

# A SYNOPSIS OF *MORAEA* (IRIDACEAE) WITH NEW TAXA, TRANSFERS, AND NOTES<sup>1</sup>

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## ABSTRACT

A synopsis of *Moraea*, a genus of African Iridaceae is presented. This summarizes, in systematic sequence, the subgenera, sections and species from revisions published over a period from 1973–1977, covering the genus over its entire range. The synopsis includes all taxonomic changes made in the later revisions and places the four species of *Moraea* transferred here from *Homeria* in 1980. Six new species, *M. linderi*, *M. flexuosa*, *M. vallisavium*, *M. longiaristata*, *M. atropunctata*, and *M. calcicola* and one new subspecies, *M. villosa* subsp. *elandsmontana* are described; *M. robusta* is raised from subspecies status in *M. galpinii*.

## INTRODUCTION

*Moraea* is a large genus of Iridaceae-Iridoideae restricted to sub-Saharan Africa. It is concentrated in montane areas in the tropics but occurs at all altitudes in southern Africa. It is best represented in the winter rainfall area of southern Africa where all of the five subgenera and over half the species occur. Currently, some 98 species are recognized, a further six are described here and one subspecies is elevated to species rank, making a total of 105. The genus has been revised recently in three parts, divided geographically: the treatment for species of the summer rainfall part of southern Africa was published first (Goldblatt, 1973), then that for the winter rainfall area (Goldblatt, 1976b), followed by tropical Africa (Goldblatt, 1977). Few species are shared by more than one region, but some overlaps occur and some changes were made in later revisions for species treated earlier. In addition, several species previously assigned to *Homeria* were transferred to *Moraea* (Goldblatt, 1979, 1980) as a result of critical biosystematic and cytological studies.

Other significant changes, published elsewhere, include the reduction to synonymy of the subspecies of *M. spathulata* (Goldblatt, 1977); placement of *M. bellendenii* subsp. *cormifera* in *M. tricuspidata* (Goldblatt, 1976b), and the application of the name *M. polyanthos* to a species previously known as *Homeria*

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*lilacina* so that the species long known by that name must be called *M. bipartita* (Goldblatt, 1979).

It now seems an appropriate time to summarize the accumulated changes to the taxonomy of *Moraea* in a synopsis of the whole genus. Species are ordered (Table 1) in a sequence that is, to the degree possible in a linear arrangement, phylogenetic, and wherever possible related species are placed close together. The subgenera and sectional treatment follows the system established by Goldblatt (1976a).

#### NOTES

There are minor changes in the system. *Moraea nubigena*, a dwarf, much reduced alpine species, is removed from subgenus *Vieusseuxia* to subgenus *Moraea*, next to *M. lugubris* in section *Moraea*. *Moraea nubigena* was unknown cytologically when originally described (Goldblatt, 1976b), but a chromosome count of  $2n = 20$ , obtained recently has (Goldblatt, in prep.) indicated that its correct placement is in subgenus *Moraea*.

A correction must be made to the published distribution information for *Moraea caeca* which was treated as occurring on the Cape Peninsula on Karbonkelberg (Goldblatt, 1976b). Recently, I was shown specimens collected here (*Malan sub Goldblatt* 5922) that were clearly *M. tricuspidata*, unusual only in having purple instead of white flowers. This collection matches *Salter* 3288, the specimen misidentified as *M. caeca*, from the same locality. The disjunction in the range of *M. caeca* between the Piketberg–Porterville Mts. and Cape Peninsula is thus incorrect. The description of *Moraea tricuspidata* must now be expanded to include this purple-colored form. The known range of this species has also been extended to the Cedarberg, where I have collected specimens, growing locally at the edge of a vleis and blooming after a veld fire (*Goldblatt* 5129).

#### NEW TAXA AND COMBINATIONS

##### SUBGENUS *MORAEA*

##### SECTION *MORAEA*

1. ***Moraea linderi*** Goldbl. sp. nov. TYPE: South Africa, Cape, Piketberg Mts., Moutons Hoek, *Linder* 638 (MO, holotype).

Planta 35–45 cm alta, cormo ca. 18 mm in diametro, multos bulbilos a base ferenti, tunicis brunneis, primis integris, ultimis fibrescentis, foliis 3, inferiore basali manifeste unifaciali vel tereti, foliis superioribus congestis, multum supra terram insertis, canaliculatis, spathis 3.5–4 cm longis, exteriore apice libro, flore pallido flavo, tepalis exterioribus ca. 35 mm longis, interioribus grandioribus, filamentis manifeste libris, ramis styli 12 mm longis, cristis ca. 10 mm longis, prominentibus.

Plants 35–45 cm high. *Corm* ca. 18 mm in diameter, bearing numerous pale cormlets at base, tunics brown, initially unbroken, breaking from below into sections and becoming fibrous eventually, older, outer layers partly fibrous. *Cataphyll* membranous. *Leaves* 3, lowermost basal, upright or curving outward, evidently unifacial but perhaps terete when live, second and third leaves inserted well above ground, and close together, 10–20 cm long, channelled, up to 4 mm wide. *Stem* erect, branching well above-ground, and branches closely set, few branched. *Spathes* 3.5–4 cm long, herbaceous, brown-tipped, truncate to acute, outer spathe leaf-like and with free apex, shorter to exceeding inner spathe.



TABLE 1. Synopsis of *Moraea*. Species marked with an asterisk (\*) are described in this paper for the first time.

SUBGENUS <i>MORAEA</i>	
SECTION <i>MORAEA</i>	
1. <i>M. ramosissima</i> (L. f.) Druce—SW and Southern Cape to Grahamstown	
2. <i>M. gawleri</i> Spreng.—Namaqualand, SW and Southern Cape	
3. <i>M. vegeta</i> L.—SW Cape	
4. <i>M. indecora</i> Goldbl.—Northern Namaqualand	
5. <i>M. papilionacea</i> (L. f.) Ker—SW Cape	
6. <i>M. fergusoniae</i> L. Bol.—Southern Cape	
*7. <i>M. linderi</i> Goldbl.—Piketberg, SW Cape	
8. <i>M. margaretae</i> Goldbl.—Namaqualand	
9. <i>M. serpentina</i> Baker—Namaqualand	
10. <i>M. tortilis</i> Goldbl.—Namaqualand	
11. <i>M. nubigena</i> Goldbl.—Brandwacht Mts., SW Cape	
12. <i>M. lugubris</i> (Salisb.) Goldbl.—SW Cape	
SECTION <i>ACAULES</i> (Baker, 1896)	
13. <i>M. falcifolia</i> Klatt—Namaqualand, Karoo, dry parts of SW Cape	
14. <i>M. ciliata</i> (L. f.) Ker—Namaqualand, SW Cape to Eastern Cape, and local in the Karoo	
15. <i>M. macronyx</i> Lewis—SW and Southern Cape	
16. <i>M. tricolor</i> Andrews—SW Cape	
SECTION <i>DESERTICOLA</i> (Goldblatt, 1976a)	
17. <i>M. saxicola</i> Goldbl.—Namaqualand	
18. <i>M. macgregorii</i> Goldbl.—Southern Namaqualand	
19. <i>M. namibensis</i> Goldbl.—Southwestern Namibia	
20. <i>M. bolusii</i> Baker—Namaqualand	
SECTION <i>SUBRACEMOSAE</i> (Baker, 1896)	
21. <i>M. gracilentia</i> Goldbl.—Western Cape	
22. <i>M. fugax</i> (de la Roche) Jacq.—Namaqualand to SW Cape	
SECTION <i>TUBIFLORA</i> (Goldblatt, 1976a)	
23. <i>M. cooperi</i> Baker—SW Cape	
24. <i>M. longiflora</i> Ker—Kamiesberg, Namaqualand	
SECTION <i>FLEXUOSA</i> (Goldblatt, this paper)	
*25. <i>M. flexuosa</i> Goldbl.—Anenous flats, Richtersveld	
SUBGENUS <i>VISCIRAMOSIA</i> (Goldblatt, 1976a)	
26. <i>M. bubalina</i> Goldbl.—Northwestern Cape	
27. <i>M. bituminosa</i> (L. f.) Ker—SW Cape	
28. <i>M. viscaria</i> (L. f.) Ker—SW Cape	
29. <i>M. inconspicua</i> Goldbl.—Namaqualand to Humansdorp, Southern Cape	
30. <i>M. elsiae</i> Goldbl.—SW Cape	
SUBGENUS <i>MONOCEPHALAE</i> (Goldblatt, 1976a)	
31. <i>M. angusta</i> (Thunb.) Ker—SW and Southern Cape	
32. <i>M. anomala</i> Lewis—SW Cape	
*33. <i>M. vallisavium</i> Goldbl.—Klein River Mts., Caledon district, SW Cape	
34. <i>M. neglecta</i> Lewis—SW Cape	
SUBGENUS <i>VIEUSSEUXIA</i> (Baker, 1892)	
SECTION <i>POLYANTHES</i> (Goldblatt, 1976a)	
35. <i>M. bipartita</i> L. Bol.—Little Karoo, Southern and E Cape	
36. <i>M. polyanthos</i> L. f.—Little Karoo and Southern Cape	
37. <i>M. crispa</i> Thunb.—Karoo, Roggeveld and Cedarberg	
38. <i>M. polystachya</i> (Thunb.) Ker—Karoo, E and N Cape, W Orange Free State, S and Central Namibia	
39. <i>M. speciosa</i> (L. Bol.) Goldbl.—Western Karoo	
40. <i>M. carsonii</i> Baker—Zimbabwe, Zambia, Malawi, S Tanzania and S Zaire	
41. <i>M. callista</i> Goldbl.—Southern Highlands, Tanzania	

TABLE 1. Continued.

