

STUDIES ON PHILIPPINE *MELASTOMA* (MELASTOMATACEAE)— THE RARELY COLLECTED *M. LAEVIFOLIUM* GROUP

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Abstract. Members of the *Melastoma laevifolium* group in the Philippines which include the poorly known *M. culionense* from Culion Island and the new species *M. lawrenceliaoi* sp. nov. from Tawi-Tawi Island are herein taxonomically reassessed and described, respectively. Having the holotype missing/lost, *M. culionense* is herein lectotypified. *Melastoma lawrenceliaoi* is closely related to *M. laevifolium* from Borneo but differs by having flattened and furrowed young twigs, shorter leaves, midrib and longitudinal veins with slightly curved lanceolate scales up to ca. 0.8 mm long on the lower leaf surface, solitary flowers, shorter and grass green bracteoles, hypanthium sparsely covered with neatly appressed linear scales up to ca. 0.8 mm long, longer hypanthium lobes, ovate petals and shorter greyish anthers on the longer stamens. Taxonomic notes on *M. laevifolium* is herein provided too.

Keywords: Culion Island, lectotype, Melastomataceae, Tawi-Tawi Island, taxonomy

Melastoma Linnaeus (1735: 389) is a genus of shrubs and small trees (Neo et al., 2017; Huang *et al.*, 2018) in Melastomataceae, which is characterized by having leaves being opposite with three prominent longitudinal veins (Haron et al., 2015), inflorescence being terminal, flowers being diplosteonous, hypanthium generally campanulate and covered with scales or bristles, petals being commonly ciliate along the apical margin, stamens being dimorphic (anisomorphic) or isomorphic, among others (Meyer, 2001). The genus is distributed in tropical Asia and Oceania (Meyer, 2001; Chen and Renner, 2007). Species number within the genus is uncertain as species delimitation is problematic, multiple names have often been applied for the same taxa across different studies (Keng and Li, 1977; Chen, 1984; Huang and Huang, 1993; Meyer, 2001; Yang and Liu, 2002; Chen and Renner, 2007; Dai et al., 2012; Chao et al., 2014; Huang *et al.*, 2018) and new species from poorly surveyed areas would be expected as many are narrowly endemic (Wong, 2016; Neo et al., 2017).

In the Philippines, there are currently nine recognized species of *Melastoma* (Pelser et al., 2011 onwards) including two being taxonomically uncertain (Meyer, 2001), distributed from Luzon to Mindanao Islands. Although a species was very recently described from Luzon Island (Agcaoili et al., 2020), the number of *Melastoma* species in the Philippines is significantly fewer in contrast to previous knowledge. The reduction of the number of species from the Philippines was a result of the concise revision of the genus by Meyer (2001) when she adopted broad concept of species delimitation which resulted in simultaneous synonymy of an overwhelming number of taxa without enough clarification and consultation to most specimens. For an instance, *Melastoma malabathricum* L. was relegated with sixty-six different taxa including many of those described from the Philippines while *M. normale* D. Don was reduced for subspecific rank and synonymized with eleven different taxa. The later species has now been reinstated back to its previous species-level status after critical taxonomic investigation

of Wong (2015) which utilized noteworthy characters for species delimitation in the genus while a number of taxa previously synonymized with *M. malabathricum* were reassessed and reinstated back to their deserving ranks (Wong 2015, 2016). However, despite the significant number of species being lumped from the Philippines with Meyer's accepted taxa, none of these entities were reassessed or re-examined.

One of the two most poorly understood Philippine species, *M. culionense* Merr. from Culion Island was considered as *species dubiae* in Meyer's work due to the scarcity of examined materials from this species and for its morphological resemblance with *M. laevifolium* Merr., a species endemic to the sandstone hills of Sandakan in the island of Borneo. These species are indeed morphologically similar based on the original description provided by the same authority. Another very similar yet undescribed species was documented from the Island of Tawi-Tawi in 2020. These taxa, including *M. decipiens* Bakh.f. from Indonesia, clearly constitute a taxonomic group which is characterized by having lanceolate leaves and funnel-shaped hypanthium neatly appressed with small ovate, triangular or linear scales which are sparsely produced and are interspersed with smaller scales. In addition to Meyer's wide morphological concept for detecting species boundaries in the genus, the suspicion on the taxonomic homogeneity of these species has been sustained for years since Borneo, Palawan and Tawi-Tawi Islands are geographically next to one another and were once connected (Woodruff, 2010). Furthermore, there were only few specimens (type specimens) of *M. laevifolium* available for examination during Meyer's revision and new collections of materials from this species has just been recently obtained and studied (Wong, 2016).

