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# *Psychotria perotensis* (Rubiaceae, Psychotrieae), a New Species from the Montane Cloud Forest in Veracruz, Mexico

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**ABSTRACT.** *Psychotria perotensis* Castillo-Campos, belonging to subgenus *Heteropsychotria* Steyermark (Rubiaceae, Psychotrieae), is described and illustrated as a new species from the region of La Cortadura, Coatepec, on the eastern slopes of the volcano Cofre de Perote, Veracruz, Mexico. This species is related to *P. phanerandra* (Standley & Steyermark) Lorence and *P. galeottiana* (M. Martens) C. M. Taylor & Lorence; however, it differs from these species in its larger leaves and inflorescence.

**RESUMEN.** Se describe e ilustra *Psychotria perotensis* Castillo-Campos perteneciente al subgénero *Heteropsychotria* Steyermark (Rubiaceae, Psychotrieae) como una especie nueva de la región La Cortadura, Coatepec, en las faldas orientales del volcán Cofre de Perote, Veracruz, México. Esta especie muestra similitudes con *P. phanerandra* (Standley & Steyermark) Lorence y *P. galeottiana* (M. Martens) C. M. Taylor & Lorence; sin embargo, difiere por el tamaño de las hojas y de la inflorescencia.

**Key words:** Mexico, *Psychotria*, Psychotrieae, Rubiaceae, Veracruz.

*Psychotria* L. is one of the largest genera, and probably one of the most taxonomically complex, of the family Rubiaceae, containing more than 1000 species distributed in the tropics and subtropics of the world (Standley & Williams, 1975; Dwyer, 1981; Burger & Taylor, 1993; Taylor et al., 2007). This genus is also one of the best represented in Mexico, with approximately 44 recognized species of trees and shrubs, of which six are endemic to the country (Lorence & Dwyer, 1987).

The genus *Psychotria* is generally divided into two subgenera: *Psychotria* L. and *Heteropsychotria* Steyermark (Steyermark, 1972; Standley & Williams, 1975; Andersson, 2001, 2002). The two subgenera can be

easily distinguished: in the subgenus *Psychotria*, of Pantropical distribution, the stipules are deciduous and the fruit red when ripe; while in the subgenus *Heteropsychotria*, which is restricted to the Neotropics, the stipules are perennial and the fruit generally white, blue, or purple at maturity (Lorence & Dwyer, 1987; Hamilton, 1989; Nepokroeff et al., 1999; Andersson, 2001, 2002; Taylor et al., 2007). Due to its perennial stipules and blue or purple fruits, the new species *Psychotria perotensis* belongs to the latter subgenus.

Intensive collections have been carried out during recent explorations in the montane cloud forest in the area of La Cortadura, municipality of Coatepec, Veracruz, Mexico. These have resulted in the collection of rare and characteristic species of this particular vegetation type, such as *Illicium mexicanum* A. C. Smith (Illiciaceae) and *Drimys granadensis* L. f. var. *mexicana* (DC.) A. C. Smith (Winteraceae) (García-Franco et al., 2008), as well as others such as *Piper xanthostachyum* C. DC. (Piperaceae) and *Ponthieva brenesii* Schlechter (Orchidaceae), which hitherto have been unreported in Veracruz (Castillo-Campos et al., 2009). Several collections of a *Psychotria* with white flowers were made in the montane cloud forest that appeared to be an undescribed species, which we describe here.

***Psychotria perotensis*** Castillo-Campos, sp. nov.

TYPE: Mexico. Veracruz: Mpio. Coatepec, La Cortadura, eastern slopes of the volcano Cofre de Perote, montane cloud forest, 2250 m, 10 Sep. 2007, G. Castillo-Campos & Jesús Pale Pale 22827 (holotype, XAL; isotypes, ENCB, MEXU, MO). Figures 1, 2.

Frutex vel arbuscula glabra. Stipulae persistentes minute biaristatae; folia petiolata, glabra, lamina elliptico-ovali, 5–15 × 1.5–6 cm, venis secundariis 5 ad 13 paribus.

