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# Endemic *Peperomia* (Piperaceae) novelties from eastern Madagascar

Guido Mathieu

## Abstract

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Three endemic *Peperomia* Ruiz & Pav. species (*Piperaceae*) from the eastern Malagasy rainforests are presented as new to science. They are described, illustrated, compared with presumed closest relatives and their conservation status assessments are provided. *Peperomia irrasa* G. Mathieu seems to be restricted to the Anjanaharibe massif, while *Peperomia robusta* G. Mathieu is reported from the National Park of Zahamena to the Loky-Manambato Protected Area (Daraina). *Peperomia variilimba* G. Mathieu is an apparently common species occurring from the Tsaratanana massif to Analamazaotra. These novelties bring the number of accepted *Peperomia* species on Madagascar to 42.

## Résumé

MATHIEU, G. (2020). Nouvelles espèces endémiques de *Peperomia* (Piperaceae) de l'est de Madagascar. *Candollea* 75: 75–82. En anglais, résumés anglais et français. DOI: <http://dx.doi.org/10.15553/c2020v751a7>

Trois endémiques nouvelles pour la science du genre *Peperomia* Ruiz & Pav. (*Piperaceae*), provenant des forêts tropicales humides de l'est de Madagascar, sont décrites, illustrées et comparées avec leurs espèces parentes. Les statuts de conservation respectifs sont déterminés. La présence de *Peperomia irrasa* G. Mathieu est apparemment restreinte au massif d'Anjanaharibe et celle de *Peperomia robusta* G. Mathieu est indiquée pour le Parc National de Zahamena dans l'aire protégée de Loky-Manambato (Daraina). *Peperomia variilimba* G. Mathieu est une espèce communément répandue du massif de Tsaratanana jusqu'à Analamazaotra. En incluant les présentes nouveautés, le nombre des espèces acceptées de *Peperomia* à Madagascar est de 42.

## Keywords

PIPERACEAE – *Peperomia* – Madagascar – New species – Taxonomy

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## Introduction

*Peperomia* Ruiz & Pav. (Piperaceae) is a giant, pantropical genus of terrestrial and epiphytic herbs. As of April 2020 it includes 1625 accepted taxa, 1455 species plus 172 forms and varieties (MATHIEU, 2001–2020). The genus shows its highest diversity in the neotropics. In the paleotropics, its diversity density is striking on the Malagasy Island. With the three novelties here presented, there are currently 42 species recognized (MADAGASCAR CATALOGUE, 2020), about twice the number known from the entire African continent. However, the Malagasy *Peperomia* richness remained underestimated for a long time. Field work conducted in 2001 and subsequent scrutinization of herbarium collections already revealed ten new species (MATHIEU, 2003a, 2003b, 2006). Three more are presented here as new to science. They are described, illustrated, compared with morphologically close taxa and assigned to subgenus.

Two of the three newly described species were observed *in situ* and their type collections were made during the three month Malagasy *Peperomia* expedition in 2001. The third species is an herbarium finding, discovered during subsequent scrutinization of about 1700 herbarium specimens of Malagasy *Peperomias* (at B, BM, BR, E, G, GENT, GH, HUA, JE, K, L, LY, M, MO, P, PR, S, TAN, US, W, WAG, Z). The new species have been compared macroscopically and by light microscope with similar taxa.

Digital images of the types of species mentioned in this article can be accessed online by the TRGP (Taxonomic Repository of the genus *Peperomia*) (MATHIEU, 2001–2020) and distribution maps by the MADAGASCAR CATALOGUE (2020). Calculations of extent of occurrence (EOO) and area of occupancy (AOO) have been conducted with Geocat (BACHMANN & MOAT, 2012).

## Taxonomy

*Peperomia irrasa* G. Mathieu, **sp. nov.** (Fig. 1).

**Holotypus:** MADAGASCAR. **Reg. SAVA [Prov. Antsiranana]:** massif de l'Anjanaharibe (pentes et sommet N), W d'Andapa, [14°43'S 49°30'E], 1700 m, 10.XII.1950–3.I.1951, *Humbert, Capuron & Cours 24638* (P [P00106743]!; iso-: BR [BR000000651342]!).