With the recent accessibility to all of these species' materials and as part of a series of studies to resolve taxonomic ambiguities on Philippine *Melastoma*, this taxonomic group is hereby formally reassessed including the description of a new species from Tawi-Tawi Island.

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MATERIALS AND METHODS

Herbarium specimens (including type) of *Melastoma culionense* and *M. laevifolium* where they are deposited were studied from several herbaria such as A, L, SING and US. A search for the holotype and isotypes of *M. culionense* in several herbaria (e.g. A, B, BM, C, E, L, K, P, PNH, NY, SING, US) was conducted but only isotypes were successfully located. Published morphological descriptions for these species were also studied (e.g. Merrill 1917; Merrill 1922; Wong 2016). In addition, photographic data obtained from recent collections and sightings were

also utilized for species description. Specimens of the new species were mounted in herbarium sheets for dry preservation and were deposited in local herbaria (e.g. PNH, CEBU, FEUH) and was compared extensively with all species in the genus from specimens in consulted herbaria including their published morphological descriptions. The terminologies on the descriptions were based from the recent morphological descriptions of Wong (2016) while herbarium acronyms follow Thiers (continuously updated).

TAXONOMIC TREATMENT

Melastoma culionense Merr., Philipp. J. Sci., Bot. 12: 353. 1917. TYPE: PHILIPPINES. Calamian Islands, Culion Island, August 1913, *L. Escritor 21647* (Lectotype, designated here: L [254737]; Isolectotypes: US [120449], PNH [not seen], NY [00228910]). Fig. 1.

Shrub up to ca. 5 m tall. *Young twigs* sparsely covered with slightly incurved narrowly lanceolate scales, 1–1.5 mm long, 0.2–0.4 mm wide at the base, surface mostly visible among scales. *Leaves* lanceolate, rarely becoming narrowly elliptic, 8–10 cm long, 3.5–4.5 cm broad; *longitudinal nerves* running from the base to apex 4 in addition to the midrib, adaxially markedly impressed, prominent below; *secondary veins* adaxially inconspicuous, abaxially immersed in the lamina, subparallel, tertiary veins branching into a conspicuous reticulate network; *upper leaf surface* in dried material abundantly appressed with flattened, elongate and thin minute hairs 0.5–0.9 mm long, becoming longer and incurved along the margin; *lower leaf surface* with root-like bristles up to 1.5 mm long on midrib, longitudinal veins and secondary veins, with shorter fewer bristles on the tertiary veins; *petioles* 1–1.2 cm long, ca. 1 mm in diameter, covered with scales similar on twigs but much smaller. *Flowers* many, produced in compact terminal cymes, peduncle robust, up to 3.5 cm long, densely covered with scales similar on hypanthia, pedicels slender, up to 1 cm long, neatly appressed with scales similar on hypanthia; *bracteoles* in pair, attached at the mid-length of the pedicel, narrowly elliptic, 7.5–8 mm long, 3–4 mm broad, apex markedly acuminate, adaxially covered with bristly scales similar on hypanthia but much smaller and denser; *bracts* not observed, highly deciduous; *hypanthium* funnel-shaped, 7.2–8.2 mm long, 7–7.8 mm wide, sparsely covered with upcurved lanceolate scales 0.6–0.8 mm long, up to 2 mm wide at the base, apex markedly acuminate, margin entire, interspersed with very small triangular scales, 0.1–0.2 mm long; *hypanthium lobes* 5, lanceolate, apex markedly acuminate, 7.5–8.2 mm long, with narrowly lanceolate intersepal lobes bearing lanceolate scales up to 2 mm long, bearing short triangular scales at the apices; *petals* 5, broadly obovate, up to 2 cm long and 11 mm broad, purple; *stamens* anisomorphic comprising 5 longer stamens (with ca. 10–11 mm long strongly incurved magenta filaments, 7 mm long magenta anthers, and ca. 10–12 mm long yellow connective with a basal bifurcate yellow extension) and 5 shorter stamens (with ca. 5–5.5 mm long yellow filaments, ca. 2.8–3 mm long linear-rostrate pale yellow anthers and inconspicuous connectives); style filiform and curved apically, 1.3–1.5 cm long, *stigma* truncate.

