

# First record of *Aristolochia wankeana* (Aristolochiaceae, Piperales) from Brazil with a key to the species of *Aristolochia* subser. *Anthocaulicae* from the Brazilian Amazon

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## ABSTRACT

*Aristolochia* comprises about 450 species, occurring mainly in tropical regions. Here, we record for the first time *Aristolochia wankeana* in Brazil, specifically in two municipalities in the state of Amazonas (Presidente Figueiredo and Rio Preto da Eva). Previously, this species had only been recorded in Guyana and French Guiana. We provide the species description based on the new records, a preliminary extinction risk assessment, photographic plates, an updated geographic distribution map, ecological comments, and an updated key for species identification of *Aristolochia* subser. *Anthocaulicae* from the Brazilian Amazon.

**KEYWORDS:** cauliflory, flora of South America, Guiana Shield, lianas, Neotropical region

## Primeiro registro de *Aristolochia wankeana* (Aristolochiaceae, Piperales) no Brasil, com uma chave para as espécies de *Aristolochia* subser. *Anthocaulicae* da Amazônia brasileira

## RESUMO

*Aristolochia* possui cerca de 450 espécies, ocorrendo principalmente em regiões tropicais. Aqui registramos pela primeira vez *Aristolochia wankeana* no Brasil, especificamente em dois municípios do estado do Amazonas (Presidente Figueiredo e Rio Preto da Eva). A espécie havia sido anteriormente registrada apenas na Guiana e Guiana Francesa. Neste estudo, fornecemos a descrição da espécie com base nos novos registros, a avaliação preliminar do risco de extinção, pranchas fotográficas, um mapa de distribuição geográfica atualizado, comentários ecológicos, e uma chave atualizada de identificação das espécies de *Aristolochia* subser. *Anthocaulicae* da Amazônia brasileira.

**PALAVRAS-CHAVE:** cauliflora, Escudo das Guianas, flora da América do Sul, lianas, região Neotropical

*Aristolochia* L. is the largest genus of the family Aristolochiaceae (Piperales), with about 450 species distributed mainly in tropical regions (POWO 2023). In Brazil, the genus is represented by 85 species distributed across all phytogeographic domains, except the Pantanal (BFG 2024; Freitas et al. 2022). In the Brazilian Amazon, 37 species are known (BFG 2024).

The genus *Aristolochia* includes plants with climbing habit, herbs or shrubs, corky stems, alternate simple, petiolate or sessile leaves (with pseudostipules present

or absent), leaf blades with 3–7 primary veins, axillary cauliflorous and racemose inflorescences (pauciflorum or not), monochlamydeous gamosepalous flowers presenting utricle, tube and limb, capsular, usually cylindrical or fusiform fruits with numerous concave-convex or flat seeds (alates or not) (Freitas and Alves-Araújo 2017; Freitas et al. 2022).

Within the taxonomic groups of *Aristolochia* that occur in South America, 25 species are part of *Aristolochia* subseries *Anthocaulicae* F. González, which present inflorescences in

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ramiflorous or cauliflorous racemes, with internodes between the flowers reduced 5 mm, and flowers subtended by small bracts (González 1990; 1991). This subseries is distributed in the Amazon and Atlantic Forest, as well as in some countries of Central America (BFG 2024; POWO 2023). *Aristolochia wankeana* J. Freitas, F. González & Poncy is a representative of this subseries and was described in 2020, with known occurrences at that time in Guyana and French Guiana. It forms a species complex with *A. cornuta* Mast. and *A. iquitensis* O.C.Schmidt, both being distinguished by perianth analysis using geometric morphometry (Freitas et al. 2020). Recent collections in Amazonas state, Brazil, expanded the distribution of *A. wankeana* and here we present the first record of this species for Brazil, with a morphological description, taxonomic comments, an updated distribution map, high-resolution photographs and an updated identification key for the species that occur in the Brazilian Amazon.

Specimens of *A. wankeana* were collected in August 2019 and August 2023 in the municipalities of Rio Preto da Eva and Presidente Figueiredo, Amazonas state, Brazil, respectively. The climate in the region is tropical humid with no dry season (Sombroek 2001), of the type Af according to the Köppen-Geiger climate classification (Beck et al. 2018). The material was deposited in the INPA herbarium [acronym according to Thiers (2024, continuously updated)]. The species determination was based on Freitas et al. (2020). We used characters collected in the field and observed the material available in the herbarium. We also dissected the flowers stored in 70% alcohol. We obtained the measurements presented here through image analysis using the ImageJ software (Schneider et al. 2012).