*Peperomia irrasa* G. Mathieu differs from *P. nicolliae* G. Mathieu and *P. silvicola* C. DC. by the pubescent stem and petiole and by the emarginate leaf apex.

Perennial terrestrial herb, 10–15(–20) cm tall, spreading by stolons. Stem slender, simple or 1–2 branched, erect or basally decumbent and there rooting at the nodes, internodes 1–3 cm long, pubescence moderately dense, trichomes very short, two internodal ribs faintly visible, reddish. Leaves 2–4(–5)-verticillate; petiole 2–4 mm long, sulcate, sulcus pubescent, reddish;

lamina succulent, obovate, (0.5–)1–1.7 × (0.3–)0.5(–1) cm, length/width ratio (1.1–)1.4(–1.9), apex rounded, distinctly emarginate, base acute to cuneate, 3-palmatinerved, only main nerve distinct, adaxially nerves slightly impressed, abaxially main nerve slightly protruding basally, adaxially discretely pubescent at the main nerve (most dense in the basal part) and in a periapical zone, abaxially glabrous, sometimes except for a small part along the base of the main nerve, margin apically ciliate, bright green adaxially, whitish green abaxially. Inflorescence 1–3 terminal spadices, peduncle ca 1 cm long, rachis 3–4 cm long in anthesis. Mature fruit not seen.

**Etymology.** – The specific epithet *irrasa* (“unshaven”) refers to the minute pubescent indument of stem and petioles, resembling a stubble beard (Fig. 1B), a key character of the species.

**Distribution and habitat.** – The new species is known from only three collections (*Cours 3861* being probably a duplicate of one of Humbert's), made during the same expedition in December 1951– January 1952 in the Anjanaharibe massif in the region of SAVA and has apparently not been reported since. It occurs at an altitude of 1600–1800 m, in the upper part of the medium altitude moist evergreen forest (sensu GAUTIER et al., 2018) corresponding to the “Sylve à Lichen” of HUMBERT (1955). It is believed to be endemic from the Anjanaharibe massif. The collections show only young inflorescences without mature fruits.

**Conservation status.** – *Peperomia irrasa* is known from three (most likely two) old specimens collected most likely in a single location from Anjanaharibe Sud National Park. Despite the very restricted distribution and the absence of recent collection, there appear to be no current threats, and thus *P. irrasa* is assigned a status of “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – *Peperomia irrasa* can easily be distinguished from other Malagasy species with small opposite or verticillate leaves by the distinct emarginate leaf apex. The short erect trichomes of the stem provide confirmation. *Peperomia nicolliae* G. Mathieu exhibits longer trichomes, curved in apical direction, whereas *P. silvicola* C. DC. exhibits a villous indument. One other Malagasy *Peperomia* shows leaves with a distinct emarginate leaf apex: *P. thomeana* C. DC., but that species shows alternate leaves. *Peperomia irrasa* is considered as belonging to *Peperomia* subg. *Micropiper* (Miq.) Miq., as it is the case with *P. nicolliae* and *P. silvicola* (FRENZKE et al., 2015).

**Paratypes.** – MADAGASCAR. **Reg. SAVA [Prov. Antsiranana]:** Anjanaharibe, [14°43'S 49°30'E], 1700 m, 25.XII.1950, *Cours et al. 3861* (P, TAN); *ibid. loco*, 1600–1800 m, 10.XII.1950–3.I.1951, *Humbert et al. 24635* (BR, P).

