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STUDIES IN THE THEACEAE, XXXII A REVIEW OF THE GENUS *TERNSTROEMIA* IN THE PHILIPPINE ISLANDS

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IN THE PHILIPPINE ISLANDS, the genus *Ternstroemia* was first recognized as such when Fernandez-Villar (Noviss. Append. Fl. Philipp. 19. 1880) transferred *Llanosia toquian* Blanco to the genus. Oddly enough, this earliest Latin description of the oldest species in the island group is the best and most completely understandable of all those presented to date.

No species were added to the group until 1912, when Elmer described *Ternstroemia gitingensis*. All of the remaining recognized taxa were described by 1918. All told, there have not been more than ten taxa described or suggested for the genus in this area. In fact, except for *Ternstroemia toquian*, all of the species presented were described by either A. D. E. Elmer or E. D. Merrill.

Most of the species were described from fruiting material and it is from this material that the species are most easily recognized. However, the genus in the Philippines is, as far as I know, dioecious, androdioecious or, perhaps, hermaphroditic. In most instances, three different specimens are necessary for a complete understanding of a single taxon. In *Ternstroemia toquian* only perfect flowers have been observed, and, since I have had an opportunity to examine considerable material, it may be that this type of flower is the only type for the taxon. In *T. philippinensis* var. *philippinensis* the plants are dioecious and both types have now been studied and presented here. In *T. philippinensis* var. *megacarpa*, also dioecious, only pistillate flowers and fruit have been studied. The much misunderstood *T. urdanatensis* is androdioecious. In this taxon, fortunately, both staminate and pistillate flowers were available. The pistillate flowers have well-developed stamens but these are much reduced in number. The pistillate flowers of *T. gitingensis* are still undescribed, only staminate flowers and fruit being available at this time.

Seldom have specimens in this group been collected at anthesis or near anthesis. Either fruiting specimens or those with flower buds constitute the extent of the material available. In a way, this is understandable, for the petals of fully mature flowers tend to separate from the flower and

drop quickly, usually in a single day, taking with them the attached stamens leaving only the calyx and pistil. Furthermore, the buds are so large and so tightly enclosed that when present they are often mistaken for fruits. Many of the early collections were made by native collectors who were very inexperienced.

The collections made by these collectors had been given herbarium numbers and these numbers when cited in the present paper have the initials of the herbarium between the collector's name and the number. The initials used in this paper are PBS (Philippine Bureau of Science), PBF (Philippine Bureau of Forestry) and PNH (Philippine National Herbarium).

The description below applies to the entire genus, the portions inapplicable to the species of the Philippine Islands being enclosed in brackets.

Ternstroemia Mutis ex Linnaeus f. Suppl. Pl. 39. 1781.

Flowers androdioecious, dioecious, hermaphroditic. Sepals 5, imbricate, persistent. Petals 5, connate at the base, free or joined to the middle; stamens 15- ∞ , 2-several-seriate, rarely 1-seriate; filaments connate, the outer adnate to the base of the corolla; anthers oblong or linear, usually shorter than the filaments, dehiscing longitudinally, the connective usually projected into an apiculate or caudate appendage, rarely muticous. Ovary 2[3, rarely 1]-loculate, the ovules in each locule 2-16, rarely solitary, pendulous from the apex of the placenta on more or less evolute funiculi. Style 1, entire or 2[or 3]-parted; stigma or stigmata punctiform or evolute, entire or lobate. Fruit irregularly dehiscent, often explosively so. Seeds usually 4, rarely 2-16; testa opaque, smooth, rarely plicate-rugulose, yellow, usually covered with reddish, many-celled papilli; endosperm pulpy, $\pm$ developed, seldom lacking; embryo bent nearly double, oily, with half-terete or flat cotyledons.

Glabrous trees, shrubs, lianas or epiphytes, with branches usually verticillate or subopposite. Leaves spirally disposed, congested or verticillate at the apex of the current year's growth, usually coriaceous, rarely chartaceous, entire or subentire. Flowers axillary, solitary, bracteolate, the bracteoles 2 [rarely 4], opposite or subopposite, placed immediately below the calyx, rarely with one somewhat removed and alternate on the pedicel.

TYPE SPECIES: *Ternstroemia meridionalis* Mutis ex Linn. f.

KEY TO THE SPECIES

1. Fruits huge for the genus, 6 cm. long, 4-5 cm. diameter, orange-red in color.
 2. Pedicels measuring up to 4 cm. long; bracteoles quickly caducous. *T. philippinensis* var. *philippinensis*.
 2. Pedicels much longer, usually about 10 cm. long; bracteoles persistent, foliaceous. *T. philippinensis* var. *megacarpa*.
1. Fruits much smaller, 1-2.5 cm. long, 1.5-2.5 cm. diameter, yellow, orange-yellow or reddish yellow.

2. Fruit and ovary 2-locular, many seeded (16-24) and multiovulate. *T. urdanatensis*.
2. Fruit and ovary 2-locular, few seeded (2-4) and pauciovulate.
3. Bracteoles 2, persistent, alternate, 5 mm. from each other below the calyx; leaves generally acute at the apex. *T. toquian*.
3. Bracteoles 2, quickly caducous, opposite, immediately below the calyx; leaves generally rounded at the apex, occasionally emarginate. *T. gitingensis*.

