



## Novelties in *Macrobium* (Detarioideae, Fabaceae) for Northern South America: Two new species and new chorological records from Colombia and Ecuador

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### Abstract

Two new species from Colombia are described and illustrated, *Macrobium ceriferum* from the Pacific biogeographical region and *Macrobium longistipitatum* from limits between Andes and Magdalena Valley biogeographical regions. Notes about their distribution, phenology, conservation status and taxonomic affinities are provided. *Macrobium ceriferum* differs from morphologically similar species mainly by its leaflet blades discolorous and bullate, whitish abaxially, its smaller inflorescence axis and flowers, its filaments glabrous and presence of conspicuous scaly wax in the surface of the inflorescence axis, pedicel, bracteoles and sepals. *Macrobium longistipitatum* differs from morphologically similar species mainly by its leaves with numerous leaflets, each with veins raised up the fourth-order on both surfaces, longer (sub-) terminal inflorescences, hypanthium cupular with longer stipe, sepals 4, slightly unequal in shape and size and ovary glabrous. The latter is the first record of *Macrobium* sect. *Macrobium* from the Inter-Andean Valleys of the northern Andes. Additionally, based in new chorological records of *Macrobium machaerioides* from Colombia and Ecuador, its currently known geographical distribution are presented, along to an emended description of its fruits morphology, which is hitherto unknown.

**Keywords:** *Brownea* clade, Chocó department, Leguminosae, Pacific, *Stenosolen*, *Vouapa*

### Introduction

*Macrobium* Schreber (1789: 30) has been supported as monophyletic (Murphy *et al.* 2018) and is one of the largest genera of the subfamily Detarioideae (Fabaceae), second only to *Cynometra* Linnaeus (1753: 382) (LPWG 2017, Murphy *et al.* 2018; Radosavljevic 2019). Within Detarioideae, *Macrobium* is grouped in the *Brownea* clade along to the genera *Brachycylis* (Harms 1925: 293) Cowan (1975: 464), *Brownea* Jacquin (1760: 6), *Browneopsis* Huber (1906: 565), *Ecuadendron* Neill (1998: 45), *Elizabetha* Schomburgk ex Benth (1840: 92), *Heterostemon* Desfontaines (1818: 248), *Paloue* Aublet (1775: 365) and *Paloveopsis* Cowan (1957a: 251) (Redden & Herendeen 2006, Murphy *et al.* 2018). Cowan (1953) recognized 48 species in the revision of the genus; subsequently, he described 20 new species (Cowan 1957b, 1961a, 1961b, 1963, 1973, 1977, 1985), eight new species was described by other authors (Burger 1968, Little 1969, Simpson 1975, Zarucchi 1990, Barneby 1992, Farroñay *et al.* 2018) and one species was recognized as a variety (Cowan & Berry 1998), resulting in a current count of 75 species for the genus.

The species of *Macrobium* are recognizable by the shrubby to arboreal habit, the leaves alternate, paripinnate, with two or more opposite leaflets, the inflorescences racemose, bracteoles present at pedicel apex, which encasing the flower before the anthesis, the hypanthium cupular to cylindrical, sepals 4 or 5, petal one, stamens three, the pollen grains three lobate, and fruit dehiscent or indehiscent (Cowan 1953).

The genus is divided in two sections, based on morphological and molecular evidence (Cowan 1953, Murphy *et al.* 2018). *Macrobium* sect. *Macrobium* (= *M.* sect. *Vouapa sensu* Cowan 1953) is characterized by its bracteoles opening completely on both sides of the flower, hypanthium cupular, sepals 4 or 5, usually unequal in shape and size, and petal long-unguiculate, while *Macrobium* sect. *Stenosolen* Harms (1906: 51) is characterized by its bracteoles

opening completely at abaxial side but incompletely at adaxial side of flower, hypanthium cylindrical, sepals 4, equal in shape and size and petal sessile or short-unguiculate (Cowan 1953).

*Macrobium* is distributed from Central America to central Bolivia and southeastern Brazil, inhabiting mainly the lowlands at riverbanks and savannahs (Cowan 1953). In Colombia, the genus is represented by 37 species and is distributed from sea level to 2300 m of elevation, mainly in the Amazonia, Guiana and Serranía de La Macarena, Orinoquia and Pacific biogeographical regions (regions *sensu* Bernal 2016) (Mancera 2016).

Recent taxonomic studies in *Macrobium* mainly focused on the Colombian species, reveal two new species from the Andes, Magdalena Valley and Pacific biogeographical regions, which are herein described and illustrated, and comments on their geographical distribution, habitat, phenology, conservation status and taxonomic affinities are provided. Additionally, these studies allowed detect new chorological records of *Macrobium machaerioides* Killip & J.F. Macbr. in Macbride (1943: 139)—heretofore only known from Peruvian Amazon—from Amazon regions of Colombia and Ecuador; these records are presented along to notes about its currently known geographical distribution and its fruit morphology, which have not been described.

## Material and methods

The taxonomy at the genus and species levels follow to Cowan (1953, 1961a), all names listed under *Macrobium* in the Tropicos database (Tropicos.org 2022) were consulted, as well as their protologues, types and representative specimens were studied from digital images through the Global Plants project (<http://plants.jstor.org>), respective virtual herbaria, and original publications. Specimens at the herbaria CAUP, CUVC, FMB, HUA, HUQ, ICESI, JAUM, MEDEL, TOLI, TULV, VALLE and digital images at COL, F, NY, UDBC and US, were also studied (acronyms according to Thiers 2022). Herbarium accession numbers were used in the citation when available, otherwise, number barcodes were used specifying each case. The descriptions and digital plates of the new species are based on herbarium specimens using stereomicroscope. Flower measurements and digital plates were based in rehydrated material. Measurements and observations of the similar species were taken from their protologues and from the revision by Cowan (1953) and revised from types or representative specimens.

Terminology for venation and shape of laminar structures follows Ellis *et al.* (2009), for indumentum follows Cowan (1953), for indumentum types not described by Cowan (1953) here follows to Hewson (2019) and for colors follows Beentje (2016); all colors were described from dried specimens. The terms “scaly waxy” and “smooth waxy” refer to the appearance that the wax gives. The former means, the wax peeling off, generating a surface like to overlapped scales; the latter means, the wax is also conspicuous, but is not peeling off and gives a surface uniform, pale and dull.

The biogeographical regions of Colombia follow the definition by Bernal (2016). The composite digital plates were made using GIMP 2.10.32. The distribution map was made using Arcgis 10.5. Data on locality or georeferencing not included in the specimen labels and then deduced in this study, are placed in square brackets in the specimen’s citation. The conservation status was evaluated according to criterion B of IUCN V 3.1 (IUCN 2012) and assessed by the R package “ConR” (Dauby 2019, Protected Planet 2019, R Core Team 2019).