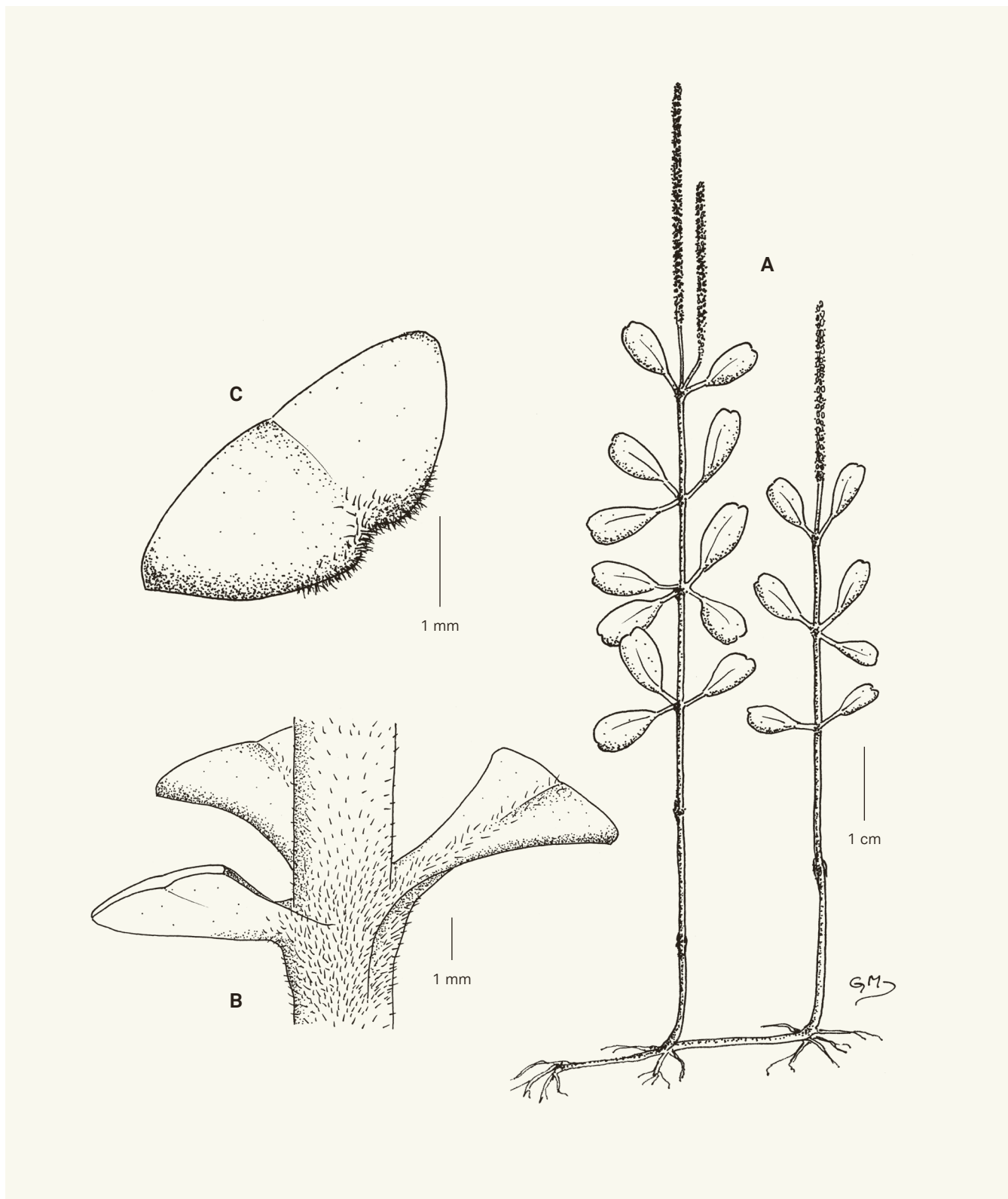


Fig. 1. – *Peperomia irrasa* G. Mathieu. **A.** General habit; **B.** Detail of node; **C.** Detail of leaf apex. [Humbert 24638, BR, P] [Drawing: G. Mathieu]

*Peperomia robusta* G. Mathieu, **sp. nov.** (Fig. 2, 3).

**Holotypus:** MADAGASCAR. **Reg. Alaotra-Mangoro [Prov. Toamasina]:** Zahamena NP, NW border, 7 km SE of Antanandavao, along trail to camp 1 (1300 m N of camp-site), 17°29'41"S 48°43'59"E, 1300 m, 26.IX.2001, *Mathieu 446* (BR [BR000000916063]!; iso-: B [B100001403]!, G [G00341878]!, MO-5662979!, TAN!).

*Peperomia robusta* G. Mathieu differs by the pilose indument from *P. portulacoides* (Lam.) A. Dietr., an essentially glabrous species, and from *P. pedunculata* C. DC., of which the indument is characterized by short erect trichomes.