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42. *M. afro-orientale* Goldbl.—East Africa, S Sudan  
 43. *M. iringensis* Goldbl.—Southern Highlands, Tanzania  
 44. *M. natalensis* Baker—Zimbabwe, Zambia, Malawi and E South Africa  
 45. *M. elliotii* Baker—E Cape, Natal, Transvaal and Malawi  
 46. *M. inclinata* Goldbl.—Drakensberg, Natal, Transkei  
 47. *M. thomsonii* Baker—E Cape through tropical central Africa to Ethiopia  
 48. *M. alpina* Goldbl.—Drakensberg, Natal and Lesotho

SECTION *THOMASIAE* (Goldblatt, 1976a)

49. *M. thomasiae* Goldbl.—Worcester to Little Karoo

SECTION *VIEUSSEUXIA*

50. *M. algoensis* Goldbl.—Little Karoo and Southeastern Cape to Port Elizabeth  
 51. *M. tripetala* (L. f.) Ker—Southwestern Cape, Roggeveld and Southern Cape to George  
 52. *M. debilis* Goldbl.—Caledon district, SW Cape  
 53. *M. incurva* Lewis—Wellington district, SW Cape  
 \*54. *M. longiaristata* Goldbl.—Caledon Zwartberg, SW Cape  
 55. *M. barnardii* L. Bol.—Caledon district, SW Cape  
 56. *M. barkerae* Goldbl.—Cedarberg Mts., SW Cape  
 57. *M. unguiculata* Ker—Namaqualand, SW Cape, Southern Cape and Mts. of the Karoo  
 58. *M. trifida* Foster—Drakensberg, Transkei, Natal, Lesotho to S Transvaal  
 59. *M. marionae* N. E. Br.—Transvaal-Swaziland escarpment and Mts. and Zululand  
 60. *M. pubiflora* N. E. Br. subsp. *pubiflora*—E Transvaal and Swaziland  
     subsp. *brevistyla* Goldbl.—Natal, Lesotho, Transkei  
 61. *M. albicuspa* Goldbl.—Southern Drakensberg, Natal, and Transkei  
 62. *M. dracomontana* Goldbl.—Drakensberg, Natal and Lesotho  
 63. *M. modesta* Killick—E Transvaal, Natal, Lesotho, and Transkei  
 64. *M. tricuspidata* (L. f.) Lewis—SW through Southern Cape to Grahamstown  
 65. *M. bellendenii* (Sweet) N.E. Br.—SW and Southern Cape  
 66. *M. lurida* Ker—Caledon district to Bredasdorp, SW Cape  
 67. *M. insolens* Goldbl.—Caledon district, SW Cape  
 \*68. *M. atropunctata* Goldbl.—Eseljacht Mts., SW Cape  
 69. *M. neopavonia* Foster—Western Cape  
 70. *M. gigandra* L. Bol.—Piketberg district, SW Cape  
 71. *M. caeca* Goldbl.—Piketberg district, SW Cape  
 72. *M. aristata* (de la Roche) Asch. & Graeb.—Cape Peninsula  
 73. *M. amissa* Goldbl.—Malmesbury district, SW Cape  
 74. *M. villosa* (Ker) Ker subsp. *villosa*—SW Cape  
 \*    subsp. *elandsmontana* Goldbl.—Elandkloof Mts., S of Gouda  
 75. *M. tulbaghensis* L. Bol.—Tulbagh district to Gouda, SW Cape  
 \*76. *M. calcicola* Goldbl.—Saldanha district, SW Cape  
 77. *M. loubseri* Goldbl.—Langebaan, SW Cape

SUBGENUS *GRANDIFLORA* (Goldblatt, 1976a)

78. *M. moggii* N. E. Br. subsp. *moggii*—N and E Transvaal  
     subsp. *albescens* Goldbl.—SE Transvaal  
 79. *M. muddii* N. E. Br.—E Cape to E Zimbabwe and Mozambique  
 80. *M. unibracteata* Goldbl.—Natal Midlands  
 81. *M. inyangani* Goldbl.—Inyanga Mts., Zimbabwe  
 82. *M. angolensis* Goldbl.—S Angola  
 83. *M. carnea* Goldbl.—Drakensberg, Natal  
 84. *M. ardesiaca* Goldbl.—Drakensberg, Natal  
 85. *M. graminicola* Oberm. subsp. *graminicola*—Natal Midlands to coast  
     subsp. *notata* Goldbl.—Transkei  
 86. *M. galpinii* (Bak.) N. E. Br.—E Transvaal, N Natal  
 \*87. *M. robusta* (Goldbl.) Goldbl.—E Transvaal, N Natal, Transkei  
 88. *M. hiemalis* Goldbl.—Natal Midlands  
 89. *M. reticulata* Goldbl.—Winterberg Mts., E Cape  
 90. *M. spathulata* (L. f.) Klatt—S Cape to E Zimbabwe and Mozambique  
 91. *M. alticola* Goldbl.—Drakensberg, Natal and Lesotho  
 92. *M. huttonii* (Bak.) Oberm.—Drakensberg, Natal, Lesotho to NE Cape  
 93. *M. schimperii* (Hochst.) Pic-Serm.—Zimbabwe and Angola north to Ethiopia and east to Nigeria
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TABLE 1. Continued.

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94.	<i>M. bella</i>	Harms—S Tanzania, Malawi, N Mozambique, Zambia and S Zaire
95.	<i>M. verdickii</i>	De Wild.—E Angola, Zambia, Zaire, Malawi, S Tanzania and Mozambique
96.	<i>M. macrantha</i>	Baker—Malawi, E Zambia and S Tanzania
97.	<i>M. ventricosa</i>	Baker—Zambia, Zaire, Burundi and S Tanzania
98.	<i>M. textilis</i>	Baker—Angola and W Zambia
99.	<i>M. tanzanica</i>	Goldbl.—S Tanzania and Malawi
100.	<i>M. brevifolia</i>	Goldbl.—Zambia
101.	<i>M. clavata</i>	Foster—Angola and Zambia
102.	<i>M. upembana</i>	Goldbl.—S Zaire
103.	<i>M. bovonei</i>	Chiov.—S Zaire
104.	<i>M. balundana</i>	Goldbl.—S Zaire
105.	<i>M. unifoliata</i>	Foster—S Zaire

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Flower evidently pale yellow; *outer tepals* ca. 35 mm long, claw ca. 15 mm, ascending, limb horizontal, ?12 mm wide; *inner tepals* ?2.5 mm long, possibly erect, ca. 4 mm at widest point. *Filaments* 8 mm long, evidently entirely free but contiguous for 2–3 mm, diverging above, *anthers* 6 mm long. Ovary ca. 7 mm long, *style branches* 12 mm long, ca. 3 mm wide, crests prominent ca. 10 mm long. *Capsule* and seeds unknown. *Chromosome number* unknown.

Flowering time: December.

Distribution: known only from one site in the Piketberg Mts., in sandy Cape mountain soil.

This species was recently discovered by Peter Linder during a survey of the flora of the Piketberg Mountains, and it is named in his honor. *Moraea linderi* is evidently rare and so far is known only from the type locality. Like many geophytes of the Cape mountain flora, it probably only flowers well after burning or clearing and it may be more common than the present record indicates.

*Moraea linderi* is an unusual species; with its several leaves and branches, and apparently free filaments it seems to be one of the most primitive species of the genus. The brown, initially entire, corm tunics, although rare in *Moraea*, are also found in the Namaqualand species, *M. margaretae* (Goldblatt, 1976b) as well as in the genus *Rheome*, which was recently segregated from *Homeria* (Goldblatt, 1980), and in *Hexaglottis nana*. It is not clear whether the possession of this distinctive type of corm tunic indicates a close relationship between these species, presently placed in three different genera, but this possibility will be investigated in the near future.

The similarity in vegetative morphology between *Moraea linderi* and *Rheome umbellata* is particularly marked. Except for the presence of a basal leaf in *M. linderi*, the two species cannot be distinguished. The flowers, however, differ markedly. *Moraea linderi* has a typical *Moraea* type of flower, with unequal inner and outer tepals, large petaloid style branches and prominent crests, while *R. umbellata* has subequal inner and outer tepals and narrow style branches without crests. It seems likely that *Rheome umbellata* may have been derived from *M. linderi* by the same pattern of floral simplification and reduction evident in *Moraea polyanthos* (Goldblatt, 1980) and in other species groups in *Moraea*, which has resulted in the independent development of this *Homeria* type flower repeatedly.

SOUTH AFRICA: Cape 3218 (Clanwilliam) Piketberg Mts, Moutons Hoek (DC), Linder 638 (MO).



SECTION *FLEXUOSA*

Section **Flexuosa** Goldbl. sect. nov. TYPE and only species: *Moraea flexuosa* Goldbl.

