THE GENUS NYSSA IN THE NETHERLANDS INDIES

by

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Nyssa

LINN., Sp. pl., ed. 1, 2, p. 1058 (1753); Gen. pl., ed. 5, p. 478 (1754); BENTH. & HOOK.F., Gen. pl., 1, p. 952 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 747 (1879); BOERL., Handl. Fl. Ned. Ind., I, 2, p. 655 (1890); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 257 (1898); KOORD. & VAL., Bijdr. booms. Java, 5, p. 95 (1900); GAMBLE, Man. Ind. timb., ed. 2, p. 392 (1902); KING, Journ. As. Soc. Beng., 71, II, p. 79 (1902); WANGERIN, in Engl. Bot. Jahrb., 38, Beibl. 86, p. 69—75, 85—86 (1906); in ENGL., Pflanzenr., IV, 220a, p. 8 (1910); KOORD., Exkursionsfl. Java, 2, p. 730 (1912); RIDL., Fl. Mal. Pen., 1, p. 895 (1922); KOORD., Fl. Tjib., 2, p. 234 (1923); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1195 (1923); *Agathisanthes* & *Ceratostachys* BLUME, Bijdr., 13, p. 645, 644 (1825); D. C., Prodr., 3, p. 10, 23 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 657, 667 (1832); ENDL., Gen. pl., p. 1183 (1840); MIQ., Fl. Ind. Bat., I, 1, p. 838, 839 (1856); *Agathidanthes* HASSK., Cat. pl. Hort. Bot. Bogor., p. 254 (1844); *Daphniphyllopsis* KURZ, in Journ. As. Soc. Beng., 44, II, p. 201 (1875); For. Fl. Burma, 1, p. 240 (1877).

Only species:

Nyssa javanica (BLUME) WANGERIN — *Ceratostachys arborea* BLUME, Bijdr., 13, p. 644 (1825); D. C., Prodr., 3, p. 23 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 667 (1832); MIQ., Fl. Ind. Bat., I, 1, p. 839 (1856); TEYSM. & BINNEND., Cat. pl. Hort. Bot. Bogor., p. 238 (1866); *Agathisanthes javanica* BLUME, Bijdr., 13, p. 645 (1825); D. C., Prodr., 3, p. 10 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 657 (1832); HASSK., Aant. nut, p. 50 (1845); MIQ., Fl. Ind. Bat., I, 1, p. 839 (1856); TEYSM. & BINNEND., Cat. pl. Hort. Bot. Bogor., p. 238 (1866); *Agathidanthes javanica* HASSK., Cat. pl. Hort. Bot. Bogor., p. 254 (1844); *Nyssa sessiliflora* HOOK.F. & THOMS., in BENTH. & HOOK.F., Gen. pl., 1, p. 952 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 747 (1879); BOERL., Handl. fl. Ned. Ind., I, 2, p. 656 (1890); KOORD., in Teysmannia, 5, p. 63 (1894); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 258 (1898); KOORD. & VAL., Bijdr. booms. Java, 5, p. 96 (1900); GAMBLE, Man. Ind. timb., ed., 2, p. 392, t. 8, ic. 6 (1902); KING, in Journ. As. Soc. Beng., 81, II, p. 79 (1902); VAN EEDEN, Houts. Ned. Ind., ed. 3, p. 152 (1906); BRANDIS, Ind. trees, p. 357, ic. 149 (1906); WANGERIN, in Engl. Bot. Jahrb., 38, Beibl. 86, p. 69—75, 85—86 (1906); DE CLERQ, Plantk. woordenb., p. 291 (1909); BOLDINGH, Cat. pl. Herb. Hort. Bogor., p. 145 (1914); RIDLEY, Fl. Mal. Pen., 1, p. 895 (1922); *Ilex daphnephylloides* KURZ, in Journ. As. Soc. Beng., 39, II, p. 72 (1870); *Daphniphyllopsis capitata* KURZ, in Journ. As. Soc. Beng., 44, II, p. 201, t. 15 (1875); For. Fl. Burma, 1, p. 240 (1877); *Nyssa javanica* WANGERIN, in ENGL., Pflanzenr., IV, 220a, p. 15, ic. 2 (1909); KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 100 (1912); KOORD. & VALET., Atlas 1, t. 192 (1913); KOORD., in Engl. bot. Jahrb., 50, suppl., p. 302 (1914); HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3, p. 402 (1917); KOORD., Fl. Tjibod., 2, p. 235 (1923); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1196 (1923); E. G. BAKER, in Journ. Bot., 62, suppl., p. 45 (1924); DEN BERGER, in Meded. Proefst. Boschw., 13, p. 148, ic. 109 (1926); HEYNE, Nutt. pl. Ned. Ind., ed. 2, 2, p. 1216 (1927); CRAIB, Fl. siam. enum., 1, p. 809 (1931); *Nyssa arborea* KOORD., Exkursionsfl. Java, 2, p. 731 (1912); *Nyssa bifida* CRAIB, in Kew Bull., 1913, p. 69 (1913); Fl. siam. enum., 1, p. 809 (1931); *Nyssa sessiflora* JANSSON., in MOLL & JANSSON., Mikrogr., 3, p. 730, ic. 223 (1918).

