

A CRITICAL STUDY OF PHILIPPINE SPECIES OF THE  
TRIBE AQUILARIEAE, FAMILY THYMELAEACEAE\*

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THE TRIBE AQUILARIEAE (R. Br.) Baill. (1877); Gilg (1894) is represented by five genera: *Aquilaria* Lam., *Gyrinopsis* Decne., *Brachythalamus* Gilg, *Gyrinops* Gaertn., and *Lachnolepis* Miq. These genera have been much confused and no two authors can agree on their status. Even the well known genus *Aquilaria* is badly defined and the species, in general, are inadequately known. Hallier<sup>1</sup> reduced the four small genera *Gyrinops*, *Gyrinopsis*, *Brachythalamus*, and *Lachnolepis* to *Aquilaria*. Hallier grouped the species of *Aquilaria* under six sections: *Agallochum*, *Gyrinopsis*, *Amphinoma*, *Brachythalamus*, *Gyrinops*, and *Lachnolepis*. His third section seems ill-founded. *Aquilaria khasiana* Hallier, the only species under this section, appears to be but a mere form of the more familiar *A. Agallochoa* Roxb. On the other hand, on account of the presence of five stamens, I agree with Domke<sup>2</sup> that *Brachythalamus* is similar to *Gyrinops*. The shape of the perianth-tube is more like that of *Gyrinopsis*, which is slender and tubular. The presence of five stamens places *Lachnolepis* under *Gyrinops*. As to *Gyrinopsis* I concur with Merrill<sup>3</sup> that it is distinct from *Aquilaria*. In addition, I feel that the form of perianth-tube is a major distinguishing feature between the two genera, as well as the relative position of the nectarial scales, and the filaments. The development of the fruit is a distinguishing character in *Aquilaria* (*A. sinensis* and *A. malaccensis*), the fruit developing at the summit of the receptacle over the perianth. In *Gyrinopsis* (*G. Cumingana* et al.), the fruit develops and breaks at the side of the perianth-tube. As to *Gyrinops*, typified by *Gyrinops Walla*, I am convinced that it is distinct from the two genera. *Aquilaria* and *Gyrinopsis* are characterized by having ten stamens; *Gyrinops* has five or six stamens, normally five. Hallier discounts the value of the number of stamens as a distinguishing feature of the genera *Aquilaria* and *Gyrinops*. In this connection Hallier<sup>4</sup> expresses his views thus:

\* The study upon which this treatment is based was essentially completed before the recent war, during which the herbarium and library of the Bureau of Science, Manila, were destroyed. Of the two new species of *Gyrinopsis* here proposed, isotypes were sent to the herbaria at Singapore and Buitenzorg and are also to be found in some American and European herbaria.

<sup>1</sup> H. Hallier in Med. Rijks Herb. Leiden, 44: 1-31. 1922.

<sup>2</sup> Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

<sup>3</sup> Merrill in Philip. Jour. Sci. Bot. 7: 313. 1912.

<sup>4</sup> H. Hallier in Med. Rijks Herb. Leiden, 44: 5. 1922.

"So hätten wir denn nur noch zwei Gattungen, nämlich *Aquilaria* (mit Einschluss von *Gyrinopsis*) und *Gyrinops* (mit Einschluss von *Lachnolepis* und *Brachythalamus*), die wiederum durch die einander sehr ähnlichen Kapseln der *A. khasiana* m. und der *Gyrinops Walla* auf's engste mit einander verknüpft werden, sich im übrigen aber nur durch das Vorhandensein oder Fehlen der fünf Kronstaubblätter von einander unterschieden. Auch auf letzteres Verhältnis darf jedoch nicht allzuviel Gewicht gelegt werden, da auch bei den vermütlichen Stammeltern der Thymelaeaceen, sowie der ganzen Myrtinen, der Polygalinen. . ."

