Western Cape, Worcester (3319): 'Louw's Hoek, Villiersdorp', (–CD), 18 Apr 1938, *Stokoe s.n. BOL22309* (BOL, holo.!; PRE, SAM!, iso.).

Deciduous geophyte. *Bulb* subglobose, 10–30 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate or spreading to

suberect, sometimes only partially emergent at flowering, ovate to suborbicular, (15–)20–30(−50) × (5–)8–20(−25) mm, acute or acuminate, leathery with narrowly membranous margins, minutely setulose marginally, upper surface green or streaked or flushed with purple, papillate or more usually tuberculato-pustulate or muricato-pustulate, pustules or tubercles up to ±0.5 mm diam., sometimes coalescent, with a solitary acute or obtuse, conical or ellipsoid papilla or trichome up to 0.5 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts usually relatively inconspicuous, lanceolate to oblanceolate, 10–15 (−30) × 3–5(−7) mm, acute to acuminate; pedicels at anthesis 5–12 mm long. *Flowers* unscented; perianth white or pink to lilac; tube narrowly cylindrical, scarcely widening at mouth, 6–10(−13) × 1.0–1.5 mm, mouth 1.5–2.0 mm diam.; tepals arising at same level or inner series adnate to filament column for 0.5 mm, patent or deflexed with weak sigmoid curve at base (rarely some flowers deflexed-coiled with strong sigmoid bend) and incurving distally, linear, 4–7 × 1.0–1.5 mm, conduplicate, apex penicillate. *Filaments* suberect, white or flushed pink, filiform, outer usually slightly longer than inner but not always all members of each whorl, outer (3.5–)5.0–12 mm long, inner (2.0–)3.5–10 mm long (thus ±1–2 mm shorter than outer), connate at base for 0.5–1.0 mm; anthers 1.0–1.5 mm long at anthesis, dark blue to purple with turquoise or yellow pollen. *Ovary* ellipsoid, green, 3–4 × ±1 mm, tapering or weakly contracted to style; style white or lilac, 11–17 mm long, weakly differentiated from ovary, erect, filiform or tapering gradually to apex. *Capsule* ovoid- or oblong-trigonous, apiculate, 5–7 × 4–5 mm. *Seeds* globose, 1.0–1.5 mm diam., smooth. *Flowering time:* April–June, rarely into September. Fig. 13.

Distribution and ecology: a high altitude endemic from the extreme southwestern Western Cape, recorded from the mountains between Montagu and Worcester, with a small disjunction to the north, where it has been recorded from the Cold Bokkeveld to the northern Cederberg, from north of Gydo Pass to Middelberg (Fig. 11); in shallow pockets on sandstone rock sheets or among boulders, on S-facing aspect at high altitude, from 900 to 2000 m a.s.l.

Diagnosis: a high altitude species of the mountains in the extreme southwestern Western Cape, recognised by the mostly papillate or tuberculato- to muricato-pustulate leaves, and flowers with slender perianth tube 6–13 mm long, spreading tepals without a marked sigmoid flexure at the base, and unequal filaments with the inner series 1.5–2.0 mm longer than the outer. Not all of the inner filaments in some flowers are always markedly longer than the outer. The anthers are dark purple or blackish and the pollen either turquoise blue or sometimes yellow.

Populations from different mountain ranges within the distribution vary slightly from one another, which is consistent with their isolation. Those from the southern portion of the distribution around the Wemmershoek Mtns have shorter filaments than those from the Cold Bokkeveld, the outer series 3.0–4.5 mm long and the inner 2–3 mm long vs 5–12 mm long and 3.5–10.0 mm long respectively; and some plants from near Montagu have tepals with a marked sigmoid bend at the base although others in the same population are typical.

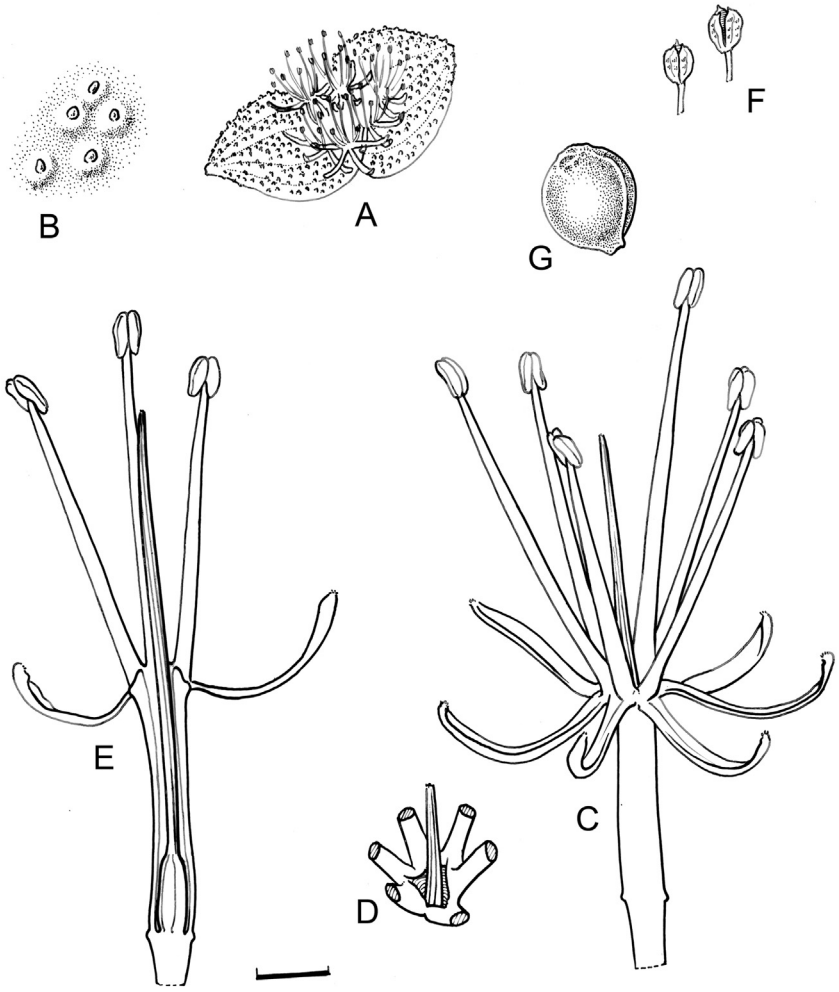

Fig. 13. *Massonia pygmaea*. A, flowering plant (without bulb); B. detail of leaf surface ornamentation; C, flower; D, mouth of perianth tube (stamens distally excised); E, half-flower; F, capsules; G, seed. *Voucher:* Western Cape, Swartruggens, *Jardine & Jardine 681*. Scale bar: A, F, 10 mm; C–E, 3 mm; G, 1 mm. Artist: John Manning.

