



Two new *Peperomia* species (Piperaceae) from southwest Mexico

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Abstract

Peperomia pasionana Trelease ex G.Mathieu and *Peperomia tancitaroana* Trelease ex J.Viccon & G.Mathieu, two new species, endemic to southwest Mexico (Guerrero, Jalisco, Michoacán), are described, illustrated and compared with morphologically similar taxa. Both were already recognized as novelties by William Trelease more than 70 years ago, but never published. They belong to subgenus *Oxyrhynchum* (Dahlst.) Samain.

Keywords: taxonomy, IUCN Red List Category

Introduction

The large vascular plant genus *Peperomia* Ruiz & Pav. (1794: 8), a pantropical genus of terrestrial and epiphytic herbs, includes 1487 accepted species, of which 128 are known to occur in Mexico (as to July 2020). Numbers are based on the TRGP (Taxonomic Repertory of the Genus *Peperomia*) that is monitoring these data on a continuous basis already for almost two decades (Mathieu 2001–2020). The description of not less than 23 Mexican species during the last decade (García *et al.* 2017 [2 species]; Jimeno-Sevilla *et al.* 2018 [5 species]; Mathieu 2017 [1 species]; Mathieu *et al.* 2015 [3 species]; Mathieu *et al.* 2011 [10 species]; this publication [2 species]) suggests the genus to be more widely represented in the country than was recognized earlier.

After C. de Candolle’s death in 1918 and before T.G. Yuncker took over the torch, William Trelease (1857–1945) was for almost three decades the world authority in *Peperomia*. During these years he published 748 names in the genus (Mathieu 2001–2020). The majority, especially the many proposed varieties, have been considered later on as taxonomic synonyms or were illegitimate for other reasons. Nowadays, 285 of his taxa are still accepted. Trelease’s legacy also included 1335 so called ‘herbarium names’, new names proposed on herbarium sheets and annotated as ‘type’ of a new taxon, but never published. In the meantime, a legitimate alternative has been presented for 95% of these herbarium names (Mathieu, 2007), but about 50 still refer to undescribed species. Two of them, occurring in southwest Mexico, have been recollected and observed in the field. They are presented herewith as new to science.

Although Trelease’s herbarium names are nomenclaturally unavailable, they are ‘circulating’ to some extent. They are figuring on herbarium sheets already for a long time, have been cited occasionally and were included in checklists and databases, not always warning for their invalid status. For that reason, the decision is made to stick to the epithets proposed by Trelease and, in that way, to prevent unnecessary proliferation of names. For similar reasons, the ‘types’ proposed by Trelease are validated.

Materials and methods

Peperomia pasionana and *P. tancitaroana* were both recognized as undescribed species in the Compendium of herbarium names in the genus *Peperomia* (Mathieu 2007: 360, 510). They have been recollected and have been studied in the field recently. To get an idea of their distribution, the *Peperomia* holdings of 62 herbaria have been screened

(AAU, ARIZ, ASU, B, BH, BIGU, BM, BR, C, CH, CIB, CM, CORU, DES, E, EBT, ENCB, F, G, GB, GENT, GH, GOET, HAL, HEM, HUA, IBUG, IEB, ILL, ISC, JE, K, L, LY, M, MA, MEXU, MICH, MO, F, L, NY, P, PH, PR, QCA, S, SEL, TCD, TEX, UADY, UAMIZ, UC, UPS, US, USU, VT, W, XAL, XALU, ZEA, ZSS). More than 11,000 Mexican specimens have been seen, amongst them 423 from Guerrero, 677 from Michoacán and 650 from Jalisco. Collections belonging to the new species have been compared in detail with morphologically similar ones, macroscopically and by light microscope.

Results

Comparative morphological study of herbarium material and observation of living plants lead to the conclusion that both new taxa substantially differ from known species and indeed deserve description. They are described, illustrated and compared with morphologically similar species. The extensive evaluation of herbarium collections revealed that both species are quite rare. They occur in pristine forests in little explored areas of the Mexican Transition zone and have to be considered as endemic to that area. Their IUCN Red List status has been evaluated (IUCN 2019).

Taxonomy

Peperomia pasionana Trelease ex G.Mathieu, *sp. nov.* (Figs. 1, 2, 3).