Apparently the genus *Gyrinopsis* was not known to Hooker.<sup>5</sup> He recognized but two genera (*Gyrinops* and *Aquilaria*) under the tribe AQUILARIEAE. Of note is the way he differentiates the two genera, on the basis of the form of the perianth and the number of stamens.

While in some genera the number of stamens varies, in others this feature is important and of a major character. I consider, in this particular case, this feature a distinguishing one.

This paper includes descriptions of two apparently new species of *Gyrinopsis* (*G. parvifolia* and *G. pubifolia*). Because of a critical study of the group a few nomenclatural changes are in order.

In conclusion, it seems best to recognize three genera (*Aquilaria*, *Gyrinopsis*, and *Gyrinops*) in this group of allied plants. They may be separated on technical characters as follows:

1. Stamens 10.
  2. Perianth-tube campanulate or infundibuliform; stamens stalked; fruit developing on the summit of the perianth; seeds with umbilical cord. . . . . 1. *Aquilaria*.
  2. Perianth slender, cylindrical; stamens sessile; fruit developing from the side of the perianth-tube; seeds without umbilical cord. . . . . 2. *Gyrinopsis*.
1. Stamens 5; perianth cylindrical. . . . . 3. *Gyrinops*.

### *Aquilaria* Lamarck

*Aquilaria* Lam. Encycl. 1: 49. 1783, 2: 610. 1788, Illus. 2: t. 356. 1799; Cav. Diss. 377, t. 224. 1790; Meisn. in DC. Prodr. 2: 59. 1825, 14: 601. 1857; Royle, Illus. Himal. Bot. 1: 173. 1835, 2: t. 36. 1839; Meisn. Pl. Vasc. Gen. 73. 1836; Arnott in Lindl. Nat. Syst. ed. 2, 442. 1836; Hook. Ic. 1: t. 6. 1837; Endl. Gen. 333. 1837; Roxb. & Colebrooke in Trans. Linn. Soc. 21: 199, t. 21. 1854.

*Agallochum* Rumph. Herb. Amb. 2: 34, t. 10. 1741; Lam. Encycl. 1: 47. 1783.

*Ophiospermum* Reichb. Consp. 82. 1828.

*Ophiospermum* Lour. Fl. Cochinch. 280. 1790; Meisn. in DC. Prodr. 2: 59. 1825.

*Decaisnella* O. Kuntze, Rev. Gen. Pl. 2: 584. 1891.

According to Roxburgh and Colebrooke, the flowers are incomplete; calyx campanulate, 5-cleft; corolla none; nectary (scales) 10-leaved, alternate with stamens; capsules superior, 2-celled, 2-valved; seed solitary; embryo inverted, without perisperm.

Distribution of the genus: Northeastern India, southern China, Hong-kong, Malaysia to New Guinea.

<sup>5</sup> J. D. Hooker, Fl. Brit. Ind. 5: 192. 1890.

## PHILIPPINE SPECIES

*Aquilaria acuminata* (Merr.) comb. nov.

*Gyrinopsis acuminata* Merr. in Philip. Jour. Sci. Bot. 17: 294. 1920, Enum. Philip. Fl. Pl. 3: 130. 1923.

DINAGAT ISLAND: Surigao Province, *Bur. Sci. 35158 Ramos and Pascasio* (TYPE — flowering), May 13, 1919, at low altitude. BUCAS GRANDE ISLAND: Surigao Province, *Bur. Sci. 35055 Ramos and Pascasio* (fruiting), June 11, 1919, at low altitude.

*Aquilaria apiculata* Merr. in Philip. Jour. Sci. 20: 411. 1922, Enum. Philip. Fl. Pl. 3: 130. 1923.

MINDANAO: Bukidnon Province, *Bur. Sci. 38601 Ramos and Edaño* (TYPE), in dry forests, altitude 1100 m.

*Aquilaria brachyantha* (Merr.) H. Hallier in Med. Rijks Herb. 44: 16. 1922.

