ACTA
AMAZONICA

http://dx.doi.org/10.1590/1809-4392202301841

BIODIVERSITY AND CONSERVATION | ORIGINAL ARTICLE

Notes on morphology, taxonomy and geographic distribution of *Apeiba* (Malvaceae, Grewioideae) in the Brazilian Amazon

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ABSTRACT

Apeiba (Malvaceae, Grewioideae) is an important component of the Neotropical flora, but taxonomic knowledge of its species is limited, particularly within the Amazon region. This study aimed to provide an updated taxonomic treatment of *Apeiba* native to Brazil, with focus on Amazonian collections. Species of *Apeiba* are trees with large yellowish-white flowers with a very particular fruit, an indehiscent capsule, usually globose to slightly flattened, covered either by long and numerous bristles, or densely apiculate. We provide synoptic descriptions for each Amazonian *Apeiba* species from Brazil, and comments on relevant synonyms and designated lectotypes for three names. We also provide an identification key, a list of examined material and distribution data, including a list of new occurrence records for some Brazilian states. Illustrations and notes on taxonomy and nomenclature are also included when appropriate.

KEYWORDS: Amazon rainforest, rosids, nomenclatural types, Tiliaceae

Notas acerca da morfologia, taxonomia e distribuição geográfica de *Apeiba* (Malvaceae, Grewioideae) na Amazônia brasileira

RESUMO

Apeiba (Malvaceae, Grewioideae) é um importante componente da flora Neotropical, mas o conhecimento taxonômico das suas espécies é limitado, particularmente na Amazônia. Este estudo teve como objetivo produzir um tratamento taxonômico atualizado das espécies de *Apeiba* nativas do Brasil, com um especial enfoque nas coleções amazônicas. As espécies de *Apeiba* são tipicamente árvores com flores amarelas ou alvas e um fruto bastante particular, uma cápsula deiscente, usualmente globosa a ligeiramente achatada, coberta por longas e numerosas cerdas, ou densamente apiculada. Apresentamos descrições sinópticas para cada uma das espécies de *Apeiba* da Amazônia brasileira, e comentários sobre sinonimizações relevantes e lectótipos designados para três nomes. Também fornecemos uma chave de identificação, uma lista de material examinado e dados de distribuição geográfica, incluindo uma lista de novos registros de ocorrência para alguns estados brasileiros. Ilustrações e notas sobre taxonomia e nomenclatura também são incluídas, quando apropriado.

PALAVRAS-CHAVE: floresta Amazônica, rosídeas, tipos nomenclaturais, Tiliaceae

INTRODUCTION

Apeiba (Malvaceae, Grewioideae *sensu* Alverson et al. 1999; Tiliaceae *sensu* Cronquist 1981) is a genus of trees with 15 species restricted to the American Tropics. The center of species diversity for *Apeiba* is the Brazilian Amazon, with all species from Brazil occurring in this phytogeographic domain (Colli-Silva 2022). Some species, like *Apeiba tibourbou* Aubl., have a broad geographic range, being widely distributed across almost all of Brazil and commonly found in various forested and riverine formations. Another species, *A. albiflora* Ducke, is primarily located in the pluvial forests of the Atlantic coast (Setser 1977; Colli-Silva 2022). Certain *Apeiba* species are easily recognized by their fruit characteristics, which are originally covered by hairs or apicules, leading to the popular name *pente-de-macaco* (monkey comb) in many parts of Brazil. The genus was initially described by Aublet (1775), who described *Apeiba* with four species: *A. aspera* Aubl., *A. glabra* Aubl., *A. petoumo* Aubl., and *A. tibourbou* Aubl., the latter being the type species of the genus.

CITE AS: Secco, R. de S.; Colli-Silva, M.; Santos Souza, J. 2024. Notes on morphology, taxonomy and geographic distribution of *Apeiba* (Malvaceae, Grewioideae) in the Brazilian Amazon. *Acta Amazonica* 54: e54bc23184.

In Martius' *Flora Brasiliensis*, Schumann (1886) established two sections for the genus: *A.* sect. *Tibourbou* and *A.* sect. *Petoumo*, based on the morphology of branches, leaves, and stamens. Pulle (1925) published a taxonomic treatment by H. Uittien describing two new species: *A. intermedia* and *A. surinamensis*, and the latter two species were later reduced by Uittien (in Lanjouw 1935) to *A. schomburgkii* Szyszył. (Szyszylowicz 1894). Uittien also revisited the genus, resulting in the recognition of six *Apeiba* species: *A. glabra* Aubl., *A. echinata* Gaertn., *A. intermedia* Uittien, *A. membranacea* Spruce ex Benth, *A. schomburgkii* Szyszył., and *A. tibourbou* Aubl. (in Lanjouw 1935).

Setser (1977) conducted a taxonomic revision of *Apeiba*, *Luehea*, and *Lueheopsis*, identifying seven species and two varieties within *Apeiba*. Jansen-Jacobs and Meijer (1995) introduced *A. uittienii* Jans-Jac. & Westra, from Roraima, northern Brazil, as part of their comprehensive treatment for the Flora of the Guianas (Jansen-Jacobs and Westra 1995b), which revisited typifications and species circumscriptions, particularly for *A. petoumo*. Dorr and Meijer (2005) contributed a second comprehensive treatment for the Flora of the Venezuelan Guayana and the Guianas, expanding the known species to eight. A later work introduced a novel species, *A. trombetensis* Dorr (Dorr 2012), from Northern Brazil. The most recent update for Brazil (Colli-Silva 2022) provided a synthesis for the genus based on taxonomic circumscriptions mostly on those outlined by Setser (1977).

Despite the existing body of literature and recent contributions on the diversity of *Apeiba*, a comprehensive revision that focuses on specific aspects of the genus's morphology is still needed. This is particularly relevant considering the number of ambiguous or unclear identifications found in herbaria, especially when dealing with specimens from the Amazon region. To address this issue, the objective of this study was to offer insights into the morphology, taxonomy, and geographic distribution of *Apeiba* with a specific focus on the Amazonian collections. As all *Apeiba* species in Brazil are found within the Amazon region, we present concise descriptions of all *Apeiba* species found in the country, with an emphasis on material collected within the Amazon phytogeographic domain. In addition to these synoptic descriptions, we present an identification key, a comprehensive list of the materials examined, distribution data (including newly recorded occurrences in several Brazilian states), illustrations, and notes on taxonomy and nomenclature. Furthermore, we provide typifications and synonymizations when applicable.

MATERIAL AND METHODS

This study is primarily based on the examination of preserved specimens, including type collections, from herbaria mainly located in the Brazilian Amazon. We analyzed materials from the Amazonian collections HAMAB, IAN, INPA, MG, RB, and RON (acronyms according to Thiers 2023, continuously updated), and additional material from Amazonia and elsewhere available at MO, NY, and RB, as well as on the databases of JSTOR Global Plants (http://plants.jstor.org), speciesLink (www.specieslink.net), and Reflora (www.reflora.jbrj.gov.br). Most of the materials from Brazilian Amazonia deposited in US collections (MO, NY) have duplicates in IAN, INPA or MG, which were physically consulted.

Preserved specimens physically examined were analyzed using a Zeiss stereomicroscope equipped with a low-light camera. Traditional taxonomy methods were employed, including plant dissection, measurements, description, and illustration. Overall ranges for the measures of structures were indicated along the descriptions, while outliers or less common ranges were indicated in parentheses. Voucher labels provided information on life form, habitat, phenology, and geographic distribution. A distribution map outlining the geographic range of all species in the Brazilian Amazon was made using QGIS v. 3.32 (www.qgis.org). For specimens with no geographic coordinates on the voucher label, we estimated the coordinates, whenever possible, based on the location information on the voucher label (following Magdalena et al. 2018).

We mostly followed the taxonomic circumscriptions of Setser (1977) and Dorr and Meijer (2005) for assigning species unless otherwise specified. An identification key was prepared for the Brazilian Amazonian *Apeiba* considering additional morphological characters, particularly vegetative traits. We emphasized vegetative characters, to contribute to their use in floristic checklists, inventories, and conservation efforts when reproductive features were unavailable for taxonomic identification.

RESULTS

Taxonomic treatment

Apeiba Aubl., Hist. Pl. Guiane: 537. 1775. Type-species: *A. tibourbou* Aubl.

