
Additions to *Gladiolus* (Iridaceae) in the Flora Zambesiaca Region: The New Species *G. metallicola* and the Reinstatement of *G. mosambicensis*

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ABSTRACT. New fruiting collections made since the publication of an account of Iridaceae for *Flora Zambesiaca* in 1993 show that spring-flowering plants until now referred to *Gladiolus crassifolius* Baker are better treated as a separate species, the earliest name for which is *G. mosambicensis* Baker. It is distinguished by the slightly smaller flowers, dry, obtuse floral bracts, and round, broadly winged seeds; *G. crassifolius* has green, acute bracts and wedge- to pear-shaped seeds with the wing fully developed at one or both ends but not on the sides. In addition, plants from northern Zimbabwe provisionally referred to *G. permeabilis* subsp. *edulis* (Burchell ex Ker Gawler) Obermeyer in the *Flora Zambesiaca* account of the genus do not belong in this species and are here described as *G. metallicola* Goldblatt. This plant, a member of section *Hebea* (Persoon) Benth. & Hooker f., remains known from one collection from the Great Dyke in Lomagundi District. *Gladiolus* L., the largest genus of the Iridaceae in the flora, now has 39 species in the Flora Zambesiaca region alone, and a total of 254 species worldwide.

Key words: *Gladiolus*, Iridaceae, IUCN Red List, Mozambique, Zimbabwe.

One of the two largest genera of the Iridaceae, *Gladiolus* L. comprises over 250 species, mostly of sub-Saharan Africa, but with some 10 species in Europe and the Middle East. The center of the genus is southern Africa where 165 species occur, but over 80 species are recorded in tropical Africa. Of these, 37 species were recorded in the countries that make up the Flora Zambesiaca region: Botswana, Malawi, Mozambique, Zambia, and Zimbabwe. In my accounts of the genus in *Flora Zambesiaca* and for all of tropical Africa (Goldblatt, 1993, 1996), *G. crassifolius* Baker was broadly circumscribed to include early spring-blooming plants of eastern Zimbabwe and adjacent interior Mozambique, as well as those that flower in the late summer and autumn and that occur over the entire range of the species, from eastern South Africa to Tanzania. New collections that have come to hand make it clear that the spring-blooming

plants referred to *G. crassifolius* have different seeds, and this combined with their slightly smaller flowers, obtuse, dry floral bracts, shorter stature, and often emergent leaves at flowering time indicates that they are better treated as a separate species. Two names are available in the literature for the species, the earlier one being *G. mosambicensis* Baker. I provide a formal description below and detail its difference from *G. crassifolius*.

A second species of *Gladiolus*, known from just one gathering in northern Zimbabwe, was provisionally referred to as *G. permeabilis* subsp. *edulis* (Burchell ex Ker Gawler) Obermeyer, with a brief note listing its differences from that species. No additional collections of this plant have been made, but it has become clear that it represents a novelty. I had hoped to re-collect the species and study living plants, but this eventuality is now unlikely. I describe the species here as *G. metallicola* Goldblatt.

- 1. *Gladiolus metallicola* Goldblatt, sp. nov.** TYPE: Zimbabwe. Mashonaland West: Lomagundi District, Great Dyke, among rocks on summit ridge, 8 Apr. 1981, D. Philcox & T. Muller 9079 (holotype, K; isotype, SRGH).

Haec species *Gladiolo permeabili* D. Delaroche primo aspectu similis, sed foliis marginibus costisque incrassatis, floribus minoribus, tubo perianthii ca. 10 mm longo, tepalo dorsali ca. 16 mm longo, apicibus attenuatis nullis, antheris ca. 4–5 mm longis et stylo brevi infra apices filamentorum diviso.