Rather small, terrestrial, lithophytic herb with erect, woody-like, deciduous stem and wide ovate to almost orbicular, cordate, acuminate and minutely pubescent leaves with alternate position, becoming subverticillate terminally, differing from P. lignescens C. De Candolle by cordate palmatinerved leaves and from P. lanceolatopeltata C. De Candolle by erect, woody-like stems with short internodes.

Type:—MEXICO. Guerrero, distr. Montes de Oca, Pasión, oak & pine forest, estim. 17°41'24"N, 101°04'48"W, 1000 m, 5 Oct. 1937, Hinton 10765 (Holotype: ILL!; isotypes: ARIZ!, GH!, K!, MO!, NY!, PH!, TEX!, US!).

Terrestrial lithophytic herb, up to 25 cm tall. Stem simple, erect, woody in appearance, basally deciduous, up to 0.8 cm diam., only rooting at the base, internodes 2–3 mm long, terminally even shorter, glabrous. Leaves alternate, terminally subverticillate; petiole (2–) 3–8 (–11) cm long, sulcate, glabrous except for the pubescent sulcus, yellow-orange hyaline dotted; lamina wide ovate to almost orbicular, 4–7 × 3.5–5.5 cm, length/width ratio 1–1.5, apex acuminate, base distinctly cordate, the basal lobes sometimes overlapping, sometimes subpeltate, 7–9-palmatinerved, the main nerves branching distally, adaxially sparsely to moderately pubescent, denser at and along the main nerves, perimarginal and near the insertion of the petiole, abaxially glabrous, margin entirely and densely ciliate, trichomes very short, ca 0.1 mm, both sides hyaline dotted, adaxially vivid green, abaxially pale green. Inflorescence simple, in the axils of the terminal leaves; peduncle 5–8 cm long, in anthesis twice as long as rachis, glabrous; rachis up to 8.5 cm long, glabrous. Flowers loosely disposed; floral bract irregularly orbicular to slightly elliptic, ca 0.5 mm diam., centrally peltate, margin entire, yellow-orange to light brown hyaline dotted; anthers ca 0.3 mm long, filaments ca 0.4 mm long; ovary ovoid, style forming an oblique ring around the apical stigma. Fruit (immature) ovoid, pericarp covered with sticky papillae.

Etymology:—The specific epithet refers to the type locality. The name was already proposed by Trelease but never published (Mathieu 2007: 360).

Relationships:—The general habit resembles that of the more common *Peperomia lignescens* C. de Candolle (1866: 137), reported from south Mexico down to Venezuela. That species usually shows longer stems with longer internodes. It has elliptic leaves, length/width ratio 2 or more, with the base rounded, truncate or subcordate and is pinnately nerved. Contrary to *P. pasionana* it usually shows the leaves adaxially glabrous and abaxially pubescent (at the central nerve). *Peperomia pasionana* also resembles *P. lanceolatopeltata* C. de Candolle (1866: 136). That species shows a narrower ovate leaf shape and does not exhibit a distinct erect stem with woody appearance.

The firm erect stem, alternate leaves, simple robust inflorescences and fruit pericarp with sticky papillae of *Peperomia pasionana* agree with the characteristics of subgenus *Oxyrhynchum* (Dahlst.) Samain (Frenzke *et al.* 2015: 434). Moreover, the new species resembles *P. lignescens* and *P. lanceolatopeltata*, two species assigned to subgenus *Oxyrhynchum* supported by DNA-based phylogeny (Frenzke *et al.* 2015). It has to be noticed that *Oxyrhynchum*

includes lineages with quite different morphology (Garcia *et al.* 2017) and that the new species has to be considered as belonging to the same lineage as *P. lignescens* and *P. lanceolatopeltata*.

Phenology:—Known collections indicate the species to flower at least September–October.

Distribution, habitat and conservation status:—*Peperomia pasionana* appears to be endemic to south Mexico (state of Guerrero), where it occurs in the Sierra Madre del Sur, part of the Mexican transition zone (Morrone, 2014), at an elevation around 1000 m in soil pockets on shaded rocks in *Pinus-Quercus* forests. It is known from four locations (Figure 1). Because of its limited Area of Occupancy (AOO 16 km²), limited Extent of Occurrence (EOO 4,800 km²) and its preference for pristine forest habitats that are threatened by anthropogenic impacts, an IUCN Red List status of ‘Endangered’ is proposed (IUCN 2019)

Paratypes:—MEXICO. Guerrero, municipality Mochitlán, Agua de Obispo, Puente El Mosco, oak wood, 17°18'50"N, 99°28'10"W, 1000 m, 15 Sep. 1963, *Kruse 153* (MEXU!); between Acahuizotla and Agua de Obispo (highway to Acapulco at km 339–340), open pine woods with oaks, estim. 17°19'N, 99°28'W, ca 1000 m, 30 Sep. 1949, *Moore 5137* (BH!, CM!, MEXU!, NY!); municipality San Luis Acatlán, Buena Vista, 1.49 km E of Paraje Campanario (Cerro Cuervo), 300 m from road to Rio Iguapa, 16°57'33"N, 98°33'53"W, 977 m, 5 Sep. 2017, *Velasco 40688* (BR!, MEXU, MO, US).