Folia 3–5, canaliculatis, caule flexuoso, tunicis cormi fibrosis, nigrescentibus, apicibus spathae exterioris libris arcuatisque, filamentis connatis, libris ad apicem, ramis styli petaloideis, cristis productis, numero chromosomato  $x = 6$ .

2. ***Moraea flexuosa*** Goldbl. sp. nov. TYPE: South Africa, Cape, Richtersveld, Eksteenfontein road, *Goldblatt 6000A* (MO, holotype, K, NBG, PRE, S, WAG, isotypes).—FIG. 1.

Planta parva ad 10 cm alta, tunicis cormi fibrosis, nigrescentibus, foliis 3–5, canaliculatis, ad 6 cm longis, caule flexuoso, simplice ad 4-ramoso, spatha 2.5–4 cm longa, exteriore ad 10 mm brevior, apicibus libris et arcuatis, flore flavo, tepalis exterioribus 28–30 mm longis, unguibus ca. 16 mm longis, columna filamentarum 11–12 mm longa, libra ad apicem, antheris ca. 3.5 mm longis.

Plants 6–10 cm high. *Corm* 10–15 mm in diameter, tunics of matted, coarsely reticulate, dark brown (–black) fibers. *Cataphyll* solitary, dry, membranous, pale or light brown. *Leaves* 3–5, lowermost inserted shortly, to 2 cm above the ground and largest, upper leaves progressively shorter, all falcate, channeled, to 6 cm long, 3–6 mm wide, grey-green. *Stem* flexuose, sharply flexed above sheathing base of each leaf, simple or with up to 4 branches. *Spathes* herbaceous, acuminate, 2.5–4 cm long, outer about as long to 10 mm shorter, sheathing below only, upper half to two-thirds free and curved outwards. *Flower* pale yellow, inner and outer tepals deeper yellow toward base of tepal limb, with nectar guides on outer tepals only, consisting of numerous small dark green dots, weakly scented; *outer tepals* 28–30 mm long, claw erect, limb horizontal, 12 mm long, 8 mm wide; *inner tepals* 25–27 mm long, claw narrow, curving outward, limb ca. 12 mm long, 7 mm wide, horizontal, blade twisted through 45°. *Filaments* 11–12 mm long, united in a cylindrical column, free in upper ca. 1.5 mm and curved outward; *anthers* appressed to style branches, straight, ca. 3.5 mm long, white. *Ovary* ca. 7 mm long, reddish; *style* dividing at apex of filament column, branches 4 mm long; *crests* ca. 2 mm long, erect. *Capsule* oblong, 12–15 mm long. *Chromosome number*  $2n = 12$  (*Goldblatt 5742*).

Flowering time: July–early August.

Distribution: local in fine sandy loess on flats in the southern Richtersveld.—Fig. 1.

This very distinct new species was discovered only in 1979 by N. J. van Berkel, while working with her husband prospecting in northern Namaqualand. Photographs taken in the field and later shown to me indicated that this was a very unusual and undescribed *Moraea*. Visits in the two following years to the area where the plants were found revealed that this species has a very localized distribution, no more than a few acres in extent in fine sandy loess, on the plains below Anenous Pass. The species is very early blooming, usually in July, and possibly even earlier. Plant growth is very rapid, and the first flowers are produced three to four weeks after the first soaking autumn or winter rains fall in this arid area of the west coast of southern Africa.

Both vegetative and floral morphology are unusual, but the overall impression is that *Moraea flexuosa* is derived from a fairly unspecialized group within the genus. Its quite generalized flower is unusual mainly in the tepals having very



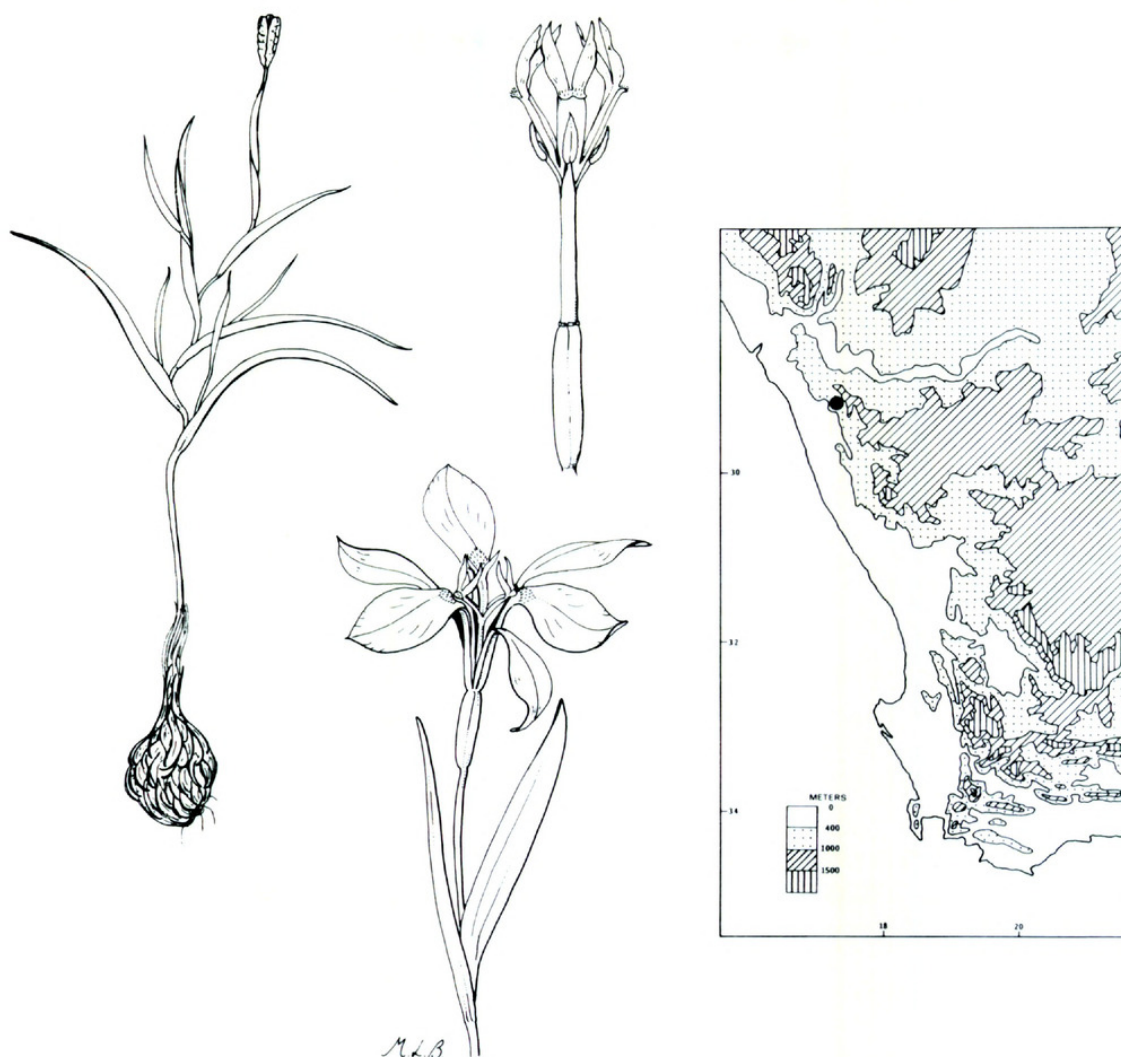


FIGURE 1. Morphology and distribution of *Moraea flexuosa* and distribution of *Moraea linderi*. Habit  $\times 0.5$ ; flower  $\times 1$ ; detail of ovary, stamens, and style branches  $\times 2$ .

long claws, and the filaments are united to a greater extent than is usual in the genus. The several-leaved character is consistent with a placement in subgenus *Moraea*, but it is so unusual here in its flower and in chromosome number of  $2n = 12$  (in contrast to the base of  $x = 10$  in the subgenus) that it is assigned to its own section. The karyotype, consisting only of acrocentric chromosomes, is remarkably similar to that found in *Homeria*, a genus closely allied to *Moraea* but having different floral morphology. It seems reasonable to speculate that *M. flexuosa* may be close to the line that gave rise to *Homeria*.

SOUTH AFRICA: Cape 2917 (Springbok) Eksteenfontein road, ca. 6 km N of Port Nolloth road, farm Kootjesvlei, sandy loess soil (AB), Goldblatt 5742 (K, MO, NBG, PRE, S, WAG), 6000 (MO), 6000A (K, MO, NBG, PRE, S, WAG), Van Berkel 93 (MO).

#### SUBGENUS *MONOCEPHALAE*

3. *Moraea vallisavium* Goldbl. sp. nov. TYPE: South Africa, Cape, Vogelgat, Hermanus, mountain slopes, 1,500 ft, Goldblatt 5394 (MO, holotype; K, NBG, isotypes).—FIG. 2.



Planta ad 10–34 cm alta, cormo 4–6 mm in diametro veteribus persistentibus, tunicis fibrosis reticulatis, folio solitario lineari unifaciali caule excedenti 1–2 mm lato, caule bractea una vaginati marginibus liberis, marginibus spathae exterioris liberis, apicibus spatharum obtusis vel truncatis, floribus luteis, limbis tepalorum horizontalibus vel pauce reflexis, tepalis exterioribus 20–24 mm longis, interioribus 16–19 mm longis, filamentis ca. 5 mm longis connatis infra, ramis styli 8 mm longis, ad 4 mm latis, capsula angusta turbinata, seminibus fusiformibus.