## Results

### New species

*Macrobium ceriferum* A.M.Trujillo & Londoño-Ech., *sp. nov.* (Figs. 1 & 2)

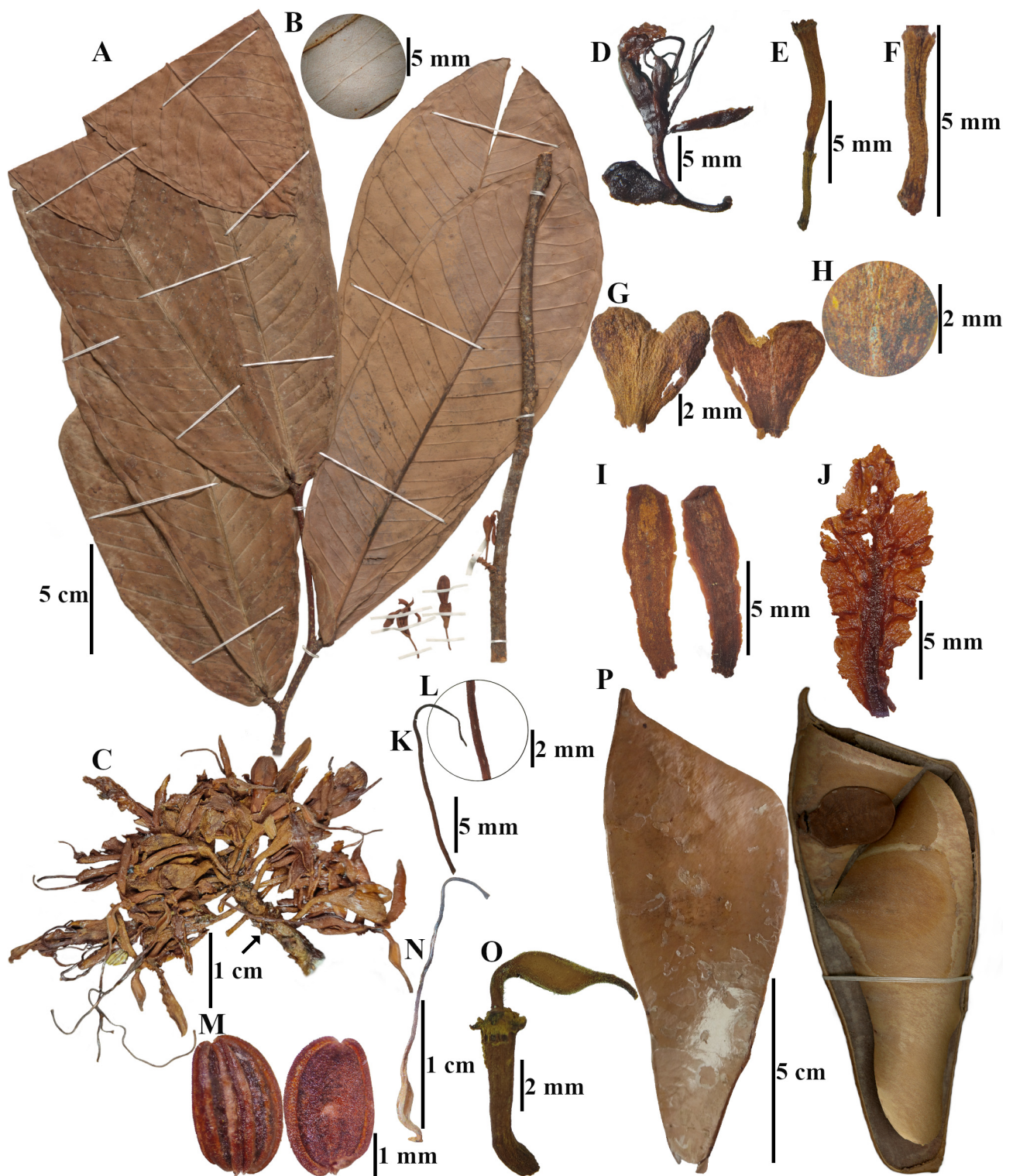
**Type:**—COLOMBIA. Chocó. Mun. Alto Baudó: Cerca del campamento dos bocas, por la quebrada Munduquera en dirección Oeste por el camino que conduce a Jurubidá, PNN Ensenada de Utría, [181 m], 5°55'35"N, 77°09'30"W, 21 May 1990 (fl & fr), *C. Barbosa 6697* (holotype: HUA-134863!, isotypes: HUA-134787!, FMB-56077!).

**Diagnosis:**—*Macrobium ceriferum* differs from morphologically similar *Macrobium pittieri* (Rose in Britton & Rose 1930: 226) Schery in Woodson & Schery (1951: 33) by its leaflets surface bullate, discoloured, whitish and sparsely dark-punctate abaxially (vs. not bullate, concolorous, not whitish and epunctate abaxially), its secondary veins raised abaxially, impressed adaxially (vs. slightly raised in both surfaces), its shorter inflorescence axis 11.1–18.1 mm long, surface scaly waxy (vs. *ca.* 35 mm long, not scaly waxy), its shorter bracts 1.3–1.8 mm long (vs. *ca.* 2.5 mm long), its pedicels surface scaly waxy (vs. not scaly waxy), its bracteoles

very sparsely puberulous adaxially, otherwise glabrous, surface scaly waxy abaxially (vs. glabrous, not scaly waxy abaxially), its hypanthium very sparsely puberulous, surface smooth waxy (vs. glabrous, not smooth waxy), its smaller sepals 9–12.9 × 1.7–3.2 mm, sparsely puberulous in both surfaces, sparsely scaly waxy abaxially, margin ciliate (vs. 17–18.5 × 4 mm, margin sparsely and irregularly ciliolate, otherwise glabrous, not scaly waxy), its smaller petal 11.7–17.8 × 4.5–7.1 mm, 0.7–1.1 mm long unguiculate (vs. ca. 43 × 15 mm, 5 mm long unguiculate), its shorter filaments 18.5–22.9 mm long, glabrous (vs. ca. 25 mm long, villose basally), its shorter anthers 3.1–3.4 mm long (vs. ca. 5 mm long), its ovary puberulous marginally, smooth waxy (vs. pilosulose marginally, not smooth waxy), its style puberulous basally (vs. pilosulose basally), fruits sparsely puberulous marginally (vs. glabrous throughout).



FIGURE 1. Holotype of *Macrobium ceriferum*.



**FIGURE 2.** *Macrobium ceriferum*: **A.** Vegetative branchlet and part of floriferous branch, **B.** Detail of leaflet abaxially, **C.** Inflorescence (arrow indicates the insertion of the inflorescence), **D.** Flower, **E.** Pedicel and hypanthium, **F.** Pedicel, **G.** Bracteole (left abaxial, right adaxial), **H.** Detail of bracteole adaxially, **I.** Sepal (left abaxial, right adaxial), **J.** Petal adaxially, **K.** Filament, **L.** Detail of filament, **M.** Anthers (left adaxial, right abaxial), **N.** Gynoecium, **O.** Hypanthium and detail of ovary, **P.** Fruit. [A from *Al Gentry 35466*, Source: National Museum of Natural History Smithsonian Institute, US2981970, Available: <http://n2t.net/ark:/65665/36927828c-0644-4363-bfb3-0f09e8304f55>, B–P from the holotype. Digital plate by Y. Londoño.]

