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RESEARCH ARTICLE

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Timonius eremiticus (*Rubiaceae*), a new species from the Philippines

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Key words

endemic
Guettardeae
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Abstract *Timonius eremiticus*, a new species from Mount Pulgar, Palawan Island, the Philippines, is here described and illustrated. It is morphologically close to *T. flavescens* but is characterized by membranous to chartaceous leaves with 2–4 pairs of lateral nerves, ivory-white corolla, bracteate staminate inflorescences bearing bracteolate flowers, 5-petaled pistillate flowers, (sub)globose fruits that are round and not 4-angled, and pyrenes being obliquely radiated in cross-section of fruits. *Timonius eremiticus* is assessed as Critically Endangered following IUCN criteria.

Buod (Wikang Filipino) Inilarawan at iginuhit sa lathalaing ito ang *Timonius eremiticus* na isang bagong espesye ng halaman na matatagapuan sa Bundok Pulgar sa pulo ng Palawan sa Pilipinas. Ito ay kawangis ng *T. flavescens* subalit natatangi dahil sa mga malalamad o malapapel nitong mga dahon na may dalawa o hanggang apat na pares ng nerbiyong lateral, kulay garing na mga talulot, brakteadong istaminate na mga inflorescence at bulaklak, mga pistiladong bulaklak na may limang talulot, (mala)bilugang mga bunga na hindi nakalundo sa apat, at mga pyrene na oblikong naka-radiate sa pahalang na hati ng mga bunga. Ang *Timonius eremiticus* ay itinataya rin na lubos nang nanganganib na maubos alinsunod sa mga pamantayan ng IUCN.

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INTRODUCTION

Timonius Rumph. ex DC. is the most diverse genus of *Rubiaceae* tribe *Guettardeae* that is estimated to contain about 200 (Darwin 2010) to 300 species (Chen et al. 2015). It is distributed in the Indo-Pacific region, and the highest diversity is found in New Guinea with 86 species (Govaerts et al. 2019). *Timonius* can be readily recognized by its dioecious state, sexually dimorphic inflorescences and flowers, valvate corolla aestivation that is described as '*timonioid*' (Achille 2006) or interlocking type (Darwin 2010), and drupaceous fruits bearing free pyrenes. Darwin (1979) suggested a close affinity of *Timonius* to the Hawaiian endemic genus *Bobea* Gaudich. based on the separated pyrenes, and he was followed by several authors (i.e., Fosberg & Sachet 1987, Darwin & Chaw 1990). On the contrary, the nrDNA-based phylogeny of Achille et al. (2006) recovered *Timonius* within their 'Paleotropical dioecious clade' with strong support, and it is sister to a clade containing species of *Guettarda* L. from New Caledonia and *Antirhea* Comm. ex Juss. from the tropical Western Pacific.

Timonius has not been revised as a whole, but was partially divided into three subgenera and an aggregate of species related to *T. flavescens* (Jack) Baker (Darwin 1993, 1994, 1997, 2010). Furthermore, regional treatments have been made for Indonesia ('Dutch East Indies') (Valeton 1909), the Malay Peninsula (Wong 1988), Kinabalu Park in Borneo (Chen et al. 2015), Palau Islands (Fosberg & Sachet 1987), Papuasia (Valeton 1927), and Thailand (Puff et al. 2005).

The base list of Philippine flowering plants (Merrill 1923) had recognized 25 species belonging to *Timonius*. This account was followed by Alejandro & Liede (2003), but they only listed 24 species. Their updated synopsis missed to include: 1) *T. pulgarensis* Elmer, which may be due to the typographical error in Merrill's (1923) work, that is, a duplicate account of the binomial *T. palawanensis* Elmer, but one of these entries had the type citation for *T. pulgarensis*; and 2) the two taxonomic additions that were proposed by Merrill (1925) and Wong (1988) namely: *T. pachyphyllus* Merr., and *T. compressicaulis* (Miq.) Boerl. (now classified as *T. finlaysonianus* (Wall. ex G.Don) Hook.f.), respectively. Nonetheless, the diversity of Philippine *Timonius* remains unsettled. It appears that the species delimitation in Merrill (1923) is problematic, because he treated distinct taxa into single species, while some single species were considered as segregates. Furthermore, morphological observations of post-war *Timonius* collections have revealed a number of probable species novelties.