Geophyte 45–50 cm tall; *corm* probably globose, ca. 15 mm in diam., tunics of dark brown, fairly fine, netted fibers; *stem* branched, enclosed by leaf sheaths to the base of the spike. *Leaves* 5 or 6, the lower 2 with well-developed sublinear blades about as long as the stem, 2–6 mm wide in the middle, the margins and central vein heavily thickened and 2 or 3 secondary veins present between them, hyaline when dry, upper 3 or 4 leaves largely to entirely sheathing, the sheaths with membranous or dry, light brown margins. *Spike* secund, with 10 to 15 flowers, slightly flexuose; bracts

soft-textured, pale green, becoming dry and light brown in the upper half, the outer ovate, (9–)10–12 mm, the inner 1–2 mm shorter, rounded apically or notched at the tip. *Flowers* pale blue-lilac, the tepals marked dark red in the midline; *perianth tube* obliquely funnel-shaped, ca. 10 mm; tepals unequal, the dorsal largest, ca. 16 mm long, widest in the upper third, narrowed and claw-like in the lower third, arching forward over the stamens and style, upper lateral and lower tepals joined together for 2–3 mm forming a lower lip, ca. 10 mm, tapering below to a narrow grooved claw ca. 3 mm; *filaments* arching beneath the dorsal tepal, ca. 10 mm; anthers 4–5 mm, evidently purple; *ovary* ovoid, ca. 3 mm; style arching over the filaments, dividing between the base and middle of the anthers, the branches spreading, ca. 2 mm. *Capsules* and *seeds* unknown.

Distribution, habitat, phenology, and etymology. *Gladiolus metallicola* is named for the heavy-metal-enriched soils and rocks of the Great Dyke of Zimbabwe. We assume the species is an endemic of these specialized soils, which would explain its rarity in a relatively well-collected country like Zimbabwe. Plants flower fairly late in the season, in April, and probably, given the advanced state of flowering in the type collection, also in March.

IUCN Red List category. Conservation status of *Gladiolus metallicola* is uncertain as the species is known from a single gathering. This, combined with its specialized habitat in a country relatively well known botanically, makes it clear this is a rare species. I suggest Near Threatened (NT) status, following the IUCN Red List conservation categories (IUCN, 2001). The extremely narrow range and occurrence on mineral-enriched soils, likely at some future date to be the focus of mining activities, prompt this decision, but I have no personal experience of this plant in the field.

Discussion. In general aspect, *Gladiolus metallicola* most closely resembles the southern African *G. permeabilis* and, in particular, subspecies *edulis*. This species, the most widespread member of section *Hebea* (Persoon) Benth & Hooker f. of *Gladiolus* (Goldblatt, 1996), extends from the southern tip of South Africa to Namibia and Zimbabwe, with subspecies *edulis* extending across summer-rainfall southern Africa and subspecies *permeabilis* restricted to the winter-rainfall zone in the southwest of the subcontinent (Goldblatt & Manning, 1998). The narrow, whip-like leaf blades are a distinctive feature of *G. permeabilis* and other members of the informal series *Permeabilis* (Goldblatt & Manning, 1998). The central vein and the central portion of the linear

leaves are thickened, whereas the margins are usually barely raised and secondary veins are not evident. In general, the leaf margins of most species of series *Permeabilis* are not thickened. Leaves of *G. metallicola*, with their thickened margins and central veins (they are hyaline and conspicuous when dry), thus stand out in section *Hebea*. The other distinctive feature of section *Hebea* are the tepals, which are typically narrowed into claws below, such that in profile one can see through the resulting gap between the narrowed tepals. *Gladiolus metallicola* has basally narrowed tepals and appears to conform to this windowed condition. Other identifying features of section *Hebea* reside in the corm tunics, capsules, and seeds, lacking in the one collection of *G. metallicola*.

The general similarity in appearance of *Gladiolus metallicola* to *G. permeabilis* subsp. *edulis* is, in fact, superficial, for not only do the leaves differ markedly in their prominently thickened margins, but the flowers are smaller and lack the tapering attenuate tips of the tepals. Flowers of *G. permeabilis* subsp. *edulis* are cream, flushed purple outside, relatively large, with the dorsal tepal 28–35 mm long and anthers 6.5–9 mm long. This is substantially larger than in *G. metallicola*, which has a dorsal tepal ca. 16 mm long and anthers 4–5 mm long. An odd feature of *G. metallicola* is the short style that divides between the base and middle of the anthers, whereas in most *Gladiolus* species the style reaches the tips of the anthers. Additional collections of the species are needed to confirm the features recorded here and to substantiate my decision to treat the collection as a new species of section *Hebea*, and to confirm that the corm tunics and capsules conform to the section.

