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RESEARCH ARTICLE

Notes on Neotropical litter-gathering Rubiaceae, and distinction between *Faramea tinguana* from southern Brazil, and *F. humicapiens* sp. nov. from French Guiana

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Abstract

Background and aims – Single-stemmed plants 20–100 cm tall, with sessile or subsessile leaves in terminal rosettes gathering leaf litter, and axillary, 1–3-flowered inflorescence, from the state of Rio de Janeiro, southern Brazil, and from French Guiana, have traditionally been identified as *Faramea tinguana*. The disjunction of more than 3,200 km air distance between French Guiana and Rio de Janeiro stimulated an in-depth analysis of the specimens from those regions to evaluate if any morphological character might distinguish them.
Material and methods – This study is based on examinations of herbarium specimens, material preserved in 60% ethanol, and field observations. Herbarium specimens were studied either on site or through loans from the CAY, CEPEC, G, G-DC, K, L, MO, NY, P, RB, U herbaria. Digital images of herbarium specimens were analysed through virtual herbaria. Traditional practices of herbarium taxonomy have been applied. A preliminary conservation status assessment of each species studied was made using the IUCN Red List Categories and Criteria.
Results – The names *F. tinguana* and *F. megalophylla* are here lectotypified, and are treated as synonymous. Numerous reproductive characters support a clear distinction between the specimens from Rio de Janeiro and those from French Guiana traditionally identified as *F. tinguana*. Hence, the two distant populations are here treated as two distinct species. *Faramea humicapiens*, endemic to French Guiana, is newly described, and *F. tinguana* is restricted to the state of Rio de Janeiro. *Faramea humicapiens* is evaluated as Vulnerable and *F. tinguana* as Critically Endangered. A discussion on Neotropical litter-gathering Rubiaceae is also presented.

Keywords

Atlantic forest, Coussareeae, critically endangered species, Guiana Shield, *Palicourea*, *Psychotria*, *Rudgea*, South America, taxonomy

INTRODUCTION

The genus *Faramea* Aubl., tribe Coussareeae, Rubiaceae, includes approximately 160 species ranging from Mexico and Central America through Bolivia and northern Argentina (Taylor and Jardim 2020). Most species are found as shrubs or small trees, in forest undercanopy. The genus is easily recognizable by its aristate stipules, usually opposite leaves, 4-merous flowers, white to blue (rarely yellow) corollas with valvate lobes, and single-seeded, dark-blue or bluish-black berries. For more information regarding a morphological characterization of *Faramea*, see e.g. Steyermark (1974), Delprete (2010), Taylor (2012), and Taylor and Jardim (2020).

Single-stemmed plants 20–100 cm tall, with large, sessile or subsessile leaves gathering organic material at

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their bases, and axillary inflorescence, from the state of Rio de Janeiro, southern Brazil, and from French Guiana, have traditionally been identified as *Faramea tinguana* Müll.Arg. (e.g. Boom and Delprete 2002). No collection with such features was found between these two distant areas. The disjunction of more than 3,200 km air distance between French Guiana and Rio de Janeiro stimulated an in-depth analysis of the two distant populations to evaluate if any morphological character could differentiate them, and eventually decide if they could possibly represent two distinct species. Before proceeding to their morphological comparison, in order to verify the application of the names in question, a typification of the names involved was undertaken.

MATERIAL AND METHODS

This study is based on examinations of herbarium specimens, material preserved in 60% ethanol, and field observations. Herbarium specimens were studied either on site or through loans from the CAY, CEPEC, G, G-DC, K, L, MO, NY, P, RB, U herbaria (Thiers 2025). Digital images of other herbarium specimens were analysed through the following websites: JSTOR Global Plants (https://plants.jstor.org/), Reflora Virtual Herbarium (http://reflora.jbrj.gov.br/reflora/), speciesLink (https://specieslink.net/), and JABOT (http://jabot.jbrj.gov.br/).

Species descriptions are based on field observations, dried herbarium material, and spirit material. Measurements used in the descriptions and presented in Table 1 were made from dry herbarium specimens. Barcode numbers of herbarium specimens, when available, are cited in square brackets after the herbarium code; when the barcode number is not available, the accession number is cited preceded by "No." in square brackets. All specimens cited have been examined, unless indicated by "n.v." (not seen) after the herbarium code.

Coordinates from collecting sites in French Guiana, when not indicated on specimen labels, were obtained from Hoff and Cremers (1996).

A preliminary conservation status assessment of each taxon studied was made using the IUCN Red List Categories and Criteria (IUCN 2012; IUCN Standards and Petitions Committee 2019).

RESULTS AND DISCUSSION

Typification of *Faramea tinguana* and *Faramea megalophylla*

Müller (1875: 471, 478), in the protologue of *Faramea tinguana*, cited what seems to be two gatherings from Serra do Tinguá, state of Rio de Janeiro, as "*Schott et Pohl no. 867*, *Pohl 5339*", without citing any herbarium of deposit. Later, Müller (1881) published a description, citing the same gatherings, and a beautiful illustration of the species in table 17, fig. 1 (Fig. 1) in the Flora Brasiliensis.

In W, there are three specimens annotated as *F. tinguana*. The specimen W0013200 has a label with the handwritten annotations "5339 Hb. Brasil, Faramea axilliflora, (867. d), Serra Tingua, Schott." Those annotations mean that this specimen pertains to the collection *Schott 5339*, and corresponds to Schott's diary no. 867. Hence, *Schott 5339* and *Schott Diary No. 867* belong to the same gathering. Therefore, Müller's (1875) citation "*Schott et Pohl no. 867*, *Pohl 5339*" actually refers to the same gathering, as he added Pohl as collector of the specimens cited, but the sole collector of this gathering is Schott. The specimen W0013200 also has a label with the annotation "Faramea Tinguana Müll. Arg." handwritten by Müller. The specimen consists of a stem with numerous leaves of various sizes and a few axillary inflorescences with flowers in anthesis. Because this specimen is complete and is annotated by Müller, it is here designated the lectotype of *Faramea tinguana*.

The specimen W0013198 has a label with the printed title "N°_____HRB. MUSEI. PALAT. VINBOB." and the handwritten annotations "5339 Hb. Brasil, Serra Tingua, Schott." The specimen consists of a small branch with five large leaves, and several axillary flowers in anthesis. This specimen is an isolectotype of *Faramea tinguana*.

The specimen W0013199 has a label with the printed title "N°_____HRB. MUSEI. PALAT. VINBOB." and the handwritten annotations "5339 Hb. Brasil, Serra Tingua, Schott." The specimen consists of a small branch with numerous leaves of various sizes. No flower is visible on the specimen, although some flowers might be hidden below the leaves. This specimen is a second isolectotype of *Faramea tinguana*.

In G, there is a sheet, with barcode G00418062, with an envelope containing two loose leaves and a few loose flowers. On the envelope is the annotation "Faramea tinguana Mull. Arg., Serra Tingua: Schott, Pohl" handwritten by Müller, which corresponds to the material cited by Müller. This specimen is a third isolectotype of *Faramea tinguana*.

In K, there are two complete specimens of *Schott Diary No. 867*. The specimen with barcode K000265088 has a label with the handwritten annotation "No. 867, Brasilia Herb. Vindob. 1837." That specimen consists of a small branch with several leaves and axillary inflorescences with flowers in anthesis and flower buds. On the sheet, there is the stamp "Herbarium Benthamianum" and pencilled sketches of a flower in side view, ovary, and hypanthium in longitudinal section, an anther in side view, and a fruit. This specimen is a fourth isolectotype of *Faramea tinguana*.

The K specimen with barcode K000432768 has a small label with the pencilled number "867". On the sheet, there is also the stamp "Herbarium Hookerianum" and the handwritten annotation "Brazil, Herb. Mus. Vien." The specimen consists of a small branch with numerous large leaves and a few axillary flowers in anthesis. This specimen is a fifth isolectotype of *Faramea tinguana*.

Table 1. Morphological comparison of *Faramea humicapiens* and *F. tinguana*.

