



A new, narrowly endemic species of *Blumenbachia* (Loasaceae subfam. Loasoideae) from Brazil

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Abstract

The genus *Blumenbachia* is restricted to Southern South America and comprises 10 species. Within that genus, monophyletic *B. sect. Blumenbachia* is a clearly delimited group of four previously known species. Here, a new species from Minas Gerais, Brazil, is described. *Blumenbachia amana* differs from the known species in ovoidal (versus spherical) capsules and in the unique combination of the inflorescence characters of *B. insignis* with the leaf morphology of *B. latifolia*, while approaching the flower size of *B. catarinensis*. Like all its close allies, the new species is facultatively autogamous, but pollinated by a highly specialized pollinator in the wild. It is geographically isolated from the other species and only known from two collections sites.

Key words: Loasaceae, *Blumenbachia*, Brazil, new species

Introduction

The delimitation of the genus *Blumenbachia* Schrad. (1825: 1705) is not entirely undisputed and some species are occasionally assigned to the genus *Caiophora* C.Presl (1831: 41)(Urban 1889, Urban & Gilg 1900, Sleumer 1955, Weigend 1997). The taxonomical core is, however, undisputedly, *Blumenbachia* sect. *Blumenbachia*, including four species which have consistently been considered as belonging to *Blumenbachia* (Urban & Gilg 1900, Sleumer 1955, Perez-Moreau & Crespo 1988). The type species, *Blumenbachia insignis* Schrader (1825: 1706), was quickly followed by *B. latifolia* Cambessèdes (1829: 209). Urban & Gilg (1900) recognized a total of four species, a number that had not changed until recently (Weigend 1997, 2010, Weigend *et al.* 2008). The four species range from central and northern Argentina to S Brazil with two wideranging species, *B. latifolia* and *B. insignis*, and two narrow endemics, *B. catarinensis* Urban & Gilg (1900: 355) in Santa Catarina, Brazil, and *B. hieronymi* Urban (1884: 249) in Córdoba, Argentina (Weigend 2010, Weigend *et al.* 2008). This species group is morphologically quite homogeneous and unique in the family with its axillary, one-flowered peduncles with a pair of narrowly ovate bracts adnate to the calyx tube, its twisted capsules with fleshy and later spongy fruit walls falling into 10 segments upon maturity, its irregularly undulate, fibrous seed coat and its opposite, triangular-ovate to trifoliolate leaves with palmate leaf veins. All species are annual or winter-annual and are soft-stemmed, decumbent, erect or winding herbs. Closely allied *Blumenbachia* sect. *Gripidea* Urban (1889: 213) is easily differentiated based on its scandent habit, thin fruit walls, several-flowered inflorescences and winged seeds.

Members of the genus *Blumenbachia* and most species of Loasaceae have complex floral morphology (Fig. 1B,C, F–H) and function (Ackermann & Weigend 2006, Henning & Weigend 2013) and often highly specialized pollination modes. This is particularly true of *Blumenbachia* (Wittmann & Schlindwein 1995, Schlindwein 2000), and the new species here presented was discovered in the course of studies on pollination ecology (C. Schlindwein & S. Oliveira unpublished data). The four known species of *Blumenbachia* sect. *Blumenbachia* are all readily differentiated from each other (Weigend 1997), as is the new species here described as a fifth species of this group.

Key to the species of *Blumenbachia* sect. *Blumenbachia*

Fruits subglobose, externally with 10 deep grooves falling into 5 narrow and 5 wide segments at maturity, capsule walls thick and succulent, spongy when dry; flowers single, axillary, prophylls narrowly ovate to linear and adnate to the base of the flower, all internodes +/- equally long (*Blumenbachia* sect. *Blumenbachia*).