Populations from the Kamiesberg in northern Namaqualand, treated as *M. pygmaea* subsp. *kamisensis* U.Müll.-Doblies & D.Müll.-Doblies (1997), differ from the typical populations in having evidently smooth leaves, filaments fused into a collar 2.5 mm long with an open, circular mouth, and the ovary tapering smoothly into the style. These morphological differences and the disjunction in distribution suggest that they are better treated as a distinct species, and we exclude them from further consideration here.

Massonia pygmaea resembles *M. dregei* from the West Coastal in its linear tepals without a strong sigmoid bend, and outer and inner filaments of different lengths with blackish anthers, but that species has the filaments connate into a short collar or column 1.5–2.5 mm long, and the ovary tapers imperceptibly into the style whereas the transition from ovary to style in *M. pygmaea* is more abrupt. The type of *M. dregei* and other collections from Lamberts Bay have the upper surface of the leaf mostly ornamented with distinctive pustules topped with several (rarely one) obtuse to acute trichomes, forming fascicles or short longitudinally elongated crests, typically with several shorter secondary trichomes or papillae as well, but populations from Saldanha have smooth leaves.

History: The species was described from plants collected by J. Mund (1791–1831) and L. Maire (*fl.* 1815–1833) sometime in the early nineteenth century on the Gydow Pass between Ceres and Citrusdal. It was subsequently transferred to the genus *Polyxena* by Durand and Schinz (1894), which was distinguished from *Massonia* at that time by having smaller bracts not forming an involucre around the inflorescence. Although Jessop (1976) correctly identified it as a species of *Massonia*, he overlooked the distinctive unequal filaments of the type of *M. pygmaea* and included it in the synonymy of a widely circumscribed *M. echinata*. The species was therefore known for many years under the name *M. heterandra* until the name *M. pygmaea* was resuscitated from synonymy by Müller-Doblies and Müller-Doblies (1997).

Conservation notes: a high altitude species known from several localities along the western mountains and mostly still unthreatened.

Additional specimens seen

South Africa. WESTERN CAPE. **3219 (Wuppertal):** top of Middelberg, (–AC), 16 May 1939, *B. Martin s.n.* (NBG); 22 Jun 1942, *E. Esterhuysen s.n.* (BOL); Middelberg hut, (–AC), 3900 ft. [1200 m], Jun 1980, *L. Hugo 2368a* (NBG); Scorpionsberg, (–AC), 26 Oct 1945 [fruiting], *E. Esterhuysen 12,219* (BOL); Matjiesrivier, (–AC), 19 Aug 1943 [immature fruit], *G. Wagener 131* (NBG); Krom Rivier, (–CB), 2 Oct 1952, *E. Esterhuysen 20,467* (BOL); Cederberg, Tafelberg, (–CD), 6400 ft. [1950 m], 13 Apr 1952, *E. Esterhuysen 20,070* (BOL); 3 May 1953, *E. Esterhuysen 21,370* (BOL, NBG); Groenfontein, Zeekoegat, (–DC), 900 m, 17 Sep 2001, *M. Stobie 9* (NBG); Swartruggens, 60 km NE of Ceres, Knolfontein, (–DC), 1279 m, 20 Jun 2007, *I. Jardine & C. Jardine 681* (NBG); 10 Sep 2013 [fruiting], *I. Jardine 2041* (NBG); 17 Aug 2010 [immature fruit], *I. Jardine & C. Jardine 1339* (NBG). **3319 (Worcester):** Ceres, Ertjieslandkloof, (–AB), 26 Sep 1944 [fruiting], *W. Barker 3062* (NBG); N of Gydoberg, (–AB), without date [photos ex hort. 23 Apr 1971], *K. Hiemstra & H. Hardich 176* (NBG); Fonteinberg [Fonteinjesberg], (–CB), 5 Apr 1929, *T. Stokoe s.n.* (BOL); Wemmershoek Mts, Tafelberg, (–CC), 9 May 1939, *T. Stokoe s.n.* (BOL); Kaaimans Peak, S end of Stettynsberg, (–CD), 22 Mar 1969, *E. Esterhuysen 32,132* (BOL). **3320 (Montagu):** Montagu, mountain ridge, (–CC), Jul 1942, *M. Levyns 8935* (BOL).

12. **Massonia longipes** Baker in Fl. Cap. 6: 411 (1897). Type: South Africa, Western Cape, Caledon (3419): 'Caledon, near Danger Point', (–CB), 1884, *MacOwan sub H. Bolus 5973* (K.–image!, holo.; BOL!, iso.).

[*Massonia pustulata* sensu Leighton (1943) et seq., non Jacq. (1791)]

Deciduous geophyte. *Bulb* subglobose, 15–35 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate, ovate to suborbicular or transversely orbicular, (40–)70–120 × (30–)50–110 mm, acute or obtuse, leathery with narrowly membranous margins, setulose or scabrid marginally, upper surface green or variously flecked or flushed with purple, longitudinally depressed-veined, murico-pustulate or tuberculo-pustulate, sometimes densely so and appearing rugose, pustules ±0.5–0.8 mm diam., topped with one or sometimes more obtuse tubercles ±0.2–0.4 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts lanceolate or obolanceolate, 20–30 × 5–15 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–15 mm long (up to 30 mm long in fruit). *Flowers* sweetly or lightly sour-scented; perianth white or flushed pink; tube cylindrical, widening slightly towards the mouth, (8–)10–12 × 2–3 mm, mouth ±3 mm diam.; tepals arising at same level or inner slightly higher, sharply sigmoid-recoiled at base, spreading or incurving distally, lanceolate, 8–10 × 1.5–2.5 mm, ±conduplicate, margins entire, apex penicillate. *Filaments* erect, white or flushed pink, filiform, (8–)12–17 mm long, connate at base for 0.5–1.5 mm, without filament invaginations; anthers 1.5–2.0 mm long at anthesis, yellow with yellow pollen. *Ovary* oblong, 4–5 × 2–3 mm, strongly contracted to style; style white, (15–)19–27 mm long, well-differentiated from ovary, erect, filiform. *Capsule* obovoid-cuneate, 3-winged, emarginate, (15–)20–30 × 10–15 mm. *Seeds* subglobose, 1.5 mm diam., smooth. *Flowering time:* May–June, rarely into July. Fig. 14.

Distribution and ecology: endemic to the south coast of Western Cape, from Gansbaai to Stilbaai and further east between George and Port Elizabeth in Eastern Cape, with a westerly outlying record from Cape Point (Fig. 15); strictly a species of neutral or calcareous coastal sand flats and sandy pockets on limestone outcrops, sometimes just above the high tide line.