*Gyrinopsis brachyantha* Merr. in Philip. Jour. Sci. Bot. 7: 313. 1912, Interpret. Herb. Amb. 380. 1917, Enum. Philip. Fl. Pl. 3: 130. 1923; Elmer, Leaflet. Philip. Bot. 5: 1629. 1913.

*Cortex filarius* Rumph. Herb. Amb. Auct.: 13. 1755.

LUZON: Cagayan Province, Abulug River, *Bur. Sci. 13862 Ramos* (TYPE), Jan. 28, 1912, *For. Bur. 17220, 19562 Convocar*, Jan. 25, 1912. ALABAT: Tayabas Province, *Bur. Sci. 48136 Ramos and Edaño*, Oct. 8, 1926, *Bur. Sci. 48220 Ramos and Edaño*, Sept. 21, 1926. Borneo, Amboina.

The calyx is campanulate.

*Aquilaria malaccensis* Lam. Encycl. 1: 49. 1783; Gamble in Jour. As. Soc. Beng. 75<sup>2</sup>: 264. 1912; Merr. in Philip. Jour. Sci. Bot. 10: 44. 1915, Enum. Philip. Fl. Pl. 3: 130. 1923.

*Aquilaria secundaria* Meisn. in DC. Prodr. 2: 59. 1825.

*Aquilaria ovata* Cav. Diss. 377, t. 224. 1790.

*Agallochum secundarium* (*coïnamense* et *malaccense*) Rumph. Herb. Amb. 2: 34, 35, t. 10. 1741.

LUZON: Camarines Prov., Salauigan, *For. Bur. 21452 Alvarez*, May 21, 1914. Malay Peninsula, Sumatra, Siam.

*Excluded Species*

*Aquilaria pentandra* Blanco, Fl. Filip., ed. 1, 373. 1837. Philippines.

## EXTRA-PHILIPPINE SPECIES

*Aquilaria Agallocha* Roxb. Hort. Beng. 33. 1814, Fl. Ind. ed. 2: 2: 422. 1832.

*Agallochum secundarium Calambac* Rumph. Herb. Amb. 2: 34. 1741.

Bengal, Assam.

*Aquilaria Baillonii* Pierre ex Lecomte, Fl. Gén. Indo-Chine, 5: 179. 1915. Indo-China: Cambodia.

*Aquilaria Crasna* Pierre ex Lecomte in Bull. Soc. Bot. France, 61: 411. 1915. Indo-China: Cambodia.

*Aquilaria hirta* Ridley in Jour. Roy. As. Soc. S. Br. 35: 78. 1901. Malay Peninsula.

*Aquilaria khasiana* H. Hallier in Med. Rijks Herb. 44: 18. 1922. India.

*Aquilaria microcarpa* Baill. in Adansonia 11: 304. 1875. Sarawak, West Borneo.

*Aquilaria Moszkowskii* Gilg in Notizbl. Bot. Gart. Berlin, 5: 84. 1908. Sumatra.

*Aquilaria Ophispermum* Poir. in Dict. Sci. Nat. 18: 161. 1820.

*Aquilaria chinensis* Spreng. Syst. 2: 356. 1825.

China.

*Aquilaria rostrata* Ridley, Fl. Malay Penin. 3: 148. 1924. Malay Peninsula.

*Aquilaria sinensis* (Lour.) Merr. in Philip. Jour. Sci. 15: 248. 1919.

*Ophispermum sinense* Lour. Fl. Cochinch. 280. 1790.

*Aquilaria grandiflora* Benth. Fl. Hongk. 297. 1861.

China.

### Gyrinops Gaertner

*Gyrinops* Gaertn. Fruct. 2: 276, *t.* 140. 1791; Meisn. in DC. Prodr. 2: 60. 1825, 14: 602. 1857; Arnott in Lindl. Nat. Syst. ed. 2, 442. 1836; Meisn. Pl. Vasc. Gen. 73. 1836; Hook. Ic. 1: *t.* 5. 1837; Endl. Gen. 333. 1837.

