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Garcinia yaatapsap (Clusiaceae), a new species from northern Myanmar

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Abstract

Garcinia yaatapsap (Clusiaceae), a new species from northern Myanmar, is described and illustrated. The new species is most similar to *G. stipulata* and *G. nujiangensis*, but differs primarily by its sessile, subcordate to cordate leaves and strongly angled branchlets (versus petiolate, cuneate leaves and terete branches in *G. stipulata* and *G. nujiangensis*).

Keywords: *Dicrananthera*, *Discostigma*, Guttiferae, Htamanthi Wildlife Sanctuary, Sagaing, taxonomy

Introduction

The pantropical genus *Garcinia* Linnaeus (1753: 443) comprises more than 250 species of dioecious small shrubs to medium-sized trees that are a common component of lowland tropical forests (Stevens 2007, Sweeney 2008). The most recent world-wide taxonomic treatment of the genus recognized 14 sections (Jones 1980), many of which have been supported by subsequent molecular phylogenetic analyses (Sweeney 2008). In Myanmar, over 20 species have been reported (Maheshwari 1964, Kress *et al.* 2003, Kundu 2006), representing five sections. Here we describe a new species assigned to a subgroup of section *Discostigma* (Hasskarl 1842: 33) Bentham & Hooker (1862: 174), based on the presence of prominent stipuliform structures and leaf, staminate flower, and fruit morphology.

Materials and methods

During floristic inventory activities undertaken by KEA, TYN and colleagues, carpellate and staminate material of a novel species of *Garcinia* was encountered in the upper Chindwin Basin, of Sagaing Region, Myanmar. Herbarium specimens and silica gel preserved leaf samples of this species were collected, and photographs were taken with a DSLR camera. Specimens and photographs were compared morphologically to species documented in checklists, floras, and taxonomic treatments describing plants of the region (e.g., Hooker 1874, Kurz 1877, Pitard 1910, Chun & How 1956, Maheshwari 1964, Li 1981, Singh 1993, Gardner 2000, 2015, Kress *et al.* 2003, Kundu 2006, Li *et al.* Stevens 2007, Murray *et al.* 2007, Newman *et al.* 2007, Buruah *et al.* 2021) and to species in section *Discostigma* (*sensu* Jones 1980), into which we placed the species based on morphology. In addition to the consultation of keys, descriptions, and illustrations in the cited publications, specimens (physical or digital and including type material) were examined from the following herbaria: BM, BR, E, GDC, HITBC, K, L, LINN, NY, P, and RAF (herbarium codes according Thiers 2022).