Perennial terrestrial herb, occasionally epiphytic, up to 40(–50) cm tall. *Stem* simple or 1–3 branched, erect or basally decumbent, terete, up to 8 mm diam. at the base, internodes 4–8 cm, pilose, dark red. *Leaves* opposite or 3–4-verticillate; petiole 8–10 mm long, pilose, red; lamina coriaceous to succulent, broad obovate, sometimes elliptic, 3–7 × 2–4 cm, smallest at the base of the stem, length/width ratio ca 1.6, apex rounded, base obtuse to acute or cuneate, 3-nerved, often only central nerve distinct, slightly impressed adaxially, both sides loosely pilose (usually more dense abaxially or at the nerves) or glabrescent, rather dark dull green adaxially, pale green abaxially, margin entire, ciliate, more dense in the apical half. *Inflorescence* 1 terminal spadix or 2–3(–4) together; peduncle 1–2 cm long, basally pilose; rachis 5–10 cm long, glabrous, loosely to moderately densely flowered, floral bracts orbicular or slightly elliptic. *Fruit* globose, ca. 0.5 mm diam., subbasally attached, entirely covered with sticky papillae, individual papilla longer than wide, style wide conical, horseshoe shaped ridge around subapical stigma, highest adaxially, open abaxially, conical pseudopedicellate when mature.

**Etymology.** – The specific epithet refers to the general habit of the plant. It is one of the largest *Peperomia* species of Madagascar.

**Distribution and habitat.** – The new species is endemic to North-East Madagascar from the National Park of Zahamena to the Loky-Manambato Protected Area (Daraina) where it occurs in medium altitude moist evergreen forests at an elevation of 700–1400 m. Because of its distribution and the number of currently known collections it is not considered as a rare species.

**Conservation status.** – *Peperomia robusta* is known from 15 locations, all but two are encompassed in the protected area network (Anjanaharibe Sud, COMATSA Nord, Corridor Ankeniheny Zahamena, Loky Manambato, Manongarivo, Marojejy, Masoala and Zahamena). With an Extent of Occurrence (EOO) of c. 59,000 km<sup>2</sup>, an Area of Occupancy (AOO) of 60 km<sup>2</sup> and no current threats, *P. robusta* is assigned a status

of “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

**Notes.** – *Peperomia robusta* resembles *P. portulacoides*, which is essentially glabrous. However, varieties of the latter species with indument have been published: *P. portulacoides* var. *pilosa* Baker from the Seychelles and *P. portulacoides* var. *hirtella* Wawra from Sri Lanka. Var. *pilosa* shows a short, erect indument. Its synonymization with *P. tomentosa* (Vahl) A. Dietr. (FRIEDMANN, 2011: 78) is questionable. *Peperomia tomentosa* not only exhibits a villous indument but is also distinct in its (sub)sessile leaves. Var. *hirtella* shows much smaller leaves (1–1.5 cm long). It is only known from its type collection and probably belongs to *P. heyneana* Miq. *Peperomia robusta* has to be distinguished from *P. pedunculata*, known from La Réunion, which does show an indument, characterized however by short erect trichomes. Moreover, the leaves of that species are smaller, 2–4(–5) cm long, elliptic, and usually show an obtuse apex. At last, there is some resemblance in general habit with *P. mantadiana* G. Mathieu. That is a glabrous species showing elliptic-lanceolate leaves. *Peperomia robusta* is considered as belonging to *Peperomia* subg. *Micropiper*, as it is the case with *P. portulacoides* and *P. pedunculata* (FRENZKE et al., 2015).

