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## Taxonomic revisions in *Fridericia* (Bignoniaceae, Bignoniaceae) II: the “Neomacfadya” clade

Miriam Kaehler<sup>1,2,3</sup> & Lúcia G. Lohmann<sup>2</sup>

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**Abstract:** *Fridericia* is a large genus of neotropical lianas with a complicated taxonomy. The genus is monophyletic and well supported by molecular characters, but lacks distinctive morphological synapomorphies, complicating its recognition. Species of *Fridericia* are distributed among six well-supported clades. As part of a series of taxonomic revisions of each clade of *Fridericia*, we present a taxonomic revision of the “Neomacfadya” clade. This group is broadly distributed through the Neotropics and includes species with glandular fruits and long-tubular calyces that are usually laterally split. We recognize 11 species for which we provide an identification key, typifications, morphological descriptions, illustrations, phenology, maps, comments on distribution and habitats, as well as suggest the conservation status for all species. We lectotypify six names (*Arrabidaea ateramnantha*, *A. craterophora* subvar. *glabrescens*, *A. craterophora* subvar. *velutina*, *Bignonia hispida*, *Scobinaria amethystina* and *S. japurensis*). We correct the typification of *A. lenticellosa* Bureau & K. Schum. and *B. arthrerion*, provide a second-step lectotypification for *B. pearcei* and a neotypification for *Paragonia schumanniana*. We also correct information associated with the type of *A. oligantha* and synonymize this name in *F. japurensis*. We further reject *A. craterophora* var. *obtusifolia* and exclude one name previously treated in *Fridericia* (*Tecoma moritziana*).

**Keywords:** *Arrabidaea japurensis* complex, *Arrabidaea* sect. *Macrocarpaea*, *Arrabidaea* ser. *Macrocalycinae*, *Bignoniaceae*, *Bignoniaceae*, *Fridericia*, nomenclature, taxonomy, typification

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### Introduction

*Fridericia* Mart. emend. L. G. Lohmann is a genus of neotropical lianas that can be recognized by simple tendrils and lepidote ovaries (Lohmann & Taylor 2014; Kaehler & al. 2019). Furthermore, a combination of characters such as prophyll shape and distribution, presence/absence of interpetiolar gland fields, leaflet shape and venation, trichome type, calyx shape, corolla indumentum and presence/absence of glands on fruits support the six clades recovered in the molecular phylogeny (Kaehler & al. 2019).

The “Neomacfadya” clade is an informally named group of *Fridericia* that includes species characterized by glandular fruits and long-tubular calyces that are usually laterally split (Kaehler & al. 2019). Four species recognized in this group (corresponding to eight names) were previously placed within *Arrabidaea* sect. *Macrocarpaea* ser. *Macrocalycinae* Bureau & K. Schum. based on calyx morphology, namely: (1) *F. craterophora* (Mart. ex DC.) L. G. Lohmann [as *A. craterophora* Mart. ex DC. and *A.*

*lenticellosa* Bureau & K. Schum.]; (2) *F. egensis* (Bureau & K. Schum.) L. G. Lohmann [as *A. egensis* Bureau & K. Schum.]; (3) *F. japurensis* (DC.) L. G. Lohmann [as *A. japurensis* (DC.) Bureau & K. Schum. and *A. oligantha* Bureau & K. Schum.]; and (4) *F. triplinervia* (Mart. ex DC.) L. G. Lohmann [as *A. triplinervia* (Mart. ex DC.) Baill. ex Bureau and *A. ateramnantha* Bureau & K. Schum.]. However, Bureau and Schumann (1896) did not select a type for their *A.* ser. *Macrocalycinae*. For Bureau & Schumann (1896), all species within this group share a long calyx with tubular to obconic morphology, with irregularly bilobed or laterally split rims and vernicose surface, usually covered by glands. Gentry (1977a) considered this series as a “natural group”, referred to as the “*Arrabidaea japurensis* complex”. He included two more species within this complex: *A. nicotianiflora* Kraenzl. [= *F. nicotianiflora* (Kraenzl.) L. G. Lohmann] and *A. verrucosa* (Standl.) A. H. Gentry [= *F. schumanniana* (Loes.) L. G. Lohmann]. Recent molecular evidence (Kaehler & al. 2019) corroborated the affinities among these taxa as

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well as their affinities with five additional species: *F. arthrerion* (Mart.) L. G. Lohmann, *F. grosourdyana* (Baill.) L. G. Lohmann, *F. pearcei* (Rusby) L. G. Lohmann [= *F. arthrerion* (Mart.) L. G. Lohmann], *F. podopogon* (DC.) L. G. Lohmann and *F. simplex* (A. H. Gentry) L. G. Lohmann. A recently described new species, *F. resinosa* A. H. Gentry ex Kaehler, was also placed in this group based on morphology (Kaehler 2020). In total, we recognize 11 species within the “Neomacfadya” clade, which is named after the oldest generic name among all the generic synonyms, *Neomacfadya* Baill.

Species of the “Neomacfadya” clade are distributed through humid and dry habitats, from S Mexico and Cuba to Paraguay and Brazil. Four broadly distributed species—*Fridericia craterophora*, *F. japurensis*, *F. schumanniana* and *F. triplinervia*—show wide and continuous morphological variation among different habitats, with characters sometimes overlapping among species. Even though the placement of species within the “Neomacfadya” clade is straightforward, the identification of the individual species is challenging.

As part of a series of taxonomic revisions in *Fridericia* (see Kaehler & Lohmann 2021a), we treat here the 11 species belonging to the “Neomacfadya” clade, the third-largest clade of *Fridericia* (after the “*Fridericia* s.str.” and “*Petastoma*” clades). For each species, we provide typifications, morphological descriptions, illustrations, information on phenology, distribution maps and comments on the distribution and habitat, as well as suggest their conservation status. We also provide an identification key to all species recognized, discuss the affinities with morphologically similar taxa and provide notes on the taxonomic and nomenclatural novelties for each species recognized.

## Material and methods

Almost 650 gatherings and more than 1000 duplicates, including all nomenclatural types deposited at HAL, K, M, MBM, MO, MPU, NY, P, R, RB, S, SPF, TEPB, UB, UPCB and W were analysed (herbarium codes following Thiers 2022+). Additionally, we consulted images in electronic repositories, especially Global Plants (<https://plants.jstor.org/>), Herbario Virtual Austral Americano (<https://herbariovaa.org/>), JACQ (<https://www.jacq.org/>), Reflora (<https://reflora.jbrj.gov.br/>), Species Link (<http://splink.org.br/>), Portal de Datos Abiertos UNAM (<https://datosabiertos.unam.mx/biodiversidad/>) and Universidad Nacional de Colombia (<http://www.biovirtual.unal.edu.co/es/colecciones/search/plants/>). We also consulted photographs of specimens deposited in LE and OXF provided by the staff of these two herbaria. The list of selected specimens examined is provided in Appendix 1 (see Supplemental content online).

Types are listed alphabetically and herbarium accession codes (accession numbers) are provided when available. Whenever herbarium accession codes were lacking,

specimen barcodes are provided. Taxonomic headings include type information provided in the labels of each specimen and the phenological condition of these materials. Whenever the data provided in the label differed from those included in the protologue, the additional information provided in the protologue was added between square brackets. The terminology of specimen citations in the text follows the definitions provided in Article 8.2 and its footnote in the *International Code of Nomenclature for algae, fungi, and plants* (hereafter “Code”, Turland & al. 2018). In this definition, “a specimen is a gathering, or part of a gathering, of a single species ... usually mounted on a single herbarium sheet ...”, whereas “the term ‘gathering’ is used for a collection presumed to be of a single taxon made by the same collector(s) at the same time from a single locality”.

The terminology of leaf venation follows Ellis & al. (2009), trichome types follow Nogueira & al. (2013) and inflorescence morphology follows Weberling (1981). All other terms follow Lohmann & Taylor (2014).

Distribution maps were prepared using QGIS 3.14.1 Pi (QGIS Development Team 2020) using the Americas Base Map (Bletter & al. 2004). When the distribution coordinates were not available on specimen labels, we searched the locations using Google Earth (<https://earth.google.com/web/>). When precise locations were not available, we used the municipality coordinates instead. The conservation status of each species was estimated using GeoCAT (Bachman & al. 2011). According to Lughadha & al. (2018), a minimum of 500 specimens is necessary to estimate an Area of Occupancy larger than the Area of Occupancy threshold for a threatened category (2 km<sup>2</sup>). Therefore, the IUCN grid size is too small for broadly distributed species with a relatively small density of gatherings within this large area. In this context, for the species with a wide Extent of Occurrence (more than one million km<sup>2</sup>), we opted to estimate the Area of Occupancy using the auto-value option for the cell width (50 km of cell width). For species with a smaller Extent of Occurrence (less than one million km<sup>2</sup>), we opted to use 2 km, which corresponds to the cell width recommended by the IUCN (2019).

## Results and Discussion

### Key for identification of *Fridericia* species included in the “Neomacfadya” clade

1. Leaflet venation pinnate (sometimes resembling palmate actinodromous basal but, in this case, with thin lateral veins) . . . . . **2**
- Leaflet venation palmate actinodromous basal or subbasal . . . . . **6**
2. Calyx tubular to obconic, 0.4–0.9 cm wide; corolla lobes undulate (if flat, then restricted to Central America); C South America or N Central America . . . . . **3**

- Calyx narrowly tubular, 0.25–0.4 cm wide; corolla lobes flat; N South America . . . . . **5**
- 3. Petiole glabrous, blades adaxially vernicose; bracteoles of inflorescence triangular . . . . . **8. *F. resinosa***
- Petiole puberulous or villous, blades not adaxially vernicose; bracteoles of inflorescence linear . . . . . **4**
- 4. Petiole villous; corolla 2.5–4 cm long, 0.7–0.9 cm wide at mouth of tube, with lobe margins flat; N Central America . . . . . **7. *F. podopogon***
- Petiole puberulous; corolla 4.1–6.4 cm long, 0.9–2.5 cm wide at mouth of tube, with lobe margins undulate; C South America . . . . . **2. *F. craterophora***
- 5. Branches glabrous to glabrescent; inflorescence with 2 or 3 orders, pubescent; corolla with lobe margins acuminate to caudate . . . . . **6. *F. nicotianiflora***
- Branches pubescent to villous; inflorescence up to 7 orders, villous; corolla with lobe margins shortly acuminate . . . . . **4. *F. grosourdyana***
- 6. Leaflets adaxially hispid, puberulous, velutinous or villous . . . . . **7**
- Leaflets adaxially glabrous or glabrescent (sometimes pubescent at veins) . . . . . **8**
- 7. Prophylls of axillary buds long apiculate, 3–5(–8) mm long; leaflets with apex obtuse or rounded (sometimes shortly acuminate); calyx lepidote with glandular peltate trichomes, 1.6–3 cm long; fruit with valves woody, 2.3–2.7 cm wide, glabrous . . . . . **3. *F. egensis***
- Prophylls of axillary buds not apiculate, 1–2.3 mm long; leaflets with apex acuminate; calyx glabrescent to velutinous, with simple and glandular capitate trichomes, 0.4–0.7 cm long; fruit with valves coriaceous, 1–1.4 cm wide, villose, with simple and glandular capitate trichomes, becoming glabrescent . . . . . **1. *F. arthrerion***
- 8. Leaflets with pocket or vestigial pocket domatia . . . . . **9**
- Leaflets without domatia . . . . . **10**
- 9. Leaflets with large pocket domatia (2–4 mm long), if smaller (1–2 mm) then restricted to C Amazonia; calyx rim truncate (sometimes irregularly split and truncate); anther connectives protruding 0.8–1.5 mm; fruit valves coriaceous and rough; dry and humid forests and savannahs from C South America to C Amazonia . . . . . **11. *F. triplinervia***
- Leaflets with vestigial pocket domatia (smaller than 1 mm); calyx rim irregularly split forming 5 lobes (sometimes bilabiate); anther connectives not protruding; fruit valves woody and verrucose; wet forests in W Amazonia, C and N Andes and Central America . . . . . **9. *F. schumanniana***
- 10. Lateral leaflets 3.4–8.8 cm long; staminode 2.2–6 mm long; anther connectives protruding 0.5–1 mm; fruit valves smooth, lepidote, not sticky, 7.9–10 cm long; Brazilian Cerrado . . . . . **10. *F. simplex***
- Lateral leaflets (8.5–)10–15.5 cm long; staminode 1.8–2 mm long; anther connectives not protruding; fruit valves rough, not lepidote, sticky, 14–40 (–52) cm long; lowland Amazonia, low-altitude rain-

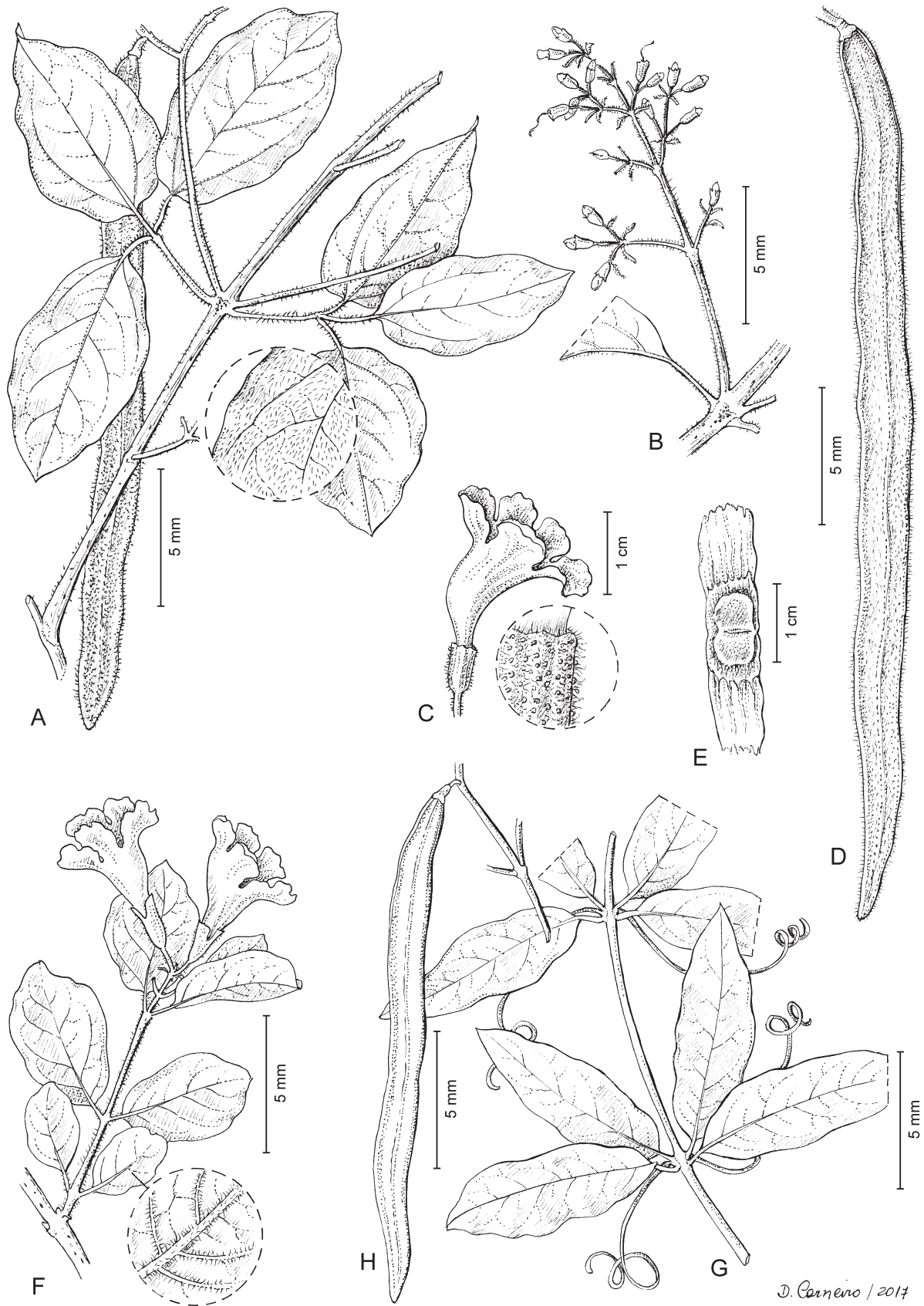
forests of C and N Andes and ecotone areas between forests and savannahs (Cerrado, Chaco and Llanos) . . . . . **5. *F. japurensis***

### Taxonomic treatment

**1. *Fridericia arthrerion*** (Mart.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 433. 2014 = *Bignonia arthrerion* Mart. in Flora 24(2, Beibl.): 47. 1841 = *Distictis arthrerion* (Mart.) DC., Prodr. 9: 191. 1845 = *Arrabidaea arthrerion* (Mart.) Baill., Hist. Pl. 10: 28. 1888. – Lectotype (designated as “holotype” by Lohmann in Lohmann & Taylor 2014: 433): Brazil, Mato Grosso, Cuiabá, 1833 [s.d.], *Herb. Fl. Bras. 515* (= *A. L. P. da Silva Manso 18*) (M accession code M-86391! [and photo F negative no. 20437!]; isolectotypes: BR barcode BR0000008804723 [image!], G-DC barcode G00014139 [image!], G-DC barcode G00133574 [image!], HAL barcode HAL0116227!, K barcode K000449144!, L barcode L003554 [image!], MO accession code MO-2005583!, NY barcode NY00313130!, P barcode P00468550!, W accession code W-0057658 [image!]). – Fig. 1A–E, 2.