*Trees* 6–8 m tall, indumentum whitish to pale yellowish throughout, cataphylls not seen, branchlets glabrous, dark greyish brown, slightly lustrous, bearing *ca.* 3 leaves; stipules 3.8–4.1 × 1.2–1.5 mm, lanceolate, acute and straight apically, glabrous on both surfaces, caducous, margin entire, ciliate. *Leaves* 2-foliolate, petiole 2–6.6 mm long,

adaxially flattened and slightly canaliculate at apex, sparsely puberulous, rachis mucro *ca.* 6.1 mm long; petiolules *ca.* 0.5 mm long, glabrous; leaflet blades (20.1–) 23.5–35.6 × (6.3–) 9–11.8 cm, elliptic to oblanceolate, asymmetrical, basally obtuse and truncate to slightly cordate at basiscopic half, cuneate at acroscopic half, apically acute and straight; puberulous toward the midvein and secondary veins abaxially, glabrous adaxially; obliquely attached to petiolule, bullate, discolorous; abaxial surface whitish, sparsely dark-punctate, smooth waxy, the wax red-punctate; midvein and secondary veins raised abaxially, impressed adaxially, secondary veins 20–27 pairs, brochidodromous, intersecondary veins present, tertiary veins percurrent, margin entire. *Inflorescences* as racemes 11.1–18.1 mm long (axis including peduncle), axillary to fallen leaves, *i.e.* ramiflorous to cauliflorous, 1.1–4.9 mm long pedunculate, 15–32-flowered, glabrous, surface scaly waxy on the axis, the wax red-punctate; bracts 1.3–1.8 × 1–1.5 mm, ovate, acute and straight apically, caducous, margin entire, ciliate; pedicels (3.8–) 5.1–13.2 mm long (fruiting pedicel not seen), glabrous, surface scaly waxy, the wax red-punctate; bracteoles 7.9–13.3 × 3.8–4.8 mm, obovate, obtuse and rounded apically, very sparsely puberulous adaxially, otherwise glabrous, opening completely abaxially and incompletely on the adaxial side of the flower, abaxial surface scaly waxy, the wax red-punctate, adaxial surface smooth waxy; hypanthium (6.1–) 7.7–11.9 × 1.7–2 mm (including stipe), cylindrical, curved, gibbose basally, 0.7–1.3 mm long stipitate, sparsely puberulous, surface smooth waxy, the wax red-punctate; calyx 4-merous, sepals 9–12.9 × 1.7–3.2 mm, oblanceolate, obtuse and rounded apically, sparsely puberulous in both surfaces, abaxial surface sparsely scaly waxy, the wax red-punctate, adaxial surface smooth waxy, all sepals equal in shape and size, margin entire, ciliate; single petal 11.7–17.8 × 4.5–7.1 mm (including claw), elliptic, obtuse and rounded apically, 0.7–1.1 mm long unguiculate, sparsely puberulous on midvein adaxially, otherwise glabrous and papillose, margin entire, undulate; androecium 3-merous, filaments 18.5–22.9 mm long, flattened with a groove adaxially, glabrous, papillose, anthers 3.1–3.4 × 1.9–2.2 mm, broadly ellipsoid, glabrous, papillose; gynophore 1.4–1.6 mm long, puberulous, surface smooth waxy, the wax red-punctate, inserted at top of the adaxial wall of the hypanthium, ovary 4.2–4.6 × 1.2–1.5 mm, oblong, puberulous marginally, otherwise glabrous, surface smooth waxy, the wax red-punctate, 3–5-ovulate, style 19.9–24.2 mm long, puberulous basally to sparsely puberulous apically, surface smooth waxy, the wax red-punctate, stigma papillose. *Fruits* 13.6–16.6 × 5.1–5.6 cm (without stipe, this not seen), narrowly obovate, obtuse and rounded basally (over stipe), obtuse and obliquely truncate apically, sparsely puberulous on the margin, otherwise glabrous, surface smooth waxy, the wax red-punctate, dehiscent, 2–3 seeds per fruit. *Seeds ca.* 2.7 × 1.6 cm, oblong to elliptic, surface smooth waxy, the wax red-punctate.

**Distribution and habitat:**—*Macrobium ceriferum* is endemic to western Colombia, where occurs in the Pacific biogeographical region. It has been collected in the departments of Chocó and Valle del Cauca, on the municipalities of Alto Baudó and Buenaventura respectively. *Macrobium ceriferum* inhabits on the lowland rainforest near to banks of the Baudó and Calima rivers, at elevations between 50 and 182 m, under equatorial rainforest climate (Af) according the Köppen-Geiger climate classification (Kottek *et al.* 2006) (Fig. 3).

**Phenology:**—Flowering in May and December and fruiting in May.

**Conservation status:**—*Macrobium ceriferum* is only known by two subpopulations, both outside of any official protected areas, and with an small area of occupancy (AOO) of 8 km<sup>2</sup>. The subpopulations are isolated between them by *ca.* 200 km, and one of these is located to less than 13 km from Buenaventura city. Its habitat is inside to areas of high mining and selective logging impact, which, although not evident in satellite images, are reported as the main economic activities of the Pacific biogeographical region and produce the mains environmental problematics for the region, such deforestation, soils degradation, disturb to water courses, among others (Moreno & Ledezma-Rentería 2007). According to Rangel-Ch. (2014), the deforestation in this area is estimated at 25–36 %, causing deterioration and loss of habitat quality for plant communities. For these reasons, *Macrobium ceriferum* is here proposed under “Endangered” EN category.

**Etymology:**—The epithet *ceriferum* is derived from the Latin “cera” (wax) and the suffix “-fer” (bearing), indicating that this species bears wax at its surfaces, referring to both, the scaly wax at the inflorescence and flower axes, and the smooth wax at the abaxial surface of leaflet blades, features that help to recognize the new species.

**Additional specimen examined (paratype):**—COLOMBIA. Valle del Cauca. Mun. [Buenaventura]: Bajo Calima, near San Isidro, N of Buenaventura, Cartón de Colombia concession, tropical wet/ pluvial forest transition above mouth of Río Calima, 50 m, 4°0'0"N, 77°0'0"W, 8 December 1981 (fl), *Al Gentry 35466* (COL-258969 [digital image!], MO-3011247 [n.v.], MO-3011248 [n.v.], US-2981970 [digital image!]).

**Notes:**—*Macrobium ceriferum* belongs to *Macrobium* sect. *Stenosolen* due to its bracteoles opening completely abaxially and incompletely on the adaxial side of the flower, hypanthium cylindrical, sepals four, equal in shape and size and petal with a short claw.

