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A MONOGRAPH OF *AGLAIA*, sect. *LANSIUM* Kosterm. (MELIACEAE)

A. J. G. H. KOSTERMANS *)

SUMMARY

1. The history of the genus and the arguments for merging it with *Aglaia*, are expounded.
2. The section *Lansium* of *Aglaia* is characterized by simple hairs and contains 15 species.
8. *Aglaia kinabaluensis*, *A. intricatoreticulata*, *A. membrartacea* and *A. chartacea* are new to science.
4. New combinations: *Aglaia anamallayana*, *aquea*, *breviracemosa*, *dubia*, **kostermansii**, **pedicellata**, **sepalina**. New names: *A. steenisii* (base: *L. pedicellatum* Kosterm.), *A. pseudolansium* (base: *L. cinereum* Hiern).
5. The genus *Reinwardtiendendron* Koorders is merged with *Aglaia* (sect. *Lansium*) ; new name: *A. reinwardtiana* (base *R. celebicum* Kds.).
6. Excluded are: *Lansium decandrum* Roxb. and *L. humile* Hassk., which are referred to *Aphanamixis* (*A. decandra* and *A. humile*, comb. nov.).
7. *Aglaia jdnowskyi* Harms is referred to *Amoora* as *A. janowskyi* (Harms) Kosterm., comb. nov.
8. The three well-known, commercial fruit trees: *Duku*, *Langsat* and *Pisitan* are considered to represent three distinct species. They have been treated exhaustively.
9. *Melia parasitica* Osbeck is referred to *Dysoxylum* as *D. parasiticum* (Osb.) Kosterm., comb. nov.; *D. caulostachyum* Miq. is a synonym.
10. Pull synonymy, descriptions, a key and an enumeration of Collector's numbers are presented.
11. *Aglaia merrillii* Elmer is reduced to *A. dookoo* Griff.

INTRODUCTION AND ACKNOWLEDGEMENTS

In 1962 a MSS. on the Indonesian species of *Lansium* was presented by Mr. B. Prijanto as a thesis for his B. Sc. degree of the Agricultural Academy, Bogor. As Mr. Prijanto left for Edinburgh to continue his studies for a Ph. D. degree, I decided to improve and edit the MSS. However, it became soon clear, that I had underestimated this task and the revision of *Lansium*, had to include a partial revision of the allied genera: *A. mcora*, *Aphanamixis*, *Aglaia*, and *Chisocheton* and some more superficial work in *Dysoxylum*.

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This took considerable time under the prevailing difficult conditions.

I wish to extend my gratitude to the Director of the Kew Gardens, Sir George Taylor and to Mr. L. L. Forman (Kew Herbarium) for their valuable help in procuring data; to the Director of the British Museum of Natural History, Dept. of Botany and Mr. Robson for trying to locate Marsden's and Correa's specimens of *Lansium domesticum*, to the Director of the Botanical Dept., Naturhistoriska Riksmuseet, Stockholm, Dr. Tycho Nordlind, for providing me with a fragment of *Melia parasitica* Osbeck and to the Directors, Rijksherbarium, Leiden and Singapore for the loan of specimens.

Messrs Anwar and Damhuri prepared the drawings; they had to work under extremely difficult conditions with a salary hardly sufficient to stay alive.

The taxonomic and nomenclatural work was carried out under abnormal conditions. No material (except that of Leiden and Singapore) could be borrowed (for safety reasons).

The personal has deserted the Herbariarii; they have to work elsewhere to seek out a living; most of the routine work of this large Institute had to be done by myself. As since several years the — formerly excellent — library hardly receives any more periodicals and other sources or reference, the bibliography of this paper is not as complete as that of my former monographs.

AGLAIA, sectio LANSIUM' Kosterm., sect. nov.

Lansium [Rumphius, Herb. Amboin. 1: 151, t. 54. 1741, p.p., excl. *L. montanum* et *L. silvestre*] Correa de Serra in Ann. Mus. Hist. nat. Paris 10: 157, t. 10, fig. 1. 1807 (fructus); Jack in Trans. Linn. Soc. London 14(1): 115, t. 4, f. 5. 1823; reprint, in Calcutta J. Nat. Hist. 4: 91. 1823; Blume, Bijdr. Fl. Ned. Ind., 4e Stuk: 164. 1825; Sprengel, Syst. Veg. 3: 66. 1826 et Gen. 2: 542. 1831 (quoad nomen tantum); Hamilton in Mem. Werner. Nat. Hist. Soc. 5(2): 355. 1826 (n.v.); de Jussieu in Mem. Mus. Hist. nat. Paris 19: 233. 1830; Bartling, Ordines nat. 356. 1830 (excl. *Cipadessa* Bl.); Spach, Hist. nat. Veg. p'ban. 3: 190. 1834; Meissner, Gen. 48(35). 1837; Reichenbach, Handb. 313. 1837; Nomencl. 212, 1841; C. DC, Monogr. 1: 596. 1878; Endlicher, Gen. 14: 1049. 1840; Enchir. 551. 1841 (excl. *Sphaerosaeme* Wallieh.); Steudel Nom., ed. 2, 2: 8. 1841 (excl. *Nemedra* Kuss.); Walp. Rep. 1: 428, 1842; Hasskarl, Tweede Cat. Pl. tuin Buitenzorg 220. 1844; Blanco, Fl. Filip., ed. 2: 288. 1845; ed. 3, 2: 61. 1878; Roemer, Fam. nat. 1: 82. 1846; Syn. Monogr., Hesper. 1: 98. 1846; Orbigny, Diet. i'hist. nat. 7: 241. 1846 (*Lanisium*); Dietrich, Syn. 4: 788. 1847; Lindley, Veg. Kingd. 464. 1847; ed. 3: 464. 1853; Miquel, Fl. Ind. bat. 1(2): 544. 1858; Bentham & Hooker f., Gen. PL 1: 334. 1862; Peiffer, Nom. 2(1): 24. 1874 (excl. *Sphaerosaeme*); Hiern in Hooker f., Fl. Brit. India 1: 557. 1875; Baillon, Hist. Pl. 5: 501. 1873; Diet. Bot. 3-4: 199. 1876; Durand, Index 61, no. 1183. 1888; Boerlage, Handl. Fl. Ned. Ind. 1:

192. 1890; King in J. As. Soc.-Beng. 64(2): 80. 1895; Harms in Engler & Prantl, Nat. Pfl. fam. 3(4): 396. 1896; ed. 2, 19 b. 1: 123. 1940 (et 1960) (excl. *Sphaerosaeme*); Koorders & Valetton, Bijdr. Kennis Booms. Java 3 in Meded. 'sLands Pl.tuin Buitenzorg 16: 178. 1896; Cooke, Fl. Bombay 1: 210. 1902; de Dalla Torre & Harms, Gen. siph. 261. 1903; Post & Kuntze, Lexikon 315. 1904; Brandis, Indian Trees 144. 1906; Backer, Fl. Batavia (in Meded. Dept. Landb. 4) 1: 278. 1907; Pellegrin in Notulao Syst. 1: 284^90. 1909; in Lecomte, Fl. g-en. Indoch. 1: 750. 1911; Merrill, Fl. Manila 275. 1912; Koorders, Excurs. Fl. Java 2: 443. 1912; Gamble, Fl. Madras 1: 182. 1915; Ridley, Fl. Malay Pen. 1: 410. 1922; Lemée, Diet. Genres 3: 943. 1931; Briquet in Boissieria 1: 1-126. 1936 (n.v.); Bailey, Stand. Cyclop. Hortio. 2: 1818. 1947; Adelbert in Backer, Fl. Java (emergency Ed.). Fam. 148: 20. 1949; How & Chen in Acta Phytotax. Sinica 4(1): 27. 1955; Backer & Bakh. v.d. Brink, Fl. Java 2: 125. 1966.

Plutea, Noronha in Verhand. Batav. Genootsch. 5, ed. 1, Art. 4: 3. 1790 (nomen); Hasskarl, Tweede Catal., I.e. 1844; Harms, II.ee.

Lachanodendron Reinwardt ex Blume, Catal. Gewassen Pl.tuin Buitenzorg 70. 1823 (nomen); Steudel, Nom., ed. 2, 2: 1. 1841; Post & Kuntze, Lexikon 315. 1904 (*Lachanodendrum*).

SECTIO LANSIUM KOSTERM.

Pilis simplicibus, foliis imparipinnatis rarissime unif oliolatis, foliolis alternantibus, rarissime suboppositis prominule reticulatis, petiolis plerumque pulvinatis; inflorescentiis racemiformibus vel spicatis, rarissime pauce brachiatis vel anguste paniculatis, floribus sub glob mis hermaphroditis, sepalibus 5 parvis, petalibus 5 incurvatis concavis, tubo stamineo mbglobo, antheribus 10 inclusis, rarissime margine impositus, cyelus I vel 2; nectarium deest, stylo patvo vel nullo-, stigmatate magno vel inconspicuo; fructus indehiscentibus, 5-locellatus, seminibus plerumqwe arillus includentibus, cotyledonis superpositis radiculis horizontalis.

DISCUSSION

It is not necessary to repeat Pellegrin's (in Notulae Syst., I.e.) arguments for including *Lansium*, *Aphanamixis* and *Amoora* into *Aglaia*, as these arguments still stand. I shall limit myself to discuss the treatment of Harms in the second edition of Engler & Prantl.

This is certainly a good compilation, but as a classification it is not satisfactory, which is already evident from the key for the genera, especially those of the *Melioidae-Trichilieae*. There are so many exceptions cited under each heading of the key, that what actually is left to separate the genera is the geographical distribution and this is certainly not an acceptable base for a generic classification.

A comparison of the description of *Aglaia* and *Trichilia* makes it evident, that *Aglaia* could as well be fused with *Trichilia*.

I cannot predict which will be the future trend for an integrated classification of *Melioidae-Trichilieae*, whether the trend of combining (as is going on now: *Heynea* with *Trichilia*; *Lansium*, *Reinwardtiadendron*, *Clemensia* included in *Aglaia*) will prevail or whether heterogeneous genera like *Trichilia* and *Aglaia* will be split up into smaller entities.

It is clear that Harms prefers smaller entities, as he conserves genera, combined by other authors (*Ruagea*, *Clemensia*) and keeps the old genus *Didymochiton* separate from *Dysoxylum*. There is nothing against this and I have in the additional notes to the *Lansium* study kept *Aphanamixis* separate from *Amoora* (for the time being, pending a full revision) and I am inclined to agree with Harms that *Didymochiton* (provided that it be restricted to species with a pseudocalyx of bracts) may be upheld.

Harms' suggestion to raise the 3 subfamilies of *Melioidae* to family rank, however, is not acceptable; *Cedreloideae* and *Swietenioideae* could as well be combined in one subfamily. Pollen morphology does not support Harms' suggestion (Erdtman).

On the other hand Harms leaves intact the huge and extremely heterogeneous genus *Trichilia*' (free sepals or a calyx tube; petals 3, 4 or 5; staminal tube or free stamens; anthers 5—10, attached to the rim of the tube; disc none or stipelike or even urceolate; ovary 2, 3 or 4-celled; style short or long; ovules usually 2 per cell, above or next to each other; capsule dehiscent; aril present or absent or partial; leaves imparipinnate or unifoliate; folioles entire or incised).

There are apparently only two constant characteristics: the anthers on the tube rim (but in *Tr. volkensis* they could as well be considered to be included) and the dehiscent, capsular fruit.

According to the key, Harms differentiates *Lansium* from *Trichiliinae* by the position of the anthers. In this way in *Trichiliinae* are included only section *Hearnia* of *Aglaia* and of section *Lansium* only *Aglaia. steenisli*. More confusing is the key in separating *Lansium*, *Reinwardtiadendron* and *Aphanamixis* and *Amoora* (*Lansium*: anthers twice as many as petals in one or two whorls, with or without appendix. Petals 4—5. *Reinwardtiadendron*: anthers twice as many as petals, in 2 rows, with appendix; petals, 4—5. *Aphanamixis* and *Amoora*' (plus many other genera): anthers twice as much as petals or the same number or slightly more, in one row. Petals 3—5).

In *Lansium* Harms includes *Sphaerosacme (decandra)*, which is polygamous dioecious and belongs in *Aphanamixis*. Hence his description

differs from that of *Lansium* proper (*Lansium* has been treated in a similar way by Hiern, King, Ridley, etc.).

He subdivides *Lansium*, in three sections: *Eulansium* Harms with flowers on the bole (which is wrong) or on older branches; *Neolansium* Harms, which is a mixture of *Aphanamixis (L. humile* Hassk.) and true *Lansium*; *Pseudolansium* Harms is an *Aphanamixis (L. decandrum)*.

He furthermore cites *L. pedicellatum* Hiern as being of uncertain status (it is an *Aglaia*) and *L. javanicum* Koorders & Valetton, which he says seems to be of uncertain position (it is *Aglaia dookkoo* Griff.).

He summarizes the differences between *Reinwardtiadendron* and *Lansium* as follows; simple leaves, connective appendix (in the key to *Lansium*, page 39 and 126, not in the description, *Lansium* is characterized by having connective appendices or these are lacking), fruitwall woody (it is not), aril lacking (cf. remark under *Aglaia reinwardtiana* Kosterm.).

Actually only the characteristic of one-foliate leaves stands and one-foliate leaves are not uncommon in *Aglaia*.

Dysoxylum, *Aglaia* and *Chisocheton* could be easily accommodated in *Trichilia* as outlined above (*Aglaia* has indehiscent fruit, according to me, but Harms includes also species of *Aglaia* with dehiscent capsules).

The anthers, attached to the tube rim (in *Trichilia*) are comparable to those in section *Hearnia* of *Aglaia*.

In other genera Harms attaches enough importance to a tubelike calyx or free sepals (*Urbanoguarea* versus *Guatea*; *Urbanoguarea* seems to be mainly differentiated by the peculiar foliole shape, but in *Trichilia* species with entire and incised folioles are kept together!)

In *Amoora*. Harms incorporates species with 3, 4 and 5 petals, although King, Koorders & Valetton and others had restricted *Amoora* to species with 3 petals.

There are many more examples to show, that the delimitation of the genera has not been carried out consistently.

Apparently it is difficult to base genera on numerical characters (calyx lobes or sepals, petals, number of stamens, number of ovary cells) as these seem to vary considerably in closely related species and even in the same specimen (in *Aglaia*: sepals 4 or 5; petals 3, 4, 5; anthers 3, 5, 6, 10; ovary with 2, 3, 4 or 5 cells).

Other characteristics (discussed below) are not much better, unless the larger genera are split up.

The character of the fruit has not been taken sufficiently into account; it seems that dehiscence and non-dehiscence may be used as a generic character (*Aglaia* has indehiscent fruit; the fruit of *A. ganggo* are in-

dehiscent; those mentioned by Koorders and Valeton are opened irregularly under artificial pressure in the herbarium; the same holds true for *A. latifolia*).

A genus like *H>eimodendron* Sillans (in Bull. Soc. bot. France 100: 263. 1953) is hardly warranted, as the fruit is unknown and it not even possible to ascribe this genus to one of the subfamilies.

Indumentum. For the Fijian species of *Aglaia*, A. C. Smith (in Contr. U.S. nat. Herb. 30: 477. 1957) presented a subdivision based on the presence of stellate hairs and two kind of scales *). He thought that this was a more practical subdivision than that based on the position of anthers fnd furthermore he questioned the value of the latter characteristic, as it cuts across the one suggested. As mentioned before, I do not believe that one or the other is more "natural", but I also for practical reasons prefer a subdivision based on the indumentum. In *Trichilia* a similar subdivision exists.

For the Javanese species of *Lansium* Koorders and Valeton pointed to the characteristic of simple hairs as opposed to stellate hairs or scales in *Aglaia* **). Whether these simple hairs are really simple has still to be proved, they might be forked hairs of which one arm is reduced. The hairs on the fruit are extremely short and are perhaps of a different character than those on the branchlets.

Lansium pedicellatum Hiern (renamed here *Aglaia pedicellata*) has to be removed from the section *Lansium*, because of the presence of scales, although in all other respects it fits in *Lansium*.

Leaves. Two kinds of leaves are found, compound and unifoliolate. Again this characteristic cuts across the primary subdivision of *Aglaia*. It would be possible to have the subdivision according to this characteristic, but at least one species of *Aglaia* has from one to 3 leaflets in the same species.

The archaic character of simple leaves is also debatable; the juvenile leaves of *A. aquea*, *dookkoo* are difficult to interpret as unifoliolate leaves and resemble more the simple leaves of *Vavaea* (cf. under *A. aquea*). In *Aglaia* an appreciable number of species has unifoliolate leaves (with stellate or lepidote indumentum), hence there is no reason to keep *Reinwardtiendron* (with unifoliolate leaves) separate from *Lansium*, as it has simple hairs. Sometimes it is stressed, that the seeds of *Reinwardtiendron* are ex-arillate, but the specimen Kostermans 13776 cited by van

*)" Sectio *Lepiaglaia*, Pierre, *indumentum lepidotum*.; Sectio *Stellato-pilosae* sect. nov., *indumentum stellato-pilosum*.