As part of the ongoing revision of Philippine *Timonius* (Chavez et al. 2017), fieldwork was conducted on the island of Palawan. This resulted to the discovery of a population of an unknown species on the summit of Mount Pulgar. The plants seemed to be related to the *T. flavescens* alliance. Detailed comparison of collected specimens with extant *Timonius* species showed conspicuous and constant gaps in morphological differences in vegetative and reproductive features, suggesting that they

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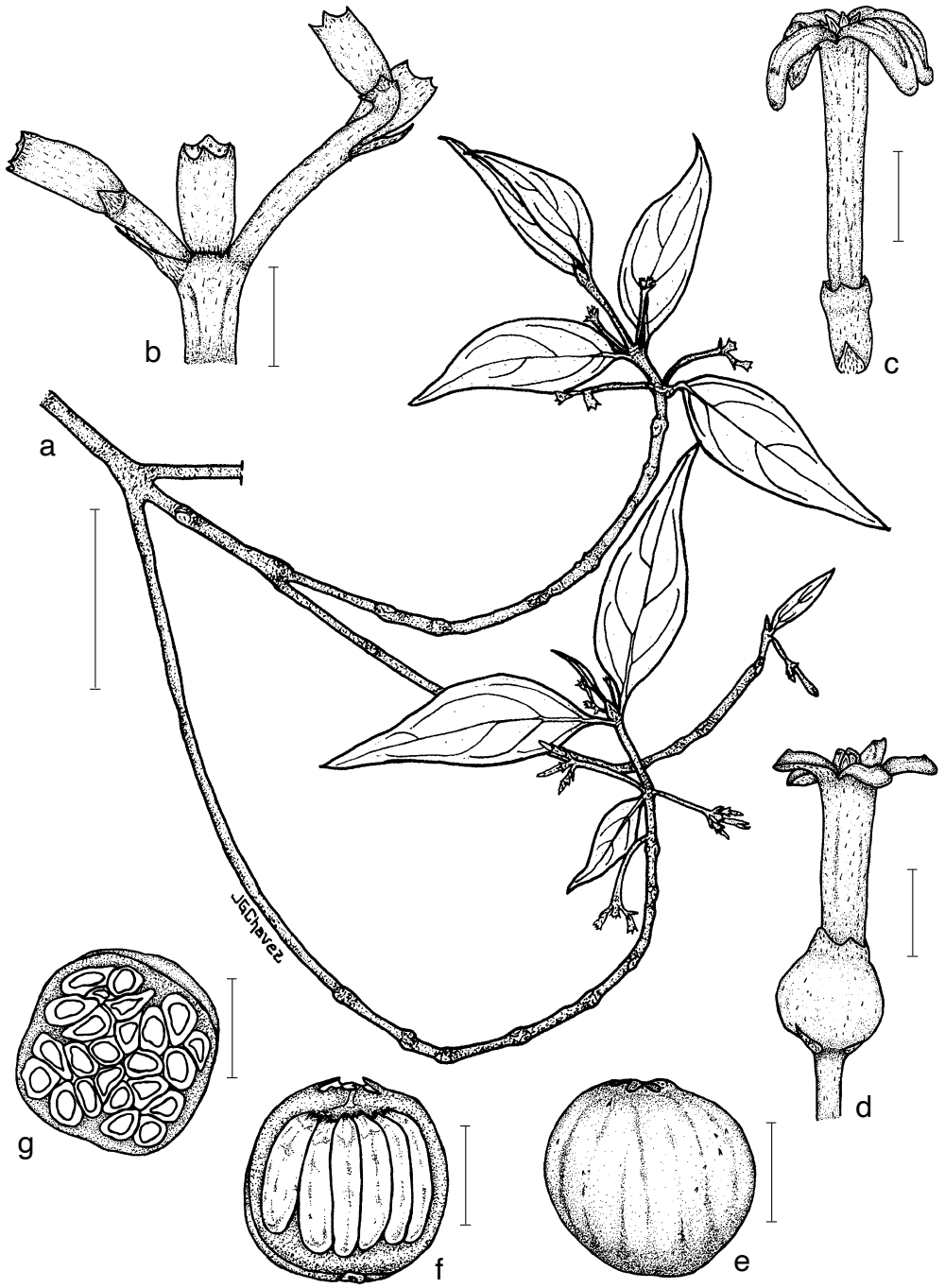

