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Original Article

# Synopsis of *Argythamnia*, *Chiropetalum* and *Philyra* (Euphorbiaceae) in South America

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## ABSTRACT

As part of the systematic study of the tribes Ditaxeae and Adelieae (Acalyphoideae-Euphorbiaceae), here we compile and present a taxonomic synopsis for the South American taxa of *Argythamnia, Chiropetalum,* and *Philyra*. We recognize 22 species for *Argythamnia,* including one herein described as a new species, 20 species and one variety for *Chiropetalum*, and a single species for *Philyra*. We also designate 22 lectotypes, a new synonymization and a *status novum,* in addition to keys for each genus, distribution maps for all taxa, analysis of collection density in South America for each genus, and taxonomic and ecological comments for all taxa.

**Keywords:** Acalyphoideae, Adelieae, *Ditaxis,* Ditaxineae, nomenclatural novelties, taxonomy.

## Introduction

Euphorbiaceae are distributed worldwide and are one of the largest families of Angiosperms (APG IV 2016), circumscribed with four subfamilies, 218 genera and approximately 6300 species (Radcliffe-Smith 2001; Webster 2014; APG IV 2016). The pantropical subfamily Acalyphoideae Beilschm. is composed of 99 genera and 1865 species (APG IV 2016). In the classification proposed by Webster (1994; 2014) and Radcliffe-Smith (2001), the Acalyphoideae genera *Argythamnia* P.Browne, *Caperonia* A.St.-Hil., *Chiropetalum* A.Juss., *Ditaxis* Vahl ex A.Juss., and *Philyra* Klotzsch were circumscribed in the subtribe Ditaxinae Griseb. In the recent phylogenetic study of Külkamp *et al.* (2023a), Ditaxinae and *Ditaxis* proved to be paraphyletic, so *Ditaxis* was synonymized under *Argythamnia*, and the subtribe was elevated to the rank of tribe (Ditaxeae) with only two genera, *Argythamnia* and *Chiropetalum*. Because *Philyra* emerged as sister to the tribe Adelieae, it was treated in Adelieae as proposed by Jestrow *et al.* (2008; 2010). *Caperonia* emerged as the sister clade to the Ditaxeae and Adelieae tribes, so it was circumscribed in the monogeneric tribe Caperoniieae (Külkamp *et al.* 2023a). Even in the new circumscription, some genera are morphologically

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similar (*Argythamnia* and *Chiropetalum*), while others are quite distinct (*Philyra*). The main diagnostic morphological characteristics of these genera can be compared in Tab. 1 and Fig. 1, based on the present and other studies (Webster 1994, 2014; Radcliffe-Smith 2001; Külkamp 2020a, b, c; Külkamp *et al.* 2020a, b; 2023a, b).

According to the new classification proposed by Külkamp *et al.* (2023a), *Argythamnia* increased from 18 to ca. 68 species, extending its distribution from southern North America to Argentina. Its centers of diversity are in southern North America, Central America, the Antilles, and northeastern and central South America (Pax & Hoffmann 1912; O'Donell & Lourteig 1942; Ingram 1967; Ramírez-Amezcua & Steinmann 2013; Külkamp 2020a; Külkamp *et al.* 2020b; 2023a). The species occur predominantly in seasonally dry environments, such as the arid regions of northern Mexico and the southern United States, and other locals with seasonally dry tropical forests in the Neotropics (O'Donell & Lourteig 1942; Ramírez-Amezcua & Steinmann 2013; Külkamp 2020a; Külkamp *et al.* 2020b).

*Philyra* is one of the monospecific genera of Euphorbiaceae, *Philyra brasiliensis* Klotzsch is distributed in northern Argentina, the southern half of Paraguay and midwest, southeast and northeast Brazil (Webster 2014; Külkamp 2020b), always associated with seasonally dry tropical forests (Külkamp 2020b).

*Chiropetalum* proved to be a monophyletic genus and is composed of 22 species (Külkamp *et al.* 2023a) distributed from Mexico to southern Argentina, with the highest species diversity in the central region of South America (Chile, southern Brazil, and Argentina) (Ingram 1980a, b; Külkamp *et al.* 2020a; 2023a). The genus has a large geographical disjunction, with two species restricted to Mexico and the other 18 south of the equator line (Ingram 1980b; Pax & Hoffmann 1912; Radcliffe-Smith 2001).

Taxonomic studies for the genera *Argythamnia*, *Chiropetalum,* and *Philyra* in South America are scarce, and Müller (1865) and Pax & Hoffmann (1912) treat the taxonomy of all then-known species of these genera. Only Ingram reviewed all species of *Argythamnia* (Ingram 1967) and *Chiropetalum* (Ingram 1980b), otherwise no other study treats these genera in their entirety. Some regional studies have also treated the taxonomy for some genera, such as O'Donell & Lourteig (1942) when present *Caperonia*, *Chiropetalum* and *Ditaxis* for Argentina, Ramírez-Amezcua & Steinmann (2013) treat *Argythamnia* subg. *Ditaxis* for Mexico and Külkamp *et al.* (2020b) present *Argythamnia* for the Brazilian Caatinga, Külkamp *et al.* (2023b) present *Argythamnia* for Chacoan and Pampean provinces in South America. As part of the study of Adelieae and Ditaxeae systematics, here we present a taxonomic synopsis, with identification keys, taxonomic heading, nomenclature update, new species, diagnosis, distribution and ecology comments and notes for all South American species of *Argythamnia*, *Chiropetalum* and *Philyra*.

## Materials and Methods

Fieldwork to observe and collect specimens was conducted from 2016 to 2022. Individuals were photographed, geographic coordinates were recorded, and samples were collected for morphological analysis: vouchers were deposited in the herbarium collection with your duplicates.

Physical and virtual specimens were consulted in the herbaria: A, ACOR, B, BA, BAA, BC, BM, BKL, BR, C, CAS, CEPEQ, CGMS, CM, COL, COR, CORD, CPAP, CTES, E, ECT, F, FLOR, G, GB, GH, GOET, HAL, HAS, HBG, HBR, HUEFS, ICN, K, LIL, LP, M, MA, MBM, MO, MOL, MPU, MVFA, MVJB, MVM, NY, P, PACA, PEL, R, RB, RSA, S, SGO, SI, SP, SPF, TUB, UC, UPCB, and US (acronyms follow Thiers 2023, constant updating). All cited specimens have been seen at least online or physically by the first author.

Literature containing descriptions and protologues was consulted in libraries and online repositories, and the nomenclatural practice follows the International Code of Nomenclature for algae, fungi, and plants (ICN Turland *et al.* 2018). The morphological terminology used in the descriptions was based on Pax & Hoffmann (1912), O'Donell & Lourteig (1942), Ingram (1980a, b), Webster (2014), and Külkamp *et al.* (2023a). The concept and terminology of biogeographic provinces was based on Morrone (2006; 2014). The circumscription of the Seasonally Dry Tropical Forest biome followed Pennington *et al.* (2000), Prado (2000) and Särkinen *et al.* (2011), and Brazilian biomes

**Table 1.** Main diagnostic morphological features to recognize the genera *Argythamnia*, *Chiropetalum* and *Philyra* in South America.

| Character | *Argythamnia* | *Chiropetalum* | *Philyra* |
|---|---|---|---|
| Number of petals in pistillate flowers | 0–5 | 0 (rarely 5) | 5 |
| Shape of petals in staminate flowers | Entire | Lobed | Entire |
| Number of stamens | 7–10 | 3–6 | 10 |
| Number of whorls in staminal column | 2 | 1 | 2 |
| Thorns | Absent | Absent | Present |
| Stellate trichomes | Absent | Present or absent | Absent |
| Malpighiaceous trichomes | Present | Present | Absent |
| Stigma and style partitions | Entire, bifid or trifid | Bifid | Multifid |
| Floral nectaries | Present | Present | Absent |

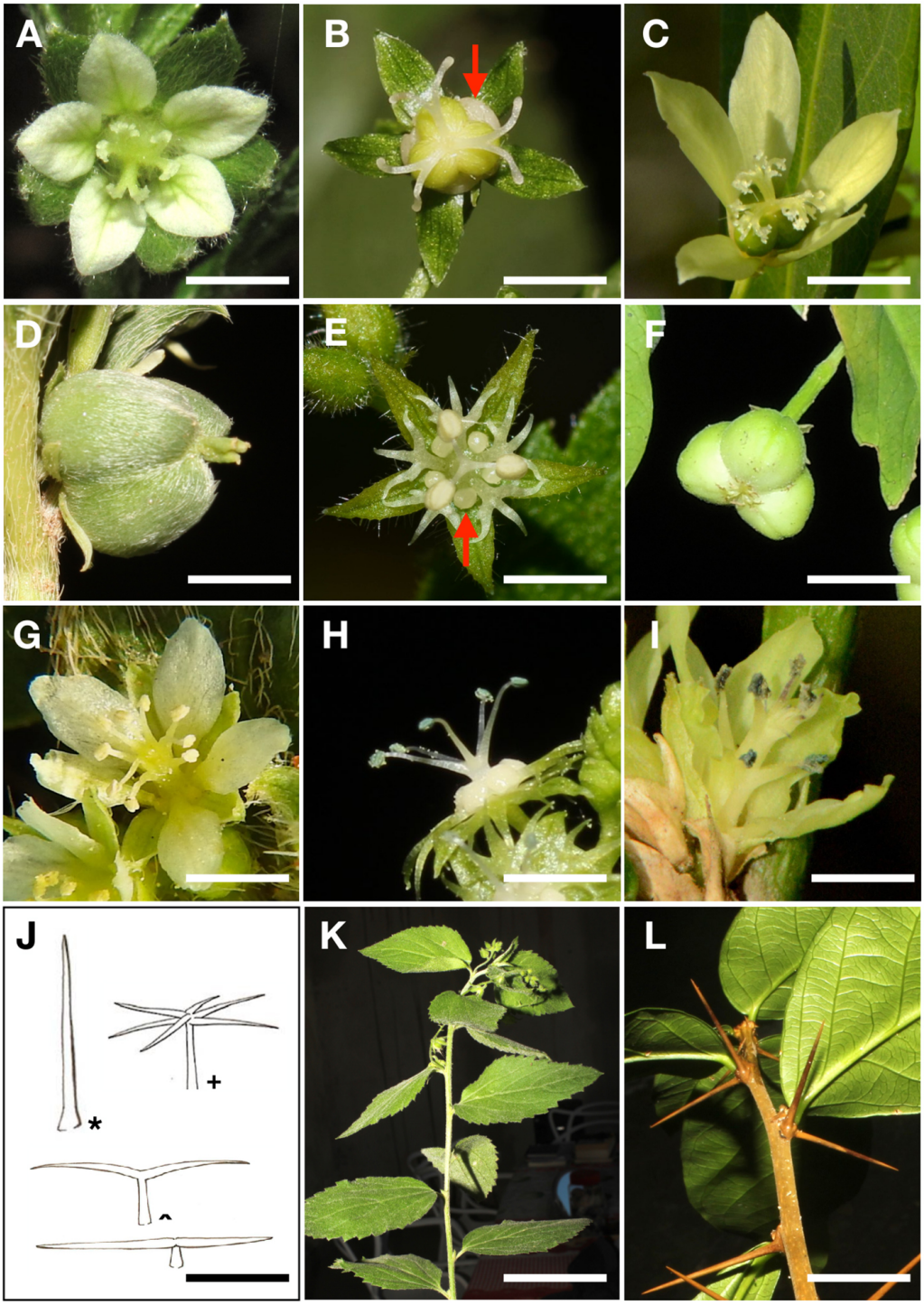


**Figure 1.** Diagnostic morphological characters for *Argythamnia*, *Chiropetalum* and *Philyra* in South America. **A**. Pistillate flower of *Argythamnia desertorum* showing sepals, petals and bifid styles. **B**. Pistillate flower of *Chiropetalum phalacradenium* showing sepals, floral nectaries (indicated by the red arrow) and bifid styles (notice petals absence). **C**. Pistillate flower of *Philyra brasiliensis* with sepals, petals and multifid styles. **D**. Fruit of *Argythamnia jablonskyana* with entire styles. **E**. Staminate flower of *Chiropetalum griseum* with lobed petals and glabrous nectaries (indicated by the red arrow). **F**. Fruit of *Philyra brasiliensis* with multifidus styles. **G**. Staminate flower of *Argythamnia sellowiana* with entire petals and stamens distributed in two whorls. **H**. Staminate flower of *Chiropetalum phalacradenium* with glabrous floral nectaries and stamens distributed in a whorl. **I**. Staminate flower of *Philyra brasiliensis* with entire petals and stamens distributed in two whorls. **J**. Simple (*), stellate (+) and malpighiaceous (^) trichomes. **K**. Branch of *Chiropetalum griseum* without thorns. **L**. Branch of *Philyra brasiliensis* with a pair of thorns at the base of the leaves. Scale bar of figures A-I corresponds to ca. 4 mm, in J ca. 0.4 mm and K-L ca. 3 cm. Photos A, B, D, E, H, I, K & L – Josimar Külkamp; C & F – Pedro Acevedo; G – Andres Gonzales; illustration in J by Rafaela Marchioretto.

follow IBGE (2004). Geographic distribution data were obtained from field collections, herbarium specimens viewed in person and online, and other databases such as GBIF (2023), REFLORA (2023), and speciesLink (2023). For samples that did not have geographic coordinates, these were inferred from the locality (municipality, department or locality) described in label, and when the locality was not sufficiently detailed (only state, province or country level), the sample was not used in the analyses. The Extension of Occurrence (EOO) and Area of Occupancy (AOO) of the species were estimated with GeoCAT-Kew (Bachman *et al.* 2011). The distribution maps and Kernel Density Estimation maps were produced in QGIS (2017). All distribution data were used in the Kernel Density Estimation maps, and for this analysis, pixels of 144 km$^2$ and a diameter of the analysis circle of 340 km were used.

## Results and Discussions

### *Taxonomic Treatment*

Key to *Argythamnia*, *Chiropetalum* and *Philyra* genera in South America with characters illustrated in Fig. 1

1. Shrub to treelet; thorn pairs present on the branches; leaves glabrous; floral nectaries absent ..... ***Philyra***

1'. Herb, subshrub or shrub; thorn pairs lacking; leaves pubescent; floral nectaries present ..... 2

2. Staminate flower with lobed petals; stamens 3–6, arranged in one whorl ..... ***Chiropetalum***

2'. Staminate flower with unlobed petals; stamens 7–10, arranged in two whorls ..... ***Argythamnia***

#### ***Argythamnia* P.Browne**

***Argythamnia*** P.Browne, The Civil and Natural History of Jamaica 3: 338. 1756.
Type: *Argythamnia candicans* Sw.

**Description:** Herbs to shrubs, annual or perennial, monoecious, rarely dioicous, acaulescent or not. Branches erect, decumbent or prostrate, covered by malpighiaceous and/or simple trichomes, lacking thorns. Stipules present, persistent or rarely caducous, ovate to lanceolate, pubescent rarely glabrous. Leaves simple, alternate, rosulate or not, petiolate, lanceolate, ovate, spatulate or elliptic, venation pinnate, margins serrate to entire, pubescent with malpighiaceous and/or simple trichomes. Racemes axillary, bi-unisexual, with proximal pistillate flowers and distal staminate flowers; flowers 1-bracteolate; bracteoles lanceolate to ovate, pubescent, rarely glabrous. Staminate flowers dichlamydeous; sepals 5(–4), valvate, linear to lanceolate, margin entire or serrate, pubescent or glabrous; petals 0–5, adnate to the staminal column, linear, lanceolate or elliptic, margin entire, pubescent or glabrous; stamens 4–10 rarely 12, free or arranged in a column with two whorls; staminodes 0–5 at the top of the staminal column, pubescent or glabrous; floral nectaries 4–5. Pistillate flowers dichlamydeous or monochlamydeous; sepals (4–)5(–6), valvate, linear, lanceolate, ovate or elliptic, pubescent rarely glabrous; petals 0–5, linear, lanceolate, oval, elliptic or rhomboid, pubescent or glabrous, unlobed, margins entire; floral nectaries 5, adnate to the receptacle at the base of the ovary, glabrous or ciliate; ovary pubescent; styles 3, entire, bifid or trifid, pubescent or glabrous. Capsule with three one-seeded loci. Seeds globose to ovoid, apiculate, surface smooth, undulate or reticulate, gray to black.

Of the 68 species recognized for *Argythamnia*, 22 are known from South America (Fig. 2A-C), 20 of which are endemic to South America. The southernmost distribution of the genus is represented by *A. malpighipila* (Hicken) J.W.Ingram in northern Patagonia, Argentina (Fig. 2B), and farthest north by *A. argothamnoides* (Bertero ex Spreng.) J.W.Ingram, *A. erubescens* J.R.Johnst., and *A. polygama* (Jacq.) Kuntze, which occur in northern Colombia and Venezuela (Fig. 2A). The countries with the greatest species richness are Brazil, with 11 species, followed by Argentina with six (Fig. 2). *Argythamnia* species have a regionalized distribution pattern, presenting many regional endemics, with a small extent of occurrence. The highest concentration of records for *Argythamnia* is found in northeastern Brazil and northern South America, and the lowest in central South America (Fig. 3). The high number of records of *Argythamnia* in northeastern Brazil and northern South America is associated with many gatherings of *A. desertorum* Müll.Arg. and *A. argothamnoides,* respectively, whereas in central South America, the expressive number of collections is related with the species richness (Fig. 2B). The most widely distributed species in South America is *A. montevidensis* (Didr.) Müll.Arg., which occurs in the Chaco and Pampa provinces in central South America (Fig. 2B).

No species of *Argythamnia* are registered in western side of the southern half of the Andes, and this may be due to the diversification of the genus in South America after the uplift of the Andes or the extinction of the lineages with western distribution. Unlike *Chiropetalum*, *Argythamnia* has several species in the north and northeast of South America, and this distribution pattern can be explained by the occurrence of seasonally dry tropical forests, vegetation with the greater diversity of *Argythamnia*.

For *Argythamnia*, the Amazon region has proved to be a barrier that disconnects the eastern and western lineages of genus in South America (Figs. 2 and 3B). Apparently, it is an ancient barrier, as neither species occurs in eastern and western Amazonia simultaneously.

For the South American *Argythamnia*, we describe here a new species, designate 12 lectotypes and a new synonym.

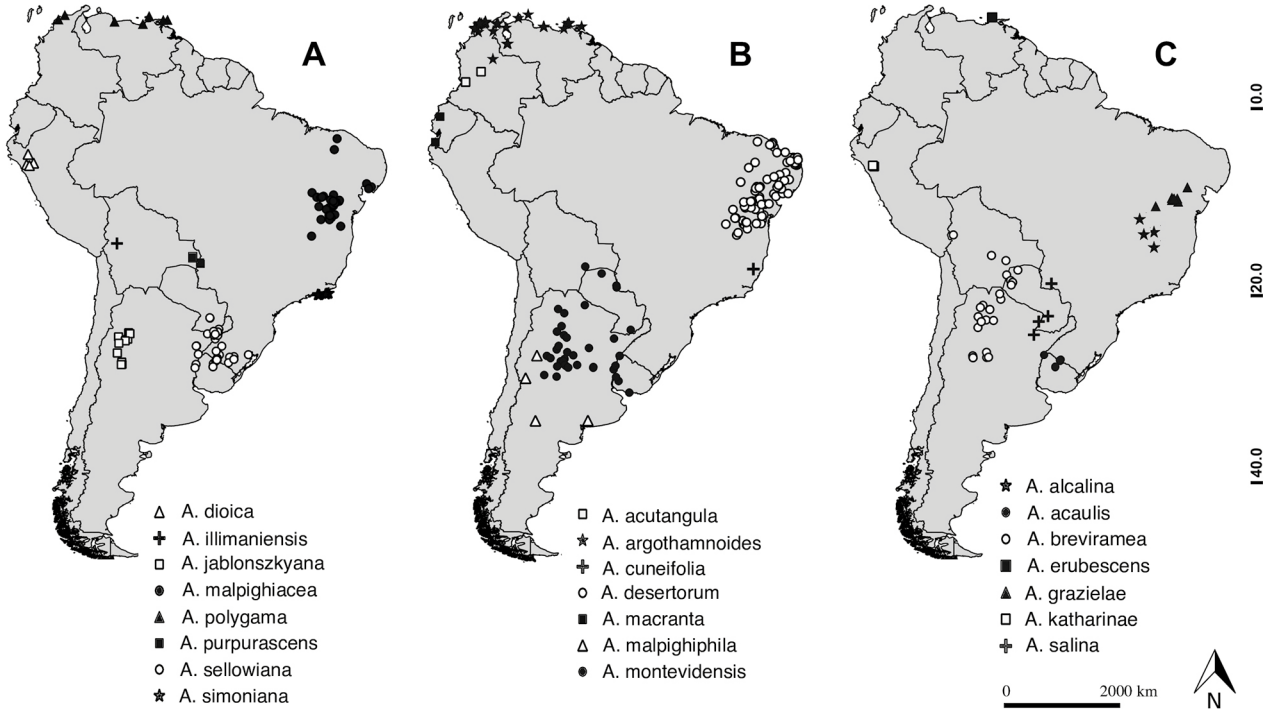


**Figure 2. A-C**. Geographic distribution of *Argythamnia* species in South America

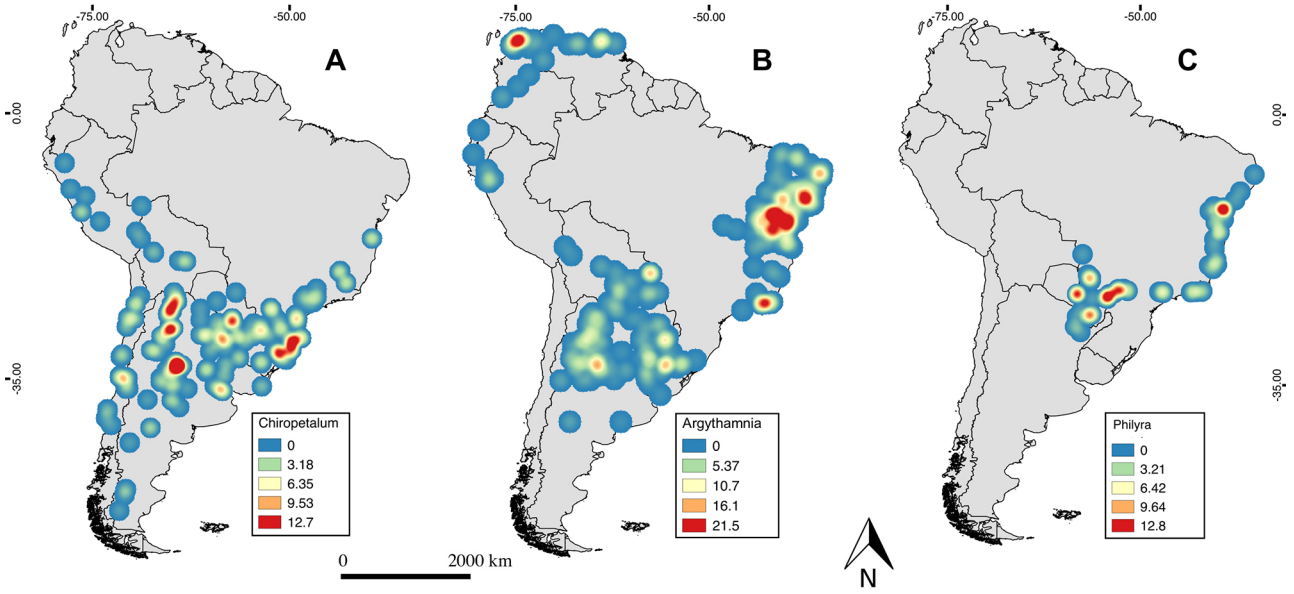


**Figure 3.** Collection density from Kernel analysis of *Chiropetalum* (**A**), *Argythamnia* (**B**), and *Philyra* (**C**) in South America; the color intensity corresponds to the number of samples collected.