We created a geographic distribution map of the known records of *A. wankeana* in the R environment, version 4.3.3 (R Core Team 2024), with the R packages *grid* (R Core Team 2024), *sf* (Pebesma 2018; Pebesma and Bivand 2023) and *tmap* (Tennekes 2018). We obtained the shapes of South American countries and Brazilian states by R packages *rnatuarearth* (Massicotte 2023) and *geobr* (Pereira and Gonçalves 2024), respectively. Based on the available records, we estimated the extension of occurrence (EOO) and the area of occupation (AOO) of the species using the GeoCAT platform (Bachman et al. 2011) to determine the preliminary conservation status of *A. wankeana* using the criteria of IUCN (2012).

***Aristolochia wankeana* J. Freitas, F. González & Poncy**  
(Figures 1 and 2)

**Type** – FRENCH GUIANA. Village de Saint-Elie, 4°50'0"N, 53°18'0"W, 120 m, 16 November 1998 (fl.), Poncy et al. 1160 (Holotype: P00187008!; isotypes: CAY014365!, NY!).

**Description** – Woody climbers with stems 0.5–0.8 cm in diameter, twigs with internodes 9–9.9 cm long. Pseudostipules absent. Petiole 4.2–5.3 cm long, pubescent; leaves obovate, 9.1–15.5 × 3–7.2 cm, chartaceous, adaxial surface glabrous,

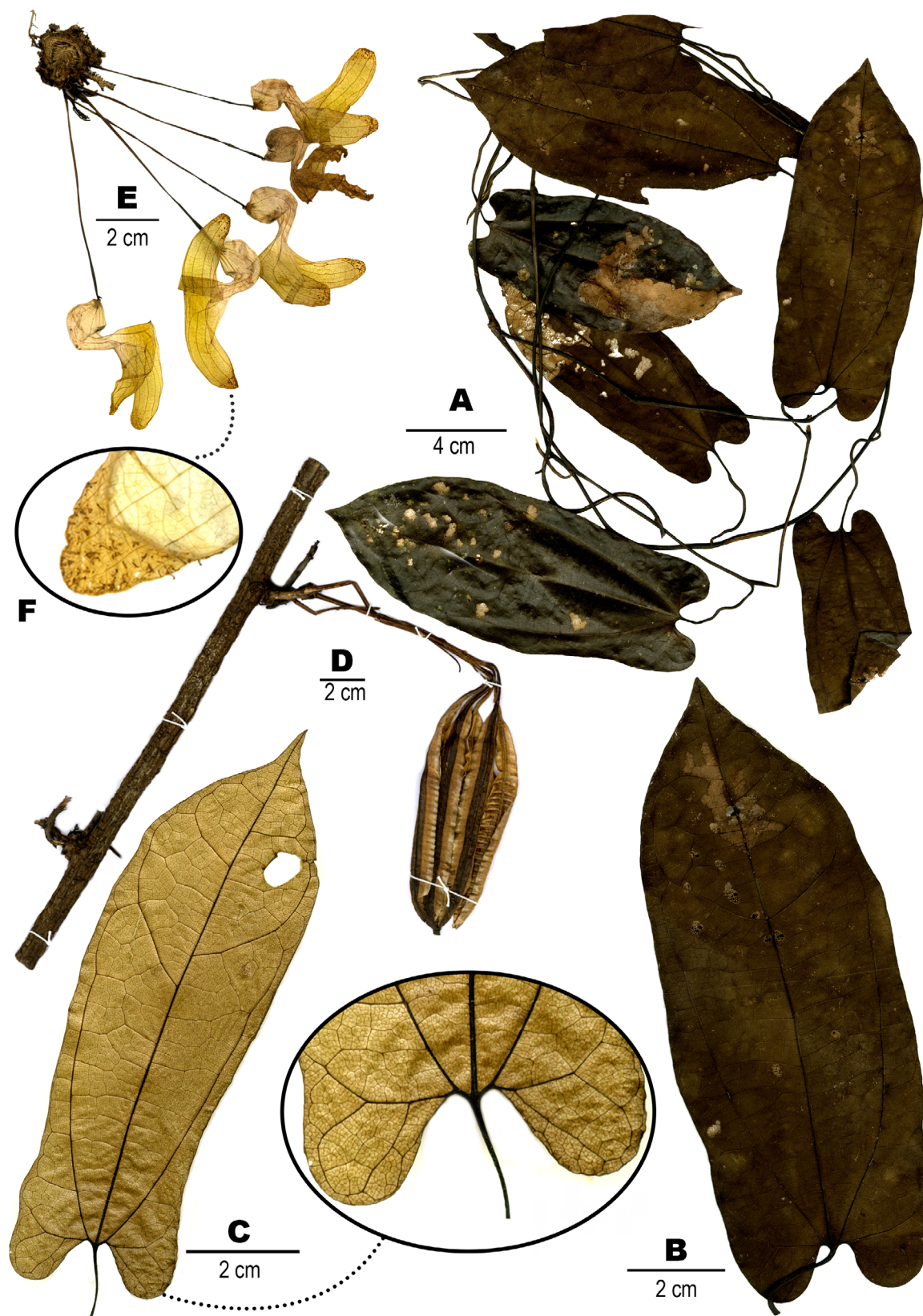
abaxial surface pubescent, lobed base, lobes with 1.3–1.7 cm of invagination, acuminate apex, basal primary veins 5. Inflorescences cauliflorous 13.6–14 cm long, ca. 20 cm above the ground, ca. 8 to 10 flowers. Peduncle 3–6.7 cm long, cream to yellowish perianth with vinaceous lines externally; utricle obovoid, 1.9–2 cm long; syrxinx 0.5–0.6 cm long, tube tapering, 1–1.2 cm long and 0.5–0.6 cm in diameter proximally, 0.6–0.7 cm in diameter distally; limb falcate, two oblong lateral lobes, 3.6–5.1 × 1–1.2 cm, stripes yellow with purple, adaxially fimbriated at the apex of the lobes, yellow fimbriae with purple apex, base of the limb emarginate, yellow with red trichomes at the entrance of the tube, apex obtuse. Gynostemium 6-lobed, 0.3–0.4 cm long; anthers ca. 0.2 cm long. Capsule mature dehiscent, 6-carpellate, ca. 9 × 2.7 cm. Seeds not seen.