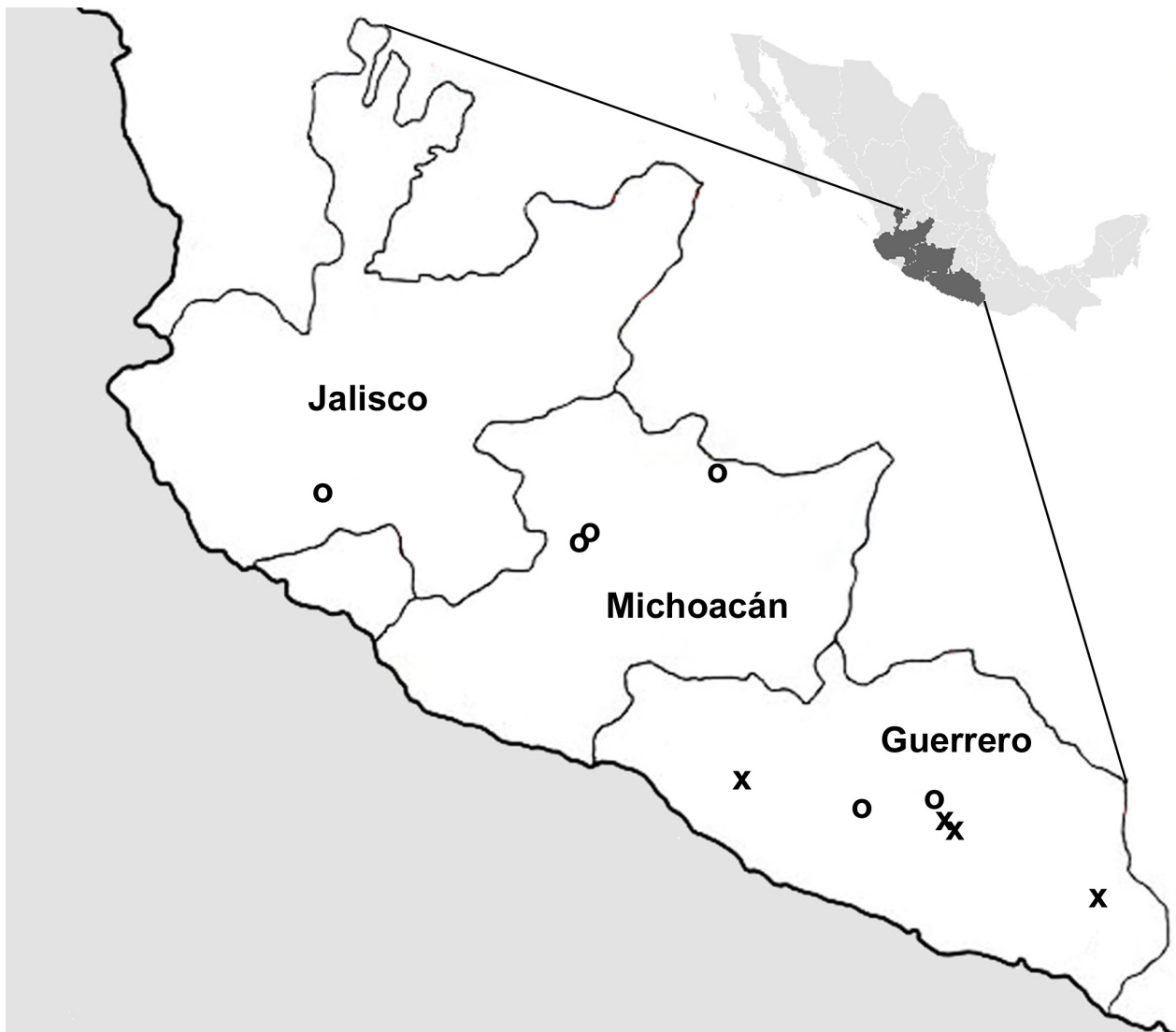


FIGURE 1. Distribution of *Peperomia pasionana* (x) and *P. tancitaroana* (o) in south Mexico.