Diagnosis. Trees, 6–30 m tall. **Leaves** simple, alternate, entire, petiolate, estipulate, typically with domatia on the abaxial surface. Inflorescence a cyme, axillary or terminal, pauciflorous. **Flowers** bisexual, actinomorphic, pedicellate, dichlamydeous and heterochlamydeous; perianth pentamerous, seldomly tetramerous, calyx usually chorisepalous, sepals lanceolate, carnose, densely pubescent on the adaxial surface, glabrous on the abaxial surface; corolla choripetalous, petals flat, spatulate, glabrous, usually yellow; stamens numerous; anthers bithecae, linear, poricidal, bearing an appendix on the theca, sometimes forked; staminodia 5, spathulate; gynoecium syncarpous, ovary superior, over a

short gynophore, 5-10-carpelar, 5-10-celled, many ovules per locule. **Fruits** indehiscent capsules, globose to flattened, covered by long bristles, often thickened; seeds many, globose, not winged.

Apeiba has eight species found in the Brazilian Amazon (Figure 1), and the main diagnostic features for specific delimitations are leaf indumentum, number of pairs of secondary veins, and fruit ornamentation.

Apeiba albiflora Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 209, t. 20. 1922.

Figures 1 and 2a-i

Type: Brazil: Pará, Rio Branco de Óbidos, estrada de Sto. Antônio, 1 Mar 1918, *A. Ducke s.n.* [MG0017007] (lectotype MG, here designated; isolectotypes: RB [barcodes RB00648719, RB00649192, RB00282368, RB00282366, RB00649191]; MG [barcode MG0015157])

= *Apeiba tibourbou* var. *krukoffii* Uittien in Lanj., Recueil Trav. Bot. Néerl. 32: 248. 1935. Type: Brasil: Mato Grosso, Source of the Jatuarana River, Machado River region, Dec 1931, *B.A. Krukoff 1567* (holotype: U; isotypes: K, L, NY).

Diagnosis. Trees, 5-20(-35) m high. **Leaves** elliptic, elliptic-lanceolate to oblong-lanceolate, with 9-12 pairs of lateral veins, easily detachable, adaxial surface conspicuously rugose, bullate, glabrous, except for some trichomes found on the main veins, abaxial surface densely pilose, covered by simple trichomes, acuminate to caudate at the apex, cordate at the base, margin slightly crenate. **Flowers** pentamerous, white, petals oblanceolate, pubescent externally. **Fruits** with long bristles, soft, hairy-like.

Geographic distribution. Venezuela, Guianas and Brazil (states of Amapá, Amazonas, Maranhão, Pará and Rondônia).

Additional comments. *Apeiba albiflora* is common in clayey soils of primary and secondary forests. Morphologically, it is closely related to *A. tibourbou*, but it differs by the leaves with a markedly rugose and bulate adaxial surface, and densely pilose only on the abaxial surface, white flowers, and fruits with long and soft hairy-like bristles (vs. leaves with abaxial surface slightly rugose, not bulate, both surfaces densely pilose, yellow flowers and fruits with spiculose, not hairy-like bristles).

Jansen-Jacobs and Meijer (1995) reduced *A. albiflora* to *A. tibourbou*. Yet, upon thorough examination of numerous samples of *A. albiflora*, including type specimens, and comparing them with *A. tibourbou* collections, it became evident to us that *A. albiflora* should be recognized as a distinct species, prompting a reconsideration of its classification, as also stated in Dorr & Meijer (2005).

Examined specimens: BRAZIL. **Amapá**: Rio Araguari, 13.09.1961, *Pires et al. 50899* (MG, NY); Rio Jari, Serra da

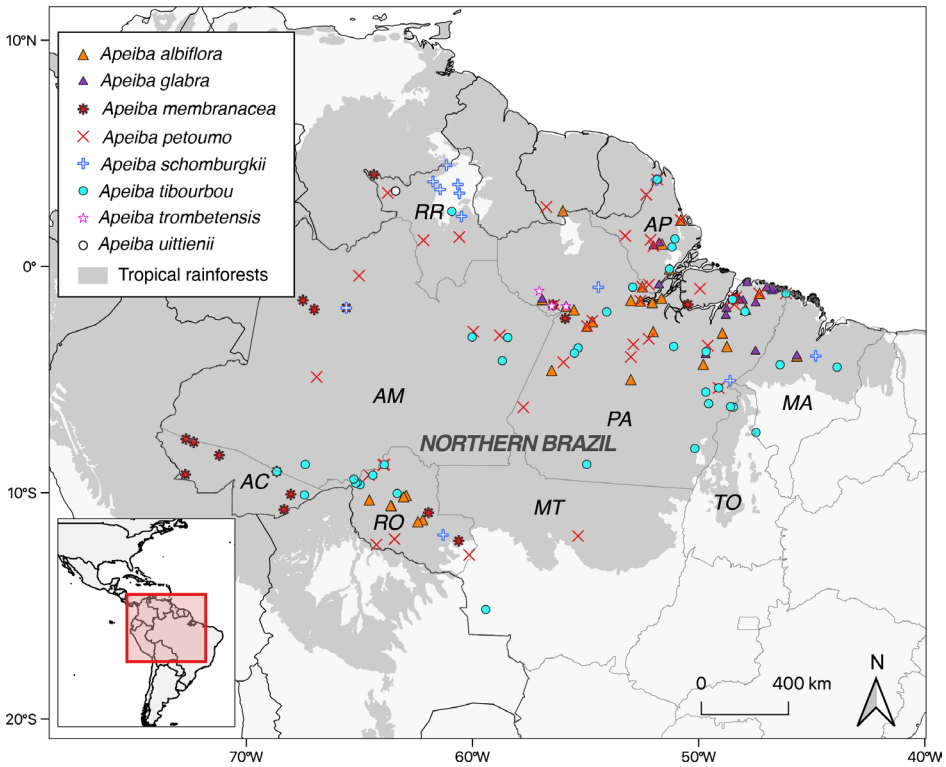

Figure 1. Distribution map of *Apeiba* species that occur in the Brazilian Amazon, derived from preserved specimen collections revised for this study (see list of examined material).

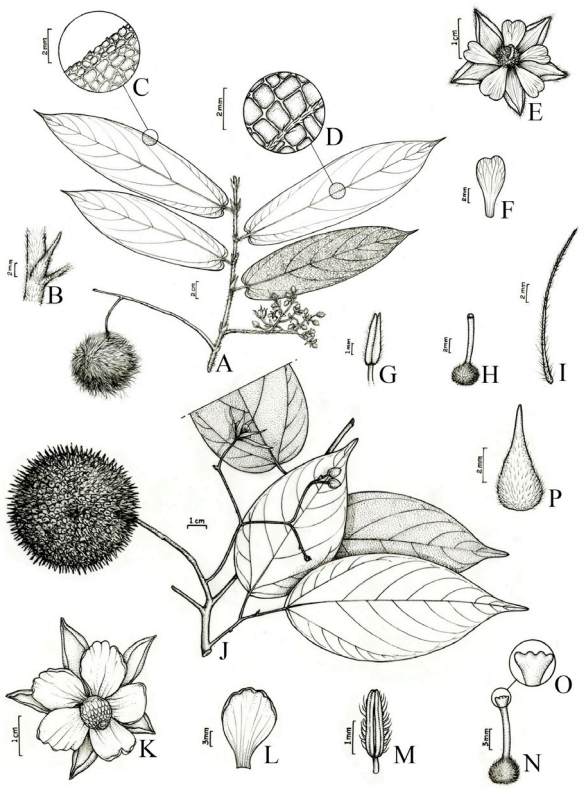

Figure 2. *Apeiba albiflora* (A-I): **A** – flowering and fruiting branch; **B** – stipules; **C** – leaf margin detail; **D** – detail of the abaxial surface, showing bullate venation; **E** – flower; **F** – petal; **G** –stamen; **H** – gynoecium; **I** – fruit bristle; *Apeiba petoumo* (J-P): **J** – flowering and fruiting branch; **K** – flower; **L** – petal; **M** – stamen; **N** – gynoecium; **O** – stigma; **P** – fruit spicule. Credit: Julio Sousa and Carlos Alvarez.