Plants 10–34 cm high. *Corm* small, 4–6 mm in diameter, with corms of past seasons persisting below, tunics of fine reticulate fibers. *Cataphyll* pale, membranous, becoming fibrous and accumulating around the base in a neck. *Leaf* solitary, linear, unifacial, inserted above ground level, 1–2 mm wide, exceeding the stem and arching over to trailing. *Stem* more or less erect to inclined, unbranched, bearing a single sheathing bract 15–40 mm long with margins free to base. *Spathes* 3–4 mm long, herbaceous, obtuse to truncate, outer about half as long as inner and with margins free to base. *Flower* yellow, tepals with claws darkly speckled, the outer with deep yellow nectar guides at base of limbs; *outer tepals* 20–24 mm long, claw ascending, 9–10 mm long, limb horizontal to slightly reflexed, limb 8–10 mm wide; *inner tepals* 16–19 mm long, claw 6–8 mm long, limb to 7 mm wide, also horizontal to slightly reflexed. *Filaments* ca. 5 mm long, united in lower 2 mm; *anthers* 5–6 mm long, reaching to the apex of the style branches, pollen red. Ovary 8–10 mm long, triangular in section, *style branches* ca. 8 mm long, about 4 mm wide, crests 6–10 mm long, erect. *Capsule* narrowly turbinate, somewhat triangular, 12–17 mm long, dehiscent in upper third, seeds spindle shaped, 2 mm long and ca. 1 mm wide. Chromosome number unknown.

Flowering time: late December to January.

Distribution: Klein River Mountains, known only from Vogelgat east of Hermanus, in damp sites, often on steep south facing slopes.—Fig. 2.

*Moraea vallisavium* is an unusual and apparently rare species, occurring in the mountains of the Caledon district. It has seldom been collected, probably owing to the fact that it blooms in summer and at relatively high altitudes and also because it has the habit of blooming well only after a fire the previous summer, although in rocky or cleared sites it will bloom year after year.

The species is unusual in several features. The corm tunics are finely fibrous and reticulate, a very rare characteristic in *Moraea*, and the older season's corms persist, accumulating below the current corm. The leaves seem unique in *Moraea* in being flat and monofacial rather than bifacial and channeled as is most frequent in the genus or terete as in its apparent relatives in subgenus *Monocephalae*. Also unusual are the margins of the sheathing bract and outer spathe, which are free to the base instead of being partly united. Fibrous corm tunics in genera where less broken tunic layers are the rule, sometimes occur in high mountain species, especially those of damp sites, and persistent old corms are also occasionally found in montane species in other genera of Iridaceae and these two characteristics may be derived rather than primitive as they at first appear. However, the monofacial leaf, unknown elsewhere in *Moraea* except perhaps in the recently discovered and incompletely known *M. linderi* also described in this paper, seems a truly primitive characteristic, as are the free margins of the sheathing bract and outer spathe valve. The solitary leafed and unbranched habit are, in contrast, specialized characteristics of *Moraea*. *Moraea vallisavium* thus has a curious combination of unusual, and both primitive and derived characteristics.



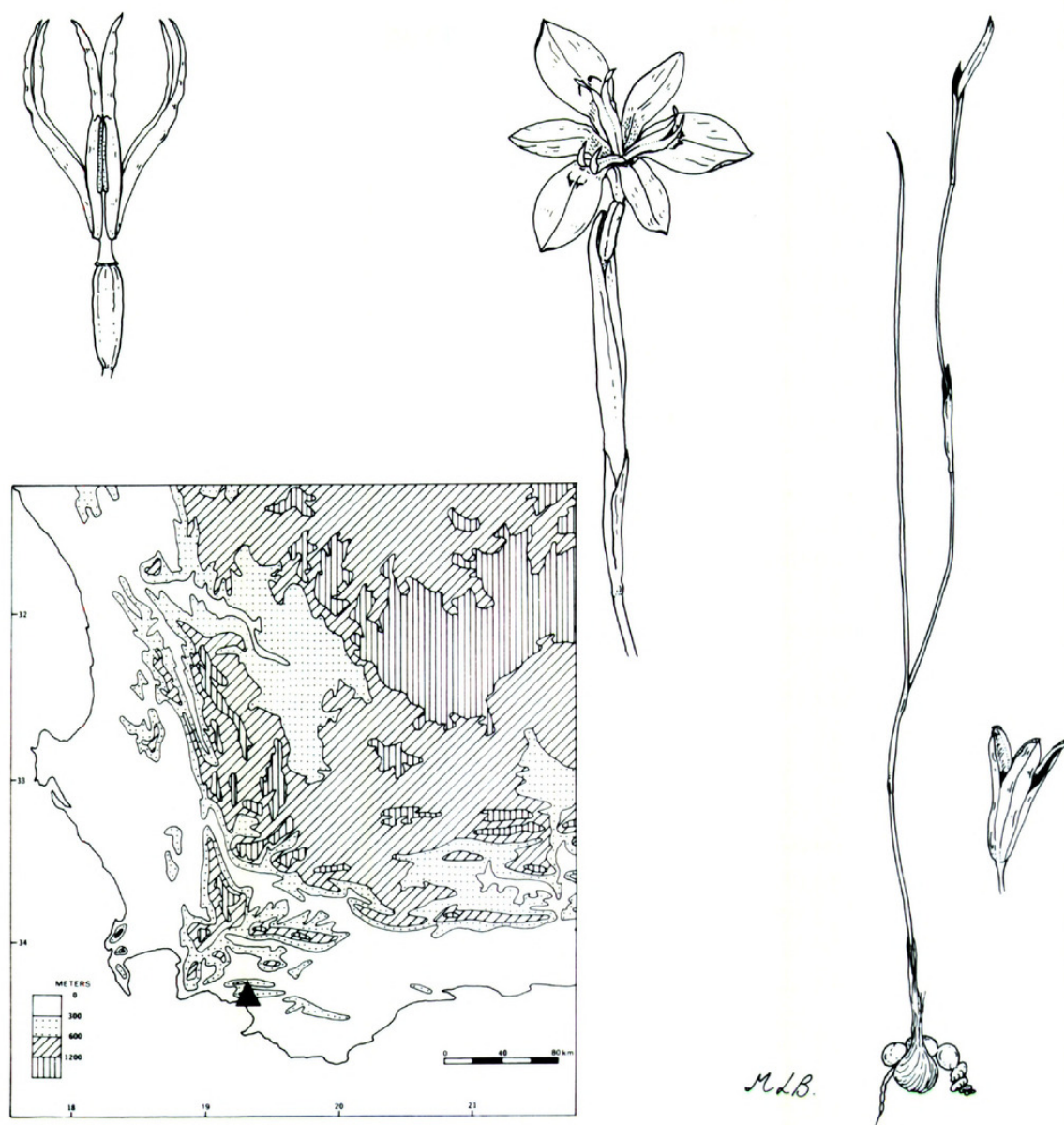


FIGURE 2. Morphology and distribution of *Moraea vallisavium*. Habit, flower, and capsule  $\times 1$ ; stamens and style branches  $\times 1.5$ .

*Moraea vallisavium* seems to be most closely related to *M. angusta* and to *M. anomala*, with which I initially associated it. These are closely related members of subgenus *Monocephalae*, all three species of which have in common a single, terete leaf, unbranched stem and fairly large yellow to cream flowers. The fruits of all three species are unmistakable in *Moraea*, being ovoid to rotund and relatively short while the seeds are flat and thin, lying horizontally in the locules of the capsule. Dry, old capsules of *M. vallisavium* that I collected with the current season's growth in 1979 seemed different in being rather slender, but since all the seed has been shed they could not be examined when I first collected the species. Only in 1982 was a complete capsule found by Ion Williams, owner of the Vogelgat Native Reserve after repeated searches at the known sites for the species. The capsules are clearly slender and narrowly turbinate, while the seeds



are spindle-shaped, relatively large for *Moraea* and quite unlike the flattened discoid seeds of other species of subgenus *Monocephalae*. The nature of the fruits convinced me that I was dealing with a distinct species rather than merely an unusual form of *M. anomala* or the related *M. angusta* with small flowers, atypical corms and corm tunics. However, *M. vallisavium* does seem to belong in subgenus *Monocephalae* with which its single leaf inserted above the ground, unbranched stem, and generalized flower conform. Also the margins of the sheathing bract and outer spathe are nearly free in the other species of the subgenus, so it appears that in this feature *M. vallisavium* is not particularly unusual. It is difficult to determine whether its flat, unifacial leaf is truly primitive or a secondary modification of the terete leaf, characteristic of subgenus *Monocephalae*. In fact, in dried material it is not even possible to determine that the leaves of members of subgenus *Monocephalae* were originally flat and unifacial or terete.