***) i Pierre (Pl. for. sub. t. 333, 1895) wrongly states that *Lansium* has stellate hairs.

Steenis has thinly arillate seeds; moreover I believe that the presence or absence of an aril (partial or complete) or an arilloid cannot be used as a generic characteristic (cf. *Trichilia*, *Guarea*, etc.).

In sectio *Lansium* the leaflets are alternate, except the apical ones in some species, which might be sub-opposite, in *A. intricatoretieltiba* they are opposite, in *A. chartacea* and *A. membranacea* they are alternate or siibopposite. The leaves are imparipinnate; there is either an apical leaflet Gr this may be reduced to a small stalk, the two kinds were observed on the same tree (*A. dookkoo*); in this sense the leaves resemble those of *Sapindaceae*. All species of section *Lansium*. have a prominulous reticulation on both surfaces of the folioles. In some species this reticulation is peculiar, consisting of secondary nerves, starting from the midrib and running parallel to the lateral nerves; in some cases they run out before reaching the margin, in other cases they form loops at the margin similar to those of the lateral nerves. This is most pronounced in *A. dubia*, where the reticulation resembles remotely that of *Calophyllum* or *Ochnaceae*. In other species the reticulation forms a dense lattice work, similar to that found in *Aglaia matthewsii*. Although the bulk of the species of *Aglaia* has rather smooth leaves, there are also species with a similar pronounced reticulation.

On the lower leafsurface sometimes domatia are found, consisting of shallow or deeper cavities with stiff hairs. These domatia are not present in all the leaves of the same specimen and are therefor not fit for specific segregation.

The foliole. base is usually slightly asymmetrical; strongly asymmetrical leaves as in *Amoora* and *Aphanamixis* are not found.

Most species of the section *Lansium* have pulvinate petiolules and petioles. This is also the case in some species of *Aglaia*.

The end bud remains dormant for a long time, once a year new flush develops.

Inflorescence. In *Aglaia* proper as a rule axillary panicles are found, In *Lansium* these are reduced to simple racemes or spikes, usually axillary, sometimes behind the leaves (in axils of fallen leaves) or on old branches. Cauliflory (on the trunk) does not occur, although (wrongly) mentioned for *A. dookkoo*. The reduction is sometimes not complete and an occasional short ramification may be found near the base of the inflorescence. Simple racemes occur also in *Aglaia*, (*A. silvestris* Merr. and some unnamed New Guinea species near *A. exigua* M. & P.). A real, narrow panicle is found in *A. chartacea*.

The racemes and spikes or not proliferous, as contended by Griffith. The flowers are usually widely spaced (interrupted); the flowers develop regularly from base to apex.

Flower. They have been described for a long time as hermaphrodite and polygamous-dioecious in *Lansium*, because *L. decandrum* was included in the genus; all other species of sectio *Lansium* are strictly hermaphrodite and so they are in *Aglar.a* proper (*Lansium decandrum* is here referred to *Aphanamixis*). The calyx (in all *Aglaiia*) consists of 5 free sepals; they are slightly grown together at the base. The size of the sepals in the fruit represents a usefull specific characteristic. Usually the sepals are ciliate at the margin; they are as a rule broader than long and concave.

The 5 petals (in *Aglaiia* 3, 4 or 5) form the subglobose flower; they sometimes become explanate or reflexed; they are always completely glabrous and rather fleshy. In one specimen the number of petals varies sometimes between 4 and 5.

The staminal tube is subglobose (also in *Aglaiia*). The anthers are as a rule completely included (except *A. steenisii*); their number is in sectio *Lansium*, 10. In *Aglaiia* there are either 10 or 5 stamens, rarely 3 (*A. triandra*). The inside of the tube shows ribs in the basal part; these represent the centre of the broad filaments; in fresh material the boundaries of the filaments are discernable; they are separated by bands of other tissue (comparable with the lamellae found in other *Meliaceae*). *A. de Jussieu's* theory could be modified in this way, that the tube consists of the broad filaments grown together with *alternating* lamellae (cf. Harms in Engler & Prantl, I.e., ed. 2, 19 b. 1: 19. 1940). The apex of the anthers is acute and simulates in dried material an appendix. The shape of the anthers is constant in all of *Aglaiia*.

A. steenisii of section *Lansium*., if following the current subdivision, should fall in section (subgenus) *Hearrda* of *Aglaiia*.

The style is lacking. Actually the top of the ovary is more or less acuminate and bears often a large stigma, which in section *Lansium* is often conical or cylindrical in shape.

In *Aglaiia* proper a similar stigma is found and here too the style is lacking (or very short).

The ovary is small, ovoid in shape, tapered towards the apex; it is densely pilose; the outside is (in dried material) ribbed (angled); the ovary has 5 cells each with one ovule, attached to the central axis.

There is no disc. This important characteristic holds also true for *Aglaiia* proper.

The fruit represents a non-dehiscent capsule; the pericarp is leathery and not very thick in sectio *Lansium*; it is pilose outside, but the hairs are so tiny, that a high power lense is necessary to observe them. The inside of the skin is smooth, glossy, white and shows in between the septa an obscure rib, indicating the spot where in other genera (*Aphanamixis*, *Dysoxylum*, *Guarea*) dehiscence takes place.

There are always 5 compartments in sectio *Lansium*, but only 1—3 seeds develop; the remaining cavities are filled with the aril only. I suppose that in *Aglaiia* with 2—5-celled fruit, the number has been actually 5; in those species with a thin aril, the compartments with abortive seeds disappear completely. Because of the leathery skin, which under pressure bursts open, pressed, dried fruit of *Aglaiia* are sometimes mistaken for dehiscent fruit. There is never more than one seed per cell, which conforms with the situation in *Aglaiia* proper.

In *Lansium humile* the fruit are dehiscent (cf. there) and for that reason and others this species has been removed to *Aphanamixis*.

The cotyledons are thick and transverse in section *Lansium*; in *Aglaiia* there seem to be exceptions. The dividing plane between the cotyledons is slanting and hence in *Aglaiia* intermediate stages between transverse and longitudinal cotyledons might be found.

An aril or arilloid is found in almost all (perhaps all) of *Aglaiia*, including section *Lansium*.. The origin of the aril or arilloid is not clear, it might be the outer testa. Koorders described *Reinwardtiodendron* as having no aril, but the specimen Kostermans 13776, if belonging here, has a thin aril. In dried material a thin aril may become completely obliterated.

KEY TO THE SPECIES

- | | |
|---|-----------------------------------|
| 1a. Leaves unifoliolate | 1. <i>A. reinwardtiana</i> |
| b. Leaves imparipinnate | 2 |
| 2a. Inflorescence a narrow panicle | 15. <i>A. ehartacea</i> |
| b. Inflorescence a raceme or spike (sometimes slightly branched at the base) | 3 |
| 3a. Leaves with scalariform secondary nerves | IS. <i>A. intricatoreticulata</i> |
| b. Leaves with reticulate secondary nerves (or these partly simulating" primary nerves, cf. <i>A. dubia</i>) | 4 |
| 4a. Anthers exsert, inflexed, closing the orifice of the tube | 2. <i>A. steenisii</i> |
| b. Anthers at the inside of the staminal tube | 5 |
| 5a. Anthers in one whorl | 6 |
| b. Anthers in two whorls | 9 |
| 6a. Racemes 0.5 - 4 cm long | 3. <i>A. breviracmosum</i> |
| b. Racemes or spikes 5 - 20 cm long | 7 |
| 7a. Lower leaf surface and branchlets densely pilose. Flowers sessile, calyx lobes | |

- 2—2.5 mm in diam.; anthers 1.5—2 mm. Fruit globose, densely pilose, orange yellow, skin tough, thin, with much latex. 4. *A. aquea*
- b. Lower leaf surface pilose on the main nerves, branchlets glabrescent. Flowers subsessile, calyx lobes 1.5—2 mm in diam., anthers 1—1.5 mm. Fruit ellipsoid, glabrescent, pale yellow, skin thick, less tough, with a little latex. 6. *A. domestica*
- c. Lower leaf surface and branchlets glabrous. Flowers shortly pedicelled; calyx lobes 0.3—0.8 mm in diam., anthers 0.3—0.5 mm. Fruit ellipsoid, pale yellow, glabrous, skin thick, less tough, without latex. 8
- 8a. Leaves membranous, alternate and sub-opposite. Infructescences in the axils of fallen leaves. 14. *A. membranacea*
- b. Leaves subcoriaceous, alternate. Infructescences on old branches. 5. *A. dookkoo*
- 9a. Branchlets densely tawny tomentellous. 10
- b. Branchlets glabrous or only the utmost apex minutely pilose. 11
- 10a. Sepals (of the fruit) 4 mm in diam. 12. *A. sepalina*
- b. Sepals (of the fruit) 1 mm in diam. 7. *A. pseudolansium*
- 11a. Lateral nerves strictly parallel, up to more than 15 pairs. 9. *A. dubia*
- b. Lateral nerves 6—10 pairs. 12
- 12a. Lower leaf surface sparingly pilose, midrib pilose; upper surface smooth. 10. *A. kostennansii*
- b. Lower leaf surface glabrous, upper surface prominulously reticulate. 13
- 18a. Spikes glabrous. Petals 4—5 mm. Stigma globose, deeply 5-furrowed. 8. *A. kinabaluensis*
- b. Spikes minutely pulverulently puberulous to glabrous. Petals 3 mm., stigma knoblike, subcylindrical. 11. *A. avatmallayana*

AGLAIA, SECT. LANSIUM KOSTERM.

1. AGLAIA REINWARDTIANA Kosterm., *nom. nov.* — Fig. 1

Reinwardtiodendron celebioum Koorders (base), Flora N.O. Celebes in Meded. Lands Pl. tuin Buitenzorg 19: 389. 1898; Suppl. Fl. N.O. Celebes 1: 23—27, t. 8a, b. 1918; Harms in Engler & Prantl, Nat. Pfl. fam. Nachtr. 2: 37. 1900; id., ed. 2. 19 b 1: 125. 1940; Koorders-Schumacher, Syst. Verzeichn., Abt. 3(1): 63. 1914; Merrill, Enum. Philipp. fl. PI. 2: 369. 1923; Van Steenis in Nova Guinea 10: 210, f. 2. 1959. — *Koorders 19712* (BO).

Reinwardtiodendron merrillii Perkins, Fragm. PI. Philipp. 74—76. 1904; Koorders, Suppl., I.e. 23; Merrill in Philipp. J. Sci. 1, Suppl. 72. 1906; Enum., I.e. 369; Elmer, Leaflets Philipp. Bot. 9: 3385. 1937. — *Merrill 3149* (typus); *Barnes 59* (para-typus).

Lansium monophyllum Merrill ex Perkins, I.e. 75. 1904 (nomen).

Tree, up to 25 m high, glabrous in all its parts, except the vegetation point, which is minutely adpressed pilose, diam. up to 30 cm, base slightly buttressed. Bark grey; living bark thin with a resinous odour. Branchlets to oblong lanceolate, 10—20 x 3.5—6.5 cm; base cuneate, apex long-acumi-

nate; both surfaces prominulously reticulate; upper surface glossy, midrib slender, in a groove, lateral nerves slender, prominulous; lower surface somewhat glossy, paler, midrib prominent, lateral nerves 7—9 pairs, slender, arcuate, axils with hollow domatia in some leaves. Petiolules 2—3 mm long, apex somewhat swollen, petioles 1—2 cm long, slender, at base shortly pulvinate.

Spikes axillary, erect, solitary or fascicled, 6—12 cm long with short petiolar part; rhachis slender, glabrous (with a few 100 μ long hairs). Flowers sparse, sessile, subglobose, 3—4 mm long, without scent, yellowish, subtended by minute bracteoles. Sepals membranous, rounded, glabrous, ca 1 mm. Petals pale yellow, oblong, obtuse, 3—4 mm long. Staminal tube pale green, shorter than the petals, margin with 5 very short, truncate teeth. Stamens 10 in 2 rows, included or slightly exsert. Anthers white, sessile, acuminate (in sicco); ovary small, ovoid, 5-angled, pubescent; style none, stigma 5-lobed, thick. Fruit densely, shortly pilose with hard exocarp (4 mm in diam.), pearshaped or oblong or subglobose, up to 3 cm in diam., usually one-celled by abortion. Seeds with thin aril, testa membranous, cotyledons above each other, plumule pubescent, radicle horizontal, short.

Distribution: Philippines, N. Celebes, N. Borneo, W. New Guinea, low and medium altitudes.

Vernac. names: Langsot, lasot (Celebes), Balibisan (Mbo.), Bianti (Tag.), Malakamanga (Tag.) (Philippines).

There are some discrepancies in Koorders' description: in the generic description it is stated that the ovary is ovoid, in the specific description it is oblong; in the former the inflorescences are racemose or paniculate, which is certainly wrong and in the latter spicate. In the key it is stated that the spikes are simple or slightly branched. If the specimen Kostermans 13776 from Borneo belongs here, the seed has a thin aril; this specimen was cited by Van Steenis.

PHILIPPINES: Luzon, Prov. of Benguet, Twin Peaks, May, fr., *Elmer 6332* (BO); Prov. of Bataan, Nov., fl., *Elmer 6766* (BO); *ibid.*, Aug. - Sept., fl., *Alvarez F.B. 12926* (BO); *ibid.*, Lamao R., Mt. Mariveles, fl., *Borden F.B. 2060* (BO); *ibid.*, Oct., fl., *Barnes F. B. 59* (BO); Mindoro, Mt. Calavite, Apr., fl., *Ramos B. Sci. 3,9381* (BO); N. CELEBES, Minahasa, Pingsan, Febr., fl., *Koorders 19713* (BO, K, L); W. NEW GUINEA, Manokwari, Maepi II, alt. 10 m, Oct., fr., *Kostermans B.W. 109U* (BO, L).

2. *AGLAIA STEENISII* Kosterm., *nom. nov.* — Fig. 2 .

Lansium pedioellatum (non Hiern) Kostermans in Reinwardtia 7: 31, fig. 11. 1965. — *Van Steenis 3U4* (BO).

Shrub or treelet 4—14 m; outer bark with peeling flakes, inner bark ochre white, 2 mm, resinous; wood light ochre; young branchlets densely, minutely, pale brown tomentellous; soon glabrous. Leaves glabrous (base of rhachis in young leaves somewhat pilose); rhachis (petiolar part of 4—10 cm included) up to 18 cm long, base shortly thickened. Foliolae chartaceous to thinly coriaceous, 5—7, alternate, glabrous, obovate or subobovate-lanceolate (apical one) to subovate or elliptical (basal ones), up to 9 X 19 cm (apical one) to 2.5 X 6 cm (basal foliole), apex conspicuously, broadly acuminate, base cuneate; both surfaces prominulously reticulate; upper surface glossy, midrib slender, impressed, lower surface paler, duller, midrib prominent, lateral nerves 7—9 pairs, arcuate, prominent, secondary nerves prominulous. Petioles slender, 3—20 mm long, pulvinate at base, flat or slightly sulcate above.

Racemes on the bare branches behind the leaves, glabrous, slender, up to 17 cm long. Flowers sub-globose, 2—4 mm in diam. Pedicel filiformous, 1—6 mm long, subtended by a minute, pilose bract. Sepals sub-orbicular, 1—2 mm in diam. (broader than long), margin ciliate, reflexed. Petals ovate-orbicular, 2—4 mm long. Anthers 10, in one row, slightly exsert, inflexed and closing the truncate, broad tube orifice; ovary ovoid, angular, pilose, stigma truncate, style cylindrical, thick, angular, 1 mm.

DISTRIBUTION: Sumatra, Borneo

The species is characterized by its glabrousness, the pedicelled flowers with reflexed sepals and the broad orifice of staminal tube. The leafsize is very variable, the Van Steenis specimen has the smallest foliolae, the Meyer specimen the largest. The flowers of both are exactly alike. Also the pedicel length varies considerable, being 1 mm in the Steenis specimen and 6 mm in the Meyer one.

MALAY PENINSULA : Perak, Mt. Pondo, May, buds, King's Coll. 7657 (SING) ; SUMATRA, North slope of Mt. Pakiwang, on lake Ranau, ca 600 m alt., Oct., fl., *Van Steenis SiU* (A, BO, K, L, U) ; Mt. Sago, Payakumbuh, alt. 100 m, Aug., fl., *Meyer 5098* (L) ; Isl. Simaloeur, July, fl., *Achmad 1272* (BO, K, L, P) et *1526* (BO, L) ; *ibid.*, fr., 66. *U07* (BO) ; June, fl., *Achmad 1156* (BO, L) ; E. BORNEO, Mt. Sekrat near Sangkulirang, June, fl., *Kosterman\$ 6223* (L).