Distribution: Endemic in the country, collected and documented from Culion and Bicawayan Islands within the Calamian Island group in Western Philippines.

Additional specimen examined: PHILIPPINES. Calamian Islands, Bicawayan Island, September 1922, *M. Ramos 41289* (US2921790).

Photographs of this species has just recently obtained from its type locality (Tobias, pers.com.) from specimens which were not collected. Photographs have verified the characteristics of petals and stamens which were obscurely described by Merrill (1917). Its affinity with *M. laevifolium* has already been suggested by Meyer (2001) but kept as *species dubiae* for failure to obtain enough specimens for examination. It differs from *M. laevifolium* by having young twigs sparsely covered with slightly incurved narrowly lanceolate scales (vs. tiny triangular-ovate appressed scales), upper leaf surface abundantly appressed with flattened, elongate and thin minute hairs (vs. subglabrous), narrowly elliptic bracteoles (vs. absent [unique linear bracts present instead]), hypanthium sparsely covered with upcurved lanceolate scales, margin entire (vs. hypanthium sparsely covered by neatly appressed ovate or triangular scales, margin serrulate) and lanceolate hypanthium lobes (vs. linear).

Melastoma lawrenceliaoi Tahil, *sp. nov.*

TYPE: PHILIPPINES. Sulu archipelago, Tawi-Tawi Province: municipality of Panglima Sugala, Brgy. Balimbing, Mt. Gaha, 05°16.52'N, 119°96'00.83"E, ca. 600 m, October 24, 2020, *A. Tahil 397* (Holotype: PNH; Isotypes: CEBU, FEUH). Fig. 2–3.

A species closely similar to *M. laevifolium* Merr. by the production of lanceolate leaves, funnel shaped hypanthium and linear hypanthium lobes but is readily distinguishable by having flattened and furrowed young twigs (vs. terete), shorter leaves (7–9 cm vs. 5.5–13.6 cm long), midrib and longitudinal veins with slightly curved lanceolate scales up to ca. 0.8 mm long on the lower leaf surface (vs. ovate scales up to 0.5 mm long), solitary flowers (vs. 1–3 in a cyme), shorter (13–15 mm vs. 18–22 mm long) and grass green bracts (vs. reddish), hypanthium sparsely covered with neatly appressed linear scales up to ca. 0.8 mm long (vs. ovate or triangular scales up to 0.5 mm long), longer hypanthium lobes (20–25 mm vs. 16–17 mm long), ovate petals (vs. broadly obovate) and shorter (9–10 mm vs. 12–13 mm long) greyish anthers (vs. pink anthers) on the longer stamens.

Shrub up to ca. 4.5 m tall. *Young twigs* flattened, slightly furrowed, slender, glabrous. *Leaves* lanceolate, apex shortly acuminate, 7–9 cm long, 2.5–3 cm broad; *longitudinal*