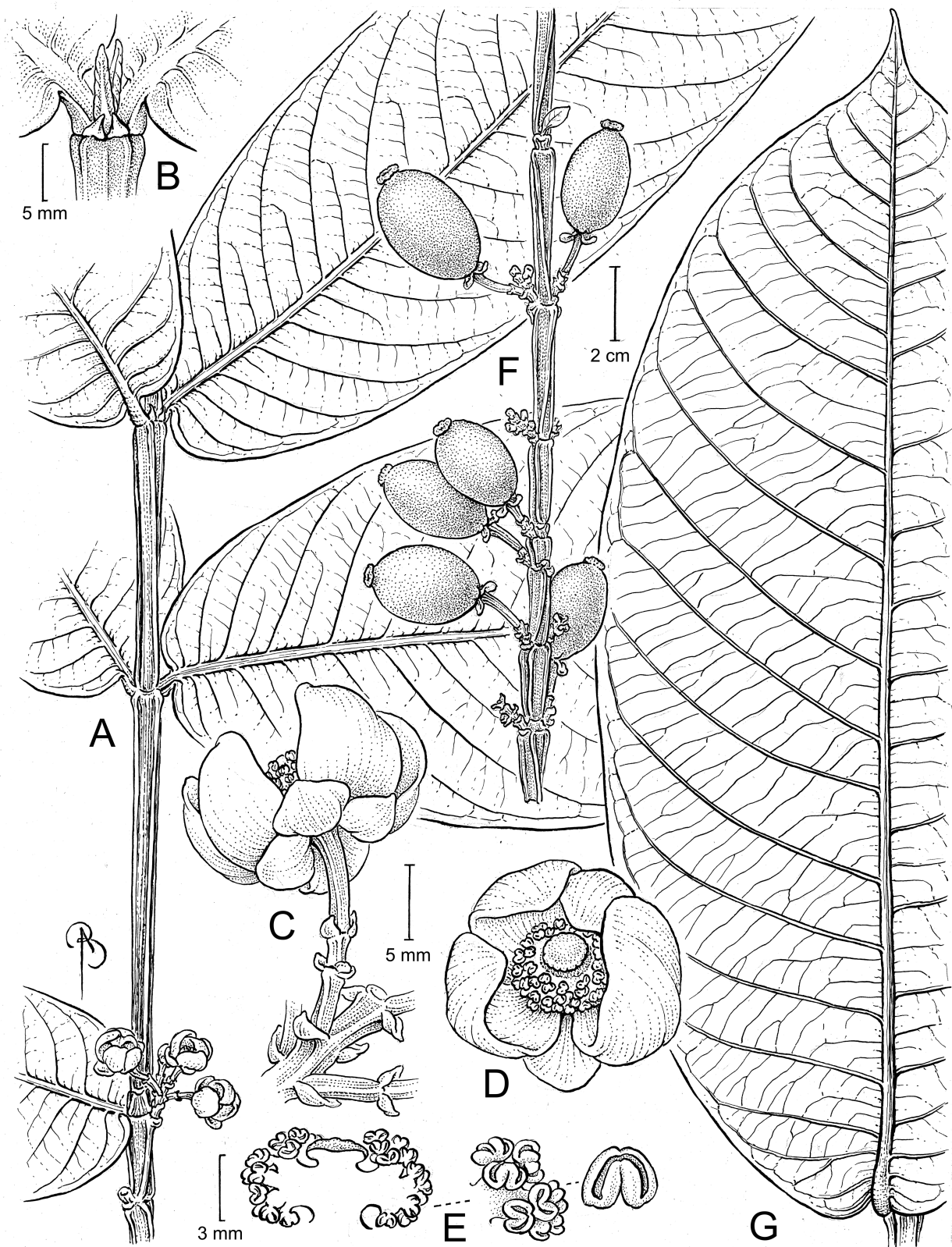


FIGURE 1. *Garcinia yaatapsap*. **A.** Branch with staminate flowers. **B.** Apex of branch showing leaf bases, young leaves, and stipuliform structures. **C.** Part of staminate inflorescence. **D.** Staminate flower. **E.** Cross section of androecium and pistillode with close-up views of stamens and an anther. **F.** Branch with fruits. **G.** View of abaxial leaf surface. Illustration by Bobbi Angell.

Taxonomy

Garcinia yaatapsap K. Armstr. & P.W. Sweeney, *sp. nov.* (Figs. 1–2)

Type:—MYANMAR. Sagaing Region: Hkamti District, Hkamti Township, Htamanthi Wildlife Sanctuary, Just upstream from Nam Eizu camp 1,184 m. a.s.l., 25.537833°, 95.465861°, 11 September 2016, K. Armstrong, D. Daly, P. P. Hnin, T. Y. Nwe, L. Zaw, K. Z. Aung, H. Aung 1406 (holotype NY [NY02654830]!; isotypes E!, RAF!).

Diagnosis:—*Garcinia yaatapsap* is similar to *G. stipulata* T. Anderson in Hooker (1874: 267) and *G. nujiangensis* C.Y. Wu & Y.H. Li in Li (1981: 494), but branchlets distinctly 4-sided and winged on angles (particularly distally) (*vs.* terete); leaf bases subcordate to cordate (*vs.* cuneate); leaves nearly sessile, petiole length to leaf blade length ratio smaller (*ca.* <1:25 *vs.* >1:16).