3. *AGLAIA BREVIRACEMOSA* (Kosterm.) Kostermans, *comb. nov.* — Fig. 3

Lansium breviracemosum Kostermans (basonym) in Bull. bot. Survey India 7: 128. 1965. — *Kostermans 18311* (BO),

A small tree, up to 15 m high and 20 cm in diam. with small buttresses. Bark smooth or cracked, pale brown, 0.5 mm, inside white; living bark 2—3 mm, green or lightbrown. Branchlets minutely adpressed pilose at apex, glabrescent, longitudinally striated with scattered, minute, elongate lenticels. Leaf buds densely, minutely sericeous. Leaves alternate, up to 27 cm long (the pilose, 4 cm long petiolar part included), spirally arranged, imparipinnate, base pulvinate. Foliolae (5—) 7—10 (—11), usually 9, chartaceous, glabrous, ovate-elliptical to elliptical, rarely obovate-elliptical or lanceolate-elliptical, 5—14 x 3—6 cm, up to 7 x 15 cm, base acute or cuneate, apex bluntly acuminate; reticulation dense, prominulous on both surfaces; midrib slightly impressed on upper, prominent on the lower surface; lateral nerves (6—) 8—10 pairs, slender, prominulous, slightly arcuate. Petioles slender, up to 1.5—2 cm long with strongly pulvinate base.

Inflorescences axillary and on the bare branchlets, 5—40 mm long, pilose towards the base, racemiform, unbranched or with a few, up to 3 mm long, widely spaced ramifications at the base. Bracts concave, ovate, acute, minute. Flowers subsessile, subtended by a tiny bracteole. Sepals 5, with scattered tiny hairs, explanate, usually broader than long, acutish, 0.5—1 mm, margin minutely ciliate; outer petals orbicular, concave, glabrous, fleshy, white, 2—2.5 mm long, in one whorl, included in the 1—2 mm high, subglobose tube, mouth sub-entire, 1—1.5 mm in diam. Ovary cylindrical, sulcate, 3—5-celled, densely sericeous, topped by a flat, fleshy, stigma, which is constricted into a short thick pilose style, which merges into the ovary.

Fruit globose, greenish grey (fresh), minutely, densely pilose, 10—15 mm in diam.; pericarp leathery, 0.5—0.7 mm thick; seeds usually 3 (one in each compartment), ellipsoid, 7—10 mm long, 4—6 mm in diam., aril none; testa coriaceous, thin; cotyledons superposed.

Distribution: Sumbawa, submontane.

Vernac. name: Narab suai.

In the original description by a printer's error, the description of the tree, inflorescence and flower has been misplaced on the same page under the heading: *Soaphium longepetiolatum* (Kosterm.) Kosterm., comb. nov. (basionym: *Microcos longepetiolatum* Kostermans in Reinwardtia 6: 301. 1963).

The flower pedicels are very short and thick and not lacking as I described them originally.

The inflorescences have occasionally a few, very short branches at their basal part.

W. SUMBAWA: Mt. Batulante, trail from Batudulang to Pukis, alt. 700-800 m, April, fl., fr., *Kostermans 18811* (A, BO, CANB, K, L, LE, P); trail to Punik, alt. 700 m, Nov., fr., *Kostermans 19195* (A, BO, C, CANB, K, L, US); trail to Pusu, alt. 800-1000 m, Oct., fr., *Kostermans 19087* (A, BO, C, CANB, G, K, L, P, SING, US); trail to summit, alt. 700-880 m, April, fl., *Kostermans 18269* (A, BO, CANB, K, L) & *Kostermans 18U3* (BO, G, K, L, LAE, LE, P, PNH, SING., US); E. Sumbawa, Ro Mts., E. side, Wawo dunga, ster.; *Elbert 3761* (L.).

4. AGLAIA AQUEA (Jack) Kosterm., comb. et stat. nov. — Fig. 4

Lansium domesticum, var. *aqueum* Jack (basionym) in Trans. Linn. Soc. London 14(1): 116. 1823; reimpr. in Calcutta J. nat. Hist. 4: 93. 1843; Roemer, Fam. Nat. Syn. Monogr., Hesperides 1: 99. 1846 (as a syn. of *Lansium aqueum* Roemer); King in J. As. Soc. Bengal 64(2): 81. 1895 (as a syn. of *Lansium domesticum* Jack); Koorders & Valetton, Bijdr. Kennis Bomms. Java 3 in Meded. 's Lands Pl.tuin Buitenzorg 16: 180 et 183. 1896 (as a doubtful syn. of *L. domesticum* Jack); Kostermans in Reinwardtia 5(3): 351. 1960 — Lectotypus propos.; *Kostermans s.n.* (BO).

Lansium aqueum (Jack) Roemer, I.e. 99; Miquel, Fl. Ind. bat. 1(2): 545. 1859; Suppl. Sumatra 197. 1860; in Ann. Mus. Lugd. bot. 4: 34. 1868; Hiern in Hooker f. Fl. Brit. India 1: 558. 1875; C. DC. Monogr. Phan. 1: 598. 1878; King in J. As. Soc. Bengal 64(2): 81. 1895 (as a syn. of *L. domesticum* Jack); Koorders & Valetton, I.e. 180 et 183 (as a syn. of *L. domesticum*, var. *pubescens* K. & V.); Koorders, Exk. Fl. Java 2: 443. 1912 (p.p., quoad „Kokosan”); Harms in Engler & Prantl, Nat. Pfl. fam., ed. 2, 19 b 1: 124. 1950 (as a syn. of var. *pubescens* K. & V.); Kostermans, I.e.

Lansium domesticum, var. *kokossan* Hasskarl, Tweede Cat. Pl.tuin Buitenzorg 220. 1844 (diag. latin, in adnot; quoad nomen tantum; material in Leiden, identified by Hasskarl as var. *kokossan* represents the real duku = *Aglaia dookkoo* Griff, and another sheet represents *A. domestica*, the pisitan or bidjitan.); Nut, I.e. 85; Teijsmann & Binnendijk, Cat. Pl.tuin 211. 1866 (kokosan); Zippel ex Miquel, Ann. Mus. bot. Lugd. bat. 4: 34. 1868 (kokosan).

Lansium domesticum, var. *pubescens* Koorders & Valetton, I.e. 181 et 183. 1896; Hoohreutiner, Pl. Bogor exsicc. 74. 1904; Backer, FL Batavia I(in Meded. Dept. Landb. Ned. Ind. 4): 279. 1907; Schoolf. Java 215. 1911; Koorders - Schumacher, Syst. Verzeichn. 1(1), Fam. 140: 30. 1911; Koorders, Exk. Fl. Java 2: 443. 1912 (p.p.; quoad "Kokosan" = "Tjeloring"; ceter. exclud.); Ridley, Fl. Mai. Pen. 1: 411. 1922; Ochse & Bakh., Vruchten & Vruchtent. Ned. Ind. 62, t. 25. 1931; id., Fruit and Fruitcult. Ind.

62, t. 25. 1931 (excl. cit. "pisitan" = "pidjitan" = "peeseetan" = "peedjeetan"); Adelbert in Backer, Fl. Java (emergency Ed.), Fam. 148: 20. 1949; Harms in Engler & Prantl, I.e. 124. 1940; Ochse et al., Trop. & subtrop. Agr. 1: 644. 1961; Backer & Bakhuizen v. de Brink, Fl. Java 2: 125. 1966. — *Koorders 5127* (BO).

Lansium domesticum (non Jack) Blume, Bijdr. Fl. Ned. Ind., 4« Stuk: 165. 1825 (quoad var. „Kokosan”); de Jussieu in Mém. Mus. Hist. nat. Paris 19: 233. 1830 (p.p.; quoad „Kokosan”); (non Jack) Miquel, Suppl. Sumatra 54, 197, 509. 1860; (non Jack) Bisschop Grevelink, PL Nederl. Ind. 495. 1883 (excl. cit. "doekoe"); (non Jack) de Clercq, Nieuw Pl. Wordenb, Ned. Ind. 266, 1909 (p.p.; quoad "Kokosan"); (non Jack) Koorders-Schumacher, Syst. Verzeichn. 3(1): 26. 1910; (non Jack) Backer, Schoolf. Java 2: 443. 1912 (p.p.; quoad "kokosan"); (non Jack) Van Gorkom, O. Ind. Cult. 3: 638. 1913 (p.p., quoad "kokosan"); (non Jack) Heyne, Nutt. PL Ned. Ind., ed. 2: 895. 1927 (p.p.; quoad "kokosan"); (non Jack) Ochse, Indische vruchten 120, fig. 60. 1927; Vruchten & Vr. t. Ned. Ind. 62. 1931 (p.p.; quoad "kokosan"; (non Jack) Burkill, Diet. econ. Prod. Mai. Pen. 2: 1314. 1935 (p.p., quoad langsat); (non Jack) Terra, Tuinbouw. 79. 1949 (p.p.; quoad "kokosan"); (non Jack) Corner, Ways. Trees Mai., ed. 2, 1: 463. 1952 (p.p.); (non Jack) Backer & Bakh. v.d. Brink, Fl. Java 2: 125. 1966.

Kokosan, Filet, Plantk. Wordenb. Nederl. Ind. 189. 1888.

Similar to *Aglaia domestica*, but: tree up to 25 m high and 25 cm in diam. Branchlets densely pubescent; the lower leaflets surface densely brown pubescent.

Folioles usually larger than those of *A. domestica*. Flowers sessile; calyx (fruiting) 8 mm in diam.; calyx lobes 2—2.5 mm in diam. Anthers 1.5—2 mm long. Fruit globose, sessile, more globose than that of *A. dookkoo*, up to 4 cm in diam., in a very compact cluster, skin with much sticky latex at maturity, rather thin; aril usually somewhat sourish; fruit-skin orange yellow, difficult to separate from the contents; separating septa thicker and tougher than those of *A. dookkoo*. Even at maturity the fruit does not detach easily from the calyx.

Distribution: Malay Peninsula, Java, Sumatra, W. Borneo, wild and cultivated from 0 - 1050 m alt.

Vernac. names: Rangsadan, Langsep (Javanese); Kokkossan (Sundanese), Aër-Aër (Sumatra).

Jack described this tree as a variety of *L. domesticum* from a specimen from Bencoolen (S. Sumatra) and although no type specimen is extant, the description and the vernacular name Aër-Aër (which is still in use), leave little doubt, that this is the plant described above. Jack cited the variety in an unusual way (as *L. aqueum*), although he stated implicitly that it was a variety. Only Koorders & Valetton cite the plant as *Lansium aqueum* "Jack".

Roemer raised the variety to specific rank, herein followed by Miquel and by myself (attributing the combination erroneously to myself).

Meanwhile Hasskarl coined another varietal name for it in 1844 (*Kokossan*), providing a latin description of the taste of the aril. Hasskarl, however, had no clear idea of the differences between kokossan and bijitan and mixed them even with the real duku, as is evident from identifications of material in Leiden*). The same varietal name was attributed to Zollinger by Miquel, who spelt it Kokosan; Teijsmann & Binnendijk in 1866 spelt it Kokkosan, probably a misprint.

In 1896 Koorders & Valetou coined a new varietal name for it: *pubescens*, quoting *Lansium aquinum* "Jack" as a possible synonym. They did not accept Jack's too short description (it is short, but sufficient). Koorders and Valetou (l.c. 181) mentioned also the variety *Kokossan* Hasskarl (misspelt kokosan), which had priority over their own name, unless Hasskarl's (latin) diagnosis is not acceptable.

Furthermore they printed in tabular form the differences between the 3 varieties of *L. domesticum* under their local names. This table was provided by a private collector in E. Java. Koorders & Valetou started confusion by assuming that the langsat of E. Java should be different from that of W. Java. Actually the table talks about langsep, which is identical with the kokosan of W. Java (*A. aquina*), whereas according to all collector's labels, the E. Javanese langsat is the W. Javanese pisitan (*A. domestica*).

The specimen Dielenhorst from Priaman, was enumerated by Miquel (Flora, l.c.) under *L. domesticum*; in Annales (l.c.) he referred it to *L. aquinum*. In Herbarium Bogoriense two sheets of this specimen are conserved, of which one, bearing the original label is certainly *A. aquina*; the other (sterile; part of a leaf) is *A. chastacea*.

The first 4 leaves of the seedling (Boot s.n.) are simple. They are difficult to interpret as folioles, as there is no petiolar part (cf. Harms in Engler & Prantl, ed. 2, 19 b, 1: 3, 1940). A discoloured part just below the leafbase, which is not thickened, is not represented in mature leaves; the petiole is pubescent, the petiole base slightly thickened and discoloured.

The fruit is eaten by sticking it in the mouth, biting it and sucking the juice of the aril out. This is what the Sundanese call: to „kokos" (which verb is used also for eating other fruit in a similar way). The Sumatra name Aër-Aër means: watery; this refers also to the softer and more juicy aril.

*) It is also possible that the Leiden material does not represent Hasskarl's specimens.

The fruit resembles in taste strongly that of *Baccaurea maliciana* and the detached fruit might be confused in superficial observation (cf. the note on *Baccaurea sphaeocarpa* Lour. under *A. domestica*).

The description, which Corner gives of the Malay „langsat" is not very clear; the slightly hairy underside of the folioles point to *A. domestica*, but the fruitskin with much latex to *A. aquina*. I assume, however, that the langsat of Sumatra is the same as that of the Malay Peninsula, which is *A. domestica*.

The fruit are usually smaller than those of *A. dookloo*, perhaps because they are so densely clustered, they are darker and more orange yellow in colour; a tiny fruit pedicel is present (not a flower pedicel).

U s e

About the size of the fruit there is no unanimous opinion. Those which I saw were smaller than those of *A. domestica* (langsat = pisitan) and *A. dookloo* (duku), the largest being 4 cm in diam. The skin is thinner and tougher than of both the others and is used in dried condition as a substitute for incense (sometimes mixed with *Styrax benzoina*) and used mainly to chase mosquitoes.

The Bogor Kokosan has a sourish sweet taste.

The timber of *A. aquina* is according to Koorders harder than that of the other two, but this I doubt. Furthermore it is not sure that he means this species.

MALAY PENINSULA: Kuala Lumpur, Wild Hills Res., Nov., young fr. *Havard 4977* (SING); Sumatra: E. Coast. Langkat, Sisirah, alt. 12 m, ster., 6.5. s.n. (A, BO, K, L); Central, Silungk, Feb., young fr., *Koorders 26879* (BO, L); West, Priaman, young fr., *Dielenhorst H.B. 1225* (BO, L); *ibid.*, buds, *Korthals s.n.* (L); Lampung Distr., Mt. Rata Bercong, alt. 400 m, Nov., *Boot 240* (BO, K, L) and 135 (A, BO, G, L, U); Sumatra, sine loc., fl., *Korthals s.n.* (L); W. Java, near Tjampoa, Nov., after anthesis, *Valetou 1* (BO, L); *ibid.*, ster., *Ja 2242* (BO, L); near Bogor, fl., *Koorders s.n.* (BO, L); *ibid.*, Nov., fl., *Kostermans s.n.* (A, BM, BO, CANB, K, L, LAE, MO, NY, P, SING), lectotypus propos.; Bantam, Mt. Karang, ster., *Koorders 4127* (BO), type of var. *pubescens*; *id.*, 4237 (BO, L); Bantam, Pandoglang, Mt. Amupan, alt. 750 m, ster., *Ja 2940* (A, BO, CANB, K, L); Batudjajar near Bandung, ster., *Noerbadi s.n.* (BO, K, L); Priangan, ster., *Ploem s.n.* (L); Central Java, Pekalongan, Wangkolang near Margisari, alt. 150 m, ster., *Boot 4991* (A, BO, K, L); culta in Hort. Bogor, sub III B s, Nov., fl. (BO); *ibid.*, e Bangka, ster. (BO, L); sub III C; Pl. Bogor exsicc., *Hochreutiner 159* (L); culta near Djatinegara-Djakarta, ster., *Baeker s.n.* (BO, L); Seedling, culta (BO, L); locality not indicated, fl., *Reiswardt s.n.* (L); *Zollinger 1168* (L); *Jungbluth 279* (L) et 27 (L); Borneo, Sarawak, village Puch, Sematan, Sept., fr., *Perseglove & Shuk P. 4617* (L).

5. **AGLAIA DOOKKOO** Griff. — Fig. 5 a, b.

Aglaia dookkoo Griffith, Notulae Pl. Asiat. 4: 505. 1854; Hiern in Hooker f., Pl. Brit. India 1: 558. 1875. — *Griffith s.n.*, Malacca ad Malim (K).

Lansium domesticum, var. *typica* Backer, Fl. Batavia 1 (in Meded. Dept. Landb. Nederl. Ind. 4): 279. 1914 (pro maxima parte); Ochse, Vruchten & Vruchtenteelt. Nederl. Ind. 62, t. 24. 1931; Fruit and Fruitcult. Netherl. Ind. 62, t. 24. 1931; Ochse et al., Trop. & subtrop Agr. 1: 644, f. 111. 1961.

Lansium javanicum (nee Roemer) Koorders in Moll & Janssonius, Mikrogr. Holzes 2: 176. 1911; Koorders-Scbumacher, Syst. Verzeichn. 1(1), Fam. 140: 31. 1911; Adelbert in Blumea 6: 319. 1947 (sub *Lansium domesticum* Correa); in Backer, Fl. Java (emergency Ed.), Fam. 148: 20. 1948; Harms in Engler & Prantl, Nat. Pfl. fam., ed. 2, 19 b 1: 125. 1940; Backer & Bakhuizen v.d. Brink, Fl. Java 2: 125. 1966. — *Koorders 23439* (BO).

