

# Two new species of *Aristolochia* (Aristolochiaceae) from Brazil and Peru

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González, F. (Herbario Nacional Colombiano, Instituto de Ciencias Naturales, Universidad Nacional, Ap. Ae. 7495, Santafé de Bogotá, Colombia). Two new species of *Aristolochia* (Aristolochiaceae) from Brazil and Peru. *Brittonia* 50: 5–10. 1998.—*Aristolochia dalyi*, from western Peruvian and Brazilian Amazonia, and *A. bahiensis*, from Bahia, Brazil, are described and illustrated. The species belong to *Aristolochia* ser. *Thyrsciae* and *A. ser. Hexandrae* subser. *Anthocaulicae*, respectively. A key to the eight western Amazonian species of the series *Thyrsciae* is presented. *Aristolochia dalyi* closely resembles *A. silvatica* Barb. Rodr. from the Río Negro basin, and *A. bahiensis*—the first cauliflorous species of *Aristolochia* known from the Mata Atlántica—is similar to *A. guentheri* O. C. Schmidt and *A. klugii* O. C. Schmidt, from the Western Amazon basin. Characters based primarily on the perianth shape, along with some vegetative features, are used to distinguish the two newly described species from their close relatives.

**Key words:** Aristolochiaceae, *Aristolochia*, Brazil, Peru, Amazonia, Neotropics.

González, F. (Herbario Nacional Colombiano, Instituto de Ciencias Naturales, Universidad Nacional, Ap. Ae. 7495, Santafé de Bogotá, Colombia). Two new species of *Aristolochia* (Aristolochiaceae) from Brazil and Peru. *Brittonia* 50: 5–10. 1998.—*Aristolochia dalyi*, del occidente de la amazonía peruana y brasilera, y *A. bahiensis*, del estado de Acre, en Brasil, son descritas e ilustradas. Las especies pertenecen a *Aristolochia* ser. *Thyrsciae* y *A. ser. Hexandrae* subser. *Anthocaulicae* respectivamente. *Aristolochia dalyi* es incluida en una clave para diferenciarla de las especies de la serie *Thyrsciae* presentes en la Amazonía occidental, y resulta ser similar a *A. silvatica* Barb. Rodr., propia de la cuenca del río Negro; por su parte, *A. bahiensis*, hasta ahora la única especie de *Aristolochia* cauliflora hallada en la Mata Atlántica, es similar a *A. guentheri* O. C. Schmidt y *A. klugii* O. C. Schmidt, propias del occidente de la cuenca amazónica. Los caracteres diagnósticos de las nuevas especies se basan principalmente en la forma del perianto, aunque algunas diferencias vegetativas son también reconocidas.

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## Introduction

The family Aristolochiaceae comprises ca. 450 species, three-fourths of which belong to the genus *Aristolochia*. The genus, primarily pantropical in distribution, is extremely diverse in the Neotropics, where ca. 60% of the species occur. Mexico, Hispaniola, and particularly Brazil are remarkably

rich in species, some of which are endemic or variously restricted.

Besides the monographs by Duchartre (1864) and Masters (1875), and the partial contributions by Malmé (1904), Ule (1905), Moore (1915), Schmidt (1924, 1927, 1930, 1932, 1933, 1935a, 1935b, 1936, 1938), and Bazzolo and Pfeifer (1977), the most comprehensive treatments for the South American Aristolochiaceae were written by Hoehne (1927, 1942). Since then, no other extensive revision of the family, for Brazil

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FIG. 1. *Aristolochia dalyi* (Daly et al. 8640). Photograph by D. Daly.

or Peru, has been published. Some local floras have covered the family (Ahumada, 1975; Capellari, 1996), and a meager number of new species have been described (Ahumada, 1977, 1979, 1989). The Peruvian species were treated to some extent by Macbride (1937), largely on the basis of contributions by Schmidt (l.c.).

