

## NOTES ON SOME ASIATIC SPECIES OF AQUILARIA (THYMELAEACEAE)

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In the course of my study of the *Thymelaeaceae* for the Flora Malesiana, it was surprising to find that the well known Asiatic species *Aquilaria agallocha* Roxb. is very similar to the Malesian *A. malaccensis* Lamk, and that the Chinese species *Ophiospermum sinense* Lour. was transferred to *Aquilaria* independently by Sprengel (1825), Gilg (1894), and Merrill (1920), with the specific epithet either 'chinensis' or 'sinensis'. In order to clarify the status and delimitation of the species concerned, the results of my investigations may follow here.

Among the unnamed collections of Thailand *Thymelaeaceae* received for determination from the Kew Herbarium, two species of *Aquilaria* were found, a new one, *A. subintegra* Ding Hou, and a new record for the flora of that country, *A. crassna* Pierre ex H. Lec.

I am very grateful to the Directors and Keepers of the following institutes for putting the material at my disposal: Herbarium Bogoriense (BO), Herbarium of the Royal Botanic Gardens, Kew (K), Rijksherbarium, Leiden (L), and Herbarium of the Botanic Gardens, Singapore (SING).

### I. AQUILARIA AGALLOCHA ROXB. = A. MALACCENSIS LAMK

The name *Aquilaria agallocha* was published by Roxburgh (1814) in his *Hortus Bengalensis*. A short diagnosis of this species ('Leaves lanceolar. Umbel lateral, subsessile'), followed by a note, was published in the Carey edition of Roxburgh's *Flora Indica* (1832).

Roxburgh had prepared a full account and a detailed description with a fine plate of the Indian Aloe-wood under the above-mentioned name; this paper was probably written some time after 1809, but unfortunately not published until 1854, with remarks by Colebrooke, in *Trans. Linn. Soc. London*, vol. 21 (pp. 199—206, t. 21). The description was chiefly based on one of the trees sent by R. K. Dick from Silhet to the Botanic Garden at Calcutta. This tree blossomed there in 1809 and 1810. Roxburgh was aware of the similarity between his *A. agallocha* and Lamarck's *A. malaccensis* as he stated that 'Lamarck's description of the specimen [of *A. malaccensis*] presented to him by Sonnerat agrees almost exactly with our plant. The inflorescence is only required to confirm their being the same species, or different' (cf. also Roxburgh 1832). In a footnote on p. 202 of the same paper, possibly added by Colebrooke, was stated: 'Since writing the above Dr. Roxburgh has received living plants, and perfect capsules with their seeds, of the *Garo de Malacca* [*A. malaccensis*] from Captain Farquhar, the Governor of Malacca. They are not to be distinguished from some plants of the same size, and seed-vessels of his *Aquilaria Agallocha*, very lately sent to this Garden by Mr. Smith from Silhet. . . .'

When one compares Roxburgh's description and plate of *A. agallocha* with specimens of *A. malaccensis*, it becomes clear that these two species are quite similar to each other with the exception that in the former the inflorescence is simple with 20 to 40 flowers, but branched in the latter with each of the utmost branchlets bearing no more than 10

flowers. However, in *A. malaccensis*, the utmost branchlets are sometimes crowded at the top of a common peduncle or short shoot, and the whole unit thus may seemingly form a simple, many-flowered inflorescence.

There are three collections of *Aquilaria agallochum* in Wallich's List (1832) under the number 7250, viz. "a. Mt Silhet KD.", [collected by R. K. Dick from Silhet], "b. HBC.", [Hort. Bot. Calcut.], and "c. Agallochum officinarum BHAM. e Gualpara", [collected by Dr. B. Hamilton near Goalpara, eastern frontier of Bengal, cf. Royle 1835, p. 172]. I have examined these three collections in the Kew Herbarium; they all bear branched inflorescences similar to those of *A. malaccensis* except that a sterile branch of *A. khasiana* Hallier f. was erroneously mounted on sheet 7250a. According to a letter of Prof. Robyns, Director of the Botanical Garden at Brussels, to Prof. Van Steenis, there is no authentic material of *A. agallocha* in Roxburgh's Herbarium preserved in that institute.