Lansium domesticum, var., Hiern in Hooker f., Fl. Brit. India 1: 558. 1875. — *Griffith s.n.* (K).

Lansium domesticum, var. *Duku* Hasskarl, Tweede Catal. Pl.tuin Buitenzorg 220. 1844 (diagn. latin, in adnot.); Harms, I.e. 124 ("doekoe").

Lansium domesticum, var. *Kokossan* Hasskarl, I.e., quoad specim. in Herb. Lugd. bat.

Aglaia merrillii Elmer, Leaflets Philipp. Bot. 9: 3298. 1937. — *Elmer 13285* (UC).

Lansium spec., Merrill in Univ. Calif. Publ. Bot. 15: 123. 1929; Harms, I.e. 125. — *Elmer 21737, 21742* (UC).

Lansium domesticum (non Jack) Blume, Bijdr., Fl. Ned. Ind. 4^e Stuk: 165. 1825 (quoad "duku" = duko); de Jussieu in Mém. Mus. Hist. nat. Paris 19: 233. 1830 (p.p.); (non Jack) Blanco, Fl. Philipp., ed. 2: 228. 1845; ed. 3, 2: 62. 1878 (p.p.); (non Jack) Miquel, Fl. Ind. bat. 1(2): 545. 1859 (quoad var. "doekoe"); (non Jack) Hoola van Nooten, Fleurs, Fruits Java t. 16. 1863 (ed. 3); (non Jack) Teijsmann & Binnerdijk, Catal. Pl.tuin Buitenzorg 211. 1866 (quoad var. "duku"); (non Jack) C. DC, Monogr. Phan. 1: 598. 1878; (non Jack) ViMar, Nov. App. 43. 1880; (non Jack) Benschop Grevelink, Pl. Nederl. Ind. 2: 459. 1883; Warburg in Engl. bot. Jahrb. 13: 344. 1891 (sphalm. Auct. Jacq.); King in J. As. Soc. Bengal 64 (2): 81. 1895 (Materials 569), excl. specim. Griffith; (non Jack) Koorders & Valetton in Meded. 's Lands Pl.tuin Buitenzorg 16: 180. 1896 (descriptio pro max. parte; exclus. "Bidjitan", "Langsat", "Kokosan"; excl. var. *pubescens* et *Lansium aqueum* "Jack"); (non Jack) Ridley in Agr. Bull. Str. & Fed. Mai. St. 1: 429. 1902 (n.v.); Mai. Timmerhoutsoorten in Bull. kol. Mus. Haarlem 27: 37. 1903 (p.p.?).; Fl. Malay Pen. 1: 411. 1923 (pro max. parte; inclus. f. "Duku"; exclus. var. *pubescens* et f. "Langsat"); (non Jack) Bland in Agr. Bull. Str. & Mail. St. 1: 590. 1902; (non Jack) Gamble, Man. Ind. Timb., ed. 2: 150. 1902; Fl. Madras 1: 182. 1915; (non Jack) Beccari, Nelle For. Borneo 598. 1902 ("Duku"); (non Jack) Merrill in Bull. 27, Dept. Inter. Phil., Bur. Gvt. Lab. 27: 31. 1905 (p.p.); Fl. Manila 275. 1912 (p.p.); Interpret. Rumph. Herb. Amb. 309. 1917 (p.p.); Enum. Born. Pl. 320. 1921 (p.p.); Enum. Phil. fl. Pl. 2: 368. 1923 (p.p.); in Univ. Calif. Publ. Bot. 15: 123. 1929 (p.p.); Pl. Life Pacific World 94, 154, f. 204. 1946 (p.p.); (non Jack) Backer, Schoolfl. Java 215. 1911 (quoad f. "Doekoe" — "Doko"); (non Jack) Koppel & Van Hall, Landb. Ind. Arch. IIA: 698. 1908; (non Jack) de Clercq, Nieuw Pl. Woordenb. *fled.* Ind. 266. 1909 (quoad "Doekoe"); (non Jack)

Koorders, Exk. Fl. Java 2: 443. 1912 (quoad f. "Duku"); (non Jack) Brandis, Ind. Trees 144. 1906 (p.p.); (non Jack) Popenoe, Man. Trees & Fr. 427, f. 54. 1920 (quoad "duku"); (non Jack) Mendiola in Philip. Agr. Bull. 11: 177—123. 1922; Man. Pl. breeding Trop. 262—271, figs. 1926; (non Jack) Wester. Foodpl. Phil. (Phil. Bur. Agr., Bull. 39), ed. 3: 113. 1924 (p.p.); (non Jack) Den Berger in Meded. Proefsta. Thee Ned. Ind. 97: 73, t. 51. 19¹⁶ (p.p.); (non Jack) Craib, Enum. Pl. Siam. 1: 259. 1926; Heyne, Nut. Pl. Ned. Ind., ed. 2: 895. 1927 (p.p.); quoad "Duku"; (non Jack) Ochse, Indische vruchten 120, fig. 60. 1927; Burkill, Diet. econ. Prod. Mai. Pen. 2: 1314. 1935 (p.p.; quoad "Duku"); (non Jack) Corner, Ways. Trees Mai. 1: 463. 1940 (quoad "Duku"); Bailey, Stand. Cycl. Hort. 2: 1818. 1947 (quoad "Duku"); (non Jack) Terra, Tuinb. Indon. 79. 1949; (non Jack) Quisumbing, Med. Pl. Phil. (Bull. 16, Dept. Agr. Bur. Phil.) 480. 1915 (quoad lansones); (non Jack) Backer & Bakh. v.d. Brink, Fl. Java, I.e. (quoad "Duku").

? Lance Bontius, Hist. nat. et Med. Ind. or., Lib. 6: 109. cum tab. 1658.

? Lansones Blanco, Fl. Filip. 1: 326. 1837; Villars, Nov. App. 43. 1880.

Similar to *A. domestica*, but usually smaller tree. Branchlets glabrous. Leaves completely glabrous (only the very juvenile ones in the flush with a sparse, very short indumentum on the nerves); with very pronounced pulvinate, grey (in sicco) foliole bases.

Flowers shortly pedicelled. Calyx (fruiting) 3 mm in diam. Calyx lobes only 0.5—0.8 mm in diam. Anthers 0.3—0.5 mm long. Fruit ellipsoid with extremely short, sparse hairs (practically glabrous), thick-skinned, without latex; seeds small; aril sweet. Fruitskin easily separable from contents, separating septa very thin (in the centre practically obliterate). Fruit at maturity detaches easily from the calyx.

Distribution: Wild and cultivated in the Malay Penins., S. Siam; perhaps S. part of S. Viet-nam; Sumatra, Java, Borneo and the Philippines, from 0—750 m alt.

Vernac. names: Lansones, Lanzon; Boboa (Bis.); Buahon (Mbo., Sul); Bulahan (Bis.); Buan (Mbo.); Bukan (Bis.); Kalibongan (Mbo.); Tubua (Bag.) (Philipp.); Duku, Dookkoo (Malay Pen., W. Java, Sumatra, Borneo); Buaan (Borneo); Langsat (Mai. Pen.).

Griffith's description fits the species, known from Java as the "Duku". I have not seen the type specimen of *Aglaia dookkoo*.

Lansium domesticum, var. *typica* Backer represents this species, but it is possible that Backer included also *A. domestica* (the "pisitan" in W. Java). The figure in Ochse, Fruit & Fruitcult. may be the real "duku".

Roemer's *Lansium javanicum*, with the vernacular name Bejettan (a peculiar orthography of bidjitan) represents *A. domestica*.

Koorders' *Lansium javanicum*, based on Koorders 23439 is in the Bogor Herbarium. The name appeared first in Moll & Janssonius, who gave a description of the timber, soon followed by a "description" of Koorders' wife (Koorders-Schumacher). Adelbert and subsequent authors wrongly included it in *Aglaia domestica*, although Koorders had already recognized it as being different.

Hiern explicitly described a variety of *A. domestica* (he added: *var.* after the name) and based it on Griffith's type specimen of *A. dookkoo*.

Jack (in Trans. Linn. Soc. London 14: 115. 1823) in a footnote says, that he is not certain whether there is a specific difference between the Lansih of Malacca and the Dookkoo.

Blume's description of 1825 is short and incomplete, he considered *A. aquae*, *dookkoo* and *domestica*. to be conspecific as is evident from the cited vernacular names.

Hoola van Nooten gave a beautiful coloured plate of the "Duku", but in the text the essential characters are missing, but as the drawing was made in W. Java from the "Duku" we may assume that it represents *A. dookkoo*.

King (l.e. 81) described mainly *A. dookkoo*. I have seen only the Specimen Wray. Mr. L. Forman (Kew) informed me, that the specimen Maingay 338 (K) has scattered hairs along the main nerves and calyx lobes. This specimen represents *A. domestica*. Gamble might have had a wood sample of the real "duku",

C. DC, l.e., cites a specimen without collectors name or number from Java and Maingay 338. This might be *A. dookkoo*, but also a mixture with *A. domestica*. The anthers are said to be 1 mm long, which points to *A. domestica*.

Koorders & Valetton copied their description from King's, because, as they said: "we had not sufficient material of this cultivated species". This is a remarkable statement as the tree is and was grown in and around Bogor, where these botanists worked; apparently they were real herbarium-botanists, who did not want to study the living plant, even it was only five minutes away.

Backer in his Schoolflora did not mention the variety *typica* which he had created before and enumerated now 4 varieties under *A. domestica* (cf. under *A. domestica*). Naves' drawing in Blanco, Fl. Filip., ed. 3: t. 117. 1880, might represent *A. dookkoo*. I have not been able to inspect sufficient material of the lansones of the Philippines, but I assume that it represents mostly *A. dookkoo*.

De Jong described the cultivation of the duku in E. Java. Although *A. dookkoo* is restricted to the always humid regions, it is possible to cultivate it in E. Java (where there is a dry spell from July to October) under heavy shade and with a dense undergrowth, on permanently moist soil.

He describes also the peculiar way of selling. The buyer agrees first with the owner, whether the latter will sell to him; if agreed the buyer looks after the growing fruit, covering them up with the fibrous tissue of the sugar palm (*Arenga saccharifera*) and cleaning the trees. When the fruit are ripe, the bargaining starts about the price. If they do not agree, the buyer loses the money, that he has put in the maintenance of the growing fruit. A similar method is used in the Philippines.

The tree may be marcotted, but this is difficult and hence not done. It is grown from seed (the 3 species grow true from seed, cf. Terra, l.e.). Even the growing from seed is difficult. They are sown in situ. This is done also in the Philippines (Mendiola).

The trees are usually smaller than those of *A. domestica* and the crowns are less dense. The trees often have a rather "unhealthy" appearance.

I had no opportunity to study most of the specimens from the Philippines enumerated by Merrill. They might represent a mixture of *A. domestica* and *A. dookkoo*. Both species occur wild in the Philippines.

The plates of Mendiola represent probably this species.

De Clercq (Nieuw Plantk. Woordenb. Ned. Ind. 266. 1909) gives some ethnological particulars, which I repeat here.

In the Minahasa (N, Celebes) it is said: „Se dima matuari se rimengan uman ange akad u monatooe se dai minaeleelekanai, si esa wo si esa nangetegam mi anana wo ni amaena un sosib; taasëan sorib se matuari dai matauan; jo naäno ne potan ketaunokan sa wo tempomo ni openera mukamo wija ni sera" (Five sisters have not seen each other since they were born and each prepares a room for her father and for her mother, each has a separate room and the sisters do not know each other; some of them are already pregnant, which will be known not before their grandmother opens the door for her). This is a riddle; the solution is the duku fruit.

In Sangir-language: „Mageng ta komehang ta lumege" (If he is not pinched at his mouth, he does not smile); in Bugis language: "Tabu purung-purung ladju, sengadjowe ritingara puti-puti te madesa taringeng te manusia" (Food, which hangs high in the trees in bunches and looks like chicken eggs).

Use

The wood is used for handles of axes and lances and for other purposes where a tough, but flexible timber is needed.

A decoction of bark, mixed with that of *Pterocarpus indicus* is used against dysentery because of its astringent properties.

The very bitter seeds, which are green outside are an anthelmintic.

A velvety yellowish brown colour, especially of women is called „kulit langsep" (*Aglaia dookkoo* skin), a colour which is esteemed very high in Malaysia.

Ochse and others mention that the plant breeds true to seed, which is denied by Mendiola. *Aglaia domestica* is exactly intermediate between *A. dookkoo* and *A. aquea* and might represent a hybrid. As it takes up to 15 years before the trees bear fruit the saying that the trees breed true to seed cannot be trusted unless a full scale experiment has been carried

out.

According to Mendiola there should be two varieties of the Lanzons in the Philippines, a sweet and a sour one. The sweet one may be *A. dookkoo* (which is pictured), the sour one might be the wild form or *A. domestica*. Mendiola recognizes two kinds of shapes, the round and the elongate, the elongate being the sweeter. An infection of a mildew at the base of the fruit around the stem causes blackness, which is considered a sure sign of the sweetness of the fruit. This infection is not always present in the sweet duku of Indonesia.

There are fully seeded fruit, but also fruit which have only one full-grown seed, two, three, four or five. There are also completely seedless fruit, but there are no trees known, which bear year after year only seedless fruit. The seedless compartments of the fruit are filled with an aril and within the aril the brownish papery seedcoat. There are also half developed seeds, which do not germinate.

Mendiola gives in tabular form 6 distinct types of trees distinguished by fruit characteristics. The size of the fruit is very variable on the same tree and is correlated (Mendiola) with the presence or absence of seeds. If the fruit are asymmetric in form there are one more viable seeds presents. Completely seedless fruit are much smaller than the seedbearing ones. Complete symmetry means either complete seedlessness or complete seediness.

Diseases and enemies

Parasitism of *Loranthacvne* causes the trees to die. A weevil attacks the bark and causes gradually death of the branches and ultimately of the whole tree. An effective control for this insect is cleaning with a common broom, as is practised in the Philippines.

The branchlets are attacked by *Coccideae*, to the effect of the bark becoming rough and pustular.

Propagation

Hard wood cuttings propagate well, the rooting may be hastened by treating the cuttings with an 1.5 to 2 % solution of potassium permanganate for 12 to 24 hours before they are placed in the sand.

Marcotting — although rarely used — is possible and requires about 134 days. It is said that plants produced by Chinese layering or air-layering, bear earlier than those grown from seed; the latter becoming productive after 12 to 15 years.

Cleft or side grafting has been successful in the Philippines. Trials of budding were usually failures. An attempt to graft on *Sandoricum koetjape* had no success (after Mendiola).

The differences between *A. domestica*, *A. dookkoo* and *A. aquea* are small but constant.

	<i>A. aquea</i> ,	<i>A. domestica</i>	<i>A. dookkoo</i>
Leaves	densely pilose *	sparsely pilose, glabrescent, except on the main nerves	glabrous
Branchlets	densely pilose	pilose to glabrous	glabrous
Flowers	sessile	sessile to subsessile	pedicelled
Calyx lobes	2—2.5 mm in diam.	1.5—2 mm in diam.	0.3—0.8 mm in diam.
Anthers	1.5—2 mm	1—1.5 mm	0.3—0.5 mm
Fruit	globose, densely pilose, orange yellow, skin tough, thin, with much latex. Fruit smaller than those of <i>A. domestica</i> .	ellipsoid, glabrescent, pale yellow; skin thick, less tough, with a little latex. The largest fruit	ellipsoid, glabrous, pale yellow skin, thick, less tough, without latex. Fruit smaller than those of <i>A. domestica</i> .