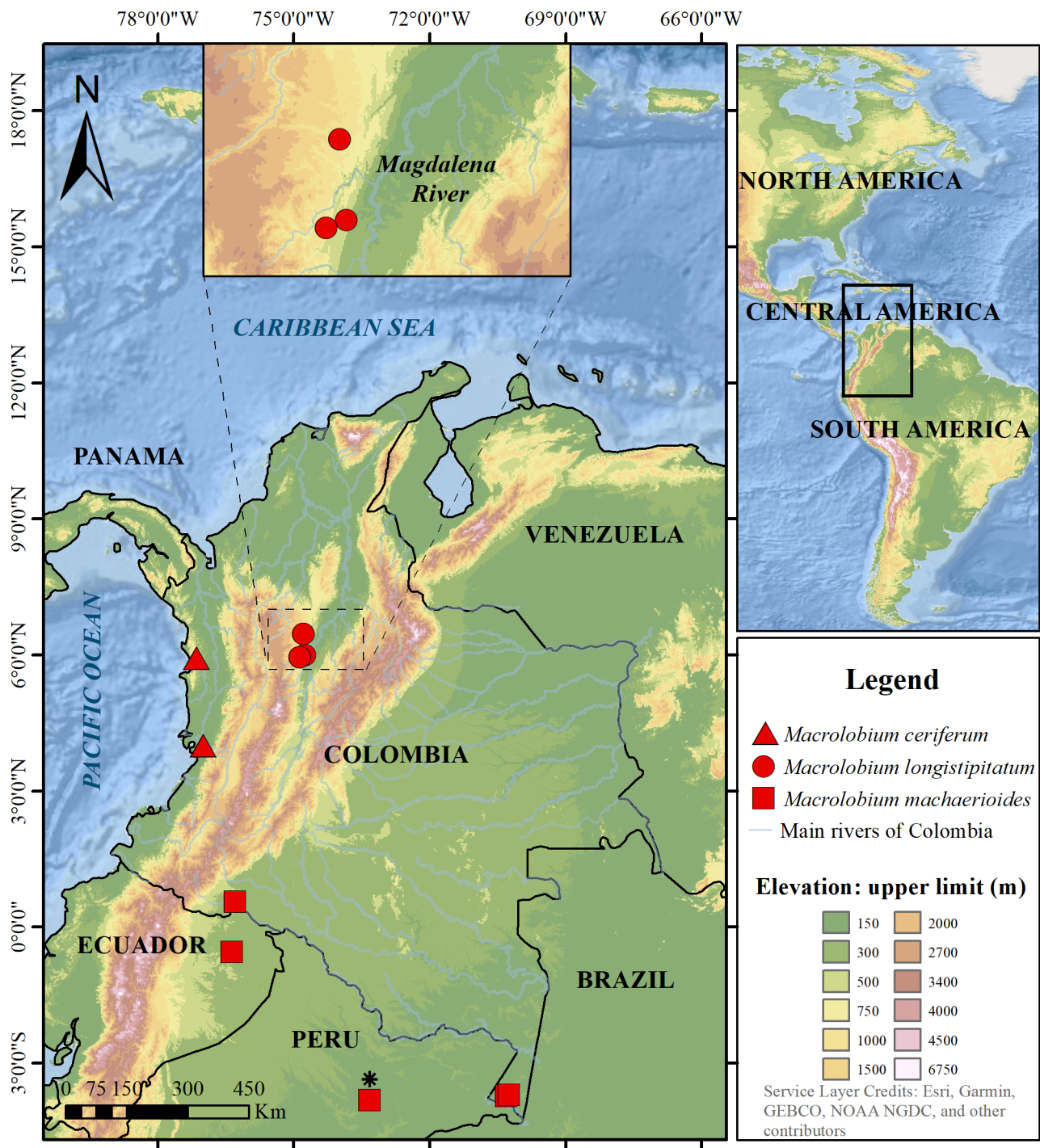


FIGURE 3. Geographical distribution of *Macrolobium ceriferum* and *M. longistipitatum*, and of *M. machaerioides* from Colombia and Ecuador (type locality georeferenced, indicated with \*).

This new species is sympatric with *Macrolobium archeri* Cowan (1953: 334), both restricted to the Pacific biogeographical region in Colombia, however, *M. ceriferum* differs from it by its leaflet blades bullate, discolorous, whitish abaxially (vs. not bullate, concolorous, not whitish in *M. archeri*), its secondary veins raised abaxially, impressed adaxially (vs. flat to slightly raised in both surfaces), its shorter inflorescence ramiflorous to cauliflorous 11.1–18.1 mm long (vs. inflorescence terminal ca. 35 mm long), its inflorescence axis glabrous, scaly waxy (vs. minute puberulous, not scaly waxy), its smaller bracts  $1.3\text{--}1.8 \times 1\text{--}1.5$  mm (vs. bracts ca.  $3 \times 1.5\text{--}2$  mm), its smaller bracteoles  $7.9\text{--}13.3 \times 3.8\text{--}4.8$  mm (vs. ca.  $17 \times 6.5$  mm), its shorter hypanthium (6.1–) 7.7–11.9 mm long, 0.7–1.3 mm long stipitate (vs. ca. 14 mm long, ca. 4.5 mm long stipitate), its smaller sepals  $9\text{--}12.9 \times 1.7\text{--}3.2$  mm (vs.  $20\text{--}22 \times 4.5\text{--}7$  mm), its smaller petals  $11.7\text{--}17.8 \times 4.5\text{--}7.1$  mm, 0.7–1.1 mm long unguiculate (vs. ca.  $28 \times 12$  mm, sessile), sparsely puberulous on the midvein adaxially (vs. glabrous), its shorter filaments 18.5–22.9 mm long (vs. ca. 27 mm long), glabrous (vs. pilose

basally), its shorter anthers 3.1–3.4 mm long (vs. 9–10 mm long), its style puberulous basally to sparsely puberulous apically (vs. glabrous), and its smaller ovary 4.2–4.6 × 1.2–1.5 mm (vs. 5–7 × 2 mm). Furthermore, *Macrolobium ceriferum* shares with *Macrolobium dressleri* Cowan (1973: 451) and *Macrolobium floridum* Karsten (1858: 151) their leaves 2-foliolate, their leaflet blades basally obtuse and truncate to slightly cordate at basiscopic half, their bracteoles and hypanthium with puberulous indumentum, but other characters distinguish *M. ceriferum* from these two species and are provided in Table 1 together to differences from *M. pittieri* and *M. archeri*.

