

New species of *Moraea* (Iridaceae: Iridoideae), with range extensions and miscellaneous notes for southern African species

P. GOLDBLATT* and J.C. MANNING**

Keywords: Iridaceae, Iridoideae, *Moraea* Mill., new species, southern Africa, taxonomy

ABSTRACT

Three new species are described in the largely sub-Saharan genus *Moraea* Mill. (± 200 spp.), all from its centre of diversity in the winter rainfall region of southern Africa. *Moraea pearsonii*, from Hottentotskloof near Ceres in Western Cape, flowers in late November and December when its leaves are \pm dry, and has small, pale lilac, stellate flowers with the style branches each divided to the base into filiform arms. *Moraea tanquana*, from the Tankwa River Basin in Northern Cape, resembles the southern Namaqualand *M. deserticola* but has broad, plane leaves, short anthers exerted from a shallower floral cup and a short style. In section *Acaules*, *M. longipes* from Namaqualand stands out in its early flowering habit, a stem consisting of a single long internode reaching well above the ground, short style and unusually long anthers. *Moraea jarmilae* described from Ox Bow, Lesotho in 2002, is conspecific with *M. albicuspa* and is reduced to synonymy. Significant range extensions are reported for *M. elsiae*, *M. falcifolia*, *M. pseudospicata*, *M. spathulata*, *M. tricolor*, *M. vegeta*, *M. verecunda*, *M. vespertina* and *M. vlokii*. A yellow-flowered morph, local in the Perdebont Valley of the Little Karoo, is reported for the first time in typically blue- to violet-flowered *M. bipartita*, as well as the occurrence of a hybrid swarm, rare in *Moraea*, between *M. bipartita* and *M. polyanthos*.

INTRODUCTION

The old world and largely sub-Saharan genus *Moraea* Mill. (Iridaceae: Iridoideae) comprises some 200 species of cormous geophytes. Although florally diverse, *Moraea* is recognized in Iridoideae by a bifacial, channelled (rarely terete) leaf blade and corms of a single internode derived from a lateral bud. Most species have iris-like flowers with flattened, petaloid style branches, with filaments at least partially united. Other floral types make exact definition of the genus difficult. *Moraea* is most diverse in southern Africa and has a marked concentration of species in the winter rainfall region of western South Africa and adjacent southwestern Namibia, the likely area of origin of the genus (Goldblatt *et al.* 2002). Here we describe three new species. *Moraea pearsonii* from Hottentotskloof, near Karooport in the Ceres District, was re-collected in 2007 for the first time since its discovery 99 years ago, when H.H.W. Pearson gathered fragmentary material in November 1908. A late flowering species, it blooms in November and late December, and the small, stellate flowers have unusual, filiform style branches each divided to the base. This style conformation appears to have evolved independently four times in the genus. *Moraea tanquana* from the Tankwa National Park, is allied to *M. deserticola* Goldblatt from southern Namaqualand and *M. speciosa* (L.Bolus) Goldblatt from the Western Karoo, and shares with these species, cup-like, blue to mauve flowers with subequal tepals. Although superficially resembling *M. deserticola*, it differs from that species in the short anthers exerted from the floral cup and short style dividing opposite the anther bases so that the style branches emerge between the anthers. In section *Acaules*, *M. longipes* from Namaqualand stands out in its early flowering, aerial stem

consisting of a single long internode reaching well above the ground, short style and unusually long anthers. Of these new species all but *M. longipes* are currently known from a single locality but we suspect that collecting nearby at the appropriate times of the year, will show them all to have wider ranges.

We take this opportunity to reduce *Moraea jarmilae* J.J.Halda, described in 2002 from Ox Bow in Lesotho, to synonymy in *M. albicuspa* Goldblatt, and to report significant range extensions for several southern African species. Populations of the southwestern Cape species *M. elsiae* Goldblatt and *M. tricolor* Andrews have been discovered in the vicinity of Stilbaai in the southern Cape, range extensions of 100 km or more from their next nearest stations. The Stilbaai populations of *M. tricolor* also exhibit a shift in flowering time and habitat, unprecedented in *Moraea*. The widespread eastern southern African *M. spathulata* (L.f.) Klatt is now known from the higher mountains of the Great Karoo, a surprising record for a plant of otherwise mesic coastal and montane grassland habitats. A population that we refer to *M. vespertina* Goldblatt & J.C.Manning, a species until now known from two localities on the Bokkeveld Plateau west of Calvinia, has been discovered in the Tankwa National Park, some 200 km to the south. Although differing in some respects from the Bokkeveld populations, notably their slightly larger flowers and drier habitat, the Tankwa plants seem best included here for the moment.

We also report range extensions for *Moraea falcifolia* Klatt, *M. pseudospicata* Goldblatt, *M. spathulata*, *M. vegeta* L., *M. verecunda* Goldblatt and *M. vlokii* Goldblatt, the last-named species known until now from a small portion of the Swartberg. For *M. tricolor*, we report for the first time, capsule and seed shape, and compare these characters with closely related *M. ciliata* (L.f.) Ker Gawl. in which seeds and capsules are unusually variable but appear to be correlated with flower colour. For *M. bipartita* L.Bolus we document the existence of yellow-flowered populations in an otherwise blue- to

* B.A. Krukoff Curator of African Botany, Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166, USA. E-mail: peter.goldblatt@mobot.org.

** Compton Herbarium, South African National Biodiversity Institute, Private Bag X7, 7735 Claremont, Cape Town. E-mail: manning@sanbi.org.

MS. received: 2008-05-27.

violet-flowered species, and discuss the presence of a hybrid swarm between *M. bipartita* and closely allied *M. polyanthos* L.f. Lastly, we discuss a likely new species from Namibia, too inadequately known to formally describe and name.

NEW SPECIES AND TAXONOMIC ADJUSTMENTS

1. *Moraea pearsonii* Goldblatt & J.C.Manning, sp. nov.

Plantae 200–450 mm altae ex cormo globoso 20–30 mm diam. profunde sub terram infosso, tunicis ex fibris nigris constantibus, folio producto solitario linearicaniculato marginibus involutis 2–3(–4) mm lato ad 1 m longo, caule erecto ramoso ramis ultimis rhipidia sessilia ferentibus, spathis siccis, floribus pallide lilacinis externe pallidis bubalinis inodoris, tepalis \pm 14 mm longis, externis 4.5–5.0 mm latis internis \pm 4 mm latis unguibus 1.0–1.5 mm longis, filamentis liberis ad basem contiguus 3.5–4.0 mm longis suberectis malvinis, antheris 4.5–5.0 mm longis flavis, stylo filiformi malvino \pm 2.5 mm longo, ramis styli ad basem furcatis in brachia filiformia duo 3.5–4.0 mm longa productis, capsula doliformi 4–5 \times 3–4 mm.

