

Flora of Singapore precursors, 22: typifying Tongkat Ali and other notes on the Simaroubaceae in Singapore

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ABSTRACT. The native Simaroubaceae of Singapore (four genera with one species each) are listed with full synonymy and typification. In the absence of any original material, a neotype is designated for *Eurycoma longifolia* Jack. Recent collections confirm *Samadera indica* Gaertn. as native in Singapore. In total 14 lectotypes and 3 neotypes are designated.

Keywords. *Ailanthus*, *Brucea*, *Eurycoma*, *Samadera*

Introduction

The Simaroubaceae are a family of some 22 genera with about 110 species in total (Clayton, 2011). The family is included in the Sapindales, forming a major clade with the larger families Meliaceae and Rutaceae. Members of the Simaroubaceae are mostly trees and shrubs, with species found throughout the tropics and subtropics, and a few extending into the northern temperate regions. The ‘Tree of Heaven’ is a vernacular name applied to certain species and the family in general. The origins of this lie with the great Dutch botanist Rumphius (Georg Eberhard Rumpf; 1627–1702) who lived on the island of Ambon in the Moluccas for many years. According to Rumphius (1743), a very tall tree species on the island was known locally as ‘Aylanto’ which Rumphius translated into Latin as ‘Arbor Coeli’ or in English, Tree of Heaven. The French botanist Desfontaines rendered the Ambonese as *Ailanthus* in describing the genus. *Ailanthus* is still in use, and the Tree of Heaven name has become most closely associated with *Ailanthus altissimus* (Mill.) Swingle, a species native to the warm temperate regions of Asia, but widely grown elsewhere.

A common feature of members of the Simaroubaceae is a strong bitter taste to the bark and twigs. The main bitter principal is usually a triterpenoid compound, generally in a class called quassinoids (from the genus *Quassia* L.) (Alves et al., 2014). Many Simaroubaceae species are used in traditional medicine, including what is probably Southeast Asia’s most famous medicinal plant Tongkat Ali, *Eurycoma longifolia* Jack. The quassinoid triterpenoids are known to be biologically and pharmacologically active compounds (Fiaschetti et al., 2011).

In preparing an account of the family for the Flora of Singapore, a number of taxonomic points came up that require attention. The purpose of this paper is to deal with these issues. To this end, a nomenclatural synopsis of the family in Singapore is presented with various notes.

Nomenclatural synopsis

1. *Ailanthus* Desf., Hist. Acad. Roy. Sci. Mém. Math. Phys. 1786 (Mém.): 265 (1788), nom. cons. – TYPE: *Ailanthus glandulosus* Desf. (= *Ailanthus altissima* (Mill.) Swingle).

Pongelion Adans., Fam. Pl. 2: 319, 593 (1763), nom. rejic. – TYPE: *Adenanthera triphysa* Dennst. (= *Ailanthus triphysa* (Dennst.) Alston).

Hebonga Radlk., Philipp. J. Sci., C 6: 365 (1912 [‘1911’]). – TYPE: *Hebonga obliqua* Radlk., lectotype designated here (= *Ailanthus triphysa* (Dennst.) Alston).

1.1 *Ailanthus integrifolius* Lam., Encycl. 3(2): 417 (1792), as ‘*Aylanthus integrifolia*’. – *Ailanthus moluccanus* DC., Prodr. 2: 89 (1825), as ‘*moluccana*’, nom. illeg. superfl. – *Pongelion moluccanum* Pierre, Fl. Forest. Cochinch. 3(19): sub t. 294 (1893), nom. illeg. superfl. – TYPE: [Published illustration] ‘Arbor coeli’ in Rumphius, Herb. Amboin. 3: t. 132 (1743) (lectotype designated by Merrill, Interpr. Herb. Amboin. 299 (1917)).

Dysoxylum dasyphyllum Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 19 (1868). – *Alliaria dasyphylla* (Miq.) Kuntze, Revis. Gen. Pl. 1: 109 (1891). – TYPE: [Indonesia], Celebes [Sulawesi], 1859–1860, *Teijsmann & de Vriese s.n.* (lectotype L [L0017724], designated here).

Ailanthus blancoi Merr., Sp. Blancoan. 205 (1918). – TYPE: Philippines, Luzon, Laguna, Mt Maquiling, February 1914, *Villamil For. Bur. 20881* (lectotype K [K000651351], designated here; isolectotype US [US00101768]).