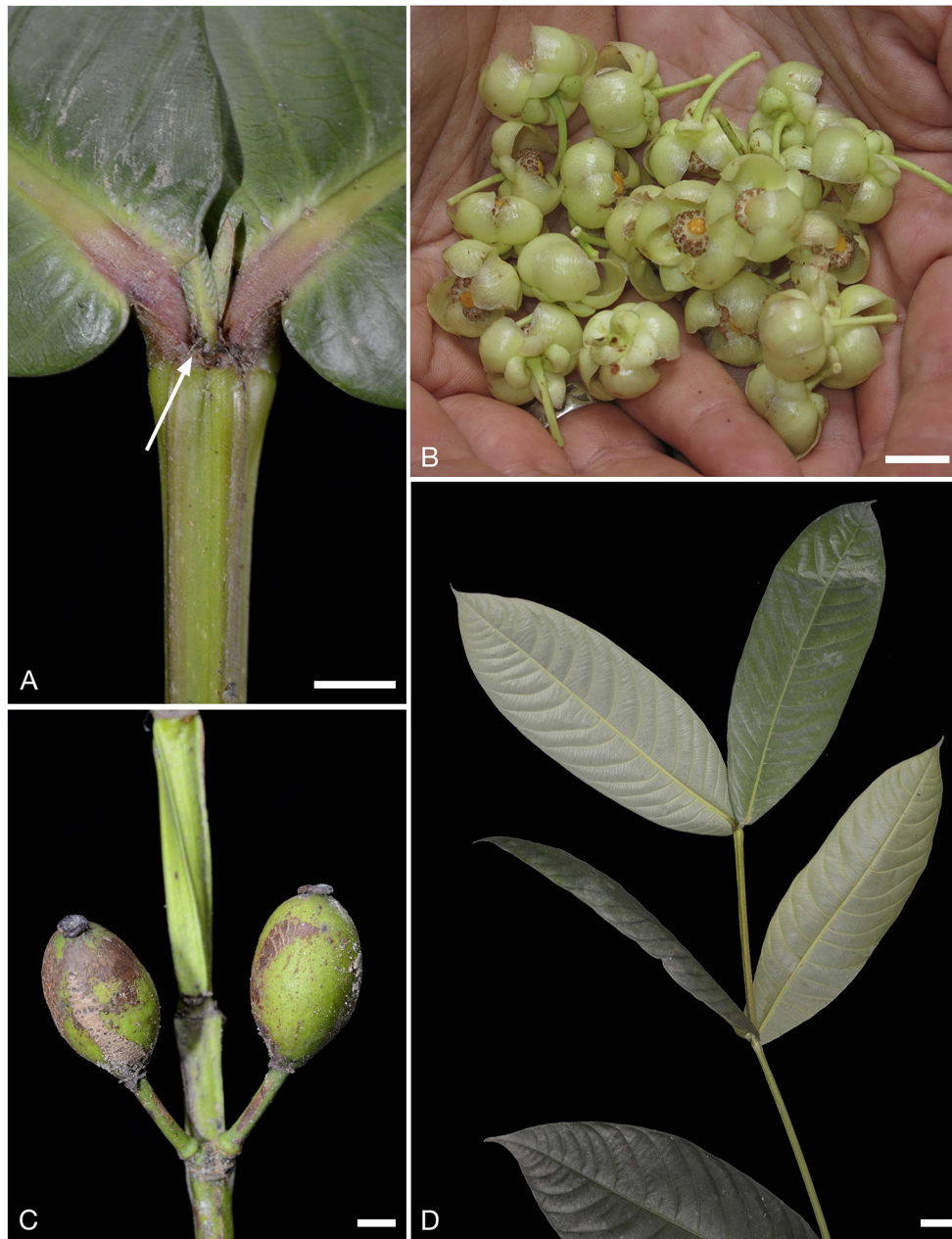


FIGURE 2. *Garcinia yaatapsap*. **A.** Apex of branch showing leaf bases, young leaves, and stipuliform structures (indicated by arrow). **B.** Staminate flowers. **C.** Branch with fruits. **D.** Branch with leaves. Scale bars: A, B = 5 mm, C = 1 cm, D = 2 cm.