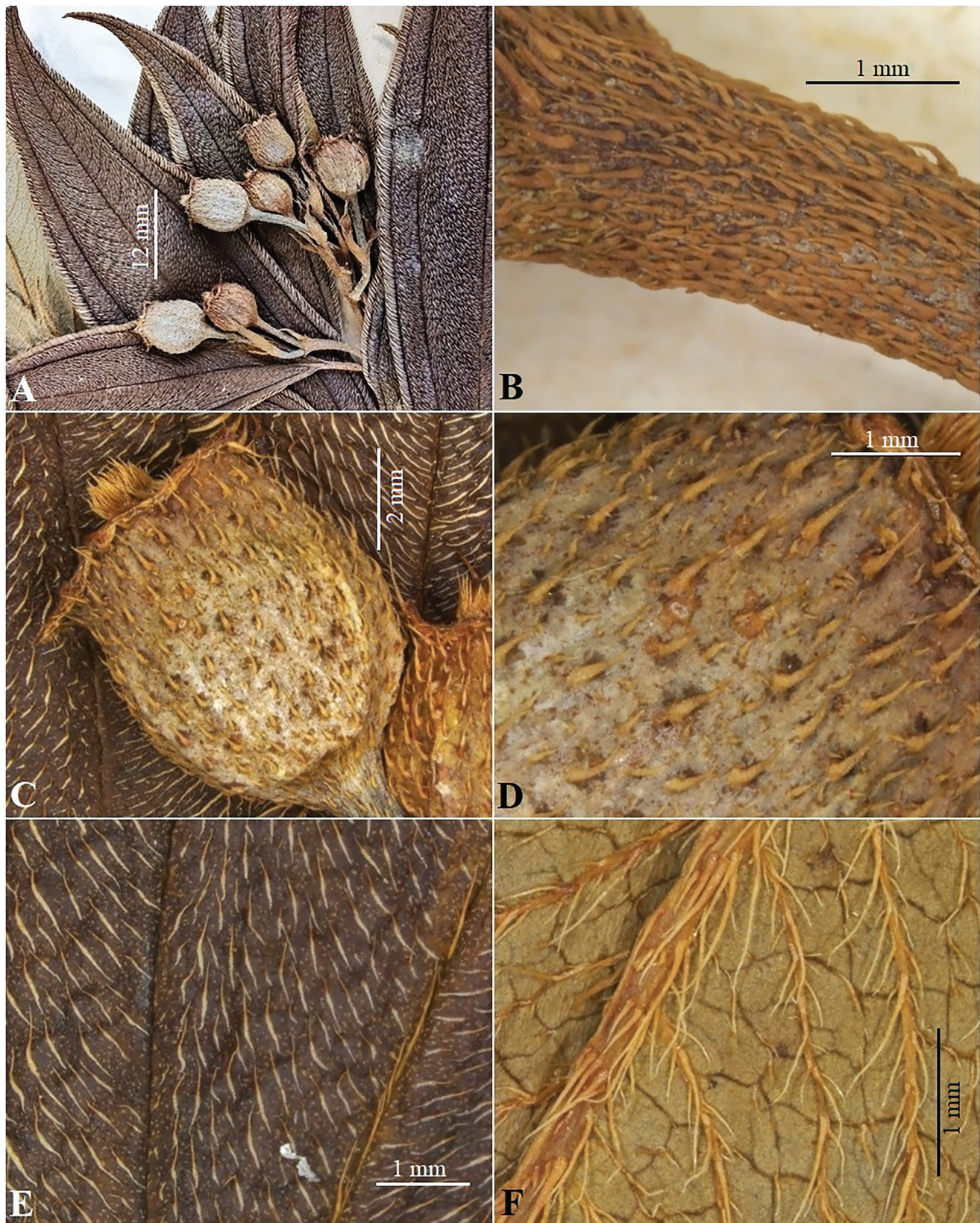


FIGURE 1. Lectotype of *Melastoma culionense* Merr. (L254737). A, Leaves and inflorescence; B, Twig scales; C, Hypanthium; D, Close-up of scales; E, Upper leaf surface; F, Lower leaf surface. Photograph courtesy of M. Scherrenberg.



FIGURE 2. Fresh specimen of *Melastoma lawrenceliaoi* Tahil. **A**, Leafy branch with flower; **B**, Anterior view of flower; **C**, Flower showing linear bract (arrow); **D**, Posterior view of flower; **E**, Lateral view of hypanthium; **F**, Hypanthium with artificially removed hypanthium lobes showing stamens. Photographs by A. Tahil based on A. Tahil 397.