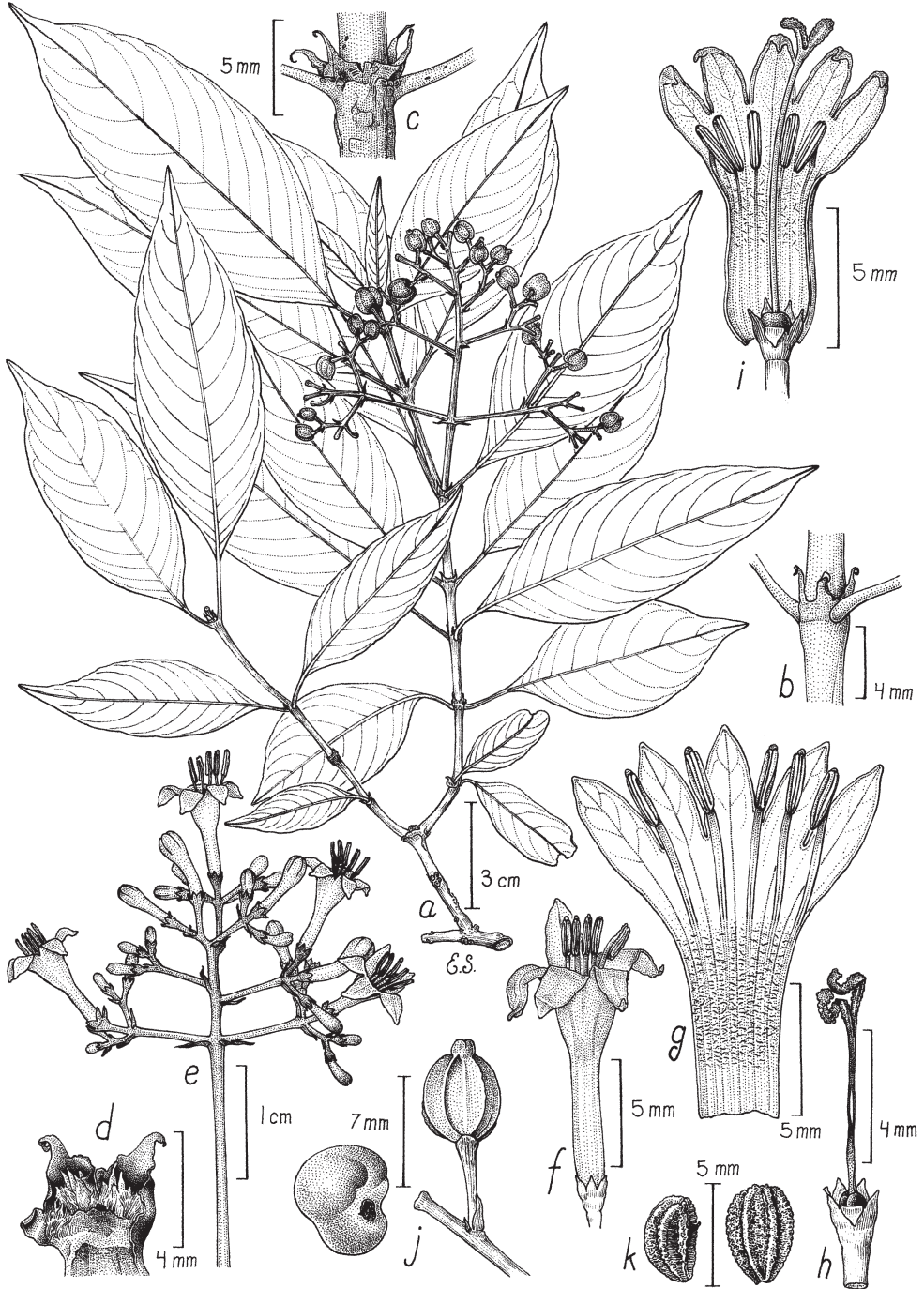


Figure 1. *Psychotria perotensis* Castillo-Campos. —A. Branch showing insertion and arrangement of leaves on the branches. —B, C. Node with stipules in young (B) and old (C) branches. —D. Stipule with colleters. —E. Inflorescence. —F. Flower. —G. Insertion of the stamens in the corolla. —H. Style. —I. Fully dissected flower. —J. Fruit. —K. Immature (right) and mature (left) seeds. Drawn from the holotype G. Castillo-Campos & J. Pale Pale 22827 (XAL).