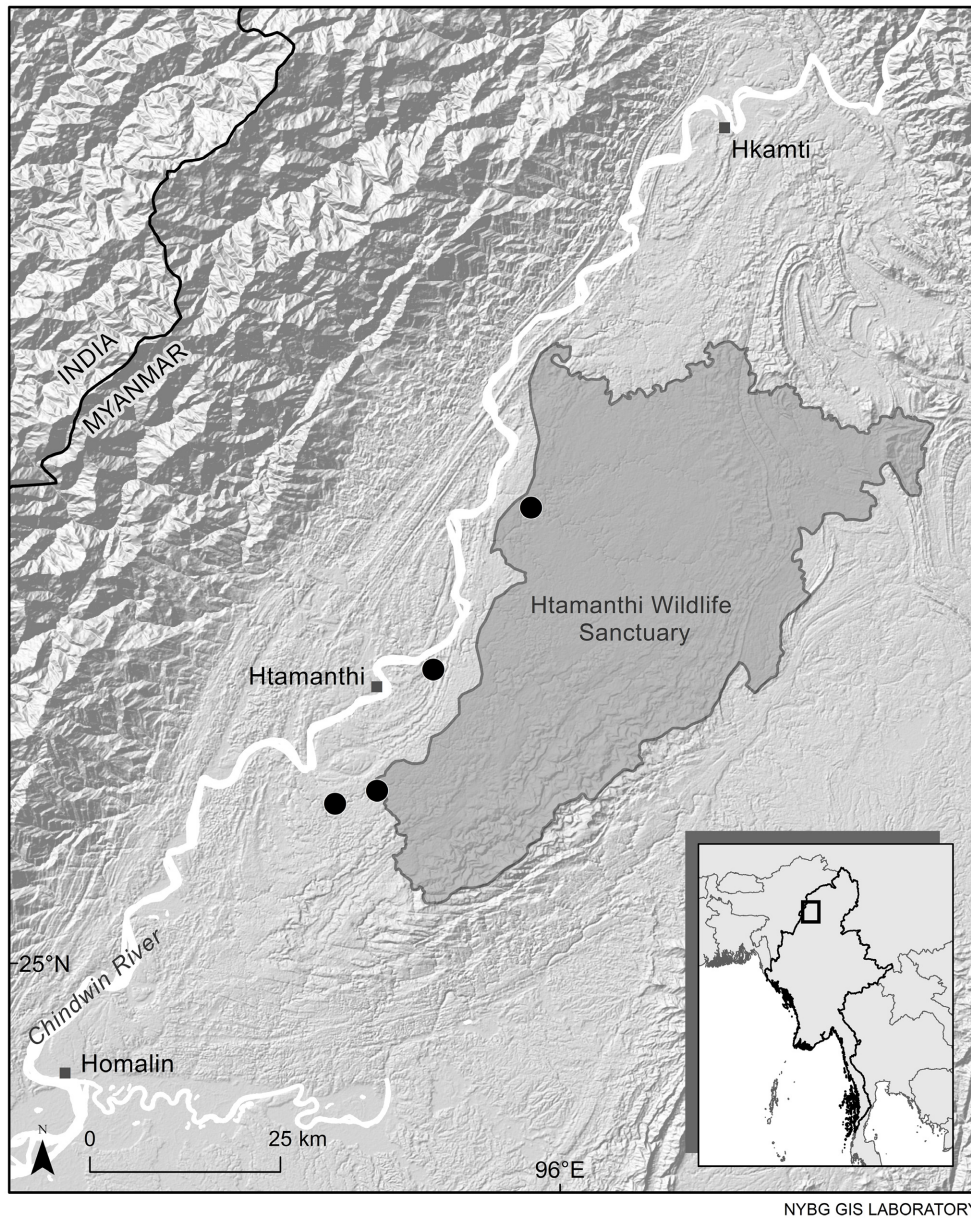


FIGURE 3. Distribution of *Garcinia yaatapsap*.