MALAY PENINSULA: Penang, Penang Hill, ster., *Holt* turn 37354 (SING); Waterfall, ster., *Curtis* 2767 (SING); Perak, Ulu Bera, alt. 200 m, Aug., fr., *King's Coll.* 10808 (L); Larut, April, young fr., *Wray* 3951 (BO); Apr., fl., *King's Coll.* 7457 (SING);

near Goping, May, buds, *Kunstler 7657* (L); Pahang, Berserak, ster., *Burkill & Haniff 17616* (SING); Temerloh, Sg. Nering, March, fl., *Henderson 10730* (SING); Raub Pahang, Nov., fr., *Kalonff 20463* (SING); Ulu Gombak For. Res., alt. 300 m, May fr., *Koehummen Kep. F.N. 9,9015* (L); Sg. Mengala For. Res., Plot 102, alt. 30 m, Jan., buds, *Wyatt-Smith, Kep. F.N. 70184* (L); Selangor, Ginting Bidai, May, fr., *Ridley 7390 a* (SING); Johore, Johore R., fr., *Ridley s.n.* (SING); Batu Gave Estate, Dec, buds, *Ridley 8256* (SING); Bukit Hitam, fr., *Ridley 7390* (SING); Ulu Kahang, June, fr., *Holtum 10907* (SING); Ulu Lepok, K. Panson, Sept., fr., *Phytochem. Survey 884* (SING); Malacca, Sg. Udang, Aug., fr., *Goodenough 1378* (SING); Bukit Besar Ophir, after anthesis, *Ridley 10822* (SING); fr., *Alvins 470* (SING); Singapore, Pulau Damar Berat, Aug., fl., *Sinclair s.n.* (L); SUMATRA: Atjeh, Distr. Tamyang, Perupuk, ster., *bb. 978?*, (BO, K, L); E. Coast, Pangkalan Brandan, Telaga Said, alt. 3 m, *bb. s.n.* (BO); Bengkalis, R. Misigit, Panglong 31, Jan., fr., *Beguïn 564* (BO, L); Langkat, Palo Meranti, alt. 2 m, June, fr., *bb. 10034* (BO, BRI); *ibid.* Sisirah, alt. 3 m (tree 25 m, diam. 35 cm), fr., *bb. 10035* (BO, L), *10036* (BO, K) et *10037* (A, BO) (fruit acid, astringent, langsai); Karo Lands, Pertumbukeu, ster., *bb. 104-54* (BO, L); W. Coast, Pajakumbuh, Muara Padang, Si Balading, alt. 1430 m, ster., *bb. 6491* (BO, K, L) (langsai tupai); Palembang, Banjuasin & Kubu regions, Sept., fl., *104 I P. 768* (BO, K, L) ("Ketepeng"); Simalur (Simaloër), fr., *bb. 4407* (BO) (langsai etam); Tapah, Distr. Defajan, ster., *Achmad 1592* (BO, L) (Langsai dotan alafai, tree 25 m); *ibid.*, Aug., fl., *Achmad 1397 = bb. 4524*: (A, BO, K, L) (tutur langsai pajo); *ibid.*, ster., *Achmad 553* (BO, K, L) (langsai dotan); JAVA, near Djakarta, culta, fr. (BO); near Djatinegara (Mr. Cornells), ster., *Backer s.n.* (BO, K); Bogor, Sept., young¹ fr., *Hallien s.n.* (BO, L); ster., *Ja 1,2,21* (BO); Djatipadang near Pasar Minggu, sapling, *Bakhuizen 6911* (BO, L); Ragunan near Pasar Minggu, culta, Nov., fl., *Ochse s.n.* (BO); Sukabumi, ster., *Ja 1700* (BO, K) (pisitan lajung); Udjungkulon, fr., *Koster-r.'ans 54 A* (A, BO, G, K, L); E. Java, Sumbermandjang near Kali Pare, Pasuruan, alt. 250 m, June, young fr., *Koorders 23439* (BO, L), *23834 (2932)* (BO), *7569* (BO, K, L); locality not indicated: ster., *Junghuhn s.n.* (as var. bidjitan, which is wrong) (L); *Reinwardt s.n.* (type of var. *Duku Hassk.*) (L); *Junghuhn s.n., de Vriese s.n.* (L); culta in Hort. Bogor. sub *XI B VIII 202*, Oct., fl., *Woerjantoro 104* (A, BO, K, L); *id.* sub *XI B 281* (BO); N. BORNEO (Sabah), Sandakan, Kabili For. Res., Sept., fr., *A 78* (BO), *ibid.*, June, fr., *B.N.B.F.D. 4853* (L, SING); Sg. Manila Rd., Aug., fr., *Meyer San 21541* (L, SING); Tawao, younar fr., *Elmer 21742* (BO, L), *21737* (BO, L, SING) et *21863*, fr. (SING); Lahad Datu, Bod Gaya *id.* Res., alt. 17 m, July, fr., *A 134* (BO, SING) et *San 3U16* (L); Tawau, Tinagat Hill, Oct., fr. *B.N.B.F.D. 5243* (L, SING); Tenom, Paal, Sapong, Oct., fl., Buntar, *San 27279* (L); Indonesian Borneo, Lianggagang, fr., *Halliev 2783* (BO, K, L); Philippines, Mindanao, Cabadbaran (Mt. Urdaneta), Prov. of Agusan, Aug., fl., *Elmer 13285* (BO), type of *A. merrillii* Elmer.

6. AGLAIA DOMESTICA (Correa, emend. Jack) Pellegrin

Aglaia domestioa (Correa, emend. Jack) Pellegrin in Lecomte, Fl. gén. Indoch. 1: 766. 1911 (p.p.; excl. *Baccaurea sylvestris* Lour.); Bois, Pl. aliment. 2: 101, fig. 1928; *Burkill*, Diet. econ. Prod. Mai. Pen. 2: 1314. 1935, Harms in Engler & Prantl. Nat. Pfl. fam., ed. 2, 19 b 1: 124. 1940. — *Lansium domesfAeum* Cori'ea in Ann. Mus. Hist. nat. Paris 10: 157, t. 7 (Carpol. t. 10), fig. 1. 1807 (fructus); Marsden, Hist.

Sumatra 101, f. 5. 1811*); Lamarck-Poiret, Encycl. méth. Bot., Suppl. 3: 299. 1813; Steudel, Nom. 462. 1821; ed. 2, 2: 8. 1841; Jack in Trans. Linn. Soc. London 14: 115, t. 4, f. 1. 1823; reimpr. in Calcutta J. Nat. Hist. 4: 188, t. 4, f. 2. 1843; Griffith's reimpr. 92. 1843 (review in Flora 6, Beibl. 2: 94. 1823); Blume, Catal. Gewassen Pl.tuin Buitenzorg 70. 1823 (nomen); Bijdr. Fl. Ned. Ind., 4? Stuk: 165. 1825 (p.p.; quoad 'pisitan'); de Jussieu in Mém. Hist. nat. Paris 19: 233. 1830; Spach, Hist. nat. Vég. phan. 3: 190. 1834 (excl. *Quinaria lansium* Lour.); Walp. Rep. 1: 428. 1842; Hasskarl, Tweede Catal. Pl.tuin Buitenzorg 220. 1844 (p.p.; quoad "Bidjitan", excl. spec. Reinwardt. (L), quoad *A. aquea* et p.p. quoad var. *kokossan*, which (specim. Herb. Reinwardt (L) is this species); Aanteek. over het Nut door de Bewoners van Java aan eenige Pl. toegeschreven 24. 18...; Blanco, Fl. Filip., ed. 2: 228. 1845; ed. 2: 228. 1845; ed. 3, 2: 62. 1878 (p.p.; descript. falsa), t. 117. 1880; Roemer, Syn. Monogr., Hesperides 1: 99. 1846; Dietrich, Syn. 4: 788. 1847; Miquel, Fl. Ind. bat. 1(2): 545. 1859 (p.p.; quoad var. "bidjitan"); Ann. Mus. bot. Lugd. bat. 4: 34. 1868; Teijsmann & Binnendijk. Catal. Pl.tuin Buitenzorg 211. 1866 (quoad var. "piedjietan"); Groenevelt in Verh. Batav. Genootsch. 39: 49. 1877; F. Villars, Nov. App. 43. 1880 (p.p.); Bisschop Grevelink, Pl. Nederl. Ind. 495. 1883 (p.p.); "Warburg in Engl. Jahrb. 13: 344. 1891; Harms in Engler & Prantl, Nat. Pfl. fain. 3(4): 2%. f. 162 (J-P). 1896; ed. 2, 19 b 1: 124. f. 30 (J-P). 1940 (p.p.); Koorders & Valetton, Bijdr. Kennis Booms. Java 3 in Meded. 's Lands Pl.tuin Buitenzorg 16: 180. 1896 (descriptio pro minima parte; quoad "bidjitan"; excl. var. *pubescens* K. & V. et *L. aqueum* "Jack"); Wray in Perak Mus. Notes. 2: 30. 1897 (n.v.); Chem. Ztg. 21: 719. 1897 (n.v.); Merrill in Bull. 27, Dept. Inter. Phil. Bur. Gvt. Lab. 31. 1905 (p.p.); Fl. Manila 275. 1912 (p.p.); Interpret. Rumph. Herb. Amboin. 309. 1917 (p.p.); Spec. Blanco, 211. 1918; Enum. Born. Pl. 320. 1921 (p.p.); Enum. Philip. fl. Pl. 2: 368. 1923 (p.p.); in Univ. Calif. Publ. Bot. 15: 123. 1929 (p.p.); Plant life Pacific World 94, 154, fig. 204 (male). 1946 (p.p.); Brandis, Ind. Trees 144. 1906 (p.p.); Backer, Fl. Batavia 1 (in Meded. Dept. Landb. Ned. Ind. 4): 278. 1907 (quoad nomen tantum); Schooffl. Java 215. 1911 (p.p.; quoad var. "bidjitan = pidjietan = pisitan = tjeloring = tjeloreng"); de Clercq, Nieuw Plant. Wordenb. Ned. Ind. 2:66. 1909 (p.p.; quoad "pisitan"); Koorders-Schumacher, Syst. Verzeiohn., Abt. III (1): 63. 1910; I (1), Fam. 140: 30. 19*11; Wehmer, Pfl. stoffe 420. 1911 (p.p.); Koorders, Exkurs. Fl. Java 2: 443. 1912 (p.p.; quoad "pisitan = bidjitan = pidjetan"; excl. var. *pubescens* et *L. aqueum* "Jack"); Van Gorkom, O. Ind. Cultures 3: 638. 1913;..... in Philip. J. Sci. Chem. Geol. 8: 80, t. 14. 1913; Boldingh, Catal. Hort. Bogor. 80. 1914; in Torreyia 15: 188. 1915 (n.v.); U.S. Dept. Agr. Bur. Pl. Industry, Invent. Seeds & Pl. Import. 32: t. 34. 1915; in Philipp. Agr. Rev. 8: 10-8. t. 9. 1915; *id.* 13: 180, t. 18. 1920; *ibid.* 184, t. 19. 1920 (n.v.); Popenoe, Man. Trees & Fr. 427, fig. 1920 (quoad langsai); Ridley, Fl. Malay Pen. 1: 411. 1922 (p.p.; quoad forma "Langsai"; excl. var. *pubescens* et forma "Duku", excl. cit. Hiern et King); Wester, Foodpl. Philipp. (Phil. Bur. Agr., Bull. 39), ed. 3: 113. 1924 (probabiliter); Craib, Enum. PL Siam. 1: 259. 1926; Ochse, Ind. Vruchten 120, p.p., fig. 59. 1927; Vruchten & Vruchtent. Ned. Ind. 61 (p.p.; quoad "pidjitan", "pisitan"), t. 25. 1931; *id.*, Fruit & Fruitcult. N. Ind. 61 (p.p.; quoad "peedjeetan", "peeseetan"), t. 25. 1931; Heyne, Nuttige PL Nederl. Ind., ed. 2: 895. 1927; ed. 3: 895, 1950 (p.p.); *Burkill*, Diet. econ. Prod. Mai.

*) The older editions of 1783 and 1784 do not contain descriptions of *L. domestium*.

Pen. 2: 1314. 1935 (p.p.; quoad "Langsat"); Elmer, Leaflets Philipp. Bot. 9: 3383. 1937; Corner, Wayside Trees Mai. 1: 463. 1940; Adelbert in Blumea 6: 319. 1947 (excl. *L. javanicum* Kds.); in Backer Fl. Java (emergency Ed.), Pam. 148: 20. 1949 (p.p.; excl. var. *pubescens* et *L. javanicum* Kds.); Terra, Tuinbouw Indon. 79. 1949 (p.p.; quoad "pitjitan"); Quisumbing, Medic. PL Philipp. (Bull. 16, Dept. Agr. Bur. Phil.) 480. 1951; Merrill in J. Arnold Arb. 33: 229. 1952; Masilung-un et al. in Phil. J. Sci. 84: 284. 1955; Backer & Bakh. v.d. Brink, Fl. Java 2: 125. 1966, p.p. — Lectotypus propositum: *Kostermans s.n.* (BO).

Lansiuin javanicum (non Kds. & Val.) Roemer, Syn. Monogr. Hesper. 1: 99. 1846; Miquel, I.e. 545 (as a syn. of *L. domesticum*); Hiern, I.e. 557; C. DC, I.e. 598.

? *Lachanodendron album* Reinwardtia ex Blume, Catal. Gewassen 's Lands Pl.tuin Buitenzorg 70. 1823 (nomen).

Lachanodendron domesticum Nees in Flora 8(1): 103. 1825; Steudel, Nom., ed. 2, 2: 1. 1841.

Taenioehlaena polyneura Schellenberg in Engl. bot. Jahrb. 59, Beibl. 131: 24. 1924; Pfl. Reich, Heft 103: 169. 1938; Leenhouts in Fl. Males., Ser. 1, 5(4): 510. 1958 (p.p.; quoad folium). — *Motley* 885, p.p. (K).

Lansium Rumphius, Herb. Amboin. 1: 15, fig. 54. 1741; Linnaeus, Amoen. Acad. 4: 119. 1759 (as a syn. of *Averrhoa acida* L.); Henschl, Clavis Rumph. Abh. in Vita Rumphii 143. 1833; Hasskari, Neue Schlüssel Rumph. in Abh. naturf. Ges, Halle 9: 162. 1866; Merrill, Interpr. Rumph. 309. 1917.

Lance Bontius, Hist. nat. et med. Ind. or. in Pisonis, de Ind. utr. re nat. et med., Lib. 6: 109. 1658.

Lansones Blanco, Fl. Filip. 1: 326. 1837 (p.p.); Villars, I.e. 43. 1880.

Tree, up to 30 m high and up to 75 cm in diam.; bole up to 25 m, rather irregularly fluted; buttresses very steep, merging into the ribs of the fluted bole, at base concave and running out for up to 2 m. Bark mottled grey and orange, ca 0.5 mm thick, rather smooth; living bark ca 2 mm thick, with very little sticky resin with a peculiar resinous smell. Branches rather stiff, usually rather erect. Leaves alternate, 30—50 cm long; petiole up to 7 cm long, pubescent, flattened above, thickened at base; rhachis pubescent, cylindrical. Foliolae alternate, 6—9, glossy, chartaceous-coriaceous, elliptical-oblong to oblong, 9—21 x 5—10 cm, base somewhat asymmetric, acutish, apex shortly acuminate with blunt, up to 5 mm long acumen, upper surface prominulously reticulate, glabrous, midrib impressed, near the base pubescent; lower surface prominulously reticulate, scantily covered with short hairs (or glabrous), denser on the main nerves. Midrib strongly prominent; lateral nerves 10—14 pairs, prominent, secondary nerves prominulous, laxly reticulate. Petiole pubescent, pulvinate at the base, 5—10 mm long.

Racemes fascicled on the upper or lower side of the bare branches; rhachis 8—18 cm long, densely pubescent. Flowers subsessile, solitary. Bracts and bracteoles small, ovate, acutish, 0.7—1 mm long. Calyx fleshy;

tube 0.5—1 mm high; lobes 1.5—2 mm in diam., suborbicular, margin ciliate. Petals ovate, 2—3 mm long. Staminal tube subglobose, 1.5—2 mm high, 1—1.5 mm in diam., orifice crenate, ca 1 mm in diam. Anthers included, in one whorl, 1—1.5 mm long. Ovary ovoid, adpressed pilose, 1.5—2 mm long, towards apex tapering. Stigma sessile, truncate, small.

Berry ellipsoid, up to 2—4 (—7) cm long and 1.5—2 cm in diam., at first densely yellowish, buff, microscopically pilose, later glabrescent, obscurely longitudinally ribbed, topped by a small notch; calyx persistent with reflexed lobes. Fruitwall 1—1.5 mm thick, inside very glossy, white. Fruit 5-celled, partitional septa near the endocarp ca 1 mm thick, towards the centre membranous. Each compartment with one seed. Usually 1—3 seeds develop, the other cells are filled with the white, later translucent sweet or sweet-acid aril, which surrounds the seeds completely. Seeds ellipsoid, attached to the central raphe; seedcoat thin. Cotyledons thick, green, very bitter, superposed, with a transverse short radicle; the separating plane of the cotyledons oblique.

Distribution: Western Malesia, Celebes and W. New Guinea; cultivated in tropical S. Siam and Indochina, from 0—500 m alt.

Vernacular names: Langsat (Malay Pen.); langsat (Sumatra); Pisitan = Pidjitan (peedjeetan) = Bidjitan (W. Java; Sundanese); Langsat (E. Java); Tjeloring (Javanese); Lansones (Philippines). For other vernacular names cf. Merrill, Enum. Phil. fl. Pl. 2, I.e. and Heyne, Nuttige Pl. Ned. Ind., I.e.; Nugawem, Duguwem (Amberbakam language), W. Nov. Guinea.

Merrill referred (in Am. J. Bot. 3: 528. 1916) *Melia parasitica* Osbeck to *Lansium domesticum*, although Osbeck's description showed characteristics, not attributable to *Lansium domesticum*.

In 1952 (J. Arnold Arb. 33: 229) *Melia parasitica* was definitely referred to *L. domesticum*.

As Merrill pointed out, Osbeck, — not acquainted with cauliflory — mistook the inflorescence for a parasite, but rightly placed it in *Melia-ceae*,

Through the courtesy of Dr. Tycho Nordlind, I received a photograph and a flower of Osbeck's specimen. There is no doubt that it represents *Dysoxylum caulostachyum* Miq., which consequently is renamed here: *Dysoxylum parasiticum* (Osbeck) Kosterm., *comb. nov.* (basonym: *Melia*

parasitica Osbeck, Dagb. Ostind. Resa 278. 1751; ed. german. 1765, ed. angl. 1771). In the flower at hand there are 4 petals.