Identification key to South American *Argythamnia* species

1. Acaulescent herbs or, if stem present, then prostrate; leaves rosulate ..... 2
1'. Non-acaulescent herbs, subshrubs or shrubs, stems erect; leaves non rosulate (spaced along the branches) ..... 3
2. Leaves linear to linear-elliptic; sepals of pistillate flowers 6, 9–11.4 mm long, lanceolate non-falcate ... **1. *A. acaulis***
2'. Leaves elliptic to obovate; sepals of pistillate flowers 5(6), 5.9–8.5 mm long, lanceolate falcate ... **21. *A. sellowiana***
3. Stems woody with prostrate branches; internodes 0.3–0.5 mm long; leaves 0.5–0.7 cm long .... **16. *A. malpighipila***
3'. Stems woody or herbaceous with erect branches; internodes 0.7–55 mm long; leaves 0.8–15.2 cm long ..... 4
4. Inflorescences with 15–35 staminate flowers .....**20. *A. salina***
4'. Inflorescences with 1–14 staminate flowers ..... 5
5. Staminate flowers with 8 stamens in two whorls (5+3) ..... **17. *A. montevidensis***
5'. Staminate flowers with 9–10 stamens in two whorls (5+5 or 5+4) ..... 6
6. Pedicel of the pistillate flower after anthesis 5–23 mm long ..... 7
6'. Pedicel of the pistillate flower after anthesis 0.7–4.7 mm long ..... 13
7. Leaf margin with 5–8 teeth (rarely absent) distributed in the distal half of the leaf .....**7. *A. desertorum***
7'. Leaf margin entire or with 9 or more teeth distributed from the base to the apex the leaf ..... 8
8. Monoecious plants; 1 pistillate flower per inflorescence ..... 9
8'. Dioecious plants; 1–4 pistillate flowers per pistillate inflorescence ..... 11
9. Leaves obovate to obovate-lanceolate; sepals of the staminate flower 8–9 mm long; staminodes 5 ..... **13. *A. katharinae***
9'. Leaves elliptic to lanceolate; sepals of the staminate flower 1.5–5 mm long; staminodes 4 ..... 10
10. Pedicel scar not evident; leaf margin entire; sepals of pistillate flowers 9–12 mm long ..... **22. *A. simoniana***
10'. Pedicel scar evident; leaf margin serrate; sepals of pistillate flowers 5–6.4 mm long ..... **2. *A. acutangula***
11. Petals of the pistillate flower 4–5.5 mm long, linear ..... **8. *A. dioica***
11'. Petals of the pistillate flower 6–10 mm long, lanceolate, elliptic or oblanceolate ..... 12
12. Stipules ca. 3 mm long; leaves sparsely pubescent; style + stigma ca. 1.5 mm long ..... **18. *A. polygama***
12'. Stipules 1–2.5 mm long; leaves densely pubescent; style + stigma ca. 3 mm long ..... **14. *A. macrantha***
13. Leaves spatulate to obovate ..... **2. *A. cuneifolia***
13'. Leaves lanceolate, elliptic or ovate ..... 14
14. Leaf margin entire ..... 15
14'. Leaf margin serrate or serrulate ..... 16
15. Erect herbs; 1 pistillate flower per inflorescence; petals of the pistillate flower longer than the sepals; styles entire ..... **12. *A. jablonszkyana***
15.' Shrubs or subshrubs; 2–3 pistillate flowers per inflorescence; petals of the pistillate flower shorter than the sepals; styles bifid ..... **15. *A. malpighiacea***
16. Leaf margin entire to 11 teeth ..... 17
16'. Leaf margin bearing 12 or more teeth ..... 19
17. Sepals of the staminate flowers 3.9–4.1 mm long, pubescent on both surfaces; staminal column ca. 3.5 mm long ... ..... **9. *A. erubescens***

17'. Sepals of the staminate flowers shorter than 3.7 mm long, pubescent on the abaxial surface only; staminal column ca. 2 mm long ..... 18

18. Leaves elliptic; petiole 1–1.5 mm long ..... **5. *A. breviramea***

18'. Leaves lanceolate; petiole ca. 10 mm long ..... **11. *A. illimaniensis***

19. Petals of the pistillate flower ca. 0.3 mm long; sepals of the staminate flowers 1.5–2.8 mm long ..... **19. *A. purpurascens***

19'. Petals of the pistillate flower 1.5–3 mm long; sepals of the staminate flowers 3–3.8 mm long ..... 20

20. Sepals of pistillate flowers serrate; staminal column 1.2–1.5 mm long ..... **10. *A. grazielae***

20'. Sepals of pistillate flowers entire; staminal column 1.9–3.1 mm long ..... 21

21. Leaf margin with 35 or more teeth; inflorescence 9–12 mm long; staminate flowers 9–14 per inflorescence ..... **3. *A. alcalina* sp. nov.**

21'. Leaf margin with 14–22 teeth; inflorescence 4–8 mm long; staminate flowers 4–8 per inflorescence ..... **4. *A. argothamnoides***

**1. *Argythamnia acaulis*** (Herter) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 422. 1958. *Ditaxis acaulis* Herter, Anales del Museo Nacional de Montevideo 1: 79. 1911. *Paxia acaulis* (Herter) Herter, Estud. Bot. Reg. Uruguay 4: 80. 1931. *Paxiuscula acaulis* (Herter) Herter, Revista Sudamer. Bot. 6: 93. 1939. Type: URUGUAY: Vale Eden, s.d., *J. Arechavaleta 15 ex part* (destroyed). Neotype (designated by Külkamp *et al.* 2023b): URUGUAY. ARTIGAS: Cuarein, Entre peñascos. Sep (no year), *J. Arechavaleta 15* (MVM [MVM5191])!.

**Description:** Herbs, monoecious, 5–10 cm tall, acaulescent and prostate, with woody tubers; internodes 0.1–0.4 mm long; leaves rosulate, blade 2–7 cm long, linear to linear-elliptic, margin entire; racemes 5–7 mm long, 1 basal pistillate flower, 3–5 distal staminate flowers; stamens 8, staminodes absent; pistillate flowers with 6 sepals, 9–11.4 mm long, lanceolate, margin entire, petals 5, styles bifid.

**Distribution and habitat:** *Argythamnia acaulis* is restricted to southern Brazil, in the state of Rio Grande do Sul, and northern Uruguay (Fig. 2C). The species is endemic to the grassland of the Pampa Province and is always associated with grazed and stony soils.

**Flowering and fruiting:** Flowers and fruits from September to January.

**Notes:** Despite having the same collection number as the original material (*J. Arechavaleta 15*), the neotype designated for *A. acaulis* has a different collection locality on the label. This species is morphologically similar to *A. sellowiana* (Pax & K.Hoffm.) J.W.Ingram, and as a consequence, many specimens are mistakenly identified, giving the impression that *A. acaulis* is a widely distributed species.

**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Santana do Livramento. Vigia, 14 Jan 1941, (fl. fr.), *B. Rambo11350* (SP). URUGUAY. RIVERA: Barren hill-top with flat outcrops near Rivera, 07 Dec 1943, (fl. fr.), *H.H. Bartlett 21079* (US); Cerros, 20 Jan 1944, (fl. fr.), *C.D. Legrand 3565* (MVFA, MVM). ARTIGAS: Cuareim, Sep, (fl. fr.), *J. Arechavaleta 15a* (MVM5191a). TACUAREMBÓ: Tambores, (fl. fr.), *C.D. Legrand 2640* (MVM); Tambores. Vale Edén, (fl. fr.), *A.E. Paz 792* (MVM).

**2. *Argythamnia acutangula*** Croizat, Ciencia (Mexico) 6: 353. 1946. Type: COLOMBIA. DEL VALLE: Cordillera Occidental, vertiente occidental, Lobo Guerrero, 610-650 m, 9-10 Sep 1944, *J. Cuatrecasas 17808* (holotype: GH [GH00045755]!, isotypes: A [A00045756]!, BC [BC638422]!, COL [COL000002061]!, F [F0055883F]!, P [P00634984]!, U [U0001862]!, US [US00109826]!.

**Description:** Subshrub to shrub, monoecious, without woody tubers; stems erect, internodes 1–20 mm long; pedicel scar evident, leaves not rosulate, blade 2–4.1 cm long, elliptic, margin serrate, 10–16 teeth; racemes 2–3 mm long, 1 pistillate flower basal, 3–5 staminate flowers distally; staminate flower with sepals ca. 3 mm long, stamens 10, staminodes 4, pubescent; pistillate flowers with pedicel 5.5–8 mm long, sepals 5, 5–6.4 mm long, margin entire, petals 5, 4–5 mm long, linear, styles bifid.

**Distribution and habitat:** *Argythamnia acutangula* is endemic to Colombia (Fig. 2B) and known from only three localities. The species occurs in seasonally dry tropical forest of the Cauca and Magdalena Provinces.

**Flowering and fruiting:** Flowers and fruits from August to December.

**Notes:** Rare species, known from three herbarium records, the type and another two records determined as *cf.* at COL herbarium.

**Selected specimens examined:** COLOMBIA. TOLIMA: Mendez, finca Bremen, 300 m, 20 Nov 1995, (fl. fr.), *H. Mendonza 9* (COL). VALLE DE CAUCA: D'agua, Lobo Guerrero, 800 m, 1 Aug 2003, (fl.), *W.G. Vargas et E. Méndez 11821* (ICESI).

**3. *Argythamnia alcalina* Külkamp, *sp. nov.*** (Fig. 4) Type: BRAZIL. MINAS GERAIS: Santo Hipólito, 6 km após Santo Hipólito sentido Conselheiro Mata, margem da estrada, próximo a um bueiro, 5 metros no interior da mata, 18°17'23.2'' S 44°11'15.1'' W, 540 m, 18 June 2019, (fl. fr.), *J. Külkamp et al. 914* (holotype: RB [RB788140]!, isotypes: CGMS!, ICN!, SP!, SPF!, US!)

**Diagnosis:** Species similar to *A. grazielae* due to the elongated staminate flowers buds; seeds apiculate and reticulate surface, leaf margin with more than 20 teeth. *Argythamnia alcalina* can be differentiated by having racemes 4–7 mm long (vs. 9–12 mm long), 9–15 staminate flowers per inflorescence (vs. 7–10 flowers), a staminal column 2.9–3.1 mm long (vs. 1.2–1.5 mm long), absence of staminodes in staminate flower (vs. 4 apical staminodes), and seeds 1.9–2.4 mm long (vs. 3.3–3.5 mm long).

**Description:** Subshrub to shrub 0.5–2 m tall, monoecious; stems erect, internodes 3–34 mm long.; stipules 1.2–1.9 × 0.2–0.35 mm, persistent, lanceolate, with malpighiaceous and simple trichomes on both surfaces; leaves not rosulate; petiole 3–7 mm long, with malpighiaceous trichomes; blade 3.8–15.2 × 1.3–5.2 cm, elliptic, base acute to cuneate, apex acute to acuminate, acrodromous venation, evident on both surfaces, secondary veins 4–6 pairs, margin serrate to serrulate with 35 or more teeth; racemes 9–12 mm long, axillary, bisexual, 1–2 pistillate flowers proximally, 9–14 staminate flowers distally; bracts 1.2–1.5 × 1–1.2 mm, ovate, concave, with malpighiaceous trichomes on both surfaces; staminate flowers: bud elongated, pedicels 1–1.3 mm long, sepals 5, 3.4–3.8 × 0.8–1.1 mm long, linear, margin entire, pubescent only on the abaxial surface, petals 5, 2.8–3 × 0.9–1.1 mm, elliptic, adnate to the staminal column, yellowish, margin entire, pubescent only on the veins of the abaxial surface, staminal column 2.9–3.1 mm long, free portion of the filaments 0.3–0.4 mm long, stamens 10 arranged in two whorls (5+5), pubescent at the top of the staminal column, staminodes absent, nectaries 5, ovate apiculate, base adnate to the staminal column; pistillate flowers: pedicels 1.3–2 mm long, sepals 5, 5–6.8 × 3.5–4.9 mm, ovate to lanceolate, apex acute, margin entire, pubescent on both surfaces; petals 5, 1.8–2.1 × 0.8–1 mm, linear to elliptic, base cuneate, apex acute, yellowish, pubescent on both surfaces, margin ciliate; nectaries 5, ligulate, adnate to the receptacle, alternate to the petals, ciliate; ovary pubescent, styles 1.9–2 mm long, bifid, free portion ca. 0.9 mm long, pubescent at the apex, stigmas flattened; capsule 6–9 × 4.5–6 mm, splitting at maturity into 3, 1-seeded cocci, densely pubescent; seeds 3.3–3.5 × 2.9–3 mm, oval, rounded to truncate at the base, acute apex, reticulate surface, gray to black.

**Etymology:** The specific epithet refers to the environment in which the species occur, which has limestone soils.

**Distribution and habitat:** *Argythamnia alcalina* is endemic to Brazil, and all of its records are from the states of Minas Gerais and Goiás (Fig. 2C). Four localities are known for the species, all belonging to seasonally dry tropical forest, as defined by Pennington *et al.* (2000), Prado (2000) and Särkinen *et al.* (2011). According to the classification by Morrone (2014) and IBGE (2004), this region is part of the Cerrado biome. However, based on the classification of vegetation for Brazil it is denominated "Floresta Estacional Decidual" (Veloso *et al.* 1991), "Floresta Estacional Decidual de Encosta", "Mata Seca de Calcário" or "Mata Calcária" (Fig. 4A) (Nascimento *et al.* 2004). The forests in these areas have above 50% of species with deciduous leaves in the in the dry season (April to September) and the most abundant taxa are from the Anacardiaceae, Bignoniaceae, Leguminosae, and Malvaceae families (Nascimento *et al.* 2004). The type locality is extremely degraded, in an initial succession stage, as the forest vegetation is composed of sprouts of native species, and currently the forest canopy does not exceed 10 meters in height. The area presents limestone soils, reddish in color, with exposed rocks in some places (Fig. 4B–C). The other three collection sites of *A. alcalina* also have limestone soils and seasonal forest. *Argythamnia alcalina* grows in dense and sporadic groups inside the forest and less often along the edges.

**Flowering and fruiting:** Flowering and fruiting from January–June, a period that partially corresponds to the rainy season in the region, which occurs from October/November to March.

**Conservation status:** Only seven collections of the new species are known from four localities. However, only the population of Santo Hipólito is known by the author. In this site, approximately 50 adult individuals and some juveniles were observed. Specimens from other sites do not present abundance information on labels. The species has an AOO of 20 km$^2$ and EOO of 29,197 km$^2$. The three collections *J. Külkamp et al. 912, 913* and *914* were considered a single point for the AOO and EOO estimation, as they were collected in the same local at distances of less than 10 meters from each other. Using the IUCN (2013) guidance, the species was classified as EN B2ab(i,ii,iii,v). The most prevalent threats to populations are the fragmentation of habitat by the suppression of vegetation by anthropic actions.

**Notes:** In addition to presenting similar morphology, *A. alcalina* is phylogenetically close to *A. grazielae* (endemic to the Caatinga) as can be seen in the phylogenetic reconstruction by Külkamp *et al.* (2023a), where these emerges as sister species. *Argythamnia alcalina* also emerges in a clade with the other species endemic of the Caatinga (Külkamp *et al.* 2020b), reinforcing the floristic similarity between the Caatinga and the Cerrado, both formations that have seasonally dry tropical forest in their composition.

*Argythamnia alcalina* is a rare species and only a few specimens have been gathered. According to the Minas Gerais state inventories of Meguro *et al.* (2007), where five seasonal forests on limestone soil areas were studied, the only site where the species was registered is Santo Hipólito. Seasonally dry tropical forests have been shown to be an

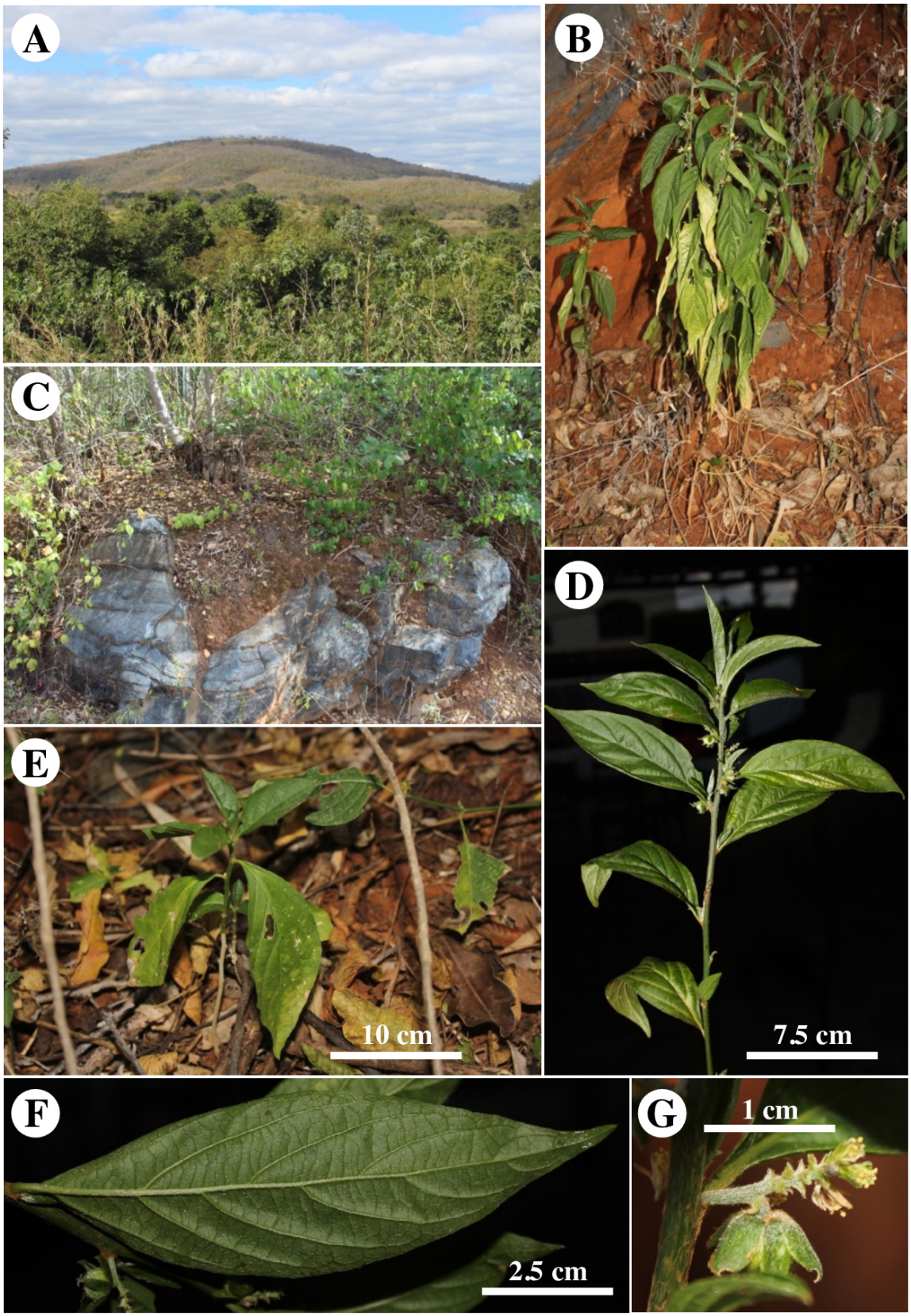


**Figure 4.** *Argythamnia alcalina*. **A.** Seasonally Dry Tropical Forest registered in Santo Hipólito, Minas Gerais, Brazil. **B.** Habit. **C.** Vegetation on soil with limestone outcrop, consisting of regrowth after total suppression of the area. **D.** Branch. **E.** Young individual registered in the type population. **F.** Abaxial surface of the leaf with evident veins. **G.** Inflorescence. Photos by J.Külkamp, based on the type specimen.

important formation for the occurrence of *Argythamnia*, and seasonal forests associated with limestone soil have contributed to micro-endemisms, such as *A. purpurascens* in Corumbá in Mato Grosso do Sul. Endemism associated with dry forests and calcareous soils is not new in the subfamily Acalyphoideae, and is a well-known case is *Leucocroton* alliance, with distribution in the Antilles (Jestrow *et al.* 2012).

**Paratypes:** BRAZIL. GOIÁS: São Domingos, ca. 50 km de São Domingos, Gruta Terra Ronca, 13°44'2"S 46°21'25"W, 580-700 m, 24 February 2003, (fl. fr.), *F. França 4666* (HUEFS). MINAS GERAIS: Itacarambi, nas redondezas do Parque Nacional Cavernas do Peruaçu, 15°14'23.5'' S 44°13'31.1'' W, 17 December 2018, (fl.), *J.F. Carrión et al. 1905* (HUEFS); Santo Hipólito, Estrada Corinto-Conselheiro Mata, a 6 km E de Santo Hipólito, 18°17' S 44°13'W, 550 m, 3 April 1996, (fl. fr.), *J.R. Pirani et al. 3729* (HUEFS, MBM, NY, SP, SPF); Santo Hipólito, 6 km após Santo Hipólito sentido Conselheiro Mata, margem da estrada, próximo a um bueiro, 5 metros no interior da mata, 18°17'23.2"S 44°11'15.1"W, 540 m, 18 June 2019, (fl. fr.), *J. Külkamp et al. 912* (BHCB, RB, SP, US); (fl. fr.), *J. Külkamp et al. 913* (HUEFS, K, MEXU, NY, RB, SPF); Varzelandia, Barreirinho, 7 February 1985, (fl.), *J.G. Silva & M. Menezes 1136* (IAB, R).

**4. *Argythamnia argothamnoides*** (Bertero ex Spreng.) J.W.Ingram, Bulletin of the Torrey Botanical Club 80(5): 423. 1953. *Croton argothamnoides* Bertero ex Spreng., Systema Vegetabilium, 3: 872. 1826. *Argythamnia argothamnoides* (Bertero ex Spreng.) Radcl.-Sm. & Govaerts, Kew Bulletin 52(2): 479. 1997. Type: COLOMBIA. MAGDALENA: Santa Martha, 1816-1821, *C.L.G. Bertero s.n.* (lectotype **designated here**: TO 6480! [specimen has a label written "HERB. BALBIS" in the lower right corner above the label with the data collection. The specimen is composed of a single branch of the plant]). Syntype remaining: COLOMBIA. MAGDALENA: Santa Martha, no date, *C.L.G. Bertero 1579* (TO 6480! [this specimen is mounted with another specimen, number 2767. However, the collector's name is illegible]).

= *Aphora blodgetti* Torr. ex Chapm., Flora of the Southern United States 408–409. 1860. *Ditaxis blodgettii* (Torr. ex Chapm.) Pax, Die Natürlichen Pflanzenfamilien 3(5): 45. 1890. *Argythamnia blodgettii* (Torr. ex Chapm.) Chapm., Flora of the Southern United States (ed. 3) 3: 431. 1897. Type: UNITED STATES. FLORIDA: Key West, *J.L. Blodgett s.n.* (holotype: NY [NY00246211]!).

= *Argythamnia savanillensis* Kuntze, Revisio Generum Plantarum 2: 593–594. 1891. Type: COLOMBIA. Savanilla. 31 May 1874, *O. Kuntze 1805* (lectotype **designated here**: NY [NY00246261!], isolectotype: K [K000600280]!).

= *Argythamnia fendleri* Müll.Arg., Linnaea 34(2): 145–146. 1865. *Ditaxis fendleri* (Müll.Arg.) Pax & K.Hoffm., Das Pflanzenreich IV.147.vi (Heft 57), 61. 1912. Type: VENEZUELA. MARACAYBO: *K. Moritz 1325* (lectotype **designated here**: HBG [HBG516357]!, isolectotype: HBG [HBG516404]!).

= *Argythamnia rubricaulis* (Pax & K.Hoffm.) Croizat, Ciencia (Mexico) 6(10–12): 353. 1946. *Ditaxis rubricaulis* Pax & K.Hoffm., Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem 10(94): 383–384. 1928. Type: VENEZUELA. Cabo blanco, dry ravine, 20 Feb 1922, *H. Pittier 10192* (lectotype **designated here**: GH [GH00047619]!, isolectotype: K [K000600278]!, US [US00109823]!).

**Description:** Subshrub to shrub monoiceous, without woody tubers; stems erect, internodes 10–22 mm long; leaves not rosulate, blade 2–5.5 cm long, elliptic to obovate, margin serrate, 14–22 teeth; racemes 4–8 mm long, 1 pistillate flower basal, 4–8 staminate flowers distally, with sepals ca. 3 mm long, staminal column ca. 2.2 mm long, stamens 9–10, staminodes 3, glabrous; pistillate flowers with pedicel 1–3.2 mm long, 5 sepals, margin entire, petals 5, 1.8–3 mm long, styles bifid.

**Distribution and habitat:** *Argythamnia argothamnoides* is distributed in the Antilles, the state of Florida in the United States, and in South America, in northern Colombia and Venezuela (Fig. 2B), in Guajira and Venezuelan provinces. It occurs mainly in seasonally dry open vegetation and coastal regions with sandy soil.

**Flowering and fruiting:** Flowers and fruits all year round.

**Notes:** *Argythamnia argothamnoides* has been widely collected, and due to nomenclatural problems and morphological variation, many names have been proposed for this taxon. Carlo Luigi Giuseppe Bertero traveled to the Antilles and Colombia between 1816-1821 and made many collections (Stafleu & Mennega 1992; Delprete *et al.* 2002). During the trip, he also described in his field diary the plant's morphology and local names, as well as uses and pharmacological properties (Delprete *et al.* 2002). The collections were sent to Giovanni Battista Balbis and Luige Colla in Turin, Italy (Delprete *et al.* 2002). Balbis received most of the collections from Bertero, and these were studied in part by Curt Sprengel and later distributed to other European herbaria (Delprete *et al.* 2002).