Ternstroemia philippinensis Merrill, Philipp. Jour. Sci. Bot. 11: 196. 1916; Enum. Philipp. Fl. Plts. 3: 72. 1923. — Melchior, Nat. Pflanzenfam. ed. 2. 21: 142. 1925.

T. philippinensis var. **philippinensis**

Tree 15-18 m. high; branchlets terete, grayish brown, 5-7 mm. diameter. Leaves thick-coriaceous, near the ends of the branchlets, generally not verticillate, oblong-oblongate, occasionally oblong-obovate, 12-25 cm. long, 4-7.5 cm. wide, broadly acuminate at the apex, cuneate at the base, the midrib canaliculate above, elevated below, the primary veins ca. 12 pairs, quite indistinct, usually arching upward near the margin, finally anastomosing, the petiole sturdy, 1-3 cm. long. Plants dioecious. Staminate flowers solitary; pedicel 1.5-2.5 cm. long, thick, swelling at apex to 5 mm. diameter; bracteoles 2, opposite, about 4 mm. below calyx, quickly caducous, dropping off before anthesis; no mature flowers available, the flower buds compact, ca. 1.2-1.5 cm. diameter; calyx lobes 5, rounded, very much (4 mm.) thickened at base, unequal, steadily increasing in size from the outer to the innermost lobe, the two outer 5-6 mm. long, 6-7 mm. wide, the three inner measuring 7×8 mm., 8×11 mm. and 10×12 mm.; petals 5, somewhat thickened (5 mm. at center), large, rounded, 2.5 cm. long, 2 cm. wide; stamens many, ca. 120 (closely attached in bud, probably more than 120), seemingly 4-seriate, unequal, the largest ones 8 mm. long, the filament 2 mm. long, joined at the base and adnate to the base of the corolla, the anthers 4 mm. long, the projection acuminate, 2 mm. long; ovary vestigial. Pistillate flowers solitary; pedicel, bracteoles, calyx and corolla as in staminate flowers; staminodia vestigial, ca. 2 mm. long, arranged in a band at the base of the pistil; ovary somewhat conical ca. 4 mm. long, 5 mm. diameter at base, 2-loculate, usually 2 ovules in each locule, the style ca. 2 mm. long, stout, divided into two parts, each part topped by a capitate-peltate stigma with irregular digitate projections. Fruit red or orange, ovoid to globose, unusually large, up to 6 cm. long and 5 cm. diameter, usually rounded at the apex, occasionally double-beaked because of the strong, separated persistent styles; seeds 4, large, up to 5 cm. long and 2.5 cm. diameter, filling the fruit cavity, covered with an orange-red mealy aril; calyx-lobes persistent, thin as in flower, separated from the fruit by a noticeable spongy thickening.

VERNACULAR NAMES: "Arana (Bik.); baraṅgoi (Tag.); hindang (S. L. Bis.); pamintugon (S. L. Bis.)," *fide* Merrill.

DISTRIBUTION: Luzon, Mindoro, Samar, Sibuyan.

Luzon: PROV. ILOCOS NORTE: Mt. Palimlim, *M. Ramos* PBS 33302 (A), Aug. 1918. PROV. ZAMBALES: Mt. Marayep, *M. Ramos & G. Edaño* PBS 44811 (A, BO), Dec. 1924. PROV. QUEZON: Mapatong, Tagkauayan, *M. Lagrinas* PNH 39422 (A), May 29, 1959. PROV. RIZAL: Montalban, *A. Loher* 13806 (A), Jan. 1914; Mt. Sumutan, *M. Ramos & G. Edaño* PBS 29773 (A, BO), July 1917. PROV. LAGUNA: *C. Mabesa* PBF 26784 (A), Feb.-Apr. 1917; San Antonio, *M. Ramos & G. Edaño* PBS 23794 (A, BO, GH, L), Oct. 1915. PROV. CAMARINES: Mt. Bagacay, *M. Ramos & G. Edaño* PBS 33841 (A), Nov.-Dec. 1918. **Mindoro:** Paluan, *M. Ramos* PBS 39642 (A, BO, L), Apr. 1921; Pinamalayan, *M. Ramos* PBS 41070 (A, BO, L), June 1922; Mt. Halcon, *G. Edaño* PNH 3376 (L), Jan.-Feb. 1948. **Sibuyan:** PROV. CAPIZ: Magallanes (Mt. Giting-giting), *A. D. E. Elmer* 12296 (A, BO, L), Apr. 1910. **Samar:** Mt. Capotoan, Catubig River, in damp soil on forest slopes, alt. 100 m., *M. Sablaya* 78 (A), Feb. 20, 1916 (tree 18 m.).