Rumphius (Herb. Amb., I.e.) gave an excellent description of what is now known as *Aglaia domestica* under the name of *Lansium* or the Lanssa boom; the plate (fig. 54) is not too good, as the fruit are never that near to the leaves and the folioles are very crudely drawn. Rumphius did not add a "specific epithet". He did so for *Lansium montanum* and for *L. silvestre*; the latter representing *Aglaia silvestris*, the other *Aglaia* spec. Linnaeus (Amoen. Acad., I.e.) reduced *Lansium* to *Averrhoa acida*. The combination *Lansium domestica* was coined by Correa in 1807, who described only the fruit. This fruit should be in the Banksian Herbarium and if still there and if the persistent calyx is still present, it will be possible to establish its identity. Without Correa's specimen, we have to accept *Lansium domestica* in the circumscription given by Jack in 1823, as Marsden's description of 1811 is not clear enough and his plate does not show the exact size of the persistent calyx. Lamarck-Poiret's description of 1813 is a copy of that of Correa.

In this sense (*Lansium domestica* Correa, emend. Jack) the species was referred to *Aglaia* by Pellegrin in 1911, but the description covers a mixture of *L. domestica* and *Aglaia dookkoo* Griff, and Pellegrin included moreover *Baccaurea sylvestris* Loureiro *) as a synonym following Pierre. (Fl. for., sub t. 333), Chevalier (Cat. Pl. Jard. bot. Saigon 64. 1919 and Crévost & Lemarié, cf. below); the latter is a true *Baccaurea*. The type specimen is conserved in the British Museum herbarium and consists of a female plant (cf. Moore in J. of Bot. 63: 254. 1925). It is not improbable that Loureiro's description of the fruit refers to *Lansium*.

i De Jussieu gave in 1830 a description of *Lansium, domestica* which is probably this species. Crévost & Lemarié, Cat. Prod. Indoch. 1: 228, t. 83. 1917 completely mixed up *Lansium* with *Baccaurea*. Their plate, captioned *L. domestica*, represents *Baccaurea*. In the text they pointed out, that *Lansium* is easily confused with *Baccaurea motleyana* (which they then did thoroughly!). The author's name of *L. domestica* is given as Jacq. (uin) instead of Jack. I assume that the Indochinese name Giau gia and the Laos name Mak fai refer to *Baccaurea*.

Pellegrin (in Lecomte, Fl. gén. Indoch., I.e.) gave a local name, apparently derived from Loureiro. This might as well be *Baccaurea*.

Blume gave in 1850 a short, inadequate description of *Lansium*

*) *Baccaurea sylvestris* Loureiro, Fl. Cochinch., 662. 1790 (ed. Willd., 813. 1793); Mueller-Arg. in DC, Prodr. 15(2): 457. 1866; Merrill, Enum. Philipp. fl. Pl. 2: 368, 1923; in Trans. Amer. phil. Soc. N.S. 24: 233. 1935.

domesticum, but he quoted the 3 varieties, which represent *A. aquea*, *A. domestica* and *A. dookkoo*.

Spach described *L. domestica*, in 1834, the addition of the vernacular name Béjettan (a french version of Bidjitan) points to *A. domestica*; *Quinaria lansium* Lour, should be excluded from the synonymy. Hasskarl in 1844 created 3 varieties of *Lansium' domestica*, of which the Bidjietan represents *A. domestica*. A latin description of the taste of the aril of the three varieties is given in a footnote.

In his paper: "Aanteekeningen over het nut, door de Bewoners van Java aan eenige planten van dat eiland toegeschreven" on page 24 the Biesietan = Biedjietan is mentioned. He says that the pounded fruitskin is used to rub in the skin after a bath to improve the skin. This is superstition (doctrine of signature); the velvety yellow-brown skin of the *Lansium* is considered the most appreciated colour for human skin, especially of women.

Blanco's description of the lansones is only partly referable to *Lansium* (part might have been *Cipadessa* Bl.); the plate provided in 1880 by Naves is real *Lansium*, but it is not sure whether *A. domestica* or *A. dookkoo* is pictured. Both species occur wild and cultivated in the Philippines.

MiqueFs conception of *L. domestica* covers 2 species: *A. domestica* and *A. dookkoo*; he followed Jack in separating *A. aquea*, which is the variety *Kokossan* of Hasskarl. In his Suppl. Sumatra (I.e. 54) he included wrongly the "rambeh"; this is *Baccaurea*.

Roemer in 1846 created *L. javanicum*, which represents this species as is evident from the vernacular name. *Lansium javanicum* Koord. & Valetton is different and represents *A. dookkoo*.

Harms in Engler & Prantl (1896) and also in the second edition (1940) gave an uncritical compilation of the *Lansium* species.

Koorders & Valetton described mainly *A. dookkoo*, as they stated implicitly. They did not take the trouble to collect this species themselves, although it grew in and around Bogor, where they lived.

According to the labels of the specimens Koorders 5145 and 5146, the E. Javanese name of *A. domestica* is langsats and this name does not refer to *A. aquea* as Koorders & Valetton pretend.

A written label on these specimens (apparently by H. Vijzelaar, as indicated by Koorders & Valetton I.e. 181) states the differences between the 3 species called: langsep, tjeloring and duku (doekoe). The langsep represents *A. aquea*; the tjeloring is *A. domestica*. An extra note is added on the label, that near Simpolan a tjeloring occurs with acid fruit, larger

than those of the *langsats* (~ *A. domestica*). A similar big fruit I bought in N. Sumatra; it was 7 cm long and had a thin very acid aril and enormous seeds.

Koorders & Valetton quote Rumphius, that the fruit bunches should be 1 m long (actually Rumphius wrote: 90 cm). Such long bunches are unknown in Java. Perhaps Rumphius meant one foot (ca 30 cm).

As most of Merrill's enumerated specimens from the Philippines could not be examined, Merrill's papers are quoted both under *A. domestica* and under *A. dookkoo*. Both species occur wild in the Philippines. Likewise Indian material (if the species is cultivated there) cannot be placed with certainty without actual material at hand.

Backer (Fl. Batavia) in 1907 described mostly *A. dookkoo*; in his Schoolflora he mentioned 4 varieties (cf. under *A. dookkoo*).

The Malay species described by Ridley in his Flora (1922) is mostly *A. dookkoo*, but he mentioned the variety *langsats*, which I suppose is the same as the N. Sumatra *langsats*, which is *A. domestica*.

I have not incorporated Mendiola, Man. Pl. breeding Tropics 262. 1926, as I assume that this valuable paper deals mostly with *A. dookkoo*. Mendiola gives in tabular form the different varieties according to fruit. As, however, the fruit are extremely variable in *A. dookkoo*, *aquea* and *domestica*, it is not possible to ascribe these varieties to one or more of these 3 species. Properties as mentioned by Mendiola are quoted in this paper under *A. dookkoo*.

I have not seen the leaf of *Taeniochlaena polyneura* Schellenberg as quoted by Leenhouts, this may represent eventually *A. dookkoo*.

Hiern's description in Hooker's Fl. Brit. India refers to *A. dookkoo* and this holds true also for King's (Materials Fl. Malay Pen.).

According to Griffith (quoted by Hiern) the flower spikes should be proliferous; this could not be confirmed.

The vernacular name *pisitan* = *pidjitan* means pressure or to press (in order to open the fruit).

Use and properties

Fresh skin of the fruit contains 0.2% volatile oil (D_{25} 0.8819, n_{25} 1.51555), a brown resin (3.5%) and some reducing acids. The dried skin yielded a dark coloured semiliquid oleoresin. This lanson resin is not toxic, it eases the irritation of the intestines caused by alcohol and has no action on the heart (Valensuela et al. as quoted by Quisumbing, Med. PL Phil. 481; Valensuela, Guevara & Garcia in U.P. Nat. App. Sci. Bull. 1: 71—91, plates 1—5, 12 textfigures).

The bark and fruitskin are astringent (tanin) and are used in a decoction against dysentery. The timber, as described by Ridley and Gamble might be also a mixture of *A. dookkoo* and *A. domestica*. The seed is anthelmintic (Low, Soil & Agr. Penang 223. 1836, confirmed by Rumphius, Koorders & Valetton and Boorsma). Leaf juice is applied for sore eyes (Burkill & Haniff in Gard. Bull. s.s. 6: 183. 1930).

Bark and fruitskin contain 6% lansium acid, used as arrow poison (cf. Burkill, Diet., I.e.); injected in frogs it stops the heart (Boorsma).

I have cited Warburg (in Engl. bot. Jahrb. 13: 344. 1891) here, because of the occurrence of *A. domestica* in Nw. Guinea; I have not seen Warburg's specimen, as vernacular name he quotes: "Tawerak".

The seeds contain 2 faintly toxic alkaloids (Boorsma); the aril has more than 14% of sugar of which 10% saccharose, 2.5% laevulose and 1.67% dextrose (cf. Chem. Ztg. 21: 719. 1897; Wehmer, Pfl. st. I.e.).

The fruit may be preserved in syrup, by a short boiling, after removing the skin and confections are known to have been made in this way in Malacca (Mrs. Bland in Agr. Bull. Str. & Fed. Mai. St. 1: 590. 1902) and were shown in London at the Colonial Exhibition of 1886 (cf. Philip. Agr. Rev. 13: 181. 1920).

MALAY PENINSULA: Perak, Telok Anson, ster., *Haniff 15851* (SING); *ibid.*, Tanjung Malim, ster., *Burkill & Haniff U010* (SING); SUMATRA, Padang Sidempuan, Dec, young fr., cult., *Kostermans 22065* (BO) (*langsats*); W. JAVA, Batudjadar near Bandung, ster., *Noerhadi s.n.* (BO, K, L); Dungus Iwul near Djasinga, alt. 220 m, ster., *Ja. 1934* (BO); Tjampea near Bogor, ster., *Koorders 30478* (BO, L) (*duku leuweung*); Bogor, culta, young fr., *Koorders s.n.* (BO, L); Nusagedeh Isl. in lake Pendjalu, alt. 720 m, ster., *Koorders 47702* (BO); culta in Hort. Bogor. sub III E. 39, fl. (BO, K, L); E. Java, Besuki, Banjuwangi, Distr. Rogodjampi, ster., *Koorders 5145* (BO, L) et *5146* (BO) (*langsats*); *ibid.*, April, fr., *Koorders 2.2436* (BO, L); local, not indicated, ster., *Perrottet s.n.* (L); *ibid.*, *Blume*, ster. (L); *ibid.*, post anthesis, *Hossuet* (he suggests 2 species!) s.n. (L); *ibid.*, buds, *Teijsmann & de Vriese* (L); sine loc, ster., *Reinwardt s.n.* (L); PHILIPPINES, Prov. of Rizal, Luzon, Antipolo, Oct., young fr., *Merrill, Spec. Blanco. 53* (BO); Mindanao, Todaya, Mt. Apo, July fr., *Elmer 11211* (BO); Mindanao, Davao, ster., *Williams 3076* (SING); CELEBES, Manado, Ratahan, ster., *Koorders 1970S* (BO, L); Malili, alt. 25 m, ster., *Cel./IV-173* (BO, K, L, U), 174 (A, BISH, BO), 175 (A, BO, K), 176 (BO, BRI, L) (*lansa takau*); Malili, Kawata, alt. 300 m, Dec, fr., *Cel./V-235* (A, BO, K, L) (*lansa, langsats*); Isl. Muna, Wasalangka, alt. 25 m, Pebr., young fr., 6.6. 2206.2 (A, BO, L, P) (*bubuno*); BORNEO, Sabah, Sandakan, Lun Manggis, Aug., after anthesis, *Saw A 1629* (L, SING); Sandakan, Segaliud, semiculta, Nov., young fr., *Cuadra B.N.B.F.D. A 1067* (BO, K) et *A 2352* (L, SING) (*langsats, lasot*); Sandakan, Sg. Manila Rd., Aug., fr., *San 21541* (BO) (*langsats*); *ibid.*, Kabili For. Res., June, young fr., *Puasa. B.N.B.F.D. 4853* (BO); Tawau, fr., *Elmer 21836* (BO, L, P, U); Lahad Datu, mile 3, Segama, Febr., young fr., *San 26986* (L) •; Tawau, mile 24, clearing area Cocoa Est., ster., *San 19409* (L); Indonesian Borneo,

Sg. Teputsen, Bukit Maang, fr., *Jaheri* 888 et 994 (BO, K, L); Mt. Njapa on Kelai R. (Berau), alt. 100 m, Oct., young fr., *Kostermans* 213-05 (BO, L); *ibid.*, Telukbajur, alt. 30 m, Nov., young fr., *Kostermans* 21612 (A, BO, C, CANB, G, K, L, P, US); Kelai R. near Long Lanuk, Oct., fr., *Kostermans* 21140 (BO, K, L) (treelet 8 m); W. Kutei, Loa Pukur, alt. 80 m, Aug., fl., *Endert* 243f (BO, K, L); W. Ceram, Kairatu, Gemba, alt. 5 m, June, young fr., *Kuswata & Soepadmo* 97 (A, BO, CANB, K, L, LAE, P, SING); W. NEW GUINEA, Sidai, 65 km W. of Manokwari, ster., *B.W.* 6719 (L).

7. **AGLAIA PSEUDOLANSIUM** Kosterm., *worn. nov.* — Fig. 6

Lansium cinereum Hiern (base) in Hooker f. *Pl. Brit. India* 1: 558. 1875; C. de Candolle, *Monogr. Phaner.* 1: 597. 1878; King in *J. As. Soc. Bengal* 64(2): 81. 1895 (*Materials* 2: 569); Ridley, *Fl. Malay Pen.* 1: 411. 1922; Harms in *Engl. & Pr., Nat. Pfl. fam.*, ed. 2, 19 b 1: 125, 1940. — *Maingay 1908 = Kew Distr.* 33.9 (K).

Tree, up to 15 m high with 7 m clear bole of 25 cm diam. Buttresses short. Bark smooth, brown; outer bark hard, 1.5 mm, living bark pink, soft, 1.5 mm, cambium white. Branchlets and leaf buds densely tawny pubescent; branches glabrous, grey to brown. Leaves with 2—7 alternate folioles; rachis (petiolar part included) 1—10 cm long, densely pubescent, shortly and slightly thickened at base. Leaflets thinly coriaceous to chartaceous, narrowly elliptic to obovate-elliptic, base acute, asymmetric, apex conspicuously, bluntly acuminate, the distal ones up to 3.5 x 9.5 cm, the basal ones ca 2 X 4 cm; upper surface densely, prominulously reticulate, midrib slightly impressed, minutely puberulous, lateral nerves slender; lower surface soon glabrous, except the densely pilose nerves; reticulation prominent, dense, slender; lateral nerves 6—8 pairs, arcuate, prominent; axils with hair-tufts; in between the lateral nerves a secondary, parallel one, which is much shorter. Petiolule 3—4 mm long, densely pilose, slightly thickened at the base.

Spikes axillary, unbranched, up to 10 cm long; peduncles densely, minutely pilose; flowers widely spaced, subsessile, subtended by a comparatively large, up to 4 mm long (basal ones), narrowly ovate, acute bract and smaller bracteoles. Flowers globose. Sepals depressed orbicular, broader than long, about 1 mm long, margin ciliate. Petals ovate, 4 mm long. Anthers included, in two rows; inside of staminal tube ribbed at the base. Ovary adpressed pilose at base with a truncate, cylindrical, large, 5-ribbed, sessile stigma.

Fruit Unknown

Distribution: Malay Peninsula, N. Borneo.

I have not seen the type specimen, but through the courtesy of the Kew Herbarium I received some information.

In the type specimen the leaflets are indeed more or less opposite, but the specimen is poor and only reduced leaves are present. Additional specimens of the same region have alternate folioles.

King described the folioles as having very numerous main nerves, but from the photograph of the type specimen it can clearly be seen, that this is not the case with the lateral nerves.

A character, not mentioned by Hiern and King are the hairy axillary domatia of the lower leaf surface, which occur also in *A. anamallayana*.

C. de Candolle described a short style, this is not present in our specimens.

The epithet *cinereum* is already occupied in *Aglaia* :

MALAY PENINSULA: Kedah, Bukit Sung-kop, ster., *For. Guard* 8954 (BO, K); Selangor, Ulu Gombok For. Res., on ridge, alt. 700 m, Nov., fr., *Kochummen, Kep. Field. N.* 94045 (BO, KEP), distributed as *Aglaia chaudocensis*, fruit are not present in the BO specimen; locality not indicated, May, fl., *Maingay 1908 (Kew Distr.* S39) (K); *Alvins* 2284, fr. Sept. (SING); SABAH (N. Borneo), Sandakan, Bettotan, aslt., 50 m, April, fl., *B.N.B.F.D.* 4659 (BO, K, L); Lahad Datu, Kelumpang, Quarry Hill, Tawau Rd., alt. 170 m, March, fl., *San* 9328 (BO, K, SAN).