	Faramea humicapiens	***Faramea tinguana***
Distribution	French Guiana	Rio de Janeiro, Brazil
Inflorescence	Sessile to subsessile, 1–3-flowered	Pedunculate, peduncle 6–8 mm long, cymose, trichotomous, 3-flowered
Bracts subtending flowers	Subtending hypanthia, lanceolate to narrowly lanceolate, 6–12 × 0.7–3 mm, margin entire, acute to acuminate at apex	Subtending base of pedicels, narrowly ovate to oblong, 2.5–3.5 × 0.7–1.5 mm, round to acute at apex, margin fringed, often with 2–3 apical lobes 0.3–0.5 mm long
Flowers	Sessile or subsessile, pedicels (when present) up to 1.5 mm long	Pedicellate, pedicels 2–4.5 mm long
Hypanthium	Obovoid, 1–1.1 × 0.8 mm, glabrous	Turbinate, 1.3–1.5 × 0.8–0.9, glabrous
Calyx	Cupular, 1.3–1.5 mm long, truncate	Cupular-cylindrical, 2.8–3 mm long, margin truncate or shallowly undulate, sometimes denticulate
Corolla length	17–20.5 mm	27–29.5 mm
Corolla tube shape and width	Cylindrical throughout, 1–1.5 mm wide	Cylindrical, gradually wider towards the mouth, 1.2–1.4 mm wide at base, 2.3–2.7 mm wide at mouth
Corolla colour	White during and after anthesis	Blue during anthesis, turning white after anthesis
Corolla tube	12.5–14 mm long	16–17 mm long
Corolla lobes	3.5–6.5 × 1.5–1.8 mm	11–12.5 × 3.5–4 mm
Anthers in long-styled flowers	Narrowly oblong, 2.5 mm long, 0.3 mm wide, round at both ends	Oblong, 4.5 mm long, 0.5 mm wide, acute at apex, round at base
Style in long-styled flowers	Included, as long as corolla tube (style lobes at corolla mouth), lobes narrowly lanceolate, 1 mm long, acute at apex	Included, 2.5 mm shorter than corolla tube, lobes oblong, 1.5 mm long, round at apex
Fruit pedicels	Absent, or (when present) up to 1.5 mm long	3–5 mm long

Müller (1881) published the illustration of *Faramea tinguana* in fig. 1 of plate 17 of Martius' Flora Brasiliensis. In the middle of the illustration, there is a branch with numerous leaves, stipules, and axillary flowers. Surprisingly, flowers on this branch are depicted as 5-merous. On the lower left side of the plate, there are a flower in anthesis in side view with an included style, a longitudinally dissected corolla tube of a short-styled flower with stamens positioned near the corolla mouth and separate anthers (ventral and dorsal view), ovaries in transversal and longitudinal sections, a hypanthium topped by the calyx and the nectary disk, and a globose fruit in side view. The corolla on the bottom left side is also depicted as 5-merous. However, the flowers of this species are consistently 4-merous. On the lower right side of the plate, there are a flower in anthesis in side view with exserted style, a longitudinally dissected corolla tube of a long-styled flower with stamens positioned well below the corolla mouth and the style cut off near its base and separate anthers (ventral and dorsal view), the stigmatic portion of a style, and an ovary longitudinally dissected topped by the calyx and the nectary disk. Hence, Müller was aware that this species is heterostylous. The corolla lobes of the flower on the bottom right side are narrower than those of the corolla on the left side.

Müller (1881: 129), in the protologue of *Faramea megalophylla* Müll.Arg., cited the gathering *Glaziou 4822* from the state of Rio de Janeiro, without indicating the collection locality or the herbarium of deposit.

In G, where Müller worked, there is a sheet (G00392556) with two handwritten labels. One label has the annotation "Rio de Janeiro: Glaziou n. 4822" probably written by Müller. The other label has the annotation "F. megalophylla Müll. Arg. scripsit Müll.- Arg.!" written by Müller. The specimen consists of a single large leaf and is here designated as the lectotype of *Faramea megalophylla*.

A sheet in P (P00836841) bears a label with the printed text "Herb. Mus. Paris, Brésil, Herbier de A. Glaziou" and the annotation "Faramea megalophylla Müll. Arg. (Rio de Janeiro), Belem, 3 Xb 1868, n. 4822" handwritten by an unknown author. The specimen consists of a small branch with five large leaves and no flowers. This specimen is an isolectotype of *Faramea megalophylla*.

A specimen in R (R10376), has a label with the heading "Plantas do Brasil Central, Glaziou N°" and the annotation "4822, Faramea megaphylla [sic!] Muell. Arg., n. sp., Flora Bras. VI, V, p. 129, Belem, Matto humido (Rio de Jan.), 3 de Dezembro de 1868. Arbusto, flores alvacentas." handwritten by an unknown author. The specimen consists of a small branch with several large leaves. No flowers are visible on the specimen, although they might be hidden by the leaf bases, as they are described as whitish on the specimen label. This specimen is a second isolectotype of *Faramea megalophylla*.

Although Müller (1881: 129–130) described the corollas of *Faramea megalophylla* as being ca 16 mm long and the anthers as non-apiculate, no flowers were seen on the original specimens examined. Nevertheless, the dimensions, shapes, and venation of the leaves show, without any doubt, that this name is synonymous with *Faramea tinguana*.

Comparison of specimens from Rio de Janeiro and French Guiana traditionally identified as *Faramea tinguana*

A detailed comparison of collections from Rio de Janeiro and from French Guiana traditionally identified as *Faramea tinguana* showed that the leaves and the stipules are similar in specimens from the two disjunct areas. However, when observing the reproductive characters, numerous significant differences were found between specimens from the two distant areas. The reproductive features that characterize the populations in the state Rio de Janeiro and those in French Guiana are summarized in Table 1. The differences between the specimens from the two distant areas demonstrate that they are in fact two distinct species, described in the taxonomic treatment below.

TAXONOMIC TREATMENT

1. ***Faramea tinguana*** Müll.Arg. (Müller 1875: 471, 478; Müller 1881: 129, fig. 17)

Figs 1–3

Faramea megalophylla Müll.Arg. (Müller 1881: 129) – Type: BRAZIL – **Rio de Janeiro** • Belém; s.d. [3 Dec. 1868]; *Glaziou 4822*; lectotype (**designated here**): G [G00392556]; isolectotypes: P [P00836841], R [R10376].

Type. BRAZIL – **Rio de Janeiro** • Serra do Tinguá; 1831; fl.; *Schott 5339* (*Diary No. 867*); lectotype (**designated here**): W [W0013200]; isolectotypes: F [No. 870292] one leaf, G [G00418062], K [K000265088, K000432768], NY [00131383], W [W0013198, W0013199].

Description. Single-stemmed woody plant, 30–100 cm tall, erect or decumbent (Fig. 2A–B); stem woody, terete or laterally compressed, sometimes with a central longitudinal groove, glabrous. Stipules free or shallowly connate at base, persistent, long-aristate, 19–49 mm long, glabrous, base broadly triangular to deltoid, 5–7 × 5–6 mm, margins thickened-cartilaginous, arista 14–40 mm long. Leaves subsessile to short-petiolate; petioles 2–4 mm long, basally thickened, glabrous; blades narrowly long-obovate, oblong-obovate to spatulate, often narrow-oblong at basal portion, 18.5–29 × 7–11 cm, cordate at base, acuminate at apex, acumen 1–1.1 cm long, dark green above, pale green below, drying olive-green, subcoriaceous, glabrous throughout; secondary veins 13–17 on each side; domatia absent. Inflorescences axillary, pedunculate, cymose, 3-flowered dichasia; peduncles 6–8 mm long (Fig. 2D–E). Bracts subtending base of pedicels broadly ovate, narrowly ovate to oblong, 1.5–3.5 × 0.7–1.5 mm, round to acute at apex, fringed, often with 2–3 apical lobes 0.3–0.5 mm long. Flower buds purplish-white, acute at tip. Flowers 4-merous, with pedicels 2–4.5 mm long. Hypanthium turbinate, 1.3–1.5 × 0.8–0.9 mm, glabrous. Calyx cupular-cylindrical, 2.8–3 mm long, margin truncate or shallowly undulate, sometimes denticulate, glabrous. Corollas hypocrateriform, 27–29.5 mm long, glabrous throughout, pale blue during anthesis, turning white after anthesis; tube 16–17 mm long, cylindrical, gradually wider towards the mouth, 1.2–1.4 mm wide at base, 2.3–2.7 mm wide at mouth; lobes lanceolate, 11–12.5 × 3.5–4 mm, acute at apex, glabrous. Long-styled flowers stamens included, subsessile, inserted 7 mm below corolla mouth; anthers oblong, 4.5 × 0.5 mm, round at base, acute at apex; style included, 2.5 mm shorter than corolla tube, bilobed, lobes oblong, 1.5 mm long, round at apex. Short-styled flowers not seen (illustrated in Müller 1881: plate 17, fig. 1; reproduced in Fig. 1). Immature fruits with pedicels 3–5 mm long, globose to subglobose, green when fresh, purple when ripe; ca 9 mm diam., dark brown when dry.