Perianth tubular, cylindrical, slender; stamens 5, arranged in a row; nectarial scales inserted above the stamens, connate in a ring; other features resembling *Aquilaria*.

The genus *Gyrinops* is based on the type of *Gyrinops Walla* Gaertn. Five species are known today under this genus. Domke<sup>6</sup> reduced three species of *Brachythalamus* to *Gyrinops*. The latter genus is distinct from *Aquilaria* and *Gyrinopsis* in having only five stamens. Domke described another species, *G. Ledermannii*, from New Guinea. Hallier<sup>7</sup> reduced all the species of *Gyrinops* to *Aquilaria*, with which I do not agree.

#### EXTRA-PHILIPPINE SPECIES<sup>8</sup>

*Gyrinops caudatus* (Gilg) Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

*Brachythalamus caudatus* Gilg in Bot. Jahrb. 28: 146. 1900.

New Guinea.

*Gyrinops Ledermannii* Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

New Guinea.

*Gyrinops moluccana* (Miq.) comb. nov.

*Lachnolepis moluccana* Miq. in Ann. Mus. Bot. Lugd.-Bat. 1: 132. 1863.

*Aquilaria moluccana* (Miq.) H. Hallier in Med. Rijks Herb. 44: 19. 1922.

Moluccas.

*Gyrinops podocarpus* (Gilg) Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

*Brachythalamus podocarpus* Gilg in Bot. Jahrb. 28: 146. 1900.

*Aquilaria podocarpa* H. Hallier in Med. Rijks Herb. 44: 19. 1922.

New Guinea.

*Gyrinops Versteegii* (Gilg) Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

*Brachythalamus Versteegii* Gilg in Nova Guinea, 8: 410. 1910.

*Aquilaria Versteegii* H. Hallier in Med. Rijks Herb. 44: 19. 1922.

New Guinea.

*Brachythalamus Versteegii* Gilg is the type of the genus *Brachythalamus*.

*Gyrinops Walla* Gaertn. Fruct. 2: 276, *t.* 140. 1791; Meisn. in DC. Prodr. 2: 60. 1825, 14: 603. 1857; Hook. Ic. 1: *t.* 5. 1837.

Ceylon.

### Gyrinopsis Decaisne

*Gyrinopsis* Decaisne in Ann. Sci. Nat. Bot. II. 19: 41, *t.* 1, *fig.* B. 1843, Bot. Zeit.

<sup>6</sup> Domke in Notizbl. Bot. Gart. Berlin, 11: 349. 1932.

<sup>7</sup> H. Hallier in Med. Rijks Herb. 44: 15-20. 1922.

<sup>8</sup> All species of *Gyrinops* herein included are extra-Philippine. The genus is not represented in the Philippines.

2: 599. 1844; Endl. Gen. Pl. Suppl. III, 65. 1843; Walp. Repert. 5: 410. 1845; Meisn. in DC. Prodr. 14: 602. 1857; Lemée, Dict. Desc. Syn. Gen. Pl. Phan. 3: 404. 1931.

The genus *Gyrinopsis* is based on *G. Cumingiana*, described from a Philippine specimen, *Cuming 1617*. The genus has previously been reported only from the Philippines, but apparently it occurs also in Borneo and Amboina.

The perianth is slender and cylindrical. There are 10 sessile stamens arranged in two rows, one below the other, unequal, the five alternating smaller. There are 10 scales, alternating with the stamens or below the stamens. The fruit develops from the side of the perianth-tube. The seeds are without umbilical cord.

#### PHILIPPINE SPECIES

*Gyrinopsis citrinaecarpa* Elmer, Leaf. Philip. Bot. 5: 1631. 1913; Merr. Enum. Philip. Fl. Pl. 3: 130. 1923.