Arumanduba, 25.07.1961, *W.A. Egler & H.S. Irwin 45981* (IAN, NY, MG, RB); Bom Nome, capoeira, 15.05.1980, *B. Rabelo 472* (MG, HAMAB). **Amazonas**: Presidente Figueiredo, REBIO Uatumã, Grade do PPBio, 23.09.2007, *J.G. Carvalho-Sobrinho 1646* (INPA). **Pará**: Tailândia, Agropalma, 16.02.2013, *F.C.A. Lucas 728* (MG); Peixe-Boi, inter Belem et Bragança, 13.07.1907, *Rod. Siqueira MG 8298* (syntype, MG, RB); Alto Ariramba, 07.10.1913, *A. Ducke s.n.* [MG 14921] (syntype, MG); Rio Branco de Óbidos, Rio Tucandeira, 16.12.1913, *A. Ducke s.n.* [MG 15157] (MG); prope Gurupá, 19.01.1916, *A. Ducke s.n.* [MG 15969] (syntypes, MG, RB); Trombetas, Lago Salgado, 25.12.1915, *A. Ducke s.n.* [MG 15896] (syntype, RB); Monte Dourado, Rio Jari, 08.10.1968, *N.T. Silva 1143* (NY, RB); Santarém, Km 35 da estrada para Mujuí dos campos, capoeira, 19.08.1969, *M.G. Silva 2320* (MG, NY); Oriximiná, Rio Paru do Oeste, 05.08.1980, *C.A. Cid-Ferreira 2111* (NY, RB); Estrada entre Gurupá e serraria Xingu, mata de várzea, 06.02.1979, *N.T. Silva & C. Rosário 5022* (NY); Belterra, 31.10.1947, G. *A. Black 47-1901* (NY); Novo Repartimento, Fazenda Aratu, 31.08.2004, *M.G. Barbosa 15* (MG); Itaituba, Parque Nac. Amazônia, Km 130, Transamazônica, 29.06.2019, *M. Pastore et al. 1038* (MG); Altamira, Rio Xingu, Lago do Irineu, 26.01.1987, *A.T.G. Dias et al. 919* (MG); Margem esquerda do Rio Iriri, Igarapé Pedro Arcângelo, 22.08.1986, *S.A.M. Souza et al. 64* (MG); Estrada entre Gurupá e serraria Xingu, mata de várzea, 06.02.1979, *N.T. Silva & C. Rosário 5022* (MG, NY); Santarém, Mujuí dos Campos, mata de beira de estrada, 13.08.1969, *M. Silva 2242* (MG, RB); Oriximiná, Rio Paru do Oeste, Cachoeira Pancada, beira do rio, 05.09.1980, *C.A. Cid-Ferreira et al. 2111* (INPA, MG, RB); Rio Branco de Óbidos, Rio Tucandeira, 16.12.1913, *A. Ducke s.n.* [MG 15157] (MG); Paragominas, Cikel, Ramal Paulo Malacá, 27.09.2019, *E.D. Cruz 1431* (IAN); Fazenda Vitória, 08.11.2012, *S.R. Xavier-Júnior 164* (IAN); Novo Repartimento, Rodovia Transamazônica, Km 206, Fazenda Aratú, 21.08.2003, *I.S. Santos 4* (IAN); Santarém, Rodovia Cuiabá-Santarém, Km 92, Fazenda Trevizo, 20.07.2010, *E.A.P. Nascimento 75* (IAN); Vitória do Xingu, 28.02.2015, *A.C. Gonçalves 05200* (RB); Rio Jari, Monte Dourado, 21.11.1968, *E. Oliveira 4270* (IAN); Região do Jari, Estrada do Munguba, Km 12, mata de terra firme, 11.08.1969, *N.T. Silva 2643* (IAN). **Rondônia**: Rodovia Alvorada-Presidente Médici, Km 15, mata de terra firme, 20.06.1983, *M.G. Silva 6285* (MG, RB); Ariquemes, Mineração Mibisa, Setor Alto Candeias, Km 128, mata de terra firme, 20.05.1983, *L.O.A Teixeira et al. 621* (INPA, MG, RB); Mineração Campo Novo, 100 Km Sw of Ariquemes, 15.09.1979, *J.L. Zarucchi et al. 2707* (INPA, MG, NY, RB); Guajará-Mirim, Trilha do Rio Formoso, várzea, 10.05.2013, *H. Medeiros 1208* (MG, RON); Ouro Preto, BR 364, Km 353, Estrada para Porto Velho, 30.06.1984, *C.A. Cid-Ferreira 4778* (INPA, MG); Porto Velho-Cuiabá, BR 364, Km 184, 11.02.1983, *J.A. Silva et al. 100* (IAN); Travessão entre as linhas do INCRA 40 e 44 a 06 km da BR-429 e a 10 km da cidade; 30.04.1987, *C.A. Cid-Ferreira 8967* (INPA, RB); 21 km SE of Ariquemes on hwy. BR 364, then 1 km E on "Linea 45", Ariquemes, 17.03.1987, *M.H. Nee 34421* (INPA, MG, NY). **Maranhão**: prope S. Luiz, *sine datum*, *A. Lisboa s.n.* [RB 4730] (syntype, RB).

Apeiba glabra Aubl., Hist. Pl. Guiane: 541, t. 214. 1775.

Figures 1 and 3a-i

Type: French Guiana, Sinnamary, *J.B. Aublet s.n* (lectotype BM [barcode BM000795156], first designated by Jansen-Jacobs & Meijer, 1995; isolectotype: W? [barcode not found]).

= *Apeiba aspera* Aubl., Hist. Pl. Guiane: 545, t. 216. 1775. Type: *op. cit.*, t. 216 (excluding fruit).

= *Apeiba burchellii* Sprague, Bull. Herb. Boissier sér. 2, 5: 703. 1905. Type: Brazil, Pará, *sine loco*, *sine datum*, *W.J. Burchell 9480* (second-step lectotype K [barcode K000381938], here designated, first designated by Jansen-Jacobs and Meijer (1995); isolectotypes: GH [GH00052272]; K [K000381939]; P [P02142951]; U [barcode not found]; W [barcode not found]).

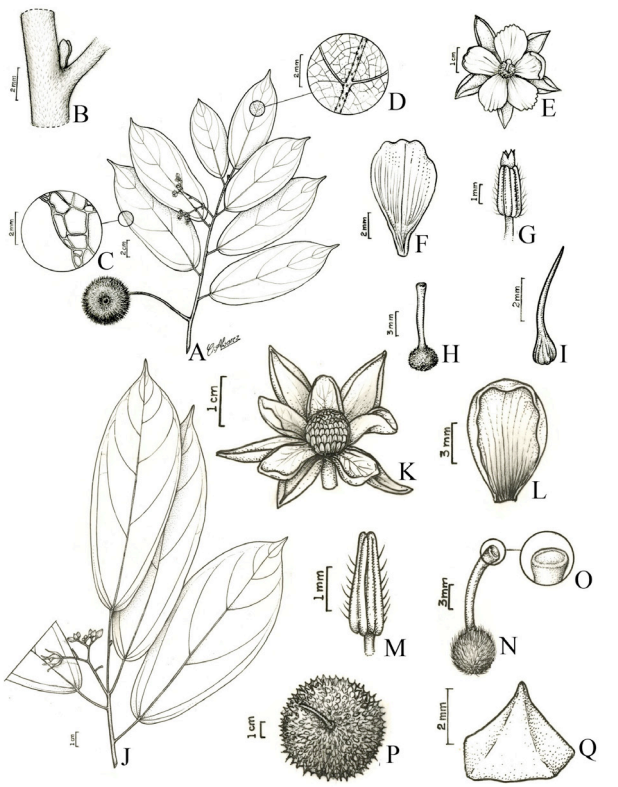

Figure 3. *Apeiba glabra* (A-I): **A** – flowering and fruiting branch; **B –** stipules; **C –** leaf margin detail; **D –** detail of the abaxial surface, showing stellate trichomes; **E –** flower; **F –** petal; **G –** stamen; **H –** gynoecium; **I –** fruit spicule; *Apeiba membranacea* (J-Q): **J –** flowering and fruiting branch; **K –** flower; **L –** petal; **M –** stamen; **N –** gynoecium; **O –** stigma; **P –** fruit; **Q –** fruit spicule. Credit: Julio Sousa and Carlos Alvarez.

Diagnosis. Trees 2-20 m high. **Leaves** elliptic to elliptic-oblong, bearing 4 pairs of lateral veins, indumentum composed of stellate trichomes sparsely found on both leaf surfaces, acuminate at the apex, obtuse at the base, margin entire to slightly serrate. **Flowers** tetramerous to pentamerous, petals yellow, cucullate, the abaxial surface pubescent, the adaxial surface glabrous. **Fruits** globose, bearing thin spicules.

Geographic distribution. Venezuela, Guianas, Bolivia and Brazil (states of Amapá, Maranhão, and Pará). Maranhão is a new occurrence reported in here.

Additional comments. *Apeiba glabra* is similar to *A. trombetensis,* but it differs by the leaves with trichomes sparsely distributed on both surfaces, yellow, 4-5-merous flowers, and by the globose and flattened fruits with thin spicules (*A. trombetensis* has leaves with trichomes only on the main veins, white and always 4-merous flowers, and globose, not flattened fruits with thickened spicules.