- 1 Flowers subsessile, pedicel much shorter than petiole of subtending leaf; petals half-spreading ($<180^\circ$) *B. latifolia*
1* Pedicel equalling or longer than petiole of subtending leaf; petals spreading to half-reflexed ($>180^\circ$) 2
- 2 Plant decumbent to trailing; leaves trifoliolate, all leaves usually shorter than 4 cm *B. catarinensis*
2* Plant erect from decumbent base, rarely trailing; at least lower leaves palmatifid with serrate lobes, or pinnatisect, longer than 4 cm 3
- 3 Leaves pinnatisect, sepals narrowly ovate, entire *B. insignis*
3* Leaves palmatifid, sepals widely ovate to deltate, margin serrate 4
- 4 Leaf margins lobulate to coarsely serrate, lateral lobes diverging $\leq 45^\circ$ from central lobe, petals ≥ 10 mm long, capsules spherical...
..... *B. hieronymi*
4* Leaf margins irregularly and shallowly serrate, lateral lobes diverging $>45^\circ$ to central lobe, petals <10 mm long, capsules ovoidal *B. amana* sp. nov.

Taxonomic Treatment

Blumenbachia amana T.Henning & Weigend, sp. nov. (Fig. 1A–D, F, I)

Type:—Brazil. Minas Gerais: Gonçalves, between the town of Gonçalves and the village of Cantagalo, Mantiqueira mountain range, 1600 m, 22°41'15"S 45°54'01"W, 10 February 2013 (flowering and fruiting), C. Schindwein & S. Oliveira 1989 (holotype BHCB 162877!, isotypes B 10 0610559!, BONN!).

Diagnosis:—*Blumenbachia amana* is similar to *B. latifolia* and *B. catarinensis* but differs from the former by having longer pedicels and spreading petals and from the latter in having shallowly dentate vs. crenate leaves. Its ovoidal fruits with alternating narrow and low, and wide and elevated ridges differentiate *B. amana* from all other taxa of sect. *Blumenbachia* that share spherical capsules with narrow and wide ridges of the same height.

Description:—Trailing to ascending herb 30–50 cm tall. Stem quadrangular, 2–3 mm thick at base, sparsely covered with deflexed scabrid trichomes 0.15–0.2 mm long, densely covered with glochidiate trichomes <0.05 mm and very few scattered setae 0.75–1.5 mm long. Leaves opposite and decussate, broadly ovate in outline and deeply trilobate below to trifoliolate above, 2.5–5 cm long, 2–4.5 cm wide, petioles 1–3 cm long, lobes unequally bilobate, lateral lobes diverging $>45^\circ$ to central lobe, margins irregularly and shallowly dentate, apex acuminate, leaf base cordate, lamina membranaceous, adaxial surface sparsely set with very few short setae 0.75–1.5 mm long and scattered with scabrid hairs, 0.1 mm long, abaxial surface esetulose and densely set with glochidiate hairs <0.05 mm, 3 veins from base, lateral ones branching 2–3 mm from base. Flowers borne singly in apparently axillary position from reduced and displaced terminal inflorescences, deflexed, pedicels 2–4 cm long, 1–2 x as long as subtending leaf, with two tiny, linear bracts at base of ovary.

Calyx tube densely covered with glochidiate and scabrid trichomes and few setae, globose, 2–2.5 mm in diameter, calyx lobes persistent, widely ovate to deltoid, coarsely serrate, 2.5–3 mm long and 1.5–2 mm wide, acuminate, dorsally densely covered with scabrid hairs. Petals 5, spreading, white with greenish base, cymbiform, 8–9 mm long, 2–2.5 mm wide, unguiculate in lower third, then abruptly widened into two triangular teeth, apex hood-shaped. Nectar scales ovate, 1.5–2 mm long, 1.5 mm wide, base incurved, dorsally in lower third with three threads, these 1–1.5 mm long, scale neck recurved, margin densely papillose, scale crimson red at neck and apex then merging into yellow and green at base, sometimes white near to neck and laterally. The threads more or less resemble the colouration of the scales. Staminodia 2 per scale, 2.5 mm long, slightly twisted and widened basally, filiform above, sometimes bifurcate i.e. with one glabrous thread dividing in upper third, 0.75 mm long and exceeding the actual staminode, remainder of staminode densely papillose. Stamens in 5 epipetalous fascicles of 10–15 each, filaments 4–5 mm long, white, anthers 0.3–0.4 mm long and 0.2 mm wide, yellow. Ovary inferior, twisted, globose, 2 mm in diameter, with five intrusive-parietal placentae, ovules numerous, style filiform, papillose, 4–7 mm long, densely pilose. Capsule ovoidal, 10–12

mm long, 6–8 mm wide, deflexed on spreading pedicel 13–15 mm long, twisted, with 10 longitudinal ridges, five of them narrower and lower, five of them higher and wider and clearly elevated, very densely covered with glochidiate trichomes and a few setae, succulent when young, then drying to spongy texture, walls very thick and filled with a spongy parenchyma, opening with ten longitudinal sutures, seeds numerous, black, testa fibrous.