*Moraea anomala*, which has the smallest flowers of the three recognized species of subgenus *Monocephalae*, has outer tepals in the 30–45 mm long range, filaments 6–14 mm long and anthers 4–8 mm long (Goldblatt, 1976b). It almost always has two sheathing bracts on the stem and blooms from September to November at higher elevations. In contrast, *M. vallisavium* has outer tepals only 20–24 mm long, filaments ca. 5 mm long and anthers 5–6 mm long. It is recorded as blooming from late December into January and all specimens have only one stem bract. It thus seems reasonably distinct from *M. anomala* in floral characters as well as in the fruits and seed. *Moraea angusta* usually has large flowers, with outer tepals in the 30–50 mm range, filaments 5–15 mm long, joined only near the base, and anthers normally 7–10 mm long. However, some high altitude collections assigned to the species, notably Wurts 496 from Eleven O'Clock Mt. at Swellendam, and a recent collection, Esterhuysen 35606, made in 1981 in the same area have smaller flowers with outer tepals 22–25 mm long, filaments ca. 6 mm long and anthers ca. 4 mm long. These specimens are easily confused with *M. vallisavium* especially as they are late blooming, November to January and have fibrous corm tunics (corms lacking in the Wurts gathering). The Esterhuysen collection has nearly ripe capsules, and these are rotund, and quite typical of *M. angusta*. It seems, then, that *M. vallisavium* lies close to both *M. anomala* and *M. angusta* but differs from both mainly in its fruits and seed characters, although it can be distinguished from most collections of these species by its corm tunics and flowers as well.

SOUTH AFRICA: Cape 3419 (Caledon) Vogelgat Nature Reserve, 1,600 ft, damp area in path between Vulture and Beaconhead Streams (AD), Goldblatt 5398 (MO); Vogelgat, S facing cliff, above Fence Stream in peaty soil, 1,500 ft, Goldblatt 5347 (MO), 5394 (K, MO, NBG); north side of Fence Stream, Vogelgat/Diepgat, at base of steep shady cliff, 490 m, Williams 3200 (MO).

SUBGENUS *VIEUSSEUXIA*  
SECTION *VIEUSSEUXIA*

4. *Moraea longiaristata* Goldbl. sp. nov. TYPE: South Africa, Caledon Zwartberg, above Caledon Garden, Goldblatt 5883 (MO, holotype, C, E, K, NBG, PRE, S, US, WAG, isotypes).—FIG. 3.



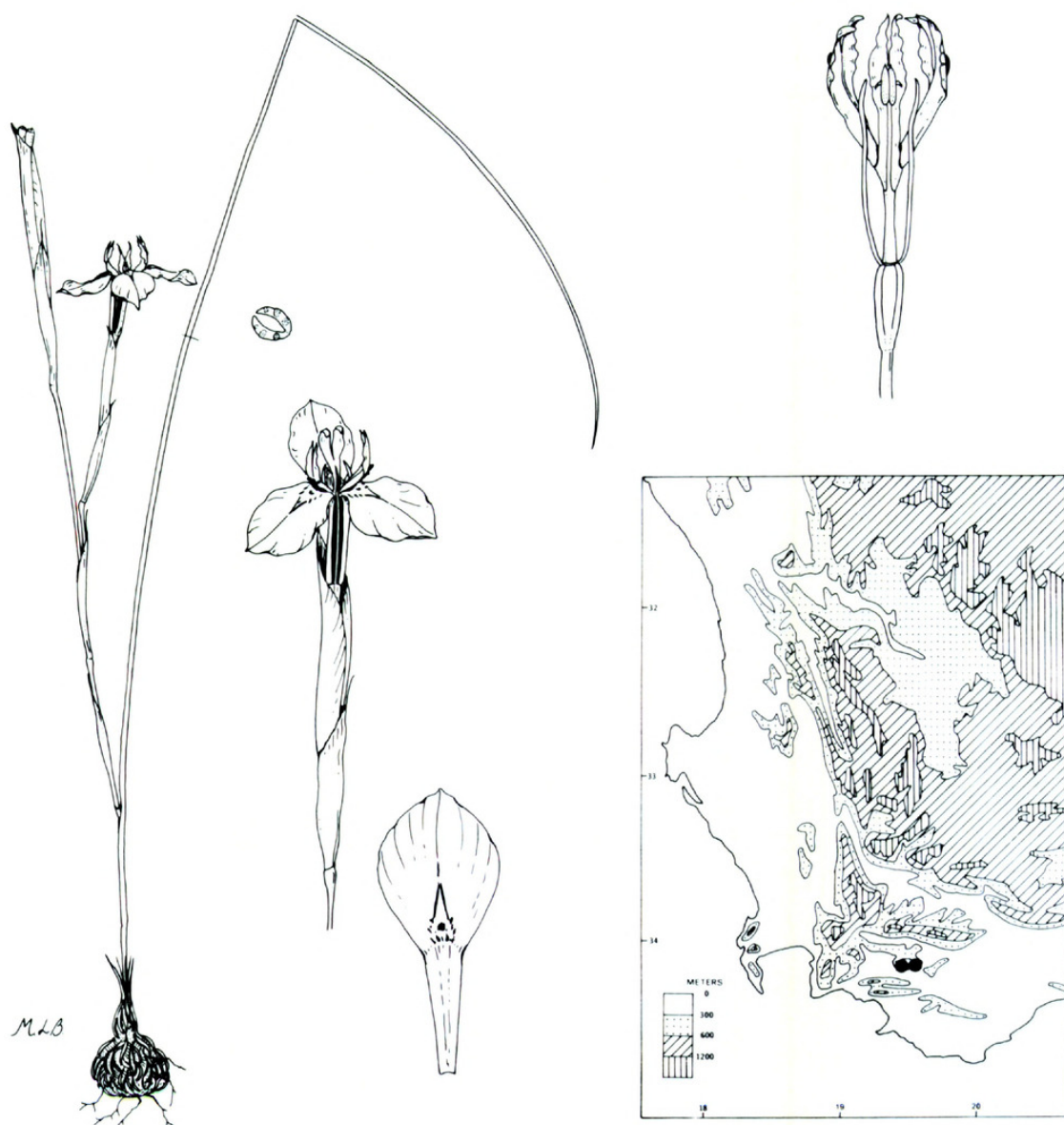


FIGURE 3. Morphology and distribution of *Moraea longiaristata*. Habit  $\times 0.5$ ; flower  $\times 1$ ; outer tepal and detail of ovary, inner tepals, stamens, and style branches  $\times 2$ .

Planta 15–30 cm alta, tunicis cormi pallidis brunneis, folio unico, basali, canaliculato, caulem excedente, caule simplice raro uniramoso, spathis 4.5–5.5 cm longis, interiore duplo longiore exteriori, flore albo, caeruleo maculato, limbis tepalorum exteriorum 11–14 mm longis, unguibus 11–16 mm longis, tepalis interioribus aristatis,  $\pm$  erectis, ad 2.5 cm longis, filamentis 12–15 mm longis, connatis in parte inferiore, antheris 3–4 mm longis, ramis styli ca. 10 mm longis, cristis ca. 5 mm longis.

Plants 15–30 cm high. *Corm* 8–12 mm in diameter, tunics of pale, coarse fibers. *Leaf* solitary, basal, channelled, erect, longer than stem, often dry toward apex, ca. 2 mm wide. *Stem* erect, simple, occasionally bearing one branch, stem bracts 2, 3–4 cm long, apices dry, attenuate. *Spathes* 4.5–5.5 cm long, outer about half the inner. *Flower* white with blue spots near base of outer tepal limbs; *outer tepals* 23–30 mm long, claw 12–16 mm, erect, limb spread horizontally to slightly



reflexed, shorter than claw, 11–16 mm wide, margins undulate; *inner tepals* 13–15 mm long, aristate, erect, curving inward toward apex. *Filaments* 12–15 mm long, united for lower 6–7 mm; *anthers* red, 3–4 mm long. Ovary 8–10 mm long, entirely or partly enclosed in spathes; *style branches* ca. 10 mm long; *crests* erect, ca. 5 mm long. *Capsule* and seeds unknown. *Chromosome number* unknown.

Flowering time: September to mid-October.

Distribution: stony sandstone soils of the Caledon Zwartberg, especially in cleared or burned situations.—Fig. 3.

*Moraea longiaristata* has been known since at least the late nineteenth century when it was collected by H. Bolus but it has until now been confused with *M. tripetala*, which it resembles closely when dry and poorly pressed. The few dry specimens available to me when studying *Moraea* in the winter rainfall area were assigned to *M. tripetala*. Only when I saw the live specimens at the Caledon Wild Flower Show placed together with *M. tripetala* and then in the field did it become clear that this was a distinct species.

It is obviously closely allied to *Moraea barnardii*, a species also endemic to the Caledon district and occurring on the mountains a few miles to the south, across the Caledon flats. Both *M. longiaristata* and *M. barnardii* have a similar habit and flower, but on examination the flowers are structurally quite different. *Moraea longiaristata* has very long cusp-like inner tepals, ca. 15 mm long, and outer tepals with long claws 12–16 mm long. In contrast, *M. barnardii* lacks inner tepals entirely, and the outer tepal claws are quite short, ca. 7 mm long. The filaments of *M. longiaristata* are extended in proportion to the tepal claws, and are up to 15 mm long, whereas in *M. barnardii* the filaments are only 8–9 mm long. In other respects, including shape, color, and orientation of outer tepal limb, anther shape and color, and style branch and crest morphology, the two species are apparently identical. The several, quite striking similarities suggest that *M. longiaristata* and *M. barnardii* are recent derivatives of a common ancestor.