Ailanthus peekelii Melch., Notizbl. Bot. Gart. Berlin-Dahlem 10: 893 (1930). – TYPE: Ins. Bismarck, *Peekel 1028* (holotype B, destroyed).

Ailanthus peekelii Melch. var. *glabra* C.T.White, J. Arnold Arbor. 31: 91 (1950). – TYPE: Papua New Guinea, Madang, February 1945, *Mair NGF 1810* (holotype BRI [BRI-AQ0022633 – i.e. a single specimen over 3 sheets]).

Ailanthus guangxiensis S.L.Mo, Guihaia 2: 145 (1982). – TYPE: China, Guangxi, Longzhou County, Longgang Conservation Area, Longhu, 25 September 1979, *Longgang Exped. 10696* (holotype IBK [IBK00191069]; isotype SYS).

Notes. Kulip & Wong (1995) and Song & Xu (2014) repeated the lectotypification of *Ailanthus integrifolius* Lam. to the Rumphius plate, but it was first effected by Merrill.

2. *Brucea* J.F.Mill., *Icon. Anim. Pl.* t. 25 (1779), nom. cons. – *Lussa* Kuntze, *Revis. Gen. Pl.* 1: 104 (1891), nom. illeg. superfl. – TYPE: *Brucea antidysenterica* J.F.Mill.

Gonus Lour., *Fl. Cochinch.* 2: 658 (1790). – TYPE: *Gonus amarissimus* Lour. (= *Brucea javanica* (L.) Merr.).

2.1 *Brucea javanica* (L.) Merr., *J. Arnold Arbor.* 9: 3 (1928). – *Rhus javanica* L., *Sp. Pl.* 1: 265 (1753). – *Ailanthus gracilis* Salisb., *Prodr. Stirp. Chap. Allerton* 171 (1796), nom. illeg. superfl. – *Brucea gracilis* DC., *Prodr.* 2: 88 (1825), nom. illeg. superfl. – TYPE: [Locality unknown], *Osbeck 14* (lectotype LINN 378.4, designated by Merrill, *J. Arnold Arbor.* 9: 3, pl. 10 (1928)).

Gonus amarissimus Lour., *Fl. Cochinch.* 2: 658 (1790). – *Tetradium amarissimum* (Lour.) Poir., *Dict. Sci. Nat.* 53: 293 (1828). – *Brucea amarissima* (Lour.) Meyen ex Walp. in Meyen, *Observ. Bot.* 322 (1843). – *Lussa amarissima* (Lour.) Kuntze, *Revis. Gen. Pl.* 1: 104 (1891). – TYPE: [Locality unknown], *Loureiro s.n.* (lectotype P [P00150885], designated by Merrill, *Trans. Am. Phil. Soc.* 24: 226 (1935)).

Brucea sumatrana Roxb., *Hort. Bengal.* 12 (1814). – TYPE: [Published illustration] ‘*Lussa radja*’ in Rumphius, *Herb. Amboin. Auctuar.* t. 15 (1755) (lectotype designated by Merrill, *Interpr. Herb. Amboin.* 299 (1917)).

Brucea sumatrensis Spreng., *Pl. Min. Cogn. Pug.* 2: 90 (1815). – TYPE: [Locality unknown], *Roxburgh s.n.* (neotype BR [BR000000542273], designated here).

Brucea glabrata Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 447, t. 20 (1834). – TYPE: [Published illustration] ‘*Brucea glabrata*’ in Decaisne, *Nouv. Ann. Mus. Hist. Nat.* 3: t. 20 (1834) (lectotype designated here).

Notes. Linnaeus based *Rhus javanica* on two specimens collected by Osbeck, most likely in China. The two specimens in LINN represent different species, the current one, and *Rhus chinensis* Mill. (Anacardiaceae). The general view in the nineteenth century was that ‘*Rhus javanica*’ should be applied to *Rhus chinensis* and Britten (1900) excluded the *Brucea* sheet. However, Merrill (1928) formally typified *Rhus javanica* to the *Brucea* sheet and made a new combination in *Brucea* for it. Although Furtado (1939) argued against this course of action, no formal proposal to overturn the typification by Merrill has been made, and *Rhus javanica* as the basionym of *Brucea javanica* now seems generally accepted.

No original material has been traced for *Bucea sumatrensis* Spreng. Sprengel indicated that the specimen he saw had come from Calcutta Botanic Garden in India. Therefore, I select a Roxburgh collection likely to have been grown at the Calcutta Botanic Garden at about that time as neotype here.

3. *Eurycoma* Jack, Malayan Misc. 2(7): 44 (1822). – TYPE: *Eurycoma longifolia* Jack.