Three infrageneric taxa have been proposed for the neotropical species, on the basis of a correlation of leaf, flower, fruit, and seed characters: *Aristolochia* ser. *Thyrsicae* and *A.* ser. *Hexandrae*, with the subseries *Anthocaulicae* and *Hexandrae* (González, 1990, 1991, 1994). The geographical distribution of the ca. 120 species of *Aristolochia* subser. *Hexandrae* ranges from Mexico to Argentina, with a remarkably high number of species in the West Indies and Brazil. By contrast, the other two taxa (each with 14 species now known) are mostly restricted to southern Central America and northwestern South America, and their number of species dramatically decreases in the West Indies, northern Central America, and eastern and southern South America; only four species

of *Aristolochia* subser. *Anthocaulicae* (*A. cauliflora* Ule, *A. klugii* O. C. Schmidt, *A. lanceolato-lorata* S. Moore, and *A. ruiziana* (Klotzsch) Duch.) and four of *Aristolochia* ser. *Thyrsicae* (*A. acutifolia* Duch., *A. paramaribensis* Duch., *A. silvatica* Barb. Rodr., and *A. sprucei* Mast.) are known to occur in Brazil, primarily in mature forests of the states of Amazonas, Acre, Pará, and Mato Grosso.

New collections of *Aristolochia* from Acre and Bahía (Brazil) and Huánuco (Peru) have come to my attention because they do not match any of those previously described.

***Aristolochia* (ser. *Thyrsicae*) *dalyi* F. González, sp. nov. (Fig. 1)**

TYPE: BRAZIL. Acre: Basin of Río Tarauacá, Mun. Tarauacá, Reserva Indígena Praia do Carapaná, Colocação Mucuripe, ca. 8°27.64'S, 71°22.39'W, 20 Nov 1995 (fl, fr), D. C. Daly, D. Costa, L. Lima, A. R. S. Oliveira, C. S. Figueiredo & C. Ehringhaus 8640 (HOLOTYPE: HPZB; ISOTYPE: NY).

*Aristolochia silvaticae* affinis, a qua imprimis differt foliis membranaceis, basi acquilateris, margine haud revolutis, rhipidii longioris internodiis usque 1 cm longis, perianthio refracto (angulus acutus inter utriculorum et tubum), usque 12 cm longo, utriculo usque  $4.4 \times 2.7$  cm, limbo usque 4.5 cm longo, laevi, acuminato.

Glabrescent liana. Petiole 3–4 cm long, with a basal abscission zone; blade oblong to elliptic, to  $16 \times 8$  cm, membranaceous, glabrous above, glabrescent below, base rounded, obtuse or cuneate, apex acuminate; venation acrodromous, basal, primary veins 3. Inflorescences consisting of axillary, elongated rhipidia to ca. 7 cm long, with internodes to 1 cm long and bracteoles  $4-8 \times 1-2$  mm; peduncle plus ovary 3.5–4.5 cm long. Perianth to 12 cm long, strongly curved between the utricle and the tube, greenish to maroon, the outside surface puberulous when young and glabrescent at anthesis; utricle obovoid, 3–4.4 cm long, 2.2–2.7 cm diam.; syrinx (an inner flange at the juncture of the utricle and the tube) present, aequilateral, 1–2 mm long; tube narrowly funnelliform, slightly bent, 2.3–3 cm long, to 5 mm proximal diam. and 8 mm distal diam., forming an angle of ca.  $\leq 45^\circ$  with the utricle; limb 1-lobed, narrowly ovate,  $3.5-4.5 \times 2-2.3$  cm, forming an angle of ca.  $180^\circ$  with the tube, apex acuminate, smooth inside, margins revolute at late anthesis. Gynostemium sessile, to 7 mm long; anthers 3–4 mm long. Capsule broadly oblong, to ca. 7 cm long and 5 cm diam., mucous.

*Aristolochia dalyi* is known from primary or secondary rain forests, of western Amazonia of Brazil and Peru; the type specimen was collected in upland forest.

Additional specimens examined. PERU. Depto. Huánuco: Prov. Pachitea, Dtto. Honoria, varadero del Macuya, a 6 km arriba del campamento de Iparia, 20 Nov 1967 (fl), *J. Schunke-Vigo* 2362 (US); Prov. Pachitea, region of Pucallpa, W part of the "Sira mtns.," ca. 26 km S of Puerto Inca, next to jct. of the Río Pachitea and Río Yuyapichis, biological field station

Panguana,  $9^\circ 37' S$ ,  $74^\circ 56' W$ , 260 m, 12 Nov 1988 (fl), *B. Wallnöfer* 11–121188 (LZ, USM, W).