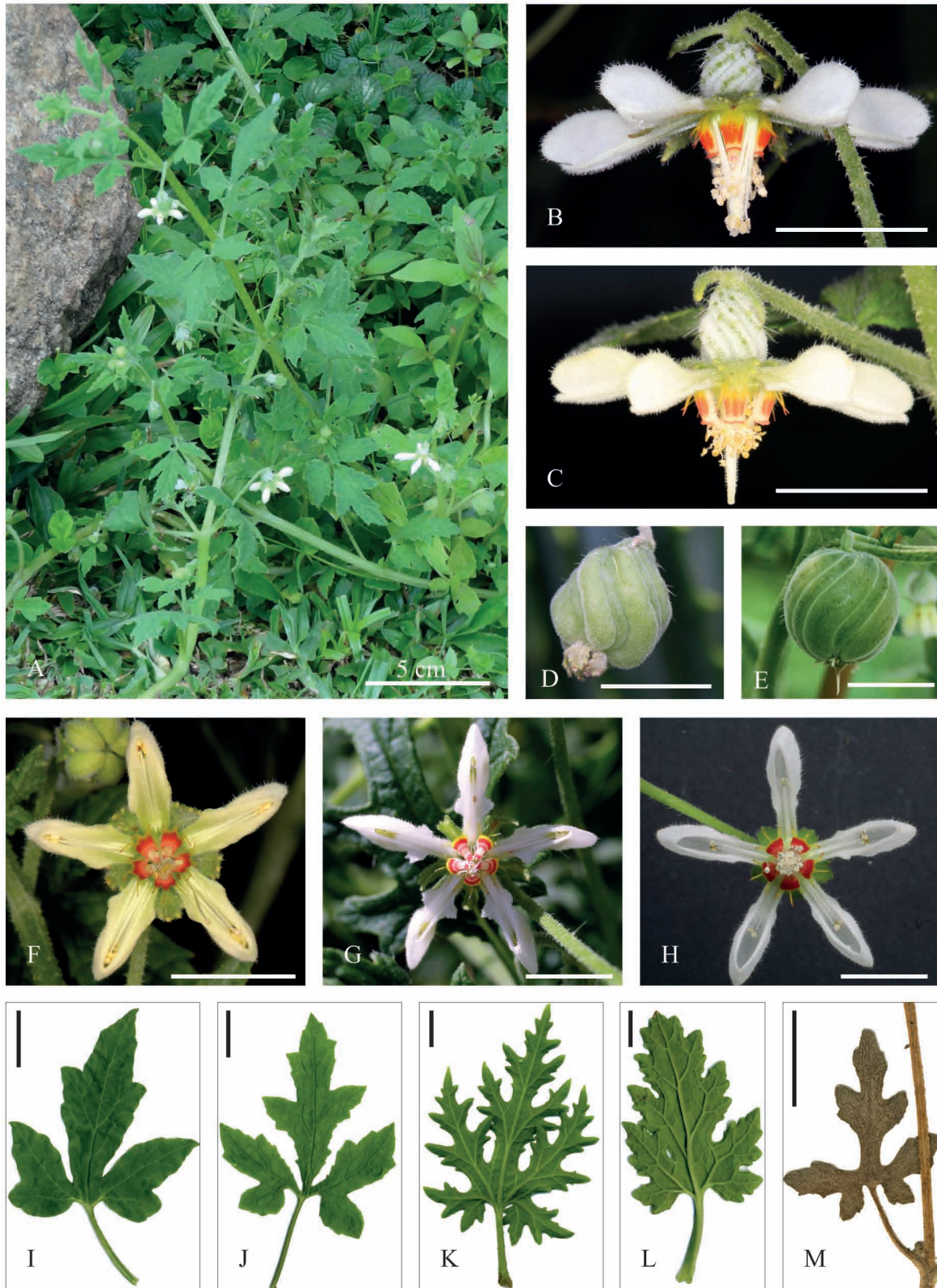


FIGURE 1. Species of *Blumenbachia* sect. *Blumenbachia*. A–D, F, I. *B. amana*. E, J. *B. latifolia*. G, K. *B. insignis*. H, L. *B. hieronymi*. M. *B. catarinensis*. A. Habit. B–C. Flower in lateral view. B. staminate phase. C. pistillate phase. D. Fruit showing the varying depth of the ridges. E. Smooth capsule as typical for *B.* sect. *Blumenbachia*. F–H. Flower in frontal view. I–M. Leaves. Scale bars = 1 cm if not otherwise indicated. (Credits: A–D, F: C. Schlindwein; E, H: M. Ackermann; G, M: T. Henning; I–L: M. Weigend).

Other Specimens Examined:—Brazil. Minas Gerais: Camaducaia, Serra da Mantiqueira, 10 February 2013 (flowering and fruiting), *C. Schlindwein & S. Oliveira 1985* (BHCB 161787!).

Affinities:—*Blumenbachia amana* shows some unique characters and combines some characters typical for other taxa of sect. *Blumenbachia*. It may be confused with *B. catarinensis* due to their altogether delicate habit (Fig. 1A), although *B. catarinensis* occurs in the states of Rio Grande do Sul and Santa Catarina, c. 1000 km further south, and shows trifoliolate, crenate leaves. It is also vegetatively indistinguishable from *B. latifolia*, especially in leaf morphology (Fig. 1I–M), but it clearly differs from that species in having much longer pedicels and spreading petals (Fig. 1B, C). The fruits of the new species are ovoidal and have 5 higher and 5 lower ridges (Fig. 1D), whereas the fruits of *B. latifolia* and the other three species are spherical and have all ridges of the same height, although differing in width (Fig. 1E). *Blumenbachia amana* is also superficially similar to *B. hieronymi*, but can be easily distinguished from this taxon by leaf morphology (Fig. 1I, L) and smaller flowers (Fig. 1F, H).

Habitat:—The species generally grows on humid soils, rich in organic material, in surroundings of mixed *Araucaria*-forest (*Araucaria angustifolia*) within the high altitude domain of the Atlantic Rainforest, in forest clearings, along streams, in humid depressions and in step-protected parts within pastures.