Distribution. Endemic to the Tinguá Biological Reserve, municipality of Nova Iguaçu, and to the nearby Curió Municipal Park, municipality of Paracambi, which is within the buffer zone of the Tinguá Biological Reserve, state of Rio de Janeiro, southern Brazil (Fig. 3).

Ecology. It grows on mountain slopes, in dense ombrophilous forest with significant accumulation of leaf litter, at 150–180 m altitude.

Notes on the habit. Two populations of *Faramea tinguana* (*Delprete et al. 12964*, *12965*) were personally observed in the Tinguá Biological Reserve in December 2023. Most individuals were erect, single-stemmed woody plants, 30–100 cm tall, with a terminal rosette of large, litter-gathering leaves. Several individuals were observed to have the basal portion of the stem, 50–100 cm long, reptant on the ground, below the leaf litter (Fig. 2B). At close examination, the reptant portions of the stems had sparse adventitious roots, and a few young stems originating from axillary buds, showing vegetative reproduction (Fig. 2B).

Phenology. Specimens with flowers and immature fruits were collected in November and December, and with mature fruits in March.

Etymology. The specific epithet refers to the Serra do Tinguá, Rio de Janeiro, where the original material was collected. In Tupi-Guarani, the word Tinguá means nose, acute beak, or mountaintop.

Preliminary IUCN conservation assessment. Critically Endangered: CR B1ab(i,ii,iii,iv). This species is known from two main areas, on low altitudes on the Serra do Mar, state of Rio de Janeiro. It has an Extent of Occurrence (EOO) of 12 km^2 and an Area of Occupancy (AOO) of 12 km^2. Based on the EOO, the species can be classified as CR, but based on the AOO, it is EN. Considering that in almost two centuries (191 years)

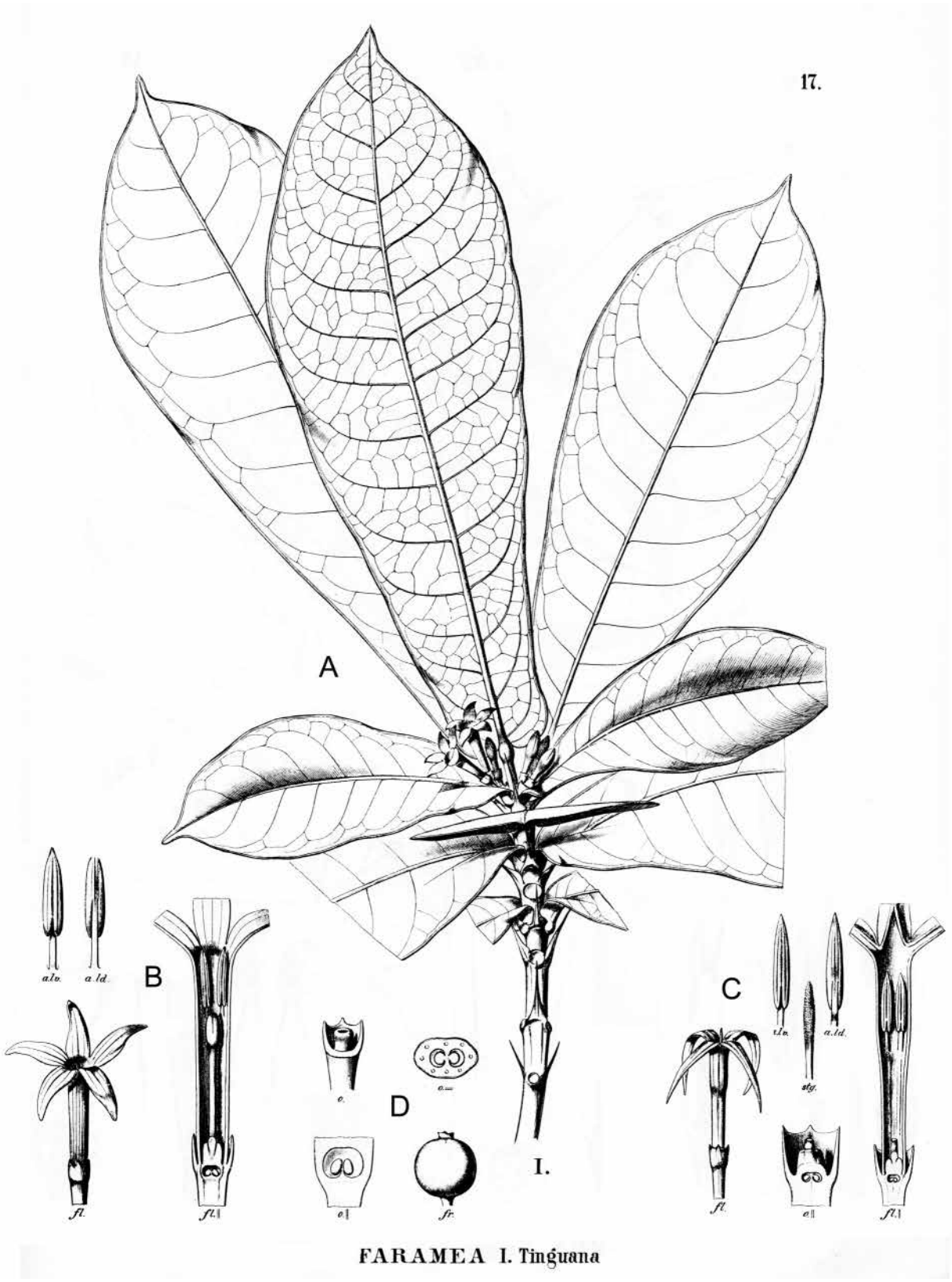

Figure 1. *Faramea tinguana*. **A**. Distal portion of stem with stipules, leaves, and inflorescences. **B**. Short-styled flower longitudinally dissected, in anthesis, and anthers in ventral and dorsal view. **C**. Long-styled flower longitudinally dissected, in anthesis, detail of ovary and calyx dissection, and anthers in ventral and dorsal view. **D**. Ovary longitudinally and transversally dissected, detail of ovary and calyx, and fruit. Reproduced with modifications from Müller (1881: fig. 17).

have passed since the first collection, the species has been found in only one additional location. Due to the history of deforestation of the Atlantic Forest, we consider it to be Critically Endangered. Additionally, the two areas of occurrence, although within conservation units, are close to urban areas. It is known by a few collection localities that are currently within the Tinguá Biological Reserve, and one collection from the nearby Municipal Park of Curió. The Tinguá Biological Reserve is within the Atlantic Forest domain, and extends between the