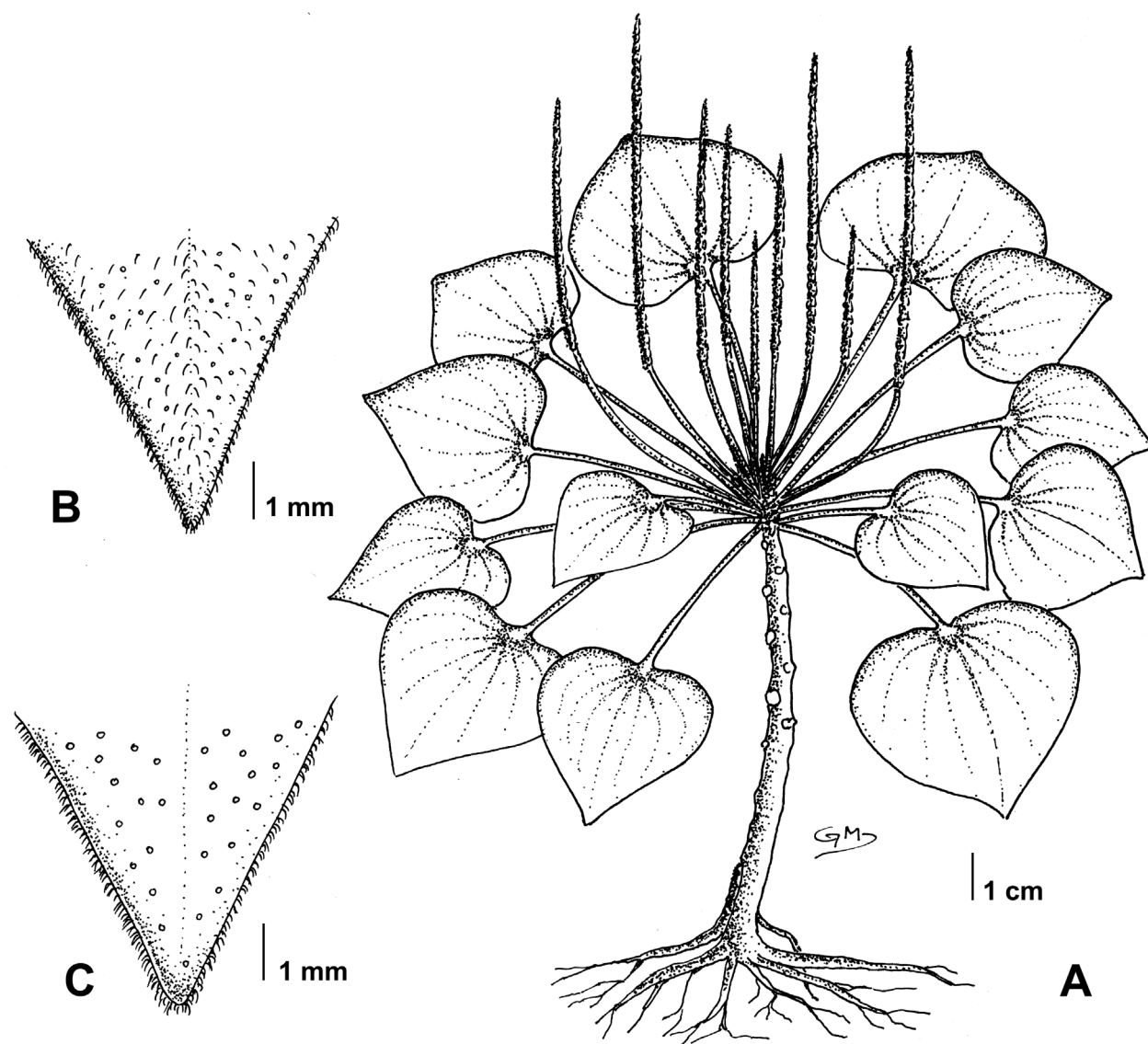


FIGURE 2. *Peperomia pasionana* A. General habit. B. Leaf apex adaxial. C. Leaf apex abaxial (drawing G. Mathieu based on K. Velasco 40688 [BR]).