**Paratypes.** – MADAGASCAR. **Reg. Alaotra-Mangoro [Prov. Toamasina]:** Mount Ankaroka, [17°48'S 48°32'E], 1200–1400 m, X.1937, *Humbert 17511* (P); Zahamena AP, massif de l'Andrangovalu, [17°40'S 48°45'E], 1200–1300 m, X.1937, *Humbert 17755* (P); *ibid. loco*, entre les rivières Sahatavy et Sivora, 17°36'34"S 48°47'10"E, 709 m, 2.X.2001, *Ratovoson 547* (MO). **Reg. Analanjirofo [Prov. Toamasina]:** Masoala NP, N ridge of Ambohitsitondroinan/Mahalevona, 25°26'16"S 49°57'22"E, 1190 m, 23.II.2003, *Lowry 6126* (MO, P). **Reg. Atsinanana [Prov. Toamasina]:** Rahobevara massif, [17°59'59"S 48°46'57"E], 1250 m, 12.III.1951, *Cours 4330* (P, TAN). **Reg. DIANA [Prov. Antsiranana]:** Manongarivo, 14°02'S 48°18'E, 1050 m, 15.XI.1994, *Gautier 2555* (BR, G, TAN). **Reg. SAVA [Prov. Antsiranana]:** Marojejy massif, NE side, [14°25'S 49°43'E], 800–1200 m, 25.I.–25.II.1949, *Humbert 23165* (BR, P); *ibid. loco*, W side, 1000–1200 m, 9.XI.–2.XII.1939, *Humbert 31394* (P); vallée inférieure de l'Androranga, Mt Anjenabe, [14°17'S 49°46'E], 1100–1130 m, 3–7.XII.1950, *Humbert 2416Ibis* (P); Marojejy PA, along E trail to summit, 14°26'20"S 49°44'50"E, 1150 m, 25.X.2001, *Mathieu 485* (BR, MO, P, TAN); Distr. Vohemar, forêt de Binara, Daraina, 13°16'38"S 49°35'21"E, 1012 m, 20.XI.2005, *Nusbaumer 1639* (BR, G, K, MO, TEF); Distr. Andapa, forêt de Betaolana, 11 km NW of Ambodiangezoka (camp 2), 14°36'22"S 49°25'30"E, 1200 m, 22.X.1999, *Rakotomalaza 2025* (G); Marojejy, 14°29'S 49°38'E, 1300–1500 m, 21–22.I.1994, *Rasoavimbaboka 17* (MO, TAN); Andranomilolo, forêt située env. 13 km à l'W d'Andranopositra, 14°19'21"S 49°17'46"E, 1380 m, 7.XI.2006, *Ravelonarivo 1955* (BR, MO, P, TAN).

*Peperomia variilimba* G. Mathieu, **sp. nov.** (Fig. 4, 5).

**Holotypus:** MADAGASCAR. **Reg. Alaotra-Mangoro [Prov. Toamasina]:** Zahamena, 17°30'01"S 48°44'00"E, 1250 m, 26.IX.2001, *Mathieu 447* (BR [BR000000916064, BR000000916124]!; iso-: B [B100001404]!, BM!, G [G00341879]!, K!, MO-5662978!, P [P00547548]!, TAN!).

*Peperomia variilimba* G. Mathieu differs from *P. villilimba* C. DC. in the alternate leaf position.