Twenty-four specimens have been available for the present study of this species; of these, sixteen possessed fruit while thirteen had tight buds. In some instances buds and fruit were found on the same specimen. However, in no instance was there open flowers—or flowers near anthesis. Apparently, mature flowers of the species have never been collected. In the original citation, Merrill recorded eight numbers. In his description he mentioned only the bud, which he obviously failed to dissect, since he made no mention of the floral parts within the calyx. My own dissections for this taxon were made necessarily from buds. They are, of course, very unsatisfactory because the mature measurements cannot be ascertained. Even so, the characters which may be used in preparing a key are presented here for the first time.

Furthermore, with the exception of a single specimen (*Sablaya* 78), no field notes were recorded with the specimens studied. Perhaps the original specimens which were deposited in the Philippine herbarium possessed field notes but they have been destroyed. *Sablaya* recorded the species as a tree 18 m. high growing at an altitude of 100 m. in damp soil on forest slopes. Merrill reported it to be a tree 15 m. occurring "in the virgin forest at altitudes varying from 15 to 1,200 meters, depending on the region in which it grows."

The species has a rather widespread distribution (for one of this genus), extending from the northernmost province of Luzon, Ilocos Norte, south through the provinces of Zambales, Quezon, Rizal, Laguna, and Camarines, and into the islands of Mindoro, Sibuyan, and Samar.

Characteristic of *Ternstroemia philippinensis* is the very large fruit measuring 6–7 cm. in length and about 5 cm. in diameter. The leaves vary considerably in size, from quite narrow (oblong-oblanccolate) to broad (oblong-obovate). The former type has a long-acuminate apex, whereas in the latter the apex is quite rounded and bluntly acuminate. A gradation

between these two extremes can be found, and occasionally both types are found on the same branchlet.

In the specimens from the islands south of Luzon the leaves tend to be larger and obovate, similar to those found in var. *megacarpa*.

Merrill, in his initial treatment of this species, separated it from *Ternstroemia megacarpa* on the basis of "its somewhat smaller leaves and its much shorter flowering and fruiting peduncles." Evidently at the time Merrill already had prepared the manuscript for *T. megacarpa*, although the treatment for the latter species actually did not appear until two years later (1918). Since Merrill did not dissect the flower buds of *T. philippinensis*, he did not realize that the pistillate flowers were nearly identical with those of *T. megacarpa*. He made no reference to staminate flowers in either species, although from his description of *Ternstroemia megacarpa* I think that the flowers he examined were staminate.

***Ternstroemia philippinensis* Merrill var. *megacarpa* (Merrill), comb. nov.**

Ternstroemia megacarpa Merrill, Philipp. Jour. Sci. Bot. 13: 309. 1918; Enum. Philipp. Fl. Plts. 3: 71. 1923. — Melchior, Nat. Pflanzenfam. ed. 2. 21: 142. 1925.

Tree about 12 m. high; branches grayish brown, terete, roughened by leaf-scars 5 mm. in diameter, the young branchlets smooth. Leaves coriaceous, oblong-obovate, large, 15–40 cm. long, 7–12 cm. wide, broadly acuminate at the apex, cuneate at the base, the midrib canaliculate on the upper surface, elevated below, the primary veins 10–15 pairs, anastomosing near the margin, the interspersed secondary veins not reaching the margin, the petiole sturdy, ca. 2 cm. long. Staminate flowers not seen. Pistillate flowers solitary; pedicel 6–10 cm. long, quite slender; bracteoles 2, alternate, foliaceous, linear, 5–8 mm. long, ca. 2 mm. wide at the base, the lower bracteole ca. 6 mm. below the calyx; calyx lobes unequal, the outer two ovate, ca. 8×8 mm., the inner three rounded, 9–10 mm. long, ca. 10 mm. wide; corolla in bud measuring 1–1.2 cm. across, the petals rounded, ca. 1.5 cm. long, 1 cm. wide; staminodia in several series at the base of the ovary, very small (1.5 mm.), undeveloped; ovary broadly conical, 2-loculate, 2(?) ovules in each locule; style short, 2–3 mm. long, divided into two parts nearly to the base, the stigmas peltate, 3 mm. across at center, flaring out palmately, with a fimbriate margin. Fruit yellow, ovoid, large, ca. 6 cm. long and 4 cm. across, 2-loculate, 2–4-seeded. Seeds oblong, rounded at both ends, ca. 3 cm. long, 1.5 cm. across, covered with a red mealy aril when fresh, orange-brown when dried.

VERNACULAR NAME: "Baletis (P. Bis.)," *fide* Merrill.

DISTRIBUTION: Mindanao.

Mindanao: Lanao District, Lake Lanao, Camp Keithley, Mrs. M. S. Clemens s.n. (lectotype, BO), Sept.–Oct. 1907, 959 (A), March 1907; Bukidnon Subprov., Tangulan and vicinity, M. Ramos & G. Edaña PBS 39047 (A), June–July 1920.