**Material examined** – BRAZIL. Amazonas: Presidente Figueiredo, Balbina, Trilha da Sussuarana, 1°54'50"S, 59°24'36"W, 176 m, 27 August 2023 (fl.), Araújo, A.M. et al. 191 (INPA! [298855]); *ibid.*, 1°54'54"S, 59°24'32"W, 178 m, 28 August 2023 (fl.), Araújo, A.M. et al. 211 (INPA! [298875]); Amazonas: Rio Preto da Eva, BR-174, Parcelas do PDBFF, acampamento Porto Alegre, 2°22'11"S,



**Figure 1.** *Aristolochia wankeana*. A – habit; B – flower bud; C – flower; D – side view of flower with floral visitor; E – fimbriae; F – trichomes at the entrance to the flower tube; G – gynostemium and floral visitor *Megaselia scalaris*; H – floral visitor *Megaselia scalaris*. Credits: A–C, E by A.M. Araújo; D, F–H by C.A.S. Batista.



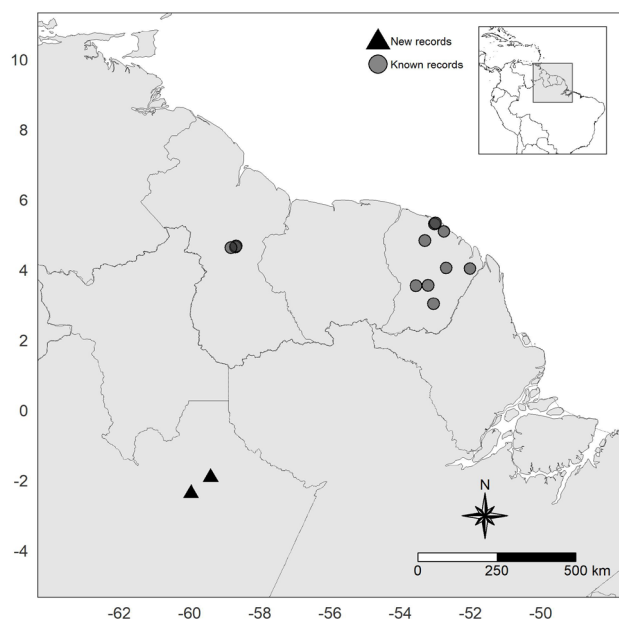


**Figure 2.** *Aristolochia wankeana*. A – leaves; B – abaxial leaf; C – abaxial leaf showing the base and primary veins; D – fruit; E – inflorescence showing the fimbriae. Specimens: A-B = Araújo A. M. 211; E = Araújo A. M. 191; C = Batista C.A.S. 19; D-F = Batista, C.A.S. 18). Credits: Adriane Maciel.

59°58'2"W, 121 m, 14 August 2019 (fl.; fr.), *Batista, C.A.S. 18* (INPA!284468)]; *ibid.*, 2°22'11"S, 59°58'2"W, 106 m, 20 August 2019 (ste.), *Batista, C.A.S. 19* (INPA!298894)].

**Preliminary conservation status** – *Aristolochia wankeana* occurs in Guyana, French Guiana, and Brazil, with EOO of 362,257.561 km<sup>2</sup>, and AOO of 56,000 km<sup>2</sup>. The estimated number of populations was >10 ("condition a") with no observed decrease in the populations ("condition b"), therefore the species was categorized as of Least Concern - LC (B1a, B2biii) according to IUCN criteria.