Description:—Dioecious, evergreen tree to ca. 12 m tall; exudate yellow; branchlets distinctly 4-sided, winged on angles (particularly distally), 6–8 mm wide at distal internode, glabrous. Leaves opposite, subsessile (petiole to lamina length ratio = 0.024–0.040); lamina dark green adaxially, whitish-green abaxially *in vivo*, blades narrowly to broadly elliptic, 20.5–34 cm long \times 7.5–14 cm wide, coriaceous, glabrous, base subcordate to cordate, sometimes clasping the stem, decurrent onto petiole ca. 5 mm, margin entire and finely revolute, apex acute to acuminate, acumen 10–15 mm long; venation brochidodromous; midrib raised adaxially and abaxially, more so abaxially, secondary veins 16–20 pairs per side, curved, impressed adaxially, prominently raised abaxially, forming an intramarginal vein loop 1–2.5 mm from the margin; intersecondary veins usually absent; tertiary venation percurrent; exudate-containing canals conspicuous abaxially (not visible adaxially); stipuliform structures triangular, ca. 1.5 cm long \times 1 mm wide, marcescent at older branchlet nodes; petioles 5–14 mm long, ca. 5 mm wide, with two longitudinal ridges on adaxial surface, sometimes reddish *in vivo*, glabrous. Inflorescences axillary, lax, cymose, 3–5-flowered, ca. 2 cm long \times 3.5 cm wide; peduncles ca. 6 mm long \times 1.2 mm wide, angled, glabrous; pedicels 5–17 mm long \times 0.6–1 mm wide, glabrous; bracts at apex of peduncle ca. 1.2 mm \times 1.2 mm, broadly triangular-ovate, glabrous, bracts in branched portion of the inflorescence ca. 1 mm \times 1 mm, broadly triangular-ovate, glabrous. Staminate flowers 4-merous, ca. 1 cm long \times 1.5 cm wide; sepals free, imbricate, broadly ovate to orbicular, convex and keeled, ca. 8 mm long \times 8 mm wide (inner pair slightly larger), light yellowish-green, glabrous; petals free, imbricate, broadly elliptic, convex and keeled, ca. 15 mm long \times 8 mm

wide, light yellowish-green, glabrous, exudate-containing canals conspicuous when dry, margin entire; androecium with ca. 200 stamens united into an annular mass encircling and attached to the pistillode, anthers suborbicular, ca. 0.5 mm × 0.5 mm, sessile; pistillode short-stalked, stigma capitate, ca. 3 mm diameter, vivid yellow; united androecium and pistillode on stalk ca. 4.5 mm long × 8 mm wide. Carpellate flowers not observed. Fruits (immature?) 2-locular, baccate, ellipsoid, ca. 4 cm long × 1.8 cm wide, green with brown suberized areas, smooth, outer-whorl of 2 sepals persistent; stigmas slightly raised, brown, concave-discoid, margin revolute, slightly irregular; pedicel ca. 1.5–1.75 cm long. Seeds two, ellipsoid, ca. 2 cm long × 1 cm wide; testa brown, exudate canals present.

Additional Specimens Examined (paratypes):—MYANMAR. Sagaing Region: Homalin Township, Basin of Chindwin River, Htamanthi Wildlife Sanctuary, Nam Khwe Daing area, along Nam Khwe Daing stream, 123 m. a.s.l., 25.1883°, 95.2345°, 27 October 2014, *Phyu Phyu Hnin et al. 62* (E, NY NY02648440, RAF, TNS, YU); Sagaing Region, Hkamti District, Homalin Township, Htamanthi Wildlife Sanctuary, Nam E Paw stream, above confluence with the Nam Khwe Daing stream, 165 m. a.s.l., 25.203722°, 95.284028°, 3 April 2018, *Kate Armstrong et al. 3716* (E, NY, RAF, TNS, YU); Sagaing Region, Hkamti District, Homalin Township, Nam Sa Bi village, 129 m. a.s.l., 25.360806°, 95.342833°, 6 March 2019, *Kate Armstrong et al. 4354* (NY, RAF, YU).

Distribution and Habitat:—*Garcinia yaatapsap* has only been collected four times in the vicinity of Htamanthi Wildlife Sanctuary (Fig. 3) and is likely to be endemic to this area of the upper Chindwin Basin. This species occurs from 123–184 m a.s.l. in the Kachin-Sagaing low elevation evergreen subtropical rainforest ecosystem (Armstrong *et al.* 2020; Murray *et al.* 2020), which is a lowland (ca. 100–300 m a.s.l.) evergreen closed forest ecosystem in northern Myanmar, where there is abundant rainfall (2,000+ mm) and generally moist conditions.

Etymology:—The specific epithet “yaatapsap” is the Shan-ni (Red Shan) vernacular name for the plant, which translates as “medicine to join the liver [back together]”. This epithet is constructed as a noun in apposition. Locally, a tea made from *Garcinia yaatapsap* is used as tonic for repairing a damaged liver due to drinking excess alcohol.