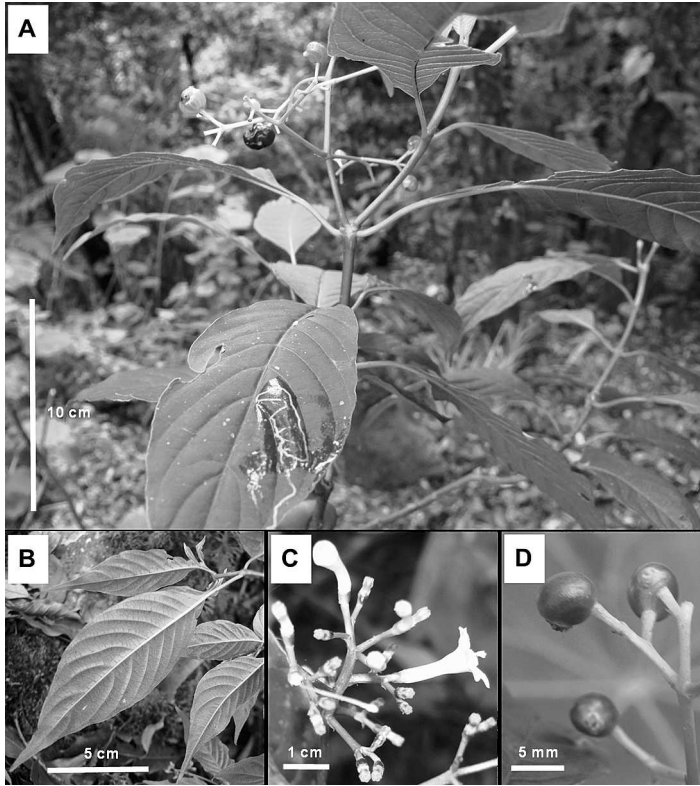


Figure 2. *Psychotria perotensis* Castillo-Campos. —A. Branch with ripe and unripe fruit. —B. Sheets showing the venation of the abaxial leaf surface. —C. Inflorescence with long-styled flowers. —D. Infructescence with unripe fruit.

Inflorescentia terminalis vel subterminalis, glabra, paniculata, 3.7–8.5 cm longa, pedunculo 3.1–7.2 cm longo rubello. Flos calyce viridi-rubello, corollae tubo 4.8–11 mm longo albo. Fructus subglobosus caeruleus vel niger in maturitate, didymus, 4–7 × 4–7(–9) mm, 4- ad 8-costatus in siccitate, saepe loculum unum abortivum efferens.

*Shrubs* or *small trees* 0.6–5 m tall, green in young terminal branches, brown in old branches, shiny when dry, cylindrical stems, internodes 1–3.3 cm, glabrous, with constrictions at the nodes above the young stems when dry and turgid, reddish when fresh; *stipules* perennial, interpetiolar, 2 per node, green in young branches, brown in old branches, shiny, biaristate, deltoid, ascending, acute at apex, apex commonly retrorse, hairs in interior base and with colleters forming a white collar in the adaxial base, associated with pubescence, 0.3–1 mm long, 0.1–0.2 mm thick, externally glabrous, 2–3 × 1.8–3 mm. *Leaves* simple, opposite, petiolar, glabrous, adaxially dark green, abaxially light green, lamina elliptic-oval, 5–15 × 1.5–6 cm, papyraceous, venation mixed craspedodromous, impressed adaxially, prominent abaxially, 5 to 13 pairs of secondary veins, apex acuminate, 1–1.5 cm, margin entire, slightly repand, base attenuate, petiole 0.7–2.5 cm × 0.6–1 mm, green when dry,

reddish when fresh in young leaves, shiny. *Inflorescences* terminal or lateral in new branches, 3.7–8.5 × 4–7 cm, 15 to 40 flowers, paniculate, main stem 31–72 × 0.7–1.2 mm, secondary axes 11–26 × 0.5–0.8 mm, brown or reddish, shiny, bracts linear to triangular, glabrous, 1–5.4(–22) × 0.2–1.2(–2.1) mm, margin entire, apex acute, base obtuse; bractlets triangular to linear, glabrous, 0.5–1.1 × ca. 0.4 mm, margin entire, apex acute, base obtuse; pedicel 0.5–7 × 0.2–0.6 mm, occasionally almost sessile. *Flowers* white, *calyx* tubular, calyx cup 1.4–1.8 × 0.5–0.8 mm, 5-lobate, reddish green, dark on drying, lobes 0.5–1.2 × 0.4–0.6 mm, margin dentate or entire, apex acute, corolla tube white, glabrous, tube 4.8–11 × 0.7–2 mm in the middle part of corolla, corolla throat internally villous, externally glabrous, lobes generally 5, glabrous, white, often recurvate, 2–4.5 × 1–2.5 mm from the base, margin entire, apex rounded or acute; *stamens* 5, petalostemonous, subsessile or filamentous, filaments 2.2–3 × ca. 0.2 mm, glabrous, anthers 1.3–2.3 × 0.2–0.3 mm, slightly exserted; *style* short, slender, glabrous, 6–11 × 0.1–0.3 mm, included in corolla tube, the length exserted 8.3–11.7 × 1–3 mm, glabrous; stigma bifid, papillate,