Fig. 1 *Timonius eremiticus* J.G.Chavez & Banag. a. Habit, staminate plant; b. staminate inflorescence, corolla removed; c. staminate flower; d. pistillate flower; e. fruit; f. fruit, longitudinal section; g. fruit, cross-section (a–c: *J.G. Chavez & S.G.S. Zamudio PL 110*, PNH; d–g: *J.G. Chavez & S.G.S. Zamudio PL111*, FEUH). — Scale bars: a = 2.5 cm; b = 2.5 mm; c–g = 2 mm. — Drawn by J.G. Chavez.

belong to an undescribed species which is recognized here as new to science.

Timonius eremiticus J.G.Chavez & Banag, *sp. nov*. — Fig. 1

Timonius eremiticus differs from *T. flavescens* (Jack) Baker by the leaf texture (membranous to chartaceous vs subcoriaceous in *T. flavescens*), number of secondary nerves (2–4 pairs vs (4–)5–6(–8) in *T. flavescens*), corolla colour (ivory-white vs yellow in *T. flavescens*), staminate inflorescences (bracteate vs obscurely bracteate in *T. flavescens*) and flowers (bracteolate vs ebracteolate in *T. flavescens*), corollas of pistillate flowers (5-lobed vs 4-lobed in *T. flavescens*), fruits (smooth vs strongly 4-angled in *T. flavescens*), and pyrene arrangement in cross-section of the fruit (obliquely radiated vs cruciform in *T. flavescens*). — Type: *J.G. Chavez & S.G.S. Zamudio PL 110* (holo PNH; iso A, CAHUP, FEUH, GB, L 2 sheets, P, PPC, UBT, US, USTH 2 sheets), Philippines, Palawan Island, Puerto Princesa City, Mt Pulgar, alt. ± 1200 m, ♂, 01 Oct. 2017.

Etymology. The adjectival Latin epithet means ‘living like a hermit’, since this species grows in a secluded habitat within an urbanized area.

Shrubs to trees up to 10 m tall. *Branchlets* 0.6–1.7 mm broad towards apex, moderately strigose, glabrescent, trichomes 0.05–0.25 mm long. *Stipules* valvate, triangular to ovate, 2.6–4.3 by 1.4–2.5 mm, slightly 2-ridged, ridges converging toward the apex, outer surface densely to moderately strigose, trichomes 0.05–0.85 mm long, inner surface densely strigose, trichomes ≥ 1 mm long. *Colleters* present on inner surface of stipules, bracts, bracteoles, sinuses of calyx teeth of both staminate and pistillate flowers. *Leaves* simple, opposite; petiole 1.5–8.5 by 0.5–1.7 mm, moderately strigose, glabrescent, trichomes 0.05–0.3 mm long; lamina lanceolate or elliptic to oblanceolate, 2–9.5 by 0.5–4 cm, apex attenuate to acuminate or caudate, base cuneate to obtuse, membranous