Picroxylon Warb., Repert. Spec. Nov. Regni Veg. 16: 256 (1919). – TYPE: *Picroxylon siamense* Warb. (= *Eurycoma longifolia* Jack).

3.1 *Eurycoma longifolia* Jack, Malayan Misc. 2(7): 45 (1822). – TYPE: Singapore, Central Catchment NR, Wood cutter trail leading to Chestnut forest, 31 March 2021, H.K. Lua et al. SING 2021-098 (neotype SING [SING0294200], designated here; isoneotype K).

Eurycoma merguensis Planch., London J. Bot. 5: 584 (1846). – *Eurycoma longifolia* Jack var. *merguensis* (Planch.) Pierre, Fl. Forest. Cochinch. 3(19): sub t. 292 (1894). – TYPE: Burma, Mergui, Griffith 727 (lectotype K [K000651336], designated here).

Eurycoma longifolia Jack var. *cochinchinensis* Pierre, Fl. Forest. Cochinch. 3(19): sub t. 292, t. 293B (1894). – TYPE: [Published illustration] Pierre, Fl. Forest. Cochinch. 3(19): t. 293B (1894) (lectotype designated here).

Picroxylon siamense Warb., Repert. Spec. Nov. Regni Veg. 16: 256 (1919). – TYPE: Thailand, Koh Chang, jungle at Lem Dan, 12 February 1900, Schmidt 509 (lectotype C [C10023280], designated here).

Eurycoma longifolia Jack var. *cambodiana* Lecomte, Fl. Indo-Chine 1: 696 (1911). – TYPE: Cambodia, Kampot, 13 December 1903, Geoffroy 256 (lectotype P [P01817303], designated here; isolectotypes P [P01817304, P01817305, P01817306]).

Manotes asiatica Gagnep., Bull. Soc. Bot. France 98: 207 (1951). – TYPE: Vietnam, reserve forestière de Suai-gia-huai, 9 April 1939, Muller 1094 (holotype P [P06676840]).

Notes. William Jack first described *Eurycoma* and *Eurycoma longifolia* based on material from Sumatra and Singapore. Kulip & Wong (1995) referred to a Jack specimen from Sumatra in K as the type, but no trace of this, or any other original material for *Eurycoma longifolia* has been found. Therefore, a neotype is designated here.

4. *Samadera* Gaertn., Fruct. Sem. Pl. 2: 352 (1791). – *Vitmannia* Vahl, Symb. Bot. 3: 51 (1794), nom. illeg. superfl. – TYPE: *Samadera indica* Gaertn.

Locandi Adans., Fam. Pl. 2: 449, 571 (1763), nom. rejic. – TYPE: *Niota pentapetala* Poir. in Lamarck, Encycl. 4: 490 (1798) (= *Samadera indica* Gaertn.).

Niota Lam., Tabl. Encycl. 1: t. 299 (1792), nom. illeg. non *Niota* Adans. (1763). – TYPE: *Niota pentapetala* Poir. in Lamarck, Encycl. 4: 490 (1798) (= *Samadera indica* Gaertn.).

Notes. Nooteboom (1962) took a very broad view of the genus *Quassia* L. and included therein *Hannoa* Planch., *Odyendyea* (Pierre) Engl., *Pierreodendron* Engl., *Samadera* Gaertn., *Simaba* Aubl. and *Simarouba* Aubl. Recent molecular analyses (Clayton et al., 2007) favour the splitting up of *Quassia* again, with all Nooteboom's synonyms listed above being resurrected as independent genera. This includes *Samadera indica* Gaertn. as the accepted name for *Quassia indica*. It should be noted that the ornamental *Quassia amara* L., occasionally planted in Singapore, remains in *Quassia*.

4.1 *Samadera indica* Gaertn., Fruct. Sem. Pl. 2: 352, t. 156, fig. 3 (1791). – *Simaba indica* (Gaertn.) Baill., Hist. Pl. 4: 440 (1873). – *Locandi indica* (Gaertn.) Kuntze, Revis. Gen. Pl. 1: 104 (1891). – *Quassia indica* (Gaertn.) Noot., Blumea 11: 517 (1963). – TYPE: [Published illustration] ‘*Samadera indica*’ in Gaertner, Fruct. Sem. Pl. 2: 352, t. 156, fig. 3 (1791) (lectotype designated by Basak, Fasc. Fl. India 4: 16 (1980)). (Fig. 1).