TYPE.—Western Cape, 3319 (Worcester): Farm Vrede, dry wash west of junction between Touwsrivier and Ceres–Sutherland roads, (–BA), 15 December 2007, Manning 3128 (NBG, holo.; K, MO, iso.).

Plants 200–450 mm high. *Corm* globose, 20–30 mm diam., deeply buried; tunics of coarse black fibres, drawn into finely fibrous neck up to 150 mm long. *Stem* erect, usually with 1–4 suberect branches at upper nodes, dull purplish where exposed; branches with (1–)4–6 sessile lateral flower clusters. *Foliage leaf* solitary, basal, much longer than stem, trailing, linear and channelled but margins inrolled when dry and thus appearing terete, 2–3(–4) mm wide and up to 1 m long, partially or entirely dry at flowering, leathery; cauline leaves bract-like and entirely sheathing, dry and papery, attenuate margins united in lower half. *Spathes* dry and papery at flowering, pale buff or lightly flushed with purple, attenuate, inner 20–33 mm long, outer \pm as long as inner. *Flowers* pale lilac flushed buff on reverse; tepals with small, transversely oblong, yellow nectar guides at limb bases, unscented, shortly clawed, claws erect, 1.0–1.5 mm long, appressed to base of filaments, limbs spreading or slightly reflexed, oblong-elliptical, outer broader, 13 \times 4.5–5.0 mm, inner 13 \times 4 mm. *Stamens* free; filaments contiguous at base, 3.5–4.0 mm long, suberect, mauve; anthers erect, 4.5–5.0 mm long, yellow, curving inwards distally at anthesis. *Ovary* ovoid, 2.5–3.0 mm long; style erect, filiform, \pm 2.5 mm long, mauve, branches spreading to ascending between anthers, divided to base into two filiform arms 3.5–4.0 mm long. *Capsules* barrel-shaped, 4–5 \times 3–4 mm. *Seeds* angled by pressure, \pm 1.5 mm diam., reddish brown, testa surface rugulose. *Flowering time*: late November to late December; flowers opening at \pm 17:30 and wilting at \pm 20:30. Figure 1.

Distribution and ecology: *Moraea pearsonii* is currently known only from the roadside between Hottentotskloof Farm and Karooport (Figure 2), almost midway

between the towns of Ceres and Touws River. Plants grow in sandy alluvium over shale in washes at the foot of the Baviaansberg, the southernmost extremity of the Swartuggens, in open shrubland transitional between renosterveld and arid fynbos.

Flowering in *Moraea* is typically in the wet season, which is summer in eastern, southern and tropical Africa, and late winter and spring in western southern Africa and southwestern Namibia. A significant number of species, however, exhibit a shift in their flowering to the dry season, although they tend to produce their leaves in the wet season when conditions are optimal for vegetative growth. Examples of such species include the eastern African *M. stricta* Baker, which blooms in August to October but produces its leaf in November, and *M. pseudospicata* from southwestern South Africa, which flowers from December to February when the leaves are dry and brown, only producing new foliage leaves in May. *M. pearsonii* has a similar ecology, and the rather leathery leaves are mostly dry by early summer when flowering takes place. The pale lilac flowers open in the late afternoon between 17:30–18:00, and last for just three hours before withering at sunset. The lack of floral scent, absence of evident nectar, and the prominently positioned anthers, suggest that *M. pearsonii* is adapted for pollination by pollen-collecting bees.

Diagnosis and relationships: *Moraea pearsonii* has a single, long, trailing leaf up to 1 m long, linear and channelled when fresh but with the margins involute on drying so that the leaf then appears to be terete. The corm, deeply buried among the rocky alluvium up to 20 cm below the surface and thus difficult to extract, has a tunic of coarse, black fibres. The branched inflorescences bear numerous sessile lateral flower clusters of pale lilac, stellate flowers, 20–25 mm in diameter. These open exceptionally late in the day, and until the tepals unfold at \pm 17:30 the plant is virtually invisible in the dry, light brown vegetation. Structurally the flowers resemble those of the *Hexaglottis* group of *Moraea* (Goldblatt & Manning 2000), with the style branches each divided to the base into thread-like arms extending between the stamens. In addition, the tepals are subequal, with short claws and spreading limbs, and free filaments. The *Hexaglottis*-type flower is typical of several species of *Moraea*, notably among the six, pale yellow-flowered species of section *Hexaglottis* (Vent.) Goldblatt, previously recognized as the genus *Hexaglottis* Vent. until merged in *Moraea* (Goldblatt 1987, 1998). It is also known in the yellow-flowered *M. nana* (L. Bolus) Goldblatt & J.C. Manning of section *Tubiflora* Goldblatt; and in the taxonomically isolated, blue-flowered Namibian *M. hexaglottis* Goldblatt of section *Moraea* (Goldblatt 1986a). Based on vegetative morphology, we conclude that *M. pearsonii* is not allied to any of these species but belongs in section *Polyanthes* Goldblatt, and more precisely with the blue- to lilac- or mauve-flowered *M. crispa* alliance of western South Africa. Within this group, it is perhaps most closely allied to *M. pseudospicata*, which has a similar branching pattern with sessile rhipidia, similar corm tunics of coarse black fibres, and it also flowers late in the season when the leaves are \pm dry (Goldblatt 1986a). The style branches of this species are more typical of *Moraea*, being flattened and forked only at the tips and the filaments are united basally.



FIGURE 1.—*Moraea pearsonii*, Manning 3128 (NBG): A, corm and flowering stem; B, flower with two tepals removed; C, inner (left) and outer (right) tepals; D, style branches; E, capsules; F, seed. Scale bar: A, E, F, 10 mm; B, C, 5 mm; D, 2.5 mm. Artist: John Manning.

History: the species was first collected by H.H.W. Pearson, Professor of Botany at the South African College (later the University of Cape Town) in late November 1908 during an expedition from Cape Town to Namibia. Pearson collected just the inflorescence branches of a sin-

gle plant, in bloom close to the hottest time of the year. Although the floral spathes were dry at the time of collection, the rhipidia (flower clusters) bore flowers that had wilted that day or the previous one. His notes on the sheet (*Pearson 4810*) indicate that the flowers were