Dioecious. Young *twigs* terete, 2.5—4 mm thick, tomentose in the youth, less tomentose to glabrous later. *Leaves* spread (in seedlings the first pair of leaves opposite), rather densely placed, without stipules; petioles 1—3.5 cm long, 1.5—2 mm thick, flat or slightly grooved above, rounded beneath, densely appressedly hairy to glabrous; lamina oblong-

lanceolate to obovate, rarely somewhat ovate, 5—23 cm long, 2.5—8 cm broad, acute at the base, abruptly acuminate towards the apex, entire (the apical portion remote-dentate in seedlings), thinly to rather thickly coriaceous, penninervous with 8—11 pairs of lateral nerves that are straight in the basal portion, incurved and uniting at some distance from the margin, distinct above, prominent below, sparingly appressedly hairy to tomentose on the midrib and the thicker lateral nerves beneath, glabrous for the rest. *Inflorescences* pedunculate nearly globose heads in the axils of the leaves, 12—18 mm in diameter; peduncles flattened towards the apex, 0.7—5 cm long, 1—1.5 mm thick, 2—5 mm broad at the apex, densely appressedly hairy to glabrous, nearly half-way with 1—2 small opposite, sessile, acute, 3—4 mm long, 1 mm broad bracts; receptacle globose to ellipsoidal, flattened, 2—3 mm long, 3 mm thick, 4—5 mm broad, rarely with 2—4 flowers remote from the head; male inflorescence with peduncle 1.5—3 cm long and with 20—40 flowers, female inflorescence with peduncle 0.7—5 cm long and usually 3—8, rarely up to 18 flowers. Flowers subtended by one bract and 2 bracteoles together enclosing the flower-base, all of them broadly ovate 2—2.5 mm long, the bract 1.5—3 mm broad, the bracteoles 1.5—2.5 mm broad, up to half-way connate, all ciliate and densely appressedly sericeous on both sides; bract of the male flower 2—2.5 mm long, 1.5—2.5 mm broad, that of the female flower somewhat larger, up to 2.5 mm long and 3 mm broad; bracteoles of the female flower up to 3 mm long, 2.5 mm broad, spreading, separated and somewhat larger when fruit-bearing; *male flower* pedicellate, the pedicel nearly cylindrical, slightly obconical, 0.5—4 mm long, 0.5—2.5 mm broad at the apex, densely appressedly hairy; calyx with 4—5 rounded teeth that are 1—1.5 mm broad, 0.5—0.75 mm long, appressedly hairy outside, ciliate; petals 4—5 in number, alternating with the calyx teeth, imbricate, ovate with broad base, curled back, 3—5 mm long, 1.5—3 mm broad, with very short spreading hairs on both sides; stamens 8—10 in number, in 2 alternating whorls, those of the outer whorl longer, 3—5 mm long, slightly dilate at the base, those of the inner whorl 2—4 mm long; anthers nearly elliptical, 1.5 mm long, 1 mm broad, dorsifixed, opening laterally with slits, the outer loculi often larger than the inner ones; disc 1—2 mm in diameter, 0.5—1 mm high, 8—10-lobed at the margin; *female flower* sessile; calyx campanulate, 2—3 mm long, circ. 1.5 mm broad, densely appressedly sericeous, with 4—5 short irregular rounded lobes 0.5—1 mm long 2.5 mm broad, sometimes nearly entire, ciliate; petals 4—5 in number, like those of the male flower, but smaller, 3—4 mm long, 2.5—3 mm broad; stamens 8—10 in