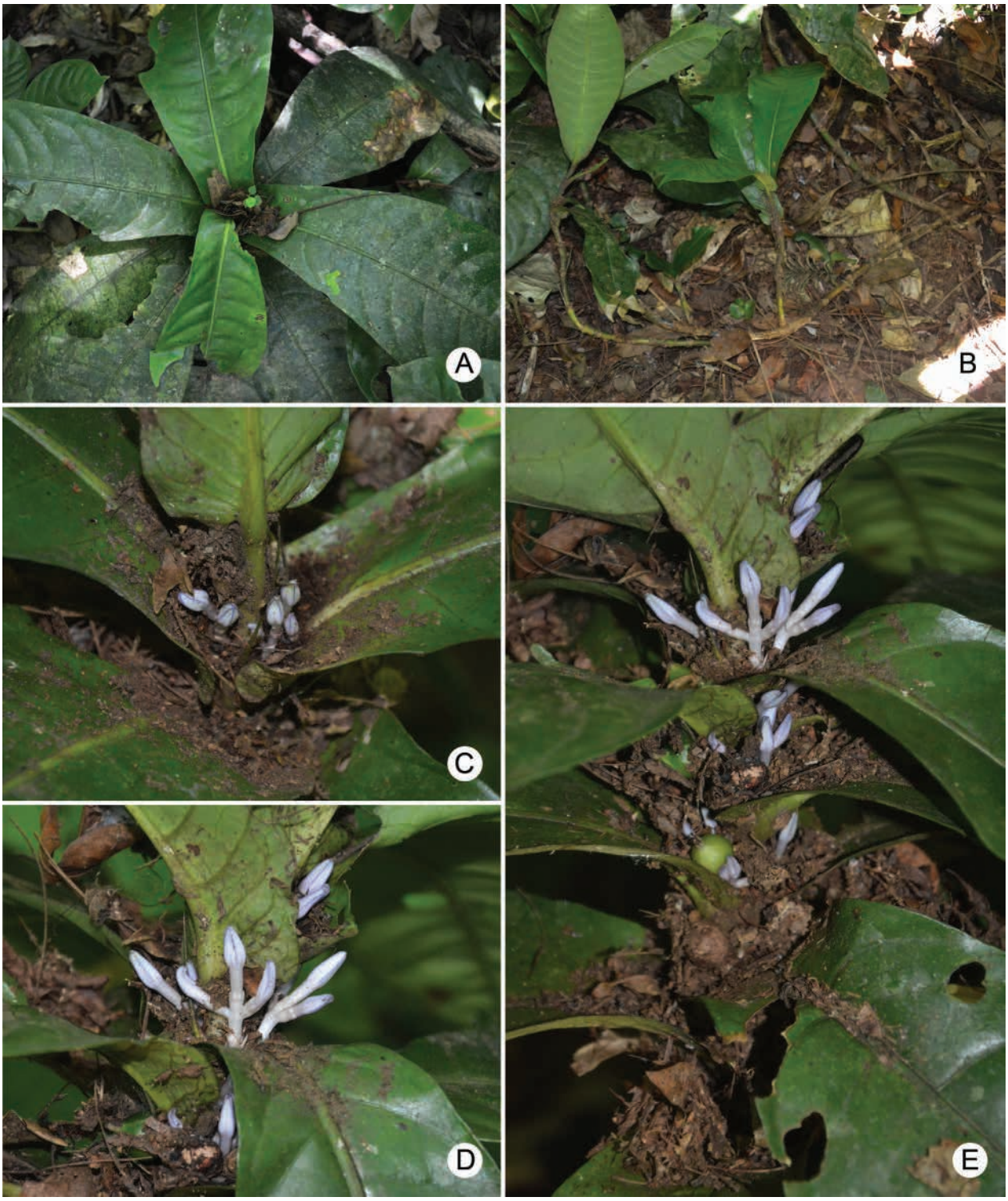

Figure 2. *Faramea tinguana*. **A**. Plant habit, top view. **B**. Plant with basal portion of the stem reptant on the ground, with adventitious roots, and young stems originating from axillary buds. **C**. Detail of a plant with axillary inflorescences and flower buds. **D**. Detail of a plant with axillary inflorescences with well-developed peduncles and flower buds. **E**. Detail of a plant with axillary inflorescences with well-developed peduncles and immature fruit. Photos by Piero G. Delprete on 7 Dec. 2023 at the Tinguá Biological Reserve, Rio de Janeiro, Brazil (*Delprete et al. 12964*, *12965*).

Serra do Mar Range and contiguous low altitudes. It is mostly within the municipality of Nova Iguaçu. The reserve was established in 1989, with an area of about 26,260 ha, and is administrated by the Chico Mendes Institute of Biodiversity Conservation (ICMBio) – a government institution subordinate to the Brazilian Ministry of Environment. It ranges from low altitudes to mountainous areas, with the highest pick, Pico do Tinguá, reaching 1600 m. The reserve is mostly covered by dense ombrophilous forest and is traversed by numerous water courses, representing an important source of water for several nearby inhabited centres. For this main reason, in 1833, Emperor Pedro II declared the area a Protected Forest, making it the oldest protected area in Brazil (Travassos et al. 2018). The reserve is crossed by the Royal Commercial Road (Estrada Real do Comércio), a stone-paved road that was initiated in 1811 and completed in 1822, to connect the town of Nossa Senhora da Piedade do Iguaçu (now the city of Nova Iguaçu), at the margin of the Iguaçu River, in the state of Rio de Janeiro, to the interior of Brazil. The road, approximately 66 km long, was built mainly for commercial purposes, traversed the Serra do Tinguá, and connected Rio de Janeiro, at that time the capital of Empire of Brazil, with the state of Minas Gerais. Many portions of its tract are no longer extant, but in the Tinguá Biological Reserve it is still well preserved. Within the reserve, along the Royal Commercial Road, there are also underground oil and gas pipelines of a national oil company. Travassos et al. (2018) produced a mammal inventory of the reserve and listed 85 species, including several rare species, making it the second most diverse reserve in mammal diversity in the Atlantic Forest of the state of Rio de Janeiro, only after the Itatiaia National Park. The Tinguá Biological Reserve is also a centre of high plant diversity and endemism. Iguatemy et al. (2017) published a tree inventory of the reserve and listed 563 species in 77 families, including 47 species of arboreal Rubiaceae. Bochorny et al. (2023) produced an inventory of all plants occurring in the reserve, listing 1310 species, comprising 1140 angiosperms, including 74 species of Rubiaceae, 169 ferns and lycophytes, and one gymnosperm.

Although the Tinguá Biological Reserve is classified by the IUCN as a strict nature reserve, category Ia, it is under constant threat by illegal human activities. In spite of the fact that its visitation is officially restricted to research and education purposes, it is frequently invaded by hunters, who illegally kill local wildlife, or capture rare animals to sell them illegally (Travassos et al. 2018). Nearby

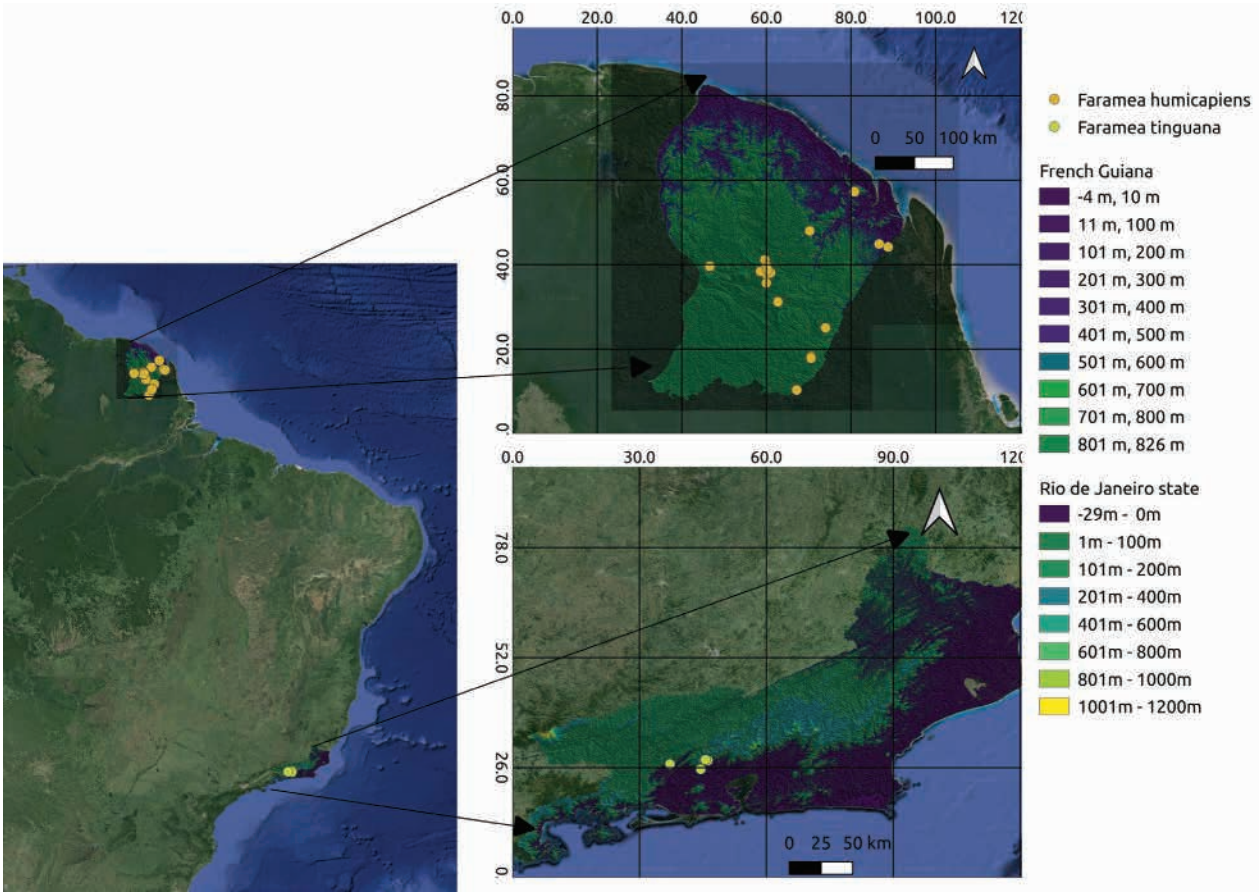

Figure 3. Distribution maps of *Faramea tinguana* and *F. humicapiens*. Map on the left, distribution of both species. Map on the upper right, distribution of *F. humicapiens* in French Guiana. Map on the lower right, distribution of *F. tinguana* in the state of Rio de Janeiro, southern Brazil.