**TABLE 1.** Comparison of the similar species to *Macrolobium ceriferum*.

Character	Species				
	<i>M. archeri</i>	<i>M. ceriferum</i>	<i>M. dressleri</i>	<i>M. floridum</i>	<i>M. pittieri</i>
Leaflets surfaces	not bullate, concolorous, abaxially not whitish, dark-punctate	bullate, discolorous, abaxially whitish and sparsely dark-punctate	not bullate, concolorous, abaxially not whitish, dark-punctate	not bullate, concolorous, abaxially not whitish, dark dots not verified	not bullate, concolorous, abaxially not whitish, epunctate
Leaflets secondary veins	flat to slightly raised in both surfaces	raised abaxially, impressed adaxially	flat in both surfaces	raised abaxially, slightly raised adaxially	slightly raised in both surfaces
Inflorescence length (cm)	ca. 3.5	1.1–1.8	2.7–7	5–7.5*	ca. 3.5
Bracts length (mm)	ca. 3	1.3–1.8	unknown	2–3	ca. 2.5
Inflorescence axis and pedicels surfaces	minute puberulous, not scaly waxy	glabrous, scaly waxy	minute puberulous, not scaly waxy	minute puberulous, not scaly waxy	glabrous, not scaly waxy
Bracteoles indumentum (adaxially)	sparsely puberulous	very sparsely puberulous	puberulous	glabrous	glabrous
Hypanthium indumentum	glabrous	very sparsely puberulous	minute puberulous	puberulous	glabrous
Sepals size (mm)	20–22 × 4.5–7	9–12.9 × 1.7–3.2	11–12 × 5	10–13 × 7–13	17–18.5 × 4
Sepals indumentum	glabrous	sparsely puberulous in both surfaces, ciliate	minute puberulous at the center abaxially, otherwise glabrous	puberulous abaxially, glabrous adaxially	margin sparsely and irregularly ciliate, otherwise glabrous
Petals size (mm)	ca. 28 × 12, sessile	11.7–17.8 × 4.5–7.1, 0.7–1.1 unguiculate	25–30 × 11–15, sessile	25–37 × 15–18, ca. 3 unguiculate	ca. 43 × 15, ca. 5 unguiculate
Filaments length (mm) and indumentum	ca. 27, pilose basally	18.5–22.9, glabrous	24–26, villose	40–45, glabrous	ca. 25, villose basally
Anthers length (mm)	9–10	3.1–3.4	ca. 4	ca. 5	ca. 5
Ovary indumentum	sparsely puberulous marginally, glabrous laterally	puberulous marginally, glabrous laterally	velutinous throughout, villose in the lower suture	shorth pilosulose marginally, puberulous laterally	pilosulose marginally, glabrous laterally

\*These values were taken from the protologue by Karsten (1858), and they are consistent to the known specimens of *Macrolobium floridum*. The values provided by Aymard-Corredor and Romero-González (2021) and Cowan (1953) are apparently misspelled as: “5–15 cm”, which wide range and large upper limit are unusual for species of *Macrolobium* sect. *Stenosolen*, besides, in the specimens cited by these authors, no inflorescences longer than 10 cm long were observed.

*Macrobium archeri* is a widely used name for specimens from both Amazon and Pacific regions in Ecuador and Colombia, however, the specimens review carried out in this study allows conclude that there are different taxonomic entities under this name. *Macrobium archeri* remains endemic to the Pacific biogeographical region in Colombia, in the departments of Choco and Valle del Cauca. All additional records from the Ecuadorian Amazon and even some from Colombian Pacific, correspond to undescribed species that will be published in ongoing studies focused on give clarity about this species group.

The description of *M. ceriferum* increases the number of species for the *M. sect. Stenosolen* to 20.

***Macrobium longistipitatum*** A.M.Trujillo & Londoño-Ech., *sp. nov.* (Figs. 4 & 5)

**Type:**—COLOMBIA. Antioquia. Mun. San Luis: Quebrada “La Cristalina”, Sector NE, 760–770 m, 6°00′00″N, 74°45′00″W, 22 March 1987 (fl), *J. G. Ramírez & D. Cárdenas 708* (holotype: JAUM-19258!, isotypes: HUA-75151!, COL-323419 [digital image!]).

**Diagnosis:**—*Macrobium longistipitatum* differs from all congeners by the following morphological combination: stipules caducous, leaves with numerous leaflets (17–39 pairs) and shorter distance between leaflets (2–5.8 mm long), leaflet blades slightly rounded and occasionally retuse apically, with veins prominent up the fourth-order on both surfaces, secondary veins closely parallel; longer and (sub-) terminal inflorescences (7.5–16.7 cm long including peduncle), shorter peduncle (1.2–3.3 mm long), shorter flowering pedicel (0.7–1.3 mm long), bracteoles glabrous, single petal long-unguiculate, hypanthium cupular with longer stipe (1.7–3.9 mm long stipitate), sepals 4, elliptic to oblong, petalodia 2, staminodes 2, filaments of fertile stamens sparsely villose at base and ovary glabrous.

*Trees* 12–40 m tall, cataphylls 0.4–3.8 × 0.9–3.8 mm, broadly ovate, rounded and obtuse apically, occasionally ripped and apparently emarginate, abaxially puberulous at base, sparsely puberulous towards apex, adaxially glabrous and papillose, papillae conspicuously orange, caducous, margin entire; branchlets striate, villose, glabrescent, indumentum shiny brownish red, whitish with age, branchlet surface dark red, smooth waxy with age, bearing 9–12 leaves; stipules (3.8–) 8.9–14.8 × 1.2–3.5 mm, lanceolate, obtuse and rounded at the apex, sparsely puberulous abaxially, otherwise glabrous, papillose and sparsely smooth waxy adaxially, caducous, veins parallel basally becoming reticulate apically, raised abaxially, flat adaxially, margin entire, papillose. *Leaves* pinnate, with 17–39 pairs of leaflets, distichous, indumentum shiny brownish red but whitish with age throughout leaves; petiole 1.7–5.2 mm long, slightly canaliculate adaxially, villose; rachis 6.0–20.2 cm long, winged adaxially, villose, wings ca. 0.5 mm high, revolute when mature (flat when young), villose, distance between leaflets 2–5.8 mm long; leaflet blades 5.4–23.5 × 2.2–6.6 mm, oblong, lanceolate or ovate, basally obtuse and rounded at basisopic half, truncate to cuneate and auriculate at acroscopic half, apically obtuse and slightly rounded, occasionally retuse, villose at very base and pilosulose on midvein in both surfaces, surfaces otherwise glabrous, concolorous; veins up to fourth-order raised on both surfaces, secondary veins numerous, not clearly differentiable from intersecondary veins, closely parallel, mainly brochidodromous, some veins cladodromous, intersecondary veins present, tertiary veins ramified, margin entire, ciliate. *Inflorescences* as racemes 7.5–16.7 cm long (axis including peduncle), (sub-) terminal, glabrous, surface smooth waxy basally, 1.2–3.3 mm long pedunculate, 36–75-flowered; bracts 6.9–8.6 × 2.5–3.6 mm, elliptic, acute and straight apically, glabrous and sparsely smooth waxy on both surfaces, early caducous, margin entire; pedicel 0.7–1.3 × 0.8–1.1 mm (fruiting pedicels 5.1–8.2 mm long), glabrous, bracteoles 5.6–8 × 1.7–2.9 mm, oblong, obtuse and rounded apically, glabrous and sparsely smooth waxy on both surfaces, longitudinally ridged at medial abaxial surface, opening completely in both sides of the flower but belatedly on the adaxial side, caducous, margin entire; hypanthium 4.5–5.9 × 1.1–2.1 mm, (including stipe), 1.7–3.9 mm long stipitate, cupular, zygomorphic, glabrous, calyx 4-merous, sepals 6.5–9.8 × 2.2–3.9 mm, elliptic to oblong, obtuse and rounded to straight apically, glabrous and papillose in both surfaces, slightly unequal in shape and size, margin entire; single petal 15.2–15.8 × 6–6.1 mm (including claw), obovate, obtuse and rounded apically, 6.3–6.8 mm long unguiculate, villose on midvein adaxially, otherwise glabrous and papillose, occasionally smooth waxy at abaxial surface, margin entire, undulate; petalodia 2, 2.3–6.6 × 0.6–1.9 mm, lanceolate, obovate to oblong, acute and straight apically, glabrous and papillose in both surfaces, borne at each lateral side of single petal; filaments 21.1–27.2 mm long, flattened adaxially, sparsely villose, anthers 1.7–1.8 × 0.7–0.9 mm, ellipsoid, very sparsely villose, papillose; staminodes 2, 0.7–1.1 × 0.2–0.4 mm, ovate to lanceolate, acute and straight to rounded apically, glabrous in both surfaces, alternate with stamens (*i.e.*, at each lateral side of central stamen); gynophore 2.6–4 mm long, glabrous, inserted near the apex of the adaxial wall of the hypanthium, ovary 4.1–4.9 × 1.3–1.8 mm, oblong, glabrous, 3-ovulate, style 20.9–26.6 mm long (including stigma), glabrous, stigma papillose. *Fruits* 14.6–18 × 5.3–6.7 cm (including stipe), 0.6–0.7 cm long stipitate, oblanceolate to obovate, obtuse and rounded basally, obtuse and obliquely truncate apically, glabrous, sparsely dark-punctate, dehiscent, 2–3 seeds per fruit. *Seeds* 2.8–3.4 × 2.2–2.9 cm, (nearly) orbiculate, glabrous, dark brown, surface venulose.