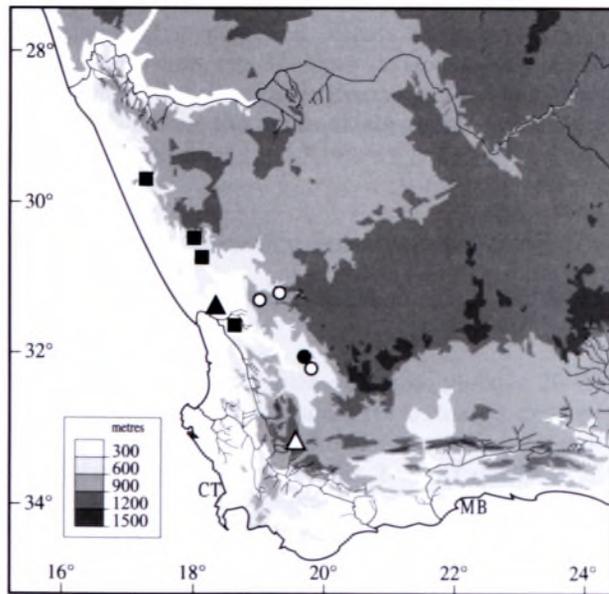


FIGURE 2.—Known distribution of *Moraea deserticola*, ▲; *M. pearsonii*, △; *M. tanquana*, ●; *M. vespertina*, ○; and *M. longipes*, ■.

blue, and examination of the withered flowers revealed that they had free filaments and slender style arms, thus unlike most *Moraea* species, which have the filaments united below and flattened style arms. More than that could not be determined from the available material and it remained impossible to identify the plant or even to draw up a satisfactory description. In December 2007, we mounted an expedition to try and locate the species, collected northeast of Ceres, between Hottentotskloof and Karooport. A small population of plants matching Pearson's original collection were located in just this area and confirmed that they represented an undescribed species.

Additional specimen examined

WESTERN CAPE.—3319 (Worcester): roadside between Hottentots Kloof and Karoo Poort, (–BA), 29 November 1908, *Pearson 4810* (K).

2. *Moraea tanquana* Goldblatt & J.C.Manning, sp. nov.

Plantae ad 0.5 m altae ex corno subgloboso, tunicis ex fibris crassis atrobrunneis usque nigris constantibus, foliis 3 infimo basali lineari canaliculato 2–5 mm lato superioribus caulibus, caule usque 3-ramoso, spathis herbaceis ad apicem siccis attenuatis interiore ± 30 mm longa, floribus pallide caeruleis vel malvinis cum cupula flava, tepalis exterioribus obovatis ± 25 mm longis limbis 15–16 × 12 mm, interioribus ± 22 mm longis, filamentis ± 10 mm longis in columnam connatis, antheris contiguis ad anthesin 5 mm longis postea ± 3 mm longis luteis, ramis styli ± 1 mm longis antheris obtectis, lobis stigmaticis bifidis sine cristis.

TYPE.—Northern Cape, 3219 (Wuppertal): Tankwa National Park, small koppie east of Leeuberg, 404 m, (–BB), 4 August 2006, *Steyn 872* (NBG, holo.; PRE, iso.).

Plants up to 0.5 m. *Corm* subglobose, ± 20 mm diam.; tunics of coarse, dark brown to blackish fibres. *Stem* up

to 3-branched from upper nodes; branches subtended by sheathing, attenuate, bract-like cauline leaves. *Cataphylls* pale and membranous. *Leaves* 3, lowermost basal, linear and channelled, 2–5 mm wide, ± three quarters as long as stem, upper 2 leaves cauline, ± as long as the basal. *Spathes* green but dry and membranous apically with brownish cusps; inner ± 30 mm long, outer ± half as long as inner. *Flowers* pale blue or mauve with a yellow cup, and small, rounded, yellow nectar guides on all tepals at mouth of cup, tepal claws minutely puberulous at base, 8–9 mm long, ascending and forming wide cup, limbs spreading horizontally; outer tepals obovate, ± 25 mm long, limb 15–16 × 12 mm, inner tepals slightly shorter, ± 22 mm long. *Stamens* with filaments ± 10 mm long, reaching to mouth of floral cup or exerted ± 1 mm, united, column cylindrical, minutely puberulous at base; anthers erect, contiguous, 4–5 mm long at anthesis but shrinking to 3 mm after dehiscence, yellow, appressed to and concealing style. *Ovary* ovoid, 4–5 mm long, exerted from spathes, uniformly pale green; style branching at top of filament column, branches ± 1 mm long, concealed by anthers; stigma lobes bifid, crests lacking. *Capsules* and *seeds* unknown. *Flowering time*: August, probably also in late July. Figure 3.

Distribution and ecology: *Moraea tanquana* is known from a single hill in the Tankwa Karoo National Park east of Leeuberg (Figure 2). The colony was found on a dolerite outcrop and comprises numerous plants.

Diagnosis and relationships: *Moraea tanquana* is most likely allied to *M. deserticola* from the Knersvlakte and the more widespread *M. speciosa* of the Western Karoo (Goldblatt 1986b). All three have upright stems bearing multiple leaves, branched stems, cup-shaped, pale blue to mauve flowers with nearly equal tepals, contiguous anthers carried on a slender, cylindrical filament column and style branches lacking crests. They differ in several vegetative and floral characteristics (Table 1). *M. speciosa*, most robust of the three, has several, broad foliage leaves up to 40 mm wide, tepals 35–45 mm long, anthers (8–)12–17 mm long, and the style divides between the middle and apex of the anthers; when fully extended the style branch tips typically exceed the anthers. Smaller *M. deserticola* has narrow foliage leaves 2–3 mm wide, tepals 30–36 mm long, anthers 6.0–6.5 mm long (shrinking after anthesis to 5 mm) that remain contiguous around the style. The style itself divides at or just beyond the anther tips into short branches ± 1 mm long that are carried above the anthers. In contrast, *M. tanquana* has foliage leaves up to 5 mm wide, tepals ± 22 mm long, short anthers, 4–5 mm long, that exceed the style? and enclose them. The style divides opposite the lower third of the anthers so that the stigmatic tips of the short style branches, ± 1 mm long, emerge from between the middle of the ± contiguous anthers. The flower of *M. tanquana* most closely resembles that of *M. deserticola* in general aspect, but its shorter anthers are held beyond the floral cup, whereas the anthers are longer in *M. deserticola* and their bases are retained within the floral cup.

Vegetatively *Moraea deserticola* also differs from *M. tanquana* in its ± membranous spathes, the longer inner spathe 30–40 mm long, whereas in *M. tanquana* the spathes are green with dry attenuate tips and the

ferent from the dolerite outcrops and heavy clay soils in which *M. tanquana* grows.

3. *Moraea longipes* Goldblatt & J.C.Manning, sp. nov.

Plantae 100–180 mm altae, caule eramoso supra terram bene extenso, cormo globoso 15–20 mm diam., tunicis ex fibris crassis pallidis constantibus oblecto, foliis 2 (spathis externis exclusis) suboppositis rectis 45–85 mm longis canaliculatis marginibus laevigatis vel parce ciliatis, rhipidium floribus nonnullis; spathis 50–70 mm longis, subaequalibus vel spatha externa paulo maiore, floribus pallide flavis vel ± albis tepalis internis cupreis, tepalis externis ± 30 mm longis unguibus ± 10 mm longis munitis, limbis ± patentibus, tepalis internis ± 28 mm longis, filamentis 7–9 mm longis basin versus per ± 1.5 mm connatis, antheris 7.7–9.0 mm longis, stylo ± 1 mm longo, ramis styli 13–16 mm longis, cristis 8–10 mm longis, anguste triangularibus.