**Distribution, habitat, and phenology** – *Aristolochia wankeana* is found in French Guiana, Guyana (Freitas et al. 2020) and the state of Amazonas in Brazil (this study) occurring in both primary and secondary tropical rainforests (Figure 3). In Brazil, individuals were found in *terra firme* forests, at elevation ranging from 106 to 178 m.a.s.l. In Rio Preto da Eva, the species was found within the conservation area of the Biological Dynamics of Forest Fragments Project (BDFFP; <https://pdbff.org.br/>), and in Presidente Figueiredo near the Uatuma Biological Reserve (Uatuma Rebio; <https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/amazonia/lista-de-ucs/rebio-do-uauma>). In both areas the species occurred in primary tropical rainforest with canopy up to 30 m and clayey soil. The new collections, observed bearing flowers and fruits in August, represent a novelty in the phenological knowledge of the species. According to Freitas et al. (2020), specimens bearing flowers were collected in April, July, and between October and December, while specimens bearing both flowers and fruits were collected in April and between October and December.



**Figure 3.** Geographical distribution of the known locality records of *Aristolochia wankeana*. Grey circles = previous records; black triangles = new records.

**Remarks** – While collecting specimen *Batista C.A.S. 19* (INPA 298894), a visiting fly of the superfamily Muscoidea (Diptera: Calyptratae) was observed landing on a flower (Figure 1d), although it was not possible to capture it for identification to specific level. Specimens of the fly *Megaselia scalaris* (Loew, 1866) (Diptera: Phoridae) (Figure 1h) were found inside the flowers of specimen *Araújo, A.M. et al. 191* (INPA 298855). The presence of *M. scalaris* may indicate a potential pollinator of *A. wankeana*, as this genus is commonly found in *Aristolochia* flowers (Hipólito et al. 2012). However, studies of pollination biology are recommended. Flies are typically attracted to *Aristolochia* flowers due to their unpleasant odor, where they oviposit (Hipólito et al. 2012). The presence of trichomes on the flower tube precludes the exit of flower visitors until pollen grains are released, allowing them to be transported to another flower (Freitas and Alves-Araújo 2017).

### Key to the species of *Aristolochia* subseries

#### *Anthocaulicae* F. González in the Brazilian Amazon forest

1. Limb of the perianth unilobed ..... 2
- 1'. Limb of the perianth bilobed (side lobes) or bilabiate (upper and lower lips) ..... 8
2. Limb of the perianth peltate at its base ..... 3
- 2'. Limb of the perianth not peltate at its base ..... 6
3. Leaf lamina peltate or slightly peltate at its base ..... 4
- 3'. Leaf lamina not peltate at its base ..... *A. lagesiana* Ule
4. Leaf base deeply cordate. Capsule 2–3 cm long ..... *A. goudotii* Duch.
4. Leaf base truncate, slightly cordate or rounded. Capsule 6–12.5 cm long ..... 5
5. Tube 1.6–3 cm long; syrxin present, inequilateral ..... *A. ruiziana* Duch.
- 5'. Tube 1–1.3 cm long; syrxin absent ..... *A. guentheri* O.C.Schmidt
6. Limb of the perianth with caudated apex ..... *A. lanceolatorata* S.Moore
- 6'. Limb of the perianth not caudated ..... 7
7. Limb ovate, 0.4–0.9 cm wide ..... *A. disticha* Mast.
- 7'. Limb very widely ovate, 2.8–3 cm wide ..... *A. lorenae* J.Freitas & F.González
8. Limb bilobed ..... 9
- 8'. Limb bilabiate ..... 11
9. Lobes of the perianth limb oblong, slightly curved downwards, with fimbriae on the distal portion of their inner surfaces ..... *A. wankeana* J.Freitas, F.González & Poncy
9. Lobes of the perianth limb linear or strongly curved downwards, efimbriate ..... 10

10. Lobes of the perianth limb upright, lineariform, 1.0–3.0 × 0.1–0.2 cm.....*A. cornuta* Mast.  
10. Lobes of the perianth limb curved downwards, oblong, hypocrepiform, 1–2 × 0.5–1.2 cm...*A. iquitensis* O.C.Schmidt  
11'. Leaf lamina not peltate at its base; inflorescences ca. 15 cm long.....*A. klugii* O.C. Schmidt  
11. Leaf lamina peltate at its base; inflorescences ca. 2 cm long.....*A. cremersii* Poncy

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DATA AVAILABILITY: The data that support the findings of this study are available, upon reasonable request, from the corresponding author, Adriane Maciel de Araújo.



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