number, in 2 alternating whorls, probably sterile, those of the outer whorl with filament 2—2.5 mm long and anther 1 mm long 0.75 mm broad, those of the inner whorl with filament 1—2 mm long and anther little developed or none; disc 2 mm in diameter, 0.5 mm high, slightly lobed at the margin, impressed in the middle; style 1, 1.5—2 mm long, 0.5—1 mm thick, with 2 divaricate or curled branches 1—2 mm long and stigmatose at the inside; ovary adnate to the calyx tube, one-celled; ovule one, anatropous, flattened, hanging, inserted near the top of the ovary. *Fruit* drupaceous, ellipsoidal, slightly flattened, 15—23 mm long, 10—15 mm broad, 7—14 mm thick, crowned by the calyx limb and the disc up to 2 mm in diameter and 1 mm high; exocarpium coriaceous, with few lenticels, glabrescent; mesocarpium spongious-fleshy; stone flattened-obovate, acute, 10—20 mm long, 5—12 mm broad, 2—6 mm thick, very hard, on one side with few tubercules above the middle and an indistinct longitudinal keel, on the other side with 5 longitudinal shallow grooves; seed with membranous spermoderm, smooth endosperm, large flat ovate-cordate cotyledons circ. 7 mm long 5 mm broad, penninervous with slightly palminervous base and a 2.5—3 mm long straight cylindrical rootlet. (Description after all the materials examined from the Malay Peninsula, Sumatra, Borneo and Java.)