Examined specimens. BRAZIL. **Amapá**: Serra do Navio, Rio Amapari, 01.11.1954, *R.S. Cowan 38093* (NY); 20.11.1954, *R.S. Cowan 38475* (IAN, NY); Rio Falsino, approx. 10 km Upstream of confluence with Rio Araguari, 03.10.1983, *B.V. Rabelo 2421* (HAMAB, MG, NY); Rio Araguari, 13.09.1961, *J.M. Pires et al. 50915* (IAN, MG, NY); Oiapoque, Clevelândia, 29.04.1960, *W.A. Egler 1475* (MG, NY, RB); Rio Oiapoque, 01.02.1950, *R.L. Fróes 25776* (IAN); Serra do Navio, Rio Amapari, 14.02.1950, *R.L. Fróes, 25970* (IAN); Rio Oiapoque, lower and midle slopes of Mt. Alikene, 01.10.1960, *H.S. Irwin 48609* (IAN, NY); Macapá, Rio Falsino, confluence with Rio Araguari, 13.12.1984, D.C. Daly et al. 3864 (HAMAB, MG, NY). **Pará**: Ulianópolis, Reserva Cauaxi, Fundação Floresta Tropical, 30.11.2000, *R. Secco et al. 1074* (MG); Moju, Reserva Moju, várzea, Rio Ubá, beira da estrada, 19.10.2000, *R. Secco et al. 1004* (MG); Belém, Bosque Rodrigues Alves, 29.04.1949, *T.N. Guedes 107* (IAN, NY); Santarém, Km 70 da estrada do Palhão, Ramal do Caetetu, 16.09.1969, *M.G. Silva & R. Souza 2625* (NY, MG); Tucuruí, Margem direita da rodovia Tucuruí-Repartimento km 16, 09.04.1981, *N.A. Rosa 4111* (MG, NY); Belém, Mata da Pirelli, Fazenda Uriboca, mata terra firme, 07.1958, *J.M. Pires 7043* (IAN); Estrada Belém-Brasília, Km 167, 25.04.1960, *E. Oliveira 556* (IAN); Belém, Capoeira 157 do IAN, 28.02.1955, *T.N. Guedes 315* (IAN); Alça Viária, Belém, beira da estrada, 14.03.2013, *S. Xavier Júnior 182* (IAN); Planalto de Santarém, Região do Gato, Rio Curuá-Una, 22.08.1954, *R.L. Fróes 31077* (IAN); Mojú, PA 150, Km 34, Campo Experimental da Embrapa, 23.02.2016, *E.D. Cruz 1122* (IAN); Belém, Reserva Mocambo, 22.09.1963, *E. Oliveira 2612* (IAN); Rodovia Belém-Brasília, Km 93, 21.08.1959, *M. Kuhlmann & S. Jimbo 86* (MG); Bragança, Comunidade Caeté/Chaú, mata da margem do Rio Caeté, 11.01.2017, *L. Oliveira 589* (MG); Belém, Horto do Museu Goeldi, 10.06.1958, *P. Cavalcante 376* (MG); Belém, Instituto Agronômico do Norte, 30.10.1942, *A. Ducke 7735* (IAN); Moju, Campo Experimental da Embrapa, Rodovia PA-150, Km 34, 17.10.2001, *D.P. Martins 03* (IAN); Bragança, Araçateua, igapó ao lado do Rio Caeté, 22.11.2011, *L. Oliveira 456* (IAN); Rodovia Belém-Brasília, Km 213, 20.05.1960, *E. Oliveira 792* (IAN); IAN, Capoeira 157 L, 04.02.1957, *G.A. Black 57-19009* (IAN); Augusto Corrêa, a 6 Km do trevo, margem da estrada, 26.11.2012, *E.A.P. Nascimento 212* (IAN); Santa Izabel do Pará, Cacoal, várzea, 05.08.2001, *M.R. Cordeiro MC-04-06* (IAN); Curuçá, Área de Estudo UFPA, 09.07.2013, *S.R. Xavier-Júnior 216* (IAN); Bujaru, PA 140, Km 8, capoeira, 18.11.2010, *M.R. Cordeiro 4945* (IAN); São Miguel, Rio Guamá, 14.01.1945, *R. Fróes 20448* (NY); Oriximiná, Flona Saracá-Taquera, Porto Trombetas, 16.01.2003, *R.P. Salomão et al. 926* (MG). **Maranhão**: Sta. Luzia, estrada da Fazenda Cacique, 27.03.1983, *M.G. Lobo et al. 312* (INPA, MG, NY).

Apeiba membranacea Spruce ex Benth., J. Proc. Linn. Soc., Bot. 5(suppl. 2): 61. 1861.

Figures 1 and 3j-q

Type: Venezuela, *sine loco*, ad flumina Casiquiari, Vasiva et Pacimoni, 26 January 1905, *R. Spruce s.n.* (holotype: K [barcode K000381905]; isotypes: G [barcode G00356914], E [barcode E00285208], P [barcode P02142956], TCD [barcode TCD0003783]).

Diagnosis. Trees 4-30 m high. **Leaves** elliptic to elliptic-oblong, membranous, bearing 9 pairs of lateral veins, both leaf surfaces almost glabrous, except for a few simple trichomes sparsely distributed on main veins and domatia abaxially, acuminate at apex, rounded to truncate at base, margin entire. **Flowers** pentamerous, petals yellow, cucullate, glabrous. **Fruits** sub-globose, flattened, bearing thin and short spicules.

Geographic distribution. Widespread in tropical Americas, in Venezuela, Guianas, Ecuador, Peru, Bolivia and Brazil (states of Acre, Amazonas, Pará, Rondônia and Roraima).

Addittional comments. *Apeiba membranacea* is one of the two species of *Apeiba* with short and thin spicules on the fruit, like *A. petoumo*. It differs from *A. petoumo* by the presence of domatia on the abaxial surface of the leaf (absent in *A. petoumo*). Check also the description of *A. petoumo* for further differences.

Examined specimens. BRAZIL. **Acre**: Cruzeiro do Sul, Rio Juruá, Rio Moa, 10.04.1971, *G.T. Prance et al. 12051* (NY, RB); Sena Madureira, 10.1968, *G.T. Prance et al. 7756* (MG, NY); Mâncio Lima, Santa Luzia, Reserva do INCRA, 05.10.1984, *D.G. Campbell 7244* (NY, RB); Mâncio Lima, Rio Moa, between Igarapé Ipiranga e Aquidabã, 18.04.1971, *G.T. Prance et al. 12051* (NY, RB); Basin of Rio Purus, Riozinho do Rola, river at record flood level, 15.03.1997, *D. Daly 9577* (NY, RB); Basin of Rio Juruá, Rio Tarauacá, left bank, Reserva Indígena Praia do Carapaná, Seringal Universo, Colocação Morada Nova, 25.11.1995, *D. Daly 8774* (NY, RB); Bacia do Rio Juruá, margem esquerda, Reserva Extrativista do Alto Juruá, colocação Belfort, 04.04.1993, *M. Silveira 462* (NY, RB); 2-4 Km of Cruzeiro do Sul, várzea, 22.10.1966, *G.T. Prance et al. 2735* (MG, NY); Rio Acre, Cobijá, 01.1912, *Ule 9585* (MG). **Amazonas**: Novo Japurá, Rio Japurá, 09.11.1982, *I.L. Amaral 377* (INPA, NY); Maraã, Novo Japurá, Lago Amanã, 15.12.1990, *N.A. Rosa et al. 5455* (MG); Limoeiro, Reserva Ecológica Juami-Japurá, Paraná Anacho, várzea, 24.04.1986, *C.A. Cid et al. 7175 (*INPA, MG, NY). **Pará**: Rio Japurá, lugar Bom Futuro, várzea, 08.11.1912, *A. Ducke MG 12222* (MG); Colônia Augusto Montenegro, Igarapé Pitoró, 10.09.1958, *R.L. Fróes 34645* (IAN); Rodovia Belém-Brasília, Km 94, 09.09.1959, *M. Kuhlmann & S. Jimbo 215* (IAN, MG); Breves, 30.07.1956, *J.M. Pires et al. 5841* (IAN). **Rondônia**: Rio Machado, igapó, 02.1981, *M. Goulding 1274* (MG); mesma localidade e datas, *M. Goulding 1343, 1384* (MG); Município de Vilhena, Serra dos Parecis, 10.05.1984, *J.U. Santos et al. 813* (MG). **Roraima**: Posto Mucajaí, Rio Mucajaí, 16.03.1971, *G.T. Prance et al. 11025* (MG, NY). PERU. **Iquitos**: beira de estrada, 21.06.1906, *A. Ducke MG 7558* (MG).