*Notes* — The protologue of *Bignonia arthrerion* does not specify who the collector is or the collecting number or the date of collection. It only provides the number 515 from the *Herbarium florum brasiliensis*. We found several specimens with this herbarium number, including two specimens in BR and M, where most of Martius’s types are deposited. The original set of gatherings used to produce the *Herbarium florum brasiliensis* (Martius 1841) has a unique label on its specimens (see Moraes & al. 2014 for a discussion on this subject), which is lacking on most specimens found, except from that in BR. The specimen BR0000008804723 has one label containing the gathering information and number 18, plus a label with the original Martius Herbarium typography. In this label, Martius annotated information about the collector (*da Silva Manso*), locality of collection and the reference to “Hbr. Fl. Br. n. 515.” When Candolle (1845) published the new combination *Distictis arthrerion*, he mentioned the specimen deposited in the *Herbarium florum brasiliensis* citing the same information provided in the label of the specimen at BR. Indeed, Urban (1906: 112) indicated that all gatherings of *A. L. P. da Silva Manso* were in Martius’s herbarium held in BR, with the duplicates distributed from there. Because there is no indication to the one specimen used by Martius in the protologue, there is a need to select a lectotype. However, Candolle (1845) did not mention the specimens he saw as the type; consequently, he did not designate a type (Art. 7.11, Turland & al. 2018). Besides, Lohmann (in Lohmann & Taylor 2014) used the term “holotype” to define the type status of the specimen in M. Following Art. 9.10 (Turland & al. 2018), we are correcting the use of the term “holotype” to lectotype.

= *Bignonia hispida* DC., Prodr. 9: 152. 1845. – **Lectotype (designated here)**: Brazil, Mato Grosso, Cuiabá, 1832, *A. L. P. da Silva Manso 71* (G-DC barcode



D. Carneiro / 2017

Fig. 1. A–E: *Fridericia arthrerion*; A: habit; B: inflorescence with old flowers and buds; C: flower and detail of calyx surface showing glandular trichomes; D: fruit; E: seed. – F–H: *F. craterophora*; F: branch with leaves 1-foliolate; G: branch with leaves 2-foliolate and tendrillate; H: fruit. – A from Nee 40823 (NY); B from Riedel (?) 947 (NY); C from Seijo & Solis Neffa 3204 (NY); D, E from Solomon 14203 (NY); F from Conceição & Campos 448 (MBM); G, H from Britto 33 (MBM). – Drawn by Diana Carneiro.

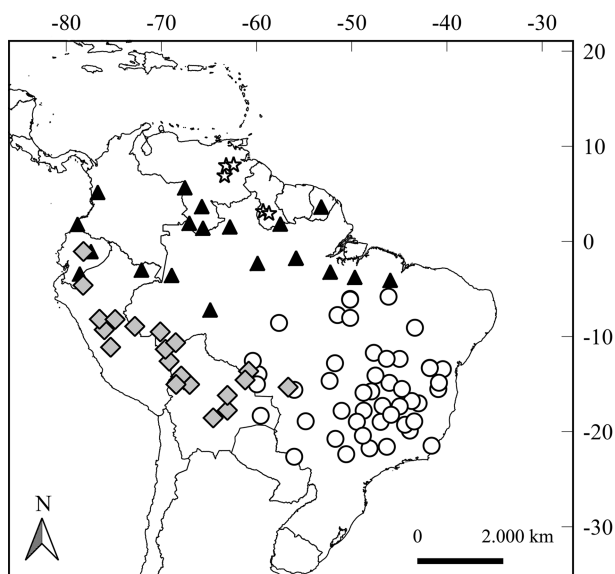


Fig. 2. Distribution of *Fridericia arthrerion* (grey diamonds); *F. craterophora* (open circles); *F. egensis* (black triangles); *F. grosourdyana* (stars).

G00133358 [image!]; isolectotypes: G-DC barcode G00133270 [image!], G-DC barcode G00133371 [image!]).

*Notes* — In the protologue of *Bignonia hispida*, Candolle (1845) described the flowers and fruits. There are four exsiccates in G-DC numbered from one to four that may have been used by Candolle to describe this species. In each of the sheets G00133265 (numbered as 2, with flowers) and G00133358 (numbered as 3, with flowers and fruits), there is a label with gathering information, collector and the numbers 70 and 71, respectively. In the specimen G00133271 (numbered as 1, with fruits) there is no label, while the specimen G00133270 (numbered as 4, with flowers) only includes a label with the name *B. hispida* handwritten (not by Candolle) and no gathering information. Because the specimen G00133358 includes flowers, fruits and the gathering information, we select it here as the lectotype. We do not consider the specimen G00133265 as an isolectotype because the collecting number is different, clearly indicating that it is not a duplicate.

- = *Bignonia pearcei* Rusby in Mem. Torrey Bot. Club 6: 100. 1896 ≡ *Arrabidaea pearcei* (Rusby) K. Schum. ex Urb. in Repert. Spec. Nov. Regni Veg. 14: 302. 1914 ≡ *Fridericia pearcei* (Rusby) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 442. 2014, **syn. nov.** – **Lectotype**, first step (designated as “holotype” by Gentry 1977b: 40): NY; **second-step (designated here)**: Bolivia, La Paz, Guanai-Tipuani, Apr–Jun 1892, A. M. Bang 1391 (NY barcode NY000313146; isolectotypes: A barcode A00091987 [image!], E barcode E00259235 [image!], F accession code F-163739 [image!], G barcode G00009125 [image!], G barcode G00009126 [image!], K barcode K000403832!, M

barcode M0086363!, MICH barcode MICH1115826 [image!], MIN barcode MIN190896 [image!], MO accession code MO-2005581!, NY barcode NY01404746!, US accession code US-47713 [image!], US accession code US-47714 [image!], US accession code US-1322423 [image!]).

*Notes* — In the protologue of *Bignonia pearcei*, Rusby (1896) listed two gatherings. *Bang 1391* is the first one listed, followed by a statement “Also collected by Pearce at Palta” without mentioning the collecting number or the herbarium where this specimen was deposited. We considered the differentiation of these two sentences as an indication of the type. Indeed, Gentry (1977b) indicated the gathering *Bang 1391* in NY as holotype; however, he did not specify which of the two sheets deposited in NY he was referring to. NY00313146 has a stamp from the Columbia College Herbarium, where Rusby worked and where the first and better-quality set of Bang’s gatherings was housed (Rusby 1893: 2). This specimen also has a printed label indicating “*Bignonia pearcei* sp. n.” and Gentry’s handwritten annotation indicating it as holotype. We select this specimen here as the second-step lectotype.

- “*Fridericia arthrerion*” (Cham.) L. G. Lohmann in Forzza & al., Cat. Pl. Fung. Brasil 1: 764. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas (sometimes scandent shrubs), high climbing. *Branches* terete to subquadrangular, striate and lenticellate, grey (young branches black) with ferruginous trichomes evident when dry, pubescent to villous, with simple trichomes; without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, not apiculate, 1.1–2.3 mm long. *Leaves* 2(or 3)-foliolate; petiole 1.2–5.2 cm long, puberulous to villous, with simple trichomes; petiolules in two lengths, central 1–5.6 cm, lateral 0.5–2 cm, villous, with simple trichomes; blade chartaceous, smooth, margin revolute, central leaflet ovate to elliptic, 11–18.5 × 2.6–4 cm, base rounded, apex long apiculate, lateral leaflets ovate, 9–25 × 4.6–7.5 cm, base rounded, subcordate to truncate, apex acuminate, adaxially not vernicose, puberulous to velutinous or villous (sometimes hispid), with simple trichomes throughout, abaxially pubescent to villous, with simple and glandular peltate trichomes throughout, venation palmate actinodromous basal, secondary veins raised, tertiary veins raised, without pocket and trichome tuft domatia. *Inflorescences* terminal and axillary, thyrse with bud abortion, with 3–5 orders, first-order peduncles 1–4.5 cm long, second-order 1.5–2.1 cm, third-order 0.3–1.1 cm, fourth-order 0.1–0.4 cm, fifth-order c. 0.2 cm, pubescent to villous, with simple and glandular capitate trichomes; bracts linear, c. 4 mm long, caducous; bracteoles linear, c. 2 mm long, caducous; pedicels 0.3–0.5 cm long. *Calyx* tubular to campanulate, not costate, truncate, 0.4–0.7 × 0.3–0.4 cm, glabrescent to velutinous, with simple and glandular capitate trichomes shortly stalked, chartaceous, pink to dark

red, without glands. *Corolla* infundibular, slightly curved, furrowed, 2.3–3.5 cm long, 0.6–1.2 cm wide at tube mouth, externally villous, without glands, lobes 0.5–0.8 × 0.6–0.7 cm, margin rounded and undulate, lilac to dark red. *Androecium* with all stamens included; longer filaments 1.6–1.7 cm long, shorter filaments 1.1–1.4 cm; staminode 4–5 mm long; anthers 2–3 mm long, connectives not protruding (sometimes protruding c. 0.1 mm). *Gynoecium* with ovary cylindrical, 2–2.5 × 0.7–1 mm, angled, lepidote, style 1.4–1.7 cm long; stigma lanceolate; nectar disk annular and smooth under ovary, c. 2 × 2.4 mm. *Fruit* linear, flat, margins slightly raised, central ridge slightly raised, valves coriaceous, rough, 24–36 × 1–1.4 cm, villous becoming glabrescent, with simple and glandular capitate long-stalked trichomes; septum coriaceous. *Seeds* oblong, body semicircular (irregular), 0.8–0.9 × 1.5–2.6 cm, wings hyaline, 0.8–1 cm wide, margins crisped.

*Phenology* — Produces flowers from December to May. Fruits were collected in May, August, September and November.

*Distribution and habitat* — *Fridericia arthrerion* is distributed through W Amazonia. This species occupies dry and wet Amazonian forests and ecotone areas between the Cerrado and Chaco. It is distributed through Bolivia (El Beni, Cochabamba, La Paz, Pando and Santa Cruz), Brazil (Acre, Mato Grosso and Pará), Colombia (La Guajira), Ecuador (Napo, Pastaza and Sucumbios) and Peru (Amazonas, Cuzco, Junín, Loreto, Madre de Dios, Pasco, Puno, San Martín and Ucayali).

*Conservation status* — *Fridericia arthrerion* is categorized as Least Concern (LC) based on its Extent of Occurrence (1,987,141 km<sup>2</sup>) and Area of Occupancy (92,500 km<sup>2</sup>).

*Remarks* — *Fridericia arthrerion* can be easily recognized by its tubular and short calyx, unique features among the species of the “Neomacfadya” clade, as well as the pubescent to villous branches and villous fruits that become glabrescent. Vegetative material is often confused with *F. nigrescens* (Sandwith) L. G. Lohmann due to the puberulous to velutinous or villous leaflets, usually becoming black when dry. However, *F. nigrescens* has branches and leaflets covered by dendritic trichomes, a synapomorphy of the “Sampaiella” clade, within which it is placed (Kaehler & al 2019). In contrast, *F. arthrerion* lacks dendritic trichomes and shows exclusively simple trichomes instead, like the remaining species of the “Neomacfadya” clade. *Fridericia nigrescens* further differs from *F. arthrerion* by the long petioles (4–11 cm vs 1.2–5.2 cm in *F. arthrerion*), bullate leaflets (vs smooth in *F. arthrerion*) and strongly asymmetric base of the lateral leaflets (vs rounded, subcordate to truncate in *F. arthrerion*). *Fridericia arthrerion* can also be confused with *F. egensis* (Bureau & K. Schum.) L. G. Lohmann; see discussion provided under *F. egensis*.

Gentry & Grose (2007) indicated that *Arrabidaea arthrerion* (≡ *Fridericia arthrerion*) may occur in Suriname. This observation was based on Bureau & Schumann (1896: 51), who mentioned a specimen in BR that was wrongly attributed to Martius and was likely collected by Wullschlaegel. Neither Bureau & Schumann (1896) nor Gentry & Grose (2007) were able to find this specimen, nor were we able to locate it. This record seems to be misidentified considering the occidental Amazonian distribution pattern of *F. arthrerion*.

In the phylogeny of *Fridericia* (Kaehler & al. 2019), two gatherings of *F. arthrerion* were retrieved in different clades. The first was placed within the “Neomacfadya” clade (Lohmann 521, as *F. egensis*), while the second was placed within the “Fridericia s.str.” clade (Kileen 4015). After a thorough study of Lohmann 521, we noted that this gathering has coriaceous and narrow fruit (c. 1.4 cm wide) as found in other *F. arthrerion* specimens, whereas *F. egensis* has woody and wider fruits (2.3–2.7 cm wide), indicating that Lohmann 521 actually corresponds to *F. arthrerion*. While Kileen 4015 was correctly identified, we suspect that there might be an error or contamination with the sequence included in the molecular phylogenetic study by Kaehler & al. (2019), given that the morphology does not match its phylogenetic placement. The phylogenetic placement of this material should be verified in future studies.

Here we synonymize *Fridericia pearcei* under *F. arthrerion* due to their shared morphologies, as noted by Gentry (1977b: 40) and Sandwith (in sched.). *Fridericia pearcei* was a widely used name for the plants with long, multicellular trichomes. However, the specimens from Ecuador lack these trichomes, as noted by Gentry (1977b). On the other hand, *F. arthrerion* was the name used for specimens with black leaves and ferruginous indumentum when dry, features that combined were found in a few specimens. After careful comparison of the types, and a thorough examination of around 100 specimens, we realized that this species includes a broad morphological variation of indumentum and colour of dried leaves, with a continuum between the extremes. The indumentum is ferruginous but varies from puberulous to completely villous leaves, calyces and fruits, whereas the dried leaves vary from green or brownish green to black. However, the shape of these structures is constant. Therefore, we follow Gentry’s and Sandwith’s suggestions and consider *Bignonia pearcei* as a synonym of *F. arthrerion* (Mart.) L. G. Lohmann.

**2. *Fridericia craterophora*** (Mart. ex DC.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 436. 2014 ≡ *Bignonia craterophora* Mart. ex DC., Prodr. 9: 147. 1845 ≡ *Arrabidaea craterophora* (Mart. ex DC.) Bureau in Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 6, 6(3): 422. 1892. – Holotype: Brazil, Provinciae M. Geraes (= Minas Gerais), deserto Serro Frio versus Contendas, Feb, *Herb. Fl. Bras.* 335 (= *C. F. P. von Martius s.n.*) (M barcode M0086376!). – Fig 1F–H, 2.

= *Bignonia craterophora* var. *acutifolia* Mart. ex DC., Prodr. 9: 147. 1845 ≡ *Arrabidaea craterophora* var. *acutifolia* (Mart. ex DC.) Bureau in Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd., ser. 6, 6(3): 422. 1892. – Holotype: Brazil, in campis editis Provinciae M. Geraes (= Minas Gerais), s.d., *Herb. Fl. Bras.* 336 (= *C. F. P. von Martius s.n.*) (M barcode M0086377!).

= *Arrabidaea craterophora* subvar. *glabrescens* Bureau & K. Schum., Fl. Bras. 8(2): 67. 1896. – **Lectotype (designated here)**: Brazil, Minas Gerais, Lagoa Santa, 1867, *E. Warming Bignon 33* (BR barcode BR0000008802637 [image!]).