industries contribute to the pollution of water courses and ground water present at lower elevations within the reserve.

The Municipal Park of Curió, within the municipality of Paracambi, was established in 2002, has an area of about 913 ha, and is administrated by the municipality of Paracambi. Within the park, the altitude ranges from 30 m to 305 m at its highest point. The vegetation type is ombrophilous forest on mountain slopes, and is within the Atlantic Forest domain. The area is fairly well protected, and is open for visitation by the general public.

Taking into account the ecological threats discussed above, and its small extent of occurrence (EOO) of 12 km^2, *Faramea tinguana* is classified as Critically Endangered (CR) following IUCN criteria (IUCN 2012; IUCN Standards and Petitions Committee 2019).

Additional specimens examined. BRAZIL – **Rio de Janeiro** • Mun. Nova Iguaçu, Tinguá Biological Reserve, Represa do Macuco, picada para a Pedra da Onça; 22°34'37"S, 43°26'06"W; 180 m; 4 Nov. 2016; fl.; *Braga et al. 16-052*; RB • Mun. Nova Iguaçu, Tinguá Biological Reserve, trilha da Macumba do Miro, entre Represa do Barrelão e Represa da Serra Velha, foresta submotana e montana; 22°35'S, 43°25'W; 30 Mar. 2012; fr.; *Bruniera & da Silva 748*; CEPEC, RB, SPFR • Mun. Nova Iguaçu, Tinguá Biological Reserve, near the trail to Pedra da Onça, close to Macuco Reservoir; 22°34'43"S, 43°26'05"W; 157 m; 7 Dec. 2023; fl. buds, fr.; *Delprete et al. 12964*; CAY, CEPEC, NY, P, RB, UB • Mun. Nova Iguaçu, Tinguá Biological Reserve, near the trail to Pedra da Onça, close to Macuco Reservoir; 22°34'40"S, 43°26'06"W; 172 m; 7 Dec. 2023; fl. buds, fr.; *Delprete et al. 12965*; CAY (2 sheets), CEPEC, NY, P, RB • "Brasil"; s.d.; *Sellow s.n.*; K [K001137958] • "Palmeiras, dans les bois vierges"; 13 Jan. 1877; st.; *Glaziou 8735*; B†, F [No. 606560] one leaf, K, P [P03814541] one leaf, photo-B in F [F0BN000827] • Mun. Nova Iguaçu, Serra do Tinguá, Região da Baixada; [ca 22°35'S, 43°25'W]; 5 Dec. 1987; fl., imm. fr.; *Gomes 277*; CEPEC, HUEFS, RB • Mun. Nova Iguaçu, Adrianópolis, Mata do Haras, com limite na Mata do Tinguá, floresta estacional semidecidual, terras baixas degradadas; 22°39'00"S, 43°28'17"W; 22 Nov. 2010; fl., imm. fr.; *Marquete et al. 4264*; RB, SP • Mun. Paracambi, Parque Municipal do Curió, estrada de Paracambi para Vassouras, ca 5 km de Parcambi, Trilha das Taquaras, floresta ombrófila densa de encosta; 22°36'39"S, 43°42'32"W; 10 Dec. 2022; fl.; *Fiaschi et al. 5534*; FLOR.

2. ***Faramea humicapiens*** Delprete & J.G.Jardim, **sp. nov.**

urn:lsid:ipni.org:names:77367189-1

Figs 3–5

Type. FRENCH GUIANA • Maroni River Basin, Gobaya Soula, rive droite, layon vers les Monts Atachi-Bacca, entre 0–1.5 km de l'Itany [River], camp 1; 3°37'N, 53°58'W; 100 m; 6 Jan. 1989; fl.; *Granville et al. 10434*; holotype: CAY [Sheet 1 of 2, CAY074825, Sheet 2 of 2, CAY074826].

Diagnosis. *Faramea humicapiens* is similar to *F. tinguana* in being erect, monocaulous, woody plants up to 1 m tall, with large, sessile or subsessile leaves in apical rosettes, gathering leaf litter at their bases, and short, axillary, 1–3-flowered inflorescences. The former differs from the latter in having sessile or subsessile inflorescences with 1, 2, or 3 flowers (vs pedunculate, with peduncles 6–8 mm long, cymose, commonly 3-flowered in *F. tinguana*), bracteoles subtending the hypanthia lanceolate to narrowly lanceolate, 6–12 × 0.7–3 mm, with entire margin, acute to acuminate at apex (vs subtending the pedicels, narrowly ovate to oblong, 2.5–3.5 × 0.7–1.5 mm, with fringed margins, often with 2–3 apical lobes 0.3–0.5 mm long), flowers sessile to subsessile, with pedicels (when present) to 1.5 mm long (vs with pedicels 2–4.5 mm long), calyces 1.3–1.5 mm long (vs 2.8–3 mm long), corollas 17–20.5 mm long, with tubes 12.5–14 mm long and lobes 3.5–6.5 × 1.5–1.8 mm (vs 27–29.5 mm long, with tubes 16–17 mm long and lobes 11–12.5 × 3.5–4 mm), and anthers 2.5 mm long (vs 4.5 mm long).

Description. Single-stemmed plant, 20–80 cm tall, erect; rarely the basal portion of the stem leaning on the ground, with a few adventitious roots; stem woody, terete or laterally compressed, sometimes with a central longitudinal groove, glabrous. Stipules free or shallowly connate at base, persistent, long-aristate, 12–25 mm long, glabrous, base deltoid to narrowly triangular, 4–9 × 4–6 mm, margins thickened-cartilaginous, arista 8–17 mm long. Leaves subsessile to short-petiolate; petioles 2–5 mm long, basally thickened, glabrous; blades narrowly long-obovate, oblong-obovate to narrowly spatulate, often narrow-oblong at basal portion, (8–)16–42 × (3.5–)5–17 cm, cordate at base, acuminate at apex, acumen 1–1.5 cm long, dark green above, pale green below, drying olive-green, subcoriaceous, glabrous throughout; secondary veins 12–22 on each side; domatia absent. Inflorescences axillary, sessile to subsessile, 1–3-flowered. Bracts subtending flowers lanceolate to narrowly lanceolate, 6–12 × 0.7–3 mm, membranaceous, margin entire, acute to acuminate at apex. Flowers 4-merous, sessile or subsessile, pedicels (when present) up to 1.5 mm long. Hypanthium obovoid, 1–1.1 × 0.8 mm, glabrous. Calyx cupular, 1.3–1.5 mm long, truncate, glabrous. Corollas hypocrateriform, 17–20.5 mm long, glabrous throughout, white or pale purplish-white during and after anthesis; tube 12.5–14 mm long, cylindrical, 1–1.5 mm wide throughout; lobes lanceolate, 3.5–6.5 × 1.5–1.8 mm, acute at apex. Long-styled flowers stamens included, subsessile, inserted 8.5 mm below corolla mouth; anthers narrowly oblong, 2.5 × 0.3 mm, round at both ends; style included, as long as corolla tube (lobe at corolla mouth), bilobed, lobes narrowly lanceolate, 1 mm long, acute at apex. Short-styled flowers stamens partially exserted, subsessile, inserted near the corolla mouth; anthers oblong, 2.5 × 0.4–0.5 mm, apiculate at both ends; style included, much shorter than corolla tube, 5–6 mm long, bilobed, lobes narrowly lanceolate, 2–2.5 mm long, apiculate. Fruits sessile or subsessile, or with pedicel (when present) up to 1.5 mm long, globose to subglobose, 10–15 mm in diam.,

purple, bluish-violet or dark blue at maturity when fresh; 9.5–12 mm diam., dark brown when dry.