to chartaceous, upper surface glabrous to sparsely strigose, trichomes 0.15–0.5 mm long, lower surface moderately strigose, trichomes 0.1–0.5 mm long; secondary nerves 2–4 pairs; domatia present as tufts of hairs or hairy pockets in axils of secondary nerves. *Staminate inflorescences* 3–5-flowered; peduncle 8–18.5 by 0.25–0.6 mm, moderately strigose, trichomes 0.05–0.20 mm long; bracts triangular to lanceolate, 0.9–1.75 by 0.8–1.2 mm, outer surface densely to moderately strigose, trichomes 0.08–0.3 mm long, inner surface densely strigose, trichomes 0.1–1 mm long, bracteoles triangular to ovate, 0.4–0.7 by 0.25–0.5 mm, outer surface densely to moderately strigose, trichomes 0.05–0.25 mm long, inner surface densely to moderately strigose, trichomes 0.05–0.1 mm long. *Staminate flowers*: calyx cupuliform, 4-toothed, outer surface moderately strigose, trichomes 0.05–0.18 mm long, inner surface dense to moderately strigose, trichomes 0.08–0.25 mm long, tube 1.4–2.5 by 0.75–1.25 mm, teeth triangular, 0.1–0.45 by 0.1–0.5 mm; corolla infundibular, ivory-white, 4-lobed, tube 4–8 by 0.5–1 mm, outer surface moderately strigose, trichomes 0.05–0.15 mm long, inner surface glabrous, lobes lanceolate, 2.5–3.5 by 1–1.5 mm, adaxial surface glabrous, abaxial surface moderately strigose, trichomes 0.05–0.25 mm long; stamens 4, anthers elliptic with sagittate base, 2.7–3 by 0.3–0.4 mm, glabrous, filaments 0.5–0.6 mm long, glabrous; pistillodia bifid, unequal, sparsely strigose at base, trichomes 0.1–0.25 mm long. *Pistillate inflorescences* solitary; peduncle 6.8–20.75 by 0.2–0.5 mm, moderately to sparsely strigose, trichomes 0.05–0.3 mm long; bracts triangular to lanceolate, 0.4–0.75 by 0.25–0.4 mm wide, outer surface densely to moderately strigose, trichomes 0.05–0.38 mm long, inner surface densely strigose, trichomes 0.1–0.4 mm long. *Pistillate flowers*: calyx tubular to cupuliform, 4- or 5-toothed, outer surface moderately strigose, trichomes 0.05–0.2 mm long, inner surface densely to moderately strigose becoming sparse towards the apex, trichomes 0.1–0.2 mm long, tube 0.4–0.5 by 1–1.25 mm, teeth triangular to ovate, 0.2–0.3 by 0.4–0.5 mm; corolla tubular, ivory-white, 5-lobed, tube c. 4 by 1.25 mm, outer surface moderately strigose, trichomes 0.05–0.20 mm long, inner surface not seen, lobes lanceolate to lance-ovate, 1.5–1.7 by 0.5–1 mm, adaxial surface glabrous, abaxial surface moderately strigose, trichomes 0.05–0.25 mm long; staminodia not seen; hypanthium ovoid to subglobose, 0.75–2.5 by 1.2–2.8 mm, moderately strigose, trichomes 0.05–0.15 mm long; style not seen. *Fruits* (sub)globose, smooth, neither costate nor tuberculate, 4.5–5.8 by 4.75–6.4 mm, sparsely strigose, trichomes 0.05–0.15 mm long; calyx crown < 0.5 mm long; schizogenous cavity absent; pyrenes 20–24, falcoid rarely ovoid, 2.75–3.5 by 0.8–1.4 mm, arranged in four double files radiating obliquely in cross-section of the fruit.

Distribution — *Timonius eremiticus* is known only from the island of Palawan (Philippines), where it is restricted to Mount Pulgar.

Habitat & Ecology — It grows in the ecotonal area between the closed canopy forest and pygmy vegetation above the rocky summit of Mt Pulgar (c. 1200 m).

Conservation status — *Timonius eremiticus* is provisionally classified here as Critically Endangered (CR B2ab(iv)) (IUCN 2017). It has a restricted area of occupancy of < 10 km^2, and occurs in a single locality. Furthermore, climate change may decrease the number of mature individuals, as it is predicted to cause extreme staminate-biased sex ratios in populations of dioecious plants (Hultine et al. 2016).

Additional specimens examined (paratypes). The Philippines, Palawan Island, Puerto Princesa City, Mt Pulgar, alt. ± 1200 m, ♀, 01 Oct. 2017, *J.G. Chavez & S.G.S. Zamudio PL111* (A, FEUH, L 2 sheets, PNH, US, USTH); ibid., ♂, 01 Oct. 2017, *J.G. Chavez & S.G.S. Zamudio PL113* (CAHUP 2 sheets, FEUH 2 sheets, L 2 sheets, P, UBT, US, USTH 3 sheets).