Even though I consider the present taxon to be only a variety of *Ternstroemia philippinensis* I have endeavored to record as complete a description as possible from the available material, which was in itself exceedingly sparse. Most of the description is supplementary to that of Merrill which seems to be lacking in most details. One must presume that Merrill examined staminate flowers from the type, *Clemens s.n.*, since he makes no mention of the pistil. He records the anther measurement as "about 1.5 cm. long." I cannot but feel that there is a mechanical error in this record, since among all the members of the genus which I have examined I have never encountered stamens, not to mention anthers, approaching this size. A more likely measurement for the anther would be 1.5 mm. Furthermore, I cannot understand why Merrill, if he was examining a staminate flower, neglected to record the measurement of the corolla, since the stamens always are adnate to the base of the corolla. In the pistillate flowers, on the other hand, the staminodia (which might measure 1.5 cm. in toto) may be found in a ring below the pistil unattached to the corolla. Although I have examined duplicates of both of Clemens' specimens cited by Merrill in the original diagnosis, no flowering material of *Clemens s.n.* was available for dissection; the fruiting specimen (*Clemens 959*) was more satisfactory.

The pistillate material used in the above description was supplied from *Ramos & Edaño 39047*. Even here, only two pistillate buds could be taken without destroying the value of the specimen. There were no mature flowers. Only the outermost petal could be removed intact and this measured ca. 1.5×1 cm. (In an open flower the innermost petal is usually larger than the outermost one.) The staminodia were minute and many, in several series, with the parts indistinguishable. The stigma in the first bud examined was as described above, that is, in two parts, each part palmate in shape with a fimbriate margin. In the second bud, from the same specimen the two parts of the style were further divided into two and three parts respectively, making a total of five styles, each with a flaring stigma much less in area, of course, than those found in the first bud.

From the material examined, this variety does not appear to be far removed from true *Ternstroemia philippinensis* var. *philippinensis*. The only characters which I can find which are truly different are (1) the long pedicel (up to 10 cm. long), and (2) the persistent, foliaceous, alternate bracteoles. In var. *philippinensis* the pedicel measures approximately 4 cm. in length and the bracteoles are quickly caducous. If available, they might prove to be foliaceous as in this species. These two characters hardly warrant specific delimitation.

***Ternstroemia urdanatensis* (Elmer) Kobuski, Jour. Arnold Arb. 28: 46. 1947.**

Adinandra urdanatensis Elmer, Leafl. Philipp. Bot. 8: 2837. 1915, "*urdanatenae*." — Merrill, Enum. Philipp. Fl. Plts. 3: 73. 1923. — Melchior, Nat. Pflanzenfam. ed. 2. 21: 144. 1925.

Ternstroemia epiphytica Elmer ex Merrill, Enum. Philipp. Fl. Plts. 3: 73. 1923, in syn.

Scandent shrub, epiphytic bush or lofty tree 20 m. or more high, the trunk often a meter in diameter, the main branches rising from above the middle, terete, the branchlets erect or ascending subverticillate, quite short, light gray. Leaves subverticillate, near the apex of the branchlets, coriaceous, obovate, 6–10 cm. long, 2–4 cm. wide, obtuse or somewhat rounded at the apex, cuneate at the base, the midrib canaliculate above, elevated below, the veins 5–7 pairs, quite obscure on both surfaces. Plants androdioecious. Staminate flowers axillary, solitary; pedicel 2–2.5 cm. long, slender; bracteoles 2, opposite, immediately below the calyx, persistent, deltoid, ca. 2 mm. long, 1.5 mm. wide at base, tapering to apex, ridged along the middle on the dorsal surface; calyx-lobes unequal, the two outer rounded-ovate, ca. 5 mm. long, 5 mm. wide near the base, the margin glandular, the three inner lobes obovate, ca. 6 mm. long, 4 mm. wide near the apex, glandular-margined; corolla-lobes quite equal, obovate, subunguiculate, quite membranaceous, not thickened at center, ca. 6 mm. long, 5–6 mm. wide; stamens bi-seriate(?), 100+, ca. 4 mm. long, the filaments 2.5 mm. long, very filamentous, tangled, adnate to the base of the corolla, the anthers 1.5 mm. long; pistillodium vestigial. Pistillate flowers axillary, solitary; pedicel decidedly recurved, 1.5–2 cm. long; bracteoles 2, opposite, immediately below the calyx, unequal, the outer one rounded-ovate, 2 mm. long and wide, apiculate, the inner one larger, ovate, 3–3.5 mm. long, 2 mm. wide, apiculate; calyx and corolla as in the staminate flower; stamens tangled and similar to those of staminate flower but fewer (ca. 45) in number; ovary subglobose, ca. 3 mm. long, 2 mm. diameter, 2-loculate, each locule multiovulate (ca. 14), tapering at the apex into a style ca. 3 mm. long, separated at the apex into two branches for 1 mm. or more, each branch topped by an asymmetrically globose stigma. Fruit globose, small, 1–1.5 cm. diameter, yellowish green, 2-loculate, each locule 8–12-seeded; seeds small, distorted in shape by crowding, ca. 4 mm. long and 3 mm. diameter, covered with a tawny mealy aril; fruiting style short, ca. 2 mm., split into two parts for 1 mm., the stigmas subglobose.

VERNACULAR NAME: "Sangnauan (Mbo.)," *fide* Merrill.

DISTRIBUTION: Luzon, Palawan, Mindanao.