8. **AGLAIA KINABALUENSIS** Kosterm., *spec. nov.* — Fig. 7.

Arbor in omnibus partibus glabris, foliis alternantibus pinnatis, foliolis 3, chartaceis utrinque prominulo-reticulatis, ellipticis vel subovato-ellipticis, basi cuneatis apice acuminatis nervis lateralibus 6—7 paribus petiolululis sulcatis vix pulvinatis, spicis axillaribus floribus distantibus, calycibus parvis.

Small tree, glabrous in all its parts, 8—22 m high, 20 cm in diam., bark smooth. Outer bark green, inner yellow, hard; outer wood yellowish. Branchlets glabrous; apex minutely adpressed pilose. Leaves alternate, rachis 7—9 cm long; folioles 3, chartaceous to rigidly chartaceous, elliptical or subobovate-elliptical, 4 x 8.5 to 7 x 15 cm, base cuneate, tapering into the slightly sulcate, slender, ca 2—5 mm long, non-pulvinate petiolule, apex distinctly bluntly acuminate, both surfaces densely prominulously reticulate, midrib and lateral nerves filiformous on upper, glossy surface. Lower surface paler, midrib prominent, lateral nerves ca 7 pairs, arcuate, prominent, secondary nerves (with a few exceptions) not parallel to the lateral nerves.

Spikes axillary, up to cm, few flowered; flowers green-yellowish, sessile; calyx lobes depressed globose (broader than high), 1.5 mm high, acutish, margin slightly fringed. Petals 5, ovate-elliptical, 4—5 mm long,

staminal tube subglobose, slightly shorter than the petals. Anthers 10, included, in two rows. Ovary subglobose, sericeous with a rather large sessile globose, deeply 5-furrowed stigma.

Fruit (of the para-type specimen) globose, 3 cm in diam., very shortly, densely pilose, pale ochre (Meyer).

Type specimen: *Chew, Corner & Stainton 122 (BO)*,

The species is closely related to *A. dubia* from which it differs by the shorter more channeled petiolule, the fewer lateral nerves, the smaller calyx, the different stigma.

The fruiting specimen has slightly thicker leaves (more mature). Some of these leaves show sunken hairy domatia in the axils of the lower surface; these are also vaguely indicated in some leaves of the type specimen.

N. BORNEO, Mt. Kinabalu, Eastern Shoulder, 6° 05' N, 116° 36—40' E, June, fl., *Chew, Corner, Stainton 122- (BO, L, SING)*; Tenom, Crocker Range, Dec, fl., *Mikil San 31916 (L)*; Sarawak: Gunung Gading, Sept., fr., *Daiid & Tachum S.F.N. 36099 (BO, SING)* (distributed as *Styrax*; Tawau, Sept., fr., *San 22883 (BO)* belongs perhaps here.

9. *AGLAIA DUBIA* (Merr.) Kosterm., *comb. nov.* — Fig. 8.

Lansium dubium Merrill (basionym) in Bull. Dept. Inter. Bur. Gvt. Lab. Philipp. 17: 23. 1904; Enum. Philipp. fl. Pl. 2: 368. 1923; W.H. Brown, Minor Prod. Philipp. For., Bull. 22, Dept. Agr. Bur. For. Philipp. 21: 82, fig. 40. 1920; id. 22(2): 304, fig. 40. 1921; Wester, Food pi. Philipp. (Bull. 39, Bur. Agr.), ed. 3: 125. 1924; Elmer, Leaflets Philipp. Bot. 9: 3384. 1937; Li in J. Arnold Arb. 25: 208. 1944 (quoad nomen); Harms in Engler & Prantl, Nat. Pfl. fam., ed. 2, 19 b 1: 125. 1940; How & Chen in Acta phytotax. Sinica 4(1): 27. 1955 (quoad nomen). — *Men-ill 3081*.

Tree or shrub, glabrous in all its parts, the apex of the branchlets and the terminal leafbud excepted (which are minutely adpressed pilose), up to 20 m high and 40 cm in diam. Buttresses up to 3 m high, straight, concave at the base and running up to 5 m out. Wood white, tough and hard (Elmer), odourless, without taste, pith quite large. Bark paperthin, greenish brown or grey, smooth, isabellinus except the skin (Elmer); living bark up to 4 mm thick, fibrous, cambium yellowish. Branchlets slender, dark redbrown (in sicco), smooth. Leaves imparipinnate; rachis 2—10 cm long (the petiolar part, which is shortly pulvinate at base, of 1—3 cm long included). Folioles (2—) 3—5, alternate, chartaceous, glossy, elliptical-lanceolate or obovate-elliptical, 6—13 X 2—5 cm, base tapering,

apex abruptly long-acuminate (acumen up to 1.5 cm long, obtuse), both surfaces prominulously reticulate, midrib on upper surface flush with the surface, lateral nerves filiformous, prominulous; midrib of lower surface prominent, lateral nerves prominulous, up to more than 15 pairs, straight, arcuately anastomosing near the margin. Petiolules 5—10 mm long, slightly sulcate above, not thickened at the base, upper part somewhat winged (decurent leaf margin). Racemes axillary, slender, up to 15 cm long. Flowers sparse, sessile, glabrous, subglobose, 5 mm in diam. Sepals orbicular, 1—2 mm. Petals ovate to obovate, up to 2 x 2.5 mm. Staminal tube 2.5—3 mm high, 1.5—2 mm in diam., mouth ca 1 mm in diam. with 10 less than 0.5 mm long teeth. Anthers in two whorls, the shorter ones (ca 1 mm) included; the longer ones (ca 1.5 mm) slightly exsert, alternating with the teeth of the tube. Ovary ovoid, densely pilose, ca 1 mm high, 3—6 celled; cells with one ovule each. Stigma conical, sessile. Fruit globose or ellipsoid (Elmer), 1.5—2.5 (—4) cm in diam., obscurely, densely pilose; apex with 5 radial grooves; pericarp 0.5—1 mm thick; cells 1—5; seeds large, surrounded by a juicy, white aril (Elmer).

Distribution: Philippines, Borneo, Malay Peninsula.

Vernacular names: Philippines: Aragan (Bik.); Bisik (Sul.); Malakanasi (Bik.); Mamatebabae (P. Bis.); Tulanan (S, L. Bis.); Uban-uban (Bik.); Buahhan (Sul.); Bulahan (P, Bis.); according to Merrill.

The species is aberrant in this group by the non-pulvinate petiolules, although this part is blackish (in sicco). The secondary nerves run more or less parallel to the lateral nerves, which makes the nervation very conspicuous, reminding that of *Calophyllum*. The leaf base is sometimes decurent as far as the dark part of the petiolule.

The *Lansium* spec, mentioned by Merrill in Lingnan Sci. J. 5: 104. 1927 was referred by Li and How and Chen, l.c. to this species. I have not seen the specimens (Lau 25411, 25472), but without fruit or flowers available, I doubt whether this is *A. dubia*. The leaflets in this group may be indistinguishable in different species.

Harms, l.c. 125 still states that there is only one seed.

MALAY PENINSULA: Selangor, Ulu Langsat, Sept., fr., *Phytoch. Survey 1776 (SING)*; PHILIPPINES: Leyte, Dagami, Aug., fl., *Ramos B. Sci. 15220 (BO)*; Basilan Isl., Dec. fr., *Tecson F.B. 24950 (BO)*; Mindanao, Lake Linao, Camp Keithley, June, fl., *Clemens 617 (BO, L, P)*; Luzon, Irosin, Mt. Bulusan, Prov. of Sorsogon, April, fl., *Elmer 15890 (BO)* et Nov., fr., *Elmer 15198 (BO)*; Prov. of Camarines, fr., *Ramos*

1502 (BO), Mt. Bagacay, Nov., fr., *Ramos & Edano B. Sci. 335!* (BO); Cantaduanes, fr., *Ramos & Edano B. Sci. 75270* (SING); Bulacan Prov., Angat, Febr., fr., *Ramos & Edano Bur. Sci. 31,11,3* (SING); Alabat Isl., Dec, fr., *Merrill 10448* (BO); N. BORNEO (Sabah): Lahad Datu, alt. 80 m, Kalumpang Tawau Rd., mile 16.5, Sept., buds, Saw 29812 (BO, L); Membalau For. Res., Aug., fl., *Singh San 22820* (L); Kelumpang Belong, alt. 80 m, June, young fr., *Abubakar San 18519* (L); Semporna, Palau Gaja, June, fl., *Singh San 203,11* (L); Lahad Datu, Block 43, Bagakak, April, fl., *Howroyd San 29364* (L); Merotai Besar, Sept., buds, Saw 31284 (L, SING); Lahad Datu, Compt. 9 Brit. N. Borneo Timber Co, alt. 70 m, May, fl., *Wood San A 4836* (L); *ibid.*, alt. 150 m, May, fl., *Tahir San 29673* (L); Sandakan, Sepilok, Djalan Hudjong Tandjong, Nov., buds, *San 28,359* (L); Sample plot 11, Brit. N. Borneo Timber Co, 60 miles W.S.W. of Sandakan, Dec, buds, *Wood San A 3995* (L, SING); Sarawak: Kuching, Semengoh For. Res., alt. 100 m, April, fr., *S. 14628* (L, SING); INDONESIA BORNEO: Nunukan Isl., Nov., young fr., *Meyer 2089* (BO, K, L); *ibid.*, ster., *Paymans 112* (BO, K, L). I am not quite sure whether some of these specimens should not be referred to *Aphanamixis humile*, especially the one of the Malay Peninsula.

10. **AGLAIA KOSTERMANSII** (Prijanto) Kosterm., *comb. nov.* — Fig. 9.

Lansium kostermansii Prijanto (basonym) in Reinwardtia 7: 63, fig. 1965. — *Kostermans 19117* (BO).

Tree, up to 30 m tall and up to 40 cm in diam. Bark pale yellowish, ca 0.5 mm thick; living bark ca 3 mm thick. Branchlets slender, smooth, glabrous (young branchlets sparsely pilose, glabrescent). Leaf rhachis up to 24 cm long (the 3 cm long, pilose, petiolar part included), base pulvinate. Folioles 3 or 5, alternate or sub-opposite, chartaceous to submembranaceous, ovate-oblong or elliptical, 8–15 X 3.5–6 cm, base cuneate, apex acute, upper surface smooth, glabrous, midrib straight, impressed, lower surface sparingly pilose, midrib prominent, pilose, lateral nerves slender, 6–10 pairs, prominulous, arcuately anastomosing towards the margin, secondary nerves obscure, prominulously reticulate; tertiary nerves inconspicuous; petiolule ca 15 mm long, slightly pulvinate at base. Flowers unknown.

Fruit bearing racemes simple, axillary, solitary, laxly pilose, glabrescent 6–20 cm long, slender. Persistent sepals rotundate, glabrous, ciliate at the margin, 0.5–0.8 mm in diam. Fruit globose, velvety (very short hairs), up to 3 cm in diam; 4–5-celled; pericarp 1.5–2 cm thick, leathery, the partitional septa subcoriaceous. Seed one per cell, 1.5–2.5 cm long, 1.5–2 cm in diam., testa chartaceous, completely covered with a dirty white, half transparent, sweetish, edible aril; only one to three seeds developing, the remaining compartments filled with aril only.

Distribution. —• W. Sumbawa, W. Flores, submontane.
Vernacular name — Kaju (= tree) narah (W. Sumbawa).

Close to *A. dubia*, from which it differs by the shape of the folioles and the indumentum of the fruit.

E. INDONESIA, W. SUMBAWA: Mt. Batulante, rivergorge N. of Batudulang, alt. 500 m, young fr., *Kostermans 18188* (BO); *ibid.*, May, young fr., *Kostermans 18657* (A, BO, CANB, G, K, L, LE, P, US); trail from Batudulang to Pusu, alt. 800–900 m, Oct., fr., *Kostermans 19067* (BO, G, PNH, SING); trail from Batudulang to Punik, alt. 700 m, Oct., fr., *Kostermans 19109* (A, BO, K, L); rivergorge near R. Lit, near Batudulang, alt. 500 m, Oct., fr., *Kostermans 19117* (BISH, BM, BO, C, CAL, K, L, NY, PNH, SING); rivergorge near Batudulang, alt. 600 m, Nov., fr., *Kostermans 19215* (A, BISH, BM, BO, C, LE, NY, PNH, SING, SYD); Sumbawa Kuta, alt. 850 m, June, young fr., *bb. 10321* (BO, L, U); W. FLORES (Manggarai), S. part of Mt. Ndeki, moist valley, 300 m, April, fr., *Kostermans & Wirawan 218* (A, BO, L); C. part, Manau near Ruteng, alt. 1000 m, Apr., fl., *Kostermans & Wirawan 621* (A, BO, L).

11. **AGLAIA ANAMALLAYANA** (Bedd.) Kosterm., *comb. nov.* — Fig. 10.

Lansium anamallayanum Beddome in Madras J. Sci., Ser. 3, 1: 40. 1864 (*anamallaiense*); in Trans. Linn. Soc. 25: 212. 1865; Fl. Sylv. t. 131. 1871; Icon. Pl. Ind. or. t. 104. 1874; Hiern in Hooker f., Fl. Brit. India 1: 558. 1875; C. de Candolle, Monogr. Phaner. 1: 597, t. 7, f. 11. 1878; Harms in Engler & Prantl, Nat. Pfl. fam. 3(4): 296. 1896; ed. 2, 19 b 1: 125. 1940; Woodrow in J. Bombay Nat. Hist. 11: 269. 1879 (nomen); Talbot Trees Bombay 40. 1894 (*anamallayanum*); ed. 2: 77. 1902 (*anamallayanum*); For. Fl. Bombay 1: 237. 1909; Brandis, Ind. Trees 144. 1906; Cooke, Fl. Bombay 1: 210. 1903; ed. 2, 1: 223. 1958; Gamble, Fl. Madras 1: 182. 1915; ed. 2, 1: 130. 1957, — *Beddome s.n.* (K).

Tree. Branchlets smooth, glossy with narrow, slender, small, pale lenticels, at apex minutely, densely, pale brown pilose. Leaf rhachis (petiolar part included) 10–17 cm long, glabrous. Folioles alternate, 5–7, per rhachis, chartaceous to thinly coriaceous, elliptical to subovate- or subobovate-elliptical, the apical ones up to 6 x 16 cm, the basal ones 4 x 11 cm, base unequal, cuneate, somewhat decurrent, apex distinctly, very broadly and bluntly acuminate, glabrous or often with hairy domatia in the axils of the lateral nerves of the lower leaf surface, both surfaces glossy and densely, prominulously reticulate, midrib flattened on the upper, prominent on the lower surface; lateral nerves 7–10 pairs, arcuate, slender, prominulous on both surfaces. Petiolules 5–7 mm long, flat above, hardly pulvinate. Spikes axillary, unbranched, one or two together, glabrous or slightly, minutely, pulverulently puberulous, 5–7 mm long. Flo-

wers widely spaced, sessile, subglobose, subtended by a minute, fimbriate bract and bracteoles. Sepals broadly ovate-orbicular, obtuse, glabrous, ca 1 mm long, often broader than long, margin ciliate. Petals ovate-elliptical, obtuse, 3 mm long. Staminal tube globose-subcylindrical, as long as the petals with a wide orifice, of which the margin is almost entire. Anthers large, in two rows, not protruding, obtuse. Ovary densely tomentose with a sessile, knob-like, subcylindrical stigma.

Fruit as big as a large grape, oblong (Hiern); 1.7 cm long (Brandis); 2-celled, 2-seeded (Cooke).

Distribution: Western Indian Peninsula, common in the moist woods of the Anamallay Hills and in Wynaad; abundant on the

Vernac. name: Santhana Viri (Tarn.), Vandakamin, Telya (W. Ghats); Thevathali (Travancore Hills).

Beddome does not mention the hairy domatia; in some leaves they are absent. In the specimens examined the stigma is not trilobed as mentioned by Beddome. Although Beddome called the species originally *anamalaiense*, he changed later this name himself.

Specimen examined: INDIA, Hoolicul, S. Kanara, Febr., fl., *Bhive 43* (BO).

12. *AGLAIA SEPALINA* (Kosterm.) Kosterm., *comb. nov.* — Fig. 11.

Lansium sepalinum Kostermans in Reinwardtia 7: 31, fig. 12. 1965 — Jacobs

Treelet, 4 m tall; branches grey, longitudinally wrinkled (in sicc); branchlets rather stout, densely, minutely pale brown tomentellous. Leaf rhachis up to 17 cm long, densely, minutely pilose; petiolar part ca 5 cm. Foliolles 9, alternate, chartaceous to sub-membraneous, lanceolate to narrowly elliptical or subobovate-lanceolate (apical one), 8 x 22 cm (apical one) to 3 x 8 cm (basal foliole), base acute or rounded, often asymmetric, apex shortly to conspicuously acuminate, both surfaces glossy, prominently reticulate, upper surface glabrous, midrib pilose, slightly impressed, lower; surf ace sparsely pilose, glabrescent, midrib prominent, lateral nerves 8--12 pairs, prominent, arcuate. Betiolule densely pilose, 2- 5 mm, base

Spikes behind the leaves on old wood, densely, minutely, pale brown pilose, up to 20 cm long. Florets remotely, alternately arranged, very shortly pedicelled; base of the pedicel with a minute, ovate, acute, pilose bract. Sepals ovate to depressed orbicular, obtuse, concave, 2 mm, densely pilose. Petals orbicular, glabrous, 3 mm. Staminal tube 2 mm, globose with almost entire, wide orifice. Anthers 10 in one row, slightly exsert (before anthesis closing the orifice). Ovary densely pilose, style short, thick, cylindrical, angular, 1 mm, glabrous, broadening towards the apex, truncate.