Table 1. Morphological similarities and differences between *Psychotria phanerandra*, *P. perotensis*, and *P. galeottiana*.

Character	<i>P. phanerandra</i>	<i>P. perotensis</i>	<i>P. galeottiana</i>
Life form, maximum height (m)	4	5	5
Internode length (cm)	1.5–4.5	1–3.3	2–4.5
Leaf			
Form	elliptic to ovate-elliptic	elliptic-ovate	elliptic to broadly elliptic
Pubescence	puberulent to glabrous	glabrous	glabrous, pubescent on main abaxial veins to densely pilose to strigillose
Length (cm)	4–10(–12.5)	5–15	4–15
Width (cm)	(1.8–)2.5–4.7	1.5–6	1.2–4
Apex	acuminate, 2 cm long	acuminate, 1–1.5 cm long	acute or acuminate, 1–2 cm long
Base	acute or cuneate, often attenuate	attenuate	acute or cuneate to rotundate
Venation			
Pairs of primary veins	5 to 8(10)	5 to 13	7 to 18
Venation type	eucamptodromous	mixed craspedodromous	camptodromous to eucamptodromous
Prominence	both sides	abaxially	abaxially
Petiole length (cm)	(0.15–)0.3–1	0.7–2.5	0.2–1.7
Flowers			
Number	15 to 22	15 to 40	5 to 11
Color	yellow	white	white or pink
Stamen	4 to 5	5	5
Filaments	glabrous	villous, petalostemonous	glabrous
Pedicle length (mm)	0–1.5	0.5–7	0–5
Fruit			
Form	ovoid, ellipsoid, or subglobose, frequently didymous and laterally complanate	frequently didymous, subglobose	ellipsoid, sometimes laterally complanate
Length (mm)	5–7	4–7	3–4
Width (mm)	5–6.5	4–7	3–4
Stones or seeds, number	2 frequently, 1 aborted	2 frequently, 1 aborted	2
Costae, number	3 to 5	4 to 8	4 to 5

0.5–2 × 0.5–0.8 mm. *Fruit* pyrenocarpous, often didymous, subglobose, green, with 1 or 2 seeds, blue or black on ripening, black on drying, shiny, glabrous, from 1 to 23 per inflorescence, 4- to 8-costate when dry, costae 4–7 mm; *persistent calyx*, 4–7(–9) mm diam., pedicel 0.5–8 × 0.2–0.7 mm, green when fresh, brown when dry, shiny, main stalk glabrous, 31–60 × 0.6–1.7 mm, secondary axes glabrous, 6–29 × 0.5–2.2 mm, bracts linear, glabrous, 0.6–8.5(–35) × 0.2–0.6(–2.5) mm, apex acute, base obtuse, margin entire; bractlets triangular, glabrous, 0.7–1.5 × 0.2–0.5 mm; *seeds* 1 to 2, slightly arcuate, 4–4.3 × 2–2.3 mm, cream colored, 4-costate, 2 prominent, often an aborted seed.

*Distribution.* Despite extensive inspections of other forested areas of Veracruz, the specimens collected so far suggest that distribution of *Psychotria perotensis* is restricted to the montane cloud forest on the eastern slopes of the volcano Cofre de Perote, in

the center of the state of Veracruz. Therefore, it is likely that this species is endemic to the state of Veracruz.