Peperomia tancitaroana Trelease ex J. Viccon & G. Mathieu, *sp. nov.* (Figs. 1, 3, 4).

Rather stout, terrestrial, lithophytic herb with firm stem, deciduous in its lower part and showing distinct semilunar leaf scars, with alternate, narrowly ovate, long acuminate leaves, differing from *P. lignescens* C. de Candolle by more rhombic (versus elliptic) leaves and shorter petioles and from *P. petrophila* C. de Candolle by leaves with lower length/width ratio, the margin of young leaves often undulate, and by shorter petioles.

Type:—MEXICO. Michoacán, municipality Tancitaro, estim. 19°20'N, 102°21'W, 2000 m, 11 Sep. 1940, G. Hinton 15661 (Holotype: ILL!; isotypes: ARIZ!, MICH!, NY!, PH!, TEX!, US!).

Terrestrial lithophytic herb, up to 50(–80) cm tall. Stem erect, basally decumbent, usually several in a cluster, simple or with a few apical branches, deciduous in its lower half, up to 1 cm diam., succulent, lower part dark grey-purple, upper part vivid green; leaf scars evident, semilunar; internodes 1.3–5.3 cm, two discrete internodal ribs, the continuation of the lateral petiole edges, running down along the internode to the next lower node. Leaves alternate; petiole 0.6–1.6 cm long, 0.3–0.4 mm long at the base of inflorescences, sulcate, sulcus pubescent, light green; lamina narrowly ovate, 2.2–5.9 cm × 1.6–3 cm, length/width ratio 1.5–1.9, apex long acuminate, base decurrent, 5-palmatinerved, the main nerves branching and abaxially protruding, pubescent at the main nerves adaxially, margin entire, undulate in young leaves, minutely ciliate in its apical ¾ part, both sides minutely hyaline dotted, vivid green adaxially, light dull green

abaxially. Inflorescences up to 5 simple spadices per branch, terminal and axillary from the apical axils; peduncle 0.3–1.0 cm long, terete, glabrous; rachis 5.4–9.8 cm long, glabrous. Flowers moderately densely disposed; floral bract orbicular, ca 0.3 mm diam., centrally peltate, margin entire; anthers ca. 0.4 mm long, filaments 0.1–0.2 mm long; ovary ellipsoid, style conical, stigma apical. Mature fruit not seen.

Etymology:—The specific epithet refers to the type locality. The name was already proposed by Trelease but never published (Mathieu 2007: 510).