*Notes* — Four syntypes were listed in the protologue of *Arrabidaea craterophora* subvar. *glabrescens*. Among these specimens, *Pohl 1376* (only found in W) is a sterile specimen and *Gardner 3899* (only found in K) has a label indicating the locality and date of collection. However, the protologue cites “loco haud accuratius addicto” indicating that Bureau and Schumann likely did not see the specimen deposited in K. Out of the two Warming specimens from Lagoa Santa deposited in BR, *Warming s.n.* (barcode BR0000008802965) has two distinct determinations of the subvarieties annotated by Bureau, making this specimen confusing. The other specimen, *Warming Bignon 33* (barcode BR0000008802637), has a detailed habitat description that matches the habitat cited in the protologue; furthermore, this is a good-quality specimen, bearing a single identification handwritten by Bureau that matches the species identity. The specimen *Warming Bignon 33* is selected here as the lectotype.

= *Arrabidaea craterophora* subvar. *velutina* Bureau & K. Schum., Fl. Bras. 8(2): 67. 1896. – **Lectotype (designated here)**: Brazil, Goiás [habitat in ejusdem provinciae campis elevatis], *A. Glaziou 21861* (K barcode K000402725!; isolectotypes: P barcode P02895999!, R barcode R000011030!).

*Notes* — In the *Flora brasiliensis*, Bureau & Schumann (1896: 67) listed a single gathering of *Arrabidaea craterophora* subvar. *velutina* made by Martius (“habitat in ejusdem provinciae campis elevatis”). However, this gathering was not located. In the same treatment, Bureau & Schumann (1897: 406) added two more examined gatherings of this subvariety in the *Mantissa* at the end of the *Flora*, including a specimen from Goiás (*Glaziou 21861*) and a specimen from Santa Luzia do Rio das Velhas in Minas Gerais (*Schwake 11421*). Of these, we were unable to locate *Schwake 11421*, but we found three specimens of *Glaziou 21861*, deposited in K, P and R. The specimen in P (barcode P02895999) has a handwritten label with a specific location (“Paranaúá près des Cascades, Goyaz”) and the date of collection is 15 February 1898. Furthermore, information handwritten on the typed label indicates that this material was donated to P from Glaziou’s private herbarium

by Glaziou’s daughter after his death in 1907. The specimen in K includes less detailed locality information (“Chiefly Province of Goyaz”) that matches the locality information provided in the protologue. Furthermore, the specimen K000402725 was identified by Bureau and was received by K in 1896, the same year of the publication of *A. craterophora* subvar. *velutina*; this specimen is selected here as the lectotype.

= *Arrabidaea lenticellosa* Bureau & K. Schum., Fl. Bras. 8(2): 64. 1896 [non *Arrabidaea lenticellosa* Pittier in J. Wash. Acad. Sci. 18: 340. 1928]. – Lectotype (designated as “type” by Gentry 1982a: 101): Brazil, Mato Grosso, *L. Riedel 1469* (K barcode K000402704!; isolectotypes: LE barcode LE01072038 [image!], LE barcode LE01072039 [image!], OXF barcode OXF00085420 [image!]).

*Note* — In the protologue of *Arrabidaea lenticellosa*, Bureau & Schumann (1896) did not indicate where the holotype was deposited. Gentry (1982a) indicated the specimen in K as the “type”, which before 2001 is sufficient to designate a lectotype according to Art. 7.11 and 9.23 of the *Code* (Turland & al. 2018).

– “*Arrabidaea craterophora* var. *obtusifolia*” Mart ex. Bureau & K. Schum., Fl. Bras. 8(2): 67. 1896. Designation not validly published (Art. 26.2)

*Note* — *Arrabidaea craterophora* var. *obtusifolia* was described based on the type of *Bignonia craterophora* DC.

– “*Fridericia craterophora*” (Mart. ex DC.) L. G. Lohmann in Monogr. Syst. Bot. Missouri Bot Gard. 107: 1605. 2008. Designation not validly published (Art. 41.1).

– “*Fridericia craterophora*” (Mart. ex DC.) L. G. Lohmann in Forzza & al., Cat. Pl. Fung. Brasil 1: 765. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas, shrubs or scandent shrubs, evergreen, up to 10 m high. *Branches* terete to subquadrangular, striate and lenticellate, brown or grey when dry, glabrescent to velutinous, with simple trichomes; without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular or narrowly triangular, not apiculate, 1.7–2.1 mm long. *Leaves* 1- or 2-foliolate; petiole 0.1–0.8(–1.1) cm long, villous, with simple trichomes; petiolules with equal lengths, 0.2–0.4(–0.7) cm, villous, with simple trichomes; blades chartaceous, smooth (sometimes slightly bullate), margin revolute, central leaflet lanceolate, ovate or obovate, base rounded, apex acute or acuminate, lateral leaflets elliptic to ovate, 2–9.7 × 1.1–4.2 cm, base cuneate or rounded, apex acuminate (sometimes retuse or rounded), adaxially not vernicose, glabrescent to puberulous, with simple trichomes throughout (sometimes hispid), abaxially glabrescent to velutinous, with simple trichomes throughout (sometimes only pubescent at veins), venation pinnate, secondary veins raised, ter-  
ti-



ary veins raised, without pocket and with or without trichome tuft domatia. *Inflorescence* terminal and axillary, thyrses with abortion of lateral buds, resembling a raceme, with 1 or 2 orders, first-order peduncles 0.8–4.8 cm long, second-order 0.3–1.7 cm, glabrescent to velutinous, with simple trichomes; bracts linear, 1.3–3 mm long, caducous; bracteoles linear, 0.5–0.8 mm long, caducous; pedicels 0.2–0.4 cm long. *Calyx* tubular or obconic, not costate, truncate and laterally or irregularly split, 1.5–1.8(–2) × 0.4–0.6(–0.9) cm, glabrescent with rim pubescent to velutinous throughout, with simple trichomes or lepidote throughout, chartaceous, green with pinkish apex, with glandular areas evenly distributed. *Corolla* infundibular, not curved, slightly zygomorphic, furrowed, 4.1–6.4 cm long, 0.9–2.5 cm wide at tube mouth, externally villous, without glands, lobes 0.7–0.9 × 0.6–1.1 cm, margin rounded and undulate, dark red, lilac, pink or purple. *Androecium* with all stamens included; longer filaments 1.6–2 cm long, shorter filaments 1.2–1.6 cm; staminode 1.3–2 mm long; anthers 3–4.4 mm long, connectives protruding 0.5 mm. *Gynoecium* with ovary cylindrical, 2–4 × 0.9–1.3 mm, furrowed, lepidote; style 2.8–3.4 cm long; stigma lanceolate or orbicular; nectar disk annular and smooth under ovary, c. 0.8 × 1.2 mm. *Fruit* linear, flat, margins not raised or slightly raised, central ridge not raised (sometimes slightly raised), valves coriaceous, rough, 9.5–28.5 × 0.6–1 cm, glabrous; septum coriaceous. *Seeds* oblong, body oblong, 0.4–0.7 × 1.5–2 cm, wings hyaline, 0.1–0.3 cm wide, margins crisped.

*Phenology* — Produces flowers from November to June. Fruits were collected from June to January.

*Distribution and habitat* — *Fridericia craterophora* is mainly distributed in the Cerrado and Chaco, reaching ecotone areas between the Amazon and the Atlantic forest. It is distributed through Bolivia (Santa Cruz), Brazil (Bahia, Distrito Federal, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Piauí, Rio de Janeiro, Rondônia, São Paulo and Tocantins) and Paraguay (Amambay).

*Conservation status* — *Fridericia craterophora* is categorized as Least Concern (LC) based on its Extent of Occurrence (3,195,212 km<sup>2</sup>) and Area of Occupancy (160,000 km<sup>2</sup>).

*Remarks* — *Fridericia craterophora* is one of the most variable species in the “Neomacfadaya” clade due to the variation in leaflet number, shape, texture and indumentum. This species is easily recognized by the villous and short petioles 0.1–0.8(–1.1) cm. The petioles are commonly so short that the leaf appears to be sessile, with a thickened area at the base. In fact, the pair of 2-foliolate leaves located on the opposite side of branches can be confused with four verticillate, simple leaves (Fig 1G), as described by Gentry (1980). However, a scar is vis-

ible between the two lateral leaflets, and a central tendril can also be detected between the leaflets [see Britto 33 (MBM) and Glaziou 21861 (K, P)].

*Fridericia craterophora* can be confused with the sympatric *F. resinosa* and *F. simplex*. The villous and shorter petiole [0.1–0.8(–1.1) cm], petiolules [0.2–0.4(–0.7) cm] and non-vernucose adaxial surface of the leaflets of *F. craterophora* contrast with the glabrous and longer petioles (1–3.3 cm), petiolules [(0.5–)1–1.8 cm] and vernucose adaxial surface of the leaflets of *F. resinosa*. The characters that distinguish *F. craterophora* from *F. simplex* are the branches subquadrangular and lenticellate (vs branches terete and sparsely or not lenticellate in *F. simplex*), the leaflets with pinnate venation (vs leaflets with actinodromous venation in *F. simplex*) and the calyx glabrous to villous (vs calyx lepidote in *F. simplex*). In ecotone areas between Chaco and Amazonian rainforests *F. craterophora* is often confused with *F. japurensis*. These two species can be distinguished by the longer petioles [(1.1–)1.4–2.8 cm] and petiolules [(1.1–)1.8–2(–2.7) cm] of *F. japurensis*, contrasting with the shorter petioles [0.1–0.8(–1.1) cm] and petiolules [0.2–0.4(–0.7) cm] of *F. craterophora*. Furthermore, *F. japurensis* has fruits with valves woody and sticky, whereas the fruit valves of *F. craterophora* are coriaceous and not sticky. *Fridericia craterophora* can also be confused with *F. podopogon* due to the short petiole and petiolules and similar shape of the leaflets. However, *F. podopogon* is restricted to the N portion of Central America and Cuba, whereas *F. craterophora* is restricted to C South America.

Gentry (1982a) treated *Arrabidaea lenticellosa* Bureau & K. Schum. as a synonym of *A. japurensis* [= *Fridericia japurensis*], although no comments about this synonymization were provided. However, a careful analysis of the type material of *A. lenticellosa* indicated a number of differences with *F. japurensis*, namely: the shrubby habit described in the label of the specimen LE01072038 (vs liana in *F. japurensis*), the leaves 1- or 2-foliolate (vs 2-foliolate in *F. japurensis*), small petioles (0.4–1 cm long vs 1.7–2 cm long in *F. japurensis*) and leaflets with pinnate venation (vs actinodromous basal in *F. japurensis*). All these features are common in *F. craterophora*. Based on these morphological traits, we treat *A. lenticellosa* as a synonym of *F. craterophora*.

The name *Arrabidaea lenticellosa* Pittier was published for another species from Venezuela. Sandwith (1968) synonymized this name in *A. corallina* (Jacq.) Sandwith (= *Tanaecium dichotomum* (Jacq.) Kaehler & L. G. Lohmann), which was subsequently accepted by Gentry (1977b, 1982a, 1982b) and by Lohmann & Ulloa Ulloa (2022+). We follow this same circumscription here.

**3. *Fridericia egensis*** (Bureau & K. Schum.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 437. 2014 ≡ *Arrabidaea egensis* Bureau & K. Schum., Fl. Bras. 8(2): 65. 1896. – Lectotype (designated by Lohmann in Lohmann & Taylor 2014: 437): Flor. Amazon. in sylvis Ega [Bra-



Fig. 3. A–E: *Fridericia egensis*; A: habit; B: open flower with upper detail showing glandular surface of calyx and bottom detail showing nectar disk; C: anthers showing connective not protruding; D: fruit; E: seed. – F–I: *F. grosourdyana*; F: habit; G: open flower with details showing villous inner surface of corolla at longer stamens insertion area (upper) and lobed nectar disk (bottom); H: fruit with detail showing scar of nectar disk at base of fruit; I: seed. – A–C from Smith 2921 (NY); D, E from Prance 13957 (NY); F from Grosourdy 13 (P); G from Rosales 416 (MO); H, I from Gentry 15021 (MO). – Drawn by Diana Carneiro.

siliae província do Alto Amazonas in silvis prope Teffe olim Ega], Dec. 1821 [s.d.], *E. F. Poeppig* 2895 (W accession code W-0002736!; isolectotypes: F accession code F-875317 [image!], W accession code W-0002737!). – Fig. 2, 3A–E.

- “*Bignonia egensis*” Poepp. ex Bureau & K. Schum., Fl. Bras. 8(2): 66. 1896. Designation not validly published, pro syn. (Art. 36.1(b)).
- “*Fridericia egensis*” (Bureau & K. Schum.) L. G. Lohmann in Forzza & al., Cat. Pl. Fung. Brasil 1: 765. 2010. Designation not validly published (Art. 41.1).

**Morphological description** — Lianas, evergreen, up to 20 m high. *Branches* terete, striate and lenticellate, brown with ferruginous trichomes when dry, villous, with simple trichomes; with inconspicuous interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, long apiculate, 3–5(–8) mm long. *Leaves* 2(or 3)-foliolate; petiole 1.8–4.1(–15) cm long, villous, with simple trichomes; petiolules in two lengths, central c. 3.7 cm (only one measured), lateral 0.4–1.9 cm, villous, with simple (sometimes bifid) trichomes; blade chartaceous, bullate, margin revolute, central leaflet elliptic, c. 23.5 × 14 cm (only one specimen measured), base rounded, apex rounded, lateral leaflets elliptic to ovate, (6.5–)9–13(–22.3) × (4.5–)8.8–16.5 cm, base cordate, subcordate, rounded or slightly asymmetric, apex acuminate (sometimes rounded or obtuse), adaxially not vernicose, puberulous and hispid, with simple trichomes throughout, abaxially puberulous to villous, with simple trichomes throughout, venation palmate actinodromous basal, secondary veins raised, tertiary veins raised, without pocket and trichome tuft domatia. *Inflorescences* axillary, thyrsoid, with 2 or 3 orders, first-order peduncles 0.7–3.5 cm long, second-order 0.3–0.8 cm, third-order 0.17–0.4 cm, puberulous to villous, with simple trichomes; bracts linear, 2–6 mm long, caducous; bracteoles linear, 1.4–2.5 mm long, caducous; pedicels 0.1–0.4 cm long. *Calyx* tubular, not costate, bilabiate (sometimes irregularly split), 1.6–3 × 0.6–1 cm, lepidote with glandular peltate trichomes, chartaceous, white or pink, with patelliform glands and glandular areas evenly distributed. *Corolla* infundibular, strongly zygomorphic, furrowed, 4.7–6.7 cm long, 1.2–2.2 cm wide at tube mouth, externally pubescent, without glands, lobes 0.7–1.1 × 0.7–1.8 cm, margin rounded and undulate, light purple or pink. *Androecium* with all stamens included; longer filaments 1.7–2 cm long, shorter filaments 1–1.6 cm; staminode c. 3 mm long; anthers c. 2.7 mm long, connectives not protruding. *Gynoecium* with ovary cylindrical, 3.5–3.8 × 1.1–1.3 mm, furrowed, lepidote, style 3.2–3.9 cm long; stigma lanceolate; nectar disk annular and smooth under ovary, c. 0.7 × 1.5 mm. *Fruit* linear, flat, margin not raised, central ridge slightly raised, valves woody, rough and sticky, 22.5–36.5 × 2.3–2.7 cm, glabrous; septum coriaceous. *Seeds* oblong, body elliptic, 1.2–1.8 × 3.9–4.4 cm, wings hyaline, 0.2–0.4 cm wide, margins crisped.

**Phenology** — Produces flowers from June to January. Fruits were collected from July to November.

**Distribution and habitat** — *Fridericia egensis* is broadly distributed in lowland and pre-montane Amazonian wet forests. It is distributed in Brazil (Amazonas, Maranhão, Mato Grosso and Pará), Colombia (Chocó and Narino), Ecuador (Morona-Santiago and Napo), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Guyana (Rapuni), Peru (Loreto) and Venezuela (Amazonas).

**Conservation status** — *Fridericia egensis* is categorized as Least Concern (LC) based on its Extent of Occurrence (3,753,715 km<sup>2</sup>) and Area of Occupancy (47,500 km<sup>2</sup>).