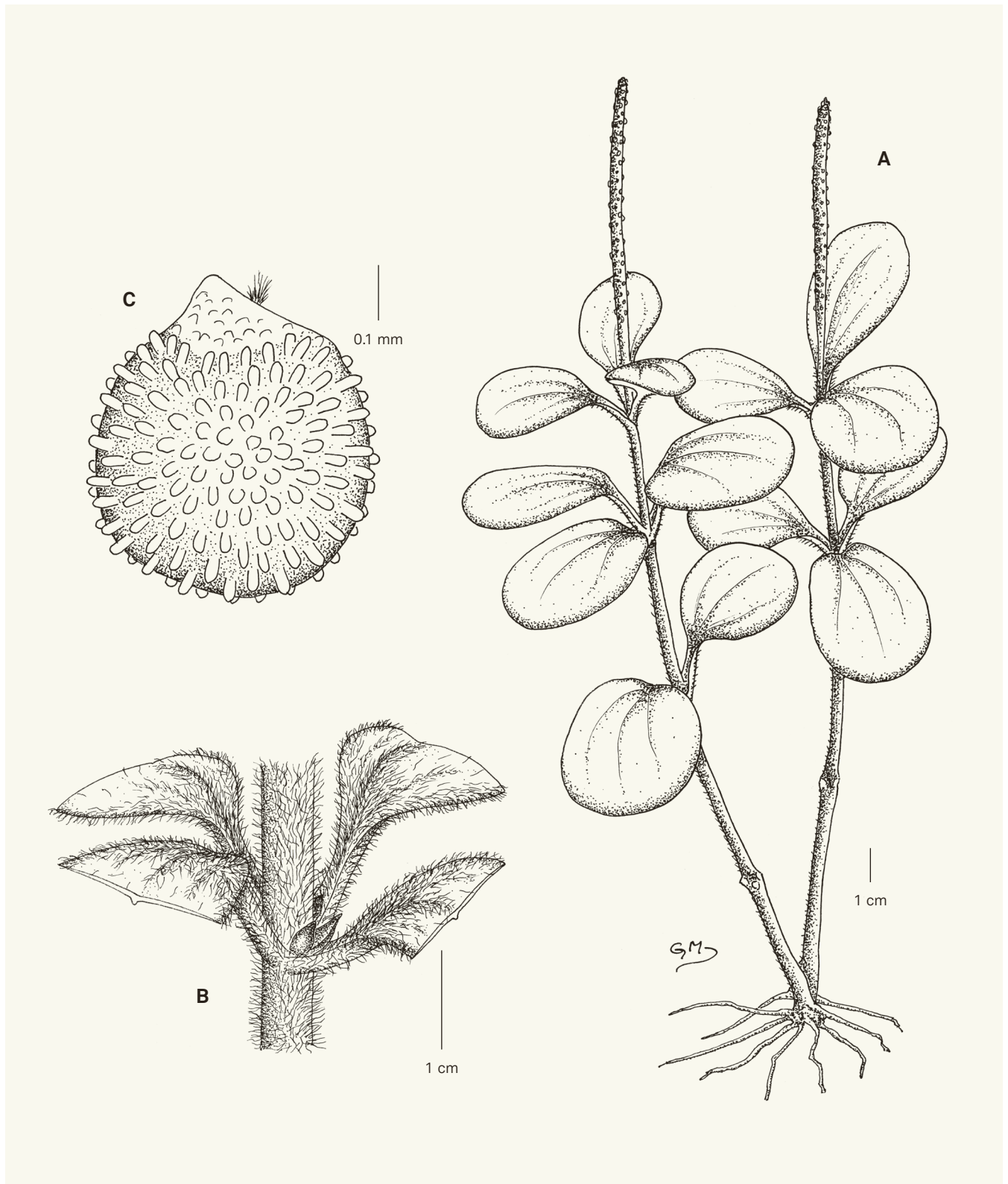


Fig. 2. – *Peperomia robusta* G. Mathieu. A. General habit; B. Detail of node; C. Fruit (lateral view).  
[A, B: Mathieu 446, BR; C: Mathieu 485, BR] [Drawing: G. Mathieu]



**Fig. 3.** – *Peperomia robusta* G. Mathieu. **A.** General habit; **B.** Apical part of flowering stem; **C.** Infructescence. [Nusbaumer 1639] [Photos: L. Nusbaumer]

Perennial *herb*, epiphytic on mossy trunks. *Stem* slender, creeping, scandent or pendent, flowering branches apically erect, simple or moderately branched, rooting from the nodes, pilose, internodes 1–4 cm. *Leaves* alternate, exceptionally subopposite; petiole pilose, up to 11 mm long; lamina thin to succulent, orbicular, elliptic, obovate or oblanceolate, 0.9–3.0 × 0.9–1.9 cm, length-width ratio 1–2.7, pilose, usually more densely around petiole insertion, sometimes glabrescent, apex rounded or obtuse, exceptionally retuse, the very tip sometimes slightly emarginate, base rounded, obtuse or acute, margin entirely ciliate. *Inflorescence* a solitary (sometimes two) terminal spadix; peduncle pilose, ca 1.5 cm long, somewhat widening near the rachis; rachis 3–7 cm long, glabrous; floral bract orbicular to elliptic, centrally peltate, ovary ellipsoid. *Fruit* globose, ca 0.5 mm diam., partially sunken in rachis, pericarp entirely covered with sticky papillae, individual papilla as long as wide, style flat conical, stigma apical, pseudopedicellate when mature.