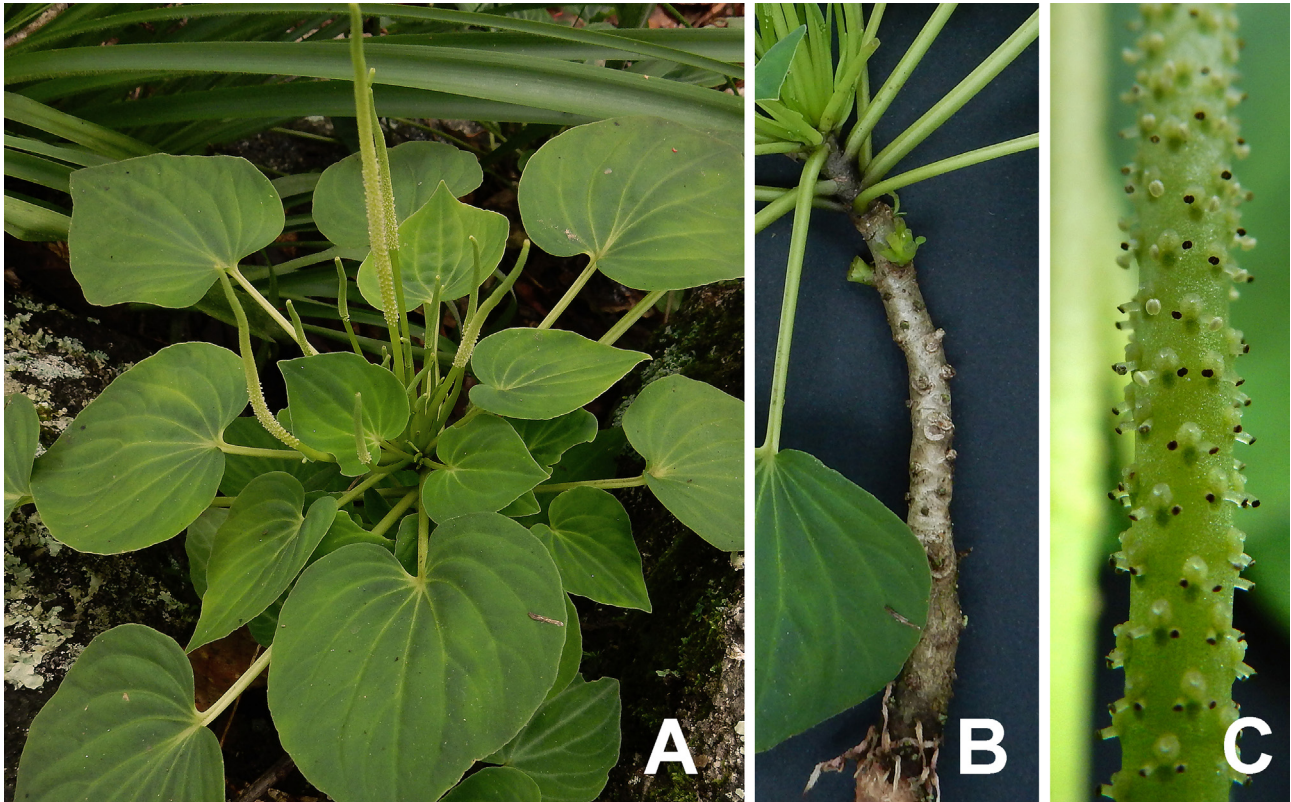


FIGURE 3. *Peperomia pasionana* A. General habit *in situ*. B. Distinct woody-like stem. C. Detail of inflorescence, K. Velasco 40688 (Photos Kenia Velasco).

Relationships:—The general habit resembles that of the more common *Peperomia lignescens* C. de Candolle (1866: 137), reported from south Mexico (Chiapas) down to Venezuela. However, *P. tancitaroana* shows more rhomboid leaves (versus elliptic in *P. lignescens*) and much shorter petioles, the leaves at the base of the inflorescences even sessile. Although the central nerve of *P. tancitaroana* shows distinct side branches, it is palmatinerved (versus penninerved in *P. lignescens*). There is also some resemblance with *Peperomia petrophila* C. de Candolle (1872: 369). That species also shows a wide distribution, from south Mexico (Chiapas, Guerrero, Oaxaca, Puebla, Veracruz) down to Colombia and Venezuela. It differs from *P. tancitaroana* by the lanceolate leaves with length/width ratio 3.5–4.5, the margin not undulate and the petioles 3–4 cm long, also at the base of the inflorescences.

The firm erect stem, alternate leaves and simple robust inflorescences of *Peperomia tancitaroana* agree with the characteristics of subgenus *Oxyrhynchum* (Frenzke *et al.* 2015). Moreover, the new species resembles *P. lignescens*, a species assigned to subgenus *Oxyrhynchum* supported by DNA-based phylogeny (Frenzke *et al.* 2015). It has to be noticed that *Oxyrhynchum* includes lineages with quite different morphology (Garcia *et al.* 2017) and that the new species has to be considered as belonging to the same lineage as *P. lignescens*.

Phenology:—The species flowers and fruits in April.

Distribution, habitat and conservation status:—*Peperomia tancitaroana* appears to be endemic to southwest Mexico (states of Guerrero, Jalisco, Michoacán), where it occurs in the Transmexican Volcanic Belt and the Sierra Madre del Sur, both part of the Mexican transition zone (Morrone, 2014), at an elevation of 1800–2500 m. It is known from six locations (Figure 1). It grows in cloud forests in a shady and moist environment where it prefers beds of mosses on metamorphic rocky river banks. Because of its limited Area of Occupancy (AOO 24 km²), limited Extent of Occurrence (EOO 5,500 km²) and its preference for moist canyon habitats in undisturbed forests that are threatened by anthropogenic impacts, an IUCN Red List status of ‘Endangered’ is proposed (IUCN 2019).