*Aquilaria citrinaecarpa* (Elmer) H. Hallier in Med. Rijks Herb. 44: 18. 1922.

MINDANAO: Agusan Province, Cabadbaran (Mt. Urdaneta), *Elmer 13566*, Aug., 1912, on forested ridges, altitude about 1200 m.

*Gyrinopsis Cumingiana* Decne. in Ann. Sci. Nat. Bot. II. 19: 41, *t. 1, fig. B.* 1843, Bot. Zeit. 2: 599. 1844; Walp. Repert. 5: 410. 1845; Miq. Fl. Ind. Bat. 1: 883. 1857; Meisn. in DC. Prodr. 14: 603. 1857; F.-Vill. Novis. App. 183. 1880; Vidal, Phan. Cuming. Philip. 140. 1885, Rev. Pl. Vasc. Filip. 230. 1886; Merr. in Philip. Bur. For. Bull. 1: 41. 1903, Enum. Philip. Fl. Pl. 3: 131. 1923; Elmer, Leaf. Philip. Bot. 5: 1629. 1913.

*Gyrinopsis Cumingiana* Decne. var. *pubescens* Elmer, Leaf. Philip. Bot. 5: 1629. 1913; Merr. Enum. Philip. Fl. Pl. 3: 131. 1923.

*Aquilaria Cumingiana* (Decne.) H. Hallier in Med. Rijks Herb. 44: 17. 1922.

*Aquilaria decemcostata* H. Hallier in Med. Rijks Herb. 44: 17. 1922.

PHILIPPINES: *Cuming 1617* (TYPE). LUZON (Nueva Ecija, Bulacan, Tayabas, Laguna, Camarines, Albay), CATANDUANES, SAMAR, SIBUYAN, LEYTE, PANAY, MINDANAO, JOLO. In primary forests at low and medium altitudes. Celebes.

Local names: *Alahan* (Tag.); *bago* (Mbo.); *binukat* (Ak., Bis.); *butlo* (Neg.); *dalakit* (S. L. Bis.); *Maga-an* (Tag.); *palisan* (Tag.); *pamaluan* (Bag.).

*Gyrinopsis urdanetensis* Elmer, Leaf. Philip. Bot. 5: 1630. 1913.

*Aquilaria urdanetensis* (Elmer) H. Hallier in Med. Rijks Herb. 44: 16. 1922.

MINDANAO: Agusan Province, *Elmer 14195, 13742*, in the mossy forest on exposed ridges, altitude about 1700 m.

Local names: *Makolan* (Mbo.); *mañgod* (Mbo.).

*Gyrinopsis parvifolia* sp. nov.

Frutex circiter 1 m. altus, partibus junioribus subtus foliis fructibusque exceptis glabris; foliis lanceolatis vel anguste lanceolatis, utrinque attenuatis, acutis vel apice leviter acuminatis, ad 8.7 cm. longis et 2.5 cm. latis, supra glabris, subtus parce pubescentibus, nervis primariis utrinque 7-10, leviter prominentibus, petiolo ad 5 mm. longo; capsulis parce pubescentibus, ad 1.2 cm. longis, obovoideis, in siccitate rugosis; pedunculis dense pubescentibus.

Shrub about 1 m. tall (Edaño), glabrous except the growing tips, young leaves, petioles, peduncles, and capsules. Leaves small, subcoriaceous, lanceolate or narrowly lanceolate, narrowed to an acute apex and base, the