*Etymology.* – The specific epithet refers to the quite variable leaves, as well in shape as in succulence and indument density.

*Distribution and habitat.* – The new species is endemic to the medium altitude moist evergreen forests at an elevation range from 900 to 2300 m. *Peperomia variilimba* is known from the Tsaratanana massif in the North-East to Analamazaotra in the Centre East. It is apparently common.

*Conservation status.* – *Peperomia variilimba* is known from eleven locations, all of which are encompassed in the protected area network (Analamazaotra, Anjanaharibe-Sud, COMASTA Nord, Mantadia, Torotorofotsy, Tsaratanana and Zahamena). With an Extent of Occurrence (EOO) of c. 21,000 km<sup>2</sup>, an Area of Occupancy (AOO) of 36 km<sup>2</sup> and no current threats, *P. variilimba* is assigned a status of “Least Concern” [LC] using the IUCN Red List Categories and Criteria (IUCN, 2012).

*Notes.* – In its general habit *P. variilimba* resembles *P. villilimba*. However, the latter species is characterized by an opposite leaf position. The taxonomic concept of *P. villilimba* has been rather confusing for almost a century due to an inaccurate description of its leaf position in the protologue. The holotype of *P. villilimba* (Baron 2606, P) was considered by Casimir de Candolle as exhibiting alternate leaves (CANDOLLE, 1911: 48). The specimen concerned is showing only 6 leaves, which were pressed and mounted with considerable superposition. After remounting (straightening of the 2 superposed spadices and turning the specimen so that its former back is in front now) the opposite leaf position became evident. This position is also obvious in the isotype at K, apparently never seen by Candolle. In *P. villilimba* there is a marked length difference between the indument of the leaf surfaces (long) and of the margin (short). That difference is lacking in *P. variilimba*. The general habit of *P. variilimba* also resembles *P. rotundilimba* C. DC., which shows an opposite (or 3-verticillate) leaf position. *P. variilimba*