This species is dedicated to Douglas C. Daly, plant systematist at The New York Botanical Garden, in recognition of his extensive work on the Amazonian flora.

The new species is closely related to two other members of ser. *Thyrsicae*: *Aristolochia silvatica* Barb. Rodr. and *A. trianae* Duch. Vegetatively, *A. dalyi* closely resembles *A. silvatica* (= *A. amesiana* R. E. Schultes; see González, 1990), from the Río Negro basin. However, *A. silvatica* has a number of distinguishing characters: coriaceous leaves with an asymmetrical base and revolute margins; extremely constricted rhipidia (the internodes reaching only 3–4 mm long); a smaller, slightly bent perianth (the angle between utricle and tube is ca.  $120^\circ$ ), with the limb oblong, papillate inside, usually cucullate, and ending in a peculiar triangular emargination at the apex. Although smaller, the flowers of *A. dalyi* are morphologically similar to those of *A. trianae*, restricted to the Chocó province in Colombia and northwestern Ecuador. These species differ vegetatively in the shape and size of the leaves, which are considerably larger, ovate, and deeply cordate at the base in *A. trianae* (see González, 1990 & 1994).

The finding of this new species in the western Amazonia of Brazil and Peru suggests that sterile or fruiting collections from Loreto, Peru [*Ayala* 1832 (AMAZ); *Gentry et al.* 39496 (MO); *González et al.* 1715, 1773, 1774 (AMAZ, COL); *Mathias & Taylor* 5568 (F, MO, US); *Vásquez et al.* 5526 (AMAZ)], some of them previously identified as *Aristolochia silvatica* (cf. González, 1990), may correspond to *A. dalyi*. These are the only known species of ser. *Thyrsicae*, having obtuse, rounded, or even cuneate leaf base, instead of the characteristic cordiform leaves of *Aristolochia*.

### Key to the species of *Aristolochia* ser. *Thyrsicae* from northwestern Amazonia

1. Leaves elliptic to oblong, base rounded, obtuse or cuneate; basal veins 3.
2. Leaves membranaceous, with base symmetrical and margin not revolute. Internodes of the rhipidia elongated, to 1 cm long. Perianth reflexed, strongly curved ( $\leq 45^\circ$ ) between utricle and tube, to 12 cm long; utricle  $3-4.4 \times 2.2-2.7$  cm; limb 3.5–4.5 cm long, smooth inside, apex acuminate.  
..... *A. dalyi*

2. Leaves coriaceous, with base asymmetrical and margin revolute. Rhipidia very short, congested, the internodes 3–4 mm long. Perianth slightly bent (ca. 120°) between utricle and tube, to 8 cm long; utricle 1.2–1.8 cm × 8–10 mm; limb 2.5–4 cm long, cucullate, papillate inside, apex emarginate, with a triangular slit up to 2 mm deep. . . . . *A. silvatica*
1. Leaves narrowly to widely ovate, rarely oblong, obovate or elliptic, base cordate; basal veins (3–)5(–7).
  3. Leaves widely ovate (as wide as long); perianth limb <1 cm wide. . . . . *A. schunkeana*
  3. Leaves ovate, narrowly ovate, rarely oblong or elliptic; perianth limb >1 cm wide.
    4. Perianth 2.5–4.1 cm long . . . . . *A. acutifolia*
    4. Perianth >4.5 cm long.
      5. Leaf sinus short, rounded, the lobes convergent and sometimes overlapping. Apex of the perianth limb acuminate, acumen to 2.5 cm long. . . . . *A. paramaribensis*
      5. Leaf sinus broader, the border of the lobes divergent to parallel. Apex of the perianth limb obtuse, acute or mucronulate, the mucro <1 cm long.
        6. Leaves smooth above, glabrescent or appressed-puberulous below, deeply cordate at base, sinus 2–5 cm deep. Petiole 5–13 cm long. Rhipidia to 21 cm long. . . . . *A. sprucei*
        6. Leaves usually asperous above, densely hispidous below, slightly cordate, sinus 1–3 cm deep. Petiole 1–4(–5.5) cm long. Rhipidia to 11 cm long.
          7. Leaf blade usually constricted at the middle. Perianth limb ovate to widely ovate, up to 2× longer than wide. . . . . *A. fragrantissima*
          7. Leaf blade entire. Perianth limb narrowly ovate to elliptic, at least 3× longer than wide. . . . . *A. tonduzii*