Diagnosis: a coastal species of neutral or calcareous sandy flats, recognised by the mostly tuberculate-pustulate leaves, often spotted or even entirely flushed purple, and the white or pinkish flowers with narrow perianth tube 2–3 mm diam., not occluded at the mouth by filament invaginations, with slender filaments (8–)12–17 mm long that are shortly connate at the base for up to 1.5 mm, and relatively small, yellow anthers 1.5–2.0 mm long at anthesis. The large, obovoid-cuneate, 3-winged capsules, (15–)20–30 mm long are also characteristic. Populations from De Hoop Nature Reserve are anomalous in their short filaments 8–10 mm long, but are otherwise florally and vegetatively consistent with the species. In its pustulate foliage *M. longipes* resembles *M. pustulata* from clay soils in the Overberg but that species has distinctive flowers with wide, obconic tube 3–4 mm diam. at the mouth, and strikingly bicoloured filaments connate at the base for (2.0–)2.5–5.0 mm in a thick, longitudinally ribbed, glossy dark green or black collar, with larger anthers 2.5–3.0 mm long at anthesis. *Massonia pustulata* is more likely to be confused with *M. setulosa*, another Overberg species of clay soils, but that species has scabrid or hispid leaves without pustules, and flowers with mostly shorter filaments 7–10 mm long, with diagnostic interstaminal invaginations or swellings on the inner side of the filament collar that partially occlude the mouth of the perianth tube. These invaginations are sometimes difficult to discern in dried herbarium material but are obvious in fresh flowers.

History: *Massonia longipes* was described by the British botanist J.G Baker from a plant brought to him at Kew by the Cape Town orchid specialist Harry Bolus (1834–1911) on behalf of local botanist Peter MacOwan (1830–1909), who had been given it by an unnamed visitor to the South African Museum in the spring of 1884. The name was later placed in the synonymy of a very broadly circumscribed *Massonia echinata* by Jessop (1976), although specimens had been routinely misidentified as *M. pustulata* for a long time before then (Leighton, 1943). The circumscription of the species and the correct application of the name were resolved by Wetschnig et al. (2012).

Conservation notes: restricted to ths south coast between Gansbaai and Port Elizabeth, and threatened in most places through urbanisation but protected in some localities.

Additional specimens seen

South Africa. WESTERN CAPE. **3323 (Oudshoorn):** George, Wilderness, (–DC), Jul 1922, *M. Levyns 4291* (BOL); Wilderness, Flat

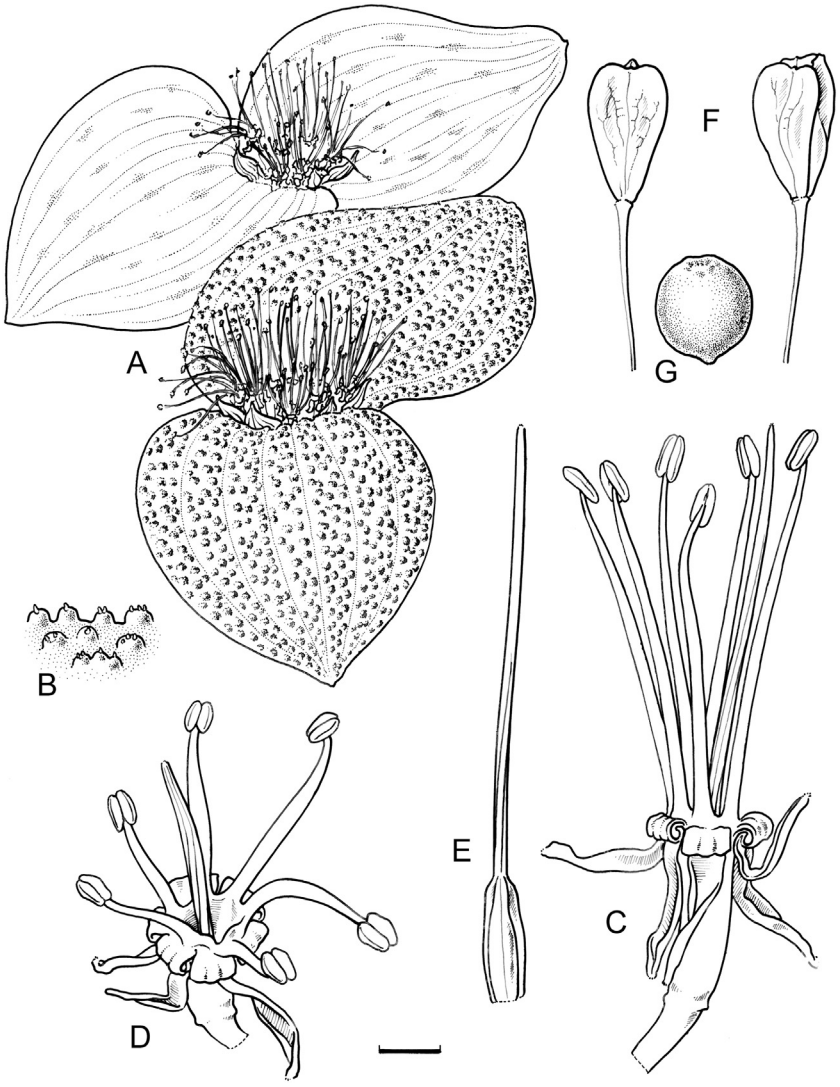

Fig. 14. *Massonia longipes*. A, flowering plants (without bulbs) showing variation in leaf surface; B, detail of leaf surface ornamentation; C, flower; D, flower showing unobstructed mouth of perianth tube; E, gynoecium; F, capsules; G, seed. *Voucher:* Western Cape, Gansbaai, *Manning 2812B*. Scale bar: A, F, 10 mm; C–E, 3 mm; G, 1 mm. Artist: John Manning.

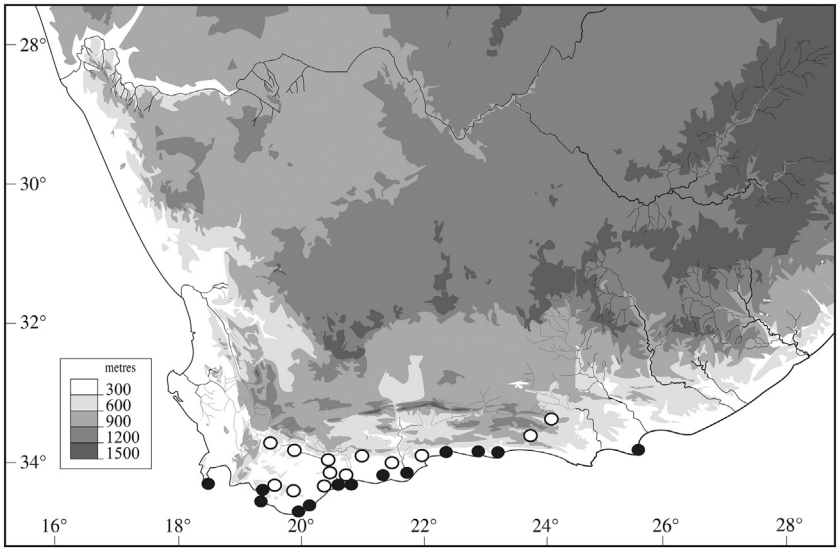

Fig. 15. Distribution of *Massonia longipes*, ●; and *M. setulosa*, ○.