Distribution:—The new taxon is so far only known from two locations at the northern slope of the Mantiqueira mountain range in the state of Minas Gerais, South-Eastern Brazil, one close to Gonçalves and another in the vicinity of Camaducaia, some 25 km further west.

Etymology:—The epithet “amana”, from the Indian Tupi language, means rain; together with the term “tykyra”, meaning “drip” in Tupi, it has formed the Portuguese word “mantiqueira”, which means “where rain drips” or “crying mountain” (Chiaradia 2009). This is the name of the mountain range spanning the states of Minas Gerais, São Paulo and Rio de Janeiro, where the species was discovered. The indigenous people who inhabited the region may have been motivated to use this name due to the great number of cascades and small waterfalls that run down the slopes of the “Serra da Mantiqueira” and the high precipitation in the area. The word “amana”, thus, refers both to the indigenous name and to the climatic conditions of the region.

Ecology and Conservation:—Like many Loasoideae, *Blumenbachia amana* shows a complex floral morphology and pollination biology with induced stamen movements, pollen partitioning and pollination by oligolectic pollinating colletid bees, here *Actenosigynes mantiqueirensis* Silveira (2009: 17), Colletidae, Neopasiphaeinae. The interaction of these plants with their specialized pollinators guarantees cross pollination by enforcing multiple repeated visits by the bees. The close relationship of the new plant species with the also recently described bee indicate a high degree of reproductive dependence of both taxa, which has to be taken into account in conservation biology. However, the specialization appears to be asymmetrical, since the plant shows full fruit and seed set under pollinator exclusion in greenhouse experiments at Bonn (Weigend unpublished data), indicating that it follows the general pattern of facultative autogamy found in annual Loasaceae with specialized pollinators (Henning & Weigend 2013).

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