***Aristolochia* (subser. *Anthocaulicae*) *bahiensis* F. González, sp. nov. (Fig. 2)**

TYPE: Brazil. Bahia: Município de Una, Reserva Biológica do Mico-leão (IBAMA), entrada no km 46 da Rod. BA-001 Ilhéus/Una, ramal que leva a Faz. Jaqueiral, ca. 8 km da entrada, 15°09'S, 39°05'W, 1 May 1996, fl. *J. Jardim, S. C. Santana & J. L. Paixão 809* (HOLOTYPE: CEPEC; ISOTYPE: NY).

*A. guentheri* et *A. klugii* affinis sed foliis subtus glabris, perianthio minori, leviter refracto, limbo oblongo usque 2 × 1.5 cm notabilis.

Glabrous vine. Petiole to 2.3 cm long; blade narrowly ovate, 14–16 × 5–6.5 cm, chartaceous, base truncate to slightly cordate and then the sinus to 4 mm depth, slightly peltate, apex acute to acuminate, venation acrodromous, prominent to prominulous on both sides, basal primary veins 3. Flowers on short (<5 mm long) cauliflorous racemes. Peduncle plus ovary to 1.5 cm long. Perianth slightly curved between the utricle and the tube, glabrous outside; utricle widely obovate, 6–8 mm long, 3–6 mm diam.; syrinx absent; tube slightly enlarged distally, 1.5–2 cm long, 2–3 mm proximal diam., 4–5 mm distal diam., forming an angle of 100–120° with the utricle; limb oblong, 1.6–2 cm × 1.2–1.5 mm, forming an angle of ca. 180° with the tube, apex obtuse and acuminate. Gynostemium

stipitate, to 4 mm long; anthers to 1.5 mm long. Capsule and seeds unknown.

*Aristolochia bahiensis* is known only from the type collection. It is the only known species of *Aristolochia* ser. *Hexandrae* subser. *Anthocaulicae* from the moist forests of eastern Brazil, i.e., the “Mata Atlântica.” Vegetatively, *A. bahiensis* resembles the western Amazonian *A. guentheri* (state of Amazonas, Brazil; Amazon basin of Colombia, Ecuador, Peru, and Bolivia) and *A. klugii* (state of Acre, Brazil; Amazon basin of Colombia, Ecuador, and Peru). Its flowers are, however, considerably smaller and narrower, less sinuate, and the villous or hirsute indument usually present on the lower surface of the leaf of *A. guentheri* and *A. klugii* is lacking.

Some similarity between the new species and *Aristolochia huebneriana* O. C. Schmidt, from the Manaus area, may also be recognized. Unfortunately, no herbarium specimens of that species were available for the study; nevertheless, obvious morphological differences are yielded by studying the protologue of *A. huebneriana*: the petiole is longer, the leaf blade (1.6–3.8 cm wide) is much narrower, cordate, and pubescent below, the tube (ca. 2 mm diam.) and the limb (ca. 8 mm wide) are also narrower; in addition, the limb is cordate at base and round at apex.