*Moraea longiaristata* grows in typical, coarse Cape Sandstone derived soil, on south trending slopes and is most common in very stony situations. It is restricted to the Caledon Zwartberg.

SOUTH AFRICA: Cape 3419 (Caledon) Caledon (AB), *Rogers s.n.* (K.); near Caledon, *H. Bolus s.n.* (BOL 7878); hills near Caledon, *H. Bolus s.n.* (BOL 9169); Swartberg, *Esterhuysen 18932* (BOL); Caledon Zwartberg, slopes above Caledon Garden, *Goldblatt 5883* (C, E, K, MO, NBG, PRE, S, US, WAG); Caledon Zwartberg slopes, ca. 1,500 ft, *Goldblatt 5898* (MO); 2 km E of Caledon, below main road, *Goldblatt 5914* (BOL, MO); farm Paarde Valley, NE side of Caledon Zwartberg (BA), *Burghers 2807* (STE).

**5. *Moraea atropunctata*** Goldbl. sp. nov. TYPE: South Africa, Caledon dist., Vleitjies farm, Eseljacht Mts., *Goldblatt 5635* (MO, holotype, K, NBG, PRE, S, US, isotypes).—FIG. 4.

Planta 15–20 cm alta, tunicis cormi pallidis brunneis, folio unico, canaliculato, basali, 4–8 mm lato, marginibus ciliato-pubescentibus, caule glabro, simplice vel uniramoso, spathis 4.5–6.5 cm longis, exteriore duplo longiore interiore, flore cremei-albo, brunneo reverso, brunneis vel caeruleis punctatis ad basem limbi, tepalis exterioribus 20–24 mm longis, unguibus 5–7 mm, tepalis interioribus trifidis, filamentis ca. 5 mm longis, libris prope apicem, antheris ca. 4 mm longis, ramis styli 4 mm longis, cristis ca. 4 mm longis.



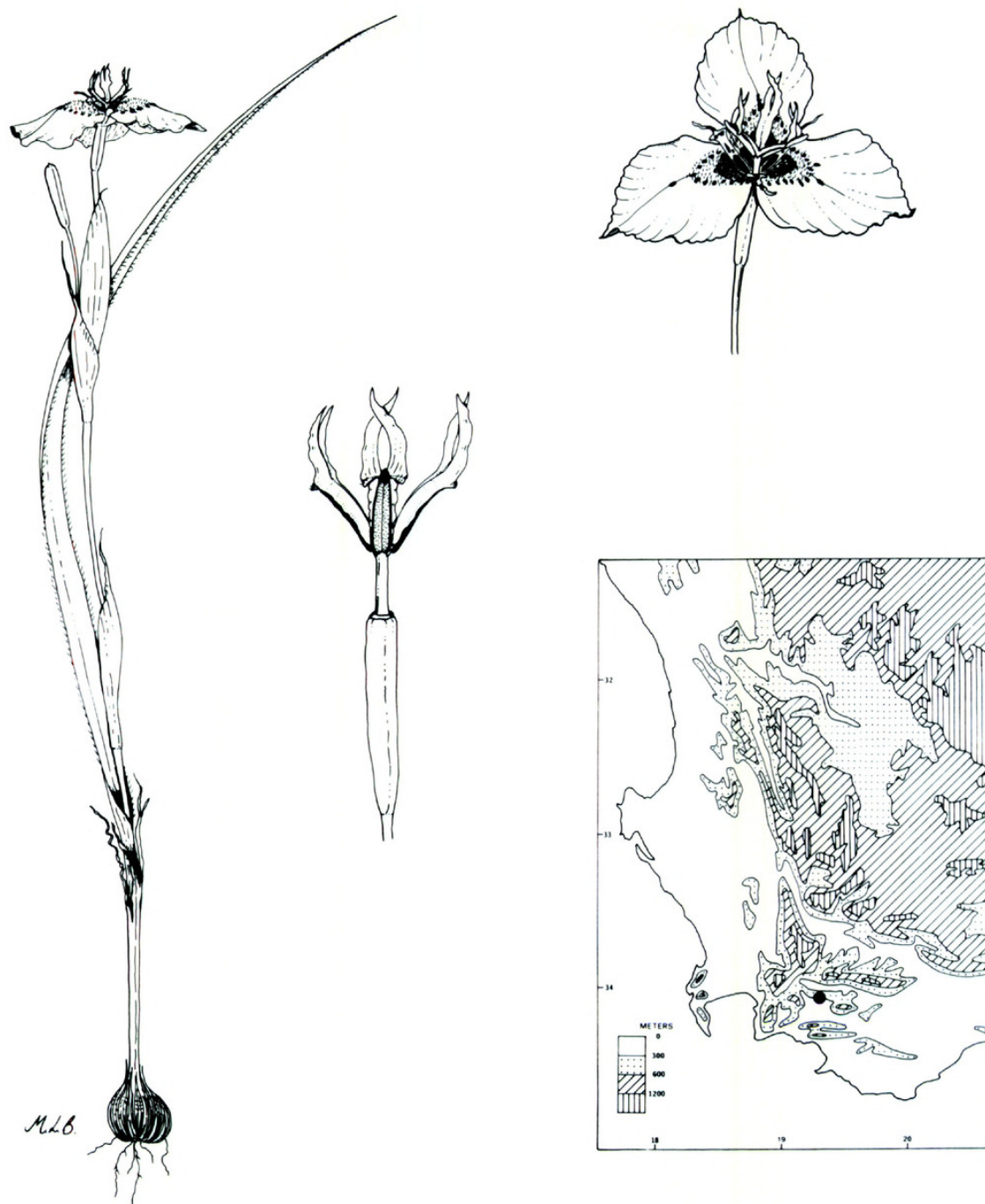


FIGURE 4. Morphology and distribution of *Moraea atropunctata*. Habit  $\times 0.5$ ; flower  $\times 1$ ; detail of ovary, stamens and style branches  $\times 2$ .

Plants 15–20 cm high. *Corm* 9–12 mm in diameter, tunics of light brown netted fibers. *Cataphyll* often conspicuous and dark brown. *Leaf* solitary, basal, linear, canaliculate, margins ciliate-pubescent, 4–8 mm at widest point, usually erect, about twice as long as stem. *Stem* erect, simple or 1-branched, glabrous, stem bracts 2.5–4 cm long, attenuate, brown above. *Spathes* herbaceous, attenuate, brown above, 4.5–6.5 cm long, outer about half the inner. *Flower* cream to white,



brown on reverse of tepals, spotted dark brown or blue toward base of outer tepal limbs, and nectar guide yellow; *outer tepals* 20–24 mm long, claw 5–7 mm, dark colored and bearded, limb horizontal, 17–25 mm wide; *inner tepals* 9–15 mm long, three-lobed, inner lobe longest, acute, straight or twisted, lateral lobes short, obtuse, yellow, speckled brown, and darker below. *Filaments* ca. 5 mm long, united, free in upper 0.5 mm; *anthers* ca. 4 mm long. Ovary 10–14 mm long; *style* 5 mm, branches as long as anthers, *crests* ca. 4 mm long, orange. *Capsule* oblong, 2.5–3.5 cm long, somewhat inflated, seeds not seen. *Chromosome number*  $2n = 12$  (Goldblatt 5635).

Flowering time: mid-August–September.

Distribution: known only from a small area of the Eseljacht Mts., N of Caledon, on clay soil.—Fig. 4.

*Moraea atropunctata* first came to the attention of botanists in 1978 when a bunch of cut specimens was exhibited at the Caledon Wild Flower Show. The following year, specimens again appeared at the Show and Dr. I. Williams obtained several specimens for preservation. He also managed to discover the source of the plants. They were picked by Mrs. G. le Roux, on her farm on the slopes of the Eseljacht Mts. The following year, Mrs. le Roux kindly showed me where the plants grew, and permitted me to make the type collection. The known range of *M. atropunctata* is restricted to a tiny area along a farm road in unploughed, virgin land at the edge of wheatfields. It seems likely that the former range was larger, but *M. atropunctata* may never have extended beyond the limits of the farm where it now occurs.

It is a very unusual species both in flower and vegetative morphology. While it is probably related to *Moraea tricuspidata* and the *M. unguiculata* group in general, it has broad, fairly short leaves with pubescent margins that are unusual in this alliance. Pubescence is unknown in other species of the *M. unguiculata* alliance but common in the related *M. villosa* group of species. The large, inflated capsule is also a characteristic of the *M. villosa* group. The flower, however, is more consistent with the *M. unguiculata* alliance in its dull coloration and three-lobed inner tepals with relatively short central and often somewhat twisted cusp. The chromosome number is  $2n = 12$  and the karyotype (Goldblatt, in prep.) is consistent with those described for *M. unguiculata* and its allies.

SOUTH AFRICA: Cape 3414 (Caledon) Vleitjies farm, Caledon dist., Eseljacht Mts., heavy clay soil (AB), Goldblatt 5635 (K, MO, NBG, PRE, S, US), Goldblatt 5863 (MO), Williams 2834 (NBG).

**6. *Moraea calcicola* Goldbl. sp. nov.** TYPE: South Africa, Cape, hill tops above Saldanha Bay, Goldblatt 4118 (MO, holotype, BR, E, K, NBG, PRE, S, US, WAG, isotypes).—FIG. 5.