Apeiba petoumo Aubl., Hist. Pl. Guiane: 543, t. 215 (flowering branch). 1775.

Figures 1 and 2j-p

Type: French Guiana, Sinnamary, *J.B. Aublet s.n.* (lectotype BM [barcode not found], first designated by Jansen-Jacobs and Meijer (1995); isolectotype: W? [barcode not found]).

= *Apeiba echinata* Gaertn, Fruct. Sem. Pl. 2: 189. 1802. Type: *op. cit.*, t. 121 (lectotype designated by Jansen-Jacobs and Meijer (1995b)

= *Apeiba hypoleuca* Steud., Flora 26: 755. 1843. Type: Suriname, *sine loco* ["in sylvis umbrosis"]., 1841, *F.W.R. Hostmann 294* (holotype: P; isotypes: F, G, GH, K, M, MEL, U, W).

= *Apeiba macropetala* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 120. 1925. ≡ *Apeiba echinata* var. *macropetala* (Ducke) Ducke, Arq. Inst. Biol. Veg. 4: 52. 1938. Type: Brazil: Pará, Belém do Pará, silva non inundabilis, 31 Jan 1923, *A. Ducke s.n.* (lectotype, here designated: RB [barcode RB00436456]; isolectotypes: K [K000381940], MG [barcode not found], RB [RB00018080], US [US00530200]) ***syn. nov***.

Diagnosis. Trees 6-30 m high. **Leaves** elliptic, elliptic-ovate, elliptic-oblong, conspicuously discolorous, with 5-8 pairs of lateral veins, adaxial surface sparsely covered by stellate trichomes concentrated on main veins, abaxial surface densely covered by small stellate trichomes, acuminate at apex, obtuse to slightly cordate at base, margin entire. **Flowers** pentamerous, yellow, petals cucullate, glabrous. **Fruits** ellipsoid, flattened, covered by thick and short spicules.

Geographic distribution. Venezuela, Guianas, Bolivia and Brazil (states of Amapá, Amazonas, Pará, Maranhão, Mato Grosso, Rondônia and Roraima). Maranhão and Mato Grosso are new occurrences presented in here.

Additional comments. *Apeiba petoumo* is one of the most widespread species of the genus in rainforests throughout the Amazon Basin. Specimens collected in Suriname examined by H. Uittien (in Pulle 1925) were difficult to align with *Apeiba* species cataloged by Aublet, including *A. petoumo* and the subsequently described *A. echinata* Gaertn. Uittien argued that Aublet would have switched identification of the fruit and branches of *A. petoumo* for those of *A. echinata* , and designated the two species as "*nomina confusum*" (as summarized in Setser 1977), although the name *Apeiba echinata* was initially preferred over *A. petoumo*. Jansen-Jacobs and Meijer (1995b) typified the fruit drawing of *A. echinata* and reclassified it as *A. petoumo*. This realignment agreed with previous authors (Sandwith 1931; Lemée 1952; also see Howard 1983). As the concept of "*nomen*

confusum" is no longer recognized by the International Code of Nomenclature for Algae, Fungi, and Plants, the lectotypification of *A. petoumo* with *A. echinata* was based on the priority of the former name (Jansen-Jacobs and Meijer 1995). *Apeiba petoumo* should be used over *A. echinata*, against the current circumscription adopted in Colli-Silva (2022) and following Dorr & Meijer (2005).

Regarding intraspecific variation, Ducke (1938) introduced a new variety, *A. echinata* var. *macropetala*, distinguished from the original variety by the absence of tufts of trichomes on the axils of basal nerves on the adaxial surface of the leaves (present in *A. echinata* var. *echinata*) and by larger fruits, reaching up to 7 cm in diameter (compared to up to 5 cm in *A. echinata* var. *echinata*). Given these rather discrete differences, we here treat the two varieties as synonyms.

Addittionally, because *A. petoumo* has fruits with minute spicules, it is probably closely related to *A. membranacea*, but differs from the latter by the discolored leaves, with 5-8 pairs of lateral veins, abaxially tomentose indumentum, densely covered by stellate trichomes, and fruits with thick spicules. In contrast, *A. membranacea* has concolor leaves, usually with 9 pairs of lateral veins, abaxially sub-glabrous indumentum, sparsely covered by stellate trichomes mostly centered on the major veins, and fruits with thin spicules.

Examined specimens. BRAZIL. **Amapá**: Serra do Navio, Rio Amapari, Igarapé Cancão, 11.11.1954, *R.S. Cowan 38244* (NY); Rio Araguari, vicinity Camp 12, 28.09.1961, *J.M. Pires et al. 51305* (IAN, MG, NY); Rio Oiapoque, Pedra Alice, 16.08.1960, *H. Irwin et al. 47559* (IAN, MG, NY); near Cachoeira Camaraná, Rio Canopi, 01.10.1960, *L.Y. Westra 48529* (IAN, MG, NY); Macapá, Riozinho, 31.12.1984, 122 Km NW of Porto Grande, Perimetral Norte Highway, 31.12.1984, *S. Mori & R. Cardoso 17576* (HAMAB, MG, NY); Oiapoque, BR 156, 02.12.1984, *B.V. Rabelo & R. Cardoso 2864* (HAMAB, MG, NY); Macapá, road from Cupixi to Rio Vila Nova, 05.01.1985, *S. Mori & R. Cardoso 17719* (HAMAB, MG, NY). **Amazonas**: Parintins, silva primaria non inundabili as lacum José-Assú, 29.12.1935, *A. Ducke 251* (MG, NY); Manaus-Itacoatiara, Km 204, 02.12.1966, *G.T. Prance et al. 3794* (INPA, MG, NY); Reserva Ducke, Km 26, Igarapé Barro Branco, 03.11.1994, *J.E.L.S. Ribeiro 1483* (INPA, MG, RB); mesma localidade, 15.07.1994, *A. Vicentini 613* (INPA, MG, RB); Rio Negro, Estirão Tacueri, 10.02.1977, *M.R. Santos 77* (MG, INPA, NY); Carauari, Rio Juruá, Poço Munguba, Petrobrás, 26.10.1980, *P. Lisboa et al. 1834* (MG). **Pará**: Marabá, Serra Norte, estrada para Acampamento Azul, 27.05.1982, *R. Secco et al. 349* (INPA, MG, NY); Jacareacanga, UHE São Manuel, 28.07.1986, *L.P. Zanzini 172* (MG); Tucuruí, próximo ao Rio Macoari, direita do Rio Tocantins, mata terra firme, 29.05.1981, *U. Maciel et al. 625* (MG); Peixe-Boi, Vila do Ananim, Fazenda Sta. Catarina, 23.11.1999, *J. Oliveira et al. 224* (MG); Reserva Florestal CVRD/Floresta Rio Doce, margem do Rio Sororó, 50 Km de Marabá, 25.05.1988, *R. Salomão et al. 25* (MG); Belém, Bosque Municipal, 11.11.1941, *A. Ducke 834* (MG); Itaituba, Km 85, Rodovia Itaituba-Jacareacanga, Parque Nacional do Tapajós, 14.11.1978, *M.G. Silva & C. Rosário 3721* (MG, NY, RB); Medicilândia, próximo Torre Tramoeste, 15.07.2019, *F.A. Silva 350* (MG); Viseu, Rio Gurupi, Reserva Indigena Tembé, Posto Canindé, 08.08.1985, *W.A. Baleé & B. G. Ribeiro 1259* (NY, MG); Itaituba, Serra Palito, 20.01.2011, *D. Amaral 371* (MG); Rio Jari, estrada entre Tinguelin e Braço, Km 22, mata terra firme, 23.01.1970, *N.T. Silva 2907* (IAN); Marabá, Fundação Zoobotânica, *S.C. Cristo 53* (IAN); Marituba, Bela Vista, capoeira, 26.04.2020, *M.R. Cordeiro 4919* (IAN); Acará, Alça Viária, Rio Acará, 24.01.2013, *E.D. Cruz 708* (IAN); Santarém-Cuiabá, Km 67, Reserva do IBDF, 07.02.1979, *M.R. Cordeiro et al. 1410* (IAN); Rio Jari, estrada entre Planalto A e Braço, 22.01.1969, *N.T. Silva 1666* (IAN, NY); Almeirim, Monte Dourado, 25.06.1979, *N.T. Silva 5398* (IAN, MG); Almeirim, 25.06.1979, *M.R. Santos 663* (MG); Belém, Bosque Municipal, 11.11.1941, *A. Ducke 834* (IAN); Campo Lyra Castro, 18 Km N de Belém, 21.01.1943, *W.A. Archer 8173* (IAN); Belterra, Santarém-Cuiabá, 30.09.1975, *Erly 094 -72 -07* (IAN); Cuanta de Anajás, Rio Anajás, 04.11.1987, *G.T. Prance et al. 30278* (INPA, MG, NY); Oriximiná, BR 163, 9 Km de Cachoeira Porteira, 20.08.1986, *C.A. Cid et al. 7868* (INPA, MG, NY); Belém, Mosqueiro, 17.03.2014, *M.R. Cordeiro 5050* (IAN); Altamira, margem direita do Rio Xingu, 21.10.1986, *R.T. P. Vasconcelos et al. 412* (MG). **Rondônia**: Costa Marques, BR-429, Km 14, 22.04.1982, *M.G. Silva & C. Rosário 5855* (MG); Km 115, RO-429, mata terra firme, 08.07.1983, *M.G. Silva 6602* (MG); Vilhena, estrada, Aripuanã, 20.05.1984, *C. Rosário et al. 391* (MG); Porto Velho, Assentamento, 22.10.2008, *Equipe Resgate 971* (RB, RON); Porto Velho, 17.01.1949, *N.T. Silva 348* (IAN); Rodovia 428, Km 115, terra firme, 08.07.1983, *M.G. Silva 6602* (IAN); Porto Velho, BR 364, Km 3.5, Linha de Transmissão Jirau, 20.102011, *M.F. Simon et al. 1394* (IAN); Caracaraí, BR 174, Km 522-524, próximo a Novo Paraíso, 25.08.1987, *C.A. Cid et al. 9165* (INPA, MG, NY). **Roraima**: Rio Branco, margem do Paraná do Marará, Ponto B1 B2, 04.03.1977, *M.R. Santos 138* (MG, NY); Rio Uraricoera, Cachoeira Tocuxema, 09.03.1979, *J.M. Pires et al. 16907* (NY, MG). Boa Vista, Terra Firme, 1932, Capucho 471 (IAN); Cupari, 09.1931, *Mont. Da Costa 88/101* (IAN). **Maranhão**: Turiaçu, estrada Muracacumi-Sta. Helena, mata de terra firme, 03.12.1978, *N.A. Rosa & H. Vilar 3149* (MG, NY). **Mato Grosso**: Sinop, BR 163, Km 30, direção ao Povoado Carmem, 20.09.1985, *C.A.C. Ferreira 6184* (MG).