TYPE.—Western Cape, 3118 (Vanrhynsdorp): Namaqualand, 6 km NW of Bitterfontein on Kotzesrus road, in stony granitic ground, (–AA), 1 June 2008, Manning 3172 (NBG, holo.; MO, iso.).

Plants 100–180 mm high, base surrounded by a well-developed fibrous collar. *Corm* globose, 15–20 mm diam., tunics of ± straw-coloured, coarse fibres often with thickened vertical ridges. *Stem* unbranched, consisting of single internode extending from corm to well above ground level. *Leaves* 2 (excluding opposed leaf-like spathes enclosing flowers), subopposite, inserted at base of spathes, suberect, straight, 45–85 mm long, channelled, paler green adaxially; margins smooth or sparsely ciliate. *Rhipidium* several-flowered; spathes subequal, or outer slightly larger, clasping inner for ± half its length, 50–70 mm long, inner with broad, transparent membranous margins. *Flowers* pale yellow or translucent white with pale copper inner tepals, margins of outer tepals and on reverse of tepals; nectar guide yellow speckled with black dots; tepals unequal, outer ± 30 mm long, claw suberect, ± 10 mm long, hairy in midline, limb ± 20 × 19 mm, laxly spreading, hairy toward base, inner tepals ± 28 × 2–4 mm, claws suberect, ± 9 mm long, limbs spreading. *Stamens* with filaments suberect, 7–9 mm long, united basally for ± 1.5 mm; anthers appressed to style branches, 7.5–9 mm long, reaching base of stigma lobes. *Ovary* elongate, fertile part ovoid, 5–9 mm long, usually at least partly included; style dividing ± 1 mm above base, branches ascending, 13–16 mm long; stigma lobe rounded; crests erect, narrowly triangular, outer margins slightly and unevenly serrated, 8–10 mm long, 2.5–3 mm wide at base. *Capsules* and *seeds* unknown. *Flowering time*: late May to early July. Figure 4.

Distribution and habitat: Namaqualand, from Springbok in the north to the Gifberg Flats in the south; on granitic or sandy gravel flats (Figure 2).

Diagnosis and relationships: a member of section *Acaules*, *Moraea longipes* has the general aspect of *M. ciliata* and *M. tricolor* except that the stem is not subterranean at flowering but extends up to 180 mm above the ground. Like most species of the section, the ovary is retracted to the base of the inflorescence spathes after



FIGURE 3.—*Moraea tanquana*, Steyn 872 (NBG): A, corm and flowering stem; B, stamens and style; C, style branches. Scale bar: A, 10 mm; B, 4 mm; C, 2.5 mm. Artist: John Manning.

inner spathe is ± 30 mm long. The ovary is conspicuously veined with dark red in *M. deserticola* thus unlike the uniformly green ovary of *M. tanquana*. Edaphically the two also differ: *M. deserticola* occurs in the Knersvlakte to the northwest and favours light, loamy clay surrounding limestone outcrops, quite dif-

TABLE 1.—Comparison of flowers of *Moraea tanquana*, *M. deserticola* and *M. speciosa*. All measurements were taken from fresh material. Anthers measured before anthesis

Character	<i>M. tanquana</i>	<i>M. deserticola</i>	<i>M. speciosa</i>
Spathe length (mm)	± 30	33–40	50–70
Outer tepals length (mm)	± 25	30–36	35–45
Tepal claws length (mm)	8–9	12	12–15
Perianth colour	blue with yellow cup	pale slate-blue with white cup	blue to grey-blue with white to yellow cup
Floral cup depth (mm)	± 9	± 12	10–12
Filament length (mm)	± 10	8–10	10–13
Anther length (mm)	4–5	6.0–6.5	12–17
Style branches (mm)	± 1	± 1	2–6
Point of division of style branches	opposite lower third of anthers	opposite anther tips or beyond them	opposite middle to upper third of anthers

flowering. The flowers are most like those of *M. ciliata* but have slightly broader style crests, triangular with the base 2.5–3.0 mm wide (\pm linear in *M. ciliata*) and the filaments are united basally for \pm 1.5 mm, about one fifth of their length. In other species of the section, the filaments are united for one third to half their length. The anthers of *M. longipes* are also the longest in the section, measuring 7.5–9.0 mm. A unique feature in the section is the collar of fibres around the underground part of the stem, this alone making *M. longipes* easily recognized even without flowers. The species flowers early in the season, May to early July, and grows in places where *M. ciliata* has been found in bloom six to eight weeks later. Flower colour in *M. longipes* is either pale, watery yellow or translucent white, then with the edges of the outer tepal limbs and the inner tepal limbs a bright copper colour and with the tepals flushed deep copper on the reverse. Like other members of section *Acaules*, the flowers are fugaceous and last just one day.

Examining the ovary of *Moraea longipes* closely, we noted that there is no line of abscission at its base as in most other species of *Moraea*. After examining other members of the section, we found they too lack this abscission line, which elsewhere in the genus is the point at which unfertilized ovaries are abscised. We tentatively suggest that the so-called pedicel of the flower in section *Acaules* may actually be part of the ovary and that the flowers then lack a true pedicel. In freshly open flowers of *M. ciliata* and *M. tricolor*, the ovary stalk is hollow and contracts in faded flowers, then becomes closely wrinkled as the tissue collapses on itself, then draws the ovule-containing part of the ovary into the lower part of the spathes. Anatomical comparison of true pedicels of *Moraea* species with those of the ovary stalk of section *Acaules* may solve this question.

Additional specimens examined

NORTHERN CAPE.—2917 (Springbok): Sanagas, near Springbok, (–DC), 4 June 1980, *Dryhout 2788* (NBG). 3117 (Lepelfontein): Namaqualand, 15 km SE of Kotzesrus, Farm Biesiesfontein, in stony granitic gravel, (–BB), 1 June 2008, *Manning 3173* (NBG).

WESTERN CAPE.—3018 (Vanrhynsdorp): Matsikamma, (–DB), 16 June 1983, *Snijman 714* (NBG).

4. *Moraea albicuspa* Goldblatt in *Annals of the Missouri Botanical Garden* 64: 230 (1973). Type: South Africa, [KwaZulu-Natal], Drakensberg, source of the Tina River, March 1904, *Galpin 6846* (BOL, holo.!, PRE!, SAM!, iso.).

M. jarmilae J.J.Halda: 69, fig. 79 (2002). Type: Lesotho, Drakensberg in the vicinity of Ox Bow, \pm 3 100 m, 10 March 1989, J.J. & J. Haldovi s.n. PR4710 (PR, holo.!), syn. nov.