Based on the specimens collected by Bertero in the Antilles and Colombia, Sprengel (1826) described *Croton argothamnoides*, mentioning in the protologue Magdalena as type locality. Two specimens collected by Bertero in the town of Santa Marta (city of Magdalena in Colombia) were found in the TO herbarium with the same registration number (TO 6480). One of them, *Bertero s.n.* has the label "HERB. BALBIS", while the other, *Bertero 1579* does not have the label "HERB. BALBIS". We consider the two as different collections. Sprengel probably analyzed these two specimens for the description, and for this reason, we designate the specimen *Bertero s.n.* (HERB. BALBIS [TO 6480]), as the lectotype of *C. argothamnoides,* and the specimen *Bertero 1579* remains as a syntype. It is worth mentioning that on the same sheet as *Bertero 1579* there is another specimen with the number 2767. Despite being a

specimen of *A. argothamnoides*, nothing indicates that this material is part of Bertero's gathering.

For *A. blodgettii*, we consider the specimen *J.L. Blodgett s.n.* (NY00246211) as the holotype, because it is the only specimen found and was deposited in Torrey's private collection, author of the species.

*Argythamnia savanillensis* was described based on syntypes (without the indication of a specific specimen as type), so we designate here the specimen *O. Kuntze 1805* (NY00246261) as this name's lectotype.

Müller (1865) described *Ditaxis fendleri*, citing *Croton argothamnoides* as a synonym. This name is valid since it is based on a description and different specimens. In the protologue, the author refers to seven collections (syntypes) of *A. fendleri*. We treat *A. fendleri* as a synonym, and designate here the specimen *K. Moritz 1325* (HBG516357) as this name's lectotype. The remaining specimens we treat as syntypes.

Pax & Hoffmann (1928) described *D. rubricaulis* based on the collection *Pittier 10192*, without mentioning a specimen as a type. So, here we designate *Pittier 10192* (GH00047619) as lectotype of the name. We also consider this taxon as a synonym for *A. argothamnoides*, agreeing with previous authors (Ulloa *et al.* 2018).

**Selected specimens examined:** COLOMBIA. LA GUAJIRA: along the road, 30 Sep 1921, (fl. fr.), *H. Pittier 9847* (US). MAGDALENA: Santa Marta, Gaira, Aug 1898-1901, (fl. fr.), *H. Smith 1218* (US). VENEZUELA. MARACAIBO: 1893, (fl.), *Mocquerys 803* (COL). MERIDA: Cardonales, 600-700 m, 31 Aug 1966, (fl. fr.), *J.A. Steyermark et M. Rabe 97005* (US). NOVA ESPARTA: Pampatar, Dec 1951, (fl. fr.), *H. Gines 3116* (US). PUERTO DE HIERRO: Ensenada del Fraile, 21 Aug 1961, (fl. fr.), *L. Aristeguieta 4759* (US).

**5. *Argythamnia breviramea*** Müll.Arg., Linnaea 34: 146. 1865. *Ditaxis breviramea* (Müll.Arg.) Pax & K.Hoffm. Pflanzenr. IV.147.vi (Heft 57), 65. 1912. Type: BOLIVIA. LACAREJA: vicinity Quiabaya, inter Motoata et Milguaya, 2550 m, Mar-Apr 1861, *G. Mandon 1082* (lectotype designated by Külkamp *et al.* (2023b): G [G00313540]!, isolectotypes: P [P00634952]!, F [F873414]!, K [K000600279]!, P [P00634953]!, S [S07-12642]!).

**Description:** Shrub, dioecious or rare monoecious, without woody tubers; stems erect, internodes 1.2–21 mm long; leaves not rosulate, petiole 1–1.5 mm long, blade 0.9–3.2 cm long, elliptic, margin serrate rarely entire, 5–10 teeth rarely absent; racemes ca. 3 mm long, 1 pistillate flower, 2 staminate flowers, with sepals ca. 3.5 mm long, pubescent on abaxial surface, staminal column ca. 2 mm long, stamens 10, staminodes 5, pubescent; pistillate flowers with pedicel ca. 1 mm long, sepals 5, margin entire, petals 5, styles bifid.

**Distribution and habitat:** *Argythamnia breviramea* is distributed in northern Argentina, northern Paraguay, and southern Bolivia (Fig. 2C). It is restricted to arid regions in shrubby vegetation, between 350–2500 meters elevation, in the Chaco and Monte provinces.

**Flowering and fruiting:** *Argythamnia breviramea* has been collected fertile throughout the year.

**Notes:** Few cases of dioecy have been reported for *Argythamnia*. Most species are monoecious, such as *A. malpighiacea* Üle and *A. desertorum* (Külkamp *et al.* 2020a). Based on two specimens cited from Rio Negro, Argentina, O'Donell and Lourteig (1942) characterized *A. breviramea* as monoecious and reported the rare presence of pistillate and staminate flowers in the same specimen.

**Selected specimens examined:** ARGENTINA. CORDOBA: Ischilín. Entre Las Lajas y Masa, a +8 Km antes de Masa, 2 May 1958, (fl.), *A.T. Hunziker 13651* (CORD, MBM, RB, SI); FORMOSA: Pozo de Maza. 135 km al N de La Cañada del Rosillo, 16 Jun 1972, (fl.), *R. Burkart 31* (SI); LA RIOJA: General Belgrano. Sierra de los Llanos (Falda 0), Entre Olta y el dique homónimo, 19 Feb 1959, (fl. fr.), *A.T. Hunziker 13913* (CORD, SI); SALTA: Guachipas. La Viña, RN68, Em vale próximo a rodovia, 25°50'45.5"S, 65°42'09.0"W, 26 Oct 2018, *J. Külkamp 563* (RB); SANTIAGO DEL ESTERO: Pellegrini. Cerro de Remate, 2 Apr 1989, (fl.), *T.M. Pedersen 15364* (MBM, SI); BOLIVIA. Región Andina. Cataña. 2450 m, Nov 1911, (fl. fr.), *B. Otto 3308* (NY, US); SANTA CRUZ: Curuyuqui. 50 km SE of Santa Cruz on Rio Parapeti, upland chaco, 18°45'56"S, 62°13'59"W, 350 m, 25 Oct 1991, *A. Gentry, R. Foster et M. Peña 75208* (NY). PARAGUAY. ALTO PARAGUAY: Mayor Pablo Lagerenza. 6 Apr 1978, (fl. fr.), *A. Schinini et E. Bordas 14996* (SI). NUEVA ASUNCIÓN: Circa de Estancia Capagro, 586 km de Asuncion, 7 Mar 1980, (fl), *Bernardi 20207* (NY, MO).

**6. *Argythamnia cuneifolia*** (Pax & K.Hoffm.) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 422. 1958. *Ditaxis cuneifolia* Pax & K.Hoffm., Pflanzenr. 4. 147(6), 57, 180. 1924. Type: BRAZIL. ESPÍRITO SANTO: Rio Mutum, Feb 1917, *P. Luetzelburg 7181* (holotype: M [M0244038]!).

**Description:** Herb monoecious, without woody tubers; stems erect, internodes longer than ca. 10 mm; leaves not rosulate, blade 9–13 cm long, spatulate to obovate, margin dentate; racemes ca. 60 mm long; 1 pistillate flower; staminate flowers 4–7, stamens 10; staminodes non seen; pistillate flowers with a pedicel ca. 3.5 mm long, sepals 5, margin entire, petals 5, styles bifid.

**Distribution and habitat:** *Argythamnia cuneifolia* is endemic to the state of Espírito Santo, Brazil (Fig. 2B) and is restricted to the Seasonally Dry Tropical Forest biome in the Atlantic province.

**Flowering and fruiting:** The only known collection was collected in February.

**Notes:** *Argythamnia cuneifolia* is one of the rarest species of *Argythamnia*, known only from the type collection, which only consists of the holotype deposited in the herbarium M, the destination of Luetzelburg collections (Stafleu & Cowan

1976). The species has not been encountered for more than 105 years, and it is listed as a possibly extinct species on the list of threatened flora and fauna of Espírito Santo (Fraga *et al.* 2019). Expeditions to the region were not successful in finding the species, and the area has been heavily impacted with only a few fragments of native vegetation remaining. New explorations will be conducted to search for the species.

**7. *Argythamnia desertorum*** Müll.Arg., Flora Brasiliensis 11(2): 310. 1874. *Ditaxis desertorum* (Müll.Arg.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 62. 1912. Type: BRAZIL. BAHIA: In silvis Catingas inter Feira de Santana, et Queimadas desertis, no date, *C.F.P. Martius s.n.* (lectotype designated by Külkamp *et al.* 2020b: M [M0244039]!, isolectotypes: G [G00434812]!, M [M0244040]!).
=*Argythamnia gardneri* Müll.Arg. Flora Brasiliensis 11(2): 310. 1874. *Ditaxis gardneri* (Müll.Arg.) Pax & Hoffmann Pflanzenr. IV.147.vi (Heft 57), 61. 1912. Type: BRAZIL. PIAUI: 1839, *G. Gardner 2444* (lectotype designated by Külkamp *et al.* 2020b: K [K000600284]!; isolectotypes G [G00434850]!, G [G00434851]!, K [K000600285]!, L!, W!).
**Description:** Shrub monoecious, without woody tubers; stems erect, internodes 3–40 mm long; leaves not rosulate, blade 1.5–9 cm long, obovate, elliptic or lanceolate, upper half margin serrate to entire, 5–8 teeth, rarely absent; racemes 10–40 mm long, 1 basal pistillate flower, 3–6 distal staminate flowers, stamens 10, staminodes 5, pubescent; pistillate flower pedicel 6–15 mm long, sepals 5, margin entire, petals 5, styles bifid.
**Distribution and habitat:** The species is endemic to northeastern Brazil (Fig. 2B), where it is widely distributed in Caatinga province associated with arboreal and shrubby vegetation. The Caatinga is one of the largest provinces that make up the Seasonally Dry Tropical Forest biome, further reinforcing the pattern of distribution of the genus in these environments and their importance for the conservation of the genus.
**Flowering and fruiting:** *Argythamnia desertorum* has been collected fertile throughout the year. A detailed discussion about this species is presented in Külkamp *et al.* (2020b).
**Selected specimens examined:** BRAZIL. ALAGOAS: Água Branca, 9°17'57"S, 37°55'44"W, 31 August 2013, *M.C.S. Mota 12077* (RB). BAHIA: Bom Jesus da Lapa, 13°15'00"S 43°25'00"W, 11 April 2005, (fl. fr.), *J.G.C. Sobrinho 504* (HUEFS); Iaçu, 12°48'24"S 40°07'23"W, 14 December 2018, (fl. fr.), *J. Külkamp et al. 631* (RB). CEARÁ: Baturité, 4°17'32"S 38°54'58"W, 13 July 1908, (fr.), *A. Ducke 1238* (RB). MINAS GERAIS: Monte Azul, 15°14'06"S 42°54'48"W, 22 April 2006, *D.S. Carneiro-Torres 725* (HUEFS). PARAÍBA: Cacimba de Dentro, 6°40'60"S 35°44'59"W, 13 April 2002, (fl.), *M.R. Barbosa 2375* (HUEFS); PERNAMBUCO: Arcoverde, 8°25'08"S 37°03'14"W, 29 March 2006, (fl. fr.), *D. Costa et M.B. Silva 2137* (HUEFS). PIAUÍ: São José do Piauí, 6°52'18"S 41°28'31"W, 12 February 2002, (fl. fr.), *M.R.A. Mendes 541* (EAC). RIO GRANDE DO NORTE: Areia Branca, 4°57'16"S 36°56'39"W, 4 September 2016, (fl. fr.), *E.O. Moura 602* (UFRN). SERGIPE: Frei Paulo, 10°32'58"S 37°32'03"W, 11 November 1986, (fl. fr.), *G. Viana 1647* (ASE).

**8. *Argythamnia dioica*** (Kunth) Müll.Arg., Linnaea 34: 145. 1865. *Ditaxis dioica* Kunth, Nova Genera et Species Plantarum, 7: 130, pl. 639. 1825. Type: PERU. JAEN: Jaen de Bracamoros, Ripam fluminis Amazonum, *M.A. Bompland & A. Humboldt 3604* (lectotype **designated here**: P [P00634954]!, isolectotypes: P [P00634955]!, G [G00434811]!.
**Description:** Subshrub to shrub dioecious, without woody tubers; stems erect, internodes 1–10 mm long; leaves not rosulate, blade 0.8–7.3 cm long, elliptic, margin serrate, 12–25 teeth; racemes 1–8 mm long, 1 pistillate flower, 3–8 staminate flowers, stamens 10, staminodes 4, pubescent; pistillate flowers with a pedicel 6–8 mm long, sepals 5, margin entire, petals 5, 4–5.5 mm long, linear, styles bifid.
**Distribution and habitat:** The species is endemic to the Yunga province in northern Peru (Fig. 2A). The environment in which the species occurs is a shrubby vegetation on dry and stony slopes.
**Flowering and fruiting:** *Argythamnia dioica* has been collected fertile from November to May.
**Notes:** Carl Sigismund Kunth studied and described many of the species collected by Humboldt and Bonpland during the expedition to South America; most of the collections of the expedition were sent to Kunth in Paris, to be part of his own collection, which was later incorporated into the herbarium P (Stafleu and Cowan 1976). In the protologue of *A. dioica*, Kunth (1825) presents an illustration and the location of the type collection (Jaen de Bracamoros Province), without collector and number data. In herbarium P, we found two specimens (syntypes) *M.A. Bompland & A. Humboldt 3604* with the same location indicated by Kunth in the protologue. Thus, here we choose *M.A. Bompland & A. Humboldt 3604* (P00634954) as the lectotype of *A. dioica* and as the illustration forms part of the original material, it remains a syntype.

*Argythamnia dioica* is known from only a few specimens and is one of the few species that presents a dioecious sexual system. New collections and field observations are still necessary to determine whether this species has variation in its sexual system, such as the cases of *A. desertorum* and *A. malpighiacea*, as pointed out by Külkamp *et al.* (2020b).

**Selected specimens examined:** PERU. AMAZONAS: Chachapoyas, Balsas, 1000 m, 14 Apr 1982, (fr.), *I. Sanchez 2795* (SI, US). CAJAMARCA: Jaen, Pucará, 1000 m, 28 Dec 1999, (fl.) *R. Rojas et al. 845* (NY). Santa Rosa: 1000 m, 22 Apr 1950, (fl.), *F. Woytkowski 5733* (US).

**9. *Argythamnia erubescens*** J.R.Johnst., Proceedings of the American Academy of Arts and Sciences 40: 689. 1905. *Ditaxis erubescens* (J.R.Johnst.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 57. 1912. Type: VENEZUELA. ILHA

MARGARITA: 21 Aug 1903, *J.R. Johnston 58* (lectotype **designated here**: GH [GH00045749]!, isolectotypes: F [F0056240F]!, K [K000600283]!, NY [NY00246258]!, US [US00109837]!). Remaining syntype: VENEZUELA. ILHA MARGARITA: El Valle, 22 Jul 1901, *O.O. Miller & J.R. Johnston 213* (NY [NY00246257]!).

**Description:** Shrub dioecious, without woody tubers; stems erect, internodes 3–20 mm long; leaves not rosulate, blade 0.9–3.5 cm long, elliptic to lanceolate, margin serrulate, with 8–10 teeth; racemes 2–5 mm long, 1 pistillate flower, 2–4 staminate flowers, with sepals 3.9–4.1 mm long, pubescent on both surfaces, staminal column ca. 3.5 mm long, stamens 10, staminodes 4, pubescent; pistillate flowers with pedicel ca. 2 mm long, sepals 5, margin entire, petals 5, styles bifid.

**Distribution and habitat:** The species is endemic to the northern of Venezuela and restricted to Margarita Island (Fig. 2C), occurring in seasonally dry tropical forest, in the Venezuelan province.

**Flowering and fruiting:** *Argythamnia erubescens* has been collected fertile from June to December.

**Notes:** In the protologue of *Argythamnia erubescens*, Johnston (1905) mentions two collections as type material (syntypes). Following art. 9.3 of the ICN, we chose *J.R. Johnston 58* (GH00045749) as lectotype for the name. This is a rare species, and until now represented only by the type specimens in herbarium collections. *Argythamnia erubescens* is morphologically similar to *A. polygama*.

**10. *Argythamnia grazielae*** (Külkamp) Külkamp & Riina, Biology, 12(2):173. 2023. *Ditaxis grazielae* Külkamp, Phytotaxa 455 (2): 152–160. 2020. Type: BRAZIL. BAHIA: Wanderley, 25 January 1996 (fl. fr.), *B.R. Chagas s.n.* (holotype: RB [RB00084882]!, isotypes: CEPEC [CEPEC131190]!, K [K001206888]!, MG!, NY [NY01183998]!, SPF [SPF196837]!).

**Description:** Herbs not acaulescent to subshrubs, monoecious, without woody tubers; stems erect, internodes 5–35 mm long; leaves not rosulate, blade 1.8–6.5 cm long, lanceolate, margin serrate to serrulate, 20–34 teeth; racemes 4–7 mm long, 1 pistillate flower, basal, 7–10 staminate flowers, distal, sepals 3.1–3.2 mm long, staminal column 1.2–1.5 mm long, stamens 10, staminodes 4, pubescent; pistillate flowers with pedicel 1.5–2.5 mm long, sepals 5, margin serrate, petals 5, 1.5–2 mm long, styles bifid.

**Distribution and habitat:** *Argythamnia grazielae* is endemic to the state of Bahia, in Brazil (Fig. 2C); has been collected in environments with anthropogenic disturbances and in the understory of open arboreous Caatinga, at elevations from 470 to 800 meters. This region is classified in the Caatinga province, one of the largest seasonally dry tropical forest areas in South America (Särkinen *et al.* 2011).

**Flowering and fruiting:** Flowers and fruits can be found throughout the year, but especially after rainy periods.

**Notes:** This species occurs in the same area as *A. desertorum* and *A. malpighiacea*, but is morphologically similar to *A. alcalina* (Minas Gerais and Goiás states, Brazil) and *A. argothamnoides* (Venezuela). Phylogenetically, *A. grazielae* is sister to *A. alcalina,* and both form a clade with the other species of the Caatinga (Külkamp *et al.* 2023a).

**Selected specimens examined:** BRAZIL. BAHIA: Juazeiro, Distrito de Massaroca, Caatinga, 9°50'53"S, 40°19'5"W, 470 m, 12 Jun 2009, (fl. fr.), *E. Melo et al. 6325* (HUEFS). Jussara, Toca, Propriedade de Lindomar, 11°05'58"S, 41°55'18"W, 18 Dec 2018 (fl.), *J. Külkamp et al. 689* (MEXU, R, RB, SPF). Morro do Chapéu, APA Gruta dos Brejões, Vereda do Romão Gramacho, 2 Oct 2009 (fl. fr.), *R.F. Machado 417* (HUEFS). São Gabriel, Fazenda Boa Sorte, area antropizada, 11°1'S, 41°39'W, 800 m, 5 Apr 2009 (fl. fr.), *R.F. Machado et al. 205* (HUEFS).

**11. *Argythamnia illimaniensis*** (Baill.) Müll.Arg., Linnaea 34: 146. 1865. *Ditaxis illimaniensis* Baill., Étude générale du groupe des Euphorbiacées 299. 1858. Type: BOLIVIA. COTAGNA: Vallée Chaude au pied de l'Illimani, 1839, *J.B. Pentland 34* (lectotype **designated here**: P [P00634957]!, isolectotype: P [P00634956]!).

**Description:** Shrub dioecious, without woody tubers; stems erect, internodes 1.2–20 mm long; leaves not rosulate, petiole ca. 10 mm long, blade 0.9–3.2 cm long, lanceolate, margin serrate, 5–9 teeth, rarely entire; racemes ca. 3 mm long, 1 pistillate flower, 2 staminate flowers with sepals ca. 3.5 mm long, pubescent on abaxial surface, staminal column ca. 2 mm long, stamens 10, staminodes 5, pubescent; pistillate flowers with pedicel 1–1.8 mm long, sepals 5, margin entire, petals 5, styles bifid.

**Distribution and habitat:** *Argythamnia illimaniensis* is endemic to northern Bolivia (Fig. 2A), occurring in arid regions with shrubby vegetation, in the Yungas province.

**Flowering and fruiting:** The period of flowering and fruiting is not known.

**Notes:** Baillon (1858) presented a description of the genus *Ditaxis* and included only a species list with their type specimens, without any descriptions. For *A. illimaniensis* the author mentions *Pentland 4*, but analyzing this collection, we found that it belongs to *Solanum corymbosum* Jacq. Later, Müller (1865) described *A. illimaniensis* and indicated the specimen *J.B. Pentland 34* as type. Here we accept this specimen as the type of the name, as it is the only collection of *Argythamnia* made by Pentland. In the P herbarium there are two syntypes *J.B. Pentland 34*, and here we chose the specimen P00634957 as lectotype of *A. illimaniensis*. This is a rare species, known only by the type from La Paz region in Bolivia, and is morphologically similar to *A. breviramea*.

**12. *Argythamnia jablonszkyana*** (Pax & K.Hoffm.) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 423. 1958. *Ditaxis jablonszkyana* Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 60. 1912. Type: ARGENTINA. CATAMARCA: Campo de Pilciao, Mar 1873, *F. Schickendatz 229* (lectotype **designated here**:

G [G00434847], isolectotypes: CORD [CORD00003090]!, GOET [GOET006401]!, K [K000600277]!). Remaining syntypes: ARGENTINA. CATAMARCA: Medanos del Pilciao, Jan 1876, *F. Schickendatz 163* (CORD [CORD00003092]!). ARGENTINA. CATAMARCA: Pilciao, Dec 1872, *F. Schickendatz 275* (CORD [CORD00003091]!).

**Description:** Herbs, monoecious, non-acaulescent, without woody tubers; stems erect, internodes 2–5 mm long; leaves not rosulate, blade 1–3.5 cm long, lanceolate to elliptic, margin entire; racemes 3–6 mm long, 1 pistillate flower, basal, 5–7 staminate flowers, distal, with 10 stamens, staminodes 2, glabrous; pedicel of the pistillate flower 1–2.5 mm long; pistillate flowers, sepals 5, ca 2.5 mm long, margin entire, petals 5, ca. 3.6 mm long, styles 3, entire, glabrous.

**Distribution and habitat:** *Argythamnia jablonszkyana* is endemic to northwest Argentina (Fig. 2A). It occurs in arid regions with shrubby vegetation at elevation from 800 to 1400 meters, in Monte province.

**Flowering and fruiting:** Flowering and fruiting from September to May.

**Notes:** Grisebach (1879) described *Aphora catamarcensis* based on two collections that belong to two different species. Realizing this, Pax & Hoffmann (1912) proposed *Ditaxis jablonszkyana* based in part on the type material of the *A. catamarcencis* Pax & Hoffmann (1912). They included three different collections (syntypes), and we choose *F. Schickendatz 229* (G00434847) as lectotype for the name. The other collections, *F. Schickendatz 163* and *F. Schickendatz 275* we treat as remaining syntypes.

**Selected specimens examined:** ARGENTINA. CATAMARCA: Andalgalá, 23 May 1943, (fl. fr.), *H.H. Bartlett 20245* (NY, SI, US). LA RIOJA: Gral. Lavalle, Ruta Villa Unión a Patquia, Entre Pagancillo y El Balde, 1200 m, 15 Dec 1973, (fl. fr.), *A.T. Hunziker 22428* (MBM, SI). SAN JUAN: Marayes, entre Marayes e lago salina de Mascasin pela ruta 141, margem da estrada (direito em direção ao lago) entre o km 94 e 95; 31°28'9"S, 67°13'1"W, 508 m, 26 Feb 2020, (fl. fr.), *J. Külkamp 1246* (BA).

**13. *Argythamnia katharinae*** (Pax) Croizat, Ciencia (Mexico) 6(10–12): 353. 1946. *Ditaxis katharinae* Pax, Pflanzenr. IV.147.vi (Heft 57), 56. 1912. Type: PERU. CAJAMARCA: Pacasmayo, Los Reyes, 1000-1100 m, *A. Weberbauer 4810* (lectotype **designated here**: MOL00002072!, isolectotype: MOL00002073!). Remaining syntype: PERU. CAJAMARCA: Pacasmayo, Los Reyes, 1000-1100 m, *A. Weberbauer 4809* (no found).

**Description:** Shrub monoecious, without woody tubers; stems erect, internodes longer than ca. 12 mm long; leaves not rosulate, blade 3–5.5 cm long, obovate to obovate-lanceolate, margin with 12–22 teeth; racemes 5–12 mm long, 1 pistillate flower basal, 5–8 staminate flowers distally; sepals of staminate flower 8–9 mm long, stamens 10, staminodes 5, pubescent; pistillate flower with pedicel of 8–13 mm long, sepals 5, margin entire, petals 5, styles bifid, pubescent; seeds with smooth surface.

**Distribution and habitat:** *Argythamnia katharinae* is endemic to northwestern Peru (Fig. 2C). It occurs in shrubby vegetation and elevations ranging from 800 to 1100 meters, in the Puna province.