Rock, (–DC), 12 Aug 1965 [fruiting], fl. in cult. 28 May 1969, *R. Bayliss 2954* (NBG); 4 miles [6.4 km] E of Wilderness, (–DC), 25 Apr 1973, *O. Augustyn s.n.* (NBG). **3418 (Simonstown):** Cape Point Nature Reserve, near Da Gama Monument, (—AD), 11 Jun 2005 (image only), *Holderness s.n.* (NBG). **3419 (Caledon):** Hermanus, (–AC), 22 Jun 1949, *H. Werner s. n. NBG389/48* (NBG); road from Stanford to Gansbaai, (–CB), 19 Sep 1938 [fruiting], *M. Gillett 4260* (BOL); De Kelders Hotel, Gansbaai, (–CB), 14 Jun 1972, *Mrs Lawder s.n.* (NBG); Bobbejaansfontein, E of Die Kelders, (–CB), 24 May 1995, *J. Paterson-Jones 347* (NBG); Gansbaai, (–CB), 23 Jun 2003, *J. Manning 2812B* (NBG); between Danger Point and Quoin Point, (–CB), Jun 1950, *G. Lewis 2974* (SAM). **3420 (Bredasdorp):** De Hoop Nature Reserve, 2 km N of De Hoop postal, (—AD), 26 Jun 1983, *C. Burgers 3081* (NBG); De Hoop-Potberg Nature Reserve, Windhoek section, (—AD), 5 Jul 1980, *C. Burgers 2389* (NBG); Witsands, (–BD), without date, *M. Pocock s.n.* (BOL); Cape Infanta, San Sebastian Point, (–BD), 16 Jul 1966, *M. Thomas s.n.* (NBG); Arniston, (–CA), 1 Jul 1952, *A. van Rensburg s.n.* (NBG); ½ mile [1 km] from Arniston to Bredasdorp, (–CA), 20 Sep 1968 [fruiting], *J. Marsh 917* (NBG); De Hoop between Buffelsfontein and Ryspunt, (–CB), 21 Jun 1984, *A. Fellingham 675* (NBG); 17 Sep 1984 [fruiting], *M. van Wyk 1837* (NBG); Struisbaai, (–CC), 5 Aug 1940 [fruiting], *R. Compton 9107* (NBG); *E. Esterhuysen 3869* (BOL); Quoin Point, (–DC), 2 Jun 1967 [photograph only], 15 Sep 1967 [fruiting], *E. Oliver s.n.* (NBG). **3421 (Riversdale):** Still Bay, (—AD), May 1909, *J. Muir sub Galpin 5390* (BOL); 10 Jun 1951, *Anon. NBG438/49* (NBG); 1 Sep 1978 [fruiting], *P. Bohnen 4031* (NBG); Aasvoëlberg, (–BA), 10 Jun 1960, *J. Acocks* (NBG); Albertinia, Yzervarkpunt (Gouriqua), (–BD), 28 Jun 1987, *D. Willemse 284* (NBG). **3423 (Knysna):** Brenton, (—AA), May 1922, *H. Thiesen s.n.* (NBG); PLettenberg Bay, (–AB), fl. ex hort. Apr 1928, *H. Fourcade 3733* (BOL).

EASTERN CAPE. **3325 (Port Elizabeth):** Humewwood, (–DC), 2 Sep 1933 [fruiting], *F. Long 1057* (GRA); Port Elizabeth, Rowallen Park, (–DC), June without year, *H. Vanderplank s.n.* (GRA). **3425 (Skoenmakerskop):** Cape Recife, Schoonmakers [Skoenmakers] Kop, (–BA), 7 Sep 2002 [fruiting], *H. Burrows 5977* (GRA).

13. **Massonia setulosa** Baker in *J. Linn. Soc.,* Bot. 11: 389 (1870); Baker: 409 (1897). Type: South Africa, 'Cap. b. Spei', *Ecklon & Zeyher s. n.* (TCD, holo.).

Massonia schlechtendalii Baker: 5 (1874), *syn. nov*.; Baker: 411 (1897) [as '*schlechtendahlii*']. Type: South Africa, 'Cap. b. spei.', without collector sub *Schlechdendal* (G [00370299], holo.–image!).

Massonia longifolia var. *candida* Burch. ex Ker Gawl.: t. 694 (1823), *syn. nov*. *Massonia candida* (Burch. ex Ker Gawl.) Baker: 415 (Baker, 1897). Type: South Africa, Western Cape, Mossel Bay (3422): 'Little Brak River, Mossel Bay Div.', (—AA), *Burchell 5746* [K (000257141), lecto.–image!, designated by Jessop: 414 (1976)].

Massonia parvifolia Baker: 8 (1892); Baker: 414 (1897). Type: South Africa, Western Cape, Caledon (3419): 'Caledon, Zwarteberg und Umgegend des Bades', (–AB), *Ecklon & Zeyh. 51.8 = Asphod. 25* (B, holo.; S–image!, WRSL, iso.).

Massonia modesta Fourc.: 79 (1932), *syn. nov*. Type: South Africa, Eastern Cape, Humansdorp (3424): 'Kareedouw', (–AB), July 1931, *Dr Jeppe sub Fourcade 4592* (BOL, holo.!).

[*Massonia candida* Burch. *ms. Burchell 6197–5* (K); Kunth: 297 (1843), in syn.]

Deciduous geophyte. *Bulb* subglobose, 15–25 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate, ovate to suborbicular, (20–)40–110 × (15–)50–100 mm, acute or obtuse, leathery with narrowly membranous margins, scabridulous marginally, upper surface green, sometimes flecked with brown, variously echinulate or scabrid to hispid, sometimes only proximally or distally, persistently so or glabrescent, scabrae or bristles acute, 0.1–1.0 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts ovate or lanceolate or oblanceolate, 15–25 × 3–15 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–10 mm long. *Flowers* sweetly scented; perianth white or flushed pink; tube cylindrical, not or widening slightly towards mouth, 7–10 × 2 mm, mouth ±2 mm diam., occluded; tepals arising at same level, sharply sigmoid-recoiled at base, spreading or incurving distally, oblong, 6–7 × 2–4 mm, plane or concave, margins entire, apex penicillate. *Filaments* suberect or slightly spreading-incurved, white or pink, subulate, sometimes slightly swollen, 9–11 mm long, connate at base for 0.5–2.5 mm, with interfilament invaginations occluding mouth of filament column; anthers ±1 mm long at anthesis, yellow or pinkish (? rarely purple: see Discussion) with yellow pollen. *Ovary* ovoid or oblong, 3–5 × 1.5–3.0 mm, strongly contracted to style; style white, 12–20 mm long, well-differentiated from ovary, erect, filiform. *Capsule* obovoid-cuneate, 3-lobed, emarginate, ±10 × 7 mm. *Seeds* subglobose, 1.5 mm diam., rugose [only one collection seen]. *Flowering time:* June–July, rarely into August. Figs. 1K and 16.