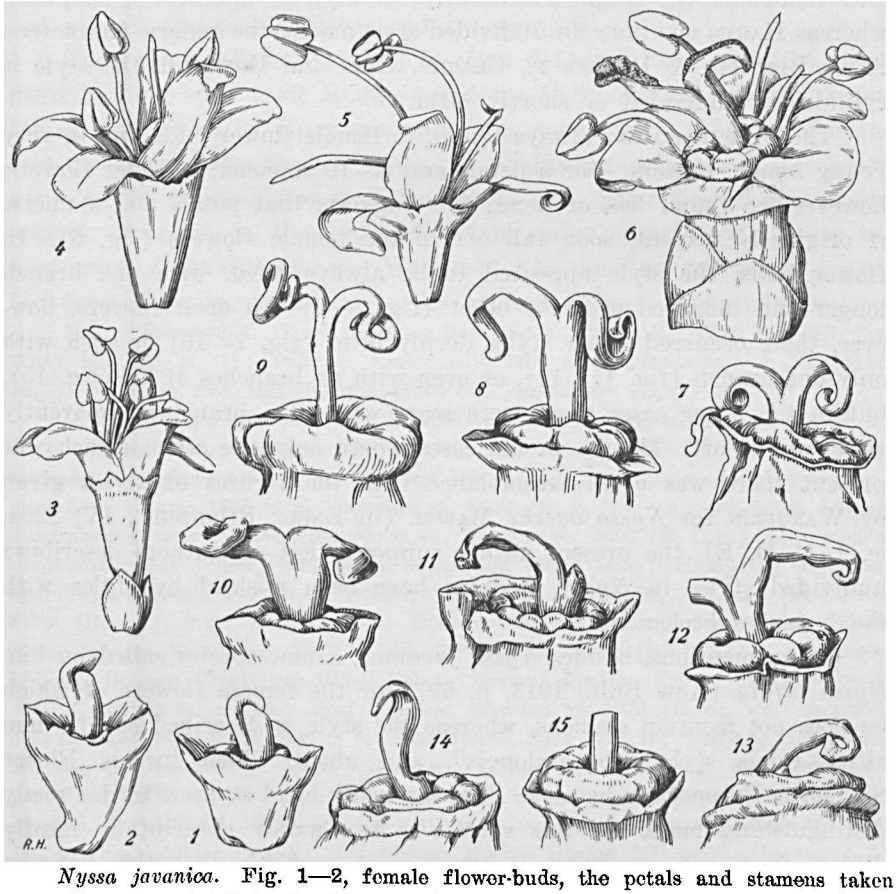
According to notes on herbarium labels *Nyssa javanica* is a tall tree often up to 30 m, sometimes even up to 40 m high, with a regular bole occupying about half the total length and with a diameter of 1—2 % of the height in the lower portion, rarely up to 1 m in diameter. Once, in a specimen from Palembang (GRASHOFF 359) buttresses are mentioned. The flowers are called greenish or whitish or yellowish, and the odour is once called agreeable, once disagreeable. The fruit is once called yellow, once wine-red, once purple-red.

The species is distributed on the Asiatic Continent from the Central and Eastern Himalayas in south-eastern direction to Annam and the Malay Peninsula, and moreover in Sumatra, Java and Borneo. In the area dealt with it has been collected at altitudes of usually 600—1540 m, but once it is recorded from only 100 m elevation. CRAIB mentions one specimen from Siam from 100 m altitude, whereas it appears to occur in the Himalayas at much higher elevations (up to 2400 m according to HOOKER F.).

The polymorphy of the materials extant of *Nyssa javanica* suggests that perhaps there might exist more than one species in the area, as was already considered by KOORDERS and VALETON (Bijdr. booms., 5, p. 98, 101) on account of the variability of the fruit. It is therefore

that the present author especially has paid attention to the characters of the flowers, about which there are found many descrepancies in literature.

BLUME mentions for *Agathisanthes* that the *male* flowers have no



Nyssa javanica. Fig. 1—2, female flower-buds, the petals and stamens taken away (KOORDERS 15359β); 3—5, male flowers (ENDERT 3179, BOSCHPR. S. W. K. III. 20 and BB. 6708); 6, female flower (cult. in Hort. Bog. sub VII. F. 1); 7—10, female flowers, without petals and stamens, the styles and stigma intact (WRAY 1617, BOSCHPR.BB. 1969, HANSEN 159, UHL 5811a); 11—14, idem, with one style branch broken off (KOORDERS 27701β, WRAY 422, BLUME s.n. from Poelasari, KOORDERS 1315β); 15, idem, both style branches broken off (BOSCHPR.BB. 1969). All figures 10 ×.

petals. The present author, however, always found 4 or 5 petals in them (fig. 3—5).

According to BENTHAM & HOOKER F., CLARKE, KING and BOERLAGE, there are, in the *female* flower, no petals at all or only small ones;

according to BLUME, MIQUEL and RIDLEY, there are no petals at all. After BENTHAM & HOOKER F., CLARKE, KING and BOERLAGE stamens are entirely lacking; by BLUME, MIQUEL, RIDLEY and EVRARD stamens are not mentioned. According to KURZ (J. As. Soc. Beng., 44, II, p. 201) and WANGERIN (in Engl., Pflanzenr.) the style is „perbrevis, simplex", whereas HARMS mentions an undivided style among the generic characters. After BENTHAM & HOOKER F., CLARKE, KING and BOERLAGE the style is cylindrical, undivided or shortly bifid.