Apeiba schomburgkii Szyszyl., Diagn. Pl. Nov. (Szyszylowicz) 2. 1894.

Figures 1 and 5a-h

Type: Guyana, Pirara, *sine datum*, *R. Schomburgk 734* (holotype: W [barcode not found]; isotypes: BM [barcode not found], L [barcode not found], K [barcodes K000381944, K000381854], P [barcode P06644365]).

= *Apeiba surinamensis* Uittien in Pulle, Fl. Suriname. 3(1): 51. 1932. Type: Suriname, Voltzberg, 21 Aug. 1920, *A. Pulle 217* (holotype: U; isotypes: BBS, BM, BR, COL, F, K, L, NY, P, RB, US).

Diagnosis. Trees 3-20 m high. **Leaves** elliptic to oblong-lanceolate, with 7-9 pairs of lateral veins, stellate trichomes densely covering the abaxial surface, slightly covering adaxial surface, acuminate to caudate at apex, obtuse at base, margin markedly dentate. **Flowers** pentamerous, petals white, bullate, glabrous. **Fruits** globose, fully covered by flexible spines or bristles.

Geographic distribution. Colombia, Trinidad and Tobago, Venezuela, Guianas and marginally Brazil (states of Acre, Amapá, Amazonas, Maranhão, Pará and Roraima). Acre, Amapá and Maranhão are new state occurrences reported in here.

Additional comments. Because the leaves of *A. schomburgkii* have an indumentum composed of stellate trichomes found on both leaf surfaces, it can be related to *A. uittienii*, but *A. schomburgkii* has leaves with dentate margins, flowers with white petals, and fruits with long bristles (vs. leaves with smooth or only slightly serrate margins, flowers with yellow petals and fruits with thick spicules in *A. uittienii*).

Examined specimens. BRAZIL. **Acre**: Rio Branco, Serra do Mel, Rio Surumu, 09.1909, *Ule 8215* (MG). **Amapá**: Oiapoque, Clevelândia, 24.04.1968, *W.A. Egler 1477* (MG). **Amazonas**: Rio Branco, Serra Grande, 31.08.1943, *A. Ducke 520* (MG, NY, RB). **Pará**: Tocantins, Coqueiro, 20.04.1924, *J.G. Kuhlmann 2122* (MG, RB); Lageira, Rio Maicuru, 17.07.1981, *J.J. Strudwick* 3229 (NY, RB). Roraima: 85 Km de Boa Vista, Fazenda União. 01.02.1969, *G.T. Prance et al. 9569* (INPA, MG, NY, RB); Alto Alegre, Ilha de Maracá, Rio Maracá, 13.07.1986, *A.J. Henderson 556* (NY, RB); Alto Alegre Ilha de Maracá, SEMA, Furo Santa Rosa, Rio Uraricoera, 08.061986, *M.G. Hopkins 591* (INPA, MG); Igarapé Iguapirá, Rio Surumú, cerrado, 23.06.1974, *J.M. Pires 14624* (IAN); **Roraima**: Boa Vista. Serra de Tepequem, 07.07.1986, *J.A. Silva 443* (RB); Rio Branco, Serra Grande, 29.06.1937, *A. Ducke RB 34963* (MG, RB); Rio Branco, Surumu, 09.1909, *E. Ule 8215* (RB); Boa Vista Serra de Tepequém, 07.07.1986, *A.S. Silva et al. 443* (INPA, MG, NY). **Maranhão**: Lago Verde, Fazenda São Francisco, 22.03.1985, *A.B. Anderson et al. 2097* (MG).

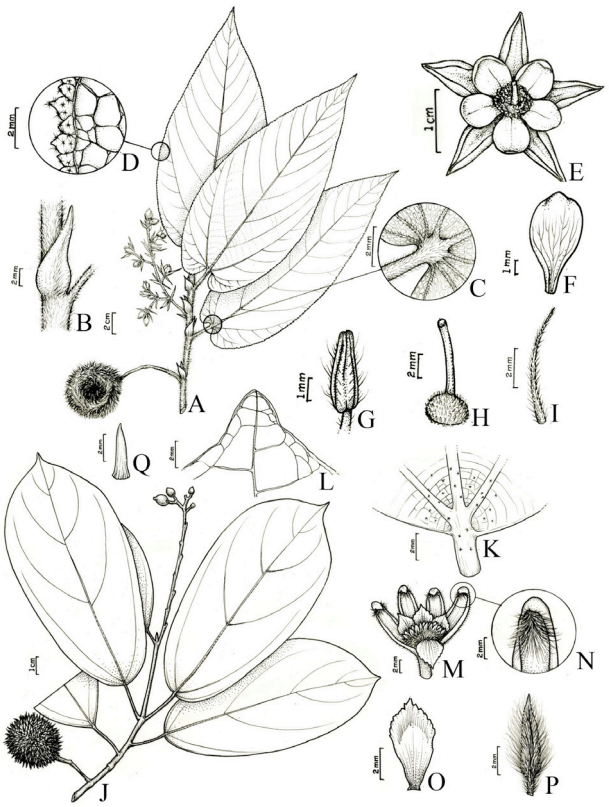

Figure 4. *Apeiba tibourbou* (A-I): **A** – flowering and fruiting branch; **B** – stipules; **C** – detail of the leaf base; **D** – leaf margin; **E** – flower; **F** – petal; **G** – stamen; **H** – gynoecium; **I** – fruit bristle; *Apeiba trombetensis* (J-Q): **J** – flowering and fruiting branch; **K** – detail of the leaf basin; **L** – leaf apex; **M** – flower; **N** – detail of the apex of the sepal, showing the trichomes; **O** – petal; **P** – stamens with long hairs; **Q** – spicule. Credit: Julio Sousa and Carlos Alvarez.

Apeiba tibourbou Aubl., Hist. Pl. Guiane: 538, t. 213. 1775.

Figures 1 and 4a-i

Type: French Guiana, *sine loco*, *Leprieur s.n.* (lectotype: P [barcode P06629604], designated by Dorr 2018).

Diagnosis. Trees to treelets (3-)4-25 m high, easily diagnosable by the prominently pilose leaves and branches. **Leaves** elliptic to elliptic-oblong, membranous, bearing 9-12 pairs of lateral veins, indumentum velutinous on both leaf surfaces, composed of both simple and stellate trichomes, acuminate at apex, cordate at base, margin serrate. **Flowers** pentamerous, stigma fimbriate, petals yellow, pubescent abaxially, glabrous adaxially. **Fruits** having long and soft bristles.