Distribution. Endemic to French Guiana (Fig. 3).

Ecology. Growing in undercanopy of tall dense ombrophilous forests, in soil rich in organic material and significant accumulation of leaf litter, at 5–400 m altitude.

Phenology. Specimens with flowers were collected in October, December, January, and February, with immature fruits in April and May, and with mature fruits in February, April, August, September, October, and November.

Vernacular name. French Guiana: Uwakaya (Wayapi, *Grenand 824A*).

Etymology. The specific epithet is derived from the Latin words "humus-" ("ground") and "-capiens". In this sense, "capiens" is the present participle of the transitive verb "capere" (capio, capis, cepi, captum), which means "to hold". Hence, the specific epithet means "holding humus", referring to the ability of this plant to accumulate organic material at the leaf bases.

Preliminary IUCN conservation assessment. Vulnerable: VU B1ab(i,ii,iii,iv). This species is most likely endemic to French Guiana. It has an AOO of 28 km^2 and an EOO of 16,536 km^2, indicating that it could be classified as EN and VU, respectively. However, according to the following considerations, we suggest to treat it as vulnerable. The vast majority of the collections are from three main regions, along the coast, from the Oyapock River Basin, and from the interior of the country, corresponding with 10 locations. The region along the coast is suffering from considerable human pressure due to selective logging and agricultural activities. The Oyapock River Basin is subject to important human pressure, due to increasing local populations. Most collections were made in the Saül area, a region of free adhesion of the French Guiana Amazonian Park, and with significant human pressure due to growing human population, increasing agricultural pressure, frequent tourist visitation, and nearby gold mining exploitation. In total, we studied 28 gatherings present in CAY, MO, NY, P, and US. Most of them are only represented by unicate specimens, and only four of them by two duplicates. This fact is here interpreted as the evidence of a species present in eleven main localities, but locally extremely rare. Exhaustive searches were undertaken in three localities (Mt. de Kaw, 4°31'N, 52°12'W; Oyapock River basin, Crique Gabaret, 3°55'N, 51°55'W; Crique Probert, 3°52'N, 51°48'W), in January 2024, during the flowering season of the species, but it was not found. All the above information is leading us to conclude that, although it is reported from several localities, this species is locally very rare, hence prone to be locally obliterated by human activities. Therefore, we classify this species as Vulnerable (VU) under IUCN criteria B1b (IUCN 2012; IUCN Standards and Petitions Committee 2019), because it is interpreted as occurring in several small subpopulations (or a sole individual) and under considerable human pressure.

Additional specimens examined (paratypes). FRENCH GUIANA • Saül, Monts La Fumée; 3°37'N, 53°12'W; 200–400 m; 24 Aug. 1982; fr.; *Boom & Mori 1565*; NY • Commune de Régina, Bassin de l'Approuague; 75 m; 5 Dec. 1994; fl.; *Bordenave 1291*; CAY • Camp Caïman, Asarco, Mt. de Kaw; 4°31'N, 52°12'W; 10 m; 24 Jan. 2000; fl.; *Bordenave & Raes 5140*; CAY, U • Région de Saül, Savane-Roche [Inselberg] Dachine; 3°28'N, 53°13'W; 150 m; 5 Apr. 1997; imm. fr.; *Cremers & Crozier 14730*; CAY • Nouragues, chablis au [parcelle] OX; [ca 4°4'N, 52°43'W]; 20 Oct. 1995; fr.; *Eockle 119*; CAY • Saül, forêt primaire; [3°37'N, 53°13'W]; 17 Oct. 1984; fr.; *de Foresta 660*; CAY • Saül, Circuit Plateau La Douane; [3°35'N, 53°12'W]; 30 Sep. 1974; fr.; *Granville B-5177*; CAY • Saül, tracé ORSTOM de la Crique Limonade à ca 2 km du village; [3°34'N, 53°13'W]; 3 Nov. 197; fr.; *Granville 2274*; CAY • Saül, Roche Bateau, sur la Crique Nouvelle France, ca 6 km E du village; [3°35'N, 53°10'W]; 6 Nov. 1974; fr.; *Granville 2292*; CAY • Nord du Massif des Emerillons, colline entre la Haute Approuague et la Crique des Emerillons; [3°15'N, 53°5'W]; 20 Sep. 1980; fr.; *Granville 3941*; CAY, P • Saül, sommet des Monts La Fumée; 410 m; 12 Oct. 1982; fr.; *Granville 5131*; CAY [2 sheets] • Région de Saül, colline à ca 18 km au S de Saül; 4 Apr. 1983; imm. fr.; *Granville 5549*; CAY • Mont Galbao, entre Crique Mana et le sommet; 3°36'N, 53°17'W; 350 m; 12 Jan. 1986; fl.; *Granville et al. 8647*; CAY, US • Oyapock River basin, Crique Gabaret, Saut Plat; 3°55'N, 51°55'W; 5 m; 14 Apr. 1988; fr.; *Granville 10293*; CAY • Camopi River Basin, Saut Petit Continent; 2°54'N, 52°51'W; 90 m; 13 May 1992; st.; *Granville 11670*; CAY • Oyapock River Basin, Roche Touatou; 2°57'N, 52°32'W; 140 m; 22 May 1995; imm. fr.; *Granville & Cremers 13035*; CAY • Région de Saül, 3 km E de Saint-Eloi, sur le layon vers Pic Matécho; 3°44'N, 53°14'W; 200 m; 21 Sep. 2000; fr.; *Granville & Crozier 14339*; CAY • Projet Routier entre Saint-Georges et le pont transfrontalier sur l'Oyapock, zone Crique Probert; 3°52'50"N, 51°48'46"W; 6 m; 20 Dec. 2005; fl.; *Granville & Crozier 17220*; CAY, MO • Mont Galbao, entre Crique Mana et le sommet; 3°36'N, 53°17'W; 350 m; 13 Jan. 1986; fl.; *Granville et al. 8647*; CAY • Région de Saül, 3 km E de Saint-Eloi, sur le layon vers le Pic Matecho; 3°44'N, 53°14'W; 200 m; 21 Sep. 2000; fr.; *Granville et al. 14339*; CAY • Trois Sauts; [2°14'N, 52°52'W]; 14 Mar. 1975; st.; *Grenand 824B*; CAY • Saül, parcelle Belvédère; 9 Feb. 1974; fr.; *Jacquemin 1445*; CAY • Saül, Les Eaux Claires, ca 300 m N from Les Eaux Claires to Belizon, ca 50 m on the right side from the bridge; 3°40'N, 53°13'W; 200–400 m; 4 Sep. 2000; fr.; *Junikka & Orava 3014*; CAY • Saül, trail from large fig to Creek Limonade; 3°37'N, 53°12'W; 250–300 m; 18 Aug. 1988; fr.; *Mori et al. 19043*; NY • Saül, vicinity of Eaux Claires, Sentier Botanique, from 450 to 1060 m (just past Creek Tortue) beyond entrance; 3°37'N, 53°12'W; 250–350 m; 11 Feb. 1993; fr.; *Mori et al. 22914*; NY • Yaroupi River, rive droite, Saut Tainoua; [2°37'N, 52°42'W]; 17 Apr. 1970; imm. fr.; *Oldeman B-2998*; CAY • Yaroupi River, rive gauche, Saut des Polissoirs; [2°36'N, 52°42'W]; 23 Apr. 1970; fr.; *Oldeman B-3063*; CAY • Inini