The present author always found, in female flower buds and in very young female flowers, 4 or 5 petals and 8—10 stamens; in older flowers, however, he found less or none; this suggests that petals and stamens, if originally present, soon fall off in the female flowers (fig. 6). In flower buds, the style appeared to be always bifid, with one branch longer and incurved over the other (fig. 1—2). In open flowers, however, there occurred either styles deeply bifid (fig. 7—10) or such with only one branch (fig. 11—14), or even with no branches at all (fig. 15), but in the latter cases there were scars where the branches apparently were broken off. Though in the cases where only one style branch was present there was often resemblance with the figures of styles given by WANGERIN for *Nyssa ogeche* MARSH. (in ENGL., Pflanzenr., IV, 220a, ic. 1, C, D, E), the present author supposes that all authors describing undivided styles in *Nyssa javanica* have been mislead by styles with the branches broken off.

CRAIB mentions, besides *Nyssa javanica,* a new species called by him *Nyssa bifida* (Kew Bull., 1913, p. 69), for the female flowers of which he does not mention stamens, whereas the style is described as „1.5 mm altus, ramis stylo subaequilongis", and about which in his Florae Siamensis Enumeratio he says: „The markedly bifid styles afford a ready distinguishing mark for this species". As CRAIB's description hardly differs from our specimens it seems most probable that this botanist may have distinguished specimens with style branches broken off as *Nyssa javanica,* and specimens with intact style branches as *Nyssa bifida.*

Yet there is variability in the shape of the style. In general the style is rather thickly, nearly 1—2 × as long as thick, and with little curled branches (fig. 1—2, 6—8, 10—15), but in 3 Sumatra specimens (HANSEN 159, BOSCHPR.BB. 8630 & 1969) the style appeared to be slender, 3—6 × as long as thick, and with thin, strongly twisted branches (fig. 9). The characters, however, of the other parts of these specimens did not allow the distinction of a separate species or variety.

BRANDIS (Indian trees) describes the inflorescences as dense globose

pedunculate heads, „these in short axillary pubescent panicles, often solitary near the ends of the branches", and in fig. 149 he gives a flowering twig bearing in one axil 2 pedunculate heads, in another a dichotomous peduncle bearing 2 heads. Among the materials examined by the author there was no specimen at all with any branched inflorescence, but always one pedunculate head in each axil.

The fruit of *Nyssa javanica* is often deformed to a gall. On specimens bearing such fruit BLUME based his *Ceratostachys arborea,* transferred into *Nyssa* by KOORDERS under the name *Nyssa arborea.* For the rest the oldest name for our species is *Agathisanthes javanica,* the oldest name in the genus *Nyssa* is *Nyssa sessiliflora.* KURZ first described the species, wrongly, in the genus *Ilex,* and later transferred it into the new genus *Daphniphyllopsis.* WANGERIN was the first to form the combination necessary according to the modern rules of nomenclature.

MALAY PENINSULA. Perak: Gunong Batu Puteh, 1020 m el., WRAY 422 (BD, ♀); WRAY 1617 (B, S, ♀); Pahang: Fraser Hill, 1200 m el., HENDERSON & NUR 11169 (S, ♀) and Herb. Fed. Mal. St. Mus. 11465 coll. HENDERSON (B, ♀).