Geographic distribution. Widely spread in the tropical Americas, in Colombia, Venezuela, Trinidad and Tobago, Guianas, Peru, Bolivia and Brazil (whole country, except the southern region). Occurrences in the Brazilian states of Maranhão and Mato Grosso are new records presented in here.

Additional comments. *Apeiba tibourbou* is commonly found throughout its distribution range, in secondary forests

and savannas, at a wide altitudinal range. See *A. albiflora* for morphological resemblances.

Examined specimens. BRAZIL. **Acre**: vicinity of Campinas on Highway from Abunã to Rio Branco, 20.07.1968, *E. Forero et al. 6414* (NY); Sena Madureira in open meadow, 01.10.1968, *G.T. Prance et al. 7723* (NY). **Amapá**: Estrada para Oiapoque, campo de aviação, 29.09.1949, *G.A. Black 49-8177* (IAN); Estação Experimental de Mazagão, 17.01.1956, *P. Ledoux 56-1504* (IAN); Roadside to Macapá, 26.V.1962, *J.M Pires & P. Cavalcante 52286* (MG, NY); vicinity og Igarapé Ariramba, 06.08.1962, *J.M. Pires & P. Cavalcante 52368* (IAN, MG, NY); Rio Oiapoque, 19.07.1962, *B. Maguire et al. 57067* (IAN, MG, NY); Ferreira Gomes, BR 156, 27.10.1979, *D.F. Austin et al. 7256* (MG, NY); Coastal Region, road to Amapá, Km 134, Água Azul, 26.07.1962, *J.M. Pires & P. Cavalcante 52286-A* (IAN, NY). **Amazonas**: on Rio Purus opposite Boca do Acre, 19.09.1966, *G.T. Prance et al. 2393* (NY); Manicoré, BR 230, 15.04.1985, *C.A. Cid 5535* (INPA, NY); Borba, Rio Abacaxis, 06.07.1983*, C.A. Cid 4086* (INPA, NY); Esperança, terra firme, 28.01.1942, *A. Ducke s/n* (IAN); Rodovia Manaus-Itacoatiara, beira do Rio Urubu, 08.11.1963, *E. Oliveira 2898* (IAN). **Pará**: Fordlandia, Estrada Pereira, 05.01.1948, *G.A. Black 48-2298* (IAN); Tucuruí, Rio Tocantins, arredores da Vila Breu Branco, 12.05.1978, *M.G. Silva & R. P. Bahia 3541* (IAN); Viseu, Serra do Piriá, 02.10.1999, *L. Carreira et al. 1658* (MG); Conceição do Araguaia, 20 Km West of Redenção, 08.02.1980, *T. Plowman et al. 8502* (INPA, MG, NY); Taperinha near Santarém, 12.11.1941, *A. Ducke 839* (NY); Rio Itacaiunas, Cachoeira Grande, 21.04.1949, *R. Fróes & G.A. Black 24653* (IAN); Curionóplis, Serra Leste, 20.01.2005, *L.V. Costa e Silva 20* (MG); Redenção, Serra da Redenção, transição cerrado mata de terra firme, 343 m alt., 10.03.2017, *M. Pastore et al. 526* (MG); Itaituba, BR 163, Km 886, Serra do Cachimbo, 04.05.1983, *I.L. Amaral et al. 1148* (INPA, MG); Monte Alegre, Rodovia PA 423, 31.011997, *M.F.F. Silva 2462* (MG); Belém, 15.11.1941, *A. Ducke 839* (IAN); São Geraldo do Araguaia, Serra das Andorinhas, Ladeira do Bastão, 05.07.1995*, I. Aragão 19* (IAN); São Geraldo do Araguaia, Parque da Serra dos Martírios, 17.09.2000, *M.R. Cordeiro MC-29-04* (IAN); Pau d'Arco Marajoara, 25.10.1997, *J. Grogan 447* (IAN); Marabá, Floresta Rio Doce, 08.07.1987, *L.R. Marinho 1366* (IAN); Pacajá, Propriedade de Enedino, terra firme, 30.11.2016, *D.P.P. Braga 727* (IAN); Concórdia do Pará, Fazenda São João, 18.12.2001*, M.R. Cordeiro MC-12-20* (IAN); Rio Tapajós, 1 Km long of Fazenda Ucururituba, opposite of Fordlândia, 15.04.1943, W. Andrew Archer 8394 (IAN); **Rondônia**: Rio Madeira, cerrado between Jaciparaná and Rio Madeira, 25.06.1968, *G.T. Prance et al. 5183* (NY); basin of Rio Madeira near Mutumparaná, 04.07.1968, *G.T. Prance et al. 5590* (NY); on road to Cassiterite, 05.07.1968, *G.T. Prance et al. 5622* (NY); vicinity of São Lourenço Mines, 26.11.1968, *G.T. Prance et al. 8875* (NY); Mineração Taboca at Massangna, 10.10.1979, *J.L. Zarucchi et al. 2663* (INPA, MG, NY); margem esquerda do Rio Madeira Ilha do Baleado, 17.08.2012, *G. Pereira Silva et al. 16326* (IAN); Porto Velho-Cuiabá, BR 364, Km 207, capoeira, 07.02.1983, *J.A. Silva et al. 43* (IAN). **Roraima**: Rio Branco, Rio Mucajaí, atrás da Colônia Fernando Costa, 07.09.1951, *G.A. Black 51-13338* (IAN); Rio Branco, Km 45, Rodovia Rio Branco-Porto Velho, 18.02.1978, *J.U. Santos et al. 11* (MG, NY). **Maranhão**: BR 316, Km 430, Codó to Peritoró, 29.09.1980, *D.C. Daly et al. 376* (INPA, MG, NY); Buriticupu, s/dat, *M.R. Cordeiro 2178* (IAN). Road between Estreito Goiás and Carolina, cerrado, 01.12.1981, *J. Jangoux et al. 1745* (MG). **Mato Grosso**: Município de Pontes e Lacerda, BR 364 to Vilhena, 31.10.1985, *W. Thomas et al. 4745* (INPA, MG, NY).

Apeiba trombetensis Dorr, Brittonia 64: 375, fig. 1. 2012.

Figures 1 and 4j-q

Type: Brazil, Pará, Oriximiná, área da Mineração Rio Norte, parte de baixo da serra Sacazinho, 40 km ao sul de Porto Trombetas, *C.A. Cid-Ferreira 9608* (holotype: INPA [barcode not found]; isotypes: BR [barcode BR013339326], CAS [barcodes CAS0214465, CAS0214471], MG [barcode not found], MO [barcode not found], NY [barcodes NY01477183, NY01477184], US [barcode not found], W [barcode W20120009044]).

Diagnosis. Trees 15-20 m high. **Leaves** ovate to obovate, with 4 pairs of lateral veins, both surfaces glabrous, except for few stellate trichomes sparsely distributed on the main veins, rounded to cuneate at base, rounded to acute or acuminate at apex, margin entire to slightly crenulate. **Flowers** tetramerous, petals white, glabrous. **Fruits** globose, with thickened, lanceolate spicules.

Geographic distribution. Brazil (restricted to Trombetas River, Pará state).

Examined specimens. BRAZIL. **Pará**: Oriximiná, Mineração Rio Norte, serra Saracazinho, 40 km ao Sul de Porto Trombetas, 13.11.1987, *C.A. Cid-Ferreira 9608* (isotypes, INPA, MG, NY, RB); Porto Trombetas, estrada Mineração Rio Norte, igarapé Saracazinho, 31.08.1980, *C.A. Cid-Ferreira 1953* (paratypes, INPA, MG, NY, RB); Rio Trombetas, Cachoeira Porteira, 06.06.1978, *N.T. Silva & M.R. Santos 4735* (parátipos MG, NY, RB); mesma localidade, 06.06.1978, *N.T. Silva & M.R. Santos 4737* (paratypes, MG, NY, RB).

Additional comments. See *A. glabra* for morphological resemblances with *A. trombetensis*.