Distribution and ecology: recorded from Stanford and Napier along the southern foothills of the Langeberg to Mossel Bay, extending inland along the Breed River Valley to Worcester in Western Cape and eastward along the northern slopes of the Outeniqua Mtns into the Langkloof in Eastern Cape (Fig. 15); in clay or loamy pockets on sandstone outcrops or flats.

Diagnosis: a species of loamy soils, recognised by leaves that are variously echinulate or scabrid to hispid above, either persistently so or glabrescent, and flowers with the perianth tube occluded at the mouth by invaginations of the staminal column between the base of the filaments, with yellowish anthers and pollen, and the ovary abruptly contracted above into the style. The ±scabrid or hispid foliage led Jessop (1976) to include *M. setulosa* in a broadly circumscribed *M. echinata*, a name that was commonly misapplied to *M. pseudoechinata* from the Bokkeveld Mountains in Northern Cape. The latter is vegetatively and florally superficially similar to *M. setulosa* but is distinguished by its blue or purple anthers and pollen, and the ovary tapering gradually into the style. *Massonia setulosa* is more likely to be confused with *M. hirsuta* from the eastern part of its range, which it closely resembles but which is recognised by its conspicuously ciliate or hispid floral bracts, and also *M. longipes*, a species of sandy flats along the southern coast that is distinguished by its tuberculo-pustulate leaves, mostly longer filaments (8–)12–17 mm long without basal invaginations occluding the mouth of the tube, and larger, strongly winged capsules (15–)20–30 mm long. The seeds from the solitary population of *M. setulosa* that we have been able to examine are rugose but further populations need to be examined to establish the consistency of this character as it is known to vary in some other species, although apparently not in *M. longipes*, which seems invariably to have smooth seeds.

The collection from Klaas Voigts near Robertson [*W. Schwegman s.n.* (NBG)] is anomalous in its purple anthers but matches *M. setulosa* in other floral details, including the intrastaminal invaginations, and in its hispid foliage. It is provisionally included here but populations in the area will repay field study.

History: the species is another of the many novelties collected by C. Ecklon (1795–1868) and C. Zeyher (1799–1858), although it was only described much later (Baker, 1870). Another of their collections from Caledon, subsequently described under the name *M. parvifolia*Baker (1897), was synonymised by Müller-Doblies and Müller-Doblies (1997) but three other names are synonymised here for the first time. These include *M. longifolia* var. *candida* Ker Gawl. (1823), collected at Little Brak River by the naturalist traveller William Burchell (1781–1863), probably in October 1814 when he is known to have stopped off at Mossel Bay. Here he gathered and pressed plants in young fruit and also collected seeds, which he geminated and flowered in London on his return home in November 1815. Seeds from these plants were subsequently cultivated and flowered in Mr. Colville's Nursery on the Fulham Road in London, at which time one of the plants was illustrated under the name *M. longifolia* var. *candida* by Ker Gawl. (1823), utilising the epithet that Burchell had proposed for what he (Burchell) had considered to be an unnamed species. The taxon was

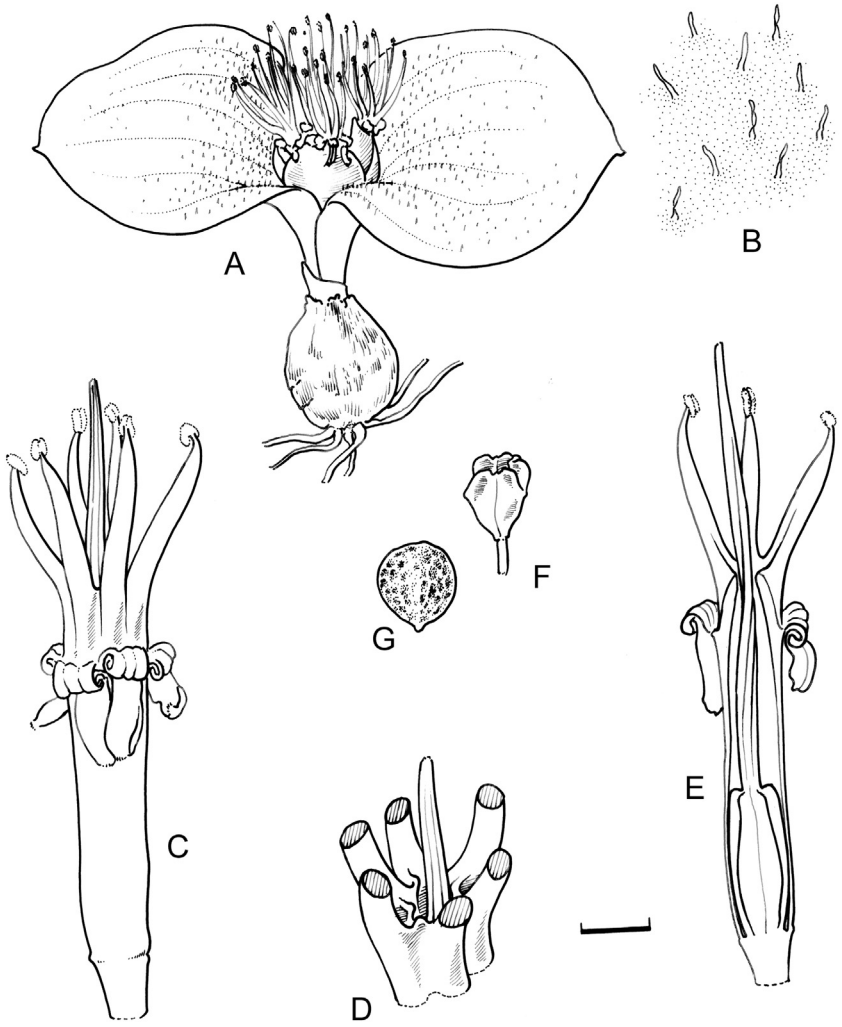

Fig. 16. *Massonia setulosa.* A, flowering plant; B, detail of leaf surface ornamentation; C, flower; D, mouth of perianth tube partially occlude by intratstaminal invaginations (filaments distally excised); E, half-flower; F, capsule; G, seed. *Voucher:* Western Cape, Napier, *Manning 3448*. Scale bar: A, F, 10 mm; C, E, 3 mm; D, 2 mm, G, 1 mm. Artist: John Manning.