Planta 30–40 cm alta, tunicis cormi pallidis brunneis, folio unico canaliculato basali, villosa, caule pubescente, simplice vel uniramoso, spathis 5–7 cm longis, flore caeruleo, limbis atrocaeruleis ad basem, tepalis exterioribus 25–35 mm longis unguibus 8–10 mm longis, tepalis interioribus trifidis, filamentis connatis 2–2.8 mm longis in apicem libris, antheris 5.5–6.5 mm longis, ramis styli latis ca. 6 mm longis, cristis ca. 4 mm longis.

Plants slender, 30–40 cm high. *Corm* 9–12 mm in diameter, tunics light brown, reticulate. *Leaf* solitary, basal, linear, canaliculate, exceeding the stem, villous on abaxial surface, 3–5 mm at widest, often bent and trailing. *Stem* erect or



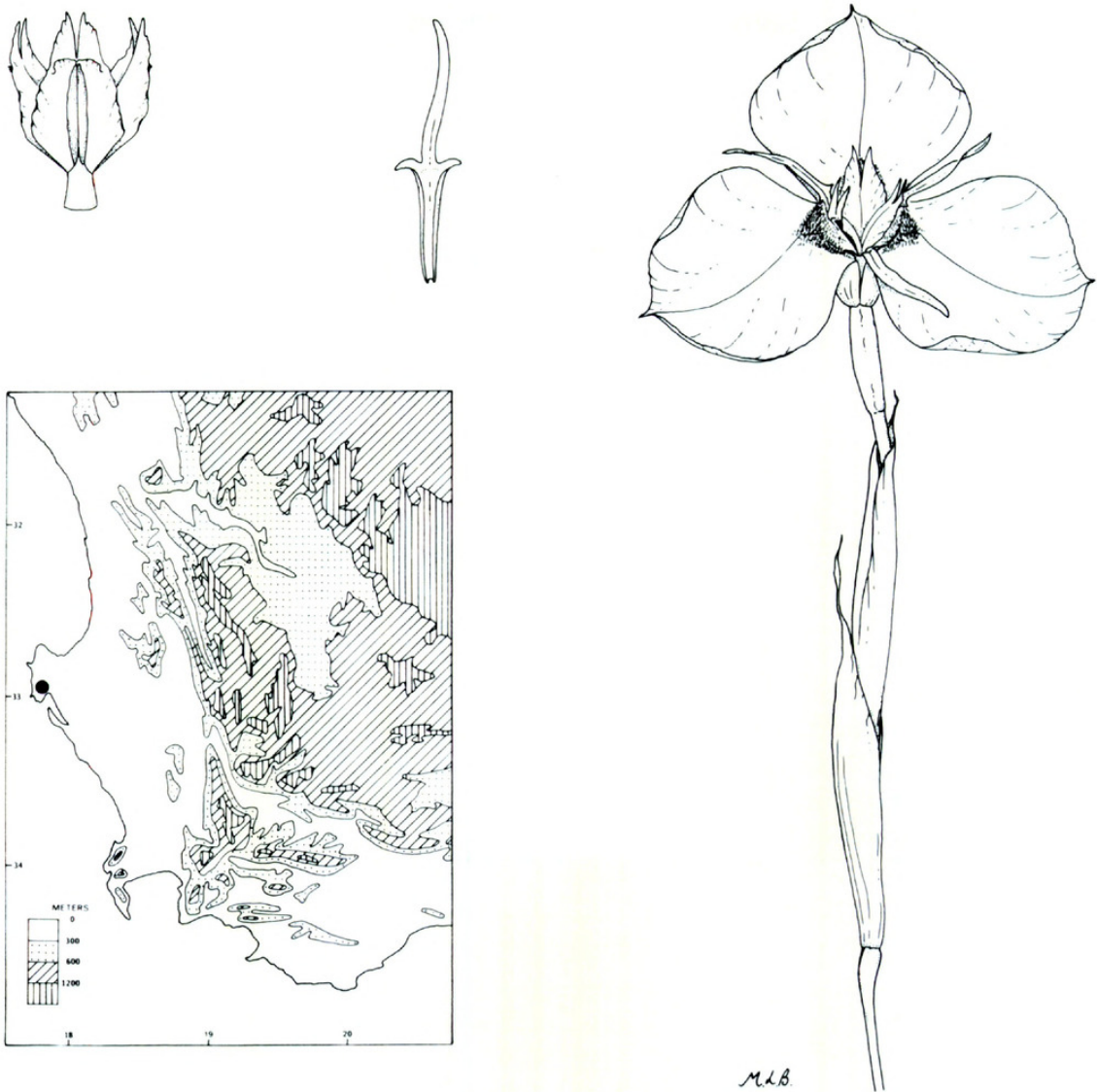


FIGURE 5. Morphology and distribution of *Moraea calcicola*. Flower and spathes  $\times 1$ ; inner tepal  $\times 1$ ; stamens and style branches  $\times 1.5$ .

inclined, simple or 1-branched, puberulous, stem bracts 5–6 cm long, attenuate and dry above. *Spathes* herbaceous, becoming dry from apex, attenuate, 5–7 cm long, outer 3–5 cm long. *Flower* clear blue, becoming paler with age, faintly scented, nectar guide a small dark blue triangle at base of tepal limb; *outer tepals* 25–35 mm long, limb 15–25 mm long and up to 32 mm wide, spreading horizontally, claw 8–10 mm long,  $\pm$  erect, heavily bearded with dark blue hairs; *inner tepals* 14–22 mm long, tricuspidate, with long acute central cusp, held horizontally; and short, obtuse, erect lateral lobes. *Filaments* 2–2.8 mm long, free in upper 0.5 mm; *anthers* 5.5–6.5 mm long. Ovary 1–1.5 cm long; *style* 2 mm long, branches inclined, to 6–8 mm long, ca. 6 mm at broadest point, just exceeding anther apex; *crests* ca. 4 mm long, margins broken irregularly. *Capsule* unknown. *Chromosome number*  $2n = 12$  (Goldblatt 4118).



Flowering time: September.

Distribution: hill tops and slopes above Saldanha Bay, among limestone rocks.—Fig. 5.

*Moraea calcicola* is related to *Moraea villosa* and its allies, a group loosely known as peacock moraeas. These species are characterized by having large brightly colored and very broad outer tepals, often with conspicuous nectar guides in contrasting pale and dark bands, and tricuspidate inner tepals. Several of the species of the group, including *M. villosa* itself, have puberulous stems and villous leaves; it is to these species that *M. calcicola* is most closely related. *Moraea calcicola* differs from *M. villosa* in its flower color and markings, which are clear blue, with rather inconspicuous nectar guides. Apart from color differences, it is more slender than *M. villosa* and has closer set outer tepals with darkly bearded claws 8(–10) mm long and relatively short filaments 2–3 mm long. *Moraea villosa* has purple, rarely pink, orange or cream colored flowers with large dark nectar guides and contrasting yellow tepal claws 8–12 mm long, and filaments ca. 5 mm long.

The dark colored beard on the outer tepal claws of *Moraea calcicola* is reminiscent of *M. loubseri* (Goldblatt, 1976b), which has outer tepals with a heavy beard covering tepal claws and part of the limb as well. This similarity may indicate a close relationship between these two species. Both *M. calcicola* and *M. loubseri*, are diploid species,  $2n = 12$ , and have very restricted ranges along the western Cape coast in the Saldanha Bay district. *Moraea calcicola* occurs on the low hills above the town of Saldanha Bay, and grows among limestone rocks. *Moraea loubseri*, now probably extinct in the wild, is known only from a single granite hill near Langebaan, a short distance to the south of Saldanha Bay. *Moraea villosa* is a much more widespread western Cape species. It occurs in flats and mountain slopes between Piketberg in the north to Gordons Bay in the south, and extends inland to Gydo Pass near Ceres. The several populations of subspecies *villosa* examined cytologically are polyploid,  $2n = 24$ , while the local subspecies *elandsmontana*, is like *M. calcicola*, diploid,  $2n = 12$ .

SOUTH AFRICA: Cape 3217 (Vredenburg) hills above Saldanha Bay, among limestone rocks (DD), Goldblatt 4118 (BR, E, K, MO, NBG, PRE, S, US, WAG).

7. *Moraea villosa* subsp. *elandsmontana* Goldbl. subsp. nov. TYPE: South Africa, Cape, S of Gouda at foot of Elandskloof Mts. on farm Elandsberg, Goldblatt 6202 (MO, holotype, K, NBG, PRE, S, isotypes).—FIG. 6.

Hic differt a subspecies villosa colore aurantiaco vel albo, macula lunari atrocaerulea in base limbis tepalorum exteriorum, tepalis exterioribus ascendentibus et numero diploideo chromosomatum  $2n = 12$ .

Plants like *Moraea villosa* in vegetative characteristics, but stem usually simple. Flower bright orange with navy blue nectar guide at base of outer tepal limb; outer tepals 28–31 mm long, claw 8–11 mm, limb ascending, not horizontal, margins curving upward; inner tepals also orange, ca. 21 mm long. Filaments 4–5 mm long, free in upper 1 mm; anthers ca. 7 mm long. Ovary 7–10 mm long; style branches ca. 6 mm long, orange or white, crests ca. 5 mm. Chromosome number  $2n = 12$  (Goldblatt 6202).