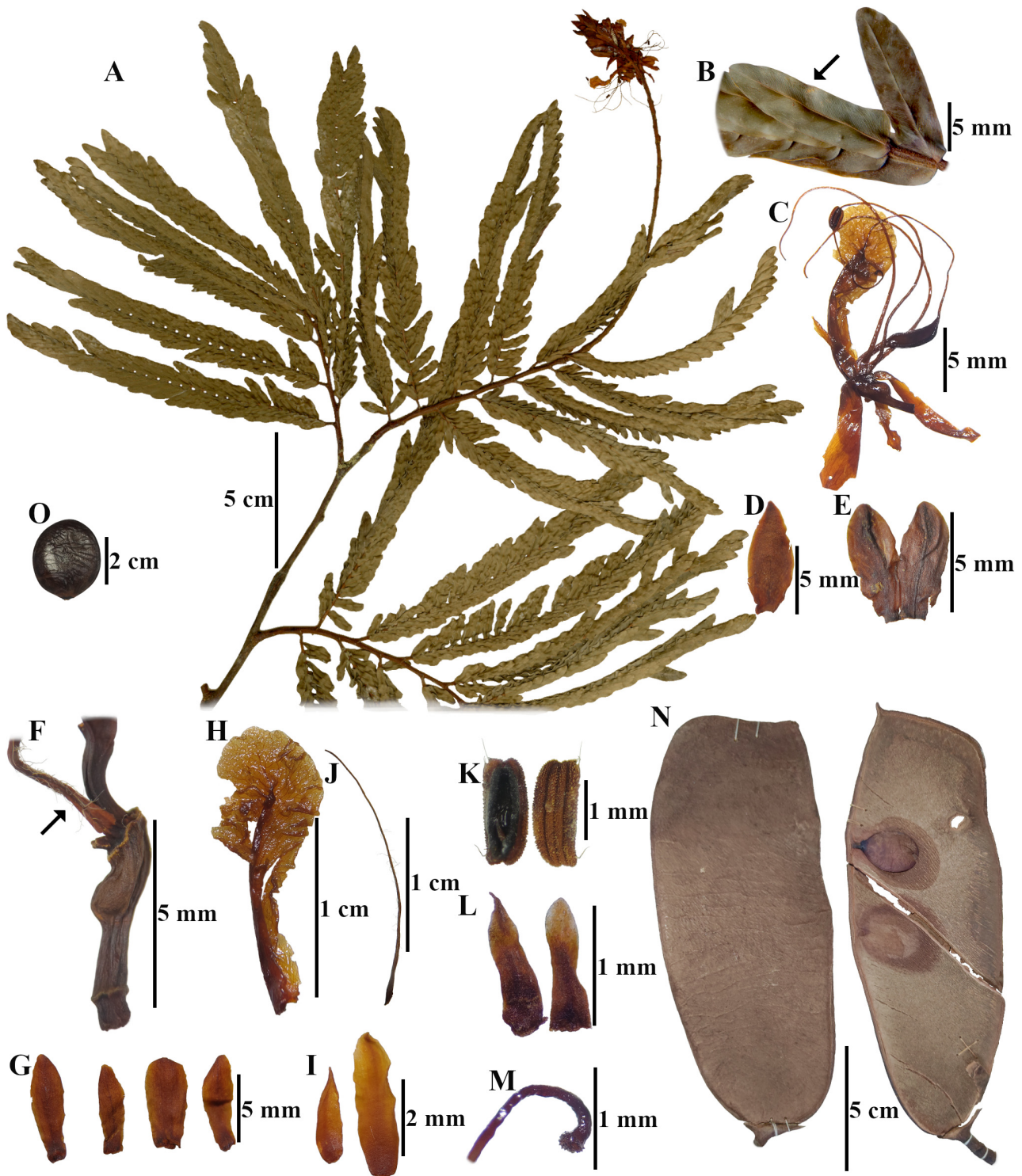




FIGURE 4. Holotype of *Macrobium longistipitatum*.

**Distribution and habitat:**—*Macrobium longistipitatum* is endemic to central Colombia, where occurs in the limits between Andes and Magdalena Valley biogeographical regions at the eastern slopes of the Central Cordillera. It has been collected in the department of Antioquia, on the municipalities of Maceo and San Luis. *Macrobium longistipitatum* inhabits lowlands rainforest, at elevations between 570 and 970 m, under equatorial rainforest climate (Af) according the Köppen-Geiger climate classification (Kottek *et al.* 2006) (Fig. 3).