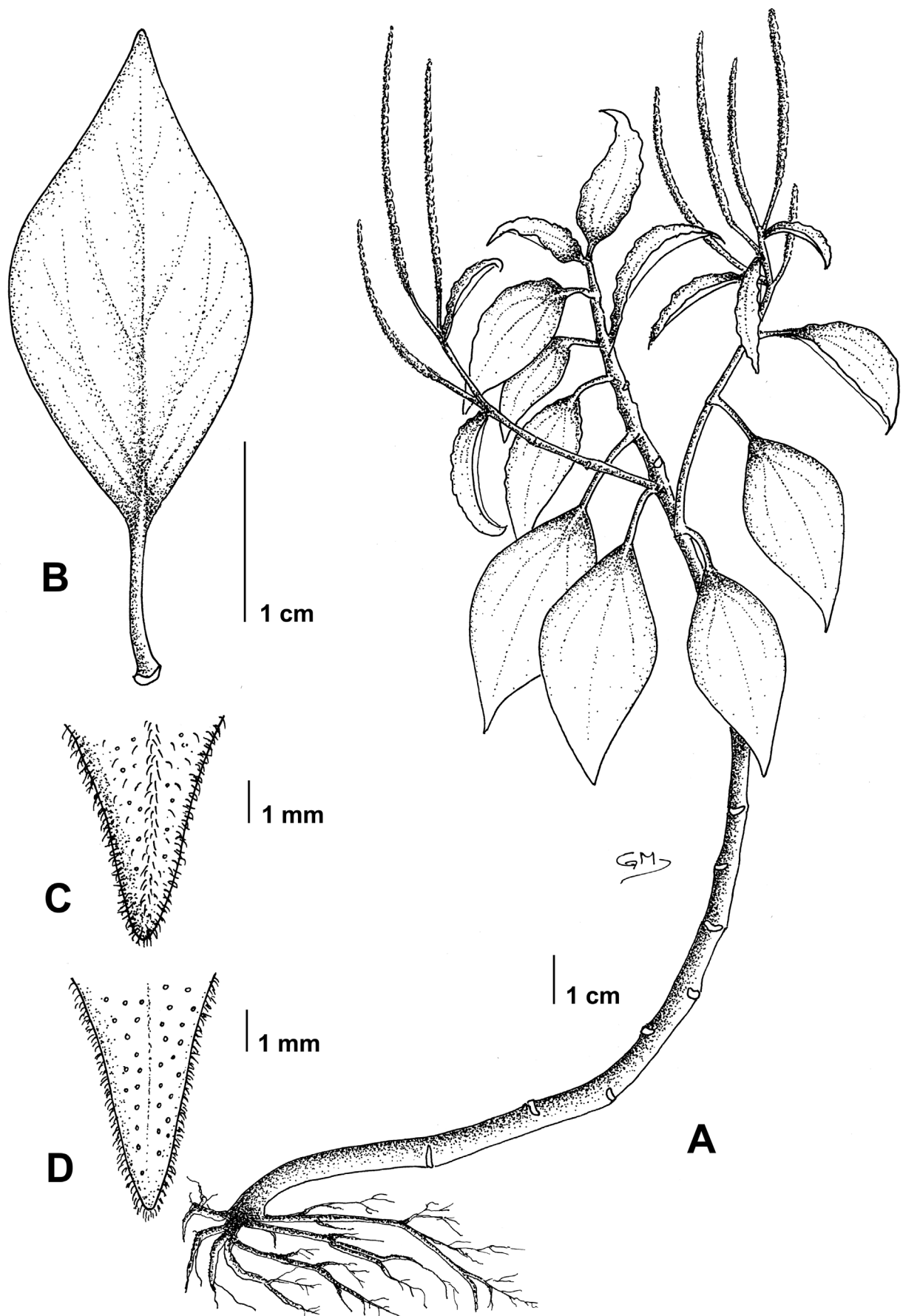


FIGURE 4. *Peperomia tancitaroana* A. General habit. B. Leaf nervature. C. Leaf apex adaxial. D. Leaf apex abaxial (drawing G. Mathieu based on M-S. Samain et al. 2007-053 [BR]).



FIGURE 5 *Peperomia tancitaroana* A. General habit, apical part of the plant. B. Apical internodes with internodal ribs. C. Young inflorescence, *M.-S. Samain et al. 2007-053* [A], *J. Viccon 44-2017* [B, C] (Photo Guido Mathieu [A], José Viccon [B, C]).