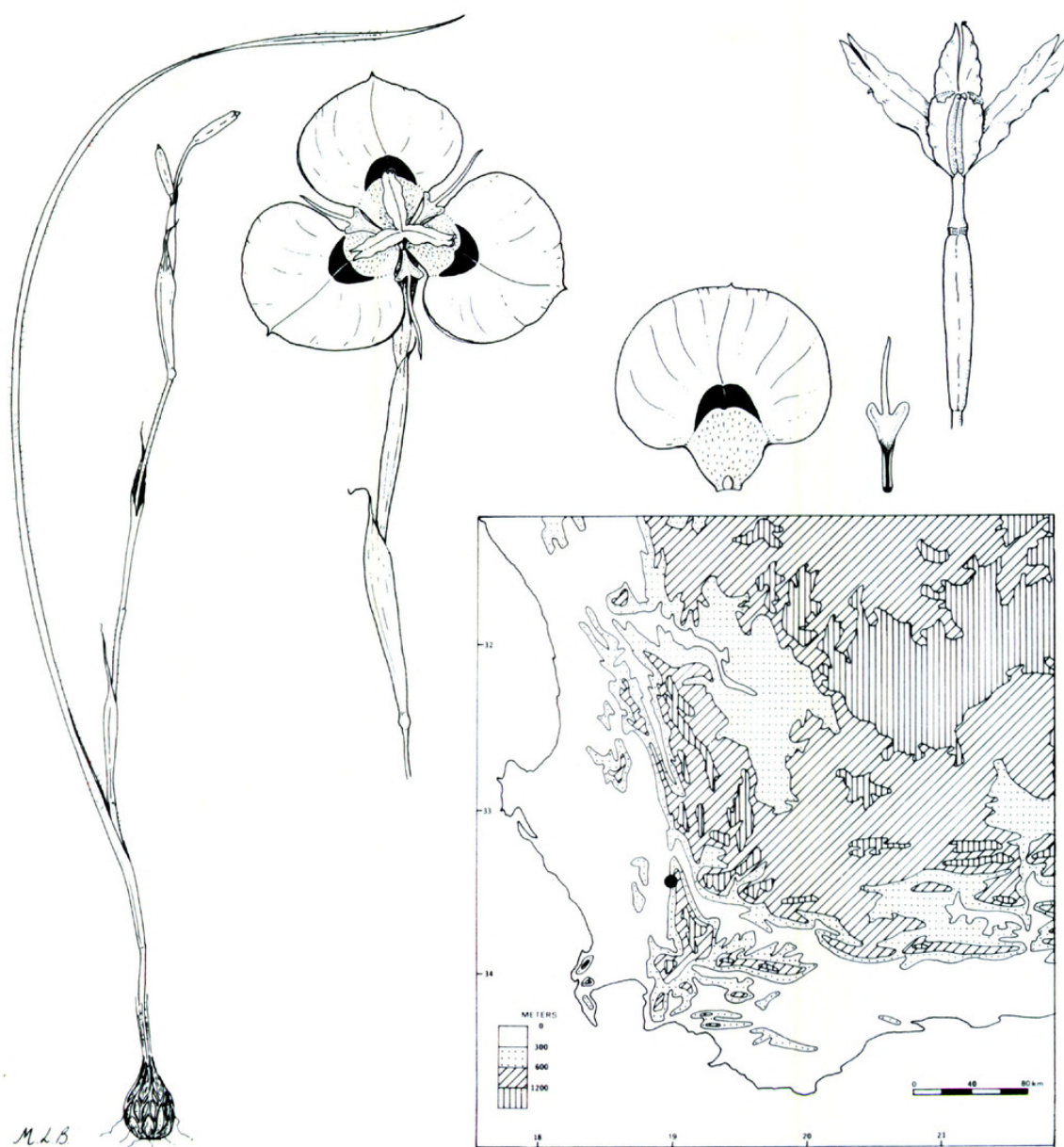


FIGURE 6. Morphology and distribution of *Moraea villosa* subsp. *elandsmontana*. Habit  $\times 0.5$ ; flower, spathes and tepals  $\times 1$ ; detail of ovary, stamens, and style branches  $\times 1.5$ .

Flowering time: September.

Distribution: local, at the foot of the Elandskloof Mts., in very stony sandstone soil in fynbos.—Fig. 6.

*Moraea villosa* is one of the more common and widespread of the group of species known as peacock moraeas for the large, conspicuous eye-like nectar guides on very broad outer tepals. It ranges from the Piketberg Mts. and upper Olifants River Valley in the north to Gordons Bay in the South, with extensions inland through the Tulbagh Valley to Ceres and Gydo Pass. It is believed to be tetraploid,  $2n = 24$  throughout its range, as is the related *M. tulbaghensis*.

The subspecies *elandsmontana* of *M. villosa* described here has most of the



attributes of *M. villosa*, but it differs sharply in its bright orange flower color. The flowers are also a little unusual for *M. villosa* in having a relatively small, dark nectar guide, and in having the outer tepals ascending and with upcurved margins. More often the tepals of *M. villosa* are flat and horizontal to slightly reflexed, although forms with slightly ascending tepals do occur. The flowers of *M. villosa* are usually shades of blue or purple, or occasionally whitish or even pink.

It is however, the diploid chromosome number of  $2n = 12$ , in contrast to the tetraploid level  $2n = 24$  of other populations of *Moraea villosa*, that sets subsp. *elandsmontana* apart rather than its unusual flower color and minor tepal differences, which alone would not merit taxonomic recognition. Subspecies *elandsmontana* is known only from Elandsberg farm at the foot of the Elandskloof Mts. south of Gouda. It is locally common on gently sloping rocky sandstone ground. Presently it is under protection because it grows in a portion of Elandsberg farm set aside by the owner Dale Parker as a nature reserve. The typical subspecies of *M. villosa* also occurs on Elandsberg, not far from the populations of subspecies *elandsmontana* but in a different habitat, on richer and deep sandy to clayish soils.

SOUTH AFRICA: Cape 3314 (Worcester) foot of Elandskloof Mts. on farm Elandsberg, S of Gouda (AC), Goldblatt 5854 (MO), 6202 (K, MO, NBG, PRE, S), Burgers 1233 (MO); Elandsberg Nature Reserve, foot of Elandskloof Mts., 4 km N of Bosplaas, Burghers 2802 (STE).

#### SUBGENUS *GRANDIFLORA*

#### 8. *Moraea robusta* (Goldbl.) Goldbl. comb. nov.

*Moraea galpinii* subsp. *robusta* Goldbl., Ann. Missouri Bot. Gard. 60:248. 1973. TYPE: South Africa, Natal, Naauwhoek, Utrecht distr. *Devenish 109* (PRE, holotype).

A recent collection and photographs of this plant from the type locality made by O. M. Hilliard and B. L. Burtt, 9153, have provided new information about its morphology and relationships. In 1973 in my revision of *Moraea* in the summer rainfall areas of southern Africa (Goldblatt, 1973) I treated it as a subspecies of the better known *M. galpinii*. This is a very short species 15–30 cm tall, having moderate-sized, bright yellow flowers with erect inner tepals (Obermeyer, 1970). Its leaves are evidently terete but actually are narrow with margins tightly inrolled and narrow adaxial groove. The leaf is very long, but often dying back, or absent, on flowering plants, but the new season's leaves may be present in a clump of plants, and, if so, are often quite short. *Moraea galpinii* blooms before the onset of spring rains, from late July to October, and it grows in open grassland.

The subspecies *robusta*, when described, was believed to be similar in most respects, but with larger flowers of pale yellow to white color, wider leaves with less tightly inrolled margins, and possibly later blooming.

The specimens collected by Hilliard and Burtt in early November confirm my previous observations on larger size and paler flower color, but the photographs of the flower indicate that the inner tepals are flaccid and spreading rather than being held stiffly erect. This difference is important because all other species of subgenus *Grandiflora* have erect inner tepals, and it now seems desirable to raise subspecies *robusta* to species rank.



*Moraea robusta* shares with *M. galpinii* the very characteristic mass of dark fibers accumulated round the base of the plants and it seems likely that the two species are closely related despite floral differences. The usual flowering time of *M. robusta* is mid-October to November but a sheet collected by Thode, A363, has the vague date "Aug., Sept. 1924," which, if correct, suggests much earlier blooming in some populations. The amended description is as follows:

Plants 30–40 cm high. *Corm* covered by dark densely matted fibers. *Leaf* 4–10 mm wide, margins incurved, exceeding stem, and often dead above. *Stem* with 3 overlapping stem bracts. *Spathes* 10–11 cm long, outer  $\pm \frac{2}{3}$  the length of inner. *Flower* pale yellow to white, tepals spreading horizontally when fully open; *outer tepals* 5.5–6.5 cm long, limb 4 cm long and to 2.6 cm wide; *inner tepals* 5.5–5.7 cm long. *Filaments* 10–11 mm long, free in upper half, *anthers* ca. 10 mm long. *Ovary* ca. 15 mm, *style branches* 15 mm, *crests*  $\pm 15$  mm.

Flowering time: (?Aug.–Sept.) Oct.–Nov.

Distribution: high altitude grassland, SE Transvaal, N Natal, E Orange Free State, and Transkei.

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