Moraea jarmilae was described for plants from Ox Bow in Lesotho that had unusual fringed edges to the outer tepals, which were otherwise \pm lanceolate in shape. The inner tepals were described as tricuspidate and greenish (Halda 2002) and the species was likened to the Mpumalanga and northern KwaZulu-Natal species, *M. pubiflora*, with the notable exception of the fringed tepal limbs, but *M. pubiflora* has the outer tepals velvety on the reverse, a feature not noted for *M. jarmilae*. The type specimen, however, clearly shows the inner tepals to be linear and apically undivided. Tepals of this shape are known among Drakensberg *Moraea* species only in *M. albicuspa*, which has white flowers, the outer tepal claws with a linear, yellow nectar guide. We are confident that *M. jarmilae* represents plants with abnormally formed outer tepal limbs, possibly due to foraging by an insect while in bud. We accordingly reduce the species to synonymy in *M. albicuspa*, which has previously been collected in Lesotho from Sehlabathebe, southeast of Ox Bow, and is known from Giant's Castle in the central high Drakensberg of KwaZulu-Natal southwards along the escarpment to Engcobo in Eastern Cape.

RANGE EXTENSIONS AND MISCELLANEOUS NOTES

Moraea bipartita L. Bolus

This widespread species extends from the Swellendam District in the west through the Little Karoo and part of the southern Cape to Uitenhage in the east (Goldblatt 1986a). Over much of its range, plants have blue to violet flowers of the standard *Moraea*-type, thus with larger outer tepals bearing nectar guides at the base of the limb, filaments united for half their length, and a style dividing at the apex of the filament column into three petaloid branches that terminate in prominent, paired, erect crests. The stigmatic lobe lies at the base of the crests on the abaxial surface of the style branch, and in *M. bipartita* is bilobed, as in many species of the genus. The species is distinguished among its allies in section *Polyanthes* by the presence of several (at least three) channelled foliage leaves, a branched stem, and relatively small flowers. Plants with yellow flowers discovered by ecologist J. Vlok in the Perdebont Valley of the Little Karoo near the northern end of Robinson Pass south of Oudtshoorn, seemed worth investigating in view of the other-

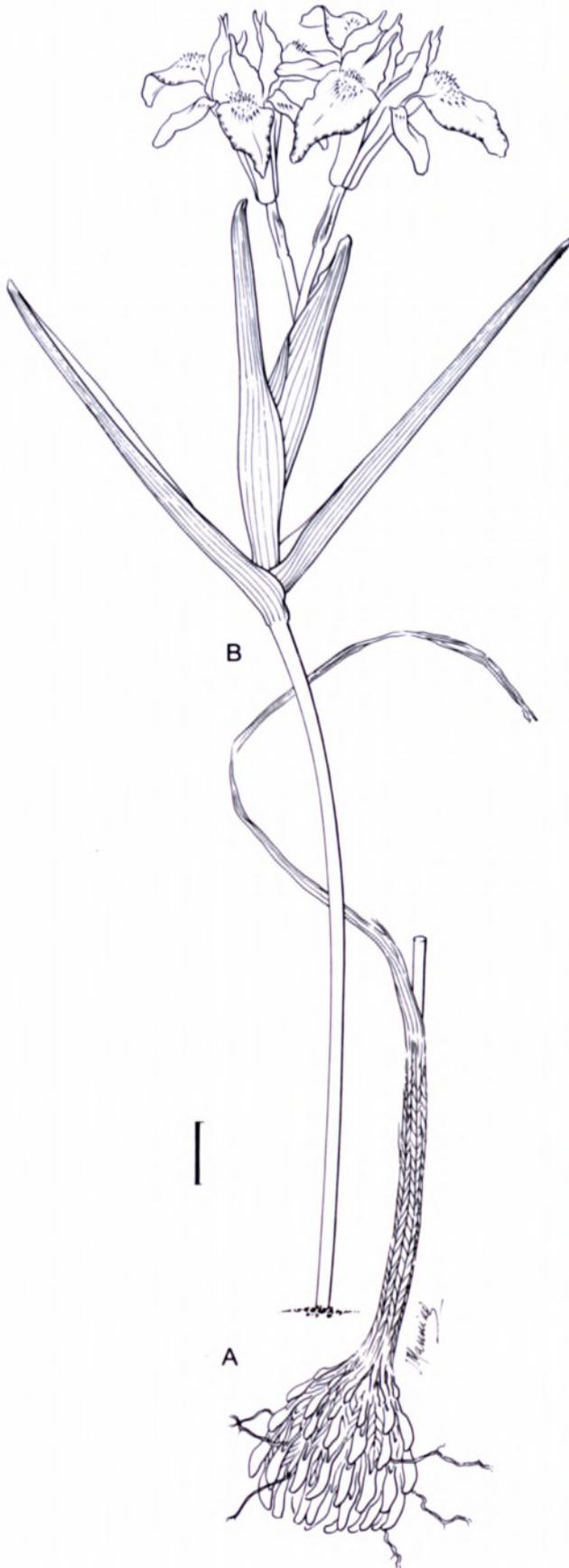


FIGURE 4.—*Moraea longipes*, Manning 3172 (NBG): A, corm. B, flowering stem and flowers. Scale bar: A, 10 mm; B, 4 mm. Artist: John Manning.

wise universal blue to violet flower colour not only in *M. bipartita* but in almost all members of section *Polyanthes* (*M. polyanthos* L.f. itself may have blue-mauve or white flowers). The yellow-flowered plants resembled typical *M. bipartita* so exactly when compared with typical blue-flowered plants found elsewhere the same day, that we were forced to conclude that colour was the only difference between these plants, growing on the Farm Safraanrivier (Goldblatt *et al.* 12955) and typical *M. bipartita*. *Moraea bipartita* then, may rarely have yellow flowers, a striking exception for section *Polyanthes*.

At the Safraanrivier site, yellow-flowered *Moraea bipartita* grew together with closely related *M. polyanthos*, a species distinguished from *M. bipartita* by flowers with subequal tepals, all with small nectar guides, and reduced style branches as wide as the anthers and without vestigial style crests. Hybrids between the two species were common and represent one of the few examples of a hybrid swarm in *Moraea*. A range of intermediate flower forms were represented among the hybrids, the most common of which had yellow or grey tepals with blue style branches, narrower than normal with smaller crests (Goldblatt *et al.* 12955A).

WESTERN CAPE.—3321 (Ladismith): northern foot of the Outeniqua Mountains in Perdebont Valley, Farm Safraanrivier, (–CC), 6 September 2007, Goldblatt, Vlok & Porter 12955 (NBG). Hybrids with *M. polyanthos*: loc. cit., Goldblatt, Vlok & Porter 12955A (NBG).