Luzon: PROV. BATANGAS: *C. Mabesa* PBF 28051 (A), Apr. 1920. PROV. TAYABAS: Lucban, in forest, alt. 900 m., *A. D. E. Elmer* 7438 (A, BO), May 1906 (tall tree climber, fls. yellow, rare); same locality, *A. D. E. Elmer* 9214 (A, BO, L), ("scandent clear to top of 18 m. high tree in woods at 850 meters, branches numerous and forming bushes," flowers recurved, creamy white), May 1907; *Alcazar & G. Edaño* PNH 4537 (A), May 1939. PROV. SORSOGON: Irosin (Mt. Bulusan), *A. D. E. Elmer* 15851 (A, BO, GH, L), Apr. 1916, and 17317 (A, BO, GH, L), Sept. 1916; Bulusan volcano, *M. Ramos* PBS 23671 (A), Sept. 1915. **Palawan:** Malasgao River, Aborlan, *G. E. Edaño* PNH 14028 (A, L), Mar.–Apr. 1951. **Mindanao:** PROV. AGUSAN: Cabadbaran, Mt. Urdaneta,

forested ridge of Cawilanan peak at 1700 m., *A. D. E. Elmer* 14078 (lectotype of *Adinandra urdanatensis*, A; isotypes FI, GH), Oct. 1912; Cabadbaran, Mt. Hilong-hilong, mossy forest ridge, alt. 1050 m., *D. Mendoza & P. Convozar* PNH 10753 (A, L) (epiphytic bush, 2 m.), Apr. 19, 1949. PROV. DAVAO: Mt. Kampalili, at summit, alt. 750 m., *G. E. Edaño* PNH 11585 (A, L), Mar. 23, 1949 (woody vine); Camaguin de Mindanao, *M. Ramos* PBS 14595 (L), Mar.-Apr. 1912.

This taxon is the most innocuous, most often misinterpreted and mis-determined, and most difficult to understand, of any of the genus in the Philippine Islands. Although field notes were often absent from the specimens examined in this study, enough were included with this taxon to show a rather variable habit. It has been described from Luzon as "scandent clear to the top of 18 m. high tree," and "tall tree climber," and from Mindanao as "epiphytic bush 2 m.," "woody vine," or "lofty tree 20 m. high or higher."

Described originally as an *Adinandra*, this plant has been known as *A. urdanatensis*, *A. scandens*, and *Ternstroemia epiphytica*. It also resembles *Cleyera japonica* var. *montana* (originally described as *Adinandra montana*) and in many respects, it is similar to members of that genus. The fruit is relatively small and possesses a rather large number of seeds (16-24), which are small, crowded and distorted, as is often the case in *Adinandra*. The species was based entirely on a fruiting specimen. However, the locules of the fruit are definitely two in number, as in almost all the taxa of *Ternstroemia*. In *Adinandra*, the locules of the fruit number three or five. The compactness and the size of the seeds (large for *Adinandra*) resemble those found in most of the three-loculate species of *Adinandra*. The presence of staminate flowers also excludes the taxon from *Adinandra* in which all flowers are perfect. The anthers in *Adinandra* are hispid or setose, but in this species the anthers are glabrous, typical of *Ternstroemia*.

The so-called pistillate flowers in this species are in reality hermaphroditic. The stamens, although less than half the number, are similar in all respects to those found in the staminate flowers. However, there seems to be no definite serial arrangement of the stamens here even though they number only about forty-five. As many as seventeen stamens may be found on one petal, with the filaments attached to the base of the petal, while on another petal in the same flower as few as five may be found similarly attached. The style in the flowers which I examined was approximately 3 mm. long and was divided for about one-third the distance from the apex. It is doubtful that the measurement of this division has any significance other than that the style is not entire. In later development, the style may split to the base or nearly so. The stigmas are described above as "asymmetrically globose." Actually, they resemble the end of a golf club.

Ternstroemia toquian (Blanco) Fernandez-Villar, Noviss. Append. Fl. Philipp. 19. 1880. — Vidal, Rev. Pl. Vasc. Filip. 55. 1886. — Merrill, Philipp. Jour. Sci. 1: suppl. 95. 1906. — Merrill & Rolfe, Philipp.

Jour. Sci. Bot. 3: 113. 1908. — Merrill, Spec. Blancoanae 19, 264. 1918; Enum. Philipp. Fl. Plts. 3: 72. 1923. — Melchior, Nat. Pflanzenfam. ed. 2. 21: 142. 1925.

Llanosia toquian Blanco, Fl. Filip. ed. 2. 319. 1845.

Ternstroemia lobbiana Pierre, Fl. For. Cochinch. 2: sub. t. 128. 1887.

Taonabo toquian Merrill, Philipp. Isl. Bur. Govt. Lab. Publ. 27: 21. 1905.