**Remarks** — Even though *Fridericia egensis* is broadly distributed, it has been poorly collected. During this study, we were only able to locate 26 gatherings, half of which are sterile. *Fridericia egensis* has only been treated in the *Flora brasiliensis* (Bureau & Schumann 1896) and *Flora of Venezuela* (Gentry 1982a) and was listed without a description in the *Flora of the Ducke Reserve* (Lohmann & Hopkins 1999). In the *Flora brasiliensis*, the species was described based only on the two duplicates of *Poeppig* 2895 both with an old inflorescence and calyces but lacking corolla and fruit. In the *Flora of Venezuela*, the species was described based on the types and two sterile and young gatherings. Notwithstanding, both Bureau & Schumann (1896) and Gentry (1982a) indicate the conspicuous villous indumentum as a diagnostic feature of *F. egensis*. Besides, the species is easily characterized by its triangular and long apiculate prophylls of axillary buds 3–5(–8) mm long, the bullate surface of the leaflets and the flat, woody, rough and sticky capsules.

*Fridericia egensis* shares the indumentum and shape of the young leaves with *F. arthrerion*. These two species can be easily distinguished because *F. arthrerion* has small and triangular prophylls (1.1–2.3 mm long, vs long apiculate (3–5(–8) mm long in *F. egensis*), smaller calyx (0.4–0.7 × 0.3–0.4 cm, vs 1.6–3 × 0.6–1 cm) and corolla (2.3–3.5 cm long, vs 4.7–6.7 cm long) and narrower fruits (1–1.4 cm wide, vs 2.3–2.7 cm wide). When sterile, this species can be also confused with *F. cinnamomea* and *F. nigrescens* because of the long petiole and villous indumentum. However, both species have branched trichomes (vs simple trichomes in *F. egensis*) and the lateral leaflets are strongly asymmetric (vs elliptic to ovate in *F. egensis*).

**4. *Fridericia grosourdyana*** (Baill.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 439. 2014 ≡ *Paramansoa grosourdyana* Baill., Hist. Pl. 10: 27. 1888 ≡ *Arrabidaea grosourdyana* (Baill.) Sandwith in Kew Bull. 22: 418. 1968. – Lectotype (designated by Lohmann in Lohmann & Taylor 2014: 439): Venezuela, Bolívar, Villa de Upata, 1864, *R. de Grosourdy* s.n. (P barcode P00468560!; isolectotype: P barcode P00468561!). – Fig. 2, 3F–I.

*Morphological description* — Lianas, evergreen, up to 4 m high. *Branches* terete to subquadrangular, striate, black with whitish trichomes when dry, pubescent to villous, with simple and glandular peltate trichomes; with inconspicuous interpetiolar ridge, without interpetiolar glandular fields; prophylls of axillary buds broadly triangular, not apiculate, 1–1.8 mm long. *Leaves* (1 or 2) (or 3)-foliolate; petiole (1.1–)3–5(–6.8) cm long, villous, with simple trichomes; petiolules with equal lengths, (0.3–)1–2.1 cm, villous, with simple trichomes; blade chartaceous, smooth, margin revolute, central leaflet elliptic to obovate, 15–18 cm long, base acute, apex long apiculate, lateral leaflets asymmetrically elliptic to ovate, 5–16 × 3–9 cm, base cuneate, obtuse, rounded or subcordate, apex acuminate to caudate, adaxially not vernicose, glabrous throughout (sometimes pubescent only at veins), abaxially puberulous, with simple trichomes throughout (sometimes only at veins), venation pinnate resembling palmate actinodromous suprabasal, secondary veins raised, tertiary veins flat to slightly raised, without pocket and with trichome tuft domatia. *Inflorescences* terminal, thyrsoid, with 4–7 orders, first-order peduncles 2.1–7.7 cm long, second-order (1–)1.7–6.1 cm, third-order 0.6–1.5 cm, fourth-order 0.4–1.2 cm, fifth-order 0.3–1.5 cm, sixth-order 1.5–1.7 cm, seventh-order c. 0.7 cm, villous, with simple and capitate glandular trichomes; bracts linear, 1.1–1.7 mm long, caducous; bracteoles broadly triangular, 0.9–1.3 mm long, persistent; pedicels 0.3–0.6 cm long. *Calyx* narrowly tubular, costate when dry, shortly 5-denticulate and laterally split, 0.9–1.5 × 0.25–0.4 cm, villous, with simple and glandular peltate trichomes, membranaceous, green with pinkish apex, with glandular areas evenly distributed. *Corolla* narrowly infundibular to tubular, zygomorphic, not furrowed, 2.2–4.5 cm long, 0.4–0.6(–0.8) cm wide at tube mouth, externally puberulous at base and tube and villous at lobes, with simple and glandular capitate trichomes shortly stalked, without glands, lobes 0.4–0.7 × 0.3–0.6 cm, margin shortly acuminate and flat, red outside and yellow inside. *Androecium* with 2 stamens exerted and 2 stamens included; longer filaments 2–2.5 cm long, shorter filaments 1.5–2 cm; staminode 2–3(–7) mm long; anthers 2–2.5 mm long, connectives not protruding. *Gynoecium* with ovary cylindrical, 2.4–4 × 0.7–1 mm, ridged, lepidote, style 1.3–1.8 cm long; stigma lanceolate; nectar disk cupular and lobed under ovary, 0.7–1 × 0.8–1 mm. *Fruit* linear, flat, margin raised, central ridge slightly raised, valves woody, smooth, 30–37 × 0.75–1.4 cm, glabrous; septum coriaceous. *Seeds* oblong, body semicircular (irregular), c. 0.7 × 2.7 cm, wings hyaline, in 2 sizes between 0.2–0.6 cm wide, margins crisped.

*Phenology* — Produces flowers from January to October. Fruits were collected in April, July and October.

*Distribution and habitat* — *Fridericia grosourdyana* occupies wet and dry Amazonian forests and savannas in N South America. It is distributed in Colombia (Amazonas

and Chocó), French Guiana (Saint-Laurent-du-Moroni), Guyana (Rapununi and Upper Takutu-Upper Essequibo) and Venezuela (Bolívar).

*Conservation status* — *Fridericia grosourdyana* is categorized as Least Concern (LC) based on its Extent of Occurrence (61,020 km<sup>2</sup>). However, this species is suggested to be Endangered (EN) based on its Area of Occupancy (40 km<sup>2</sup>): EN B2ab(i,ii).

*Remarks* — The shape of the leaflets of *Fridericia grosourdyana* are variable even within a single specimen. However, the acuminate to caudate apex and coriaceous texture are unique features within *Fridericia*. When in flower, *F. grosourdyana* is easily recognized by the narrowly tubular calyx (0.9–1.5 × 0.25–0.4 cm), which is costate when dry, by the tubular or narrowly infundibular and red corolla, by the exerted longer stamens (0.18–0.35 cm beyond the tube mouth), whereas the shorter stamens are included, and the cupular and lobed disk.

**5. *Fridericia japurensis* (DC.) L. G. Lohmann** in Ann. Missouri Bot. Gard. 99: 439. 2014 ≡ *Tabebuia japurensis* DC., Prodr. 9: 214. 1845 ≡ *Macfadyena japurensis* (DC.) Miers in Proc. Roy. Hort. Soc. London 3: 200. 1863 ≡ *Arrabidaea japurensis* (DC.) Bureau & K. Schum., Fl. Bras. 8(2): 65. 1896 ≡ *Scobinaria japurensis* (DC.) Sandwith in Kew Bull. 13: 440. 1959 [“1958”]. – **Lectotype (designated here)**: Amazonas, Rio Negro, Japurá, Dec 1819, C. F. P. von Martius 182 (M barcode M0086354!; isolectotype: G-DC barcode G00133910 [fragment] [image!]). – Fig. 4A–E, 5.

*Notes* — In the protologue of *Tabebuia japurensis*, Candolle (1845) indicated that the type was collected by Martius and deposited in M. However, there are two Martius gatherings in M, specimens M0086354 and M0086355. The date of collection of specimen M0086355 is January 1820, which is different from that provided in the protologue. The locality indicated on this specimen is “Rio Negro, sylvis ad Cataractas Cupatensis”. This place is located along the Caquetá River, which corresponds to the upper portion of the Japurá River in Colombia, close to the mountains Cupati and Arara-Coari (= Araracoara) (Urban 1906: 82). We selected the specimen M0086354 as the lectotype because this is the only specimen whose information fully matches that presented in the protologue. This specimen also represents the most complete gathering. Because both specimens seem to have been collected at different localities, specimen M0086355 cannot be considered as an isolectotype.

= *Arrabidaea oligantha* Bureau & K. Schum., Fl. Bras. 8(2): 63. 1896 ≡ *Fridericia oligantha* (Bureau & K. Schum.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 441. 2014, **syn. nov.** – Lectotype (designated as “holotype” by Lohmann in Lohmann & Taylor 2014: 441): Surinam [in Brasilia loco haud accuratis indicato], F. W. R. Hostmann 1258 [G. Gardner 1258] (W

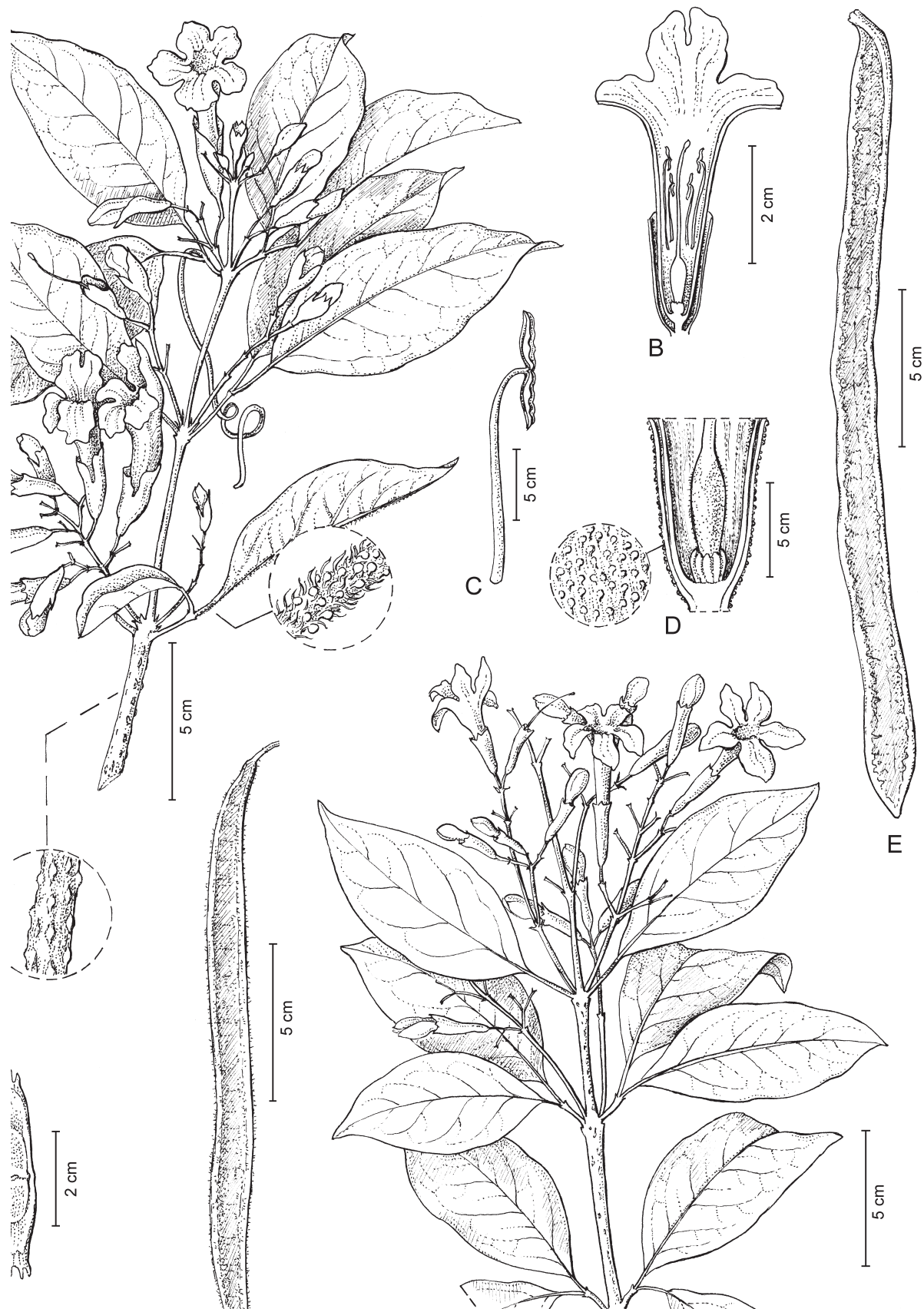


Fig. 4. A–E: *Fridericia japurensis*; A: habit with detail showing densely lenticellate bark; B: open flower; C: anthers showing connective not protruding; D: bottom of open flower showing ovary and annular and pulvinate nectar disk and detail showing lepidote surface of calyx; E: fruit. – F–H: *F. nicotianiflora*; F: habit; G: fruit; H: seed. – A from Cowan 38541 (K); B–D from Melinon 279 (P); E from Prance 13867 (MO); F from Santos 302 (MO); G, H from Nuñez 12514 (MO). – Drawn by Diana Carneiro.

accession code W-002735!; isolectotypes: K barcode K000402693!, K barcode K000402695!, US accession code US-2338120 [image!]).

*Notes* — Bureau & Schumann (1896) cited *Gardner 1258* in the protologue of *Arrabidaea oligantha* without mentioning the herbarium or herbaria where the specimens of this gathering (i.e. syntypes) were deposited. We found a single specimen of *Gardner 1258* in W (W-002735), but three other specimens of *Hostmann 1258* were found in K and US (see below). When Gardner's numbers were around 1258 he was at Alagoas (Kew 2022) and Pernambuco States in Brazil (National Museum of Natural History 2022), far away from the area where *F. japurensis* occurs. Indeed, the label information of the specimen in W is dubious. The first annotation is in German and indicates the country where the specimen was collected (“Brasilien”) as well as the collector “Gardener” [sic]. The second annotation, the number “1258”, was written by someone else in red ink. The third annotation corresponds to Schumann's handwriting and includes the species name. We were able to find three additional exsiccates of various taxa in W (*Brunfelsia guianensis* Benth. W-0066779, *Erythroxylum citrifolium* St. Hil. W-0018332 and *Euphorbiaceae* indet. W-0074673) with the same layout of the W-002735 printed label and including the first and second annotations with the same two handwritings and colour inks. In these three specimens, the collector's name “Gardener” [sic] and “Brasilien” are crossed out in pencil and annotated in superscript as “Hostmann” and “Surinam”, respectively. We found the same handwriting of the number “1258” in red ink on the specimen in W and in black ink on the specimens K000402693, K000402695 and US-2338120, the last with an additional label indicating it was distributed from K. All of these specimens are identified or annotated as Hostmann's gatherings. The William Hooker herbarium (later becoming K) received the first and best set of almost 2000 gatherings of F. W. R. Hostmann, most of which were annotated. However, Hostmann sent several duplicates to many other herbaria without annotations (Pulle 1906). The herbarium at W received duplicates of Hostmann's gatherings (Naturhistorisches Museum Wien 2022). We believe the lack of annotations on sheets may have led to the mistake in the specimens in W, where the staff annotated “Gardener” [sic] and “Brasilien” instead of “Hostmann” and “Suriname”. Given all this information, we correct the locality and collector of the syntypes. We also correct the typification made by Lohmann (in Lohmann & Taylor 2014), who indicated the specimen in W as the holotype. Because in the protologue there is no indication of the herbarium or herbaria where the syntypes were deposited, and there are three additional specimens of *Hostmann 1258*, we are correcting Lohmann's use of the term “holotype” to lectotype (Art. 9.10, Turland & al. 2018).