Hooker (1886), in a note under *A. agallocha* stated that 'the figure in the Linnaean Transactions represents a short broad thick capsule, quite like that of *A. malaccensis*, and very different from those of the Bhotan and Khasian *A. Agallocha*'. On the Khasian collection mentioned by Hooker and collected by Hooker and Thomson (s.n., type in L, isotype in K), Hallier (1922) based a new species, *A. khasiana*, which differs from *A. malaccensis* by the cylindrical floral tube about three times as long as the erect calyx lobes, the sessile stamens, and the narrow suture surface of the fruits.

From the above it may be concluded that *Aquilaria agallocha* Roxb. must be reduced to the synonymy of *A. malaccensis* Lamk.

***Aquilaria malaccensis*** Lamk; for literature and other synonyms see Fl. Mal. I, 6 (1960) 9.—*A. agallocha* Roxb., [Hort. Beng. (1814) 33] Fl. Ind. ed. Carey, 2 (1832) 422; Royle, Ill. Bot. Himal. 1 (1835) 173, 2 (1835) t. 36, fig. 1; Roxb., Trans. Linn. Soc. London 21 (1854) 199, t. 21; Hook. f., Fl. Brit. Ind. 5 (1866) 199, p.p.

*Distribution*: India (eastern part), Burma (Tenasserim), and Malesia (Sumatra, Malay Peninsula, Borneo, and the Philippines) (cf. Hou 1960).

## II. TWO NEW RECORDS FOR THE FLORA OF THAILAND

1. ***Aquilaria crassna*** Pierre ex H. Lec., Bull. Soc. Bot. Fr. 61 (1914) 411, f. 1; Fl. Gén. I.-C. 5 (1915) 177, f. 17.

*Distribution*: Indo-China and Thailand.

THAILAND. Kao Petcha Kut, Chantaburi, *Nai Noe* 83 (K); Koh Chang, *Vanpruk* 973 (K); Krat, *Nai Noe* 18 (K).

The three Thailand specimens cited above match very well the syntype of *A. crassna*, Pierre 3619 (L), from Cambodia. This species is characterized by the accrescent calyx with very broad-ovate or -obovate lobes (12–15 by 11–12 mm), the stamens c. 2 mm long and as high as the petaloid appendages, and the large, suborbicular, rarely obovoid, slightly compressed fruits (3–3½ by 2½–3 cm) which are usually round at the apex and cuneate at the base, and with the suture surface of the valves c. 7 mm wide.

There are three sterile Thailand specimens which may also belong here: Kaw Chang, *Kerr* 9315 & 9315a (K), Krabin, *Kerr* 10043 (K).

2. ***Aquilaria subintegra*** Ding Hou, *sp. nov.* Frutex. Folia chartacea, subtus sparse pubescentia, glabrescentia, elliptico-oblonga, vel leviter obovato-oblonga, (14–)22–26

cm longa, (5—)8½—9 cm lata, basi cuneata, apice acuminata. Inflorescentia multiflora, pedunculo 2½—3 cm longo; pedicelli 10—13 mm longi. Tepalorum tubus elongatus, cylindricus, 7½—11 mm longus, leviter puberulus, in sicco extus decemcostatus, lobi ovato-oblongi, 3½—5 mm longi. Appendices petaloideae in annulum connatae, villosae, apice irregulariter erosae, Stamina sessilia, oblonga, 1½—2 mm longa. Ovarium sessile, ovoideum, 2—2½ mm longum, villosum; stylus cylindricus, ½—1 mm longus; stigma magnum, capitatum. Capsula juvenilis ellipsoideo-oblonga, e tepalorum tubo fissura laterali exserta, basi attenuata. Semina angustissime ellipsoidea, sparse puberula, appendice glabra.