Proposed IUCN Conservation Status:—*Garcinia yaatapsap* is expected to be endemic to the upper Chindwin River Basin in and around Htamanthi Wildlife Sanctuary. Based on currently available specimen data its Extent of Occurrence (EOO) is 88 km² and Area of Occupancy (AOO) is 16 km² as calculated using GeoCAT (Bachman *et al.* 2011). Thus, it is assessed as being Endangered [B2a, biii,iv,v] based on AOO, due to its occurrence in a small area, the low number of mature individuals observed, and its popular local use as a medicinal plant (IUCN 2019).

Discussion

In all aspects, *Garcinia yaatapsap* is most similar to *G. stipulata*, differing primarily by its subsessile, subcordate to cordate leaves and strongly 4-angled branchlets. *Garcinia yaatapsap* is also similar to *G. nujiangensis*, but differs by its subsessile, subcordate to cordate leaves, strongly 4-angled branchlets, larger leaves (20.5–34 cm long × 7.5–14 cm wide vs. 10–18 cm long × 3–5 cm wide), fewer flowered male inflorescences (3–5 flowers vs. 6–10), and flowers, which are approximately twice as large (e.g., sepals ca. 8 × 8 mm vs. ca. 4 × 4 mm). Table 1 summarizes the differences among *G. yaatapsap*, *G. nujiangensis*, *G. stipulata*, and two other species (see below).

TABLE 1. Comparison of characters that distinguish among species of the “*Garcinia stipulata*” group. Some measurements and character states are from Pierre (1882), Pitard (1910), Jones (1980), and Li *et al.* (2007).

Character	<i>G. yaatapsap</i>	<i>G. stipulata</i>	<i>G. nujiangensis</i>	<i>G. paucinervis</i>	<i>G. thorelii</i>
Branchlet shape	4-sided (winged on angles)	Terete	Terete	4-sided (sides depressed)	Terete (4-sided when young)
Petiole to lamina length ratio (expressed as a decimal number)	0.024–0.040	0.0625–0.125	0.060–0.066	ca. 0.10	ca. 0.060
Lamina size (cm)	20.5–34 long × 7.5–14 wide	15.25–30.5 long × 3.8–9 wide	10–18 long × 3–5 wide	8–14 long × 2.5–6.5 wide	ca. 17–20 long × 5–9 wide
Lamina base shape	Subcordate to cordate	Cuneate	Cuneate	Cuneate	Cuneate
Staminate inflorescence flower number	3–5	4–6	6–10	4–10	ca. 20–40
Sepal length (mm)	ca. 8	ca. 7	ca. 4–4.5	ca. 3	ca. 2
Petal length (mm)	ca. 15	ca. 14	ca. 3.5–4	ca. 5	ca. 4–5.5

Several morphological features of *Garcinia yaatapsap* place it within a group of species (herein called the “*Garcinia stipulata*” group) that collectively range from eastern India and Bhutan, east to southwest China, and south to Myanmar and Laos. In addition to *G. yaatapsap*, this group includes *G. paucinervis* Chun & How (1956: 12), *G. nujiangensis*, *G. stipulata*, and *G. thorelii* Pierre (1882: t. [plate] 62). These species all share prominent stipuliform structures (rare in Clusiaceae, Stevens 2007), leaves with prominent, widely spaced, curved secondary veins and percurrent tertiaries, staminate flowers with numerous stamens united into an annular mass encircling and attached to the pistillode (in *G. paucinervis* and *G. nujiangensis* the stamens are described as being in four bundles [Chun & How 1956; Li 1981]), and ellipsoid fruits with a discoid stigma and one to two seeds.

In an unpublished PhD dissertation and based on features of the inflorescence, flower, and fruit, Jones (1980: 373) placed *G. stipulata* and *G. thorelii* (the other species mentioned above were not treated) into section *Discostigma*, creating a new subsection for them based on Pierre’s (1883: 8) sectional name *Dicrananthera*. Molecular phylogenetic analyses (Sweeney 2008) found support for section *Discostigma*; however, species belonging to the *G. stipulata* group were not included in these analyses. Thus, their placement into section *Discostigma* is tentative. Indeed, the morphology of *G. stipulata* group species is in some ways unlike that of other members of section *Discostigma*, which differ by having staminate flowers with stamens distributed into four separate bundles, leaves that lack prominent stipuliform structures, and secondary veins that are more closely spaced and less prominent.

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