2. *Gladiolus mosambicensis* Baker, Fl. Trop. Afr. 7: 576. 1898. TYPE: Mozambique. [Sofala Province:] “Beira,” s.d., A. J. Braga 117 (holotype, B).

Gladiolus gazensis Rendle, J. Linn. Soc., Bot. 40: 210. 1911. TYPE: Zimbabwe. Chimanimani (Melssetter), 1800 m, 23 Sep. 1907, Swynnerton 779 (lectotype, designated by Goldblatt, 1993: 70, BM; isotype, K).

Plants 30–40 cm tall, sometimes with multiple stems; *corm* 18–30 mm in diam., tunics coarsely fibrous; *stem* sometimes simple, or up to 5-branched. *Leaves* evidently 3 or up to 5, dry at flowering time, often scorched by fire, or new leaves emerging; blades narrowly sword-shaped, as long or longer than the spike, 2–6 mm wide, the margins and central veins heavily thickened. *Spike* with 10 to 15 flowers, branches with fewer; bracts (9–)12.5–15 mm, ca. half

the length of one internode, evidently partly dry at flowering, subacute, obtuse, or obtuse-apiculate; inner bracts slightly shorter, usually obtuse, sometimes emarginate. *Flowers* pale to deep pink or light purple, the lower lateral and sometimes the lowermost tepal each with a dark band of color across the lower half of the limb, presence of scent unknown; *perianth tube* obliquely funnel-shaped, cylindric below, widening and curving outward in upper half, 8–9 mm; *tepals* unequal, the dorsal largest, broadly ovate, arching over the stamens and style, 16–18 × 7–8 mm, the upper laterals directed forward and curving outward above, the lower 3 tepals \pm straight and directed downward, united below for ca. 4 mm, narrowed into claws below, the lower laterals 10–13 × ca. 5 mm, the lower median 8–10 × ca. 4 mm; *filaments* ca. 10 mm, exerted 6–7 mm from tube; *anthers* 6–8 mm, evidently white to yellow; *style* arching over the filaments, usually dividing between the base and lower third of the anthers, the style branches 2.5 mm. *Capsules* obovoid, 12–16 mm, 3-lobed above and retuse; *seeds* ovate, broadly winged, 5–7 × 4–5 mm, the wing translucent or flushed light brown.

Discussion. One of the most widespread species of *Gladiolus*, *G. crassifolius* extends from southwestern Tanzania through Malawi, eastern Zimbabwe, and interior Mozambique to Eastern Cape Province of South Africa (Goldblatt & Manning, 1998). As currently circumscribed, the species includes populations of plants flowering in late summer and autumn, mainly February to April, but as late as June in tropical Africa. These plants are generally relatively tall and have pink to purple flowers on a many-flowered, inclined spike borne above a fan of several lanceolate to sword-shaped leaves. A second series of populations, restricted to Zimbabwe and adjacent interior Mozambique, flowers in spring, mainly from mid-September to mid-November, but sometimes as early as August. These plants flower before the narrowly sword-shaped foliage leaves have fully emerged (Goldblatt, 1993) and often have a shorter, more highly branched stem. My provisional hypothesis was that the early-blooming plants were stimulated to flower precociously by grassland fires, which are common in late winter and spring, when dry grassland is often deliberately set ablaze before the rains to stimulate growth of new pasture. Fire stimulates flowering in many geophytic plants, and I thought it might promote precocious flowering in *G. crassifolius*. Flowering twice in a year is unknown in other species of *Gladiolus* and is not reported in the species elsewhere across the range of *G. crassifolius*.