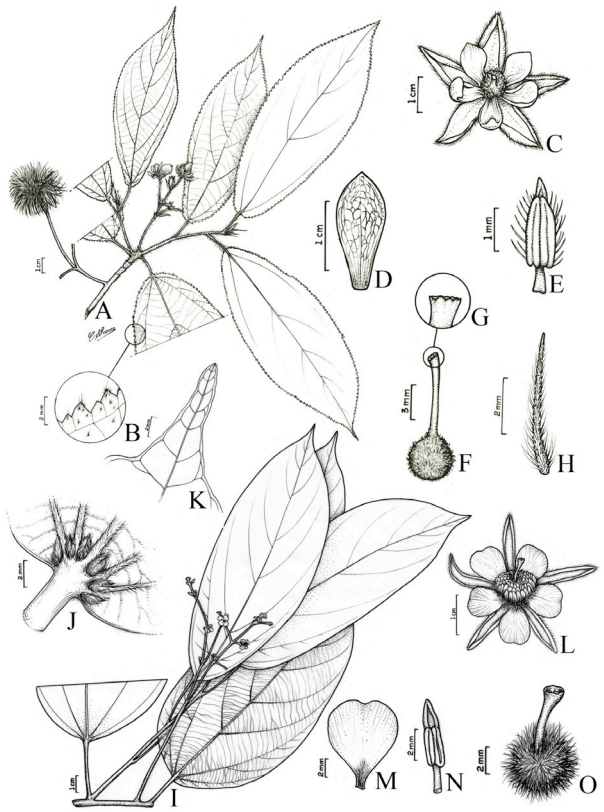

Figure 5. *Apeiba schomburgkii* (A-H): **A –** flowering and fruiting branch; **B –** detail of the leaf margin irregularly serrate; **C –** flower; **D –** petal; **E –** stamen; **F –** gynoecium; **G –** stigma; **H –** fruit bristle; *Apeiba uittienii* (I-O): **I –** flowering and fruiting branch; **J –** detail of the leaf basin, showing the domatia; **K –** leaf base; **L –** leaf apex; **M –** flower; **N –** detail of the apex of a sepal; **D –** stamen; **O –** gynoecium. Credit: Julio Sousa and Carlos Alvarez.

Apeiba uittienii Jans.-Jac. & Westra, Brittonia 47: 335. 1995.

Figures 1 and 5i-o

Type: Brazil, Roraima, "Indian trail from Surucucu to Uiacá, near Maitá Indian Village", 14 Feb. 1971, *G.T. Prance 10511* (holotype: US [barcode US00578714]; isotypes: INPA [barcode not found], K [barcode K000381936], MG [barcode not found], NY [barcodes NY00039324, NY00039326, NY00039325], U [barcode U0006901]).

Diagnosis. Trees 10-20 m high. **Leaves** elliptic to obovate, with 6-7-9 pairs of lateral veins, indumentum pale brown and pilose on both surfaces, trichomes densely distributed on abaxial surface, denser on adaxial surface, acuminate at apex, rounded to slightly sub-cordate at base, margin entire to slightly serrate. **Flowers** pentamerous, petals yellow, glabrous. **Fruits** globose, bearing long stiff bristles sparsely covered by adpressed stellate trichomes.

Geographic distribution. Restricted to Brazil (Roraima state) on its border with Venezuela.

Additional comments. See *A. schomburgii* for resemblances with *A. uittienii*.

Examined specimens. BRAZIL. **Roraima**: Indian trail from Surucucu to Uaicá, near Maitá Indian Village, 14.02.1971, *G.T. Prance et al. 10511* (isótipos, INPA, MG, NY, RB).

Identification key to the species of *Apeiba* in Brazil

1. Leaves densely pilose, velutinous, abaxially or on both surfaces 2

2. Leaves 9-12-nerved, base widely cordate…..…….…3

3. Leaves bullate, adaxial surface prominently rugose, only abaxial surface densely pilose; flowers white, petals emarginate at apex .....*A. albiflora*

3'. Leaves not bullate, adaxial surface only slightly rugose, both surfaces densely pilose; flowers yellow, petals slightly acuminate at apex …..……..*A. tibourbou*

2'. Leaves 5-8-nerved, base slightly cordate to obtuse ……4

4. Leaves discolor, fruits bearing thickened and short apicules, < 2 cm long……..……..*A. petoumo*

4'. Leaves concolor, fruits not apiculate, covered by long bristles. .....…5

5. Leaves deeply serrate, caudate at apex, obtuse at base; flowers with an undulate stigma. …..... .....*A. schomburgkii*

5'. Leaves entire to slightly serrate, acuminate at apex, rounded to slightly cordate at base; stigma not undulate. .....…..…… *A. uittienii*

1'. Leaves glabrous, trichomes found only spread on main veins, abaxially or on both surfaces. .....…6

6. Leaves membranous, with 9 pairs of lateral veins; petals cucullate, margin almost entire, anthers without connectives; fruits with short apicules. .....*A. membranacea*

6'. Leaves chartaceous to sub-coriaceous, with 4 pairs of lateral veins; petals flat, margin undulate, anthers with connective prolonged above apex; fruits with long apicules. ….....…7

7. Flowers always tetramerous, calyx pubescent ventrally; fruits globose, with thick apicules (> 1 cm diameter)…….....……*A. trombetensis*

7'. Flowers (4-)5-merous, calyx glabrous ventrally; fruits globose, with thin apicules (≤ 1 cm diameter). .....……*A. glabra*

DISCUSSION

Our work brought a contemporary perspective to the taxonomic status of *Apeiba* species in Brazil, where, despite its prominence as a genus of Amazonian trees, its taxonomy has garnered limited attention. By favoring the use of specific names, we aligned with the nomenclature adopted in more recent treatments in the floras of the Guianas (Jansen-Jacobs and Meijer 1995) and the Guayana region of Venezuela

(Dorr and Meijer 2005). This harmonization was important, especially to ensure consistency in the context of the Flora and Funga of Brazil database.

Regarding taxonomic treatments in Brazil, Colli-Silva (2022) adopted the delimitations established by Setser (1977). However, there is a need for improvement in various aspects, particularly concerning species delimitations and the inclusion of additional materials to enhance the identification key provided in Setser's incomplete treatment. Colli-Silva (2022) synthesized general aspects of *Apeiba* but refrained from introducing original contributions for the genus in Brazil, such as typification issues and the acceptance of specific names, which were now addressed in our study.

A more comprehensive taxonomic revision of *Apeiba* should encompass names from other countries and address unresolved nomenclatural and typification issues. *Apeiba* is just one of many genera within Malvaceae that require a contemporary approach to taxonomic delimitations, with a focus on phylogenetic insights. For example, Brunken and Muellner (2012) explore trends in the morphological evolution of *Apeiba* within the broader context of the tribe Grewioideae, with *Apeiba* representing one of its terminals. However, a more genus-specific approach is crucial for understanding issues like taxonomic delimitations of widely distributed species, assessing species monophyly, and unraveling the morphological evolution of traits within *Apeiba*.

While some typifications have been correctly addressed by Jansen-Jacobs and Meijer (1995), as reviewed by us, some isotypes remain to be located, along with the potential type series of certain names attributed to Aublet. A more comprehensive effort is likely to refine the morphological delimitation of *Apeiba* species and expand their geographic distribution, as demonstrated in our study for five species, notably in the state of Maranhão in northeastern Brazil. The approach adopted in this study, which was limited to Brazil and Amazonian collections, can be considered preliminary.

CONCLUSIONS

Our study advanced the understanding of the diversity of *Apeiba* species in the Amazon region, the predominant diversity center in Brazil. We confirmed that *A. petoumo* should be preferred over *A. echinata*. The updated recognition of Brazilian *Apeiba* refined the key by Colli-Silva (2022) by incorporating the most recent taxonomic advancements and vegetative morphological characters that make identification easier. The extended distribution range of some *Apeiba* species can aid in refining conservation strategies and ecological assessments in the region. Finally, our work aligned the taxonomic status of *Apeiba* species in Brazil with the nomenclature adopted in floras for other South American countries (notably Venezuela and the Guianas).

ACKNOWLEDGMENTS

This study received partial funding from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil – Finance Code 001. We would like to express our gratitude to Laurence J. Dorr for providing valuable suggestions. JSS acknowledges support from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the fellowship received and Programa de Capacitação Institucional (PCI) at Museu Paraense Emílio Goeldi (MPEG) for the resources necessary to conduct this study. RSS also extends thanks to the Programa de Voluntários at MPEG, as well as to the curators of HAMAB, IAN, INPA, MG, NY, and RB for their contribution to the collection information. We appreciate André Cardoso from Bioparque Vale for providing data about the Serra dos Carajás, and Dr. Hans-Joachim Esser from the Botanische Staatssammlung München, Munich, Germany, for sharing some literature on *Apeiba*.

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RECEIVED: 13/06/2023
ACCEPTED: 08/11/2023
ASSOCIATE EDITOR: Ricarda Riina
DATA AVAILABILITY: The data that support the findings of this study are available, upon reasonable request, from the corresponding author, Ricardo de Souza Secco.