FIGURE 3. Holotype of *Melastoma lawrenciaoii* Tahil. **A**, Leaves; **B**, Flattened twigs (arrows); **C**, Hypanthium showing the hypanthium lobes and intersepal emergence (arrow); **D**, Close-up of hypanthium; **E**, Upper leaf surface; **F**, Lower leaf surface. Photographs by A. Tahil based on *Tahil 397*.

nerves running from the base to apex 4 in addition to midrib, adaxially deeply impressed, prominent below; *secondary veins* adaxially inconspicuous, abaxially impressed, subparallel, tertiary veins inconspicuous; *upper leaf surface* in dried material appressed with rows of spicule-like crystalliferous cells up to ca. 1 mm long; *lower leaf surface* subglabrous, lamina and secondary veins devoid of bristles but the adaxially appressed spicule-like crystalliferous cells are markedly prominent herein, midrib and longitudinal veins with sparsely produced slightly curved lanceolate scales up to ca. 0.8 mm long; *petioles* 10–15 mm long, ca. 1 mm in diameter, adaxially flattened, sparsely covered with slightly curved bristles up to ca. 0.8 mm long. *Flowers* solitary, pedicel 8–10 mm long, covered with scales similar on hypanthia but denser; *bracteoles* absent; *bracts* attached at the very base of pedicel, linear, 13–15 mm long, 3–3.5 mm broad, apex acute or blunt, leaf-like, grass green, apically curved outside, glabrous; *hypanthium* funnel-shaped, 12–13 mm long, 9–11 mm wide, sparsely and neatly appressed with linear scales up to ca. 0.8 mm long, ca. 0.01 mm wide, apex acute, margin entire, interspersed with much shorter and smaller linear scales of up to ca. 0.04 mm long; *hypanthium lobes* 5, linear, claw-like, apex acuminate, slightly incurved, 20–25 mm long, 4–5 mm broad, adaxially covered with appressed triangular scales of up to ca. 0.05 mm long especially on the mid-part and becoming sparse and absent towards the margin, intersepal lobes bearing narrowly lanceolate scale, up to ca. 3 mm long, ca. 0.8 wide at the base, apex extremely acuminate, bristle-like; *petals* 5, ovate, 5–5.5 cm long, 4–4.5 cm broad, mauve; *stamens* anisomorphic comprising 5 longer stamens (with ca. 13–15 mm slightly outcurved pinkish filaments, ca. 9–10 mm grayish linear-rostrate anthers, and ca. 5–8 mm pinkish connective with a very short basal bifurcate yellow extension) and 5 shorter stamens (with ca. 9–10 mm long yellow filaments, ca. 12–14 mm long linear-rostrate yellow anthers and inconspicuous connectives); *style* filiform, strongly curved apically, ca. 2.5–3 cm long, *stigma* blunt.

Additional specimen examined: PHILIPPINES. Sulu archipelago, Tawi-Tawi, Panglima Sugala, Mt. Gaha, 05°16.52'N, 119°96'00.83"E, ca. 530 m, October 24, 2020, A. Tahil 398 (CEBU).

NOTES ON *MELASTOMA LAEVIFOLIUM* MERR.

Described by Merrill (1922) from materials collected from an unspecified locality in Sandakan, Sabah, Borneo and subsequently recollected from 1938 to 1965 in nearby localities, *M. laevifolium* Merr. was reassessed after 94 years of its discovery (Wong, 2016). It has been mistakenly relegated with *M. sanguineum* Sims by Meyer (2001) which is an unrelated species by having filiform bristles on its hypanthium (vs. neatly appressed ovate or triangular scales). In addition, *M. decipiens* Bakh.f. which was synonymized with *M. laevifolium*, should be reinstated for having diagnostic characters comparable from the latter species. The long hypanthium lobes of *M. laevifolium* together with those of *M. lawrenceliaoi*, are among the longest in the genus. In addition, bracts of *M. laevifolium* weren't described by Wong (2016) despite that these are present among the specimens examined and are distinguishable from those of the associated taxa

Eponymy: This handsome species is named after Phycologist Dr. Lawrence M. Liao, Professor at the Graduate School of Biosphere Science, Hiroshima University, in honor for his significant contributions to the marine botany of the Philippines.

Distribution and ecology: *Melastoma lawrenceliaoi* is presently only known from Mt. Gaha, a small forested limestone mountain which occupies a total area of less than 30 km². The forest of Mt. Gaha is ca. 1000 ha area of secondary forest over limestone at ca. 600–700 m. This new species grows on limestone structures along with *Paraboea* sp. Epiphytes such as *Hoya* and *Dischidia* spp. were observed growing on this species. Bees were also observed visiting the flowers of this species.