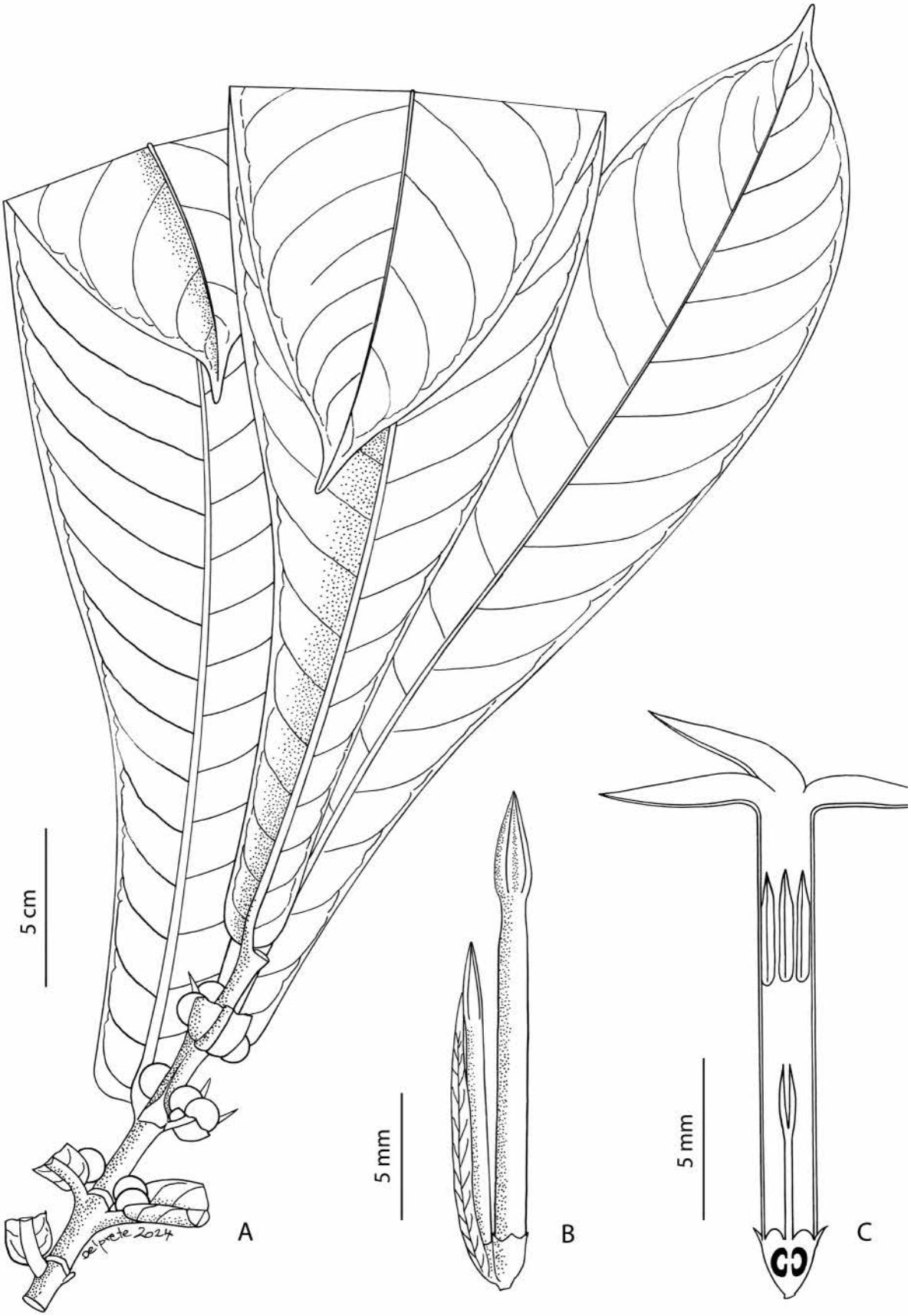

Figure 4. *Faramea humicapiens*. **A**. Distal portion of stem with stipules, leaves, and fruits. **B**. Subsessile inflorescence, with a bracteole, and two flower buds at different stage of development. **C**. Short-styled flower in anthesis, longitudinally dissected. A from *Cremers 14730*; B–C from *Bordenave & Raes 5140* (CAY). Drawn by Piero G. Delprete.

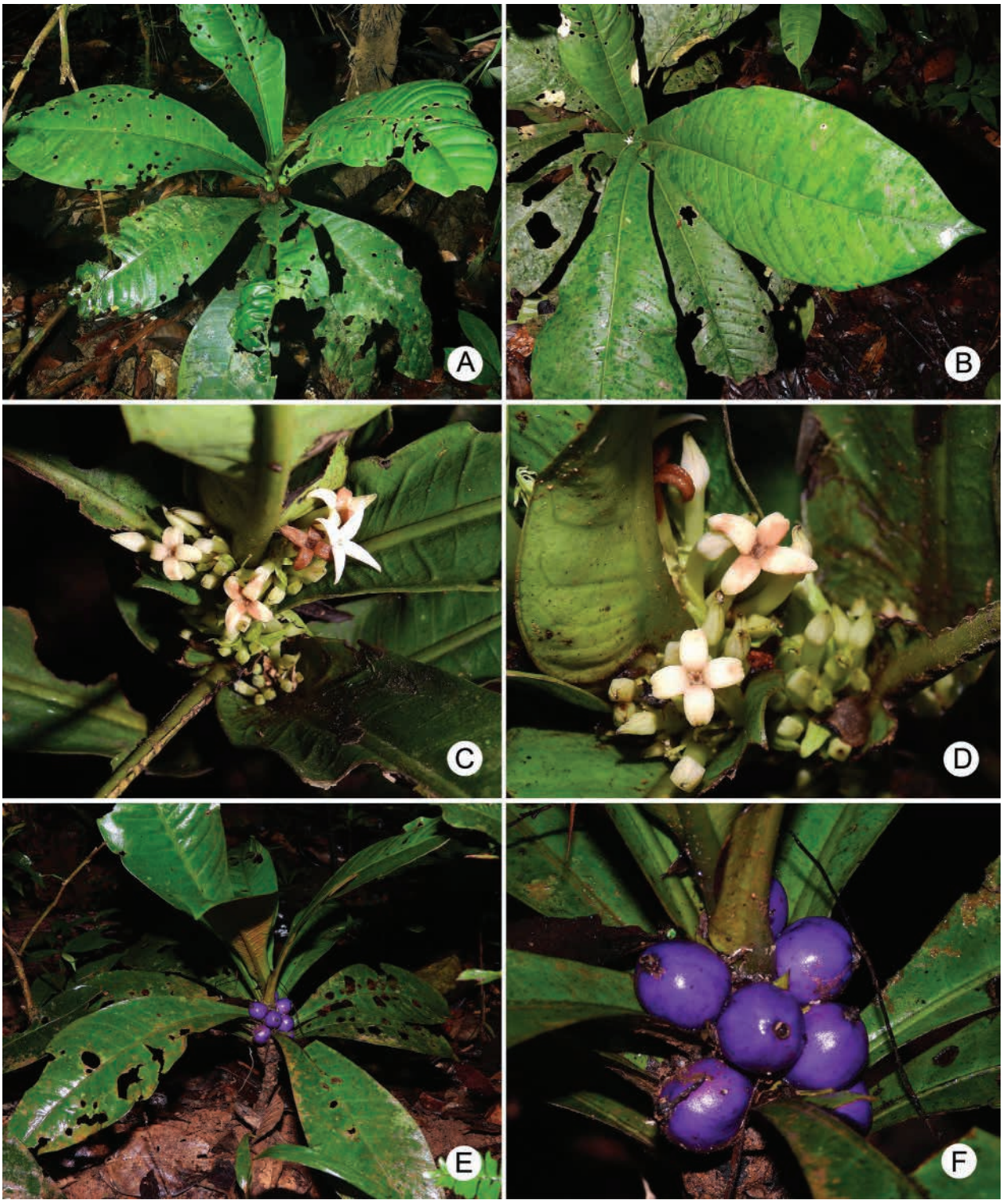

Figure 5. *Faramea humicapiens*. **A**. Plant habit, with immature fruits. **B**. Plant habit, with flower in anthesis. **C**–**D**. Details of inflorescences with flower buds and flowers in anthesis. **E**. Plant habit, with mature fruits. **F**. Detail of infructescence, with mature fruits. Photos taken by Sébastien Sant in 2023, at the Saül Region, French Guiana. Plants not collected.

River Basin, Znieff Atachi-Bakka; 3°39'35"N, 53°52'06"W; 90 m; 7 Oct. 2011; fl.; *Silland 105*; CAY.