SUMATRA. Karo-plateau, Lau Boeloeh, 100 m el., BOSCHPR.BB. 11970 (B, o), v.n.: *kalimbangbang*; Tongkoh, 1500 m el., BOSCHPR.BB. 6827 (B, o), v.n.: *boenga sempah*; Teungkeh, 1400 m el., HANSEN 159 (B, L, ♂, ♀), v.n.:*djamboe-djamboe*; near Laut Kawar, 1500 m el., BOSCHPR.BB. 8630 (B, L, ♀), v.n.: *sangketan benang*; Toba-plateau, near Pandoemaän, 900 m el., BOSCHPR.BB. 5694 (B, L, ♀), v.n.: *modang sangkotan,* fruit yellow, with sweet odour and bitter taste; Kampoeng Hoeloe-air near Pajakoembooh, 1000 m el., BOSCHPR. S. W. K. III. 20 (B, ♂), and BOSCHPR.BB. 6708 (B, ♂), v.n.: *madang toei*; Doesoen Moeara Padang near Pajakoembooh, Kampoeng Si Baladoeng, 1540 m el., BOSCHPR.BB. 6490 (B, L, ♀); Bengkoeloe-Lebong, Doesoen Tandjoeng Ratoe Talang meranti djedjar, 800 m el., BOSCHPR.BB. 1969 (B, ♀), v.n.: *medang sepat*; *ibidem,* BOSCHPR.BB. 1970 (B, o), v.n.: *medarah*; near Doesoen Kotadonok, 600 m el., BOSCHPR.BB. 2023 (B, ♀); Redjang, Kepahiang, alt. 650 m, BOSCHPR.BB. 15938 (B), v.n.: *medang tai kambing;* Bengkoeloe-Kroë, near Doesoen Kotabesi, 900 m el., BOSCHPR.BB. 4098 (B, o), v.n.: *talas tjalih*; Kota Bonglai, BOSCHPR.BB. 10303 (B, o), v.n.: *talas sowa-ba*; *ibidem,* BOSCHPR.BB. 10307 (B, o), v.n.: *patjar kidang*; Palembang, Moelak Hoeloe, 800 m el., GRASHOFF 359 (B, o), v.n.: *medang drian idjang,* tree 40 m high with trunk up to 1 m thick, and with buttresses nearly 1.5 m high; Pasemahlanden, Pg. Oebar, 1000 m el., BOSCHPR. T. B. 215 (B, L, o), v.n.: *medang bambang koening*; Airangat, foot of Goenoeng Kaba, 600 m el., FORBES 2880 (L, ♀), v.n.: *rawe-rawe.*

BORNEO. East-Borneo, Long Petah, 700 m el., ENDERT 3179 (B, ♂), tree 30 m high, 1 m thick.

JAVA. Without exact locality: BLUME s.n. (B, BD, L, U) at least party originals of *Agathisanthes javanica* Bl., and of *Ceratostachys arborea* BL.; Banten, Poelasari, VAN HASSELT (L, ♀), v.n.: *hoeroe rebing*; Goenoeng Karang, near Poelasari, 1050 m el., KOORDERS 1325 β (B, o), and 1075 m el., KOORDERS 1326 β (B, L, ♀), v.n.: *heroeng*; Goenoeng Tjisalak, Pasirtengah, ARSIN 19536 H.B. (B, o), v.n.: *hiroeng*; G. Salak, BLUME s.n. (L, ♀), originals of *Agathisanthes javanica* BL., v.n.: *hirung*; G. Salak, KOORDERS 24162 β (B, ♀), v.n.: *hiroeng* (N.B., the same number is enumer-