Moraea elsiae Goldblatt (1986a)

Moraea elsiae is one of several species of subgenus *Visciramosa*, an alliance distinguished by woody, rather than fibrous corm tunics, multiple foliage leaves, branched stems always viscid below the nodes, and flowers with filaments free but contiguous around the style (elsewhere in the genus the filaments are entirely connate or united in the lower half). Most species of the subgenus have typical *Moraea*-type flowers with outer tepals larger than the inner and with nectar guides at the base of the limbs, and flattened style branches bearing paired, petaloid crests. *M. elsiae* is an exception in having narrow style branches with vestigial crests and subequal tepals, all of which have nectar guides. The recorded range of *M. elsiae* is from the Cape Peninsula to the Potberg near Cape Infanta. The presence of the species has now been established in the Pauline Bohnen Reserve at Stilbaai, a range extension of some 100 km eastward.

WESTERN CAPE.—3421 (Riversdale): Stilbaai, Pauline Bohnen Reserve, (–AD), 20 October 2000, De V. Pienaar & Pienaar PB570 (NBG).

Moraea falcifolia Klatt

One of the most widespread of the winter rainfall *Moraea* species, *M. falcifolia* has been recorded from southern Namibia through Namaqualand south to the Breede River Valley and the western Little Karoo, as well as from Bushmanland and the Upper Karoo as far east as Kimberley. In Goldblatt's (1976, 1986a) revisions of the genus, no records were known from Eastern Cape or the central and eastern Little Karoo. Collections have now been made from the Little Karoo near Sebrasfontein in the northern foothills of the Outeniqua Mountains, in the Long Kloof, and from near Alexandria, thus

enlarging its already wide range significantly. Plants from these sites do not differ in any significant way from known collections.

WESTERN CAPE.—3322 (Oudtshoorn): low northern foothills of the Outeniqua Mountains near Sebrasfontein, (–CC), 13 July 1986, *Vlok 1518* (MO).

EASTERN CAPE.—3323 (Willowmore): Onder Kouga, off Long Kloof, (–DD), 28 September 1975, *Bayliss BS7098* (PRE). 3326 (Grahamstown): Salem–Alexandria road, Bushmans River Gorge, Longford Grange Farm, (–CB), 26 August 1995, *Dold & Cocks 1771* (GRA; MO, photo.).

Moraea pseudospicata Goldblatt (1986b)

When described, this late summer- and autumn-flowering species was known with certainty only from the Nieuwoudville Wildflower Reserve and from Lokenburg, 30 km south of Nieuwoudville. In March 1997, the species was found on the Nieuwoudville Sports Ground and in March 2000 we found it to be common on Glenlyon Farm, now the Hantam National Botanic Garden, on soils derived from Dwyka tillite. Then in 2003 we discovered large numbers of what appeared to be *M. pseudospicata* in fruit on the Hantamsberg at Calvinia in areas that had been burned two years earlier. While flowers are not known for the Hantamsberg plants, they have the sessile lateral inflorescences, single linear leaf with tightly inrolled margins, and small, globose capsules that are diagnostic for *M. pseudospicata*. The species now seems to be common north and south of Nieuwoudville in a belt along the western end of the Bokkeveld Plateau as well as inland on the Hantamsberg. The reasons for its apparent rarity are not only that it flowers in February, March and April when little collecting is done in this hot and summer-dry part of the Western Karoo, but also that the flowers only open late in the afternoon, after 16:00 and are until then virtually invisible except to the specialist collector. We suspect that *M. pseudospicata* has an even wider range than is currently documented.

NORTHERN CAPE.—3119 (Calvinia): Nieuwoudville Sports Ground, (–AC), 31 March 1997, *Van Rooyen, Steyn & De Villiers 411* (NBG, PRU); Glenlyon Farm, renosterveld near reserve at entrance to farm property, (–AC), 13 March 2000, *Goldblatt 11305* (MO); Glenlyon Farm, renosterveld on road to Camel Koppie, (–AC), 13 March 2000, *Goldblatt 11305* (MO); Hantamsberg slopes, (–BD), 4 September 2002 (late fr.), *Goldblatt & Porter 12163* (MO, NBG, PRE).

Moraea spathulata (L.f.) Klatt

A widespread, eastern southern African species, *M. spathulata* extends from George in the southern Cape through eastern South Africa and Swaziland to eastern Zimbabwe, and is typically found in well-watered, montane habitats except at the extreme southern end of its range between George and Humansdorp where it occurs close to the coast. Exploration in the high mountains fringing the Great Karoo by E.G.H. Oliver in the 1970s and later by Ralph Clarke in 2005–2007, have resulted in the documenting of the species on the Koudeveldberge near Graaff-Reinet. Plants from the mountains of the Karoo differ in no way from those in the south at Knysna and Humansdorp, nor from those in the Drakensberg, despite the drier, and in winter, colder habitat. They constitute a remarkable range extension.

EASTERN CAPE.—3224 (Graaff-Reinet): Koudeveldberge SE of Doornbosch, (–AA), frequent scattered clumps on summit plateau and

north slopes with low tussock grass, 6 November 1974, *Oliver 5221* (NBG). 3225 (Somerset East): Sneeuweg above Suurkloof, Asante Sana Private Game Reserve, 1800 m, (–AC), 6 December 2005, *Clarke & Coombs 155* (GRA).

Moraea tricolor Andrews

Until now, this southwestern Cape species has been recorded from Darling, the Malmesbury and Tulbagh Districts, historically from the Cape Peninsula (where it is now extinct), and locally in the Caledon District as far east as Napier (Goldblatt 1986a). A member of section *Acaules* Goldblatt (5 spp.), it has the acaulescent habit characteristic of the group, with flowers borne above the ground and then withdrawn by contractions of the stalk of the ovary to lie within the spathes and near ground level where the fruits mature. Within the section, *M. tricolor* is recognized by the broad, triangular style crests, 8–10 mm long and 4–5 mm wide at the base, usually with the filaments united for half their length, and often glabrescent foliage. Flower colour in *M. tricolor* ranges from pale yellow to pink, brick-red, violet or deep mauve-pink, always with prominent deep yellow nectar guides edged in darker pigment, often red or purple, at the base of the outer tepal limbs, hence the specific epithet *tricolor*. Collections from Stilbaai in the southern Cape (*Naudé s.n.*), where four separate populations are known (J. Naudé pers. comm. 2008), represents a range extension of some 150 km. These plants are also remarkable for flowering in May, whereas other populations of *M. tricolor* typically bloom in August and September, although plants have been collected in flower near Hopefield in June. The habitat of the Stilbaai populations, which grow in the well-drained sandy ground of coastal dunes, is unusual for the species, which typically favours seasonally moist to inundated, poorly drained sandy or clay flats. Despite the ecological shift and change in flowering time of the Stilbaai populations, we find no character of any taxonomic significance that permits their recognition. For the present we record the range extension and note the shift in ecology and flowering time.