Slender tree 5–10 m. high, branching usually at the apex only; branches gray-brown, terete, subverticillate. Leaves coriaceous, crowded at the apex of the branchlets, obovate, 5–8 cm. long, 1.5–2.5 cm. wide, abruptly acuminate at apex (definitely rounded in specimens from Ilocos Norte and Cagayan), cuneate at base tapering gradually and decurrently into a petiole less than 1 cm. long, the midrib canaliculate above, elevated below, the veins (3 or 4 pairs), inconspicuous on both surfaces. Flowers hermaphroditic (as far as known), solitary, axillary; pedicel 2.5–3 cm. long; bracteoles 2, alternate, 5 mm. distant from each other below calyx, ovate, 1.5×1.5 mm., subacute at the apex, glandular-apiculate; calyx-lobes unequal, joined at the base more than in most species, thickening in fruit, the two outer lobes rounded, ca. 3 mm. long, 3.5 mm. wide, the inner lobes about as long as the outer lobes but wider, 5 mm. wide, the margin scarious; corolla-lobes unequal, the outer ones obovate, 10–11 mm. long, 5–6 mm. wide, broadly obtuse at the apex, narrowed at the base, the margin lightly scarious, progressively so in the inner ones, the inner one ca. 10 mm. long, about the same as the outer ones, wider, 8–10 mm. also wider at the base, rounded at the apex, the margin quite scarious; stamens several-seriate, crowded, mounted on a disk which is raised toward the center, ± 175 , free from the petals, ca. 3.5 mm. long, the filaments joined lightly at the base, ca. 1.5 mm. long, the anthers ca. 1.25 mm. long, the projection 0.25 mm. long, subemarginate; ovary conical, 2-loculate, with three or more ovules in each locule attached at the apex of the cell, the style negligible, only 0.2 mm. long, divided into two parts, the stigmas 2, fan-shaped with scalloped edges, spreading over the apex of the ovary. Fruit globose, 2–3 cm. long, about the same in diameter, thin-shelled, orange-yellow, 2-loculate, occasionally appearing 1-loculate (because of broken septum), each locule one- or two-seeded, the seeds 1–1.7 cm. long, ca. 1 cm. diameter, covered with a tawny or orange aril.

VERNACULAR NAMES: "Bigag (Tag.); bikag (Tag.); boalau (Mbo.); debaak (Ilk.); garamansatai (Tag.); malapuyau (Tag.); simbinuluka (Sbl.); tabak (Ilk.); tokian (Tag.)," *fide* Merrill. "Batohan-no-mahingtig, Boalau," *fide* Elmer.

DISTRIBUTION: Luzon, Mindoro, Sibuyan, Panay, Palawan, Mindanao.

Luzon: PROV. ILOCOS NORTE: Bangui, *M. Ramos* PBS 27417 (A, BO), Feb.–Mar. 1917. PROV. ILOCOS SUR: *E. Paraiso* PBF 25463 (A), Mar. 1918. PROV. CAYACAN: Lucban, Abulog, in swampy places, *V. Veracion* PNH 33432 (L), Jan. 2, 1955; *H. M. Curran* PBF 17205 (BO), Mar. 1909; Mt. Bababtning, *G. Edaño* PBS 79395 (BO), May 1930. PROV. BENGUET: *M. Ramos* PBS 5596 (BO, L), Dec. 1908. PROV. PANGASINAN: Mt. Isidro, *E. Fenix* PBS 29966 (BO,

GH, L), Nov. 1917. PROV. ZAMBALES: Mt. Tapalao, *M. Ramos & G. Edaño* PBS 44727 (A), Nov.–Dec. 1924; *M. Ramos* PBS 4795 (BO, GH), Dec. 1907. PROV. ECIJA: Carabbala Mts., *S. Vidal y Soler* 58 (A, L); *R. J. Alvarez* PBF 22149 (BO), Dec. 1910. PROV. PAMPANGA: Mt. Arayat, *E. D. Merrill* 5021 (L), Feb. 1906; Mt. Arayat, *E. D. Merrill* Sp. Blanco. 720 (BO, GH, L). PROV. BATAAN: Mt. Mariveles, Lamao River, *T. E. Borden* PBF 787, 835, 2935 (BO), 1904–1905, *R. Meyer* PBF 2605, 2614, 2760 (BO), Feb. 1905, *P. T. Barnes* PBF 150 (BO), Jan. 1904, Ahern's Coll. PBF 1506 (BO), July–Aug. 1904; Upper Lamao River, alt. 1000 m., *R. S. Williams* 403 (GH), Jan. 3, 1903 (tree 10 m. high); Mt. Kuyapo, *G. Edaño* PNH (L), Nov.–Dec. 1947; *A. P. Racelis* PBF 27987 (BO), Feb. 1920; Mt. Mariveles, mountains above 700 m. alt., *P. T. Barnes* PBF 208 (A), Jan. 1904 (small tree). PROV. BULACAN: Angat, *S. Vidal y Soler* 59 (A, L). PROV. RIZAL: Mt. Lumutan, *M. Ramos & G. Edaño* PBS 29703 (GH), July 1917; Tanay, *E. D. Merrill* 2288 (GH), May 1903; *A. Loher* 13895 (A), Jan. 1913; Paningtinan, *A. Loher* 13482 (BO), Mar. 1915. PROV. LAGUNA: Mt. Banahao, *S. Vidal y Soler* 58c (A). PROV. TAYABAS: *G. Edaño* PBS 26900 (L), Mar. 1917; Mt. Camatis, *Alcazir & G. Edaño* PNH 4541 (A), May 1929. PROV. CAMARINES SUR: Kamugong River, *G. Edaño* PBS 75846 (BO), Oct. 1928; Sarapan, *G. Edaño* PBS 76141 (A), Oct. 1920. **Mindoro:** Paluan, *M. Ramos* PBS 39755 (A, BO, L), Apr. 1921. **Sibuyan:** Magallanes, Mt. Giting-giting, in moist, rocky soil of forested ridge, alt. 800 m., *A. D. E. Elmer* 12428 (A, BO, GH, L), May 1910 (slender, erect tree 5 m. high, branched toward the top only). **Panay:** PROV. ILOILO: Miagao, Bugani, *S. Vidal y Soler* 58 bis (A). **Palawan:** Puerto Princesa, *A. L. Cenebra* PBF 29200 (A), Feb. 1923. **Mindanao:** PROV. AGUSAN: Cabadbaran (Mt. Urdaneta), in red clay on steep forested ridge, alt. 400 m., *A. D. E. Elmer* 13282 (A, BO, GH, L), July 1912 (small tree 10 m. high, branched from the middle).