- “*Adenocalymma japurensis*” Mart. ex DC., Prodr. 9: 203. 1845. Designation not validly published, pro syn. (Art. 36.1(b)).
- “*Phryganocydia japurensis*” Mart. ex DC., Prodr. 9: 214. 1845. Designation not validly published, pro syn. (Art. 36.1(b)).
- “*Fridericia japurensis*” (DC.) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 765. 2010. Designation not validly published (Art. 41.1).
- “*Fridericia oligantha*” (Bureau & K. Schum) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 766. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas, evergreen, up to 20 m high. *Branches* terete, striate and lenticellate, brown when dry, pubescent, with simple trichomes; with inconspicuous interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, apiculate, 1.7–3 mm long. *Leaves* 2-foliolate; petiole (1.1–)1.4–2.8 cm long; petiolules with equal lengths, (1.1–)1.8–2(–2.7) cm, pubescent, with simple trichomes at canalicule or lepidote with glandular peltate trichomes; blade chartaceous, smooth, margin entire (sometimes revolute), lateral leaflets elliptic, 8.5–15.5 × (3.6–)6–8.5 cm, base cuneate, obtuse, rounded or subcordate, apex acuminate, adaxially not vernicose, lepidote with peltate glandular trichomes and glabrous throughout (sometimes pubescent, with simple trichomes at veins), abaxially lepidote with peltate glandular trichomes and glabrous or pubescent, with simple and capitate glandular trichomes (sometimes pubescent only at veins), venation palmate actinodromous basal, secondary veins raised, tertiary veins raised, without pocket and with or without trichome tuft domatia. *Inflorescences* axillary and terminal, thyrsoid, with 1–3 orders, first-order peduncles 0.4–0.8 cm long, second-order 0.2–0.4 cm, third-order 0.15–0.25 cm, glabrescent, with simple trichomes; bracts linear, c. 3 mm long, caducous; bracteoles linear, 0.5–1.2 mm long, caducous; pedicels 0.3–0.4 cm long. *Calyx* tubular to narrowly obconic, not costate, irregularly split (sometimes bilabiate), 2–2.2 × 0.5–0.7 cm, lepidote with glandular peltate trichomes, chartaceous, pink to dark red, with patelliform glandular trichomes evenly distributed. *Corolla* infundibular, furrowed, (3.5–)4.3–6.9 cm long, 0.9–1.3(–1.6) cm wide at tube mouth, externally puberulous, without glands, lobes (0.8–)1.2–1.4 × 0.9–1.1 cm, margin rounded and undulate, white or pink to dark purple or vinaceous. *Androecium* with all stamens included; longer filaments 2–2.4 cm long, shorter filaments 1.5–1.8 cm; staminode 1.8–2 mm long; anthers 2.7–4 mm long, connectives not protruding. *Gynoecium* with ovary cylindrical, 3.3–4 × 1–1.2 mm, smooth or angled, lepidote, style 2.6–3 cm long; stigma lanceolate or rhomboid; nectar disk annular and pulviniform under ovary, c. 1.7 × 3 mm. *Fruit* linear, flat, margins raised, central ridge slightly raised, valves woody, rough and sticky, 14–40(–52) × 1.5–2.1 cm,

glabrous; septum coriaceous. *Seeds* elliptic, body elliptic, 1.1–1.3(–1.5) × 2–4(–4.4) cm, wings hyaline, 0.1–0.25 cm wide, margins crisped.

*Phenology* — Produces flowers all year round. Fruits were collected from July to March.

*Distribution and habitat* — *Fridericia japurensis* is distributed in lowland Amazonia, low-altitude rainforests of the C and N Andes and in ecotone areas between forests and savannahs in Brazil, Guyana and Suriname. It is distributed through Bolivia (La Paz, Pando and Santa Cruz), Brazil (Acre, Amapá, Amazonas, Maranhão, Mato Grosso, Pará and Roraima), Colombia (Amazonas, Meta, Putumayo and Vaupés), Ecuador (Esmeraldas, Guayas and Pastaza), French Guiana (Cayenne and Saint-Laurent-du-Maroni), Guyana (East Berbice-Corentyne and Essequibo), Peru (Amazonas, Loreto and Madre de Dios), Suriname (Brokopondo and Para) and Venezuela (Amazonas).

*Conservation status* — *Fridericia japurensis* is categorized as Least Concern (LC) based on its Extent of Occurrence (5,711,454 km<sup>2</sup>) and Area of Occupancy (162,500 km<sup>2</sup>).

*Remarks* — *Fridericia japurensis* and *F. schumanniana* share many morphological features and a widely overlapping geographical distribution in W lowland Amazonia and the C Andes. *Fridericia japurensis* can be segregated by the densely lenticellate branches (vs lenticellate and striated branches in *F. schumanniana*), tubular calyx (vs broadly obconic calyx in *F. schumanniana*) and fruits narrower than 1.5 cm with hispid and sticky valves (vs fruits wider than 2 cm with verrucose valves in *F. schumanniana*). *Fridericia japurensis* is also similar to *F. craterophora* in ecotone areas between Amazonia and the Cerrado (see discussion under *F. craterophora*).

Here we synonymize *Fridericia oligantha* in *F. japurensis*, two names formerly included in the “*Arrabidaea japurensis*” complex (Gentry 1977a). Because the protologue of *A. oligantha* was based on a single specimen that bears only two flowers and one incomplete leaf, the few-flowered inflorescences and white corollas have been considered as key features to separate *F. oligantha* from *F. japurensis*. Gentry (1977a) noted the similarity between these two species based on fruits and indicated that intermediate morphologies might represent extremes of intraspecific variation. Indeed, a careful analysis of c. 100 flowering specimens indicated a full range of flower numbers and corolla colours that range from white (previously called *F. oligantha*) to dark purple or vinaceous, passing through several shades of pink. This information, combined with molecular phylogenetic data (Kaehler & al. 2019), has further supported Gentry’s hypothesis, leading us to treat *F. oligantha* and *F. japurensis* as a single taxon.

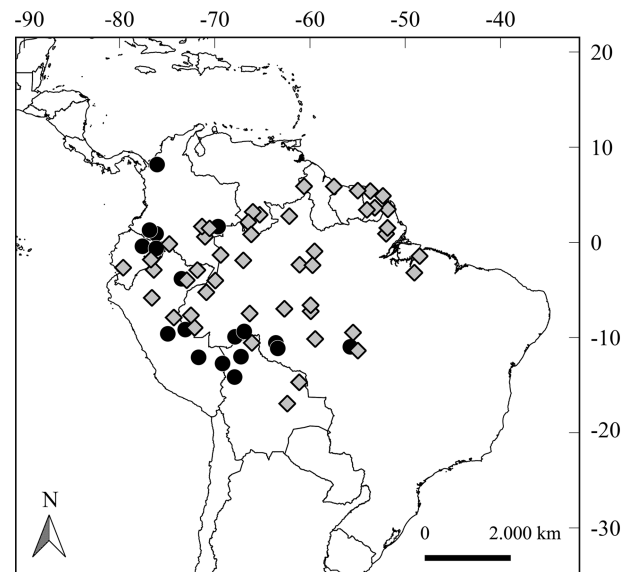


Fig. 5. Distribution of *Fridericia japurensis* (grey diamonds); *F. nicotianiflora* (black circles).

**6. *Fridericia nicotianiflora*** (Kraenzl.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 440. 2014 ≡ *Arrabidaea nicotianiflora* Kraenzl. in Notizbl. Bot. Gart. Berlin-Dahlem 6: 369. 1915. – Holotype: Brazil, Acre, Rio Branco, Seringal São Francisco, Apr 1911, *E. Ule* 9782 (B destroyed [photo F negative no. 18451!, photo MO accession code MO-1026106!]; lectotype (designated by Lohmann in Lohmann & Taylor 2014: 441); K barcode K000403352!; isolectotype: MG barcode MG014611 [image!]). – Fig. 4F–H, 5.

– “*Fridericia nicotianiflora*” (Bureau K. Schum) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 766. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas, evergreen, up to 25 m high. *Branches* terete (sometimes subquadrangular), lenticellate, brown when dry, glabrous to glabrescent, with simple trichomes; without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, not apiculate, c. 1.5 mm long. *Leaves* (1 or)2-foliolate; petiole 0.4–2.5 cm long, velutinous, with simple trichomes only at canallicule; petiolules with equal lengths, 0.7–2 cm, velutinous, with simple and glandular capitate trichomes; blade chartaceous, smooth, margin entire or revolute, central leaflet elliptic when 1-foliolate, base cuneate, apex acute, lateral leaflets elliptic, 7.6–17.5 × 3–7.5 cm, base cuneate, apex long acuminate, adaxially not vernicose, glabrescent, with simple trichomes throughout, abaxially puberulous, with simple trichomes only at veins, venation pinnate, secondary veins raised, tertiary veins flat to slightly raised, without pocket but sometimes with trichome tuft domatia. *Inflorescences* terminal and axillary, thyrses with abortion of buds, with 2 or 3 orders, first-order peduncles 2–2.7 cm, second-order 0.7–1.4 cm, third-order c. 0.3 cm, pubescent, with simple and capitate glandular

trichomes; bracts linear, c. 2 mm long, caducous; bracteoles triangular, c. 1 mm long, persistent; pedicels 0.5–0.7 cm long. *Calyx* narrowly tubular, costate when dry, shortly 5-denticulate (sometimes laterally split), 1.4–1.7 × 0.2–0.4 cm, glabrescent to pubescent, with simple trichomes and lepidote with glandular peltate trichomes, membranaceous, green at base and whitish close to rim, without glands. *Corolla* narrowly infundibular, slightly zygomorphic, not furrowed, 3.4–4.5 cm long, (0.4–)0.7–1.2 cm wide at tube mouth, externally puberulous, without glands, lobes 1–1.5 × 0.6–0.8 cm, margin acuminate to caudate and flat, white, pale pink to purple outside and in lobes and white inside. *Androecium* with all stamens included; longer filaments 1.5–2.5 cm long, shorter filaments 1.1–2 cm; staminode 2–3 mm long; anthers 2.2–3 mm long, connectives not protruding. *Gynoecium* with ovary cylindrical, 2–3 × 0.7–1.2 mm, smooth, lepidote, style 2.1–2.7 cm long; stigma rhomboid; nectar disk annular and pulviniform under ovary, c. 0.7 × 2 mm. *Fruit* linear, flat, margins slightly raised, central ridge not raised (sometimes slightly raised), valves coriaceous, smooth, 20–37 × 0.9–1.4 cm, pubescent with glandular capitate long stalked trichomes; septum coriaceous. *Seeds* oblong, body oblong, 0.9–1.1 × 3.2–3.4 cm, wings hyaline, 0.2–0.5 cm wide, margins crisped.

*Phenology* — Produces flowers all year round. Fruits were collected in February, June and August.

*Distribution and habitat* — *Fridericia nicotianiflora* is distributed in W lowland Amazonia and low-altitude rainforests in the C and N Andes. It is distributed through Bolivia (Pando), Brazil (Acre and Rondônia), Colombia (Cordoba, Putumayo and Vaupés), Ecuador (Napo and Orellana) and Peru (Huánuco, Loreto and Madre de Dios).

*Conservation status* — *Fridericia nicotianiflora* is categorized as Least Concern (LC) based on its Extent of Occurrence (1,849,631 km<sup>2</sup>) and Area of Occupancy (50,000 km<sup>2</sup>).

*Remarks* — *Fridericia nicotianiflora* is easily recognizable by the long (1.4–1.7 cm), narrow (0.2–0.4 cm), costate and tubular calyx and by the apically acuminate to caudate corolla lobes. When sterile, this species can be confused with *Cuspidaria floribunda* (DC.) A. H. Gentry due to the elliptic leaflets with cuneate base and pinnate venation. However, the flowers of *C. floribunda* have short (< 0.9 cm) and not costate tubular calyces and apically rounded corolla lobes. The fruits of *F. nicotianiflora* share simple and glandular capitate trichomes with those in *F. arthrerion*. However, the leaflets of *F. arthrerion* are ovate to elliptic with actinodromous basal venation and rounded bases, whereas the leaflets of *F. nicotianiflora* are elliptic with pinnate venation and cuneate bases.

**7. *Fridericia podopogon* (DC.) L. G. Lohmann** in Ann. Missouri Bot. Gard. 99: 443. 2014 ≡ *Spathodea podopogon* DC., Prodr. 9: 205. 1845 ≡ *Macfadyena podopogon* (DC.) Griseb. in Cat. Pl. Cub. 195. 1866 ≡ *Neomacfadya podopogon* (DC.) Baill., Hist. Pl. 10: 26. 1888 ≡ *Arrabidaea podopogon* (DC.) A. H. Gentry in Rhodora 79: 439. 1977. – Holotype: Cuba, Havana, 1829, *R. de la Sagra* 293 (G-DC barcode G00133616 [image! and photo F negative no. 33894!]). – Fig. 6A–C, 7.

= *Bignonia simplex* A. Rich. in Sagra, Hist. Fis. Cuba, Bot. 11: 104. 1850. – Holotype: Cuba, Guanabo, s.d., *R. de la Sagra s.n.* (P barcode P00608127!).

= *Phryganocydia brevicalyx* Standl. in Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 261. 1929. – Holotype: British Honduras, Tower Hill, 1928, *J. S. Karling* 39 (F accession code F-559725 [image!]; isotype: US barcode US00125803 [image!]).

*Morphological description* — Lianas, evergreen, up to 10 m high. *Branches* terete to subquadrangular, striate and sparsely lenticellate, grey when dry, puberulous, with simple trichomes; without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, not apiculate, 0.5–1 mm long. *Leaves* (1 or) 2-foliolate; petiole 0.3–1.1 cm long, puberulous, with simple trichomes (sometimes glabrescent and puberulous only at canalicule); petiolules with equal lengths, (0.4–)0.7–1.2 cm, glabrous to pubescent, with simple trichomes; blade chartaceous, smooth, margin entire, lateral leaflets elliptic, 5–10 × 2–5.2 cm, base cuneate, rounded or subcordate, apex acute to attenuate, adaxially not vernicose, glabrous throughout, abaxially glabrescent throughout and puberulous, without pocket and with trichomes tuft, venation pinnate (sometimes resembling palmate actinodromous basal), secondary veins raised, tertiary veins raised, without pocket and with trichome tuft domatia. *Inflorescences* axillary, thyrse with abortion of lateral buds (sometimes resembling a raceme), with 1 or 2 orders, first-order peduncles 0.5–0.8 cm long, second-order 0.4–0.5 cm, glabrous; bracts not seen, caducous; bracteoles linear, 1–1.2 mm long, persistent; pedicels 0.5–0.8 cm long. *Calyx* tubular, not costate, irregularly split, 1–1.8 × 0.5–0.8 cm, lepidote with glandular peltate trichomes, chartaceous, green, with glandular areas. *Corolla* infundibular, zygomorphic, furrowed, 2.5–4 cm long, 0.7–0.9 cm wide at tube mouth, externally puberulous, without glands, upper lobes almost completely fused, 0.2–0.4 cm free, lower lobes 0.8–1.2 × 0.5–1.2 cm, margin rounded and flat, white, lavender, pink or magenta. *Androecium* with all stamens included; longer filaments 1.1–1.5 cm long, shorter filaments 0.7–1.3 cm; staminode 1.5–2 mm long; anthers 1.9–2.1 cm long, connectives not protruding. *Gynoecium* with ovary cylindrical, 1.3–2.9 × 0.8–1 mm, smooth, densely lepidote, style 1.6–2.1 cm long; stigma lanceolate; nectar disk annular and smooth under ovary, 0.8–1.1 × 1–1.2 mm. *Fruit* linear, flat, margins not raised, central ridge not raised,