I have now received fruiting material of plants conforming to the early-flowering plants of *Gladiolus*

crassifolius, and the capsules and seeds do differ significantly from those of the summer–autumn-flowering plants. The latter have capsules 9–12(–14) mm long and wedge- or more or less pear-shaped seeds ca. 4 × 2–3 mm with the wing developed only on one half of the seed, whereas the spring-flowering plants have capsules 12–16 mm long and broadly winged, and oval to round seeds 5–7 × 4–5 mm. The fruit and seed differences have prompted a reappraisal of the spring-flowering *G. crassifolius*. The more lax spikes, slightly smaller flowers, shorter, usually obtuse bracts, and narrow leaves now assume more significance and, taken in combination with the fruit differences, make it seem reasonable to treat the spring-flowering plants as a separate species, *G. mosambicensis* Baker, until now treated as a synonym of *G. crassifolius*.

Apart from the early flowering time, the differences between *Gladiolus mosambicensis* and *G. crassifolius* include a flowering stem with up to four branches, floral bracts with rounded apices and 9–15 mm long, always shorter than the internode above it, and pink to purple flowers somewhat smaller than those of *G. crassifolius*. Its flowers have a perianth tube 8–9 mm long, a dorsal tepal 16–18 mm long, and anthers 6–8 mm long. Perhaps even more significant, the capsules are 12–16 mm long, and the seeds are rounded, 5–7 × 4–5 mm, and have a fully developed wing around the seed body. *Gladiolus crassifolius* normally has stems bearing one or rarely two branches and firm, acute, usually entirely green, acute bracts 9–12(–14) mm long, always somewhat longer than an internode, a perianth tube 12–17 mm long, dorsal tepal 18–22 mm long, and anthers 7–8 mm long. The capsules are 9–12 mm long and the seeds are wedge- to pear-shaped to oval, ca. 4 × 2–3 mm, with the translucent or light brown wing well developed at one or both ends but not on the sides. An illustration of *G. mosambicensis* is available in Plowes and Drummond's (1976) handbook, *Wild Flowers of Rhodesia*, pl. 37. Color and pen-and-ink illustrations of typical *G. crassifolius* can be found in Goldblatt and Manning (1998).

Because the type collection of *Gladiolus mosambicensis* has no date or a precise locality, I have tried to determine where the collector, A. J. Braga, might have collected the type of the species, said to have come from Beira, in central coastal Mozambique, where the plant does not occur. According to information provided by G. V. Pope, Braga traveled from Beira to Mozambique Island in 1895 and returned via Quelimane and the lower Zambezi before passing through the Gorongosa highlands where *G. mosambicensis* has been collected several times. He must have collected what was later named *G. mosambicensis*

there, presumably late in the year. Unfortunately, I have not been able to find more precise dates of Braga's itinerary, but it now seems likely that the type locality is the Gorongosa region of interior Mozambique.

Specimens examined. MOZAMBIQUE. **Manica e Sofala:** Gorongosa Mtns., 1000 m, *Torre & Pereira 12476* (LISC); Gorongosa Mtns. near Morombodzi Falls, *Mendonça 2455* (BM, C, LISC, MO); Gurué, toward Namuli, *Andrada 1860* (COI, LISC). ZIMBABWE. **Manicaland:** Nyanga, Mt. Inyangani, S end of Nyazengu Ridge, *Pope & Muller 1702* (MO, SRGH); Nyanga, Inyanga Downs, dry hillside, *Biegel 246* (MO, SRGH); Chimanimani, Pork Pie [near Chimanimani (Melsetter)], *Munch 321* (MO, SRGH), *Davies 2261* (MO, SRGH); Chimanimani, Rocklands, Melsetter, *Chase 2291* (MO, SRGH); Chimanimani, Mtare, hill near Mozambique border, *Chase 7178* (BM, EA, K, LISC, SRGH); Chimanimani, near Mtare, Oct. 1996 (fr), *Plowes s.n.* (MO). **Mashonaland East:** Makoni, near Headlands, *Plowes 2118* (K, SRGH). **Masvingo:** Zimbabwe Distr., Great Zimbabwe, *Fries, Norlindh & Weimarck 2066* (BM, BR, LD, S). **Midlands:** Bikita Distr., summit of Mt. Buhwa, *Biegel, Pope & Gosden 4333* (C, MO, SRGH, WAG).

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