Vitmannia elliptica Vahl, Symb. Bot. 3: 51, t. 60 (1794). – TYPE: India orientalis, *Koenig s.n.* (lectotype C [C10019132], designated here).

Niota pentapetala Poir. in Lamarck, Encycl. 4: 490 (1798). – *Niota pendula* Sm. in Rees, Cyclop. 25: [unpaged] (1819), nom. illeg. superfl. – *Niota lamarckiana* Blume, Bijdr. Fl. Ned. Ind. 251 (1825), nom. illeg. superfl. – *Samadera pentapetala* (Poir.) G. Don, Gen. Hist. 1: 811 (1831). – TYPE: [Published illustration] ‘*Katin-Njoti*’, Rheede, Hort. Malab. 6: t. 18 (1686) (lectotype designated here).

Niota tetrapetala Poir. in Lamarck, Encycl. 4: 490 (1798). – *Samadera tetrapetala* (Poir.) G. Don, Gen. Hist. 1: 811 (1831). – TYPE: not traced.

Samadera madagascariensis A. Juss., Mém. Mus. Hist. Nat. 12: 516 (1825). – *Locandi madagascariensis* (A. Juss.) Kuntze, Revis. Gen. Pl. 1: 104 (1891). – TYPE: Madagascar, *Commerson s.n.* (lectotype, P-JU [sheet no. 13008], designated here).



Fig. 1. Fallen fruit and foliage of *Samadera indica* in the Western Water Catchment, Singapore. (Photo: H.K. Lua).

Niota lucida Wall., Pl. Asiat. Rar. 2: 54, t. 168 (1831). – *Samadera lucida* (Wall.) C.Presl, Symb. Bot. 2: 1 (1834). – *Vitmannia lucida* (Wall.) Steud., Nomencl. Bot., ed. 2, 2: 778 (1841). – *Samadera indica* Gaertn. var. *lucida* (Wall.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44(3): 136 (1876). – *Locandi lucida* (Wall.) Kuntze, Revis. Gen. Pl. 1: 104 (1891). – TYPE: Burma, Amherst, 14 February 1827, *Wallich 1442* [EIC 1062 p.p.] (lectotype K-W [K001110883], designated here, restricting selection to the shoot mounted upper right and the adjacent fruit).

Samadera glandulifera C.Presl, Symb. Bot. 2: 1, t. 51 (1834). – *Locandi glandulifera* (C.Presl) Pierre, Fl. Forest. Cochinch. 3(17): sub t. 262 (1892). – TYPE: *Anon. s.n.* (lectotype PR [sheet no. 375771], designated here).

Manungala pendula Blanco, Fl. Filip. 306 (1837). – *Locandi pendula* (Blanco) Pierre, Fl. Forest. Cochinch. 3(17): sub t. 262 (1892). – TYPE: Philippines, Luzon, Isabela Province, Palanan Municipality, 4 km SW of Palanan Point, 16 May 1991, *Co 3483* (neotype K [K001129812], designated here; isoneotypes A, CAHUP, L [L.4156385], PNH, PUH, US).

Samadera brevipedata Scheff., Natuurk. Tijdschr. Ned.-Indië 32: 410 (1872). – *Samadera indica* Gaertn. var. *brevipedata* (Scheff.) Backer, Fl. Batavia 259 (1907). – TYPE: not traced.

Locandi mekongensis Pierre, Fl. Forest. Cochinch. 3(17): t. 262 (1892), as '*Locandia*'. – *Samadera mekongensis* (Pierre) Engl., Nat. Pflanzenfam. 3(4): 210 (1896). – TYPE: Cochinchine, Hamlong, ad propum Mi Soué Thôu prope Mô Cai, February 1869, *Pierre 422* (lectotype P [P01817274], designated here; isolectotypes P [P01817273, P01817275]).

Notes. The record for this species in Singapore seems to arise from Ridley (1922: 363), who reported *Samadera indica* Gaertn. in Singapore. Unusually, Ridley simply cited Singapore, not a specific locality in Singapore, which inclines me to think that this may have been based on a recollection of seeing the plant rather than collecting it, as no herbarium material from Singapore could initially be found. There are certainly collections from nearby Johor, so it would not be unreasonable to expect it to be found in Singapore. However, recently a group of three small trees were found within the live-firing area in the Western Water Catchment (*Lua et al. SING2019-1445*, 26 Dec 2019; *Lua & Ng SING2020-080*, 29 Jan 2020, Fig. 1), confirming the inclusion of the species in the native flora of Singapore.

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