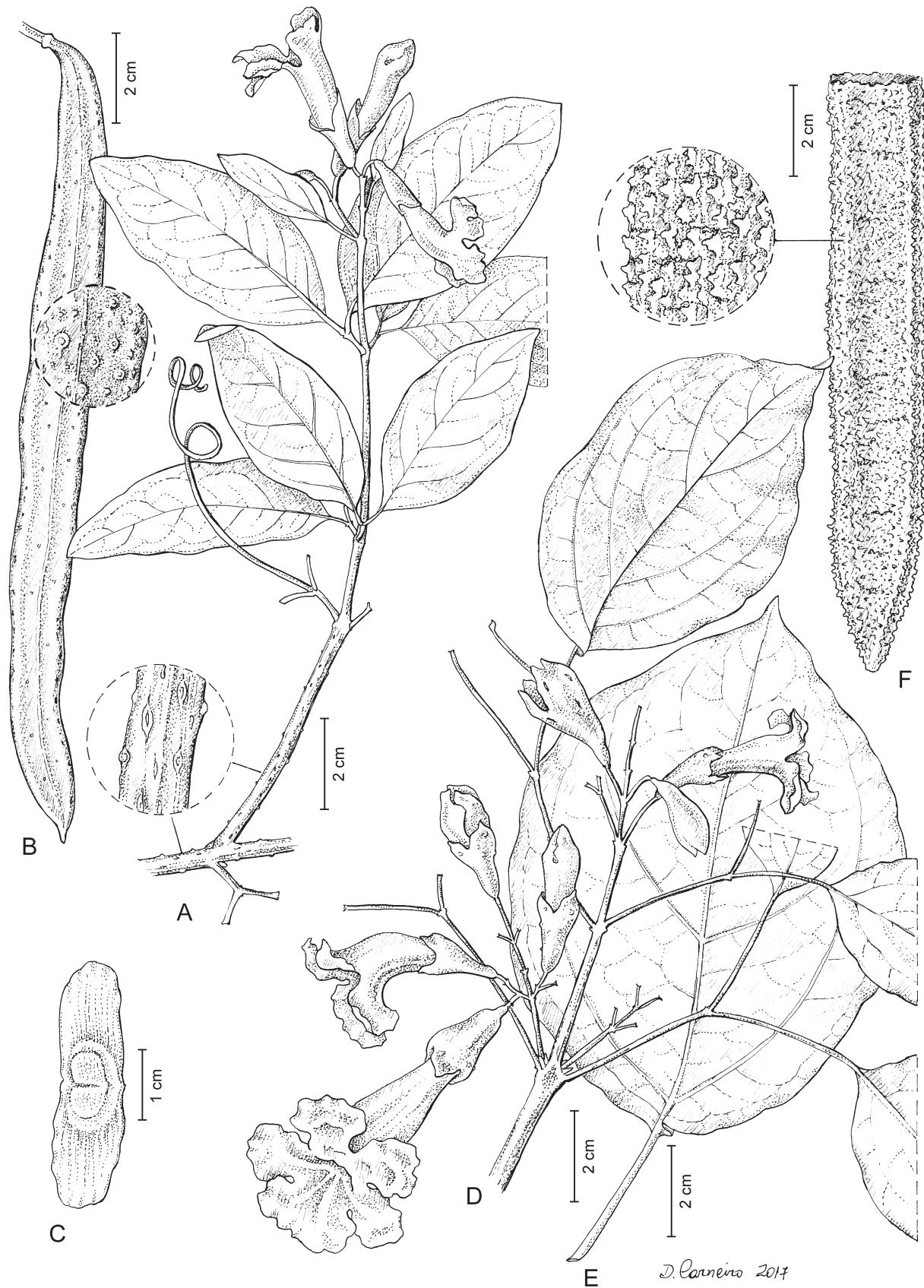


Fig. 6. A–C: *Fridericia podopogon*; A: habit with detail showing striate and sparsely lenticellate bark; B: fruit with detail of lenticels on surface of valve; C: seed. – D–F: *F. schumanniana*; D: habit; E: leaflet showing palmate actinodromous suprabasal venation; F: sectioned fruit with detail showing verrucose surface of valve. – A from Arvigo 665 (NY); B, C from Arvigo 535 (NY); D, E from Cabrera & Cabrera 5301 (NY); F from Atha & Romero 1329a (NY). – Drawn by Diana Carneiro.

valves coriaceous to woody, hispid, 18–23 × 1.2–1.5 cm, glabrous; septum coriaceous. *Seeds* elliptic, body elliptic, 1.1–1.3 × 2.8–3.1 cm, wings opaque, c. 0.05 mm wide, margins entire.

*Phenology* — Produces flowers from March to December. Fruits were collected from May to February.

*Distribution and habitat* — *Fridericia podopogon* is distributed mostly in dry forests, also occurring in moist forests of Petén and Yucatán. This species is distributed through Belize (Belize, Cayo, Orange Walk and Toledo), Cuba (Cuba, La Habana and Pinar del Río), Guatemala (Petén) and Mexico (Campeche, Chiapas, Quintana Roo and Yucatán).

*Conservation status* — *Fridericia podopogon* is categorized as Least Concern (LC) based on its Extent of Occurrence (242,342 km<sup>2</sup>). However, this species is suggested to be Endangered (EN) based on its Area of Occupancy (128 km<sup>2</sup>): EN B2ab(i,ii,iii).

*Remarks* — *Fridericia podopogon* is morphologically close to *F. craterophora*. However, the distributions of these two species are very distinct, with the former endemic to N Central America and Mexico and the latter restricted to Bolivia, Brazil and Paraguay. *Fridericia podopogon* can be distinguished by the shorter prophylls 0.5–1 mm long (vs 1.7–2.1 mm long in *F. craterophora*), inflorescence with 1 branching order and peduncle 0.5–0.8 cm long (vs 2 branching orders and first-order peduncle 1.4–6 cm long in *F. craterophora*) and upper lobes of the corolla mostly fused, with only 0.2–0.4 cm free at the apex (vs 0.6–1.1 cm free in *F. craterophora*). The other species of the “*Neomacfadya* clade” with an overlapping geographical distribution is *F. schumanniana*, which is easily distinguished from *F. podopogon* by the lateral leaflets 5–10 × 2–5.2 cm (vs 9–15 × 5.4–9.5 cm in *F. schumanniana*) and tubular calyx 1–1.8 cm long (vs obconic calyx 1.6–2.7 cm long in *F. schumanniana*).

**8. *Fridericia resinosa*** A. H. Gentry ex Kaehler in *Phytotaxa* 461: 132. 2020. – Holotype: Brazil, Bahia, Barra, c. 58 km W de Ibotirama, na BR-242, 12°12'S, 43°36'W, 11 Oct 1994, L. P. de Queiroz & N. S. Nascimento 4067 (HUEFS-018496 barcode HUEFS000024996 [image!]; isotypes: BAH-10335 n.v., FLOR barcode FLOR0041323 n.v., HUNEB-7635 n.v., NY barcode NY00412107!, TEPB accession code TEPB-17.852!, UB accession code UB-118325!, VIES barcode VIES013149 [image!]). – Fig. 7, 8A–E.

*Morphological description* — Lianas or scandent shrubs, evergreen, up to 3 m high. *Branches* terete, striate and sparsely lenticellate, brown when dry, glabrous; without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds triangular, apiculate, 1–1.2 mm

long. *Leaves* (1 or)2-foliolate; petiole 0.5–0.8 cm long when 1-foliolate, 1–3.3 cm when 2-foliolate, glabrous (sparsely puberulous at canallicule, with simple trichomes); petiolules with equal lengths (0.5–)1–1.8 cm, glabrous or puberulous; blade chartaceous or coriaceous, smooth, margin revolute, central leaflet ovate or elliptic when 1-foliolate, (2.5–)6–8 × (1.5–)3.4–6 cm, base obtuse or truncate to subcordate, apex shortly acuminate, lateral leaflets ovate or elliptic, (5–)7.5–11 × (2.4–)5–6.5 cm, base obtuse, rounded or subcordate, apex acuminate to caudate, adaxially vernicose, glabrous and lepidote throughout (sometimes glabrescent with trichomes only at veins), abaxially glabrous throughout (sometimes pubescent, with simple trichomes only at veins), venation pinnate, secondary veins raised, tertiary veins raised, without pocket and with trichome tuft domatia. *Inflorescences* axillary, thyrsoid with abortion of lateral buds resembling a raceme, with 2 or 3 orders, first-order peduncles 1.1–6 cm long, second-order 0.3–2.9 cm, third-order 0.3–0.6 cm, glabrous or pubescent, with simple trichomes; bracts linear, 2–3 mm long, caducous; bracteoles triangular, 0.8–1.2 mm long, persistent; pedicels 0.2–0.5 cm long. *Calyx* tubular to obconic, not costate, truncate (sometimes irregularly split), 1.6–2.2 × 0.5–0.8(–1.2) cm, lepidote with glandular peltate trichomes, chartaceous, yellowish green, with patelliform glandular trichomes clustered close to rim and few scattered through surface. *Corolla* infundibular with abrupt narrowing close to calyx, strongly zygomorphic, furrowed, 3.8–5.7 cm long, 0.8–2 cm wide at tube mouth, externally pubescent, with simple and glandular capitate trichomes outside, without glands, lobes 0.6–1.1 × 0.6–1(–1.4) cm, margin rounded and undulate, pink or purple to vinaceous. *Androecium* with all stamens included; longer filaments 1.9–2.1 cm long, shorter filaments 1.3–1.5 cm; staminode 1.7–3.3 mm long; anthers 2–4 mm long, connectives protruding 0.75–0.8 mm. *Gynoecium* with ovary cylindrical, c. 2.1 × 0.75–0.8 mm, furrowed, lepidote, style 2.9–3.2 cm long; stigma oval; nectar disk annular and smooth under ovary, 0.16–0.2 × 1.1–1.6 mm. *Fruit* not seen.

*Phenology* — Produces flowers in October and February.

*Distribution and habitat* — *Fridericia resinosa* is found in ecotone areas between the Cerrado and the Atlantic rainforest of Brazil and between the Cerrado and the Amazon rainforest. It is endemic to Brazil (Bahia, Maranhão, Piauí and Tocantins).

*Conservation status* — *Fridericia resinosa* is categorized as Least Concern (LC) based on its Extent of Occurrence (230,828 km<sup>2</sup>). However, this species is known from only six localities suggesting it is Endangered (EN) based on its Area of Occupancy (20 km<sup>2</sup>): EN B2ab(ii,iv).

*Remarks* — *Fridericia resinosa* resembles *F. craterophora*, although these two species can be distinguished

by the glabrous petiole 1–3.3 cm long (vs villous and 0.3–0.8 cm long in *F. craterophora*) and petiolule length (0.5–)1–1.8 cm (vs 0.2–0.4 cm in *F. craterophora*).

**9. *Fridericia schumanniana*** (Loes.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 444. 2014 ≡ *Paragonia schumanniana* Loes. in Bot. Jahrb. Syst. 23: 130. 1896 [non *Arrabidaea schumanniana* Huber in Bol. Mus. Goeldi Hist. Nat. Ethnogr. 4: 606. 1906 = *Bignonia binata* Thunb.]. – Holotype: Nicaragua, Matagalpa, near Cañada Yasica, c. 800 m, Aug, *E. Rothschild* 230 (B destroyed). – **Neotype (designated here)**: Mexico, Chiapas, Palenque, en los alrededores de la zona Arqueológica de Palenque, a 9 km al Oeste de el Pueblo de Palenque, 16 Aug 1983, *E. F. Cabrera & H. de Cabrera* 5301 (MEXU accession code MEXU-395494 [image!]; isoneotypes: MO accession code MO-3322271!, NY!). – Fig. 6D–F, 7.

*Note* — The types of Loesener were housed at B, where most of the *Bignoniaceae* types were destroyed during the II World War (Hiepko 1987). We were not able to find any isotypes. Therefore, we selected as the neotype a specimen that perfectly matches the very detailed description provided in the protologue, including the two diagnostic features discussed in the protologue notes, i.e. the conspicuous trichomes of the tuft domatia and the bilabiate calyx rim.

= *Adenocalymma verrucosum* Standl. in Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 323. 1929 ≡ *Martinella verrucosa* (Standl.) Standl. in Contr. Arnold Arbor. 5: 138. 1933 ≡ *Scobinaria verrucosa* (Standl.) Seibert in Publ. Carnegie Inst. Wash. 522: 408. 1940 ≡ *Arrabidaea verrucosa* (Standl.) A. H. Gentry in Selbyana 2: 43. 1977. – Holotype: Honduras, Atlántida, near Tela, Dec 1927–Mar 1928, *P. C. Standley* 54891 (F accession code F-584059!; isotypes: A barcode A00091823 [image!], G barcode G00008924 [image!], US barcode US00125752!).

= *Arrabidaea belizensis* Standl. in Publ. Field Mus. Nat. Hist., Bot. Ser. 8: 48. 1930. – Holotype: British Honduras, Middlesex, 4 Jul 1929, *W. A. Schipp* 284 (F accession code F-598217!; isotypes: BKL barcode BKL00000241 [image!], BM barcode BM000630907 [image!], EAP barcode EAP96947 [image!], K barcode K000449102!, MICH barcode MICH1115816 [image!], MO accession code MO-988641!, NY barcode NY00313080!, S accession code S04-3462!, UC barcode UC396570 [image!], US barcode US00125711!).

= *Scobinaria amethystina* Dugand in Caldasia 7: 24. 1955. – **Lectotype (designated here)**: Colombia, Depto. de Bolívar, Ayapel, Montelíbano, 23 May 1949, *R. Romero-Castañeda* 1735 (COL barcode COL000004387 [image!]; isolectotypes: COL barcode COL000004386 [image!], MEDEL barcode MEDEL000101 [image!]).

*Note* — In the protologue of *Scobinaria amethystina*, Dugand (1955) listed two specimens depos-

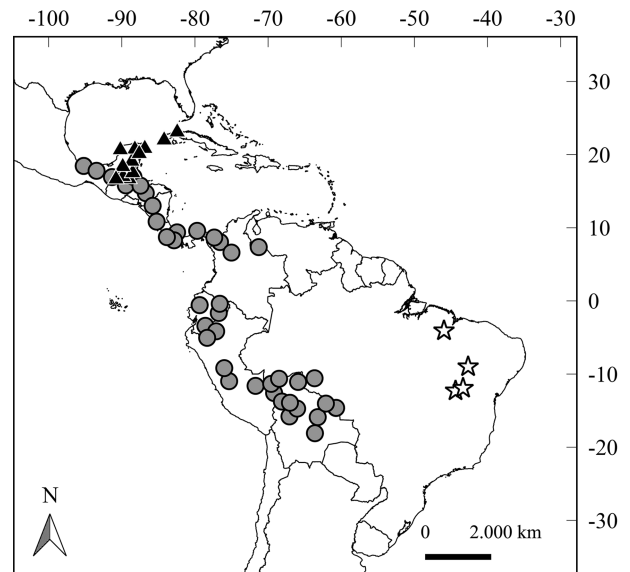


Fig. 7. Distribution of *Fridericia podopogon* (black triangles); *F. resinosa* (stars); *F. schumanniana* (grey circles).

ited in COL as types (32317 and 33652), demanding lectotypification. The specimen COL-33652 (COL000004387) bears a stamp “holotype” followed by Dugand’s handwriting. In turn, the specimen COL-32317 (COL000004386) bears a stamp “isotype”. Following Rec. 9A.3 of the *Code* (Turland & al. 2018), we choose the specimen stamped with “holotype” as the lectotype.

– “*Fridericia verrucosa*” (Standl.) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 766. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas, evergreen, up to 30 m high. *Branches* terete, striate and lenticellate, brown or grey when dry, glabrescent to puberulous and lepidote; with or without interpetiolar ridge, with interpetiolar glandular fields; prophylls of axillary buds narrowly triangular, not apiculate, 0.8–2 mm long. *Leaves* 2-foliolate; petiole 1.8–4 cm long, lepidote with glandular peltate trichomes and pubescent, with simple trichomes only at canallicule; petiolules (1–)1.9–4.2 cm long, pubescent, with simple trichomes; blade chartaceous to membranaceous, smooth margin entire to revolute, leaflets ovate or elliptic, 9–15(–19.5) × 5.4–9.5(–15.9) cm, base cuneate, rounded or subcordate, apex acuminate, adaxially not vernicose, glabrous throughout (sometimes glabrescent, with simple trichomes at veins), abaxially glabrous throughout (pubescent, with simple trichomes at midrib), venation palmate actinodromous basal or supra basal, secondary veins raised, tertiary veins flat, with a vestigial pocket (< 1 mm) and trichome tuft domatia. *Inflorescences* axillary, thyrsoid with abortion of buds, with 2(or 3) orders, first-order peduncles 2.1–3.8 cm long, second-order 0.4–1.5 cm, third-order 0.2–0.6 cm, puberulous or glabrescent, with simple trichomes; bracts narrowly triangular, 1–2.5 mm long, caducous or persistent; bracteoles linear,