Note — The bracts on the staminate inflorescence of *T. eremiticus* show a variety of positions (Fig. 1b). During the early stage of inflorescence development, the bracts subtend the base of each inflorescence branch, but as the inflorescence branches develop, the bracts are usually positioned on the apex of each inflorescence branch. Furthermore, a fruiting specimen collected in the Laklangua Peak of Mt Matalingahan, Palawan (*D.D. Soejarto et al. 8879*, L (L2963270)), closely resembles the newly described species but differs by its leaves that are clustered on the apex of branchlets hindering a safe identification as *T. eremiticus*.

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REFERENCES

Achille F. 2006. Tinadendron, nouveau genre de Rubiaceae, Guettardeae de Mélanésie orientale. Adansonia 28: 167–180.

Achille F, Motley TJ, Lowry PP, et al. 2006. Polyphyly in Guettarda L. (Rubiaceae, Guettardeae) based on nrDNA ITS sequence data. Annals of the Missouri Botanical Garden 93: 103–121.

Alejandro GD, Liede S. 2003. The Philippine Rubiaceae genera: updated synopsis in INTKEY databases of the DELTA system. Blumea 48: 261–277.

Chavez JG, Alejandro GJD, Meve U. 2017. Lectotypification of Timonius pachyphyllus Merr. (Rubiaceae, Guettardeae). Adansonia 39: 145–148.

Chen J, Tan HTW, Wong KW. 2015. A revision of Timonius (Rubiaceae) in Kinabalu Park, Borneo, with notes on typification and species distinction. Plant Ecology and Evolution 148: 420–430.

Darwin S. 1979. A synopsis of the indigenous genera of Pacific Rubiaceae. Allertonia 2: 1–44.

Darwin S. 1993. A revision of Timonius subgenus Timonius (Rubiaceae: Guettardeae). Allertonia 7: 1–39.

Darwin S. 1994. Systematics of Timonius subgenus Abbottia (Rubiaceae-Guettardeae). Systematic Botany Monographs 42: 1–86.

Darwin S. 1997. New species of Timonius flavescens alliance (Rubiaceae: Guettardeae) in Papuasia. Systematic Botany 22: 85–98.

Darwin S. 2010. A taxonomic revision of Timonius subgen. Pseudobobea (Valeton) S.P.Darwin (Rubiaceae). Candollea 65: 217–240.

Darwin S, Chaw SM. 1990. Bobea Gaud. 'Ahakea'. In: Wagner WL, Herbst DR, Sohmer SH (eds), Manual of the flowering plants of Hawai'i 2: 1114–1118. University of Hawaii Press and Bishop Museum Press, Honolulu.

Fosberg FR, Sachet MH. 1987. The genus Timonius (Rubiaceae) in the Palau Islands. Micronesica 20: 157–164.

Govaerts R, Ruhsam K, Andersson L, et al. 2019. World checklist of Rubiaceae. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet: http://apps.kew.org/wcsp [accessed 14 June 2019].

Hultine KR, Grady KC, Wood TE, et al. 2016. Climate change perils for dioecious plant species. Nature Plants 2: 16109.

IUCN Standards and Petitions Subcommittee. 2017. Guidelines for using the IUCN Red List categories and criteria, v.13. https://www.iucnredlist.org/documents/RedListGuidelines.pdf [accessed 2 July 2019].

Merrill ED. 1923. An enumeration of Philippine flowering plants 3. Bureau of Printing, Manila.

Merrill ED. 1925. Additions to our knowledge of the Philippine flora, 1. The Philippine Journal of Science 26: 447–496.

Puff C, Chayamarit K, Chamchumroon V. 2005. Rubiaceae of Thailand, a pictorial guide to indigenous and cultivated genera. Prachachon, Thailand.

Valeton T. 1909. Beiträge zur Kenntniss der Gattung Timonius. Bulletin de Département de l'Agriculture aux Indes Néerlandaises 26: 1–61.

Valeton T. 1927. Die Rubiaceae von Papuasien, zweiter Teil: Coffeoideae. Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 61: 32–163.

Wong KM. 1988. The Antirheoideae (Rubiaceae) of the Malay Peninsula. Kew Bulletin 43: 491–518.