Paratypes:—MEXICO. Jalisco, ca 15 miles SE Autlán, trail Chante-Rancho Manantlán, then 3–4 hours towards El Cuartón, on rocks in stream-bed in canyon in pine-oak-fir forest, estim. 19°35'43"N, 104°10'25"W, 2400–2600 m, 14 Apr. 1949, *R. McVaugh 10307* (MICH! NY!). Guerrero, municipality Atoyac de Alvarez, N.E. of Nueva Delhí, close to Puerto del Gallo, cloud forest, 17°27'11.89"N, 100°10'47.56"W, 1808 m, Apr 2017, *J. Viccon 44-2017* (BR!, MEXU!); municipality Chilpancingo, ca 10 km W of Mazatlán and highway 95, road up to 'El Tejocote', on rocks above dry stream-bed in pine-oak forest, estim. 17°26'15"N, 99°30'50"W, 2140 m, 29 Sep. 1983, *W. Anderson 12875* (MICH!). Michoacán, municipality Queréndaro, San Miguel de las Cuevas, estim. 19°22'N, 102°14'W, 2350 m, 28 Mrt. 1991, *J. Rzedowski s.n.* (IEB!); municipality Uruapan, road Uruapan-Tancitaro, canyon just before El Durazno, 19°22'47.5"N, 102°14'12.8"W, 2130 m, 27 Jul. 2007, *M.-S. Samain et al. 2007-053* (BR!, GENT!, K!, MEXU!, MO!).

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References

- Candolle, C. de (1866) Piperaceae novae. *The Journal of Botany, British & Foreign* 4: 132–147.
- Candolle, C. de (1872) Piperaceae novae – Trib III. Peperomiae. *Linnaea* 37: 365–384.
- Frenzke, L., Scheiris, E., Pino, G., Symmank, L., Goetghebeur, P., Neinhuis, C., Wanke, S. & Samain, M.-S. (2015) A revised infrageneric classification of the genus *Peperomia* (Piperaceae). *Taxon* 64 (3): 424–444 incl. electronic supplement.
<https://doi.org/10.12705/643.4>
- Frodin, D.G. (2004) History and concepts of big plant genera. *Taxon* 53: 753–776.
<https://doi.org/10.2307/4135449>
- García-Martínez, R., Beutelspacher-Baigts, C.R., Callejas-Posada, R. & Mathieu, G. (2018) Two new lithoethic species of the genus *Peperomia* Ruiz & Pavón (Piperaceae) from the state of Chiapas, Mexico. *Phytotaxa* 338 (1): 109–116.
<https://doi.org/10.11646/phytotaxa.338.1.9>
- IUCN (2019) *Guidelines for using the IUCN red list categories and criteria*, version 14. Prepared by the Standards and Petitions Subcommittee. Retrieved from: <http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf> (accessed 28 August 2020)

- Jimeno-Sevilla, H.D., Vergara-Rodríguez, D., Krömer, T., Armenta-Montero, S. & Mathieu, G. (2018) Five endemic *Peperomia* (Piperaceae) novelties from Veracruz, Mexico. *Phytotaxa* 369 (2): 93–106.
<https://doi.org/10.11646/phytotaxa.369.2.3>
- Mathieu, G., Vergara-Rodríguez, D., Krömer, T. & Karger, D.N. (2015) *Peperomia* (Piperaceae) novelties from Veracruz State, Mexico. *Phytotaxa* 205 (4): 268–276.
<https://doi.org/10.11646/phytotaxa.205.4.6>
- Mathieu, G. (2007) *Compendium of herbarium names in the genus Peperomia (Piperaceae)*. Nautilus Academic Books, Zelzate, 616 pp. [Belgium]
- Mathieu, G., Symmank, L., Callejas, R., Wanke, S., Neinhuis, C., Goetgehebeur, P. & Samain, M.-S. (2011) New geophytic *Peperomia* (Piperaceae) species from Mexico, Belize and Costa Rica. *Revista Mexicana de Biodiversidad* 82: 357–382.
- Mathieu, G. (2017) *Peperomia tuberculata* (Piperaceae), a new geophytic species from Oaxaca, Mexico. *Phytotaxa* 313 (3): 293–295.
<https://doi.org/10.11646/phytotaxa.313.3.9>
- Mathieu, G. (2001–2019) TRGP (Taxonomic Repertory of the genus *Peperomia*). Available from: <http://www.peperomia.net/repertory.asp> (accessed 28 August 2020)
- Morrone, J.J. (2014) Biogeographical regionalization of the Neotropical Region. *Zootaxa* 3782 (1): 1–110.
<https://doi.org/10.11646/zootaxa.3782.1.1>
- Ruiz, H. & Pavón, J. (1794) *Florae Peruvianaee et Chilensis Prodromus*. Sancha, Madrid, Spain, xxii + 154 pp. + xxxvi lam.