**Flowering and fruiting:** Flowering and fruiting in February.

**Notes:** Pax & Hoffmann (1912) indicated in the protologue of *D. katharinae* two syntypes as original material (*A. Weberbauer 4809* and *A. Weberbauer 4810*). Both collections were in the herbarium B and were destroyed during World War II. Weberbauer's main collections are at La Molina herbarium (MOL), and we found two specimens of *A. Weberbauer 4810* and none under the number 4809. Here we choose the specimen *A. Weberbauer 4810* (MOL0002072) as lectotype. *Argythamnia katharinae* is known from few specimens. Thus, field expeditions are necessary to understand the variation and conservation status of this taxon.

**Selected specimens examined:** PERU. CAJAMARCA: San Miguel, El Papayo, La Florida, 800 m, 1 Feb 1986, (fl.), *S.L. Quiroz 1760* (F).

**14. *Argythamnia macrantha*** (Pax & K.Hoffm.) Croizat, Ciencia (Mexico) 6: 353. 1946. *Ditaxis macrantha* Pax & K.Hoffm., Pflanzenr. IV. 147. vii (Heft 63), 426. 1914. Type: ECUADOR. Agua Amarga. El Recreo, 15 Jan 1897, *H.F.A. Eggers 15557* (lectotype **designated here**: US [US00109818]!, isolectotypes: F [F0056241F]!, GH [GH00047617]!, P [P04811592]!, S [S07-12980]!).

**Description:** Shrub, dioecious, without woody tubers; stems erect, internodes 2–25 mm long; stipules 1–2.5 mm long; leaves not rosulate, blade 2–8.7 cm long, obovate, margin serrate, 20–30 teeth, densely covered by malpighiaceous trichomes; racemes 4–9 mm long, 1–3 pistillate flowers, 3–7 staminate flowers with 10 stamens; pistillate flowers with a pedicel 6–10 mm long; sepals 5, margin entire, petals 5, 6–10 mm long, lanceolate, elliptic or oblanceolate, style and stigma ca. 3 mm long, styles bifid (with an inconspicuous second division at the apex), pubescent.

**Distribution and habitat:** *Argythamnia macrantha* is distributed in northwestern Peru and central-west Ecuador (Fig. 2B). This is the only species of the genus occurring in Ecuador, but the review of local herbaria and field expeditions may reveal the occurrence of other species, considering that there are poorly known areas of seasonal forest in the country. It occurs in shrubby and open arboreous vegetation at elevations ranging from 400 to 600 meters.

**Flowering and fruiting:** Flowering and fruiting in February.

**Notes:** Pax & Hoffmann (1914) described *D. macrantha* but did not indicate a main specimen. The description probably was based solely on the specimen deposited in the

B herbarium, where the authors worked, but this collection was destroyed during World War II. Thus, it is necessary to choose a lectotype for the name. Here we designate the specimen *H.F.A. Eggers 15557* (US00109818) as lectotype.
**Selected specimens examined:** PERU. TUMBES: Region del Pampa Hospital, 500 m, 10 Feb 1947 (fl. fr.), *O.V. Nuñez 345* (US).

**15. *Argythamnia malpighiacea*** Ule, Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 42: 217. 1908. *Ditaxis malpighiacea* (Üle) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 60. 1912. Type: BRAZIL. PIAUÍ: Im Walde unterhalb der Serra da Lagoa, Jan 1907, *E.H.G. Ule 7448* (lectotype designated by Külkamp *et al.* 2020b: HBG [HBG516356]!, isolectotypes: G [G00434846]!, K [K000600286]!).
**Description:** Subshrub to shrub, monoecious, without woody tubers; stems erect, internodes 3–30 mm long; leaves not rosulate, blade 1.5–7 cm long, ovate, lanceolate to elliptic margin entire; racemes 4–10 mm long, 2–3 pistillate flowers, 5–11 staminate flowers with 10 stamens, staminodes 3, pubescent; pistillate flowers with a pedicel 0.7–1.5 mm long, sepals 5, ca. 8 mm long, margin entire at anthesis, serrate in fruit, petals 5, ca. 1.7 mm long, styles bifid, pubescent.
**Distribution and habitat:** *Argythamnia malpighiacea* is endemic to northeastern Brazil (Fig. 2A). It occurs in shrubby and open arboreous vegetation at elevations ranging from 400 to 1150 meters, in the Caatinga province, one of the largest areas of the Seasonally Dry Tropical Forest biome.
**Flowering and fruiting:** Flowers and fruits throughout the year, usually blooming after the rains, in January to June.
**Notes:** This is an endangered (EN) species (Külkamp *et al.* 2020b), since its habitat is under constant anthropogenic pressure and the main threat is the severe fragmentation of the environment.
**Selected specimens examined:** BRAZIL. BAHIA: Abaíra, 13°14'00"S 41°51'00"W, 12 Mar 1992, (fl. fr.), *B. Stannard 51884* (HUEFS); Mucugê, 13°08'24"S 41°23'08"W, 16 Dec 2018, (fl.), *J. Külkamp et al. 658* (RB). CEARÁ: Baturité, 4°19'58"S 38°52'26"W, 12 Apr 1909, (fr.), *A. Ducke 1982* (RB). MINAS GERAIS: Jaíba, 15°16'39"S 43°23'55"W, 22 Apr 2006, (fl. fr.), *D.S. Carneiro- Torres 737* (HUEFS).

**16. *Argythamnia malpighipila*** (Hicken) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 423. 1958. *Croton malpighipilus* Hicken, Physis. Revista de la Sociedad Argentina de Ciencias Naturales 2: 106. 1916. *Ditaxis malpighipila* (Hicken) L.C. Wheeler, Contributions from the Gray Herbarium of Harvard University 124: 39. 1939. Type: ARGENTINA. RIO NEGRO: General Roca, 250-360 m, Sep 1914 to Feb 1915, *W. Fischer 190* (lectotype **designated here**: SI [SI001366]!, isolectotypes: BKL [BKL00000632]!, CM [CM1260]!, F [F0056160F]!, GH [GH00047338]!, K [K000574047]!, NY [NY03932713]!, SI [SI001367]!, SI [SI001368]!, SI [SI001369]!, SI [SI001370]!, US [US00109610]!).
**Description:** Subshrub, dioecious, without woody tubers; stems prostrate, internodes 0.3–0.5 mm long; leaves not rosulate, blade 0.5–0.7 cm long, elliptic, margin entire; inflorescences 1.5–2 mm long, pistillate flower solitary, staminate flowers solitary or rarely 2–5, with 10 stamens, 3 staminodes, glabrous; pistillate flowers, sepals 5, margin entire petals 5, styles connate to apex, pubescent.
**Distribution and habitat:** *Argythmania malpighipila* is endemic to Argentina (Fig. 2A), and the middle Andes Mountain range is the area with most records, from 400 to 1700 meters. It occurs in arid open areas, usually on rocky plateaus with red soil, in the Monte province.
**Flowering and fruiting:** Flowers and fruits from November to March.
**Notes:** Hicken (1916) described *Croton malpighipilus* (basionym of *Argythamnia malpighipila*) based on *W. Fischer 190*. The author does not mention the collection location nor the herbarium where the specimen is deposited. In an exhaustive search, we located 12 *W. Fischer 190* specimens (syntypes) with the collection site as Rio Negro, Argentina. There are five duplicates at the San Isidro (SI) herbarium (Instituto de Botánica Darwinion), where Hicken worked during the time that the taxon was described. Here we chose the specimen *W. Fischer 190* (SI001366) as the lectotype.

This species' peculiar growth form has attracted the attention of botanists because it generally does not exceed 30 cm tall and has a thickened stem with a diameter of 4–10 cm. The architecture of the branches makes the plants resemble cushions in the desert, as mentioned on herbarium labels and observed in the field. This species is sister to *A. jablonszkyana*, and they form the clade sister to all other South American *Argythamnia* (Külkamp *et al.* 2023a).
**Selected specimens examined:** ARGENTINA. BUENOS AIRES: Despeñadero, 15 Feb 1945, (fl.), *R. Huidobro 1249* (US). MENDONZA: Potrerillos, Montanhas entre Ruta 7, Av. Los Condores (89) e Lago, 32°57'24"S 69°12'31"W, 1503 m, 24 Feb 2020, (fl.), *J. Külkamp 1245* (BA). RIO NEGRO: General Roca, 57 km N de Barda del Medio por Ruta Nac. 151, 400 m, 7 Dec 1997, (fr.) *R.H. Fortunato et al. 5720* (NY). SAN JUAN: Valle Fertil, Ruta 150, Ischigualasto (reserva provincial), subiendo la Formación Los Colorados desde el Rio de La Sal, 27 Dec 1997, (fl. fr.), *F. Biurrun et al. 5007* (SI).

**17. *Argythamnia montevidensis*** (Didr.) Müll.Arg., Linnaea 34: 147. 1865. *Stenonia montevidensis* Didr. Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn 148: 1857. *Ditaxis montevidensis* (Didr.) Pax, Die Natürlichen Pflanzenfamilien 3(5): 45. 1890. Type: URUGUAY. MONTEVIDEO: *C.F.E. Otto s.n.,* (holotype C (mounted on 2 sheets) [C10011214]!, C [C10011215]!). = *Ditaxis trinervia* Baill., Adansonia 4: 271. 1864. Type: BRAZIL. RIO GRANDE DO SUL: 1824, *F. Sellow s.n.* [correct: *F. Sellow d 1011*] (lectotype designated by Külkamp *et al.*

(2023b): P [P04811562!]; isolectotypes: BR [BR590560]!, C [C10011214]!, G [G00434845]!, G [G00434844]!, P [P04811566]!, TUB [TUB009143]!, W [W0060337!]). Remaining syntype: URUGUAY. Banda Oriental del Uruguay, *St.-Hilaire, A. C2-2456* (P [P04811555]!). Additional information: There are photographs of the destroyed type specimen at F 211525 and NY.
=*Ditaxis triplinervia* Klotzsch, Arch. Naturgesch. 7: 199. 1841. (not validly published).
= *Aphora catamarcensis* Griseb. Abh. Königl. Ges. Wiss. Göttingen 24: 58. 1879. *Argythamnia catamarcensis* (Griseb.) Hieron. Bull. Acad. Nac. Cordova 4: 449. 1881. *Ditaxis catamarcensis* (Griseb.) Pax, Nat. Pflanzenfam 3(5): 45. 1890. Type: ARGENTINA. CATAMARCA: Quebrada de Tala, Nov 1872, *Lorentz, P.G. & Hieronymus, G. 477* (lectotype designated by Külkamp *et al.* (2023b)): GOET [GOET006400]!, isolectotypes: CORD [CORD00005966!], GOET [GOET006399]!, K [K000600276]!). Additional information: Photographs of the type specimen destroyed exist at the F 211516 and NY.
**Description:** Herb not acaulescent to subshrub, monoecious, without woody tubers; internodes 8–32 mm long; leaves not rosulate, blade 0.8–5.2 cm long, lanceolate to elliptic, margin serrate, 2–10 teeth; inflorescences 6–9 mm long, 1 pistillate flower basal, 2–5 staminate flowers distal, with 8 stamens in two whorls (5+3), staminodes 3, glabrous; pistillate flowers, sepals 5, margin entire, petals 5, styles bifid, pubescent.
**Distribution and habitat:** *Argythamnia montevidensis* is distributed in Argentina, Bolivia, Brazil, Paraguay and Uruguay (Fig. 2B). Its occurs in open areas of the Chaco and Pampa provinces associated with sparse tree vegetation, at elevations ranging from 300 to 800 meters.
**Flowering and fruiting:** *Argythamnia montevidensis* has been collected fertile throughout the year.
**Notes:** *Argythamnia montevidensis* presents great morphological variation depending on the environment in which it occurs across its range. After analyzing the type specimens, Külkamp *et al.* (2023b) observed that the morphology of *Argythamnia catamarcensis* and *A. montevidensis* strongly overlap, so they treated *A. catamarcensis* as a new synonym for *A. montevidensis*. The species is similar to *A. salina* but can be distinguished by being exclusively monoecious, while *A. salina* is dioecious. The lectotypification of *Argythamnia trinervia* was detailed by Külkamp *et al.* (2023b).
**Selected specimens examined:** ARGENTINA. CATAMARCA: Alredores de Capital, 6 May 1910, (fl. fr.), *Castillon 1565* (NY, US). CORDOBA: Cordoba. Chacra de La Merced, cerca del Puente Negro, 16 Nov 1949, (fl. fr.), *A.T. Hunziker 8094* (CORD); Parque Sarmiento, bosque nativo, 31°25'50"S, 64°10'20"W, 27 Feb 2020, (fl. fr.), *J. Külkamp 1250* (BA). CORRIENTES: Maraetá. Ruta 14, Caminho antes de Maraetá, 27 Apr 1953, (fl. fr.), *E.G. Nicora 6360* (SI). JUJUY: Capital. Santo Domingo, entre El Bordo y El Barrial, 20 Apr 1955, (fr.), *A.T. Hunziker 11017* (RB); La Rioja: Angel V. Peñaloza. Ruta 29, al Sur de Punta de los Llanos, entre el desvio a Tama y Carrizal, 19 Mar 1960, (fl. fr.), *A.E. Cocucci et T.E. Fulvio 16087* (CORD). SALTA: Anta. San Severo, 35 km al NE de J.V. Gonzales, ruta 44, 320 m, 14 Feb 1984, (fl.), C.S. *Toledo 863* (SI). San Luis: Altos Ponchos. Feb 1914, (fl. fr.), *B. Carette 82* (SI). SANTIAGO DEL ESTERO: Espada. 10 Jan 1939, (fl. fr.), *J.L. Argañarás 148* (SI). TUCUMAN: Burruyacú. Cerro del Campo, 800 m, 1928, (fl. fr.), *S. Venturi 7660* (SI, US); BOLIVIA. SANTA CRUZ: Cordillera. Parque Nacional Kaa-Iya del Gran Chaco, alrededores del Puesto Militar 27 de Noviembre, rodeado de bosque chaqueño xérico, 15 Sep 1998, (fl. fr.), *A.F. Fuentes 2544* (MO). BRAZIL. MATO GROSSO DO SUL: Porto Murtinho, Apr 2001, *A. Pott et al. 8878* (HMS, RB); RIO GRANDE DO SUL: Barra do Quaraí. Parque Estadual do Espinilho, 30°11'28"S, 57°31'30"W, 12 Oct 2017, (fl. fr.), *J. Külkamp et al. 367* (ICN, RB); PARAGUAY. BOQUERÓN: Rio Pilcomayo, 1888-1890, (fl.), *T. Morong 996* (NY, US935668, US209700); CHACO: Agua Dulce. 4 Oct 1979, (fl. fr.), *A. Schinini et E. Bordas 18064* (SI). Gran Chaco: Loma Clavel, Nov 1903, (fl. fr.), *E. Hassler 2471* (F). URUGUAY. MONTEVIDEO: Montevideo. 1 Feb 1877, (fl. fr.), *Fruchat s.n.* (US28124490). RIO NEGRO: Campos Mafalda, ruta 24, km 46, 32°51'S, 58°00'W, 5 Feb 1997, (fl. fr.), *E. Marchesi et M. Vignale s.n.* (MVFA26641). SORIANO: Vera, no date, (fl. fr.), *M. Berro 48* (MVM).

**18. *Argythamnia polygama*** (Jacq.) Kuntze, Revisio Generum Plantarum 2: 594. 1891. *Croton polygamus* Jacq., Enumeratio Systematica Plantarum, quas in insulis Caribaeis 32. 1760. *Ditaxis polygama* (Jacq.) L.C.Wheeler, Contributions from the Gray Herbarium of Harvard University 124: 39. 1939. Type: VENEZUELA. CARTHAGENAE [CARTAGENA]: (Not found).
= *Ditaxis lancifolia* Schltdl., Linnaea 26: 635. 1855. *Argythamnia lancifolia* (Schltdl.) Müll.Arg., Linnaea 34: 145. 1865. Type: VENEZUELA. Curucuti, 2000 m, *H. Wagener 320* (Not found).
=*Ditaxis glabella* Griseb., Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen 7: 171. 1857. Type: VENEZUELA. GUADALUPE: *F.E.P. Duchassaing s.n.* (holotype (mounted on 2 sheets): GOET [GOET006396]!, GOET [GOET006397]!).
**Description:** Subshrub dioecious, without woody tubers; stems erect, internodes 7–37 mm long; stipules ca. 3 mm long; leaves not rosulate, blade 3–11 cm long, elliptic to oblanceolate, margin serrate, 9–25 teeth, malpighiaceous trichomes present; inflorescences 5–9 mm long, 1 basal pistillate flower, 2–5 distal staminate flowers, with 10 stamens, staminodes 4, pubescent; pistillate flowers with pedicels 10–20 mm long, sepals 5, margin entire, petals 5, ca. 7 mm long, lanceolate to elliptic, style and stigma ca. 1.5 mm long, styles bifid, pubescent.

**Distribution and habitat:** *Argythamnia polygama* is distributed in northern South America in Colombia and Venezuela (Fig. 2A), Central America (Panama), and the West Indies (Trinidad and Tobago). It occurs in seasonally dry shrubby and arboreal vegetation, at elevations ranging from 15–400 meters.

**Flowering and fruiting:** Flowers and fruits from November to June.

**Notes:** Jacquin (1760) described *Croton polygamus*, however did not mention type specimen in the protologue. Later, in the study "*Selectarum stirpium Americanarum Historia*", Jacquin (1763) cites as the type local "*Carthagenae*". According to D'Arcy (1970), Jacquin collected several plant specimens on his trip to the West Indies, and many were grown in the Vienna Garden by him and used for later descriptions. According to Stafleu & Cowan (1976), Jacquin herbarium collection was acquired by Joseph Banks and currently is part of the BM herbarium, but duplicates are in other European herbaria. According to these authors, specimens collected by Jacquin in the West Indies are rare in the BM herbarium, which was confirmed by us after exhaustive search at the mentioned and other herbarium collections. To date, no original material of Jacquin has been found, and additional research is needed in order to conduct a secure typification for this name.

Schlechtendal (1855) described *Ditaxis lancifolia* based on the collection *H. Wagener 320* from Colombia, but the specimen was not found. A few collections of Wagener are housed at B, HAL and W herbaria, but none of them belong to *Argythamnia* or *Ditaxis*. As in the case of *A. polygama*, due to the lack of material, we will not designate a type without further information.

Some botanists consider *A. lancifolia* as the accepted name (Pax & Hoffmann 1912). However, despide that no type was indicated for the basionym of *A. polygama* (*Croton polygamus*), it has priority since the protologue has a brief description validating the name.

Grisebach (1857) described *D. glabella* based on the specimen *F.E.P. Duchassaing s.n.*, from his collection, today incorporated at GOET herbarium. The type consists of two sheets with one label. We here consider it as a single specimen mounted on two complementary sheets, and we recognize it as the holotype for the name. This binomial is validly published and we agree with Pax & Hoffmann (1912) that it is a synonym of *A. polygama*.

*Argythamnia polygama* is similar to *A. acutangula*, *A. katharinae* and *A. macrantha*. Therefore, more studies, including field expeditions, are necessary for a better understanding of the relationship among these taxa. In the phylogeny of Külkamp *et al.* (2023a), only *A. polygama* was sampled, showing that the northern region of South America is the greatest gap in knowledge and sampling of the genus.

**Selected specimens examined:** COLOMBIA. ATLANTICO: Usiacurí, Caminho de Isabel Lopez, 100 m, 6 Jan 1940, (fl.), *A. Dugand et H.G. Barriga 2322* (US). MADALENA: Santa Marta, 1898-1901, (fl.), *H. Smith 2072* (US). VENEZUELA. CARABOBO: Cristobal Colon: 22 Feb 1923, (fl. fr.), *W.E. Broadway 111* (US). Hacienda Taborda, near El Palito na rodovia de Valencia para Puerto Cabello, 0-200 m, 31 Dec 1917, (fl.), *H. Pittier 7682* (US). NOVA ESPARTA: Tragaplata, Dec 1951, (fl.), *H. Gines 2823* (US).

**19. *Argythamnia purpurascens*** S.Moore, Transactions of the Linnean Society of London, 2nd series: Botany 4: 466. 1895. *Ditaxis purpurascens* (S.Moore) Pax & K.Hoffm., Pflanzen. IV.147.vi (Heft 57), 61. 1912. Type: BRAZIL. MATO GROSSO DO SUL: Corumbá, Jan 1892, *S. Moore 959* (holotype: BM [BM000947420]!, isotype: NY [NY00246260]!). The specimen at B was destroyed, but there is a pictured at the Field Museum (F0BN005232).
= *Ditaxis malmeana* Pax & K.Hoffm., Pflanzen. IV.147.xvii (Heft 85), 179. 1924. Type: BRAZIL. MATO GROSSO DO SUL: Corumbá. 6 Apr 1903, *G.O. Malme 3049* (lectotype **designated here**: S [S07-12640]!, isolectotypes: GH [GH00047618]!, S [SR-10594]!); Remaining syntype: BRAZIL. MATO GROSSO DO SUL: Corumbá. 18 Dec 1902, *G.O. Malme 2722* (S [S18-24591]!), ***syn. nov.***

**Description:** Subshrub monoecious, without woody tubers; stems erect, internodes 5–28 mm long; leaves not rosulate, blade 1.5–11 cm long, ovate to elliptic, margin serrate, 19–35 teeth; inflorescences 4.5–6.7 mm long, 1 basal pistillate flower, 3–8 distal staminate flowers, with sepals 1.5–2.8 mm long, stamens 10, staminodes 4, glabrous; pistillate flowers with pedicel ca. 2 mm long, sepals 5, margin entire, petals 5, ca. 0.3 mm long, styles bifid or trifid, pubescent.

**Distribution and habitat:** Until the present study *A. purpurascens* was known only from a small region (Corumbá and Ladário municipalities) in the western state of Mato Grosso do Sul, Brazil, and therefore considered as endemic. However, a recent collection made in Puerto Quijarro, Bolivia (*S.G. Beck 27535* [LPD, MA]) expanded the range of the species (Fig. 2A) and corresponds to the first record of the species from Bolivia. It is restricted to limestone soils and understory of seasonally dry tropical forests, at elevations of 200-300 meters.

**Flowering and fruiting:** Flowers and fruits from June to December.

**Notes:** Moore collected many plant specimens during his expedition through South America, and later he worked on their descriptions at the BM herbarium. We agree that the specimen *S. Moore 959* (BM000947420) is the holotype of *A. purpurascens*. Since Ingram labeled the duplicate (NY00246260) as isotype, he therefore considered the BM specimen as the holotype. Moore worked principally at the collection of the herbarium BM. After carefully analyzing the type specimens, descriptions, and adittional specimens, we conclude that *A. malmeana* is a synonym of *A. purpurascens* and is presented here as a new synonym.

Pax & Hoffmann (1924) described *D. malmeana* based on two collections (syntypes) mentioned in the protologue (*G.O. Malme 3049* and *G.O. Malme 2722*). Here we choose the specimen *G.O. Malme 3049* (S07-12640) as the lectotype of the name, and we treat *G.O. Malme 2722* as remaining syntype.

**Selected specimens examined:** BOLIVIA. SANTA CRUZ: Puerto Quijarro, 6 km hacia Puerto Suarez (de arroyo Concepcion), 9 Set 2000, (fl. fr.) *S.G. Beck 27535* (LPD, MA). BRAZIL. MATO GROSSO DO SUL: Corumbá, Bairro Universitário, próximo ao Campus da UFMS, entrada que leva ao porto limoeiro, 26 Aug 2018, (fl. fr.), *J. Külkamp 512* (COR, RB). Ladário, Fazenda Uruba, primeira lage, 8 Nov 1996, (fl. fr.), *V.J. Pott, A.M. Gonzales et A.L. Sanches 3251* (CPAP).

**20. *Argythamnia salina*** (Pax & K.Hoffm.) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 423. 1958. *Ditaxis salina* Pax & K.Hoffm., Pflanzen. IV.147.vi (Heft 57), 72. 1912. Type: PARAGUAY. PARAGUARI: Salzige Standorte bei Mbay in der Umgebung von Paraguari, *B. Balansa 3152* (lectotype designated by Külkamp *et al.* (2023b)): G [G00306964]!, isolectotypes: P [P00634961]!, P [P00634960]!).

**Description:** Subshrub, dioecious, with woody tubers; stems erect, internodes 7–50 mm long; leaves not rosulate, petioles absent to 1–15 mm long, blade 1.8–5.5 cm long, ovate to elliptic, margin entire to serrate, 8–12 teeth; inflorescences 9–40 mm long, (1)2 pistillate flowers, 15–35 staminate flowers, with 8 stamens, staminodes 2, glabrous, pistillate flowers, sepals 5, margin entire, petals 5, styles bifid, pubescent.

**Distribution and habitat:** *Argythamnia salina* occurs in northeastern Argentina, west of Brazil and Paraguay (Fig. 2C), in the Chaco province. This species occurs in grassland environments with clayey, moist, and saline soils.