Fruiting plants from Stilbaai (*Goldblatt, Manning & Naudé 11199*, MO, NBG) have capsules 9–12 × ± 6 mm, and light brown, angular to subglobose seeds, ± 1.4 × 2 mm, with reticulate sculpturing. Capsules from one population of southwestern Cape *Moraea tricolor*, not recorded before, are 7–11 mm long and the seeds are also angular to subglobose with reticulate sculpturing and 1 × ± 1.3 mm (*Goldblatt 11572*, MO). These seeds match those of most other species of the section except for small differences in size and are probably the plesiomorphic type for the section.

We also include a minor range extension for *Moraea tricolor* from Langebaan on Saldanha Bay, the northernmost record for the species (*Goldblatt & Porter 13066* (fl.), MO, NBG, *13210* (fr.), MO, NBG). Plants at this site have violet tepals with an orange rather than yellow nectar guide, colouring not before reported for the species. The capsules are ± 10 mm long, typical for the species.

Capsules and seeds of populations of *Moraea ciliata* (e.g., *Goldblatt & Porter 12710*, MO, *12691*, MO) with yellow or white flowers, are similar in size and shape to those of *M. tricolor*, the seeds rather more angular and

often 5-sided, obscurely reticulate and $\pm 1 \times 1.5$ mm. Curiously, blue-flowered populations of the species that we have examined (e.g. *Snijman & Perry 2142*, NBG, in flower) have larger, globose seeds with less pronounced sculpturing and $2 \times 2-3$ mm, and are borne in elongate capsules 18–20 mm long (*Goldblatt et al. 12863*, MO). The variation in capsule and seed shape and size in colour morphs of *M. ciliata*, suggests differentiation among populations of the species associated not only with perianth colour but also capsules and seeds, and perhaps other features. Insufficient collections with capsules and fully developed seeds make more detailed exploration of this question impossible at this time.

WESTERN CAPE.—3318 (Cape Town): Langebaan, wet site in granite outcrop opposite post office, (–AA), 3 September 2008, *Goldblatt & Porter 13066* (MO, NBG), 28 September 2008, *Goldblatt & Porter 13201* (fr.) (MO, NBG). 3421 (Riversdale): Stilbaai, Geelkrans Nature Reserve, (–AD), May 2006, *Naudé s.n.* (NBG), 5 September 2007 (fr.), *Goldblatt, Manning & Naudé 12950* (MO, NBG); Stilbaai, Panorama Circle, 29 May 1980, *P. Bohnen 7542* (NBG); Stilbaai, grounds of The Gem Nursery, road from Stilbaai to Jongensfontein, 24 May 2003, *U. de V. Pienaar & A. Pienaar 378* (NBG).

Moraea vegeta L.

Locally common on the Cape Peninsula and recorded as far north as Darling and Hermon in the greater Malmesbury District, and as far east as Swellendam (*Goldblatt 1986a*), *Moraea vegeta* is a fairly inconspicuous species, with watery yellow or dull purple flowers. It is readily recognized by the several channelled, glaucous leaves and nodding, globose capsules with soft walls that show the outlines of the seeds. A new record from the Kobee Valley, some 250 km to the north is an unexpected and remarkable range extension. In the Kobee Valley, plants grow in sheltered kloofs and gullies in open bush dominated by wild olive (*Olea europaea* subsp. *africana*) on a west-facing slope above the valley floor. This is the only record of the species from the northwestern centre of the Cape flora region.

WESTERN CAPE.—3119 (Calvinia): Kobee Valley, gully on west-facing slopes above valley floor in light bush, (–CA), 1 September 2001, *Goldblatt & Porter 11801* (NBG).

Moraea verecunda Goldblatt

Although currently known from a few sites in the immediate vicinity of Nieuwoudtville (*Goldblatt 1986a*), specimens collected from south of the Bokkeveld Moun-

tains, on Uitkyk Pass descending into Biedouw Valley, appear to represent this species. The collection (*Stirton 11507*) has sessile lateral inflorescences, a solitary, narrow basal leaf, and small violet flowers with tepals 10–12 mm long, and partially fused filaments. No capsules are fully developed but the ovaries are fusiform and one immature capsule is beaked. These features accord exactly with *M. verecunda* and we tentatively treat this as a range extension for the species. A photograph (R. MacFarlane pers. comm. 2008) taken on the mountain slopes ± 3 km NW of Wuppertal on the road to Biedouw Valley on 24 September 2006, also appears to be *M. verecunda*. Plants should be checked at these new localities, which represent the first records of the species in Western Cape and 80 and 100 km from Nieuwoudtville.

WESTERN CAPE.—3219 (Wuppertal): 11 km from Pakhuis Pass to Biedouw Valley, descending down Uitkyk Pass, (–AA), 11 November 1986, *Stirton 11507* (NBG).

Moraea vespertina Goldblatt & J.C. Manning

Described in 2000, based on plants from the dolerite hills east of Nieuwoudtville in Northern Cape, *Moraea vespertina* was distinguished in subgenus *Visciramosa* Goldblatt by its several foliage leaves and relatively large, white flowers opening in the late afternoon and fading shortly after sunset. Subsequently, a second population was reported from Matjiesfontein Farm, lying to the east, between Nieuwoudtville and Calvinia (*Manning s.n.*). The flowers of this population are slightly larger (the outer tepals are ± 45 mm long, filaments 10 mm, anthers 6–7 mm) (Table 2) and on fading become faintly suffused with grey blue. In 2006 and 2007 we collected plants resembling *M. vespertina* in the Tankwa National Park, but with larger, pale grey-blue flowers. At first we considered that they represented a new species, distinguished from *M. vespertina* by the larger perianth, blue-grey coloration, crescent-shaped nectar guide, purple markings and veins on the outer tepal claws and other floral details (Table 2), notably the longer filaments, anthers and style crests. The Tankwa population grows among dolerite boulders on south-trending slopes. Differences between the populations are relatively small and at present we prefer to expand the circumscription of *M. vespertina* rather than to recognize a new taxon. We suspect that more populations of this species remain to be discovered between the Bokkeveld Plateau sites and the Tankwa National Park, over 120 km to the south (Figure

TABLE 2.—Comparison of Nieuwoudtville and Tankwa National Park populations of *Moraea vespertina*. All measurements were taken from fresh material

Character	Nieuwoudtville	Tankwa National Park
Spathe length (mm)	40–45	43–50
Tepal limb length (mm):		
outer	30–32 \times \pm 15	30–32 \times \pm 20
inner	28–30 \times 8–9	28–30 \times 14–15
Tepal claw length (mm)	10–11	\pm 16
Perianth colour	white	pale slate-blue, claws purple
Nectar guide shape	longitudinal streak	crescent
Stamens:		
filament length (mm)	7–8	\pm 12
anther length (mm) and colour	\pm 6, linear, white	\pm 8, oblong, lilac
Style branches (mm)	7 \times 8	10 \times 9
Style crests length (mm)	\pm 15	\pm 20

2) and if so, will no doubt cast more light on questions about the taxonomic status of the southern, larger-flowered population.