**Phenology:**—Flowering in March and August and fruiting in February, March, November and December.



**FIGURE 5.** *Macrobium longistipitatum*: **A.** Flowering branch, **B.** Leaflets (arrow indicates the abaxial surface), **C.** Flower, **D.** Bract abaxially, **E.** Bracteoles abaxially, **F.** Pedicel, hypanthium, base of filament and ovary (arrow indicates the indument of filament), **G.** Sepals adaxially, **H.** Petal adaxially, **I.** Petalodia adaxially, **J.** Filament, **K.** Anthers (left abaxial, right adaxial) **L.** Stamines, **M.** Stigma, **N.** Fruit, **O.** Seed. [A, C, H, M from *J. J. Hernandez et al.* 487, B from *P. A. Morales* 308, D–G, I–L from *J. G. Ramirez et al.* 708, N from leaf *A. Cogollo et al.* 223 & right *A. Cogollo et al.* 320, O from *J. G. Ramirez et al.* 631. Digital plate by Y. Londoño.]

**Etymology:**—The epithet *longistipitatum* is derived of the Latin “longus” (long) and “stipitatum” (that has stipe), indicating that this species has a hypanthium long-stipitate, an unique feature for species with pinnate leaves within *M.* sect. *Macrobium*.

**Conservation status:**—*Macrobium longistipitatum* has an area of occupancy (AOO) of 12 km<sup>2</sup>, an extent of occurrence (EOO) of 336 km<sup>2</sup>, and has three known subpopulations. All subpopulations occur outside of protected areas and are located less than 10 km from an urban center. The species is found in very small and fragmented forest patches (<50 km<sup>2</sup>), which are in continuous decline due to agricultural expansion frontier and the deforestation, which is considered one of the main environmental disturbs at the Magdalena Valley Region, giving a category of “deforestation hotspot” in Colombia (Sánchez-Cuervo & Aide 2013). In addition, innumerable limestone mining projects surround the potential habitat of *M. longistipitatum*, which subpopulations are located less than 9 km from the mentioned projects. For these reasons, *M. longistipitatum* is here propose under “Endangered” EN category.

**Additional specimen examined (paratypes):**—COLOMBIA. Antioquia. Mun. Maceo: Vereda San Pedro, Finca San Pedro, 970 m, 6°24'13"N, 74°45'38"W [6°27'43.89"N, 74°47'16.51"W], June 2009 (st), *P. A. Morales et al.* 308 (HUA-188544!); Vereda San Pedro, Reserva Natural Hacienda San Pedro, 925 m, 6°27'43.89"N, 74°47'16.51"W, 27 March 2023 (st), *A.M. Trujillo 1060* (HUA!); *ibid.*, *A.M. Trujillo 1061* (HUA!). Mun. San Luis: Vereda Altavista-Río Claro, 690–710 m, 5°57'23.12"N, 74°51'53.87"W, 5 June 2018 (st), *J. D. Acosta et al.* 726 (MEDEL-67805!); Autopista Medellín-Bogotá, sector Río Samaná-Río Claro, camino hacia la vereda La Primavera, 790 m, 13 November 1982 (fr), *A. Cogollo & C. C. Estrada 223* (JAUM-12798!, JAUM-12799!, MO-3094192 [n.v.]); Autopista Medellín-Bogotá, sector Río Samaná-Río Claro, Puente sobre la quebrada La Cristalina, 790 m, 19 December 1982 (fr), *A. Cogollo & C. C. Estrada 320* (JAUM-13135!, MO-3094193 [n.v.]); Autopista Medellín-Bogotá, Sector Río Samaná-Río Claro, Carretera Autopista-Altavista, 700 m, 5°57'19.40"N, 74°51'54.82"W, 24 August 1982 (fl), *J. J. Hernández & S. E. Hoyos 487* (COL-281685 [digital image!], COL-281686 [digital image!], HUA-16333!); Quebrada “La Cristalina”, Sector SE, 570–770 m, 6°00'00"N, 74°45'00"W, 23 February 1987 (fr), *J. G. Ramírez & D. Cárdenas 631* (COL-323164 [digital image!], HUA-75276!, JAUM-20980!, MO-4000714 [n.v.]).

**Notes:**—*Macrobium longistipitatum* belongs to *M.* sect. *Macrobium* due to its bracteoles opening completely in both side of the flower, hypanthium cupular and petal long-unguiculate. Although the bracteoles remain attached at early anthesis (as shown in Fig. 5-E), these opening completely with age and even are easily detach when handled.

The specimens of *Macrobium longistipitatum* were previously identified under the names *Macrobium gracile* Spruce ex Bentham (1870: 223) and *Macrobium machaerioides*. Due fact, *M. longistipitatum* can be confused with these two species by its leaves with numerous leaflets, the base of leaflets auriculate on the acroscopic half (shared with *M. machaerioides*), its shorter pedicel, and filaments indumented at the base (*M. machaerioides* villose, *M. gracile* villosulose), however, the new species can be differentiated from *M. gracile* by both vegetative and reproductive features: its leaflet veins up to fourth-order raised on both surfaces (vs. secondary to high-order veins strongly obscure in both surfaces, not discernable, immersed in a thick smooth waxy cover abaxially), its inflorescence (sub-) terminal, 7.5–16.7 cm long, axis glabrous (vs. axillary, 1–6.5 cm long, axis puberulous), its bracteoles glabrous (vs. at least pilose, pilosulose, puberulous or villosulose), its sepals 4 (vs. sepals 5), its ovary glabrous (vs. villose or pilose marginally, glabrous laterally). From *Macrobium machaerioides* the new species can be recognized by its leaves with 17–39 pairs of leaflets (vs. 13–21), its leaflets slightly rounded, occasionally retuse apically, concolorous (vs. strongly emarginate apically, discolorous), its leaflet veins raised up to fourth-order on both surfaces (vs. secondary to high-order veins strongly obscure in both surfaces, not discernable, immersed in a thick smooth waxy cover abaxially), its leaflet margin ciliate (vs. glabrous), its longer and (sub-) terminal inflorescence, 7.5–16.7 cm long, axis glabrous (vs. axillary, 1.5–3 cm long, axis puberulous), its bracts 6.9–8.6 × 2.5–3.6 mm (vs. 1.5–2 × 1 mm), its bracteoles glabrous (vs. short-pilosulose and puberulous abaxially, villose adaxially), its hypanthium 4.5–5.9 mm long, long-stipitate (vs. 1 mm long, sessile), its sepals 4 (vs. sepals 5), its ovary glabrous (vs. villose marginally, glabrous laterally). *Macrobium longeracemosum* Amshoff (1948: 389), is also similar to the new species, see Table 2 for the differences between these species.