**Flowering and fruiting:** Flowers and fruits from November to March.

**Notes:** It is a rare species, known from a few specimens, and recently two new records from the same area have been reported for Brazil (Külkamp *et al.* 2023b). Even with the expansion of the EOO, *D. salina* was preliminarily categorized as Endangered (EN), and the threats include severe fragmentation due to agricultural monocultures, continuous decline of the AOO, and loss of habitat quality in its range (Külkamp *et al.* 2023b).

**Selected specimens examined:** ARGENTINA. CORRIENTES: Empedrado. Estancia Las Três Marias, 13 Mar 1954, (fl.) *T.M. Pedersen 2638* (US); FORMOSA: Formosa, (fl.), *P. Jorgensen 40684* (LIL, SI); Formosa. Jan 1918, (fr.), *P. Jorgensen 2264* (BA, US). BRAZIL. MATO GROSSO DO SUL: Bela Vista. Rod. BR-267, próximo do trevo para Bela Vista, 16 Nov 2002, (fl. fr.), *G. Hatschbach, M. Hatschbach et J.M. Silva 74272* (MBM); Bela Vista. próximo a entrada da Fazenda União, estrada MS-178 de Bonito a BR-267 para Porto Murtinho, 21°35'15"S, 56°39'34"W, 406 m, 16 Nov 2002, (fr.) *A. Pott et al. 10785* (CPAP).

**21. *Argythamnia sellowiana*** (Pax & K.Hoffm.) J.W.Ingram, Bulletin of the Torrey Botanical Club 84: 423. 1958. *Ditaxis sellowiana* Pax & K.Hoffm., Pflanzen. IV.147.vi (Heft 57), 77. 1912. Neotype designated by Külkamp *et al.* (2023b): BRAZIL. RIO GRANDE DO SUL: Bagé, Próximo ao trevo, 55°49'46''W, 29°48'32"S, Nov 2017, *J. Külkamp et al. 394* (RB 827128!, isoneotype: ICN [ICN197214]!).

=*Argythamnia rhizantha* (Pax & K.Hoffm.) J.W.Ingram, Bull. Torrey Bot. Club 84: 423. 1958. *Ditaxis rhizantha* Pax & K.Hoffm., Pflanzenr. 4: 77. 1912. *Paxia rhizantha* (Pax & K.Hoffm.) Herter, Estud. Bot. Reg. Uruguay 4: 80. 1931. *Paxiuscula rhizantha* (Pax & K.Hoffm.) Herter, Revista Sudamer. Bot. 6: 93. 1939. Neotype designated by Külkamp *et al.* (2023b): URUGUAY. RIVERA: Cerro Aurora, 10–12 Feb. 1961, *Arrillaga et al. 1137* (MVFA!).

=*Argythamnia rosularis* (Pax & K.Hoffm.) J.W.Ingram, Bull. Torrey Bot. Club 84: 423. 1958. *Ditaxis rosularis* Pax & K.Hoffm., Pflanzenr. 4: 76. 1912. *Paxia rosularis* (Pax & K.Hoffm.) Herter, Estud. Bot. Reg. Uruguay 4: 80. 1931. *Paxiuscula rosularis* (Pax & K.Hoffm.) Herter, Revista Sudamer. Bot. 6: 93. 1939. Neotype designated by Külkamp *et al.* (2023b): ARGENTINA. MISSIONES: Bonpland, 15 Dec 1909, *Jörgensen, P. 667* (BAB [BAB31210]!).

**Description:** Herbs, monoecious, with woody tubers; stems prostrate; internodes 0.1–0.5 mm long; leaves rosulate, blade 2–9 cm long, elliptic to obovate, margin entire; inflorescences 4–6 mm long, 1 pistillate flower, basal, 3–5 staminate flowers, distal, stamens 8, staminodes absent, pistillate flowers, sepals 5 (6), 5.9–8.5 mm long, falcate, margin entire, petals 5, styles bifid, pubescent.

**Distribution and habitat:** *Argythamnia sellowiana* occurs in northeastern Argentina, south of Brazil and north of Uruguay (Fig. 2A), a region in the Chaco and Pampa provinces. The information on specimens labels indicates that the species is associated with grasslands and rocky outcrops, not occuring in shady locations.

**Flowering and fruiting:** Flowers and fruits from October to March.

**Notes:** This species is morphologically very close to and occurs in sympatry with *A. acaulis*. A detailed discussion about them is presented in Külkamp *et al.* (2023b). In the phylogenetic reconstruction of Külkamp *et al.* (2023a), *A. sellowiana* emerges as sister to the Chaco and Pampa species, *A. salina* and *A. montevidensis*. However, *A. acaulis* was not sampled.

**Selected specimens examined:** ARGENTINA. CORRIENTES: Ituzaingó. Playadito, 20 km W de Apóstoles, 1879, (fl. fr.), *A. Schinini 21790* (CTES). Mercedes. Estancia Itá Caabó, 21 Mar 1956, (fl. fr.), *T.M. Pedersen 3807* (NY, US). ENTRE RIOS: Colón. Palmar de Colón, 58°15'36"W, 31°52'48"S, *A. Burkart s.n.* (SI). MISSIONES: Candelária. Bonpland, alrededores de balneario municipal, 57°27'36"W,

27°29'05"S, *H.A. Keller s.n.* (SI). BRAZIL. RIO GRANDE DO SUL: Alegrete. Beira da BR 290, próximo do arroio Lageadinho, cerca de 15 km após Alegrete em direção a Rosário, alto da primeira colina, 12 Feb 1990, (fl. fr.), *D.B. Falkenberg 5287* (FLOR); Arroio dos Ratos. Estrada do Faxinal, Fazenda Esperança, 30°16'22"S, 51°43'12"W, 15 Mar 2018, (fl. fr.), *J. Külkamp et G.P. Coelho 466* (ICN). Caçapava do Sul. Guaritas, Topo da Guarita, 30°50'19"S, 53°30'07"W, 10 Oct 2017, *J. Külkamp et al. 342* (ICN). PARAGUAY. GUAIRA: Villarica. Feb 1931, (fl. fr.), *P. Jörgensen 7352* (F, NY). URUGUAY. ARTIGAS: Rivera. Parque Gran Bretanha, 5 Feb 1989, (fl. fr.), *A.E. Paz 567* (MVM); Cerro Aurora, 10-12 Feb 1961, (fl. fr.), *Arrillaga et al. 1137* (MVFA).

**22. *Argythamnia simoniana*** (Casar.) Müll.Arg., Linnaea 34: 145. 1865. *Ditaxis simoniana* Casar., Novarum Stirpium Brasiliensium Decades 10: 87. 1845. Type: BRAZIL. RIO DE JANEIRO: "Reperi in sylvis caeduis montis Corcovado prope Rio de Janeiro". Oct 1839, *G. Casaretto 1840* (lectotype designated by Delprete *et al.* 2019): TO [mounted on 6 sheets] not seen, isolectotype: G-DC [G00313059]!).
=*Ditaxis melochiiflora* Baill., Adansonia 4: 270. 1864. Type: BRAZIL. RIO DE JANEIRO: Capueiras prés dÚba, 1816-1821, *A. Saint-Hilaire A1-540* (lectotype **designated here**: P [P00634962]!, isolectotypes: F [F0056242F]!, P [P00634963]!, P [P00634964]!).
**Description:** Subshrub to shrub monoecious, without woody tubers; stems erect, internodes 9–55 mm long; leaves not rosulate, pedicel scar not evident, blade 3–15 cm long, elliptic to lanceolate, margin entire, rarely toothed; inflorescences 3–8 mm long, 1 pistillate flower, basal, 4–10 staminate flowers, distal; staminate flower with sepals ca. 3.5 mm long, stamens 10, staminodes 4, pubescent, pistillate flower with pedicel 7–23 mm long, sepals 5, 9–12 mm long, margin entire, petals 5, styles bifid, pubescent; seed with reticulated surface.
**Distribution and habitat:** *Argythamnia simoniana* is endemic to the state of Rio de Janeiro, Brazil (Fig. 2A). It occurs in the understory of forests restricted to rocky inselbergs along the ocean coast, a region in the Atlantic province.
**Flowering and fruiting:** Flowers and fruits throughout the year.
**Notes:** *Argythamnia simoniana* was described based on collections acquired in Rio de Janeiro by Casaretto during his expedition to Brazil. Delprete *et al.* (2019) lectotypified the name because no main specimen was indicated in the protologue, and the authors considered the six samples at TO herbarium as lectotype.

We analyzed the type specimens and original description of *D. melochiiflora* and agree that this name should be treated as a synonym for *A. simoniana*. *Ditaxis melochiiflora* was described by Baillon (1864) based on the collection *A. Saint-Hilaire A1-540*. However, he did not indicate the repository herbarium. We found four specimens of this collection, and here we are recognizing *A. Saint-Hilaire A1-540*, (P00634962) as the lectotype of *D. melochiiflora*. *Argythamnia simoniana* is the only species of the genus that occurs in the state of Rio de Janeiro (Külkamp 2020a). It is similar to the shrubby species of northern South America (*A. acutangula, A. dioica, A. katharinae, A. macrantha*, and *A. polygama*), but it can be differentiated by the reticulate surface and blackish color of the seeds (vs. smooth and gray color). The phylogenetic reconstructions of Külkamp *et al.* (2023a) show that *A. dioica* and *A. polygama* belong to the same clade as *A. simoniana*, and a close relationship is reinforced here based on morphology.
**Selected specimens examined:** BRAZIL. RIO DE JANEIRO: Cabo Frio, Reserva Tauá. Limite entre os municípios de Armação dos Búzios e Cabo Frio, 6 Jan 2018, (fl. fr.), *L.J.S. Pinto 2013* (RB). Iguaba Grande, BR 116, 3 Oct 2012, (fl. fr.), *L. Quintanilha 98* (RB). Niterói, Itaipu, Serra da Tiririca, 100 m, 16 Apr 2018, (fl. fr.), *J. Külkamp et al. 483* (RB). Rio de Janeiro, Jardim Botânico, 18 Jul 1945, (fl. fr.), *J.G. Kuhlmann s.n.* (RB).

***Chiropetalum* A.Juss.**

***Chiropetalum*** A.Juss. in Ann. Sci. Nat. 25: 21. 1832. Type: *Chiropetalum lanceolatum* (Cav.) A.Juss. (designated by O'Donell & Lourteig 1942).

Herbs or subshrubs, perennial or rarely annual; monoecious, less commonly dioecious, gynodioecious, or androdioecious. Branches erect or decumbent, thorns absent, glabrous or covered by malpighiaceous, simple, or stellate trichomes. Stipules present, glabrous or covered by simple and/or malpighiaceous trichomes. Leaves simple, alternate, petiolate; venation pinnate, basal and suprabasal actinodromous, margin crenate, serrate, bisserrate or entire; glabrous or pubescent with trichomes malpighiaceous, simple, stellate. Raceme uni-bisexual, axillary; flowers 1-bracteolate; bracteole persistent, sessile, pubescent. Staminate flowers 3–35, positioned distally in the inflorescence, pedicel articulated; sepals 5, valvate, covered by simple and/or malpighiaceous trichomes; petals 5, glabrous, 3–7-lobed, free portion 1/3–1/2 of the petal length; floral nectaries 5, around the base of the staminal column, antessepalous, glabrous or pubescent; stamens 3–6, filaments partially joined together forming a column; anthers arranged in one whorl, basifixed. Pistillate flowers 1–6, proximal in the inflorescence; sepals 5, valvate, covered by simple and/or malpighiaceous trichomes; petals absent, rarely 5; floral nectaries 5, adhered to the receptacle, antessepalouss, glabrous or pubescent; ovary superior, subglobose, 3-locular, locules uniovulate; styles 3, bifid. Capsule 4–8 mm diam., dehiscent, covered by simple, glabrous or stellated and/or malpighiaceous trichomes. Seeds spherical, surface foveolate or rough, gray to black.

Twenty *Chiropetalum* species and one variety are recognized from South America, all endemic to the southern

region of the Equator (Fig. 5). Here, we treat *Aonikena patagonica* Speg. in *Chiropetalum* as proposed by O'Donell & Lourteig (1942), but we understand that molecular studies are needed to position the taxon properly in Ditaxeae. The southernmost distribution of the genus is represented by *C. patagonicum* (Speg.) O'Donell & Lourteig in Patagonia, Argentina (Fig. 5A), and northernmost by *C. pavonianum* (Müll.Arg.) Pax in Bagua, Peru (Fig. 5C). The greatest species richness is registered for Brazil, with eight species, followed by Argentina, with five species (Fig. 5). *Chiropetalum* species have a regionalized pattern of distribution, presenting many regional endemisms with reduced extent of occurrences. The most widely distributed species are *C. patagonicum* and *C. griseum* Griseb. (Fig. 5A) that occur in the southern and northern of Argentina, respectively, and *C. tricoccum* (Vell.) Chodat & Hassl. in eastern Brazil (Fig. 5A).

The highest concentration of collections for *Chiropetalum* is found in southern Brazil and northern and central Argentina (Fig. 3A). The number of records in southern Brazil is associated with the species richness in the region, eight species (Fig. 5), while northern and central Argentina species richness is mainly associated with the highly number of records of *C. argentinense* Skottsb., *C. boliviense* (Müll. Arg.) Pax & K.Hoffm. and *C. griseum*.

The southern half of the Andes has proven to be a barrier that separates the *Chiropetalum* species from the east and west. In this region it is not common to observe the occurrence of species at elevation above 1000 meters, unlike the species that occur in Bolivia and Peru, which are often found at elevation above 2500 meters. The *Chiropetalum* species of Argentina, Bolivia, Chile, and Peru occur in seasonally dry environments, while some Brazilian species occur in more humid and shaded environments. *Chiropetalum* may have diversified and adapted in these environments. In this context, we believe that biogeographic studies would elucidate this distribution pattern. Here, 10 lectotypes, one neotype, one *status novum*, and two new synonyms are presented for the *Chiropetalum* species occurring in South America.

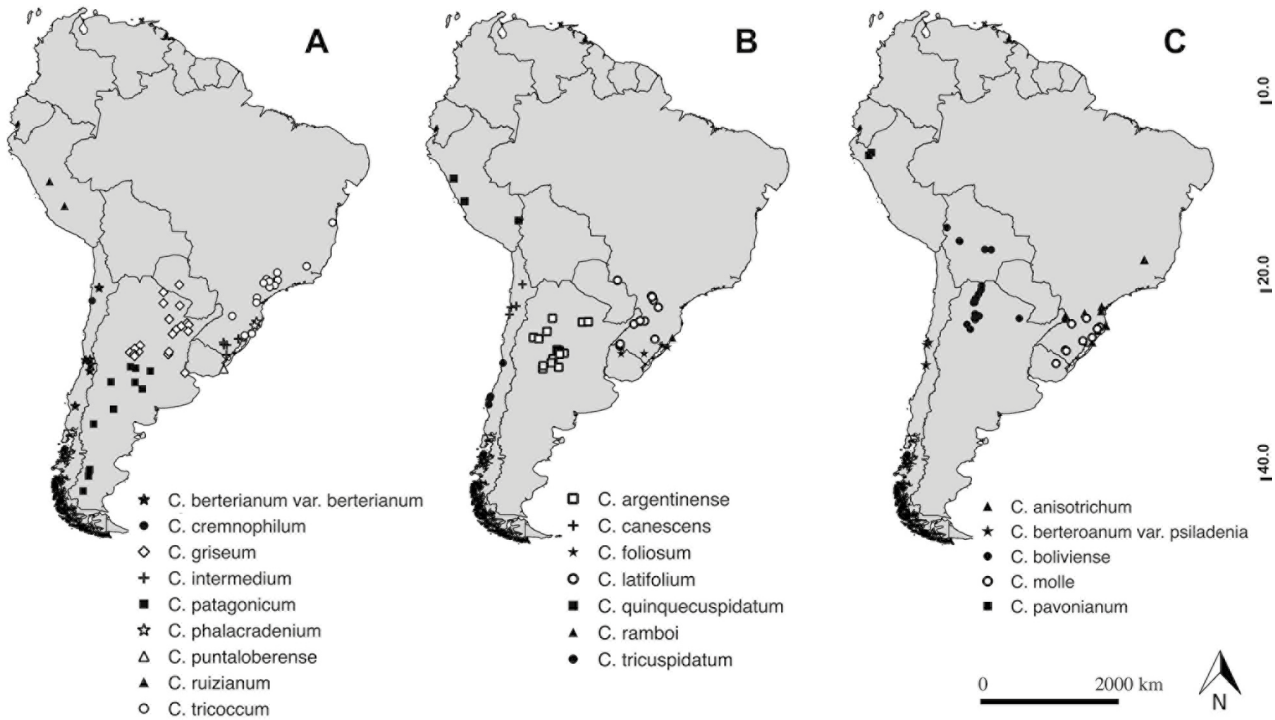


**Figure 5. A-C**. Geographic distribution of *Chiropetalum* species in South America.

Key to the species of *Chiropetalum* in South America

1. Leaves with stellate trichomes ..... 2
1'. Leaves without stellate trichomes ..... 9
2. Floral nectaries pubescent ..... 3
2'. Floral nectaries glabrous ..... 5
3. Staminate flowers with petals 5–6-lobed; stamens 3 (4–5) ..... **26. *C. boliviensis***

3'. Staminate flowers with petals 3–5-lobed; stamens (4)5 ..... 4

4. Leaves ovate, margin 5–11 toothed; ovary densely covered by stellate trichomes, in addition to simple and malpighiaceous trichomes ..... **30. *C. griseum***

4'. Leaves elliptic to ovate, margin 10–16 toothed; ovary densely covered by malpighiaceous trichomes, in addition to simple trichomes, stellate trichomes absent ..... **35. *C. pavonianum***

5. Inflorescence with 2–7 staminate flowers; petals of staminate flowers 3–5 lobed; stamens 3–4 ..... 6

5'. Inflorescence with 8–48 staminate flowers; petals of staminate flowers 5–7 lobed; stamens (4)5(6) ..... 7

6. Ovary with stellate trichomes ..... **39. *C. ramboi***

6'. Ovary without stellate trichomes ..... **31. *C. intermedium***

7. Leaf with the adaxial surface flat (tertiary veins not evident); 1 inflorescence per node ... **38. *C. quinquecuspidatum***

7'. Leaf with the adaxial surface irregular undulate (tertiary veins conspicuous); 1–3 inflorescences per node ..... 8

8. Style pubescent in basal half and glabrous in the apical half ..... **33. *C. molle***

8'. Style pubescent to the apex ..... **37. *C. puntaloberense***

9. Leaf margin with more than 10 teeth ..... 10

9'. Leaf margin entire or serrate with 1–9 teeth ..... 13

10. Staminate petals 3-lobed; floral nectaries glabrous ..... 11

10. Staminate petals 4–7-lobed; floral nectaries pubescent ..... 12

11. Leaf base rounded, covered by malpighiaceous trichomes ..... **41. *C. tricoccum***

11'. Leaf base subcordate, covered by simple and malpighiaceous trichomes ..... **23. *C. anisotrichum***

12. Leaves covered by malpighiaceous trichomes ..... **32. *C. latifolium* stat. nov.**

12'. Leaves covered by simple and malpighiaceous trichomes ..... **40. *C. ruizianum***

13. Leaves glabrous; petals of the staminate flowers unlobed with an undulate apex ..... **34. *C. patagonicum***

13'. Leaves pubescent; petals of the staminate flowers deeply lobed ..... 14

14. Leaf margin entire ..... 15

14'. Leaf margin serrate ..... 18

15. Leaves linear ..... **24. *C. argentinense***

15'. Leaves elliptic, lanceolate, ovate or cordate ..... 16

16. Inflorescence with 3–7 staminate flowers; petals of the staminate flowers 3–4-lobed .....28. ***C. cremnophilum***

16'. Inflorescence with 8–40 staminate flowers; petals of the staminate flowers 4–5-lobed ..... 17

17. Leaves ovate; inflorescence with 10–40 staminate flowers ..... **25. *C. berterianum***

17'. Leaves lanceolate to elliptic; inflorescence with 8–13 staminate flowers ..... **27. *C. canescens***

18. Leaves covered only by malpighiaceous trichomes ..... 19

18'. Leaves covered by simple and malpighiaceous trichomes ..... **29. *C. foliosum***

19. Inflorescence glabrous; pistillate flowers without petals ..... **36. *C. phalacradenium***

19'. Inflorescence pubescent; pistillate flowers with petals ..... **42. *C. tricuspidatum***

**23. *Chiropetalum anisotrichum*** (Müll.Arg.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 93. 1912. *Argythamnia anisotricha* Müll.Arg. Flora Brasiliensis 11(2): 314. 1874. Type: BRAZIL. MINAS GERAIS: in silvis prope Lagoa Santa, *Warming 1576* (lectotype designated by Ingram 1980b: G [G00434178]!, isolectotypes: C [C10023218]!, C [C10023219]!, C [C10023220]!). Remaining syntypes: BRAZIL. MINAS GERAIS: in silvis prope Lagoa Santa, *Warming 1617*: C [C10023221]!, C [C10023222]!; *Warming s.n.*: GH [GH00045757]!, P [P04865025]!.

**Description:** Herb to subshrub; leaves ovate, subcordate base, covered by simple and malpighiaceous trichomes, stellate trichomes absent, margin with 14–26 teeth per side; inflorescence covered by simple trichomes, 1–5 pistillate flowers, 10–17 staminate flowers per inflorescence, floral nectaries glabrous in both staminate and pistillate flowers; staminate flowers with 3-lobed petals, stamens 5, pistillate flowers without petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.
**Distribution and habitat:** Until the present study, *C. anisotrichum* was thought to be endemic to Brazil, but during the review of herbaria collections, two specimens were identified from the province of Missiones, Argentina, being the first records. In Brazil, this species occurs in the states of Minas Gerais, Paraná, Rio Grande do Sul, and Santa Catarina (Fig. 5). It is found in the Atlantic Forest and Cerrado phytogeographical domains, at the edges and understory of riparian forests.
**Flowering and fruiting:** Flowers and fruits all year round, most frequently in Spring and Summer.
**Notes:** The protologue (Müller 1874) indicates "*Habitat in prov. Minas Gerais, in silva prope Lagoa Santa: Warming*," without mentioning a collection number. Pax & Hoffmann (1912) indicated *Warming 1576* and *1617* as type materials, while Ingram (1980b) indicate *Warming 1576* (G) as the holotype. Müller worked extensively in the Geneva herbarium, including the G-DC, G-BOIS, and G-BU collections, but he also had access to other European herbaria at the same time (Schultes 1953). We cannot be certain that Müller analyzed all Warming specimens that we found in the herbaria C, G, GH, and P, with or without a collect number. Although *Warming 1576* is the only specimen in G-DC, it is not specifically mentioned in the protologue. We believe that Müller analyzed more than one specimen for the description of the taxon, since the description is very complete, and it is evident that more than one specimen was used in the description and the specimens were already deposited in these other collections at that time. By indicating the specimen at G as a holotype, Ingram (1980b) made an "inadvertent lectotypification" for using the term holotype for a syntype (Prado *et al.* 2015). This inadvertent lectotypification is acceptable according to art. 9.23 ICN when published before 1 January 2001. According to art. 9.10 ICN, the use of the term "holotype" should be treated as an error to be corrected.
**Selected specimens examined:** ARGENTINA. MISIONES: Frontera. Bernardo de Irigoyen, 24 Jul 1945 (fl. fr.), *J.H. Hunziker 949* (CORD); Dept. General Manuel Belgrano. 2 km S de Bernardo de Irigoyen, salto del Río Pepirí Guazú, 800 m, 15 Oct 1996 (fl. fr.), *O. Morrone 1479* (SI). BRAZIL. MINAS GERAIS: Cardeal Mota, Limestone (marble) outcrop ca. 10 km S. of Serra do Cipó, 19 Feb 1972 (fl. fr.), *W.R. Anderson et al. 36284* (HB, MBM, RB, US). PARANÁ: Campina Grande do Sul, sítio do Belizaro, 27 Dez 1966 (fl. fr.), *G. Hatschbach 15552* (MBM, UPCB, US). RIO GRANDE DO SUL: Pareci Novo, Saindo da RS-124 percorrer 700 metros na estrada Montenegro-Mathias, beira da estrada próximo ao rio 29°38'43"S, 51°25'42"W, 07 May 2017 (fl. fr.), *J. Külkamp et al. 222* (ICN). SANTA CATARINA: Florianópolis, Bairro Tapera, Trilha do morro dos Naufragados, 27°47'59.9"S, 48°33'53.35W", 17 Nov 2016 (fl. fr.), *J. Külkamp et al. 148* (ICN); São Miguel do Oeste, Margin Forest, Paraíso 26°34'S, 53°40'W, 21 Oct 1964 (fl. fr.), *L.B. Smith et R.M. Klein 12774* (NY, US).