ated for Tjibodas in KOORDERS, Fl. Tjib., 2, p. 235); G. Salak, near Kampoeng Bobodjong, 650 m el., KOORDERS forest no. 147*, herb. no. 24170β (B, L, ♀), v.n.: *hiroeng*; Parakansalak, and G. Endoet, WARBURG 3289 (BD, o), v.n.: *kihiroeng*; G. Gedé, forest Kebonpodjok, 1200 m el., tree no. 12, UHL 5811a (B, L, ♀), v.n.: *kiroeng*; from the same tree LOS 5811a (B, ♀), KRAMER 5811a (B, ♀); *ibidem*, tree 19, KRAMER 5811 (B, ♂); Tjibodas, coll.? 1318β (L, o); Pasir Kramat, Kp. Tendjolaja Tjisaät near Soekaboemi, UHL 6591 (B, ♀), fruit dark-wine-red, v.n.: *kiroeng*; Takokak, 1050 m el., KOORDERS 1317β (B, ♀); forest no. 2037a, with herb. no. 1311β (B, o), 1312β (B, o), 11919β (B, ♀), 25651β (B, L, o), 32796β (B, o), v.n.: *hiroeng*; forest no. 2042a, with herb. no. 1313β (B, ♀), 1314β (B, BD, L, ♀), 1315β (B, BD, L, ♀), 1316β (B, o), 11920β (B, o), 15323β (B, o), 25818β (B, o), 32800β (B, o); forest no. 2362a, with herb. no. 15322β (B, ♀), 32694β (B, o); forest no. 2372a, with herb. no. 15203β (B, L, ♂); forest no. 2380a, with herb. no. 32722β (B, o); forest no. 2396a, with herb. no. 15359β (B, L, ♀), 15759β (B, L, ♀), 25668β (B, ♀); forest no. IIw, with herb. no. 1321β (B, ♀), 1322β (B, ♀), v.n.: *hiroeng*; Tjigenteng, KOORDERS forest no. 2167a, with herb. no. 4529β (B, o), 9895β (B, o), 24499β (B, ♂), v.n.: *kihonjè*; forest no. IIw, herb. no. 1320β (B, L, o); Kampoeng Tjigoeloedoeg, near Bandoeng, 1050 m el., BOSCHPR. Ja. 1498 (B, o), v.n.: *hiroeng*; G. Papandajan, KORTHALS s.n. (L, ♂); G. Slamet, forest Bentjana (Tegal), KOORDERS 1323β (B, o); G. Prahoe, above Soerdjo, KOORDERS 1329β (B, o), 11250β (B, o); G. Telamaja, KOORDERS forest no. 682, with herb. no. 27701β (B, ♀), v.n.: *sengi*; forest no. 2228i, with herb. no. 9967β (B, L, o), forest no. 2247i, with herb. no. 9969β (B, o), v.n.: *wijoeng*; forest no. 2290i, with herb. no. 9968β (B, L, o), v.n.: *serid*; forest no. 2409i, herb. no. 9971β (B, L, ♀); forest no. 2242i, with herb. no. 9973β (B, L, o); 1300 m el., for. no. 2470, herb. no. 35789β (B, L, ♀); Koedoes, near Desa Ternadi, 800 m el., BOSCHPR. Ja. 1804 (B, o), v.n.: *gedangan*; G. Kawi, Sengon, WARBURG 3973 & 3977 (BD, ♂), v.n.: *bedali*; G. Argapoera, N.W. slope, 1200 m el., BACKER 13121 bis (B, ♂); G. Idjen, forest Pandjoes, 1000 m el., KOORDERS 14386β (B, L, ♀); forest no. 3487, herb. no. 32464β (B, L, ♀); Ragadjampi, KOORDERS 10085β (B, o), v.n.: *tandjang goenoeng*.

Moreover cultivated in the Buitenzorg Botanic Garden under VII. F. 1 (B, L, ♀); seedlings cultivated at Tjiomas, near Buitenzorg, from a specimen from Tendjolaja, Tjisaät, Soekaboemi, are in the seedling herbarium of the Boschproefstation under no. 2993 (B); idem, from a specimen from Kebon Podjok, Soekaboemi, sub no. 1862 (B).

Species reicienda.

Nyssa Hollrungii K. SCHUMANN, in SCHUM. & LAUTERB., Nachtr. Fl. deutsch. Schutzgeb. Südsee, p. 334 (1905) = **Alangium javanicum** (BL.) WANGERIN var. **papuanum** (MELCH. & MANSF.) BLOEMBERGEN, in Blumea, 1, p. 284 (1935).