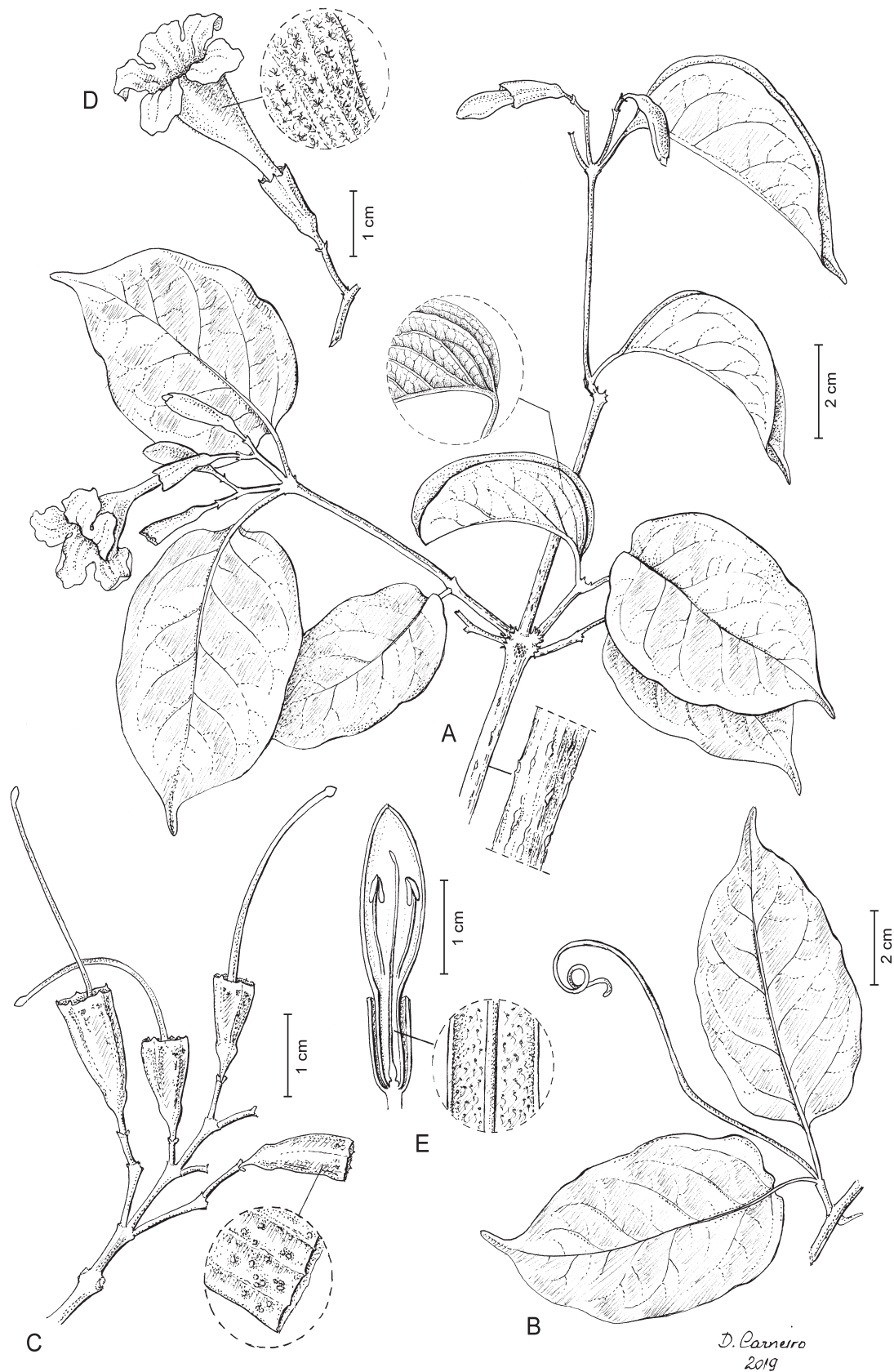


Fig. 8. A–E: *Fridericia resinosa*; A: habit of a 1-foliolate branch with detail showing sparsely lenticellate bark; B: 2-foliolate leaf; C: old inflorescence and detail showing glands clustered close to rim. D: flower and detail showing pubescent surface of outside corolla; E: open bud and detail showing base of corolla with glandular trichomes. – A from *Queiroz s.n.* (VIES-13149); B, D, E from *Queiroz 4067* (NY); C from *Emperaire 220* (RB). – Drawn by Diana Carneiro.

0.8–1 mm long, persistent; pedicels 0.3–0.7 cm long. *Calyx* broadly obconic, not costate, irregularly split forming 5 lobes (sometimes bilabiate), 1.7–2.7 × 0.5–1.5 cm, glabrescent to pubescent, with simple and glandular peltate trichomes, chartaceous, yellowish green, with glandular areas close to rim. *Corolla* infundibular, strongly zygomorphic, furrowed, 3.6–6.9 cm long, 0.7–1.7 cm wide at tube mouth, externally puberulous, without glands, lobes 0.7–1.4 × 0.7–1.5 cm, margin rounded and undulate, pale pink to purple in lobes and outside, white inside. *Androeceum* with all stamens included; longer filaments 1.7–2.2 cm long, shorter filaments 1.1–1.6 cm; staminode 1–3.6 mm long; anthers 3.3–5.4 mm long, connectives not protruding. *Gynoeceum* with ovary cylindrical, 3.8–4.7 × 1.1–1.5 mm, furrowed or smooth, lepidote, style 1.8–2.8 cm long; stigma lanceolate; nectar disk annular and smooth under ovary, c. 2.1 × 2.5 mm. *Fruit* linear, flat or slightly inflate, margins slightly raised, central ridge not raised, valves woody, verrucose, (12–)28–45 × (1.3–)2–2.9 cm, glabrous; septum coriaceous. *Seeds* oblong, body oblong, 1.2–1.8 × 3.6–4.9 cm, wings hyaline, c. 0.3 cm wide, margins entire.

*Phenology* — Produces flowers from March to December. Fruits were collected all year round.

*Distribution and habitat* — *Fridericia schumanniana* is found in wet forests of W lowland Amazonia and premontane forests from the C Andes all the way to Central America. It is distributed in Belize (Belize, Cayo, Stann Creek and Toledo), Bolivia (Beni, La Paz and Santa Cruz), Brazil (Acre, Amazonas, Mato Grosso and Rondônia), Colombia (Antioquia and Chocó), Costa Rica (Alajuela, Heredia, Limón, Puntarenas and San José), Ecuador (Esmeraldas, Los Ríos, Morona-Santiago, Orellana, Pastaza and Sucumbios), Guatemala (Izabal and Petén), Honduras (Atlántida), Mexico (Chiapas, Guerrero, Jalisco, Oaxaca, Tabasco and Veracruz), Nicaragua (Atlántico Norte, Jinotega, Managua and Matagalpa), Panama (Bocas del Toro, Canal Area, Chiquirí, Colón, Darién, Panamá and Veraguas), Peru (Amazonas, Huánuco, Junín, Loreto, Madre de Dios, Pasco and Puno) and Venezuela (Apure and Zulia).

*Conservation Status* — *Fridericia schumanniana* is categorized as Least Concern (LC) based on its Extent of Occurrence (5,649,746 km<sup>2</sup>) and Area of Occupancy (185,000 km<sup>2</sup>).

*Remarks* — *Fridericia schumanniana* belongs to the *Arrabidaea japurensis* complex recognized by Gentry (1977a). Under his circumscription, *A. verrucosa* [= *F. schumanniana*] is distributed through Central America and W South America. The vegetative material of *F. schumanniana* can be confused with *F. japurensis* and *F. triplinervia* due to the shared elliptic leaflets with actinodromous venation. However, *F. schumanniana* can

be separated from these two species by having bark striate and sparsely lenticellate (vs not striate and densely lenticellate in *F. triplinervia* and *F. japurensis*) and from *F. japurensis* based on other traits discussed under the remarks for that species. *Fridericia schumanniana* can be segregated from *F. triplinervia* by having calyx broadly obconic (vs tubular to narrowly obconic in *F. triplinervia*), calyx rim usually forming 5 lobes, sometimes bilabiate (vs truncate or sometimes irregularly split in *F. triplinervia*), corolla infundibular without a wide opening above the calyx (vs infundibular with a wide opening above the calyx in *F. triplinervia*) and fruits woody and verrucose (vs coriaceous and smooth in *F. triplinervia*).

- 10. *Fridericia simplex*** (A. H. Gentry) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 444. 2014 ≡ *Arrabidaea simplex* A. H. Gentry in Phytologia 46: 206. 1980. – Holotype: Brazil, Tocantins [Goiás], Parque Nacional do Tocantins, entre a Sede e Veadeiros, 26 Sep 1967, de Haas Sr., J. H. de Haas & R. B. Belém 344 (HB barcode HB000050388 n.v.; isotype: MO accession code MO-2698253!). – Fig. 9A, 10.  
– “*Fridericia simplex*” (A. H. Gentry) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 766. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Shrubs or scandent shrubs, evergreen, up to 2.5 m high. *Branches* terete, striate and sparsely or not lenticellate, black or brown when dry, glabrescent to pubescent and lepidote; with inconspicuous interpetiolar ridge, with (sometimes inconspicuous) interpetiolar glandular fields; prophylls of axillary buds narrowly triangular, not apiculate, 0.5–1.6 mm long. *Leaves* 1- or 2-foliolate; petiole 0.7–2.1 cm long, puberulous to velutinous, with simple trichomes; petiolules with equal lengths when 2-foliolate, 0.4–0.7 cm, glabrous and lepidote or puberulous to velutinous, with simple trichomes; blade chartaceous, smooth, margin revolute, central leaflet lanceolate, base rounded, apex attenuate or acute, lateral leaflets elliptic (sometimes ovate), 3.4–8.8 × 2.5–5.4 cm, base rounded to subcordate, apex attenuate or acute, adaxially not vernicose, adaxially glabrous and lepidote, abaxially glabrous to pubescent throughout and puberulous at domatia and midrib, venation palmate actinodromous basal or suprabasal, secondary veins raised, tertiary veins raised, without pocket and with trichome tuft domatia. *Inflorescences* axillary, thyrses with abortion of lateral buds (sometimes resembling a raceme or isolate flowers), with 1 or 2 orders, first-order peduncles 0.4–1.4(–3.5) cm long, second-order 0.2–1 cm, puberulous or glabrescent, with simple trichomes; bracts narrowly triangular, 1–3(–10) mm long, caducous; bracteoles linear, 0.3–1.5 mm long, persistent; pedicels 0.1–0.3 cm long. *Calyx* tubular, not costate, truncate or irregularly split, (1.3–)1.8–2.5 × 0.5–0.7(–1) cm, lepidote with glandular peltate trichomes, chartaceous, green, with patelliform glands and



D. Carneiro / 2017

Fig. 9. A: *Fridericia simplex*, habit with detail showing lepidote surface of calyx. – B–E: *F. triplinervia*; B: habit with detail of evident pocket domatia at axils of midrib and secondary veins; C: calyx; D: fruit; E: seed. – A from Labiak & al. 5831 (UPCB); B, C from Assis & al. 748 (MBM); D, E from Krieger & Urbano 9063 (MBM). – Drawn by Diana Carneiro.

glandular areas evenly distributed. *Corolla* infundibular, strongly zygomorphic, furrowed, 4.9–7.1 cm long, 1.1–2 cm wide at tube mouth, externally puberulous to villous, without glands, lobes 0.7–1.6 × 0.6–1.6 cm, margin rounded and undulate, pale pink or lilac. *Androecium* with all stamens included; longer filaments 1.5–1.8 cm long, shorter filaments 1–1.4 cm; staminode 2.2–6 mm long; anthers 3–4.7 mm long, connectives protruding 0.5–1 mm. *Gynoecium* with ovary cylindric, 1.7–2.4 × 0.6–0.8 mm, furrowed, glabrous, style 2.8–3.7 cm long; stigma orbicular or lanceolate; nectar disk annular and smooth under ovary, c. 2 × 1.5 mm. *Fruit* linear, flat, margins not raised, central ridge not raised, valves coriaceous, smooth, 7.9–10 × 1.9–2.2 cm, lepidote; septum coriaceous. *Seeds* elliptic, body elliptic, c. 1.2 × 2.2 cm, wings hyaline, c. 0.1 cm wide, margins entire.

*Phenology* — Produces flowers on October and February. Fruits were collected in March, April and July.

*Distribution and habitat* — *Fridericia simplex* is found exclusively in the Cerrado. It is endemic to Brazil (Goiás, Maranhão, Piauí and Tocantins).

*Conservation status* — *Fridericia simplex* is categorized as Least Concern (LC) based on its Extent of Occurrence (401,326 km<sup>2</sup>). However, this species is suggested to be Endangered (EN) based on its Area of Occupancy (72 km<sup>2</sup>): EN B2ab(i,ii).

*Remarks* — *Fridericia simplex* is recognized by its usually 1-foliolate leaves in which the leaflet blade is lanceolate to ovate with an acuminate apex. Some specimens of *F. resinosa* from Maranhão State also have the leaflet blade lanceolate to ovate, although the leaves are (1 or)2-foliolate and the leaflets are vernicose on the adaxial surface (vs 1-foliolate with a dull surface in *F. simplex*). *Fridericia simplex* is often misidentified as *F. craterophora*. However, *F. simplex* has longer petioles 0.7–1.7 cm (vs 0.3–0.8 cm in *F. craterophora*) and lanceolate leaflets (vs central leaflet lanceolate, ovate or obovate and lateral leaflets elliptic to ovate in *F. craterophora*).

**11. *Fridericia triplinervia*** (Mart. ex DC.) L. G. Lohmann in Ann. Missouri Bot. Gard. 99: 446. 2014 ≡ *Bignonia triplinervia* Mart. ex DC., Prodr. 9: 153. 1845 ≡ *Petastoma triplinervia* (Mart. ex DC.) Miers in Proc. Roy. Hort. Soc. London 3: 195. 1863 ≡ *Arrabidaea triplinervia* (Mart. ex DC.) Baill. ex Bureau in Vidensk. Meddel. Dansk Foren. Kjøbenhavn 1893: 99. 1894 ≡ *Saritaea triplinervia* (Mart. ex DC.) Dugand in Caldasia 3: 266. 1945. – Lectotype (designated by Arbo 2018: 112): Brazil, São Paulo, Dec 1817, C. F. P. von Martius s.n. (M accession code M-86356! [photo in NY!]; isoelectotypes: G-DC barcode G00133252 [image!], K n.v., M accession code M-86357! [between Paranangaba and Mineiros in label of specimen]). – Fig. 9B–E, 10.

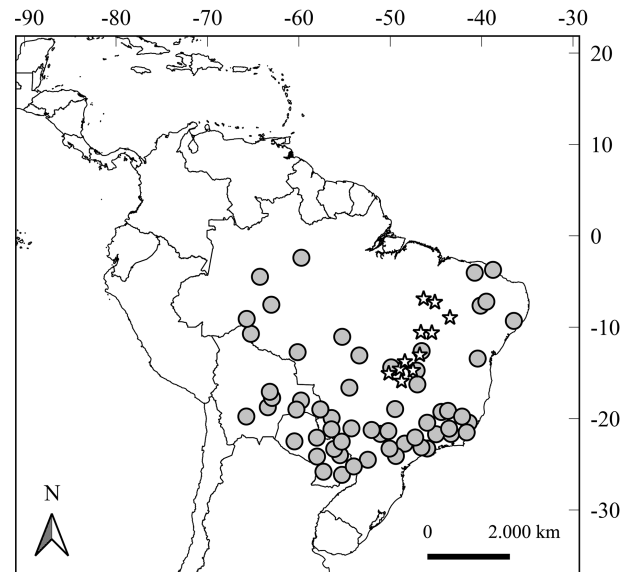


Fig. 10. Distribution of *Fridericia simplex* (stars); *F. triplinervia* (grey circles).

= *Arrabidaea ateramnantha* Bureau & K. Schum. in Fl. Bras. 8(2): 68. 1896. – **Lectotype (designated here):** Brazil, Espírito Santo, Itapemirim [in Brasiliae australiore loco haud accuratius indicato], 12 Feb 1876, A. Glaziou 11228 (P barcode P00587292!; isoelectotype: P barcode P00587291!).

*Note* — In the protologue of *Arrabidaea ateramnantha*, Bureau & Schumann (1896) did not indicate where the type was deposited. We found two gatherings of *Glaziou 11228* in P. We chose the specimen P00587292 as lectotype because it is the most complete and well-preserved specimen.

= *Arrabidaea triplinervia* var. *brachycalyx* Hassl. in Bull. Herb. Boissier 6(App. 1): 26. 1898. – Lectotype (designated by Arbo 2018: 112): Paraguay, Cordillera de Altos, Jan, E. Hassler 31 (P barcode P03586448!; isoelectotypes: G barcode G00085611 n.v., K barcode K000449155!, NY barcode NY00313123!, P barcode P03586447!).

– “*Fridericia triplinervia*” (Mart. ex DC.) L. G. Lohmann, Cat. Pl. Fung. Brasil 1: 766. 2010. Designation not validly published (Art. 41.1).