**24. *Chiropetalum argentinense*** Skottsb., Lilloa 17: 304. 1949. *Argythamnia argentinensis* (Skottsb.) Allem & Irgang. Revista Brasileira de Biologia 36(2): 286. 1976. Type: ARGENTINA. CÓRDOBA: Rio Primero, Estancia, Feb 1905, *T. Stuckert 14985* (holotype: LIL [LIL4785]!, isotypes: CORD [CORD00053057]!, GB [GB004-7686] fragment!).
= *Chiropetalum tricuspidatum* var. *angustifolium* Griseb., Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen 19: 97. 1874. Type: ARGENTINA. CORDOBA: In den Barrancas bei Córdoba zwischen Gebüsch [In the Barrancas near Cordoba between shrub], 1870, *P.G. Lorentz 77* (lectotype **designated here**: GOET [GOET006402]!, isolectotypes: CORD [CORD00005947]!, GOET [GOET006403]!).
**Description:** Herb; leaves linear, base cuneate to truncate, pubescent, covered by simple and malpighiaceous trichomes, stellate trichomes absent, margin entire; inflorescence with 2, rarely 3, pistillate flowers, 11–25 staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers; staminate flowers with 3-lobed petals, stamens 5, pistillate flowers with petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.
**Distribution and habitat:** *Chiropetalum argentinense* is endemic to the northern region of Argentina and the Chaco province. It occurs in native forests of the Chaco, near the Andes, at elevations between 300–1000 meters, where it is associated with shaded environments.
**Flowering and fruiting:** Flowers and fruits can be found all year round, most frequently from October to January.
**Notes:** Skottsberg (1949) did not consider that Grisebach (1874) validly described the variety, so the author describes *C. argentinense* as a new species, without raising the variety to the species rank. Here, following art. 32.1 of the ICN (Turland *et al.* 2018), the taxa proposed by Grisebach (1874) is validly published, but it has no priority over *C. argentinense*, because it is in another rank (art. 11.2 of the ICN).

Grisebach (1874) described *C. tricuspidatum* var. *angustifolium* Griseb. based on two specimens (syntypes) present in its own herbarium, mentioning the shape and measures of the leaves and the type locality (Cordoba), without mentioning a single type. However, in the introduction to the work, the author mentions that the study is also based on Lorentz collections. Currently, Grisebach's

private collection is incorporated into the GOET herbarium (Stafleu & Cowan 1976). Analyzing the two specimens used by the author in the description of the name, we designated *P.G. Lorentz 77* (GOET006402) as the lectotype by the set of information present in the exsiccate.
**Selected specimens examined:** ARGENTINA. CHACO: Güemes, San Lorenzo, 12 Apr 1972, (fl. fr.), *A.G. Schulz 18137* (SI). CÓRDOBA: Capital, Parque Sarmiento em bosque nativo, 09 Oct 2012, (fl. fr.), *L.M. Carbone 736* (ACOR). LA RIOJA: Chilecito, Nonogasta, 900 m, 27 Dec 1928, *S. Venturi 7830* (US). SALTA: San Luis del Palmar, Potrero del Funes, 10 Feb 1925, (fl. fr.), *A. Castellano s.n.* (BA). SAN LUIS: La Aguada, 5 Nov 1940, (fl. fr.), *A. Burkart 10948* (SI).

**25. *Chiropetalum berterianum*** Schltdl., Linnaea 26: 637. 1853 [1855].
**Description:** Herb; leaves ovate, base obtuse to subcordate, pubescent, covered by simple and malpighiaceous trichomes, stellate trichomes absent, margin entire; inflorescence with 0–1 basal pistillate flowers, 10–40 distal staminate flowers; floral nectaries glabrous or pubescent in both staminate and pistillate flowers; staminate flower with 5-lobed petals, stamens 5; pistillate flowers with petals 0–4, linear, styles glabrous, ovary and fruit covered by malpighiaceous trichomes.

Key to the varieties of *Chiropetalum berterianum*

1. Floral nectaries pubescent ..... **25a. *Chiropetalum berterianum* var. *berterianum***

1'. Floral nectaries glabrous ..... **25b. *Chiropetalum berterianum* var. *psiladenium***

***25a. Chiropetalum berterianum* var. *berterianum***
Schltdl., Linnaea 26: 637. 1853 [1855]. *Argythamnia berteriana* (Schltdl.) Müll.Arg. Linnaea 34: 151. 1865. Type: CHILE. In sylvis umbrosis collin, Quillota, Oct 1829, *C.G. Bertero 226* (holotype: HAL [HAL0043498]!, isotypes: A [A00257844]!, G [G00434173]!, G [G00434174]!, G [G00434175]!, GH [GH00045758]!, GH [GH00257845]!, MO [MO2235041]!, P [P00634965]!).
**Distribution and habitat:** *Chiropetalum berterianum* var. *berterianum* is endemic to the western side of the Andes, from northern to central Chile (Fig. 5A). It occurs in open arid vegetation in the northern part of the country, classified as the Atacama province (Morrone 2014), and in the central region called Desert Mesochilen, Central Chile and Valdivian provinces sense Rivas-Martínez & Navarro (1994), since Morrone (2014) did not propose a classification for this region.
**Flowering and fruiting:** Flowers and fruits can be found from May to December.
**Notes:** The single diagnostic character of *C. berterianum* varieties is the presence or absence trichomes on floral nectaries, which are stable between varieties.
**Selected specimens examined:** CHILE. LOS ANDES: Santa Rosa de Los Andes, May 1882, (fl.), *J. Ball 104* (NY). RANCAGUA: Termas de Cauquenes, S of Rio Cachapoal, ca 12 km E of Hwy, 600 m, 6 Oct 1993, (fl. fr.), *L.R. Landrum 7898* (MBM). SANTIAGO: Cerro Culibrin, Oct 1950, (fl.), *F. Gallardo 274* (NY). VALPARAISO: Valdivia, Casilla 22, 18 Nov 1895, (fl. fr.), *O. Buchtien s.n.* (US).

**25b. *Chiropetalum berterianum* var. *psiladenium***
Skottsb. Acta Horti Gothoburgensis 18: 63. 1949. *Argythamnia berteroana* var. *psiladenia* (Skottsb.) Ingram. Gentes Herbarum; 11: 454. 1980. Type: CHILE. VALPARAISO: Quintero, 20 m, Sep 1923, *E. Werdermann 34* (holotype: S [S-R-10596]!, isotypes: BM [BM000947430]!, CAS [CAS0001961]!, E [E00273096]!, F [F0055982F]!, G [G00434172]!, GH [GH00045759]!, NY [NY03932673]!, US [US00109825]!).
**Distribution and habitat:** *Chiropetalum berterianum* var. *psiladenium* is endemic to the western side of the Andes in central Chile, classified as Central Chilean and Valdivian provinces (Rivas-Martínez & Navarro 1994), and it occurs in open arid vegetations (Fig. 5C).
**Flowering and fruiting:** Flowers and fruits can be found from September to December.
**Selected specimens examined:** CHILE. COQUIMBO: La Serena, Oct 1926, (fl., fr.), *C. Joseph 4419* (US). Deserto do Atacama, 1885, (fl.), *W. Geisse 48* (NY).

**26. *Chiropetalum boliviense*** (Müll.Arg.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 94. 1912. *Argythamnia boliviensis* Müll.Arg. Linnaea 34: 149. 1865. Type: BOLIVIA. LARECAJA: Vinicitis Sorata, Cerro del Iminapi, 2650 m, 1859-1860, *G. Mandon 1081* (lectotype [first-step] inadvertently designated by Ingram 1980b, [second-step] **designated here**: G-DC [G00313503]! (specimen at the right on a sheet with two specimens, each having its barcode), isolectotypes: A [A00045761]!, BM [BM000947428]!, BR [BR0000006999421]!, F [F0055884F]!, G [G00434170]!, G-DC [G00313502]!, G-DC [G00313504]!, GH [GH00045760]!, GOET [GOET003317]!, K [K000600297]!, MPU [MPU014921]!, MPU [MPU014922]!, NY [NY00246255]!, NY [NY00246256]!, P [P00634967]!, P [P00634968]!, P [P00634969]!, S-R [S-R-10600]!).
= *Chiropetalum triandrum* Griseb. Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen 24: 56. 1879. *Argythamnia triandra* (Griseb.) Allem & Irgang, Revista Brasileira de Biologia 36: 286. 1976. Type: ARGENTINA. CATAMARCA: na Hecken in Fuerte de Andagala, Mar 1875, *F. Schickendantz 231* (lectotype designated by Ingram 1980b: GOET [GOET006395]!, isolectotypes: CORD [CORD00005964]!, G [G00434171]!). Remaining syntypes: ARGENTINA. TUCUMAN: Siambon.

*G. Hieronymus & P.G. Lorentz 769*: CORD [CORD00005962]!, GOET [GOET006394]!, Berlin Negative F [F0BN005243]!; *P.G. Lorentz & G. Hieronymus 1040*: CORD [CORD00005963]!, GOET [GOET006394]!.

**Description:** Herb to subshrub; leaves ovate, base rounded to acute, covered by simple, stellate and malpighiaceous trichomes, margin serrate, teeth 20–32 per side; inflorescence with 1–4 pistillate basal flowers, 11–25 distal staminate flowers, floral nectaries pubescent in both staminate and pistillate flowers; staminate flower with petals 5(6)-lobed, stamens 3(4–5), pistillate flowers without petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum boliviense* is distributed in northern Argentina and central and southern Bolivia (Fig. 5C), at elevations of 500-3100 meters. It occurs in the interior of the most humid forests of the northern Chaco and southern Rondônia provinces.

**Flowering and fruiting:** Flowers and fruits can be found throughout the year, most frequently between September and January.

**Notes:** When Müller (1865) described *C. boliviense*, he did not indicate a type specimen, and there were four specimens (mounted on three sheets) in the G herbarium, where he worked. Ingram (1980b) considered the specimens deposited in G-DC as the holotype, but the author does not specify a specimen, indicating a lectotype [first-step] according to art. 9.17 of ICN (Turland *et al.* 2018). By indicating the specimens as a holotype, Ingram (1980b) also is making an "inadvertent lectotypification" for using the term holotype for a syntype. This inadvertent lectotypification is acceptable according to art. 9.23 ICN when published before 1 January 2001. According to art. 9.10 ICN, the use of the term "holotype" should be treated as an error to be corrected. So, here we indicate the lectotype [second-step] *G. Mandon 1081* deposited in G-DC (G00313503). This specimen is mounted on the right of a sheet with another specimen, both having their respective barcodes. This specimen was chosen because it was on a sheet with the original label of Mandon and deposited in the collection where the author of the species worked. We also analyzed the protologue and the type specimens of *C. triandrum* and agreed with Ingram (1980b) that this name is a synonym for *C. boliviense*.

**Selected specimens examined:** ARGENTINA. CATAMARCA: Andalgala, 04 Oct 1915, (fl. fr.), *P. Jorgensen 1059* (BA, SI, US). CHACO: Sargento Cabral, Parque Nacional Chaco, alrededores del Río Negro, 22 Nov 1991, (fl. fr.), *R.H. Fortunato et al. 2564* (SI). JUJUY: Ladesma, Sierra de Calilegua, 12 Sep 1927, (fl.), *S. Venturi 5804* (SI, US). SALTA: Oran, El Cedral, 26 Oct 1913, (fl. fr.), *Rodriguez 1061* (BA, NY, SI). TUCUMAN: Tafi, Yerba Buena, 900 m, 10 Apr 1920, (fl.fr.), *S. Venturi 843* (BA, NY, SI, US). BOLIVIA. ACRE: Bermejo, Tarija, 1900 m, 6 Dec 1903, (fl. fr.), *K. Fiebrig 2338* (NY, SI). LA PAZ: Bautista Saavedra, 1500 m, 19 Apr 2005, (fl. fr.), *A. Fuentes et al. 6978* (NY). SANTA CRUZ: Florida, 2200 m, 2 Jun 1991, (fl.), *M. Nee 40679* (NY).

**27. *Chiropetalum canescens*** Phil., Florula Atacamensis seu Enumeriatio 49. 1860. *Argythamnia canescens* (Phil.) F.Phil. Anales de la Universidad de Chile 262. 1881. Type: CHILE. ANTOFAGASTA: Prope Hueso Parado, 1200 m, *R. Philippi s.n.* (holotype: SGO [SGO000002992]!, isotype: BH fragment [indicated by Ingram 1980b, not seen here]).

=*Chiropetalum sponiella* (Müll.Arg.) Pax, Die Natürlichen Pflanzenfamilien 3(5): 45. 1890. *Argythamnia sponiella* Müll.Arg. Linnaea 34: 148. 1865. Type: CHILE. Cobija, *C. Gaudichaud s.n.* (lectotype designated by Ingram 1980b: G-DC [G00313508]!).

=*Chiropetalum gigouxii* Espinoza, Revista Chilena de Historia Natural 40: 190. 1936[1937]. Type: CHILE. Atacama. Caldeira, *E. Gigoux s.n.* (holotype: SGO [SGO151550]!).

**Description:** Herb; leaves lanceolate to elliptic, base rounded to cuneate, pubescent, covered by simple and malpighiaceous trichomes, stellate trichomes absent, margin entire; inflorescence with 1 basal pistillate flower, 8–13 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers, staminate flower with 4–5-lobed petals, stamens 5, pistillate flowers without petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum canescens* is endemic to the northern region of Chile, called by Morrone (2014) as the Atacama province, where it occurs in arid vegetation below 500 meters elevation (Fig. 5B).

**Flowering and fruiting:** Flowers and fruits can be found between September and December.

**Notes:** In the protologue of *Argythamnia sponiella*, Müller (1865) mentions as type the specimen *C. Gaudichaud s.n.*, with the collection site Cobija, Bolivia. However, this species does not occur in this country, since it is endemic to the west coast of the Andes. Nevertheless, at the time of the Gaudichaud`s trip, Bolivian territory extended to the Pacific coast, where the specimen was collected, which currently comprises the city of Antofagasta, in Chile (Lofstrom 1974).

**Selected specimens examined:** CHILE. ANTOFAGASTA: Taltal, 300 m, Oct 1925, (fl.), *E. Werdermann 773* (NY, SI, US). Atacama: Puerto de Chañaral, 28-29 Oct 1925, (fl.), *I.M. Johnston 4780* (BA, US).

**28. *Chiropetalum cremnophilum*** I.M.Johnst., Contributions from the Gray Herbarium of Harvard University 85: 64. 1929. *Argythamnia cremnophila* (I.M.Johnst.) J.W.Ingram, Gentes Herbarum: Occasional Papers on the Kinds of Plants 11: 449. 1980. Type: CHILE. ANTOFAGASTA: Taltal, about head of fog-bathed sea cliffs near Aguada Grande, 16-18 Dec 1925, *I.M. Johnston 5779* (holotype: GH [GH00045762]!).

**Description:** Herb; leaves cordate to ovate, base rounded to cordate, pubescent, covered by simple and malpighiaceous

trichomes, stellate trichomes absent, margin entire; inflorescence with 1 basal pistillate flower, 3–7 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers, staminate flowers with 3–4-lobed petals, stamens 5, pistillate flowers without petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum cremnophilum* is endemic to the western slope of northern Chile (Fig. 5B). It occurs in arid formations of the Atacama province, as defined by Morrone (2014).

**Flowering and fruiting:** Flowers and fruits can be found between September and February.

**Selected specimens examined:** CHILE. ANTOFAGASTA: Taltal, 14-15 Dec 1925, (fl.), *I.M. Johnston 5705* (BA, US). Campanha, 28 Feb 1954, (fl.fr.), *A. Garaventa 4141* (SI).

**29. *Chiropetalum foliosum*** (Müll.Arg.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 91. 1912. *Argythamnia foliosa* Müll.Arg., Linnaea 34: 150. 1865. Type: In Brasilia Meridionalis [BRAZIL. RIO GRANDE DO SUL]: *F. Sellow s.n.* (lectotype designated by Ingram 1980b: G [G00434168]!), isolectotype: P [indicated by Ingram 1980b, not seen here]).

**Description:** Herb; leaves ovate, base rounded, pubescent, covered by long, simple and malpighiaceous trichomes, stellate trichomes absent, margin serrate, 5–8 teeth; inflorescence with 1, rare 2, basal pistillate flowers, 2–5 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers, staminate flower with 3-lobed petals, stamens 5, pistillate flowers without petals, styles glabrous, ovary and fruit covered by simple and malpighiaceous trichomes.

**Distribution and habitat:** The species occurs in Brazil and Uruguay (Fig. 5B) in the Pampas phytogeographical domain, in rocky grassland covered by herbaceous and shrub vegetation.

**Flowering and fruiting:** Flowers and fruits can be found from July to April.

**Notes:** The species was previously known from two collections, the type material, *Sellow s.n.* from *Brasilia Meridionalis* (no specific location), and *M. Sobral 3571* from Viamão, Rio Grande do Sul, Brazil. During this study a specimen from Rivera, Uruguay, was found in herbarium collections, and four new collections were recorded in the municipality of Porto Alegre and Piratini during field expeditions. Ingram (1980b) designated the specimen deposited in G (G00434168) as the lectotype and the author also mentioned that he saw a specimen in the herbarium P, but we did not have access to this material during our study.

**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Piratini, Quinto distrito, 31°36'28"S, 53°09'11"W, 6 Sep 2023 (fl.), *J. Külkamp et al. 1584* (FLOR, PEL, RB). Porto Alegre, Morro da Tapera, borda da trilha na face leste do morro, 30°08'09.2"S, 51°11'15.7"W, 15 Jul 2017 (fl. fr.), *J. Külkamp et al. 230* (ICN, RB). Viamão, Parque Estadual de Itapuã, em campo pedregoso na encosta de um morro, 02 Dec 1984, (fl. fr.), *M. Sobral 3571* (MBM). URUGUAY. RIVERA: Ruta 29, km 15, Cerro Chato Dorado, Laderas de cerro, 31°03'59"S, 55°27'27"W, 12 Dec 1997 (fl. fr.), *E. Marchesi et I. Grela s.n.* (MVFA 27163).

**30. *Chiropetalum griseum*** Griseb., Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen 24: 57. 1879. *Argythamnia grisea* (Griseb.) Allem & Irgang, Revista Brasileira de Biologia 36: 286. 1976. Type: ARGENTINA. CORDOBA: *G. Hieronymus 92* (lectotype, designated by Ingram 1980b: GOET [GOET003318]!, isolectotypes: CORD [CORD00005965]!, F [F0055984F]!, G [G00434167]!). Remaining syntype: ARGENTINA. CORDOBA: *G. Hieronymus 112* (F [F0055984F]!, GOET [GOET006404]!).

=*Chiropetalum cupreum* Pax & K. Hoffm., Pflanzenr. IV 147 VI 57: 89. 1912. Type. PARAGUAY. GRAN CHACO: Loma Clavel, *E. Hassler 2497* (lectotype first-step designated by Ingram 1980b, second-step **designated here**: G [G00307039]!, isolectotypes: G [G00307036]!, GH [GH00045763]!, NY [NY00246360], P [P00634974]!, S [S-R-10598]!, K [K000600301]!, K [K000600300]!, Negative of destroyed holotype in Berlin F [F0BN005238]!.

**Description:** Herb to subshrub; leaves ovate, base rounded, covered by simple, stellate and malpighiaceous trichomes, margin serrate, 5–11 teeth per side; inflorescence with 1–2 basal pistillate flowers, 4–12 distal staminate flowers, floral nectaries pubescent in both staminate and pistillate flowers; staminate flower with 3–5-lobed petals, stamens (4)5, pistillate flowers with petals absent, glabrous styles, ovary and fruit densely covered by stellate trichomes, in addition to simple and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum griseum* is distributed in Argentina, Paraguay, and Uruguay (Fig. 5A), occurring in vegetation of dry and gallery forests of the Chaco and Pampa provinces.

**Flowering and fruiting:** Flowers and fruits can be found all months of the year.

**Notes:** In the introduction, Grisebach (1879) mentions that the study was based on collections made by Hieronymus, Lorentz, and Schickendantz. In the GOET herbarium, where the private collection of Grisebach is included (Stafleu & Cowan 1976), there are two gatherings of *C. griseum* from Argentina, *G. Hieronymus 92* and *G. Hieronymus 112*. Ingram (1980b) treats the specimen *Hieronymus 92* (GOET003318) as a holotype, according to art. 9.10 ICN, the use of the term "holotype" should be treated as an error to be corrected for lectotype. We agreed with Ingram (1980b). The gathering *G. Hieronymus 112* (F0055984F, GOET006404) is the remaining syntype.

Ingram (1980b) designates the specimen *E. Hassler 2497* (G) as the lectotype of *C. cupreum*. However, we found two specimens in the collection (G00307036, G00307039). Here we perform the second-step lectotypification, and selected G00307039 as the lectotype of *C. cupreum*.

**Selected specimens examined:** ARGENTINA. BUENOS AIRES: San Isidro, 23 Oct 1933, (fl. fr.), *L.R. Parodi 11301* (BAA, SI, US). Cordoba: Capital, 27 Dec 1935, (fl.), *A. Burkart 7298* (SI). CORRIENTES: San Luis del Palmar, Oct 1976, (fl. fr.), *A. Schinini et C.L. Cristobal 13680* (MBM, SI). ENTRE RIOS: Paraná, 32 km al norte de Paraná, Oct 1962, (fl. fr.), *A. Burkart 23719* (MBM). PARAGUAY. GRAN CHACO: Loma Clavel, Nov 1903, (fl. fr.), *E. Hassler 2497* (NY).

**31. *Chiropetalum intermedium*** Pax & K.Hoffm. Pflanzenr. IV.147.vi (Heft 57), 91. 1912. *Argythamnia intermedia* (Pax & K.Hoffm.) Allem & Irgang, Rev. Bras. Biol. 36: 286. 1976. Type: Südbrasilianische Provinz [URUGUAY], Campos, *J. Arechavaleta 37* (holotype: B destroyed), neotype **designated here**: URUGUAY. Orillas del Río, October 1890, *J. Arechavaleta s.n.* (MVM-5263!).

**Description:** Herb to subshrub; leaves elliptic to ovate, base rounded, covered by malpighiaceous rarely stellate trichomes, margin serrate, 12–19 teeth per side; inflorescence with 1–3 basal pistillate flowers and 2–7 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers; staminate flower with (3)5-lobed petals, stamens 3–4, pistillate flowers lacking petals, pubescent style, ovary and fruit covered by malpighiaceous trichomes, stellate trichomes absent.

**Distribution and habitat:** *Chiropetalum intermedium* is distributed in Brazil and Uruguay. In Brazil, it occurs in central and southern portion of the state of Rio Grande do Sul (Fig. 5A). It occurs in the Pampa province, in the understory of open forest, grasslands associated with rocky outcrops, and along the edges of riparian forests.

**Flowering and fruiting:** Flowers and fruits can be found throughout the year, but more often from September to February.

**Notes:** *Chiropetalum intermedium* was cited for Uruguay and Argentina (Pax & Hoffmann 1912, Ingram 1980b), but after reviewing herbaria collections we found that some specimens from Argentina were misidentified and they are *C. griseum*. For this reason, we exclude the occurrence of *C. intermedium* for Argentina and confirm its occurrence for Brazil (new records) and Uruguay.

The type material of *C. intermedium* deposited in the Berlin Herbarium was destroyed during World War II (Ingram 1980b). In the taxonomic revision for the genus, Ingram (1980b) indicated the possibility of having an isotype in the MVM herbarium. However, no specimens were found during the revision of this herbarium. Therefore, according to the Art. 9.16 of the ICN we choose a neotype for *C. intermedium*. The specimen was designated based on the collector and the original location of the type, which was also collected by J. Arechavaleta in grasslands from Uruguay.

**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Arroio Grande, 02 Nov 1961 (fl. fr.), *G. Pabst et E. Pereira 6724* (HB, RB); Caçapava do Sul, Guaritas, 26 Sep 1985 (fl. fr.), *D.B. Falkenberg 2662* (FLOR); 50 metros da escada de acesso ao topo da Pedra do Leão, 30°32'47"S, 53°33'13"W, 18 Sep 2016 (fl. fr.), *J. Külkamp et C. Rabuske 81* (ICN); Santana da Boa Vista, Pedra da Cruz, 30°53'48"S, 53°25'25.3"W, 03 Dec 2016 (fl. fr.), *J. Külkamp et al. 154* (ICN); Pedra da Cruz, 30°53'48"S, 53°25'25.3"W, 03 Dec 2016 (fl, fr), *J. Külkamp et al. 155* (ICN). URUGUAY. ARTIGAS: San Gregorio, Costa del Rio Uruguay, Campos de arrocera Riusa, unos 2 km al Oeste de confluencia de Cañada Yacaré y A Tigre, 30°34'27.60"S, 57°50'16.7"W, 28 Sep 2014 (fl. fr.), *Rossado et F. Haretche 801* (MVJB); CANELONES: 15 Nov 1908 (fl. fr.), *M.B. Berro 542* (MVM); Santa Lucía, en el monte, terreno arenoso, Dec 1874 (fl. fr.), *Arechavaleta 3552* (MVM); SAN PEDRO DEL TIMOTE: Arroyo Mansa Villagra, en bosque ribereño, 02 Oct 1942 (fl. fr.), *PE 5021* (MVM).