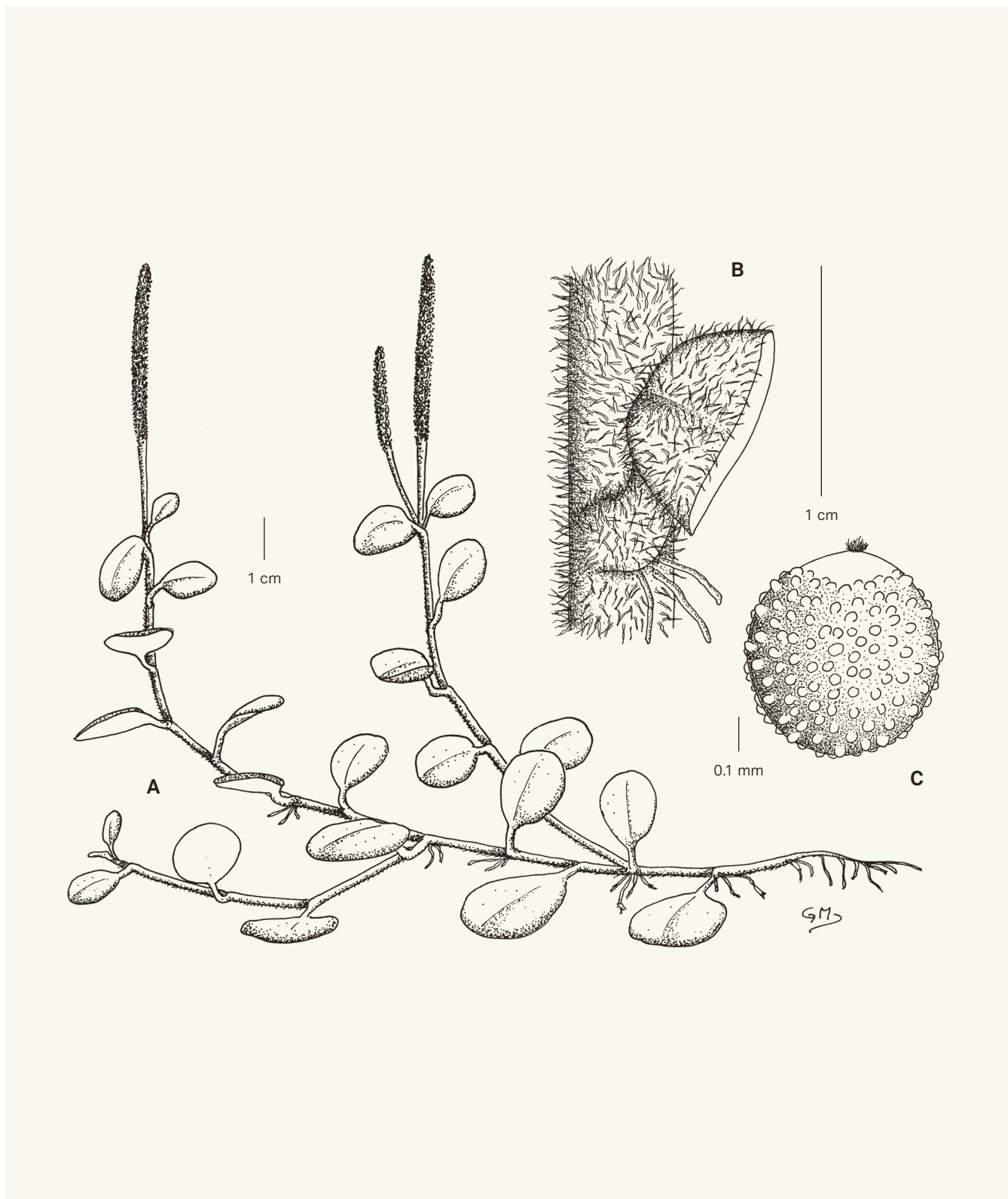


Fig. 4. – *Peperomia variilimba* G. Mathieu. **A.** General habit; **B.** Detail of node; **C.** Fruit (lateral view).  
[Mathieu 447, BR] [Drawing: G. Mathieu]





Fig. 5. - General habit of *Peperomia variilimba* G. Mathieu. [Photo: J.K. Spooner]

is considered as belonging to subgenus *Micropiper*, as it is the case with *P. villilimba* (FRENZKE et al., 2015).

*Paratypi.* – MADAGASCAR. **Reg. Boeny [Prov. Mahajanga]:** Distr. Andapa, Anjanaharibe-Sud RS, around camp 2, 14°44'52"S 49°27'58"E, 1350 m, 18.X.2001, *Mathieu 468* (BR, G, MO, P, TAN). **Reg DIANA [Prov. Antsiranana]:** Tsaratanana massif, trail from Mangindrano up South ridge of the Maromokotro peak, 1800–2000 m, 8.V.1974, *Gentry 11579* (MO, P); *ibid. loco*, 2000–2300 m, XI–XII.1937, *Humbert 18352* (P); mountains N of Mangindrano, Ambatohafo valley, [14°12'00"S 49°06'30"E], 1200–1400 m, 19.I.–12.II.1951, *Humbert 25363* (P); Tsaratanana massif, 2000 m, I.1923, *Perrier de la Bathie 15351* (P); SAVA, Andapa, Doany, Andranomilolo, 10 km NW of Andranopositra, 14°18'34"S 49°19'05"E, 1128 m, 16.XI.2006, *Rakotovoao 3411* (BR [2 sheets]); *ibid. loco*, 13 km W of Andranopositra, 14°19'23"S 49°17'54"E, 1462 m, 10.XI.2006, *Ravelonarivo 2001* (BR). **Reg. Alaotra-Mangoro [Prov. Toamasina]:** Zahamena PA, Andrangovallo massif, [17°40'S 48°45'E], 1200–1400 m, X.1937, *Humbert & Cours 17802bis* (P); Mantadia NP, PK 10, 18°49'48"S 48°25'58"E, 950 m, 17.IX.2001, *Mathieu 431* (BR, TAN); Analamazaotra RS, 18°56'45"S 48°25'10"E, 900 m, 18.IX.2001, *Mathieu 438* (BM, BR, MO, P, TAN); Ambatovy, 18°50'13"S 48°18'59"E, 1186 m, 5.V.2008, *Rakotondrafara 737* (MO, TAN).

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