This taxon is the first-recognized member of the genus from the Philippine Islands and understandably so since it has by far the broadest distribution of the group in that area. It has been widely collected from the northernmost provinces of Luzon throughout the island, including (in my study) specimens from Ilocos Norte, Cayacan, Benguet, Pangasinan, Zambales, Neuva Ecija, Pampanga, Bataan, Bulacan, Rizal, Laguna, Tayabas, and Camarines Sur, sometimes with several collections from each province. The species extends southward from Luzon through Mindoro, Sibuyan, Panay, Palawan into Mindanao. With all of the specimens represented, field notes are at a minimum. Very rarely is anything but the general locality in a province given and often even that is missing.

There is considerable variation found in the leaves. Generally they are obovate in shape, with the apex abruptly acuminate, measuring 5–8 cm. in length and 1.5–2.5 cm. in width. In some specimens from Benguet Province, Luzon, the leaves are as long as 10 cm. but are still only 2.5 cm. wide, giving a much narrower appearance. From Ilocos Norte and Cayagan provinces, the leaves are definitely rounded at the apex.

Even though there is considerable variation in leaf size and shape, the following characters are quite consistent. The small calyx lobes are distinctly joined at the base in the flower in the form of a shallow cup, the united portion thickening in fruit. The style is minute, in fact so minute as to be preserved in the fruit without damage. The stamens, joined to-

gether only lightly at the base, are not attached to the petals, a character most unusual in the genus. The "disk" or base for the very many stamens (ca. 175) is raised somewhat at the center.

The flowers examined by me all proved to be hermaphroditic. There may be staminate flowers but I was unable to find any. In all dissections, the ovary proved to be two-loculate with three or more ovules in each locule. Variation in fruit development may be found. In rare instances the locule wall has broken down giving the appearance of a one-loculate fruit with two seeds. However, in such instances one can see the edges of the broken septum along the side. In most instances the fruit retains the septum and is filled with two, three, four, or even more well-developed seeds.

Ternstroemia gitingensis Elmer, Leaf. Philipp. Bot. 4: 1480. 1912, "gitingense"; Merrill, Enum. Philipp. Fl. Plts. 3: 71. 1923. — Melchior, Nat. Pflanzenfam. ed. 2. 21: 142. 925.

Ternstroemia obovata Merrill, Enum. Philipp. Fl. Plts. 3: 71. 1923, nomen.

Small tree 8–10 m. high, branching at the top, the main branches crookedly rebranched, lax, with ascending tips, yellowish gray; branchlets grayish white, ca. 5 mm. thick. Leaves verticillate at the tips of the branchlets, horizontal or radially spreading, thick-coriaceous, obovate, rounded at the apex, occasionally emarginate, cuneate at the base, (9–)12–15 cm. long, 4–6 cm. wide, reddish on the upper surface, yellowish green beneath, the midrib canaliculate above, elevated below, the veins about 4 pairs, quite obscure on both surfaces, the petiole stout, ca. 2 cm. long. Plants androdioecious. Staminate flowers solitary, axillary; pedicel 1–2 cm. long; bracteoles opposite, immediately below the calyx, quickly caducous; calyx-lobes unequal, quite thickened at the center at the base, the two outer smaller, ca. 3 mm. long, 4.5 mm. wide, rounded, with a thin margin, the three inner rounded, with an abrupt transition from thickened center to wide scarious margin, ca. 5 mm. long, 6 mm. wide; corolla-lobes rounded at apex, unguiculate, ca. 10 mm. long, 8–10 mm. wide near center, 4–5 mm. wide at base; pistillodium sterile, deceptively appearing to be fertile, conical, 2 mm. long, 2 mm. wide at base, occasionally 2-loculate, 0-ovulate, usually lacking locules; stamens ca. 120, several-seriate, very short and sturdy, nearly filling flower, 2.5 mm. long, the filament and anther each about 1 mm. long, the projection truncate before pollen dispersal, later bifid. Pistillate flower not seen. Fruit globose or ellipsoid, ca. 2 cm. long, reddish yellow, quite thin-shelled, 2.5 cm. long, ca. 1.5 cm. diameter, 2-loculate, each locule single-seeded. Seeds about 1.3 cm. long, 0.8 cm. in diameter, attached at the apex, covered with a crimson-red, mealy aril. The fruiting style very short (1 mm. or less), topped by a spreading, peltate stigma.