**32. *Chiropetalum latifolium*** (Chodat & Hassl.) Külkamp & Iganci, ***stat. nov.***

Basionym: *Chiropetalum tricoccum* (Vell.) Chodat & Hassl. f. *latifolia* Chodat & Hassl., Bull. Herb. Boissier, 2(5): 502. 1905. Type: PARAGUAY. CENTRAL: Ad ripam lacus Ypacaray, Feb 1898-1899, *E. Hassler 3927* (lectotype **designated here**: G [G00307035]!, isolectotypes: A [A00045924]!, BM [BM000504338]!, G [G00307030]!, G [G00307032]!, G [G00307033]!, G [G00307034]!, K [K000600299]!, MPU [MPU014910]!, NY [NY00246361]!, P [P00634980]!, UC [UC941597]!).

**Description:** Subshrub; leaves ovate to lanceolate, base rounded, covered by malpighiaceous trichomes, stellate trichomes absent, margin serrate, 12–25 teeth per side; inflorescence with 1–4 basal pistillate flowers and 12–28 distal staminate flowers, floral nectaries pubescent in both staminate and pistillate flowers, staminate flower with 4–7-lobed petals, stamens 5; pistillate flowers without petals, styles glabrous, ovary and fruit covered by malpighiaceous and simple trichomes.

**Distribution and habitat:** *Chiropetalum latifolium* is distributed in Argentina, Brazil, Paraguay and Uruguay (Fig. 5B). It occurs in the understory of open and riparian forest of the Chaco, Pampa, and Parana Forest provinces.

**Flowering and fruiting:** Flowers and fruits can be found throughout the year, but are more frequent from October to February.

**Notes:** When Müller (1865) assigned an physical specimen to *Argythamnia tricocca* (Vell.) Müll.Arg., a confusion began about these names, because this epitype from South Brazil and Vellozo's illustration based on a specimen from Rio de Janeiro correspond to different species. Chodat & Hassler (1905) describe the *C. tricoccum* f. *latifolia* based on the specimen *E. Hassler 3927* from Paraguay, and they only mention the height of the plant and measurements of the leaves in the protologue. By studying the types and protologues, we conclude that the physical specimen attributed by Müller corresponds to the same entity *C. tricoccum* f. *latifolia* described by Chodat & Hassler (1905),

and both differ from the species described by Vellozo. Pax & Hoffmann (1912) treat *C. tricoccum* f. *latifolia* as a synonym of *C. tricoccum*. As discussed in the comments of *C. triccocum*, we conclude that *C. tricoccum* f. *latifolia* is a distinct species, and here we elevate it to the rank of species as *C. latifolium*. In the protologue of f. *latifolia* Chodat & Hassler (1905) do not indicate the herbarium where the type was deposited, so according to the Art. 9.11 of the ICN, here we are designate *E. Hassler 3927* (G00307035) as lectotype of *C. latifolium*. *Chiropetalum latifolium* has a more southern distribution than *C. tricoccum* (Fig. 5A-B).

**Selected specimens examined:** ARGENTINA. CORRIENTES: Capital, En baldío. Sotobosque, 01 May 1989 (fl. fr.), *A. Krapovickas et C.L. Cristóbal 15380* (MBM). Concepcion: Estancia San Justo del Palmar, 10 Nov 1982 (fl. fr.), *T.M. Pedersen 13446* (MBM, NY). BRAZIL. MATO GROSSO DO SUL: Bela Vista, Rod. MS-384, Rio Guaviral, 10 Nov 1993 (fl. fr.), *G. Hatschbach et al. 58833* (MBM). Paraná: Campo Mourão, Rio da Vargem, 10 Dec 1960 (fl. fr.), *G. Hatschbach 7554* (MBM). RIO GRANDE DO SUL: Derrubadas, Parque Estadual do Turvo, estrada Porto Garcia, 27°08'11"S 53°52'18"W, 03 Jul 2009 (fl. fr.), *G.A. Dettke 384* (ICN); Estrela, Barranco do Rio Taquari, May 2017 (fl. fr.), *J. Külkamp et al. 225* (ICN, RB). PARAGUAY. Departamento Acahay Massif: Eastern most Peak, 20 Jan 1992 (fl. fr.), *E. Zardini et R. Franco 29849* (UPCB). Paraguari, on diorite rock outcrops on eastern side of eastern peak, 21 Jul 1988 (fl. fr.), *E. Zardini et R. Franco 5843* (UPCB); URUGUAY. Salto, 12 Spt 1961, (fl.), *D. Puerto 31* (MVFA). Paysandú: Paso Andrés Perez, Queguay Grande, 05 Apr 2008, (fl. fr.), *F. Haretche 106* (MVJB).

**33. *Chiropetalum molle*** (Müll.Arg.) Pax & K.Hoffm. Pflanzenr. IV.147.vi (Heft 57) 92, 1912. *Argythamnia mollis* Müll.Arg., Adansonia 4: 289. 1864. Type: In Brasilia Meridionalis [BRAZIL. RIO GRANDE DO SUL]: *F. Sellow s.n.* (lectotype [first-step] designated by Ingram 1980b, [second-step] **designated here**: G [G00415056]!, isolectotypes: BR [BR0000006998776]!, F [F336638] [fragment]!, F [F336651] [fragment]!, F [F336652]!, [G00415057]!, [G00415058]!, K [K000600302]!, P [P00634975]!, P [P04865053]! – (specimen of Sellow numbered by Gaudichaud [*Gaudichaud 1691*]), TUB [TUB009144]!).

= *Chiropetalum pilosistylum* (Allem & Irgang) Radcl.-Sm. & Govaerts, Kew Bull. 52: 478. 1997. *Argythamnia pilosistyla* Allem & Irgang, Rev. Bras. Biol. 36: 285. 1976. Type: BRAZIL. RIO GRANDE DO SUL: Cambará do Sul, in Araucária forest, near the river, February 1948, *Rambo s.n.* (holotype: PACA36212!, isotypes: BH, S [both isotypes were cited in the protologue; however, we have not seen them in this study]). ***syn. nov.***

**Description:** Subshrub to shrub; leaves lanceolate to elliptic, base obtuse, adaxial surface irregular, both surfaces covered by simple, stellate and malpighiaceous trichomes, margin biserrate, 14–40 teeth per side; 1–3 inflorescences per node, 1–4 basal pistillate flowers and 11–34 distal staminate flowers, floral nectaries glabrous on both staminate and pistillate flowers, staminate flowers with 5–7-lobed petals, stamens 5(6); pistillate flowers lacking petals, styles pubescent in the basal half and glabrous in apical half, ovary and fruit covered by simple, stellate, and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum molle* is distributed in southern Brazil and Uruguay (Fig. 5C), in the understory of open forest and grasslands associated with rocky outcrops, between 100–1400 meters elevation, in the Pampa and *Araucaria* Forest provinces.

**Flowering and fruiting:** Flowers and fruits can be found from September to April.

**Notes:** Controversies over the authorship of *C. molle* have caused confusion among taxonomists. *Chiropetalum molle* Klotzsch was indicated as a new species for Brazil, but no description nor a type specimen were presented (Klotzsch 1841). Baillon (1864) transferred *C. molle* to *Argythamnia*, establishing *A. mollis* and citing three specimens examined *"(– Sellow, Brésil herb. Mus., ex herb, Berl. – A. S. H., cat. C2, n. 2049, Banda oriental del Uruguay, un pelit bois près de S. Thereza (dioique). – Gaudichaud, Herb. imp. brés., n. 1691, Prov. de Rio Grande do Sul)."* However, no description or diaganosis was provided by Baillon, it being a nomen nudum as well. Later, Müller (1865) provided a description for *A. mollis*, based on the specimen *Sellow s.n.* (in hb. Berol.), one of the specimens cited by Baillon (1864). In this same study, Müller makes reference to *C. molle* Klotzsch as a *nomem*. Pax & Hoffmann (1912) accepted *C. molle* Klotzsch, but later, Ingram (1980b) used the name *A. mollis* Müll.Arg for this species.

The names of Baillon (1864) and Klotzsch (1841) have not been validly published. Müller (1865) was the first author to validly describe the species. As it was combined for *Chiropetalum* by Pax & Hoffmann (1912), the correct name in *Chiropetalum* should be *C. molle* (Müll.Arg.) Pax & K.Hoffm.

Another incongruence related to this species was the lectotypification performed by Ingram (1980b), who while designating a lectotype (*Sellow s.n.*) for *A. mollis*, cited the herbarium G as the repository. However, this herbarium has three duplicates, and the author does not specify this. The author indicates a lectotype first-step, thus, according to Art. 9.17 of the ICN (Turland *et al.* 2018), here we designate *Sellow s.n.* G (G00415056) as the second-step lectotype of *C. molle*. This specimen was chosen because it is more complete and because it has an original label from the Berlin herbarium, the institution where the author of the species worked. According to Moraes (2023), Gaudichaud did not collect in southern Brazil, and the specimens attributed to him were in fact collected by Sellow. During the passage through Rio de Janeiro, several specimens of Sellow were donated to Gaudichaud, who numbered them as his collections. The specimens cited in the protologue

of *C. molle* "*Gaudichaud, Herb. imp. brés., n. 1691, Prov. de Rio Grande do Sul*" should be considered as isolectotypes, as they belong to the *Sellow s.n.* collection. We found the specimen (P04865053) numbered by Gaudichaud, which is *Sellow s.n.* and consequently, isolectotypes of *C. molle*.

After studying protologues, type specimens, field collect, and herbarium specimens, we concluded that *Chiropetalum pilosistylum* is synonym of *C. molle*. Allem & Irgang (1976) described *C. pilosistylum* but did not mention the relationship of this species with *C. molle* in the protologue. Ingram (1980b) accepts both species, probably because he had few specimens to make such a decision. In the protologue, the authors cite an isotype of *C. pilosistylum* for the BH herbarium and Ingram (1980b) cites another for S, but neither these specimens were found by us.

**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Bagé, Casa de Pedra, 30°57'37.65"S, 53°35'26.26"W, 10 Oct 2017 (fl. fr.), *J. Külkamp et al. 334* (ICN). Montenegro, Pareci, Linha Bonita perto de Montenegro ad rio em Silva, 19 Jan 1949 (fl. fr.), *B. Rambo 39986* (PACA). Trindade do Sul, Projeto de Assentamento Trindade, em beira de floresta ciliar do Lageado Passo do Cervo, 15 Sep 2008 (fl. fr.), *M. Grings 718* (ICN); Veranópolis, Paredão de basalto a 10 km S de Veranópolis, 16 Sep 1971 (fl. fr.), *J.C. Lindeman et B.E. Irgang s.n.* (ICN008106). SANTA CATARINA: Bom Retiro, Campo dos Padres, 23 Jan 1957 (fl. fr.), *B. Rambo 60191* (PACA); Urubici, Vacas Gordas, Parque Nacional de São Joaquim, 1,5 km do alojamento do parque (pistillated specimen), 28°08'57.9" S, 49°37'524" W, 11 Dec 2016 (fl. fr.), *J. Külkamp et al. 190* (ICN). Urupema, Morro das torres, ao lado da cachoeira que congela (pistillated specimen), 27°55'40.9"S, 49°51'18.6"W, 1532 m, 12 Dec 2016 (fl. fr.), *J. Külkamp et al. 207* (ICN). URUGUAY. RIVERA: Rivera, 30°55'48"S, 55°39'15.5"W, 10 Oct 2022, *A. González et J.L. Antúnez s.n.* (MVM23504).

**34. *Chiropetalum patagonicum*** (Speg.) O'Donell & Lourteig, Lilloa 8: 41. 1942. *Aonikena patagonica* Speg. Anales del Museo Nacional de Buenos Aires 7: 162. 1902. Type: ARGENTINA. Chonkenk-aik, Río chico, in campis sabulosis editioribus secus, Feb 1898, (fl. fr.), *C. Ameghino s.n.* (holotype: LP [LP003172]!).

**Description:** Annual herb; leaves orbicular, ovate or cordate, base cordate to rounded, glabrous, margin entire to crenate with 1–4 teeth per side; inflorescence with 1–3 basal pistillate flowers and 3–5 distal staminate flowers, floral nectaries glabrous on both staminate and pistillate flowers, petals of the staminate flowers entire with an undulate apex, stamens 3(–5), pistillate flowers without petals, styles glabrous, ovary and fruit glabrous.

**Distribution and habitat:** *Chiropetalum patagonicum* is endemic to Argentina and occurs the southern half of the country, with the majority of the scarce records from the Patagonia region (Fig. 5C). It is distributed in open arid environments, mainly in sand along the margins of the temporary rivers, between 200–750 meters above sea level in the Monte and Patagonia provinces.

**Flowering and fruiting:** Flowers and fruits can be found from September to February.

**Notes:** Due to some unique morphological characteristics, such as an annual life cycle, absence of trichomes, and petals entire to 3-lobed, *C. patagonicum* was first described as a monospecific genus and its circumscription has been questioned by some researchers (O'Donell & Lourteig 1942; Ingram 1980b). Ingram (1980b), for example, treats the taxon in the genus *Aonikena* Speg. whereas O'Donell & Lourteig (1942) circumscribes in *Chiropetalum* section *Aonikena* (Speg.) O'Donell & Lourt. Here we follow the classification of O'Donell & Lourteig (1942). However, we do not recognize sections. Külkamp *et al.* (2023a) did not sample this taxon in the phylogenetic reconstruction, which is necessary in future studies to understand the position of this taxon in Ditaxeae.

**Selected specimens examined:** ARGENTINA. BUENOS AIRES: Bahia Blanca, 1884, (fl. fr.), *M.G. Mansel r.n.* (BM000552159). CÓRDOBA: La Cesira, Villa Maria, 25 Sep 1904, (fl. fr.), *E.S. Holanbey 12820* (CORD). LA PAMPA: La Maruja, 11 Nov 1939, (fl. fr.) *A. Burkart 9881* (SI, US). MENDONZA: San Rafael, RP190, puesto Los Pejecitos, 7 Dec 1973 (fl.), *O. Boelcke et al. 15662* (SI). RIO NEGRO: General Roca e vicinity, 18 Oct 1914, (fl. fr.), *W. Fischer 148* (F, NY, MO, SI, US). SAN LUIS: Villa Mercedes, 11 Nov 1940, (fl. fr.) *A. Burkart 10881* (SI). SANTA CRUZ: Lago Buenos Aires, Ruta 40, 19 Feb 1970, (fl. fr.), *E.G. Nicora 7537* (BAA); *E.G. Nicora 7538* (BAA).

**35. *Chiropetalum pavonianum*** (Müll.Arg.) Pax, Die Natürlichen Pflanzenfamilien 3, 5: 45. 1890. *Argythamnia pavoniana* Müll.Arg., Linnaea 34: 149. 1865. Type: PERU. *J.A.J. Pavon s.n.* (holotype: G-DC [G005596]!).

**Description:** Subshrub to shrub; leaves elliptic to ovate, base acute to rounded, with simple, stellate and malpighiaceous trichomes, margin serrate, 10–16 teeth per side; inflorescence with 1–3 basal pistillate flowers and 6–13 distal staminate flowers, floral nectaries pubescent on both staminate and pistillate flowers, staminate flower with 5-lobed petals, stamens 5, pistillate flowers without petals, styles pubescent, ovary and fruit densely covered by malpighiaceous trichomes, in addition to simple trichomes, stellate trichomes absent.

**Distribution and habitat:** *Chiropetalum pavonianum* is endemic to Peru (Fig. 5C), where few records are known from the northern part of the country.

**Flowering and fruiting:** Flowers and fruits can be found from September to November.

**Notes:** The main collection of Ruiz & Pavon is in the MA herbarium, but no specimens were found. According to the herbarium technician (Eva García Ibáñez), Ruiz sold part of his collection to fund his botanical research. Thus, we consider the only specimen found in G-DC as a holotype

of the name. *Chiropetalum pavonianum* is a poorly known species and apparently similar to *C. ruizianum* (Müll.Arg.) Pax & K.Hoffm. Further studies should be carried out to understand their relationships.

**Selected specimens examined:** PERU. BAGUA: Hacienda Marerilla on Río Utcubamba, 400 m, 01 Oct 1957, (fl. fr.), *P.C. Hutchison 1510* (MO).

**36. *Chiropetalum phalacradenium*** (J.W.Ingram) L.B.Sm. & Downs, Fl. Ilustr. Catarin. (Euphorbiac.) 1: 155. 1988. *Argythamnia phalacradenia* J.W.Ingram, Gentes Herbarum, Occasional Papers on the Kinds of Plants 11: 458. 1980. Type: BRAZIL. SANTA CATARINA: Lauro Müller, rain forest, lower and middle slopes of Serra do Rio do Rastro, 21 km west of Lauro Müller, 700-1000 m, 3 Apr 1957, *L.B. Smith et R.M. Klein 12343* (holotype: US [US00096115]!, isotypes: HBR [HBR0019549]!, K [K001206866]!, NY [NY00246259]!, R [R114719]!, UC [UC1079692]!).

**Description:** Subshrub to shrub; leaves lanceolate, base cuneate, pubescent, covered by malpighiaceous trichomes, stellate trichomes absent, margin serrate, 6–9 teeth per side; inflorescence with 1–3 basal pistillate flowers and 6–12 distal staminate flowers, floral nectaries glabrous on both staminate and pistillate flowers, staminate flower with 3-lobed petals, stamens 5; pistillate flowers without petals, styles glabrous, ovary and fruit covered by malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum phalacradenium* is endemic to the states of Santa Catarina and Rio Grande do Sul, Brazil (Fig. 5A), and known from just a few records in three localities. It occurs in the Atlantic Forest province, on rocky outcrops and understory humid forest, at elevations of 800–1000 meters.

**Flowering and fruiting:** Flowers and fruits can be found from January to July.

**Notes:** *Chiropetalum phalacradenium* is a very restricted species and should be prioritized for conservation due to threats and low area of occupancy (12 km$^2$) and extent of occurrence (310 km$^2$) (Bachman *et al.* 2011). The species was collected by Smith and Klein, in 1957, and treated as *C. gymnadenium* by Smith & Downs (1959). In a review of the genus, Ingram (1980b) analyzed this collection (*Smith et Klein 12343*), and described it as a new species. In the protologue, the author cites the holotype and two isotypes, but now analyzing databases and reviewing herbaria collections, four other isotypes were found. Previously to this study, the occurrence of the species was cited for the states of Paraná, Santa Catarina and Rio Grande do Sul, but with the analysis of herbaria collections, field expeditions and recently collected specimens it is possible to confirm that the species is restricted to the states of Rio Grande do Sul (one collect) and Santa Catarina (eight collections to two localities). The records of *C. phalacradenium* from Paraná correspond to incorrect identification.

**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Morrinhos do Sul, 16 Dez 1995 (fl., fr.), *J.A. Jarenkow et M. Sobral 2898* (PEL); SANTA CATARINA: Lauro Müller, Serra do Rio do Rastro, 21 km do centro de Lauro Müller, beira da estrada em frente ao monumento dos tropeiros, 28°23'57.48"S, 49°32'59"W, 19 Mar 2017 (fl. fr.), *J. Külkamp 216* (ICN, RB); Beira da estrada ao lado da cachoeira, 28°23'55.32"S, 49°31'11"W, 19 Mar 2017 (fl, fr), *J. Külkamp 217* (ICN); 28°23'57.12"S, 49°32'53.88"W, 21 May 2017 (fl, fr), *J. Külkamp et al. 227* (ICN); Anitápolis, Trilha dos Índios, metade da trilha, 27°55'48.9"S, 49°18'14.2"W, 900 m, 26 Jul 2020, (fl.), *J. Külkamp 1315* (FLOR, RB).

**37. *Chiropetalum puntaloberense*** Alonso Paz & Bassagoda, Comunicaciones Botanicas del Museo de Historia Natural de Montevideo 6(135): 1–2. 2009. Type: URUGUAY. ROCHA: Parque de Santa Teresa, Punta de los Loberos, Cerro Verde, 33°56'42.8"S, 53°30'22.9"W, 16 Oct 2003, *E. Alonso-Paz et M.J. Bassagoda 3659* (holotype: MVM, isotypes: MVFQ, MVFA, MVJB).

**Description:** Subshrub to shrub; leaves ovate, elliptic to lanceolate, base acute to rounded, adaxial surface irregular, with simple, stellate and malpighiaceous trichomes, margin serrate, 13–29 teeth per side; 1–3 inflorescences per node, 1–4 basal pistillate flowers and 12–30 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers, staminate flowers with 5–7-lobed petals, stamens 5, pistillate flowers without petals, styles pubescent to the apex, ovary and fruit covered by simple, stellate and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum puntaloberense* is endemic to Uruguay (Fig. 5A) and known from just a few records, all from one single location along the northern coast. It occurs in the Pampa province, at the edge of the sea with shrubby vegetation at low elevations, ca. 20 meters.

**Flowering and fruiting:** Flowers and fruits can be found from June to November.

**Notes:** *Chiropetalum puntaloberense* is a very restricted species and should be prioritized for conservation due to threats and low area of occupancy (2 km$^2$) and extent of occurrence. This species has individuals which are highly branched at the base and have decumbent branches. It is similar to *C. ramboi* (Allem & Irgang) Radcl.-Sm. & Govaerts, which occurs in northeastern Rio Grande do Sul, Brazil. During the revision of Uruguayan herbaria, the type specimens were not found in the respective collections mentioned in the protologue, so we followed the information about the type contained in the protologue.

**Selected specimens examined:** URUGUAY. ROCHA: La Coronilla, Santa Teresa, punta de los loberos, 20 m, 28 Apr 2019, *J. Külkamp et J. Iganci 801* (RB). Santa Teresa, Mar 1946, (fl. fr.), *A. Lombarde 4685* (MVJB).

**38. *Chiropetalum quinquecuspidatum*** (A.Juss.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 92. 1912. *Argythamnia quinquecuspidata* (A.Juss.) Müll.Arg., Linnaea 34: 150. 1865. *Croton quinquecuspidatum* A.Juss., Euphorb. Tent. 110, 1824. Type: PERU. *Dombey s.n.* (lectotype [first-step] designated by Ingram 1980b, [second-step] **designated here**: P [P00634976]!, isolectotypes: P [P00634977]!, P [P00634978]!, P [P00634979]!). Syntype remaining: Illustration in Euphorb. Tent. 110, pl. 8, fig. 26c. 1824.
= *Chiropetalum peruvianum* A.Juss, Annales des Sciences Naturelles 25: 22. 1832. [illegitimate superfluous name].
**Description:** Subshrub to shrub; leaves ovate, adaxial surface flat, base rounded, covered with simple, stellate and malpighiaceous trichomes, margin serrate, 9–22 teeth per side; 1 inflorescence per node, 1–4 basal pistillate flowers and 8–22 distal staminate flowers, floral nectaries glabrous on both staminate and pistillate flowers, petals of staminate flowers 5–7-lobed, stamens 5, petals acicular on pistillate flowers, glabrous styles, ovary and fruit covered by simple and malpighiaceous trichomes.
**Distribution and habitat:** *Chiropetalum quinquecuspidatum* is endemic to Peru (Fig. 5B) and known by few records at elevations between 2300–2800 meters. It occurs in the Rondônia, Puna and Yungas provinces, on rocky slopes with sparse shrub vegetation.
**Flowering and fruiting:** Flowers and fruits can be found from September to April.
**Notes:** Jussieu (1824) described *Croton quinquecuspidatum* citing *Herb. Mus.*, referring to Herbarium P. He also provides an illustration of reproductive structures. However, the author does not indicate a type specimen. The only collection of *Chiropetalum* from Peru in P herbarium in 1824 is *Dombey s.n.*

Ingram (1980b) mentions that the holotype (*Dombey s.n*) is deposited in the herbarium P. However, there are four specimens of *C. quinquecuspidatum* collected by *Dombey* in the P herbarium. Thus, the author performs a lectotype first-step by not specifying a sample as type specimens. Apparently, Ingram (1980b) did not consider the illustration presented in the protologue to be original material. Here, we indicate *Dombey s.n* (P00634976) as the lectotype second-step of *C. quinquecuspidatum* according to art. 9.17. The four specimens of P have few differences, we chose P00634976 as the lectotype because it presents the collector's original handwritten label, differentiating it from the other specimens. The illustration presented in the protologue by Jussieu (1824) is treated as a remaining syntype. *Chiropetalum peruvianum* was combined from *Croton quinquecuspidatus* by Jussieu (1824), creating a superfluous name by not using the epithet quinquecuspidatus, which was available in *Chiropetalum*.
**Selected specimens examined:** PERU. BOLOGNESI: Ancash, Conay, 2700 m, 12 May 1950, (fl. fr.), *R. Ferreyra 7349* (US). HUAROCHIRÍ: Lima, Matucana, 2400 m, 23 May 1940, (fl. fr.), *E. Asplund 10986* (US). Sandia: Puno, 2300 m, 12 Nov 1987, *L. Hoogte et C. Roersch 3534* (NY).