Notes on Neotropical litter-gathering Rubiaceae

Single-stemmed plants with large sessile, subsessile, or short-petiolate leaves in apical rosettes, collecting leaf litter, are present in numerous Rubiaceae genera. In the Neotropics, there are several species of Rubiaceae reported to be litter-gathering. One example is the recently described *Rudgea quisquiliae* Bruniera & Torres-Leite (Torres-Leite et al. 2016: 192, figs 1–2), from the mountain slopes of the Brazilian state of Espírito Santo. Aside from those characteristics, *R. quisquiliae* is similar to *Faramea tinguana* and *F. humicapiens* in having axillary (which is exceptional in *Rudgea* Salisb.), congested inflorescences, and differs from *Faramea* by the characteristic stipules with numerous appendages, and white fruits (vs aristate stipules and commonly blue fruits). The ecological preference of *R. quisquiliae*, *F. tinguana*, and *F. humicapiens* are also similar and typical of litter-gathering species, as they grow in the undercanopy of dense ombrophilous forest on mountain slopes.

Another Brazilian litter-gathering species of *Rudgea*, growing in ombrophilous forest, is *R. macrophylla* Benth. (Bentham 1850: 456), which is also found on the mountain slopes of the state of Rio de Janeiro. *Rudgea macrophylla* was personally observed growing sympatrically with *Faramea tinguana* on the Serra do Tinguá, and displays a rather variable habit, which changes with the aging of individuals (Fig. 6). Young individuals of *R. macrophylla* are single-stemmed woody plants 0.5–1 m tall, topped by a rosette of litter-gathering leaves 20–40 cm long (Fig. 6B). As the individuals continue to grow, they become sparsely branched treelets 1.5–3 m tall. The older, ramified individuals maintain the large, ascending leaves in dense rosettes at the apex of each branch, which continue to collect leaf litter even when they become 3 m tall (Fig. 6A). Mantovani and Vieira (1993) studied the leaf surface of *R. macrophylla*, and did not report any foliar anatomical character that could be associated with the litter-gathering habit of this species.

Taylor (2002: 564–566, fig. 1D) published *Faramea accumulans* C.M.Taylor, a species found on San Blas Island, Panama, in wet forests at 50–180 m altitude. She described it as a tree up to 5 m tall, entirely glabrous, with elliptic-oblong leaves, 28–44 × 13–24 cm, and axillary, cymose inflorescences. She also added "This species apparently accumulates detritus in the clasping leaf bases that surround the stem, and the specific epithet refers to this habit."

The litter-collecting *Psychotria dressleri* (Dwyer) C.W.Ham. (Hamilton 1998: 223) occurs in Panama and Colombia. Because of the bi-dentate stipules and several other morphological characters, this species should probably be transferred to *Palicourea* Aubl., as currently broadly delimited (e.g. Taylor 2015a, 2015b; Delprete and Lachenaud 2018). *Psychotria alfaroana* Standl. (Standley 1928: 273), a species found in Costa Rica, Panama, and Colombia, also has bicuspidate stipules, and large, litter-gathering leaves in apical rosettes. Morphological and phylogenetic studies are necessary to eventually support the transfer of these two species to *Palicourea* s.l. If these transfers are supported, they would be two litter-gathering species of *Palicourea*.

Palicourea woronovii (Standl.) Bruniera & C.M.Taylor (in Taylor et al. 2015: 2, fig. 2), is another litter-gathering species from Colombia. It was originally described by Standley (1930: 155) as *Rudgea woronovii* Standl., as having succulent stems, laciniate stipules 3–4 cm long, and large, oblong-ovate leaves, ca 30 × 12.5 cm, abruptly acuminate at apex. Bruniera and Taylor (in Taylor et al. 2015: 2–3), following the observation of additional specimens, corrected Standley's stipules description as being "two-lobed, with the lobes relatively broad and glandular-fimbriate." They also added that "It has the habit of a 'rubbish-bin' plant (fig. 2B), with a low (0.5–1 m tall) unbranched habit and detritus held at the stem nodes; in most such plants detritus accumulates in the axils of the subsessile or sessile leaves, but in *Palicourea woronovii* the detritus is held by the enlarged stipules and the leaf axils."

An additional litter-gathering species was recently described from the Brazilian state of Rio de Janeiro. *Palicourea goytacaz* Torres-Leite (in Torres-Leite et al. 2025: 294, fig. 1–2) was described as "*Shrubs* up to 3 m tall, much branched, with litter-trapping habit, i.e., with the leaves grouped at the apex of the branches and favoring litter accumulation. [...] *Leaves* with blades (18–)24–30(–36) × (6–)10–15(–19) cm, smaller at at the base of the inflorescence 6–15 × (2.5–)3–5(–7.5) cm, obovate to elliptic, base cordate, subcordate or acute [...]", mentioning its habitat as "understory of a dense ombrophilous forest near a watercourse."

Zona and Christenhusz (2015) presented a worldwide review of litter-gathering plants, analysed the terminology present in literature, and provided the following definition "Litter-trappers can be defined as those plants that, by virtue of their growth habit and morphology, trap or channel falling debris (leaf litter, twigs, flowers, fruits, bird droppings, dead animals, etc.) and use the nutrients derived from this detritus for their own growth." For the family Rubiaceae, they stated that litter-trapping species are "primarily African, despite the fact that Rubiaceae are abundant throughout the American and Asian tropics." In tropical Africa, litter-gathering Rubiaceae species are more numerous than in the rest of the World. Lachenaud and Jongkind (2013) described two new African litter-gathering species of *Psychotria* L., *P. blydeniae* O.Lachenaud & Jongkind and *P. tetragonopus* O.Lachenaud & Jongkind, which are both single-stemmed woody plants, either 30–50 cm tall, or 120–150 cm tall, respectively, with shortly petiolate large leaves. In the same article, those authors cited about a dozen litter-gathering Rubiaceae occurring in Africa, namely, one species of *Chassalia* Comm. ex Poir., two species of *Chazaliella* E.M.A.Petit & Verdc., one species of *Coffea* L.,

Figure 6. *Rudgea macrophylla*. **A**. Ramified individual, ca 3 m tall, with basal main trunk, with large, ascending or spreading leaves in dense rosettes at the apex of each branch, which continue to collect leaf litter. **B**. Young individual about 50 cm tall. **C**. Detail of stem apex, with stipules topped by acicular extensions. **D**. Detail of the bark of an old individual. **E**. Detail of a plant with immature fruits. Photos by Piero G. Delprete on 7 Dec. 2023 at the Tinguá Biological Reserve, Rio de Janeiro, Brazil (*Delprete et al. 12958*).

one species of *Ixora* L., one species of *Oxyanthus* DC., and several species of *Pavetta* L. and *Psychotria*. Lachenaud (2019: 68–70, table 3) augmented the number of African litter-gathering Rubiaceae to a total of 44, listing one species of *Bertiera* Aubl., two species of *Chassalia*, one species of *Coffea*, two species of *Eumachia* DC., one species of *Ixora*, one species of *Oxyanthus*, five species of *Pavetta*, and 31 species of *Psychotria* (many of them newly described). All those species share a similar habit and ecological preference as those from the Neotropics, by growing in dense ombrophilous forests, and by being mostly 30–150 cm tall, usually single-stemmed or rarely sparsely branched, with large leaves in apical rosettes.

Zona and Christenhusz (2015: 572–573, table 2), listed 25 species of litter-gathering Rubiaceae, in several genera from Africa, one species of *Ixora* from mainland Asia, five species of *Morinda* L. from the Samoa Islands, and six species from the Neotropics. For the Neotropics, they listed the following Rubiaceae: *Pentagonia macrophylla* Benth. (Costa Rica, Panama, Colombia, and Ecuador), *Pentagonia wendlandii* Hook.f. (Costa Rica, Panama, and Colombia), *Psychotria alfaroana* (see discussion above), *Psy. chitariana* Dwyer & C.W.Ham. (Costa Rica), *Psy. dressleri* (see discussion above), and *Psy. insueta* (Dwyer) C.W.Ham. (Panama). In conclusion, adding *Rudgea quisquiliae*, *R. macrophylla*, *Faramea accumulans*, *F. tinguana* and *F. humicapiens*, and *Palicourea woronovii* and *P. goytacaz*, to Zona and Christenhusz's list, there are at least 13 litter-gathering species of Rubiaceae in the Neotropics.

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