Conservation status: Botanical studies were carried out in all small mountains and hills of the province of Tawi-Tawi since September 2020. *M. lawrenceliaoi* was only documented in the eastern side of Mt. Gaha, a small forested limestone mountain with no protected status. Lower parts of the mountain were already converted for agricultural purposes and the density of local settlers in this part is apparently increasing. Rampant logging was also observed in the area. In addition, less than 50 mature individuals were documented from the type locality. Following the Red List Criteria of the International Union for the Conservation of Nature, this species is hereby considered as Critically Endangered (CR B1ab (i, ii, iii) + B2ab (I, ii, iii); D, IUCN 2017).

Melastoma lawrenceliaoi is undoubtedly one of the most handsome species described from the Philippines and currently the only limestone-obligate species present in the archipelago. Its distinctive linear hypanthium lobes are by far, the longest known in the genus *Melastoma*. Interestingly, unlike most *Melastoma* species which inhabit ultramafic or mountainous areas, both *M. lawrenceliaoi* and *M. laevifolium* appear to be restricted on stone hills or structures (limestone for *M. lawrenceliaoi* while sandstone for *M. laevifolium*). Table 1 presents diagnostic characters and morphological differences between *M. culionense*, *M. laevifolium* and *M. lawrenceliaoi*.

(e.g. *M. decipiens*, *M. lawrenceliaoi*, *M. sanguineum*). The bracts of this species are linear, attached from the base of pedicel, ca. 18–22 mm long, ca. 3–4 mm broad, slender and reddish. Moreover, the neatly appressed ovate or triangular scales in the hypanthium of *M. laevifolium* are interspersed with smaller, linear scales. The reddish lower surface of the longitudinal veins of this species are diagnostic too. The affinity demonstrated by Western and Southern Philippine species, *M. culionense* and *M. lawrenceliaoi* respectively, with the Northern Bornean species *M. laevifolium* suggests an evidence of transitioning speciation of *Melastoma* from these adjacent ecoregions. See Fig. 4 for features of this species.

Additional specimens examined: MALAYSIA. Borneo, Sandakan, September–December 1920, *M. Ramos 1132* (A72593; A112329). Trig Hill, 28 November 2015, Wong *et al.* WKM 3512 (SING).



FIGURE 4. Hypanthium and branch of *Melastoma laevifolium* Merr. (SING0222894). A, Young flower showing the hypanthium; B, Close-up of hypanthium; C, Leafy branch. Photographs courtesy of K. M. Wong (A) and L. Neo (B and C).

TABLE 1. Diagnostic characters and morphological differences between *M. culionense*, *M. laevifolium* and *M. lawrenceliaoi*.

CHARACTERS	MELASTOMA CULIONENSE	MELASTOMA LAEVIFOLIUM	MELASTOMA LAWRENCELIAOI
Twig scales	Slightly incurved narrowly lanceolate scales	Tiny triangular-ovate appressed scales	Glabrous
Upper leaf surface	With flattened, elongate and thin minute hairs	With spicule-like rows of crystalliferous cells	With spicule-like rows crystalliferous cells
Lower leaf surface (midrib and longitudinal veins)	Root-like bristles	Ovate scales	Slightly curved lanceolate scales
Leaf length	8–10 cm	5.5–13.6 cm	7–9 cm
Inflorescence	Many, in a compact cyme	1–3 in a cyme	Solitary
Bract shape, color and length	Not seen	Linear, reddish, 13–15 mm	Linear, grass green, 18–22 mm
Bracteole shape	Narrowly elliptic	Absent	Absent
Hypanthium scales	Sparsely covered with upcurved lanceolate scales (up to 0.8 mm long)	Neatly appressed ovate or triangular scales (up to 0.5 mm long)	Neatly appressed with linear scales (up to 0.8 mm long)
Scale margin	Entire	Serrulate	Entire
Length and shape of hypanthium lobes	7.5–8.2 mm, lanceolate	16–17 mm, linear	20–25 mm, linear
Petal shape	Broadly obovate	Broadly obovate	Ovate
Length and color of anthers in long stamens	7 mm, magenta	12–13 mm, pink	9–10 mm, greyish

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