**39. *Chiropetalum ramboi*** (Allem & Irgang) Radcl.-Sm. & Govaerts, Kew Bull. 52: 478. 1997. *Argythamnia ramboi* Allem & Irgang, Rev. Bras. Biol. 36: 283. 1976. Type: BRAZIL. RIO GRANDE DO SUL. Torres do Sul: [Torres] at slopes at the hill, 15 Mar 1975, A. *Allem et B. Irgang s.n.* (holotype: ICN [ICN027340]!, isotypes: BH!, CEN!, DAV, U [U421115]!).
**Description:** Subshrub; leaves ovate, base rounded, covered with simple, stellate and malpighiaceous trichomes, margin crenate, 12–22 teeth per side; 1 inflorescence per node, 1–2 basal pistillate flowers, 2–8 distal staminate flowers, floral nectaries glabrous on both staminate and pistillate flowers, staminate flowers with 5-lobed petals, stamens 3–4, pistillate flowers with acicular petals, pubescent styles, ovary and fruit covered by simple, stellate and malpighiaceous trichomes.
**Distribution and habitat:** *Chiropetalum ramboi* is endemic to the state of Rio Grande do Sul, in southern Brazil (Fig. 5B), and known from few records made at three locations on the coast, at elevations between 2–45 meters. It occurs in the Pampa province, in shrubby vegetation with sandy soil.
**Flowering and fruiting:** Flowers and fruits can be found around the year.
**Notes:** The specimen collected by B. Rambo in 1954 was identified as *Argythamnia mollis* Klotzsch ex Baill. by him, but upon studying the specimen, Allem & Irgang (1976) realized that this corresponds to a new species, and then collected other specimens and described *A. ramboi*. Previous to the present study, the species was known only from collections made in the municipality of Torres, but recent field expeditions have identified new occurrences on Cidreira and Mostardas, also along the coast of the state of Rio Grande do Sul. In the protologue, the authors cite two isotypes for *C. ramboi*, in the BH and DAV herbaria, but these specimens were not found. *Chiropetalum ramboi* is an extremely threatened species due to urban expansion on the coast of the state of Rio Grande do Sul. In many locations, the vegetation has been suppressed for construction or by the large number of tourists trampling over native vegetation.
**Selected specimens examined:** BRAZIL. RIO GRANDE DO SUL: Cidreira, Fazenda Azaléia, 30°05'14.40"S, 50°13'53.5"W, 14 Aug 2017 (fl. fr.), *R.M. Senna 1703* (HAS); Mostardas, Bacopari, Lagoa do Bacopari, 30°32'43.43"S, 50°25'45.8"W, 29 May 2017 (fl. fr.), *J. Külkamp et al. 228* (ICN); Torres, Parque da Guarita, 29°21'11.20"S, 49°43'56.30"W, 13 Dec 2016 (fl. fr.), *J. Külkamp 209* (ICN); Torre Sul, Parque da Guarita, 27 Jan 1953 (fl. fr.), *D.B. Falkenberg 6051* (FLOR).

**40. *Chiropetalum ruizianum*** (Müll.Arg.) Pax & K.Hoffm., Pflanzenr. IV.147.vi (Heft 57), 94. 1912. *Argythamnia ruiziana* Müll.Arg. Linnaea 34: 151. 1865. Type: PERU. Prope

Cheuchin, *L.H. Ruiz et J.A.J. Pavon, s.n.* (lectotype designated by Ingram 1980b: G-DC [G005597]!, isolectotypes: HAL [HAL118975]!, MA [MA812824]!, MA [MA812825]!, MA [MA812826]!).

**Description:** Subshrub to shrub; leaves elliptic to ovate, base acute to rounded, with simple and malpighiaceous trichomes, stellate trichomes absent, margin serrate, 11–18 teeth per side; inflorescence with 1–3 basal pistillate flowers and 7–15 distal staminate flowers, floral nectaries pubescent in both staminate and pistillate flowers, staminate flowers with 5-lobed petals, stamens 5, pistillate flowers without petals, styles pubescent, ovary and fruit covered by simple and malpighiaceous trichomes.

**Distribution and habitat:** *Chiropetalum ruizianum* is endemic to central Peru (Fig. 5A) and known from a few records. It is distributed in the Yunga and Rondônia provinces, at elevations between 2700-3000 meters.

**Flowering and fruiting:** Flowers and fruits can be found from June to February.

**Notes:** *Chiropetalum ruizianum* is a poorly known species and similar to *C. pavonianum*. Further studies should be carried out to understand their morphological differences and phylogenetic relationships. Ingram (1980b) designated the lectotype for *C. ruizianum*, and here we indicate three other specimens as isolectotypes deposited in the MA herbarium, where Ruiz and Pavón's main collection is housed.

**Selected specimens examined:** PERU. DE LA MAR: Ayacucho, Entre Tambo e The Apurimac, 2700-2800 m, (fl.), Jun 1914, *A. Weberbauer 5594* (US). CHAGLLA: 2800-2900 m, 1909-1914, *A. Weberbauer 6696* (US).

**41. *Chiropetalum tricoccum*** (Vell.) Chodat & Hassl, Bull. Herb. Boissier. Ser 2. 5: 502. 1905. *Desfontaena tricocca* Vell., Fl. Flum. p. 95. 1829 (1825). Type: BRAZIL. RIO DE JANEIRO: illustration in J.M.C. Vellozo, *Flora Fluminensis*, vol. 2, t. 146, 1831 ["1827"]! (lectotype **designated here**: original parchment illustration of *Flora fluminensis* t. 146 in the Manuscript Section, Biblioteca Nacional, Rio de Janeiro, indexed under digital object code mss1198651_149!).

= *Chiropetalum gymnadenium* Müll.Arg., Fl. bras. 11(2): 316. 1874. Type: BRAZIL. MINAS GERAIS: in umbrosis prope Villa do Presídio, *L. Riedel 331* (holotype, G [G00434166]!), ***syn. nov.***

*Argythamnia lineata* Baill., Adansonia 4: 288. 1864. *Nomem nudum*.

*Chiropetalum lineatum* Klotzsch, Archiv für Naturgeschichte 7: 199. 1841. *Nomem nudum*.

**Description:** Subshrub; leaves ovate to lanceolate, base rounded, covered by malpighiaceous trichomes, stellate trichomes absent, margin serrate, 13–28 teeth per side; inflorescence with 1–4 basal pistillate flowers and 12–26 distal staminate flowers, floral nectaries glabrous in both staminate and pistillate flowers, staminate flowers with 3-lobed petals, stamens 5, pistillate flowers without petals, styles glabrous, ovary and fruit covered by malpighiaceous and simple trichomes.

**Distribution and habitat:** *Chiropetalum tricoccum* is endemic to Brazil (Fig. 5A), occurring in Bahia, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, and São Paulo. The species is distributed in the understory of open and riparian forest of the Atlantic, Parana Forest and *Araucaria* Forest provinces, between 200–720 meters above sea level.

**Flowering and fruiting:** Flowers and fruits can be found throughout the year.

**Notes:** Vellozo (1829) described and illustrated *Desfontaena tricocca* based on a specimen observed by him in the "Alps Fluminensis", Rio de Janeiro. The tome with the description was distributed in 1829 and the illustration only in 1831. In 1798, Vellozo's original specimens were sent to the Royal Museum of Lisbon, where they were incorporated into the herbarium, possibly by Vellozo himself (Lima 1995). Our recent research was unsuccessful in locating the original Vellozo's collection, thus the lectotypification is necessary. As the illustration is the only original material of the species, we designate it as the lectotype of *C. tricoccum*, in accordance with the ICN.

Müller (1865) transferred *Desfontaena* Vell. to *Argythamnia* and mentioned the specimen *Sellow s.n.* (P), collected in *Brasilia meridionalis* (Rio Grande do Sul State). From this moment, taxonomists began to consider only this physical specimen and apparently no longer Vellozo's illustration. However, this specimen corresponds to *C. latifolium* (see discussion in *C. latifolium*).

Chodat & Hassler (1905) treats *Desfontaena* as a synonym of *Chiropetalum*, and describes *C. tricoccum* f. *latifolia* based on a specimen from Paraguay. Pax & Hoffmann (1912), when analyzing the specimen (*Sellow s.n.*) of *C. tricoccum* cited by and the type specimens of *C. tricoccum* f. *latifolia*, concluded that they were the same biological entity, thus treating it as a synonym.

In all subsequent descriptions the morphological features used for recognition of *C. tricoccum* were the pubescent of floral nectaries and the 4–7–lobed petals, but in Vellozo's illustration, the petals are 3–lobed, and nothing is mentioned about the nectary pilosity. Here we treat the specimen *Sellow s.n.* as *C. latifolium*. For the state of Rio de Janeiro, no other specimens of *Chiropetalum* were recorded, and the only known citation of the genus is the specimen on which Vellozo based the illustration.

Müller (1874), when describing *Argythamnia gymnadenia*, uses the same morphological features presented by Vellozo in the illustration (3–lobed staminate petals). Analyzing the type and protologue, we conclude that *C. gymnadenium* is synonymy of *C. tricoccum*. According to Art. 9.1 note 1, we recognize *Riedel 331* (G) as the holotype of *C. gymnadenium* because it is the only specimen found in the G herbarium collections, that is the main herbarium where the author worked (Stafleu & Cowan 1976). Possibly, in LE there is a duplicate of *Riedel 331*, as it is the herbarium with the

collector's main collection. However, it was not possible to confirm this.

*Chiropetalum lineatum* was described as a new species for Brazil, but no description nor a type specimen were provided (Klotzsch 1841). Baillon (1864) transferred *C. lineatum* to *Argythamnia*, establishing *A. lineata* and citing two specimens *"(– Sellow, Brésil herb. Mus., ex herb, Berl. – A. S. H., cat. C1, n. 465)"*. Later, Müller (1865) treated correctly *C. lineatum* as *nomem* and synonym of *A. tricocca*.

**Selected specimens examined:** BRAZIL. BAHIA: Jussari, Serra do Teimoso, 04 Feb 1998 (fl. fr.), *A.M. Amorim et al.* 2593 (NY). MINAS GERAIS: Viçosa, Fazenda do deserto, 25 Sep 1930 (fl. fr.), *Y. Mexía 5103* (NY, US). PARANÁ: Cerro Azul, Estrada de Turvo, Rio Ribeira, 22 Jan 1959 (fl. fr.), *G. Hatschbach 5420* (MBM, US). RIO GRANDE DO SUL: Parobé, Santa Cristina do Pinhal, Oct 1987 (fl.), *S. Diesel s.n.* (PACA). SÃO PAULO: Botucatu, Usina Indiana, Aug 1972 (fl. fr.), *Gottsberger et al. 925* (SP).

**42. *Chiropetalum tricuspidatum*** (Lam.) A.Juss., Annales des Sciences Naturelles (Paris) 25: 22. 1832. *Chiropetalum tricuspidatum* var. *genuina* (Müll.Arg.) Pax & K.Hoffm. Pflanzenr. IV.147.vi (Heft 57), 93. 1912. *Argythamnia tricuspidata* var. *genuina* Müll.Arg. Linnaea 34: 150. 1865. *Odotalon tricuspidata* (Lam.) Raf., Sylva Telluriana 33. 1838. *Croton tricuspidatus* Lam. Encyclopédie Méthodique, Botanique 2: 212. 1786. Type: CHILE. *M. Dombey s.n.* (lectotype [first-step] designated by Ingram 1980b, [second-step] **designated here**: P [P00634982]!, isolectotypes: F [F971814F]!, P [P00634981]!, P [P00634983]!).

= *Chiropetalum lanceolatum* (Cav.) A.Juss., Annales des Sciences Naturelles (Paris) 25: 21. 1832. *Chiropetalum tricuspidatum* var. *lanceolatum* (Cav.) Pax & K.Hoffm. Pflanzenr. IV. 147. vi (Heft 57), 92. 1912. *Argythamnia tricuspidata* var. *lanceolata* (Cav.) Müll.Arg. Linnaea 34: 150. 1865. *Odotalon lanceolata* (Cav.) Raf. Sylva Telluriana 67. 1838. *Croton lanceolatus* Cav. Icones et Descriptiones Plantarum 6: 38. 1800. Type: CHILE. BÍO-BÍO: Talcahuano, *L. Neé s.n.* (lectotype [first-step] designated by Ingram 1980b, [second-step] **designated here**: MA [MA475593]!, isolectotypes: MA [MA475594]!).

= *Chiropetalum ovatum* Phil. Linnaea 29: 42. 1858. Type: CHILE. VALPARAÍSO: Prope Quillota, *P. Germain s.n.* (holotype: SGO [SGO051543]!, isotypes: BH, K).

**Description:** Subshrub; leaves linear to ovate, base acute to rounded, pubescent, covered by malpighiaceous trichomes, stellate trichomes absent, margin serrate, 3–8 teeth per side; inflorescence with 1–3 basal pistillate flowers and 5–30 distal staminate flowers, both pubescent, floral nectaries glabrous on both staminate and pistillate flowers, staminate flowers with petals 3-lobed, stamens 5, pistillate flowers with 5 petals, 3-lobed to entire, styles glabrous, ovary and fruit covered by malpighiaceous and simple trichomes.

**Distribution and habitat:** *Chiropetalum tricuspidatum* is endemic to Chile (Fig. 5B) and distributed in the forest understory in the Central Chilean and Valdivian provinces (Rivas-Martínez & Navarro 1994).

**Flowering and fruiting:** Flowers and fruits can be found from September to February.

**Notes:** Ingram (1980b) designated the lectotype for *C. tricuspidatum*, maybe the author considers the three exsiccatae of *M. Dombey s.n.* present in P as a lectotype. However, it was not specified. Here we consider as lectotype second-step of the name the specimen *M. Dombey s.n.* (P00634982) according to art. 9.17 of the ICN.

Ingram (1980b) also lectotypified *C. lanceolatum* Cav., but he did not specify the specimen chosen, since in the MA herbarium there are two specimens of *L. Neé s.n.* Thus following art. 9.17 of ICN, we designate here the lectotype second-step for *C. lanceolatum,* and consider *L. Neé s.n.* (MA475593) as lectotype. Some authors quote the collector *Neeiten*, when the correct name is Luis Neé. This confusion is caused because on the specimens it is written "Neé dedit," indicating that the collection was carried out by him.

We agree with the synonymization of *C. ovatum* under *C. tricuspidatum* carried out by previous authors (Ingram 1980b). We consider the specimen *P. Germain s.n.* (SGO051543) as the holotype of *C. ovatum*, because the author of the name, Rudolf Amandus Philippi, worked for many years in the SGO collection, where most of the author's type collections are deposited (Stafleu & Cowan 1976). Ingram (1980b) mentioned the presence of isotypes in BH (fragment) and K, but we did not find these two samples. *Chiropetalum tricuspidatum* is used as a natural dye by some traditional communities in Chile. By infusing fresh or dried leaves in heated water, the color is blue and after a few hours it turns red (com. pers. of Marcela Ibañez Muñoz). This blue color after drying is observed in other species of *Chiropetalum* and *Argythamnia*, but it is not possible to extract the blue color using the same methods.

**Selected specimens examined:** CHILE. ACONCAGUA: Zapallar, 22 Feb 1947, (fl. fr.), *O. Boelcke 4619* (BAA). CONCEPCION: Avenida Alemana, 15 Feb 1951, (fl.), *E. Junge 2218* (US). Lanalhue, Jan 1929, (fl. fr.), *J. Claude 5964* (US).

### ***Philyra* Klotzsch**

***Philyra*** Klotzsch, Archiv für Naturgeschichte 7(1): 199. 1841.

Type: *Philyra brasiliensis* Klotzsch.

Shrubs to treelets dioecious. Branches erect, with thorns, glabrous. Stipules developed, brown, persistent, paleaceous, lanceolate, trichomes simple, caducous. Leaves simple, alternate, petiolate, elliptic, base and apex acute, venation pinnate, margins entire, glabrous. Raceme axillary, flowers bracteolate, pedicelate; bracteole 1–4 per flower, paleaceous, lanceolate, pubescent, glabrescent or not. Staminate flowers 6–13 per inflorescence, pedicelate, dichlamydeous, actinomorphic; sepals 5, valvate, free, entire, lanceolate, simple trichomes; petals 5, valvate, free, entire, spatulate,

glabrous; stamens 10–12; column with 2 whorls; staminodes 2, at the top of column; floral nectaries absent. Pistillate flowers 1–5 per inflorescence, pedicel long, articulated in half, dichlamydeous, actinomorphic; sepals 5, valvate, free, entire, acicular to lanceolate, trichomes simple; petals 5, larger than sepals, free, entire, spatulate to elliptic, glabrous; floral nectaries absent; ovary 3-locular, trichomes simple, caducous; styles 3, 1/2-proximal fused, 1/2–distal multifid. Capsule with 3 loci, 1-seeded, glabrous, columella persistent. Seeds spherical, surface smooth, gray to blackish.

*Philyra* is restricted to central and eastern South America (Fig. 6). The highest concentration of *Philyra* collections are from northeastern (Bahia state) and central-western (Mato Grosso do Sul state) Brazil and in the central region of Paraguay (Fig. 3C). All of these collection locations coincide with the distribution of Seasonally Dry Tropical forest, demonstrating the importance of this biome for the conservation of this lineage. In the phylogenetic reconstruction of Külkamp *et al.* (2023a), *Philyra* emerges as sister to other taxa of the tribe Adelieae, and thus was circumscribed in this tribe.

**43. *Philyra brasiliensis*** Klotzsch, Archiv für Naturgeschichte 7(1): 199. 1841. *Argythamnia brasiliensis* (Klotzsch) Müll.Arg., Linnaea 34: 144. 1865. *Ditaxis brasiliensis* (Klotzsch) Baill., Adansonia 4: 269. 1864. Type: BRAZIL. *F. Sellow s.n.* (lectotype **designated here**: P [P0063498]!, isolectotypes: BR [BR0000005102808]!, K [K0006002]!, TUB [TUB009146]!).

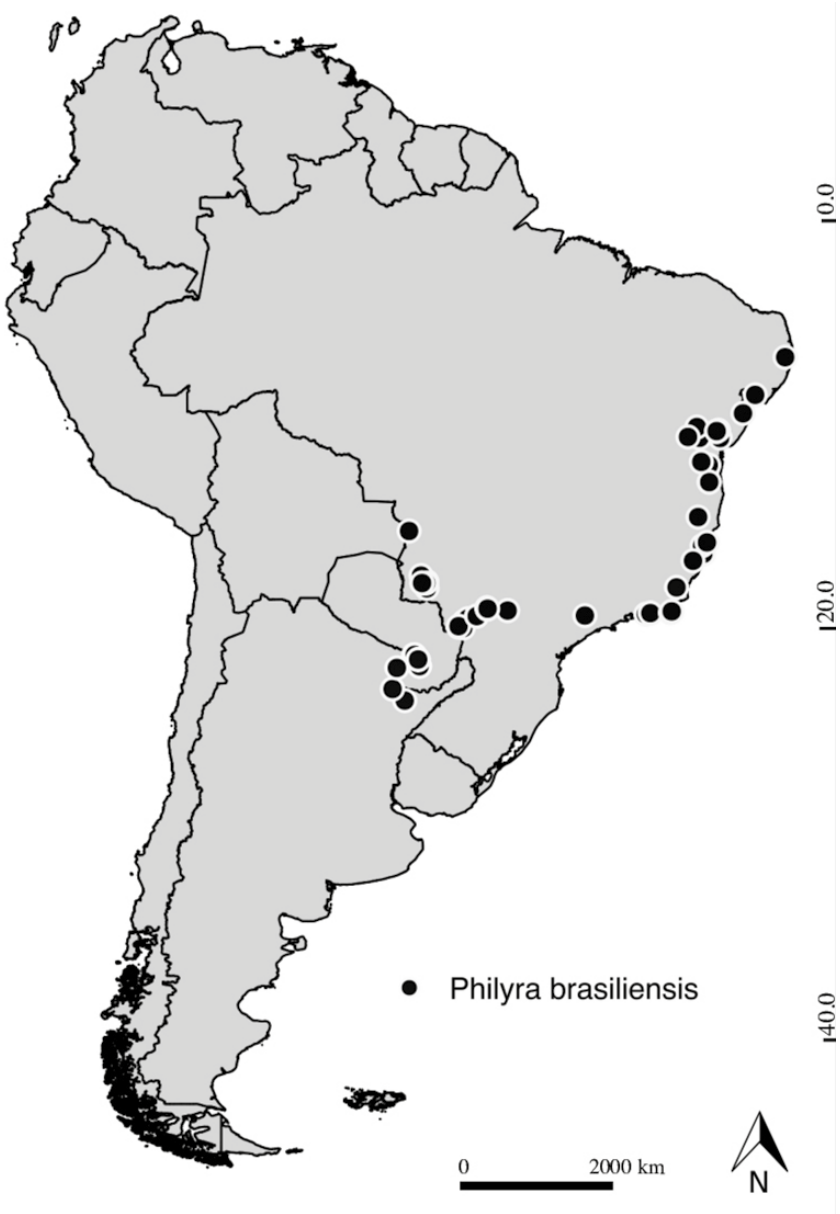


**Figure 6.** Geographic distribution of *Philyra*.

**Description:** Shrub to treelets dioecious; thorns on the branches; leaves elliptic, glabrous, venation pinnate, margin entire; inflorescences 5–14 mm long; bracts paleaceous, pubescent, glabrescent or not; 6–13 staminate flowers, with 10–12 stamens, glabrous, staminodes 2, pubescent, floral nectaries absent, 1–5 pistillate flowers, with pedicels larger than 12 mm long, styles multifid.

**Distribution and habitat:** *Philyra brasiliensis* is distributed in Argentina, Brazil, and Paraguay (Fig. 6). It occurs in the understory of seasonally dry tropical forest, at elevations ranging from sea level to 700 m, in the Atlantic, Cerrado, Chaco and Parana Forest provinces.

**Flowering and fruiting:** Flowers and fruits from July to April.

**Notes:** *Philyra brasiliensis* was described in detail by Klotzsch (1841). However, the author did not mention the type specimen in the protologue. When describing *P. brasiliensis*, Klotzsch worked as curator of the herbarium B (1833 to 1860); in this period, specimens of *P. brasiliensis* made by *F. Sellow s.n.* during his expedition to Brazil and Uruguay (1814 to 1831) were housed at B, as its main collections were sent to this herbarium and later duplicates were sent to others (Urban 1893; Stafleu & Cowan 1976). In the B, K, P, and TUB herbaria, there are duplicates of *P. brasiliensis* collected by *Sellow s.n.*, all with original labels from Berolinense herbarium, indicating that they were received as a donation from B.

Baillon (1864) transferred *P. brasiliensis* to *Ditaxis* (*D. brasiliensis*) and mentioned two specimens examined (*F. Sellow s.n.* [with the indication "*Herb. Mus., ex her. Berl.*"] and *A. Saint-Hilaire 510*). The collections made by Saint-Hilaire during the expedition to South America (1816 to 1822) were sent to the Paris Museum (Stafleu & Cowan 1976).

So, we have no evidence to affirm that Klotzsch used this collection of Saint-Hilaire in the original description of *P. brasiliensis*. Some specimens of *P. brasiliensis* collected by *L. Riedel s.n.* are indicated as types in different databases, but we also have no evidence that Klotzsch analyzed samples of this collection, as the collections from Riedel's expedition were sent to St. Petersburg (LE) and later donated to other herbaria (Brummitt & Powell 1992). Hence, and since the specimens at B herbarium were destroyed during World War II, here we consider the *F. Sellow s.n* as original material and chose the specimen P0063498 as lectotype of *P. brasiliensis*. We did not find any negative photos from B at the Field Museum of any specimen of *Philyra*, probably because the specimens were in the general collection and were not photographed.

**Selected specimens examined:** ARGENTINA. FORMOSA: San Cosme, Ruta 12, 23 km E de Corrientes, 10 Oct 1976 (fl.), *A. Schinini et C.L. Cristobal 13656* (SI). Formosa, Aug 1919, (fr.), *P. Jorgensen 3268* (SI). BRAZIL. MATO GROSSO DO SUL: Bonito, Parque Estadual da Serra da Bodoquena, Fazenda Boqueirão, 525 m, 18 Apr 2009, (fl. fr.), *A. Pott et V.J. Pott 152929* (CGMS, RB). RIO DE JANEIRO: Italva, Quimbira, 300 m, 14 Dec 2019, (fr.), *J. Külkamp et al. 1113* (HUEFS, MBM, RB, SP, US); Rio de Janeiro, 1822, (fr.) *A.S. Hilaire 510* (P). No locality, no date, *Riedel s.n.* (GH00048511, K000600293, MO260337, S-R10601). PARAGUAY. CENTRAL: Ypacaray, Oct 1913, (fl.), *E. Hassler 12323* (US - 2 sheets). Cordillera: Caacupe, Instituto Agricola Nacional, 80 m, 11 Sep 1981, (fl.), *M. Vavrek et C. Cuevas 320* (US). PARAGUARI: Sapucai, Jul 1913, (fl. fr.), *E. Hassler 11839* (US - 4 sheets).

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