*Habitat.* *Psychotria perotensis* is a common species in the understory of the well-preserved montane cloud forest of La Cortadura. This habitat has a semi-humid climate and is the warmest climate found in temperate areas, with average annual temperatures of over 18°C (García, 2004). Within the arboreal stratum, *P. perotensis* is associated mainly with the trees *Drimys granadensis* var. *mexicana*, *Liquidambar styraciflua* L., *Podocarpus matudae* Lundell, *Prunus samydoides* Schlechtendal, *Quercus corrugata* Hooker, *Q. laurina* Bonpland, and *Rhamnus longistyla* C. B. Wolf. Within the shrub stratum, the most common taxa are *Bernardia interrupta* (Schlechtendal) Müller Argoviensis, *Deppea grandiflora* Schlechtendal, *Hoffmannia excelsa* (Kunth) K. Schumann, and *Moussonia deppeana* (Schlechtendal & Chamisso) Hanstein. The



herb stratum is characterized by a diversity of ferns, chief among which are *Arachniodes denticulata* (Swartz) Ching, *Asplenium auriculatum* Swartz, and *Blechnum falciforme* (Liebmann) C. Christensen, as well as species such as *Greigia van-hyningii* L. B. Smith and *Piper xanthostachyum*.

*IUCN Red List category.* *Psychotria perotensis* is known locally as “jihuite” and is a forage species, being very palatable to goats. In the study area, it is associated with *P. galeottiana* (M. Martens) C. M. Taylor & Lorence and *P. nervosa* Swartz. *Psychotria galeottiana* also belongs to subgenus *Heteropsychotria*, while *P. nervosa*, which has red fruit, belongs to subgenus *Psychotria*. Therefore, two subgroups of the same genus coexist in the La Cortadura, one Neotropical and the other Pantropical. Although population levels of *P. perotensis* appear to be adequate, its habitat is limited to well-preserved montane cloud forests. These forests may be considered endemic to the center of the state of Veracruz due to their restricted distribution, and therefore *P. perotensis* could be considered Vulnerable (VU B1a; C2) according to IUCN Red List criteria (IUCN, 2001) because these original fragments of montane cloud forest are small and unprotected.

*Phenology.* Flowering in *Psychotria perotensis* is from February to May and fruiting from July to October. Both flowering and fruiting are irregular, varying between individuals during each season.

*Etymology.* The epithet refers to the volcano Cofre de Perote, one of the highest mountains in the state of Veracruz, where the species grows on the eastern slopes.

*Discussion.* Due to the great diversity of species of the genus *Psychotria*, an exhaustive review was carried out in order to confirm that *P. perotensis*, of montane cloud forest, is a new taxon, and that *P. galeottiana*, also of montane cloud forest, and *P. phanerandra* (Standley & Steyermark) Lorence, of the tropical evergreen rainforest in southern Veracruz, Oaxaca, Chiapas, and Tabasco (Lorence & Dwyer, 1987; Taylor & Lorence, 1992), are the morphologically closest species. *Psychotria perotensis* is similar to *P. phanerandra* and *P. galeottiana* in habit, leaf shape, floral dimorphism (distyly), flower color, and the shape, size, and color of the fruit. However, it differs from *P. galeottiana* in leaf pubescence, number of primary nerves and flowers per inflorescence, indumentum of the stamen filaments, pedicel length, and number of ribs of the fruit. It also differs from *P. phanerandra* in leaf pubescence and size, number of primary veins, prominence of venation, petiole length, color and

number of flowers per inflorescence, pedicel length, and in the number of ribs of the dry fruits and seeds (Table 1).

*Paratypes.* MEXICO. **Veracruz:** Mpio. Coatepec, La Cortadura, local nature reserve, E slope of the volcano Cofre Perote, 2200 m, *G. Castillo-Campos & M. J. Peralta 21415* (ENCB, XAL), 21506 (MEXU, XAL), 21796 (XAL), 22289 (XAL), 22441 (ENCB, MEXU, XAL), *G. Castillo-Campos & J. Pale Pale 22702* (ENCB, MEXU, MO, XAL), 22703 (ENCB, MEXU, XAL), 22705 (ENCB, MEXU, MO, XAL), 22737 (XAL), 22746 (ENCB, MEXU, MO, XAL), 22750 (XAL), 22868 (ENCB, MEXU, XAL), *G. Castillo-Campos & R. Madrigal 22907* (ENCB, MEXU, MO, XAL), 22942 (XAL), 22943 (ENCB, MEXU, MO, XAL), 22944 (MEXU, XAL), 22946 (ENCB, MEXU, XAL), 23381 (XAL), 23383 (XAL), 23384 (XAL).

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