later raised to species status by Baker (1897) but was subsequently included in a widely circumscribed *M. echinata* by Jessop (1976), along with *M. setulosa*Baker (1870), *M. parvifolia*Baker (1892) and *M. modesta* Fourc. (1932), until it was resuscitated by Müller-Doblies and Müller-Doblies (1997). Although *M. parvifolia* was mistakenly described as having glabrous leaves, Müller-Doblies & Müller-Doblies (1997) suggest that this was a consequence of Baker (1892) having mistaken the underside of a conveniently mounted leaf on the holotype for the upperside. *Massonia schlechtendalii*Baker (1870) was based on a single pressed specimen of unknown origin sent to the De Candolle herbarium in 1826 by the German botanist D. Schlechtendal (1794–1866). Although tentatively included in *M. pustulata* by Jessop (1976), the small white flowers with filaments ±9 mm long and shortly connate at the base with intrafilament vaginations, and small yellow anthers, are consistent with *M. setulosa* and we include it here, along with *M. modesta* Fourc. (1932) from Kareedouw in the lower Langkloof near Humansdorp in Eastern Cape.

Conservation notes: endemic to stony soils in the Overberg and southern coast and threatened by agriculture across most of its range.

Additional specimens seen

South Africa. WESTERN CAPE. **3319 (Worcester):** hill near Brandvlei, (−DA), 8 Jul 1970, *W. Barker 10,701* (NBG); Robertson, Klaas Voigts, (−DD), Jul 1987, *W. Schwegman s.n.* (NBG). **3322 (Oudshoorn):** George Div., Waboomskraal, N side of Outeniqua Mtns, 4 miles [6.4 km] from top of Outeniqua Pass, (–CD), 18 Jul 1954, *G. Lewis 4399* (SAM). **3419 (Caledon):** lower slopes of Kleinriviersberge below Sandsuikerskloof of Stanford, (−AD), 28 Sep 2013, *J. Deacon* et al. *3014* (NBG); near Strandkloof, (–CB), 12 Jun 1950, *B. Maguire 61* (NBG); near Napier, (–BD), Sep 1932, *P. Jordaan s.n.* (NBG); Napier, foot of Bredasdorpberge, (–BD), 20 Jul 2013, *J. Manning 3448* (NBG). **3420 (Bredasdorp):** Swellendam, base of Langeberg, (–AB), 27 Jun 1952, *J. Wurts 195* (NBG); shooting range at Bontebok Park, (–AB), 23 Aug 1965 [young fruit], *P. Grobler 573* (NBG); De Hoop, (−AD), 20 Jun 1969, *Anon. s.n.* (NBG); Potberg, (−AD), fl. ex hort. 10 Jul 2008, *A. Harrower 2678* (NBG); 2 miles [3 km] along Cape Infanta road, (–BD), fl. ex hort 14 Jun 1972 [coll. 16 Jul 1966}, *M. Thomas s.n.* (NBG); 1 mile [1.6 km] W of Cape Infanta Village, (–BD), fl. ex hort. 23 Jun 1970 [coll. 16 Jul 1966], *M. Thomas s.n.* (NBG). **3421 (Riversdale):** Palmyra Farm, between Heidelberg and Riversdale, (−AA), fl. ex hort. 29 May 1972 [coll. 26 Aug 1968], *I. Davidson s.n.* (NBG); Albertinia Commonage, (–BA), Jun 1913, *J. Muir 918* [mixed with *M. pustulata*] (BOL); Albertinia, (–BA), 11 Jun 1969, *NBG Exp. 210/67* (NBG); Farm Tierfontein, N of Albertinia, (–BA), 15 Jun 1984, *D. Snijman 790* (NBG). **3422 (Mossel Bay):** Little Brak River, (−AA), 5 Jun 1938, *G. Lewis s.n.* (NBG).

EASTERN CAPE: **3323 (Willowmore):** rocky hill N of Joubertina, (−DD), Aug 1923, *H. Fourcade 2684* (NBG). **3324 (Steytlerville):** Steytlerville, (−AD), Aug 1912, *J. Lawrence SAM3887* (SAM).

14. **Massonia hirsuta** Link & Otto, Icon. Pl. Rar. 1: t. 1 (1828); Baker: 410 (1897). Type: South Africa, 'Cape' *Krebs s.n.*, illustration in Link & Otto: t. 1 (Link and Otto, 1828).

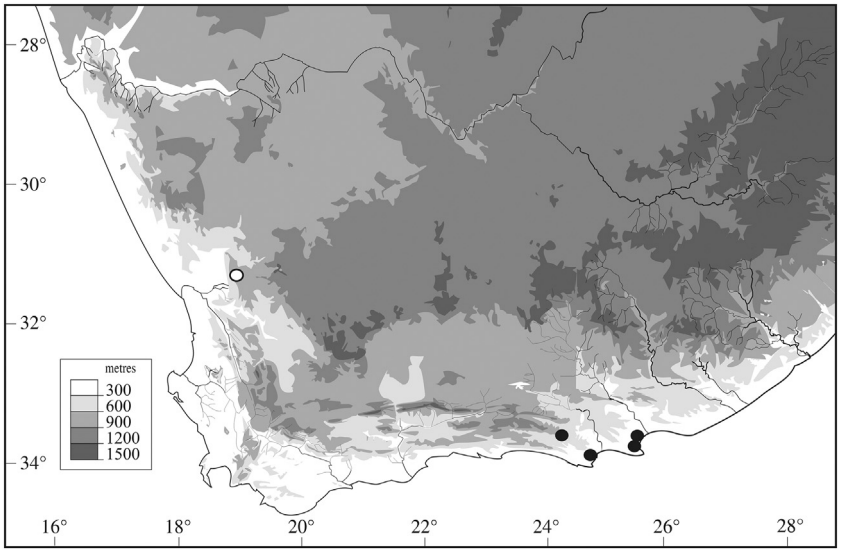

Fig. 17. Distribution of *Massonia hirsuta*, ●; and *M. pseudoechinata*, ○.

Massonia orientalis Baker: 321 (1878); Baker: 414 (1897). Type: South Africa, Eastern Cape, Port Elizabeth (3325): 'sand dunes at Port Elizabeth' (–DC), 1872, *H. Bolus 2239* (K [000257137], holo.–image!).

Massonia inexpectata Poelln.: 384 (1946). Type: South Africa, Eastern Cape, Port Elizabeth (3325): 'Zwartkopsrivier, villa Paul Maré to Uitenhage', (–DC), Nov without year, *Ecklon & Zeyher 2.11* (WRSL, holo.; S [10–14,238]–image!, iso.).