The narrowly ovate leaves of *Aristolochia*

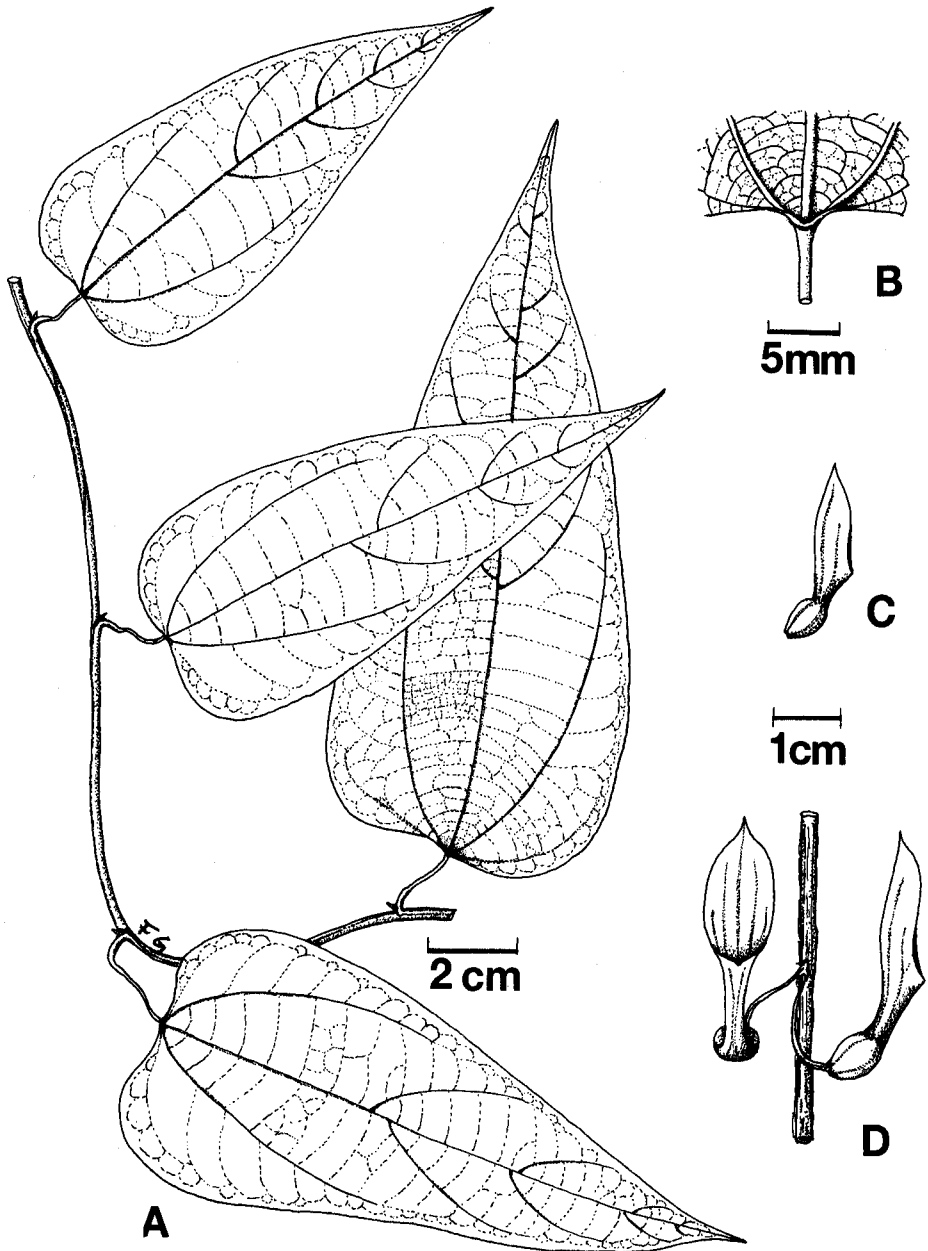


FIG. 2. *Aristolochia bahiensis* (Jardim et al. 809, NY). A. Vegetative branch. B. Adaxial view showing the slightly peltate leaf blade. C. Flower at pre-anthesis. D. Flowers at anthesis.

*chia bahiensis* contrast with the broad leaves found in the majority of the other NE South American cauliflorous species, such as *A. bukuti* Poncy, *A. cremersii* Poncy, *A. daemoninoxia* Mast., and *A. flava* Poncy, all

from the Guianas (Feuillet & Poncy, in press), as well as the widely distributed *A. ruiziana* (Klotzsch) Duch. (states of Amazonas, Acre, and Mato Grosso, Brazil; Amazon basin of Colombia, Venezuela, Ecu-

dor, and Peru). Furthermore, none of the latter species have flowers that resemble those of *A. bahiensis*.

These morphological differences, considered critical for species recognition in the genus, together with the disjunct geographical distribution of *Aristolochia bahiensis*, are sufficient to propose this new species.

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