apex in some cases somewhat acutely acuminate, 4.5–8.7 cm. long, 1–2.5 cm. wide, greenish or olivaceous when dry, glabrous above, the lower surface slightly pubescent, in young unopened leaves very densely pubescent, the primary lateral nerves somewhat distinct, 7–10 on each side of the midrib, the secondary ones exceedingly numerous, very slender, densely arranged, the petioles slender, glabrous with age, otherwise pubescent, 4–5 mm. long. Perianth (in fruit) slightly pubescent, 5–6 mm. long including the lobes, the lobes 5, broadly ovate, rounded, about 1.5 mm. long. Capsules yellowish, rugose when dry, slightly pubescent, obovoid, 10–12 mm. long, 2-valved, 2-seeded (sometimes 1-seeded), more or less compressed, the seed broadly ovoid, apiculate, dark brown, glabrous, shining, smooth, 8–9 mm. long, 6.5–7 mm. wide, flat on the ventral side, the peduncles densely pubescent, very short, 1–2 mm. long.

LUZON: Camarines Sur Province, Her-it River, *Bur. Sci. 76441 Edaño* (TYPE), December 10, 1928, on forested slopes, altitude about 1000 m.

This species is closely allied to *G. urdanetensis* Elmer, from which it is distinguished by its differently shaped leaves with somewhat prominent primary lateral nerves, and its pubescent capsules.

*Gyrinopsis pubifolia* sp. nov.

Frutex circiter 1 m. altus, ramis et foliis supra exceptis pubescens; foliis lanceolatis, ad 18 cm. longis et 5 cm. latis, graciliter acuminatis, basi cuneatis; nervis lateralibus primariis utrinque 12–16, secundariis numerosis, dense dispositis; floribus parvis, circiter 1 cm. longis, axillaribus, fasciculatis.

Shrub about 1 m. high (fide Edaño), pubescent except the branches and older branchlets and upper surface of the leaves, the branchlets terete, brownish. Leaves lanceolate, 10–18 cm. long, 3–5 cm. wide, slenderly acuminate at apex, narrowed to the cuneate base, greenish and shining on both surfaces when dry, chartaceous, glabrous above, soft pubescent beneath, the primary lateral nerves distinguishable, 12–16 on each side of the midrib, the secondary ones numerous, very slender, somewhat obscure, the petioles pubescent, 4–7 mm. long. Inflorescence in few-flowered fascicles, sessile or very shortly peduncled (peduncles 1–1.5 mm. long). Flowers 10–15 mm. long, the pedicels very slender, pubescent, 2–3 mm. long, the tube slender, slightly pubescent; stamens 10 arranged in a single row near the throat, the filaments nearly sessile, ciliate, the anthers about 1.5 mm. long, the scales 10, densely ciliate; ovary densely pubescent, oblong-obovoid, narrowed downward, the style sessile, the stigma capitate.

CATANDUANES: Mt. Abucay, *Bur. Sci. 75314 Edaño* (TYPE), September 11, 1928, on summit, altitude about 1600 m.

A species doubtless allied to *G. Cumingiana* Decne., differing conspicuously in its pubescent leaves and smaller flowers. It differs from *Elmer 10981* (*G. Cumingiana* Decne. var. *pubescens* Elmer) in the color, shape, and size of the leaves.

#### EXTRA-PHILIPPINE SPECIES

*Gyrinopsis grandifolia* (Domke) comb. nov.

*Aquilaria grandifolia* Domke in Notizbl. Bot. Gart. Berlin 11: 348. 1932.

I have not seen the type, which is from Sumatra. But based on the

description (calyx-tube more or less cylindrical, about 7 mm. long and 2 mm. in diameter; scales 10; stamens 10, subsessile or the filaments 0.2–0.8 mm. long), there seems no doubt that it is a *Gyrinopsis*. The leaves are unduly large (17–27 cm. long, 6–7.5 cm. wide). The lateral nerves on both sides of the midrib are prominent, 15–25. The species, therefore, by its description, is apparently allied to *Gyrinopsis Cumingiana* Decne.

*Gyrinopsis salicifolia* (Ridley) comb. nov.

*Gyrinops salicifolia* Ridley in Trans. Linn. Soc. Bot. II. 9: 145. 1916.

New Guinea.

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