*Morphological description* — Lianas or scandent shrubs, evergreen, up to 12 m high. *Branches* terete, striate and lenticellate, brown or grey when dry, glabrous and lepidote; with inconspicuous interpetiolar ridge, with (sometimes inconspicuous) interpetiolar glandular fields; prophylls of axillary buds broadly triangular, not apiculate, 0.6–0.8 mm long. *Leaves* 2-foliolate; petiole 1–3.1 cm long, lepidote with glandular peltate trichomes to pubescent, with simple trichomes; petiolules 0.7–2 cm long, lepidote with peltate glandular trichomes to pubescent, with simple trichomes; blade chartaceous or coriaceous, smooth, margin entire to revolute, leaflets ovate to elliptic, 5–13 × 2.5–7.5 cm, base cuneate, rounded or subcor-

date, apex acuminate, adaxially not vernicose, glabrous throughout, abaxially glabrous to lepidote throughout (sometimes pubescent, with simple trichomes at domatia), venation palmate actinodromous basal or suprabasal, secondary veins raised, tertiary veins raised, with evident pocket (2–4 mm long or 1–2 mm in C Amazonia) and trichome tuft domatia. *Inflorescences* terminal and axillary, thyrsoid with abortion of buds, with 1 or 2 (or 3) orders, first-order peduncles 1–5.5 (–8.6) cm long, second-order 0.4–2.3 cm, third-order c. 0.5 cm, glabrous; bracts linear, (0.5–)2–3 mm long, caducous; bracteoles linear, 0.8–1.5 mm long, caducous; pedicels 0.4–1.2 cm long. *Calyx* tubular to narrowly obconic, not costate, truncate (sometimes irregularly split), 0.9–1.6 × 0.4–0.7 cm, lepidote with glandular peltate trichomes, chartaceous, green to yellowish green, with patelliform glands and glandular areas evenly distributed. *Corolla* infundibular with abrupt widening above to calyx, strongly zygomorphic, furrowed, 4.2–6.6 cm long, 1.4–2.1 cm wide at tube mouth, externally puberulous, without glands, lobes 1.1–1.6 × 1–1.5 cm, margin rounded or acuminate and undulate, dark pink, purple or white. *Androecium* with all stamens included; longer filaments 1.8–2 cm long, shorter filaments 1.2–1.8 mm; staminode not seen; anthers 3.6–4 mm long, connectives protruding 0.8–1.5 mm. *Gynoecium* with ovary cylindrical, 3.5–4.2 × c. 0.8 mm, furrowed, glabrous, style 2.9–3.4 cm long; stigma lanceolate; nectar disk annular and pulviniform under ovary, 0.8–1.3 × c. 2.5 mm. *Fruit* linear, flat, margins slightly raised, central ridge slightly raised, valves coriaceous, rough, 18–40 × 1.2–1.7 cm, glabrous; septum woody. *Seeds* elliptic, body elliptic, 0.9–1.2 × 2.2–2.3 cm, wings hyaline, 0.1–0.2 cm wide, margins entire.

*Phenology* — Produces flowers all year round. Fruits were collected from February to October.

*Distribution and habitat* — *Fridericia triplinervia* is distributed in C South America in dry and humid forests (semideciduous Atlantic and lowland Amazonian rainforests), as well as in dry and humid savannahs (Cerrado, Chaco and Pantanal). It is distributed in Bolivia (Santa Cruz), Brazil (Alagoas, Amazonas, Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, Pernambuco, Rio de Janeiro, Rondônia and São Paulo) and in Paraguay (Caazapá, Canendiyú, Central, Cordillera, Guairá, Paraguairí and Presidente Hayes).

*Conservation status* — *Fridericia triplinervia* is categorized as Least Concern (LC) based on its Extent of Occurrence (6,586,053 km<sup>2</sup>) and Area of Occupancy (240,000 km<sup>2</sup>).

*Remarks* — *Fridericia triplinervia* from dry areas is easily recognized by the conspicuous pocket domatia (2–4 mm long) found on the axils of the leaflet veins.

This feature is shared with *Lundia damazioi* C. DC., a species that is frequently confused with *F. triplinervia* in the Brazilian Atlantic rainforest and the W borders of the Brazilian Cerrado. However, *L. damazioi* can be easily distinguished by a series of features that are lacking in *F. triplinervia*, such as a prominent interpetiolar ridge, cordate leaflets, villous anthers and ciliate stigma (Kaehler & Lohmann 2021b). In turn, *F. triplinervia* bears a conspicuous nectar disk, a feature that is lacking in *L. damazioi*. The specimens of *F. triplinervia* from C Amazonia bear smaller pocket domatia (1–2 mm long) and are similar to *F. japurensis* and *F. schumanniana* due to the ovate to elliptic leaflets with actinodromous basal or suprabasal venation. *Fridericia triplinervia* has tubular to narrowly obconic calyces with truncate rims (vs broadly obconic with a 5-lobed or irregularly split rim in *F. schumanniana*) and has an infundibular corolla with an abrupt widening above the calyx (vs infundibular lacking an abrupt widening above the calyx in *F. japurensis* and *F. schumanniana*). *Fridericia triplinervia* has coriaceous to woody fruits with rough valves, whereas *F. japurensis* and *F. schumanniana* have woody fruits, the former with hispid and sticky valves, the latter with verrucose valves.

### Species exclusa

*Tecoma moritziana* Kraenzl. in Repert. Spec. Nov. Regni Veg. 17: 218. 1921 ≡ *Tabebuia moritziana* (Kraenzl.) Schnee in Pittier & al., Cat. Fl. Venez. 2: 409. 1947. – Syntype: Venezuela, El Palmar, *Moritz* 238 (B probably destroyed).

*Remarks* — Gentry (1982a) synonymized *Tecoma moritziana* in *Fridericia grosourdyana* based on the protologue description because the type of the former was probably destroyed. Gentry based the synonymization on the noticeable capitate glandular trichomes found on the inflorescence branches and calyx. Gentry (1982a) also highlighted differences in calyx length, with the calyx of *T. moritziana* smaller than that of *F. grosourdyana*. Moreover, *F. grosourdyana* can be distinguished by the shorter petiole, up to 8 cm (vs c. 10 cm in *T. moritziana*), the elliptic to obovate central leaflet (vs broadly ovate in *T. moritziana*), the tubular calyx (vs broadly campanulate in *T. moritziana*), narrower calyx 0.25–0.4 cm wide (vs c. 0.7 cm wide in *T. moritziana*) and 2 exerted stamens (vs all stamens included in *T. moritziana*). Given all the morphological differences between these taxa, we do not recognize *T. moritziana* as a synonym of *F. grosourdyana*. Furthermore, *T. moritziana* lacks several diagnostic features of *Fridericia*, such as the triangular and minute prophylls, simple tendrils and lepidote ovaries with a single series of ovules on each placenta. We therefore exclude *T. moritziana* from *Fridericia*, although further studies are needed to verify its best generic placement.



## Author contributions

L.G.L. and M.K. conceived the ideas; L.G.L. provided the initial georeferenced specimen list; M.K. checked the classification of the specimens, produced the key, described the species and wrote the first draft; M.K. and L.G.L. looked for and analysed the types, discussed taxonomic decisions and led the writing; L.G.L. funded the illustrations and trips to European and North American herbaria.

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## References

- Arbo M. M. 2018: *Bignoniaceae*. – Pp. 77–138 in: Zuloaga F. O. & Anton A. (ed.), *Flora vascular de la República Argentina* **20(1)**. – Buenos Aires: Instituto de Botánica Darwinion.
- Bachman S., Moat J., Hill A. W., Torre J. de la & Scott B. 2011: Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. – *ZooKeys* **150**: 117–126. Crossref.
- Bletter N., Janovec J., Brosi B. & Daly D. C. 2004: A digital base map for studying the neotropical flora. – *Taxon* **53**: 469–477. Crossref.
- Bureau E. & Schumann K. 1896–1897: *Bignoniaceae*. – Pp. 1–230 [1896], 229–452 [1897] in: Martius C. F. P. von, Eichler A. W. & Urban I. (ed.), *Flora brasiliensis* [...] **8(2)**. – Monachii, Lipsiae: Frid. Fleischer.
- Candolle A. P. de 1845: *Bignoniaceae*. – Pp. 142–248 in: Candolle A. de (ed.), *Prodromus systematis naturalis regni vegetabilis* **9**. – Parisiis: Fortin, Masson et Sociorum.
- Dugand A. 1955: *Bignoniaceas nuevas o notables de Colombia*. – *Caldasia* **7**: 7–32.
- Ellis B., Daly D. C., Hickey L. J., Johnson K. R., Mitchell J. D., Wilf P. & Wing S. L. 2009: *Manual of leaf architecture*. – Ithaca: Cornell University Press. Crossref.
- Gentry A. H. 1977a: New species of *Leguminosae*, *Lauraceae*, and *Monimiaceae*, and new combinations in *Bignoniaceae* from western Ecuador. – *Selbyana* **2**: 39–45.
- Gentry A. H. 1977b: *Bignoniaceae*. – Pp. 1–45 in: Harling G. W. & Sparre B. (ed.), *Flora of Ecuador* **178**. – Göteborg: Department of Systematic Botany, University of Göteborg.
- Gentry A. H. 1980: Studies in *Bignoniaceae* 37: new species of *Bignoniaceae* from eastern South America. – *Phytologia* **46**: 201–215.
- Gentry A. H. 1982a: *Bignoniaceae*. – Pp. 1–433 in: Febres Z. L. de & Steyermark J. A. (ed.), *Flora de Venezuela* **8(4)**. – Caracas: Ediciones Fundación Educación Ambiental.
- Gentry A. H. 1982b: *Bignoniaceae*. – In: *Flora de Veracruz* **24**. – Xalapa: Instituto Nacional de Investigaciones sobre Recursos Bióticos.
- Gentry A. H. & Grose S. 2007: *Bignoniaceae*. – Pp. 214–220 in: Funk V., Hollowell T., Berry P., Kelloff C. & Alexander S. N. (ed.), *Checklist of the plants of the Guiana Shield (Venezuela): Amazonas, Bolívar, Delta Amacuro; Guyana, Surinam, French Guiana*. – *Contr. U.S. Natl. Herb.* **55**. – Washington: Smithsonian Institution.
- Hiepko P. 1987: The collections of the Botanical Museum Berlin-Dahlem (B) and their history. – Pp. 219–252 in: Scholz H. (ed.), *Botany in Berlin*. – Englera **7**. Crossref.
- IUCN 2019: Guidelines for using the IUCN Red List categories and criteria. Version 14 (August 2019). Prepared by the Standards and Petitions Committee of the IUCN Species Survival Commission. – Published at <https://www.iucnredlist.org/resources/redlistguidelines> [accessed 29 Mar 2022].
- Kaehler M. 2020. *Fridericia resinosa*: a new species of *Bignoniaceae* from Brazil. – *Phytotaxa* **461**: 131–135. Crossref.
- Kaehler M. & Lohmann L. G. 2021a: Taxonomic revisions in *Fridericia* (*Bignoniaceae*, *Bignoniaceae*) I: the “Acrodromous venation” and “Piriadacus” clades. – *Willdenowia* **51**: 181–194. Crossref.
- Kaehler M. & Lohmann L. G. 2021b: Taxonomic revision of *Lundia* (*Bignoniaceae*, *Bignoniaceae*). – *Syst. Bot. Monogr.* **112**: 1–64.
- Kaehler M., Michelangeli F. A. & Lohmann L. G. 2019: Fine tuning the circumscription of *Fridericia* (*Bignoniaceae*, *Bignoniaceae*) II: the “Piriadacus” clade. – *Phytotaxa* **461**: 131–135. Crossref.

- nonieae*, *Bignoniaceae*). – Taxon **68**: 751–770. Crossref.
- Kew 2022: Kew database. – Published at <http://apps.kew.org/herbcat/gotoHomePage.do> [accessed 29 Mar 2022].
- Lohmann L. G. & Hopkins M. 1999: *Bignoniaceae*. – Pp. 608–623 in: Ribeiro J. E. da S., Hopkins M. J. G., Vicentini A., Sothers C. A., Costa M. A. da S., Brito J. M. de, Souza M. A. D. de, Martins L. H. P., Lohmann L. G., Assunção P. A. C. L., Pereira E. da C., Silva C. F. da, Mesquita M. R. & Procópio L. C. (ed.), *Flora da Reserva Ducke: guia de identificação das plantas vasculares de uma floresta de terra-firme na Amazônia Central*. – Manaus: DFID, INPA.
- Lohmann L. G. & Taylor C. M. 2014: A new generic classification of tribe *Bignoniaceae* (*Bignoniaceae*). – *Ann. Missouri Bot. Gard.* **99**: 348–489. Crossref.
- Lohmann L. G. & Ulloa Ulloa C. 2022+ [continuously updated]: *Bignoniaceae* in iPlants prototype checklist. – Published at <http://www.iplants.org/> [accessed 29 Mar 2022].
- Lughadha E. N., Walker B. E., Canteiro C., Chadburn H., Davis A. P., Hargreaves S., Lucas E. J., Schuiteman A., Williams E., Bachman S. P., Baines D., Barker A., Budden A. P., Carretero J., Clarkson J. J., Roberts A. & Rivers M. C. 2018: The use and misuse of herbarium specimens in evaluating plant extinction risks. – *Philos. Trans., Ser. B* **374**: 20170402. Crossref.
- Martius C. F. P. 1841: *Herbarium florum brasiliensis. Continuatio*. – *Flora* **24(2, Beibl.)**: 1–112.
- Moraes P. L. R. de, Smedt S. de, Cardoso D. B. O. S. & Guglielmo L. 2014: On some Brazilian plants distributed by Martius in 1827 and published by Colla in *Herbarium pedemontanum*—IV. – *Harvard Pap. Bot.* **19**: 133–141. Crossref.
- National Museum of Natural History 2022: Data portal. – Published at <http://n2t.net/ark:/65665/3090b6fa4-0f51-4efa-be7b-27155c571b67> [accessed 29 Mar 2022].
- Naturhistorisches Museum Wien 2022: Important collectors in Herbarium W. – Published at [https://www.nhm-wien.ac.at/en/research/botany/collections/important\\_collectors](https://www.nhm-wien.ac.at/en/research/botany/collections/important_collectors) [accessed 29 Mar 2022].
- Nogueira A., El Ottra J. H. L., Guimarães E., Machado S. R. & Lohmann L. G. 2013: Trichome structure and evolution in neotropical lianas. – *Ann. Bot. (Oxford)* **112**: 1331–1350. Crossref.
- Pulle A. 1906: An enumeration of the vascular plants known from Surinam, together with their distribution and synonymy. – Leiden: E. J. Brill. Crossref.
- QGIS Development Team 2020: QGIS – Geographic information system, 3.14.1 Pi. Open source geospatial foundation project. – Published at <https://qgis.org/en/site/index.html> [accessed 30 Jul 2021].
- Rusby H. H. 1893: An enumeration of the plants collected in Bolivia by Miguel Bang, with descriptions of new genera and species. – *Mem. Torrey Bot. Club* **3(3)**: 1–67.
- Rusby H. H. 1896: An enumeration of the plants collected in Bolivia by Miguel Bang, with descriptions of new genera and species. Part 3. – *Mem. Torrey Bot. Club* **6**: 1–130.
- Sandwith N. Y. 1968: Contributions to the flora of tropical America: LXXVI. Notes on *Bignoniaceae*: XXIX: *Arrabidaea* in Martius's '*Flora brasiliensis*' and subsequently. – *Kew Bull.* **22**: 403–420. Crossref.
- Thiers B. 2022+ [continuously updated]: Index herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's virtual herbarium. – Published at <http://sweetgum.nybg.org/science/ih/> [accessed 29 Mar 2022].
- Turland N. J., Wiersema J. H., Barrie F. R., Greuter W., Hawksworth D. L., Herendeen P. S., Knapp S., Kusber W.-H., Li D.-Z., Marhold K., May T. W., McNeill J., Monro A. M., Prado J., Price M. J. & Smith G. F. (ed.) 2018: International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. – Glashütten: Koeltz Botanical Books. – *Regnum Veg.* **159**. Crossref.
- Urban I. 1906: *Vitae itineraque collectorum botanicorum, notae collaboratorum biographicae, florum Basiliensis ratio edendi chronologica, systema, index, familiarum*. – Pp. 1–268 in: Martius C. F. P. von, Eichler A. W. & Urban I. (ed.), *Flora brasiliensis [...]* **1(1)**. – Monachii et Lipsiae: R. Oldenbourg.
- Weberling F. 1981: *Morphology of flowers and inflorescences*. – Cambridge: Cambridge University Press.

### Supplemental content online

Appendix 1. Selected specimens examined (see <https://doi.org/10.3372/wi.52.52204>).

## Willdenowia

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