VERNACULAR NAMES: "Apin (Tag.); palilag (Ibn.); tapmis (C. Bis.)," *fide* Merrill.

DISTRIBUTION: Luzon, Sibuyan, Panay, Palawan.

Luzon: PROV. ISABELA: Palanan Bay, *I. Escritor* 1209 (BO, GH, L), June 1913. PROV. TAYABAS: Baler, *E. Quisumbing* PNH 7654 (A), May 1941; Mt. Binuang, *M. Ramos & G. Edaño* PBS 28564 (A), May 1917. **Sibuyan:** PROV. CAPIZ: Magallanes, Mt. Giting-giting, steep, densely wooded ravine near a creek, alt. ca. 500 m., *A. D. E. Elmer* 12397 (A, lectotype; BO, GH, L, isotypes), May 1910. **Panay:** PROV. CAPIZ: Libacao, *A. Martellino & G. Edaño* PBS 35448 (A, BO, L), May-June 1919. **Palawan:** PROV. PALAWAN: Puerto Princesa, Mt. Pulgar, in low, black, compact soil in a lightly wooded flat area, alt. 80 m., *A. D. Elmer* 12901 (A, BO, GH, L), May 1911.

This species is the smallest fruited taxon found in the Philippines. The distribution is of a pattern which Elmer considered quite typical for the Philippines, namely, from Luzon, south through Sibuyan into Palawan.

Elmer based his original description on two of his own collections, 12397, from Sibuyan, and 12901, from Palawan. Since the type material in Manila has been destroyed it is necessary to designate a lectotype. I have selected *Elmer* 12397 (in the Arnold Arboretum herbarium) as the lectotype. Of the two numbers cited by Elmer, 12397 is the only one with fruiting material. Furthermore, it was collected from a region centrally located as far as distribution is concerned. In his field notes Elmer refers to fruiting material on his no. 12901. However, I have examined four duplicates of this number and have found them all sterile.

The fruits examined in this study showed them to be 2-loculate with a single seed in each locule. I doubt that this will hold as a specific character, for later fruit collections may well show two seeds to a single locule, variation in seed number being not at all unusual in *Ternstroemia*. Unfortunately, no pistillate flowers were available, hence the ovule number could not be ascertained.

The staminate flower might be mistaken for a perfect flower. The pistillodium is much more developed than is usually found in staminate flowers of the genus. It is of the size of many functional pistils, tapering, however, from the base to the apex with no definite style. In one dissection I found two distinct lacunae (or locules) but a careful search revealed no ovules. In all the other dissections there were no evidences of locules.

The leaves of the specimens from the southernmost area (Sibuyan and Palawan) are larger than those found in the northern specimens, measuring as much as 15×6 cm. In the Luzon specimens the leaves are smaller, measuring only 9×4 cm. These, of course, are the two extremes.

This species is closely allied to *Ternstroemia toquian*, the first-described species from the Islands and one much more widely distributed. Only staminate flowers and fruit were observed in *T. gitingensis*. However, a study of the styles, occasionally attached to the fruit, show that they are very short (not more than a millimeter in length) and that the fragmentary stigmas are peltate. One may presume, naturally, that the pistillate flowers when observed will bear out these characters. In *T. toquian*, on the other hand, only pistillate flowers were observed. Here, the ovary

contained 2 or 3 ovules for each locule with a very brief style and a peltate stigma. The fruit has only one or two developed seeds, however.

It may turn out eventually that *Ternstroemia gitingensis* is merely the staminate phase of *T. toquian*. However, the perfect flower of *T. toquian* has 175 stamens, while the staminate flower of *T. gitingensis* has only 120 stamens. There are a few other minor differences. In *T. toquian*, the bracteoles are alternate, 5 mm. distant from each other below the calyx, and persistent. In *T. gitingensis* the bracteoles are opposite, immediately below the calyx, and quickly caducous. The leaves in *T. toquian* are smaller, 5–8 cm. long and 2.5 cm. wide, obovate and abruptly acuminate at the apex. However, leaf shape and size are not sound characters for delimiting species in this genus. In certain specimens of *T. toquian*, the leaves are definitely rounded at the apex. In *T. gitingensis*, the leaves are larger, 12–15 cm. long, 4–6 cm. wide and always rounded at the apex, sometimes emarginate.



Kobuski, Clarence Emmeren. 1961. "Studies in the Theaceae, XXXII: a Review of the Genus Ternstroemia in the Philippine Islands." *Journal of the Arnold Arboretum* 42(3), 263–275. <https://doi.org/10.5962/p.185624>.

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