A shrub. *Leaves* chartaceous, elliptic-oblong or slightly obovate-oblong, acuminate, cuneate at the base, (14—)22—26 by (5—)8½—9 cm, almost glabrous, only the lower surface sparsely pubescent, glabrescent. *Inflorescences* many-flowered; peduncle 2½—3 cm long; pedicels 10—13 mm long. *Flowers* white. *Floral tube* elongate, cylindric, 7½—11 mm long, 10-costate when dry, slightly puberulous on both surfaces, with rather dense retrorse hairs towards the base inside. *Calyx* lobes ovate-oblong, 3½—5 mm long. *Petaloid appendages* united into a ring, irregularly erose, c. 2/3 the length of stamens, villous. *Stamens* sessile, oblong, 1½—2 mm long. *Ovary* sessile, ovoid, 2—2½ mm long, villous; style cylindric, ½—1 mm long; stigma large, capitate. *Capsula* (very young) ellipsoid-oblong, splitting the floral tube on one side. *Seeds* very narrowly ellipsoid, sparsely puberulous, attenuate to the base; appendage attached along one side of the elongate part, glabrous.

THAILAND. Peninsula: Kao Re Chaw, Toh Moh, *M. C. Lakshnakara* 719 (K, *typus*), in evergreen forest at an altitude of 540 m.

This new species is closely related to *A. rostrata* Ridl. from Pahang, Malay Peninsula, as both have a cylindrical floral tube split laterally by the developing fruit, and seeds with a glabrous appendage. As for the characteristic, connate, ring-shaped petaloid appendages, they are found only in a quite different species, *A. cumingiana* (Decne) Ridl., of the Philippines (cf. Hou, 1960). Unfortunately *A. rostrata* is known only from its incomplete type collection, and the characters of the petaloid appendages cannot be verified. From the material available, the differences between the new species and *A. rostrata* are listed as follows.

	<i>A. subintegra</i>	<i>A. rostrata</i>
Leaves	elliptic- or slightly obovate-oblong, (14—)22—26 by (5—)8½—9 cm	lanceolate, rarely ovate-oblong, 6½—10 by 2½—10 cm
Pedicels	10—13 mm long	c. 3 mm long
Flowers	14—16 mm long	c. 7½ mm long.
Calyx lobes	ovate-oblong, 3½—5 mm long	slightly oblong, c. 1½ mm long
Appendage of seed	attached along one side of the elongated part	attached at the base of the elongated part

### III. AQUILARIA SINENSIS (LOUR.) SPRENG.

*A. sinensis* (Lour.) Spreng., Syst. 2 (1825) 356. '*chinensis*'; Gilg, in E. & P. Pfl.-Fam. 3, 6a (1894) 224, fig. 77C—E; Bot. Jahrb. 28 (1900) 145; Merr., Philip. J. Sc. 15 (1920)

248; in Trans. Am. Phil. Soc. n.s., 24, ii (1935) 277. — *Ophiospermum sinense* Lour., Fl. Cochinch. (1790) 281, ed. Willd. (1793) 344. — *A. grandiflora* Benth., Fl. Hongkong. (1861) 297.

CHINA. Kwangtung: Kao-Yao, S. Y. Lau 20215 (BO, L, SING), Y. Tsiang 823 (BO). — Hainan: Lam-ko, C. I. Lei 864 (BO); Ling-shui, F. A. McClure 20072 (BO, SING).  
HONG KONG. Legunde 6304 (L).

Gilg (l.c.) and Merrill (l.c.) independently transferred *Ophiospermum sinense* Lour. to *Aquilaria*. They overlooked that the transfer was already made by Sprengel (l.c.), who changed the specific epithet into '*chinensis*'. According to the Code (1961), Art. 55, he should have retained the original spelling. Under *Aquilaria*, the species should therefore be cited as *Aquilaria sinensis* (Lour.) Spreng.

This species is very closely related to the Indo-Chinese *A. crassa*, from which it differs by the smaller calyx persistent at the base of the fruit, the calyx lobes 8 by 5—6 mm, the  $2\frac{1}{2}$ —3 mm long stamens exceeding the petaloid appendages, and the obovoid-oblong fruits which measure  $2\frac{1}{2}$ — $3\frac{1}{2}$  by  $1\frac{1}{2}$ — $1\frac{3}{4}$  cm with the suture surface of the valves c. 2 mm wide.

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