The new species represents the first and unique record of the *M.* sect. *Macrobium* for the Inter-Andean Valleys of the northern Andes (all other species belonging it occurs at east of the Andes, mainly at Amazon, Guianas and Atlantic Forest regions), which may have important implications for future biogeographical and evolutionary studies in the genus. All records of *M.* sect. *Macrobium* from west of Andes in Ecuador and Colombia provided in the distribution map by Murphy *et al.* (2018) are wrongly georeferenced or misidentified; due fact, their specimen labels indicate that were collected at east of Andes in Amazon Region and others no correspond to the identification provided. Additionally, the records for the section at Inter-Andean Valleys of central Colombia correspond to *M. longistipitatum*. The specimen *R. Espinoza 92* (MO) identified as *Macrobium microcalyx* Ducke (1932: 729) and cited by Murphy *et al.* (2018) from Costa Rica was well georeferenced but was not available to examine in this study, however, its identification seems doubtful. This specimen and some duplicates were previously identified under genus *Clusia* Linnaeus (1753: 509) and its field observations (Epiphyte to 15 m. Fruit immature green) matched with this genus; furthermore, *M.*

*microcalyx* was described based on Amazonian specimens. While this specimen and its duplicates are not observed, it is not possible to clarify its identity, or ensure that it is a mixed collection, or that it is an error in databases.

The description of *M. longistipitatum* increases the number of species for *M.* sect. *Macrolobium* to 57.

**TABLE 2.** Comparison of the similar species to *Macrolobium longistipitatum*.

Character	Species			
	<i>M. gracile</i>	<i>M. longeracemosum</i>	<i>M. longistipitatum</i>	<i>M. machaerioides</i>
Number of leaflets pairs	10–40	12–19	17–39	13–21
Leaflets apex shape	rounded to truncate, usually emarginate or occasionally minutely mucronate to apiculate	rounded to emarginate	slightly rounded, occasionally retuse	strongly emarginate
Leaflets base shape at acroscopic half	not auriculate	not auriculate	auriculate	auriculate
Leaflets veins	secondaries to high-order strongly obscure in both surfaces	slightly obscure abaxially, raised up to fourth-order adaxially	raised up to fourth-order on both surfaces	secondaries to high-order strongly obscure in both surfaces
Inflorescence position	axillary	axillary	terminal to occasionally subterminal	axillary
Inflorescence length (cm) and axis indumentum	1–6.5, puberulous	3–12, lanulose-puberulous	7.5–16.7, glabrous	1.5–3, puberulous
Bracts size (mm)	1.5–3 × 1–2.5	ca. 1 × 0.7	6.9–8.6 × 2.5–3.6	1.5–2 × 1
Pedice length (mm)	1–3	1.5–3	0.7–1.3	1–2
Bracteoles indumentum	at least pilose, pilosulose, puberulous or villosulose	lanulose-puberulous abaxially, glabrous adaxially	glabrous	short-pilosulose and puberulous abaxially, villose adaxially
Hypanthium length (mm)	1–1.5, sessile	ca. 2, ca. 0.5 stipitate	4.5–5.9, 1.7–3.9 stipitate	ca. 1, sessile
Calyx merosity	5-merous	5-merous	4-merous	5-merous
Filaments indumentum	villosulose basally	glabrous	sparsely villose	villose
Ovary indumentum	villose or pilose marginally, glabrous laterally	pilose marginally, glabrous laterally	glabrous throughout	villose marginally, glabrous laterally
Fruit size (cm)	5.5–11.5 × 2.5–5	11 × 3	14.6–18 × 5.3–6.7	4.8–6.9 × 2.9–4.5

## New chorological record for the flora of Colombia and Ecuador

### *Macrolobium machaerioides* Killip & J.F.Macbr.

**Type:**—PERU. Loreto: Mishuyacu, near Iquitos, forest, 100 m, October–November 1929 (fl), *G. Klug 547* (holotype: US-1455546 [digital image!], isotypes: F-613442 [digital image!], F-1116544 frag. [digital image!], NY barcode-4473 [digital image!]).

This species is described from Peruvian Amazon in Macbride (1943). In the protologue and in the revision of Cowan (1953), the fruits morphology was unknown. Subsequently, R. S. Cowan determined a fruiting specimen in 1985, recorded from Huánuco, Perú, by J. Schunke in 1966 (*J. Schunke 1058* [NY!]). This is the first known collection with fruits for the species, but its morphology stills unpublished heretofore.

*Macrolobium machaerioides* is easily recognizable by its leaflets auriculate basally at the acroscopic half and its leaflet apex strongly emarginate (Fig. 6). It has been recently found in the Amazon region in the departments of Amazonas and Putumayo in Colombia, and in province of Napo in Ecuador (Fig. 3).

Mancera (2016) report to *Macrolobium machaerioides* from the Inter-Andean Valleys of the department of Antioquia, Colombia, however, this record was based on specimens (*A. Cogollo et al.* 223 [JAUM, 2 sheets; MO]) that belong to new species described here, *M. longistipitatum*.



FIGURE 6. Specimen of *Macrolobium machaerioides*, from *A. Rudas et al.* 3471 (HUA).

**Emended fruit description:**—Fruits 4.8–6.9 × 2.9–4.5 cm (including the stipe), 0.3–0.6 cm long stipitate, obovate, obtuse and rounded basally, obtuse and rounded to truncate apically, sparsely villose marginally, otherwise glabrous, indehiscent, inflated in the seminal cavity. *Seeds* 1–2, not examined (few fruits available).

**Additional specimens examined:**—COLOMBIA. Amazonas. Mun. Leticia: Parque Nacional Natural Amacayacu, Sector sureste del parque, parcela permanente “U” En bosque de tierra firme sobre suelos arcillosos, 80–110 m, 3°43′10″S, 70°18′25.8″W, 9 February 2005 (st), *A. Prieto et al.* 2983 (FMB-81392!); Parque Nacional Natural Amacayacu, Alrededores de la quebrada Agua Pudre en bosque de tierra firme, Parcela E, No. 10, 120 m, 3°42′00″S, 70°15′00″W, 21 March 1992 (st), *A. Rudas et al.* 3408 (HUA-114023!, FMB-28265!, MO [n.v.]); *ibid.*, Parcela E, No. 11, 22 March 1992 (fr), *A. Rudas et al.* 3471 (HUA-114057!); Parque Nacional Natural Amacayacu, 100 m, 3°47′00″S, 70°15′00″W, 1991 (st), *A. Rudas et al.* 4100 (FMB-39389!, MO [n.v.]); Parque Nacional Natural Amacayacu, Alrededores de la quebrada Agua Pudre en bosque de tierra firme, Transecto U11-U12, 120 m, 3°42′00″S, 70°15′00″W, 30 March 1992 (st), *A. Rudas et al.* 4131 (HUA-113712!). Putumayo. Mun. Puerto Asís: Vereda Canacas, 230 m, 0°33′19.95″N, 76°17′54.19″W, 30 May 2017 (st), *P. Díaz* 22 (TOLI-18422!). ECUADOR. Napo: Añangu, NW corner of the “Parque Nacional Yasuní”, Primary terra firme forest on permanent study plot S of SEF point 51, on the highest plateau in the area, 355–365 m, 00°33′00″S, 76°22′00″W, 1–15 February 1986 (fr), *J. Korning & K. Thomsen* 47735 (US-3281752 [digital image!]). PERU. Huanuco: Carretera a Monzón in tall forest, 833 m, 11 February 1966 (fr), *J. Schunke* 1058 (NY barcode-3196918 [digital image!]).

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