The flowers of the Tankwa population opened at 17:00–17:30 and closed at \pm 17:30. When fully open, as the sun began to set, they produced a strong odour of stocks (a heavy, sweet, clove scent). As night fell, we observed settling moths (not captured) visiting the flowers. The strong scent, pale flower colour and timing of anthesis make it all but certain that the Tankwa population is adapted for pollination by settling moths, as was previously reported for the Nieuwoudtville plants (Goldblatt & Manning 2000).

In a curious aside, we report that the corms of *Moraea vespertina* are boiled in goat's milk and eaten locally in the Calvinia District as a delicacy (I. Coetzee pers. comm. 2007). This leads us to think there are more sites for the species, but unfortunately not yet recorded.

NORTHERN CAPE.—3119 (Calvinia): Farm Matjiesfontein between Calvinia and Nieuwoudtville, (–AD), 20 October 2007, Manning s.n. (NBG). 3220 (Sutherland): Tankwa National Park, east end of Elandsberg, (–AA), 16 September 2006, Manning 3060 (NBG); Tankwa National Park, kloof along Maansedam road to Elandsberg, (–AA), 10 September 2007, Goldblatt & Porter 12978 (MO, NBG).

Moraea vlokii Goldblatt

When described (Goldblatt 1992), *Moraea vlokii* was known from two collections in the Swartberg near Gamkakloof at fairly high elevations, one at \pm 985 m and the other at \pm 490 m. We found a third population in 1997 near Montagu, which establishes a wider range for the species and, though still in the Little Karoo, at a lower elevation, below 300 m and some 150 km distant. The species is vegetatively very like the widespread *M. gawleri* Spreng. in corm tunic structure and the unusual, short inflorescence spathes, although it has a single foliage leaf (*M. gawleri* normally has two or three foliage leaves), and Goldblatt postulated that the two were immediately allied. DNA sequence analysis using a single sample of each species shows the two to be sister taxa (Goldblatt *et al.* unpublished data).

WESTERN CAPE.—3320 (Montagu): below Ouberg Pass to Montagu, rock outcrop, \pm 260 m, (–CC), 27 September 1997, Goldblatt & Manning 10764A (MO, NBG).

Moraea sp.

A collection from the summit of the Aurusberg in southwestern Namibia, Williamson & Hamer 4564, NBG, found on 2 November 1992, appears to represent a new species. The flowers, said to be yellow, were destroyed by insects before we received the specimen but it is worthwhile describing the plants for future reference and to establish its existence. Plants appear to grow in tufts in rock crevices on steep south slopes, and have corms \pm 12 mm in diameter and are covered by medium-textured, dark fibres, much like those illustrated for *M. tanquana* (Figure 3). The stems, about 60 mm long, are

unbranched, trailing and bear several, channelled leaves, up to 1 mm wide. The blades are somewhat twisted, have undulate margins and like the stem, they are trailing, but are much longer than the stem. The spathes are almost equal, the inner 13–14 mm long and the outer \pm 12 mm long. Nothing remains of the flowers or buds, but apart from the colour, were said to be *Spiloxene*-like, this with at least partially free filaments and thread-like style branches. We speculate that the flowers were of the *Hexaglottis*-type as illustrated in Figure 1.

ACKNOWLEDGEMENTS

Support for this study by grants 7316-02, 7799-05 and 8248-07 from the National Geographic Society is gratefully acknowledged. We thank Elizabeth Parker and London Porter for assistance and companionship in the field; Jan Vlok for alerting us to the existence of yellow-flowered *Moraea bipartita* and *M. tricolor* at Stilbaai; Ralph Clarke for alerting us to the presence of *M. spathulata* in the Karoo highlands; Tony Dold for providing information about the occurrence of *M. falcifolia* near Alexandria; Janet Naudé for guiding us to populations of *M. tricolor*; Roger MacFarlane for the Wuppertal record of *M. verecunda*; and Sharon Bodine for help with herbarium searches. Roy Gereau kindly checked the Latin descriptions. Collecting permits were provided by the nature conservation authorities of Western Cape and Northern Cape Provinces, South Africa.

REFERENCES

- GOLDBLATT, P. 1973. Contributions to the knowledge of *Moraea* (Iridaceae) in the summer rainfall region of South Africa. *Annals of the Missouri Botanical Garden* 60: 204–259.
- GOLDBLATT, P. 1976. Evolution, cytology and subgeneric classification in *Moraea* (Iridaceae). *Annals of the Missouri Botanical Garden* 63: 1–23.
- GOLDBLATT, P. 1986a. The moraeas of southern Africa. *Annals of Kirstenbosch Botanic Gardens* 14: 1–224.
- GOLDBLATT, P. 1986b. Convergent evolution of the *Homeria* flower type in six new species of *Moraea* (Iridaceae) in southern Africa. *Annals of the Missouri Botanical Garden* 73: 102–116.
- GOLDBLATT, P. 1987. Systematics of the southern African genus *Hexaglottis* (Iridaceae–Iridoideae). *Annals of the Missouri Botanical Garden* 74: 542–569.
- GOLDBLATT, P. 1992. New species, chromosome cytology and notes on the southern African Iridaceae–Irideae: *Moraea*, *Roggeveldia* and *Homeria*. *South African Journal of Botany* 58: 209–214.
- GOLDBLATT, P. 1998. Reduction of *Barnardiella*, *Galaxia*, *Gynandris*, *Hexaglottis*, *Homeria* and *Roggeveldia* in *Moraea* (Iridaceae: Irideae). *Novon* 8: 371–377.
- GOLDBLATT, P. & MANNING, J.C. 2000. New species of *Moraea* (Iridaceae–Iridoideae) from southern Africa. *Novon* 10: 14–22.
- GOLDBLATT, P., SAVOLAINEN, V., PORTEOUS, O., SOSTARIC, I., POWELL, M., REEVES, G., MANNING, J.C., BARRACLOUGH, T.G. & CHASE, M.W. 2002. Radiation in the Cape flora and the phylogeny of peacock irises *Moraea* (Iridaceae) based on four plastid DNA regions. *Molecular Phylogenetics and Evolution* 25: 341–360.
- HALDA, J.J. 2002. *Moraea jarmilae* J.J.Halda, spec. nov. *Acta Musei Richnoviensis sect. Natur* 9,1: 69, fig. 79.