Deciduous geophyte. *Bulb* subglobose, 10–30 mm diam., outer tunics papery, greyish to pale brown. *Leaves* 2, prostrate, ovate to suborbicular, (15–)30–80 × (10–)20–70 mm, acute or obtuse, leathery with narrowly membranous margins, scabridulous and pilose marginally, upper surface green, densely hirsute or pilose with pale or golden bristles 0.5–2.0 mm long. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts ovate or oblanceolate, 10–20 × 5–15 mm, acute to acuminate, recurved apically, pilose or hispid distally along margins and adaxially with bristles 0.5–1.0 mm long; pedicels at anthesis 5–10 mm long. *Flowers:* perianth white or flushed pink; tube cylindrical, not or widening slightly towards mouth, 5–7 × 1.5–2.0 mm, mouth ±1.5 mm diam.; tepals arising at same level or inner slightly higher, sharply sigmoid-recoiled at base, spreading or incurving distally, oblong, 4–6 × 1.5–2.0 mm, plane or concave, margins entire, apex penicillate. *Filaments* suberect, flushed pink, filiform-subulate, 4–7 mm long, scarcely or shortly connate at base for 0.1–0.5 mm, without interfilament invaginations; anthers ±1 mm long at anthesis, black with blue pollen. *Ovary* ellipsoid, 3–4 × 1.0–1.5 mm, tapering into style; style white flushed pink distally, 8–11 mm long, not differentiated from ovary, stiffy erect, needle-like. *Capsule and seed* not seen. *Flowering time:* June–July.

Distribution and ecology: a local endemic of the Eastern Cape coast, recorded from Jeffrey's Bay and the immediate vicinity of Port Elizabeth extending shortly into the Longkloof to Assegaaibosch (Fig. 17); on coastal dunes in open bush.

Diagnosis: readily recognised by its hirsute leaves with hairs or bristles 0.5–2.0 mm long, and especially the distally ciliate-bristly inflorescence bracts recurved at the tips that are diagnostic for the species. The ovary that tapers gradually and imperceptibly into the style, and the black anthers with blue pollen are characteristic of the group of species centred on *M. pseudoechinata* but none of these species have hirsute bracts.

History: *Massonia hirsuta* was described and illustrated from a specimen collected by G.L. Krebs (1792–1844) and cultivated in Berlin. Although Baker (1897) associated the name with several additional collections from Port Elizabeth, he also maintained his *M. orientalis*Baker (1878), based on a collection made by Harry Bolus (1834–1911) from the same locality and with the diagnostic ciliate bracts of *M. hirsuta* but supposedly with glabrous leaves. This was an egregious error on Baker's part as it is evident that the leaves of the type of *M. orientalis* are mounted upside-down with their hairless, lower surface uppermost, although the characteristic hairs on the upper surface are readily visible protruding beyond the margins. Both names, as well as the later *M. inexpectata* Poelln. (Poellnitz, 1946), were treated by Jessop as synonyms of a broadly circumscribed *M. echinata* until *M. hirsuta* was resurrected by Müller-Doblies and Müller-Doblies (1997). *Massonia bolusiae* W.F.Barker, described from near Middelburg in Eastern Cape, was included in *M. hirsuta* by Müller-Doblies and Müller-Doblies (1997) but the type lacks the distally ciliate-bristly bracts that are diagnostic of this species and it is accordingly excluded.

Conservation notes: a highly local endemic of the area around Port Elizabeth and highly threatened by urbanisation, industry and agriculture across its entire range.

Additional specimens seen

South Africa. EASTERN CAPE. **3324 (Steytlerville):** Assegaaibosch, (–CD), 1 Aug 1912, *F. Rogers 3098* (BOL). **3325 (Port Elizabeth):** Port Elizabeth (–DC), without date [recd. May 1883], *E. Holub s.n.* (K); 8 Jul 1903, *I.L. Drège 43* (BOL, GRA, SAM); Jul 1908, *E. West 309* (BOL); Redhouse near Port Elizabeth, (–DC), Jul 1914, *F. Paterson 1115* (BOL); Coega I[ndustriual] D[evelopment] Z[one], (–DC), 24 Jul 2002, *P. Phillipson 5542* (GRA). **3424 (Humansdorp):** Ferreira Town near Jeffrey's Bay, (–BB), Jul 1927, *A. Duthie 1076* (NBG); *H. Fourcade 3284* (NBG).

15. **Massonia pseudoechinata** Mart.-Azorín et al. in *Phytotaxa* 239: 124 (2015c). Type: South Africa, Northern Cape, Calvinia (3119): 'edge of street in Nieuwoudtville', (–AC), 10 Jun 1955, *D. Comins 1142* (PRE [0050957], holo.!; GRA!, L, iso.).

[*Massonia echinata* pp. sensu Jessop (1976); Müller-Doblies and Muller-Döblies (1997) et seq., non L.f. (1782)]

Deciduous geophyte. *Bulb* subglobose, 15–35 mm diam., outer tunics papery or leathery, pale or dark brown. *Leaves* 2, prostrate, ovate to suborbicular, 30–70(−120) × 23–80 mm, acute or apiculate, leathery with narrowly membranous margins, minutely ciliolate marginally, upper surface green, smooth or sparsely setulose-tubercled, especially distally, tubercles topped with

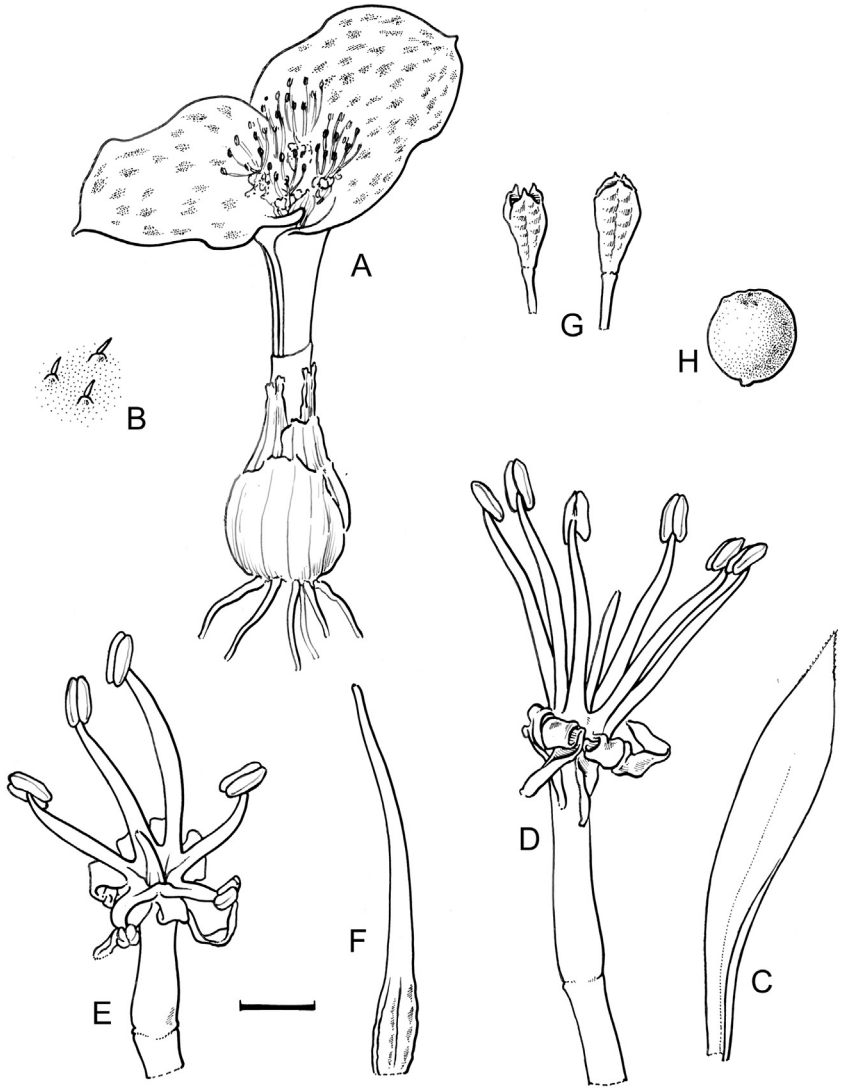

Fig. 18. *Massonia pseudoechinata*. A, flowering plant; B, detail of leaf surface ornamentation; C, bract; D, flower; E, flower showing mouth of perianth tube partially occlude byintratstaminal swellings; F, gynoecium; G, capsules; H, seed. *Voucher:* Northern Cape, Nieuwoudtville, *Manning 2156*. Scale bar: A, G, 10 mm; C–F, 3 mm; G, 1 mm. Artist: John Manning.

smooth, suberect or deflexed seta 0.2–0.5 mm long but later merely sparsely tubercled. *Inflorescence* a condensed, subcapitate raceme, few- to many-flowered, protruding shortly above leaves; bracts oblanceolate, 15–30 × 5–10 mm, acute to acuminate, margins smooth; pedicels at anthesis 5–20 mm long. *Flowers* sweetly or lily-scented; perianth white fading pinkish; tube narrowly cylindrical, 10–15 × 1.5–2.0 mm, mouth ±1.5 mm diam., partially occluded by slight invaginations between bases of filaments, thus hexagonal-stellate; tepals arising at same level or inner slightly higher, reflexed and sigmoid-coiled at base, spreading or incurving distally, linear, 6–10 × 1.5–2.0 mm, concave-canaliculate, margins entire, apex penicillate. *Filaments* suberect, white, filiform, 8–12 mm long, shortly connate at base for 0.5–1.0 mm; anthers ±2 mm long at anthesis, bright blue with blue pollen. *Ovary* conical, 3–5 × 1.5–2.0 mm long, tapering into style; style white, 14–17 mm long, not differentiated from ovary, stiffy erect, needle-like, ultimately exserted shortly beyond stamens. *Capsules* obovoid, 3-lobed, 8–12 × 4–5 mm. *Seed* globose, 1.5–2.0 mm diam., smooth. *Flowering time:* May–June. Figs. 1L and 18.

Distribution and ecology: restricted to the Bokkeveld escarpment in Northern Cape in the immediate vicinity of Nieuwoudtville (Fig. 17); on tillite clay flats in seasonally damp places in renosterveld shrubland.

Diagnosis: one of a group of species from the interior plateau characterised by dark blue or purple anthers with blue pollen, and the ovary tapering smoothly into the style. Among this group, *Massonia pseudoechinata* is distinguished by the smooth or sparsely setulose-tubercled leaves, perianth tube 10–15 mm long, tepals that are strongly sigmoid-coiled at the base, filaments shortly connate at the base for 0.5–1.0 mm, and style 14–17 mm long. It closely resembles *M. roggeveldensis* from the Roggeveld Escarpment but that species has a longer perianth tube, 14–20 mm long, tepals reflexed but with only a slight sigmoid curvature at the base, and a relatively longer style, 17–22 mm long.

History: this species appears to have been first collected by the botanist H.W.R. Marloth (1855–1931), who gathered bulbs from the wild on the Bokkebeld and flowered them in cultivation at Stellenbosch in 1918. It is relatively common around the top of Vanrhyn's Pass on the Bokkeveld Escarpment west of Nieuwoudtville and has been collected regularly since then but was at first identified as *M. angustifolia* L.f. and later as *M. echinata* L.f., a much less commonly collected species from the same area, until it was recently recognised as a distinct species by Martínez-Azorín et al. (2015c). The circumscription of *M. angustifolia* L.f., which is still known only from the type collection from the Onder Bokkeveld south of Calvinia, remains unclear but it is certainly very close to *M. pseudoechinata*, and is distinguished from it essentially by

the slightly shorter perianth tube, 7–9 vs 10–15 mm long, and slightly greater degree of fusion of the filaments, 1–2 mm vs 0.5–1.0 mm. Although Martínez-Azorín et al. (2015c) interpret the pollen of *M. angustifolia* as being yellow, this is likely due to fading and it is almost certainly blue. Additional collecting around Calvinia is required to resolve the issue.

Conservation notes: a highly local endemic of shale soils in and around Nieuwoudtville, where it is severely threatened by agricuture and urbanisation.

Additional specimens seen

South Africa. NORTHERN CAPE. **Calvinia (3119**): near Nieuwoudtville, (–AC), May 1946, *C. Leipoldt 4208* (BOL); Glenlyon farm, S of Nieuwoudtville, (–AC), 3 Jun 1980, *Goldblatt 5524* (MO); summit of Vanrhyn's Pass, (–AC), 22 May 1947, *G. Smith 6450* (NBG); 31 May 1970, *H. Hall 3580* (NBG); 14 May 1971, *H. Hall 3580* (NBG); 27 May 1998, *J. Manning 2156* (NBG); 1 km W of Nieuwoudtville, (–AC), 3 Jun 1980, *P. Goldblatt 5509* (MO); near Grasberg, (–AC), 8 Aug 1961 [fruiting; fl ex. hort. 6 Jun 1962], *W. Barker 9370* (NBG).

4. Excluded species

Massonia sempervirens U.Müll.-Doblies et al. in Feddes Repert. 121: 130 (2010). Type: South Africa, [Western Cape]: '?Prince Albert, collecting date and collector unknown, received in 2007 as two years [sic.] old seedling from the Dutch succulent grower C. & I. Grootsscholten, and cultivated in Dresden… one leaf, one infructescence and one withered inflorescence taken on 30 May 2010 as holo.' (B, holo.). The identity and actual origin of this taxon is unclear, especially as the South African grower, G. Summerfield, the source of the original seed, claimed a second locality for the species in the Free State near Winburg (Müller-Doblies and Müller-Doblies, 2010). In any event, neither presumed locality is witin the Core Cape Floristic Region.

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