Fruit globular, 2—2.5 cm in diam., densely, velvety tomentellous, one-seeded by abortion; persistent sepals orbicular, 4 mm, densely pilose.

N. SUMATRA, Tapanuli, Sopsopan on Aek Si Olip, Sept., buds, *Rahmal Si Toroes 5438* (L) et fl., 53.91 (L); C. Sumatra, W. side of Mt. Tudjuh, 1° 40' S, 101° 20' E., alt. 1400—1600 m, Aug., fr., *Jacobs U56* (A, K, L, SING).

13. *AGLAIA INTRICATORETICULATA* Kosterm., *spec. nov.* — Fig. 12.

Arbor parva glabra foliis alternantibus magnis irnparipinnatis foliolis chartaceis oppositis ovato- et obovato-ellipticis acuminatis utrinque dense intricatoque scalariforme reticulatis, nervo media/no supra, impressa, petiolo sulcato, infructescentia parva, fructus ellipsoideo-globosus sepalibus minutis triangularibus glabris vel pilosis.

Tree, 4—5 m tall, glabrous in all its parts. Leaves spirally arranged, rhachis up to 23 cm long, cylindrical, pulvinate at base; folioles 5 or 7, opposite or alternate, chartaceous, the basal pair ovate, 11 x 19 cm with obtuse base, the apical ones broadly obovate-elliptical, up to 13 X 30 cm, base cuneate; all folioles shortly acuminate, both surfaces glossy, densely, prominulously, parallelly reticulate, midrib sulcate on upper, prominent on lower surface, lateral nerves 15—22 pairs, erect-patent, rather straight, near the margin arcuate; petiolules 1.5—2 cm, not pulvinate, sulcate above.

Infructescence 3 cm long, axillary, glabrous, with a few simple, very short ramifications at its base. Fruit almost sessile, glabrous, ellipsoids globose to ellipsoid, up to 3 cm long; persistent sepals triangular, 1 mm, glabrous; seeds two, cotyledons above each other; seed arillate.

Type: *Burkill 6400 a* (SING)

The reticulation resembles that of *A. oligophylla* Miq. and *A. maithewii* (fiiMerr.), but the leaves are larger with far more lateral nerves; the fruit is moreover glabrous. By its simple hairs it differs from *A. matthewsii*.

which has stellate hairs (the scalariformous reticulation is found in a Bornean species of *Chisacheton*).

In the specimen *Alvins* s.n., the persistent sepals seem to be minutely adpressed pilose.

In subgenus *Lansium* the species is aberrant by its opposite folioles.

MALAY PENINSULA: Malacca, Sept., fr., *Alvins* s.n. et ster., *Alvins* 2219 (SING); Pekin Pahang, Febr., fr., *Forest Guard* 165-38- (SING); Negri Sembilan, Gemas, Sept., fr., *Burkill* 6400 a (SING).

14. **AGLAIA MEMBRANACEA** Kosterm., *spec. nov.* — Fig. 13.

Arbor in omnibus partibus glabris (gem/mis minutissime adpresse pilosis exceptis) foliis alternantibus foliolis alternantibus vel suboppositis membranaceis imparipinnatis ovato usque ad obovato-silpticis basi acutis saepe obliquis apice conspicue acuminatis petiolulis distinctis pulvinatis; infructescentia parva racemiforma ad ramulis defoliatis dispositis, fructus ellipsoideus vel subglobosis minutissime perdense pilosis pedicellis brevis sepalibus parvis glabris.

Tree, glabrous in all its parts (except the minutely, adpressed pilose leafbuds), 6—30 m tall, diam. 6—30 cm; wood yellow, outer bark 0.5 mm, light ochre yellow, inner bark 2—3 mm, greenish yellow to light whitish yellow, cambium brown; sapwood light yellow, wood yellow. Branchlets (*In sicco*) finely, longitudinally wrinkled, grey; foliar buds with simple hairs. Leaves spirally arranged; rachis up to 15 cm long, slender, cylindrical, grey. Folioles 5, alternate or opposite, thinly chartaceous, the lower ones ovate, 5—6 x 10—13 cm, the apical one obovate-elliptical, up to 10 X 20 cm, base cuneate, apex conspicuously acuminate, both surfaces densely, prominulously reticulate, midrib on upper surface very slender, prominulous, on the lower surface thicker, prominent; lateral nerves 6—10 pairs, erect-patent, curved near the margin, prominent on the lower, prominulous on the upper surface. Petiolules 10—15 (—20, apical foliole) mm, flat or somewhat sulcate above, pulvinate at base.

Infructescence in the axils of fallen leaves, racemiformous, up to 6 cm long. Fruit ellipsoid to subglobose, up to 4 cm long on a 2 mm long, thick pedicel; persistent sepals broader than long, acutish, 1.5 x 1 mm; seed one or more, arillate.

Typus: *Meyer* 4922 (L).

The leaves resemble strongly those of *A. dookoo*, but are thinner, the fruit are much larger than those of *A. dookoo* and the infructescences are semi-ramiflorous,

I once bought in the market of Padang (W. Sumatra) a fruit which might have belonged to this species; it was up to 5 cm long and had a thin, very acid arillus.

W. SUMATRA, Pajakumbuh, Mt. Sago near Haleban, alt. 800 m, April, fl., *Meyer* 4922 (L); *ibid.*, Hutan ladang gambir, Batubadinding, June, fr., *Marad(o)* 12 (L).

15. **AGLAIA CHARTACEA** Kosterm., *spec. nov.* — Fig. 14.

Frutex ramulis glabris foliis alternantibus foliolis sub-paripinnatis suboppositis vel alternantibus chartaceis glabris ellipticis basi subobtusis apice acuminatis utrinque dense prominulo-reticulatis petiolulis distinctis subpulyinatis, pilosis glabrescentibus.

Pseudo-racemis ramifloris dense minute ferrugineo-pilosis (pilis simplicibus), brevis; fructibus subsessilibus globosis dense minutissime ochraceo-pilosis.

Shrub, 3 m.; branchlets glabrous, smooth. Leaves spirally arranged, rhachis up to 26 cm long, cylindrical, longitudinally grooved (*in sicco*), glabrous. Folioles 6, subopposite or alternate, glabrous, thinly chartaceous, elliptical or ovate-elliptical, up to 11 x 30 cm (the lower ones 5 X 13 cm), base contracted into the petiolule, apex conspicuously acuminate, both surfaces conspicuously prominently reticulate, upper surface glossy, midrib slender, prominulous in a groove, lateral nerves filiformous; lower surface more dull, midrib strongly prominent, lateral nerves ca 10—15 pairs, erect-patent, slightly arcuate, near the margin arcuate; petiolules densely pilose, glabrescent, 10—20 mm, sulcate above, slightly pulvinate.

Infructescences below the leaves, pseudo-racemiformous, densely, minutely rusty pilose, up to 8 cm long. Fruit sessile, globose, densely, minutely rusty ochraceous pilose, 2.5 cm in diam.

Typus: *Van Steenis* 6455 (BO)

The species was already collected by Korthals in 1833. Two sheets of his collection are in Leiden (one was erroneously labelled: Java). This demonstrates how badly Sumatra's flora is known, as, according to Van Steenis the species is common.

The infructescence are pseudo-racemes, the main peduncle bears remotely up to 2—4 mm long ramifications, which in turn have obscure, very short, few branches.

The specimens of Korthals were identified by Adelbert as *Lansium domesticum*, which they are certainly not (sub-opposite folioles with obscure pulvination, branched infructescence on the branches).

SUMATRA, locality not indicated, fr., *Korthals s.n.* (L), two sheets; Atjeh, slope of Bur ni Geredong, alt. 1600 m, common, Sept., fr., *Van Steenis 6455* (BO); Priaman, ster., *Diepenhorst s.n.* (BO).

SPECIES EXCLUDENDAE

1. *Lansium decandrum* (Roxb.) Briquet

Lansium decandrum (Roxburgh) Briquet in Mém. Inst. Nat. Genève 24: 70. 1935. — *Aglaia deeandra* Wallich in Roxburgh, Fl. Ind., ed. Carey 2: 427. 1824; Wight & Arnott, Prodr. 1: 119. 1834; Hiern in Hooker f, Fl. Brit. India 1: 562. 1875; Prain in Rec. bot. Survey India 234. 1898; Brandis, Ind. Trees 144 et 703. 1909. — *Sphaerosacme deeandra* Wallich, Cat. no 1276. 1829; Hiern, I.e. — *Amoora deeandra* (Roxb.) Hiern, I.e. 562; C. DC, Monogr. Phan. 1: 588. 1878; King in J. As Soc. Bengal 64 (2): 51. 1895. — ? *Sphaerosacme fragrans* Wallich, I.e. 429; Voigt, Hort. suburb. Calc. 135. 1845; Hiern, I.e. 562. — *Lansium spec.*, Wight & Arnott, Prodr. 1: 199. 1834; Bentham & Hooker f, Gen. PL 1: 334. 1862; Hiern, I.e. 562; C DC, I.e. (*Lansium*).

King (I.e. 51) thought that *Amoora deeandra* was nearer to *Lansium*, than to *Amoora* because of the 10 anthers in two rows and the 5-celled ovary and fruit; he did not make the transfer to *Lansium*.

The species has opposite oblique folioles, a 3—5-celled ovary, an apparently dehiscent capsule and male flowers in a panicle, consisting of racemes, the female ones in a simple raceme.

This points to *Aphanamixis*; the 10 anthers in two rows are unusual, but this is no reason to exclude it from that genus.

Aphanamixis deeandra (Roxb.) Kosterm., *comb. nov.* (basionym: *Aglaia deeandra* Wallich).

I am not sure whether *S. fragrans* is this species or *Amoora cucullata*.

2. LANSIUM HUMILE Hassk.

Lansium humile Hasskarl, Hort. Bogor. descript. sive Retziae 1: 121. 1858; Flora 6, Beibl. 2: 94. 1823; Miquel, Fl. Ind. bat. 1(2): 545. 1859; Suppl. Sumatra 197. 1860; in Ann. Mus. bot. Lugd. bat. 4: 34. 1868 (excl. cit. *Lansium domesticum*, var. *Kdkosan* Zipp.); C. DC, Monogr. Phan. 1: 598. 1-878; Koorders & Valetton, Bijdr. Kennis Booms. Java 3 in Meded. Pl. tuin Buitenzorg 16: 183. 1896 (excl. cit. *L. cinereum* Hiern); Hochreutiner, PL Bogor. exsicc. 74. 1904; Backer, Schoofl. Java 215. 1911; Koorders-Schumacher, Syst. Verzeichn. 1(1), Fam. 140: 30. 1911; Koorders, Exkurs. Fl. Java 2: 443. 1912; Suppl. Fl. N.O. Celebes 1(1): 26. 1918; Adelbert in Backer, Bekn. Fl. Java (emergency Ed), Fam. 148: 20. 1948, Backer & Bakh. v.d. Brink, Fl. Java 2: 125. 1966. — *Hasskarl s.n.*

The species was described after a living plant, growing in the Bogor botanical Garden and originating from Sumatra; Hasskarl mentioned also a specimen from Mt. Salak in W. Java.

Material collected from the Garden's Number III B. 47 in 1904, was considered by Valetton and Hochreutiner to be from the original stock, although Hasskarl's species had already disappeared; now the number III B 47 is also gone.

In the specimens, enumerated below, the male inflorescences consist of panicles of racemes. The material, collected by Koorders' assistant, on the island of Nusakambangan (C. Java) has fruiting branches, which are simple racemes. The mature fruit (Koorders 3969), preserved in alcohol in Bogor are globose, 6 cm and more in diam. with a thick, glabrous skin, completely dehiscent and have 5 large seeds, of which the aril is inconspicuous or wanting.

This fruiting material was unknown to Koorders & Valetton at the time, that they made their description. Later Koorders (Suppl. Fl. N.O. Celebes) made a remark, that because of the dehiscent fruit, *L. humile* should be excluded from *Lansium*. This remark was overlooked by Adelbert (I.e.).

Hasskarl had described a young fruit with a leathery skin, warty above the middle and with 5 short radial ribs near the top. Although he said nothing about dehiscence the 5 radial ribs point in that direction. The male and female inflorescences and the typical fruit should place this species in *Aphanamixis*, although it differs by the 5 petals and the 10 stamens; together with *Aphanamixis deeandra* it should form at least a section of *Aphanamixis*, or a separate genus, depending on the trend of a future classification of *Meliaceae*.

Aphanamixis humile (Hassk.) Kosterm., *comb. nov.* (basionym: *Lansium humile* Hasskarl).

SUMATRA: Indragiri, Muara Pedjangki, ster., 66. 27445 (BO, L); W. coast, Sidjundjung, ster., 66. 9114 (BO); W. Java, Tjiampea near Bogor, ster., *Koorders 301,80* (BO), rather narrow leaflets; Palabuanratu, southcoast, Sukabumi Distr., *Koorders 9904*. (BO, L); Banten, Mt. Karang near Pandeglang, ster., *Koorders 7573* (BO, K, L); Central Java, Banjumas Distr., Isl. Nusakambangan, fr., *Koorders 24660* (BO, K, L); April, fr., *Koorders 39691* (BO, L); Aug., fl., *Koorders 22253* (BO, L); ster., *Koorders 22012* (BO, K, L, P); culta in Hort. Bogor sub III B 35 (BO, L), fl. (*Hochreutiner*, Fl. Bogor. exsicc. 160); sub III B 1,7 (BO), ster.; INDONESIA: BORNEO: Isl. Nunukan, Nov., fl., *Meyer 2271* (A, BO, K, L); 2178 (A, BO, K, L, LAE, NY, P, PNH, SING, SYD); Dec, fl., *Kostermans 89U* (A, BO, BRI, CAL, CANB, KEP, L; LAE, P, PNH, SAN, SING, SYD); E. Kalimantan: Kelindjau R., June, young fr., *Kostermans 9574* (A, BO, BRI, K, L, P, SING); Menta Avto' R., near-Balikpapan, July.

fl., *Kostermans* 9803 (A, BO, K, L, PNH, SING); S. Kalimantan: Puruktjahu, alt. ftfl m, ster., bb. 10161 (BO); uncertain: Sumatra, Palerrtbang Distr. Semangus, ster., bb. 317J,5, 3,1751, \$203U (A, BO, L) (these may be *A. dubia*).

3. LANSIUM MONTANUM [Rumph.] Jack

Lansium montanum [Rumphius, Herb. Amboin 1: 154, t. 56. 1742] Jack in Trans. Linn. Soc. 14(1): 117. 1825; Royle, III. Bot. Himal. 1: 140. 1839; Steudel, Nom., ed. 2, 2: 8. 1841; Roemer, Syn. Monogr., Hesper. 126. 1846; Merrill, Interpr. Rumph. Herb. Amboin. 311. 1917.

Jack referred Rumphius' species to *Milnea (montana)* Jack; Roemer to *Selbya (montana)* Roem.; Teijsmann, quoted by Hasskarl (Neue Schluessel 20. 1866), considers it to be a species of *Aglaia* and this disposition is accepted by Merrill, although the latter does not exclude the possibility of it being a small-flowered *Dysoxylum*.

4. LANSIUM PEDICELLATUM Hiern

Lansium pedleellatum Hiern (non Kosierm.) in Hooker f, Fl. Brit. India 1: 55S. 1875; C. DC., Monogr. Phan. 1: 597. 1878; King in J. As. Soc. Bengal 64(2): 82. 1895; Ridley, Fl. Malay Pen. 1: 411. 1922. — *Maingay* 3U06, *Ketv Distr.* 356 (K).

King, who saw two specimens remarked that there was nothing to connect this species absolutely with *Lansium*.

In consider the species to belong to *Aglaia* (section with scales and? monosexual flowers) and hence it is renamed here: *Aglaia pedicellata* (Hiern) Kosterm., comb. nov. (basonym: *Lansium pedicellatum* Hiern.).

5. LANSIUM SILVESTRE Rumph.

Lansium silvestre Rumphius, Herb. Amb. 1: 153, t. 55. 1742; Loureiro, Fl. Cochinch. 272. 1790 (quoad nomen tantum; species est *Clausena punctata* (Lour.) W. & A.); Roemer, Hesper. 99. 1846; Hasskarl, Neue Schluessel 20. 1866 (under *Aglaia*); Merrill, Interpret. Rumph. Herb. Amboin. 310. 1917.

This represents *Aglaia silvestris* (Roemer) Merrill.

6. AGLAIA JANOWSKYI Harms

Harms (in Engl. bot. Jahrb. 72: 176. 1942) based his description on the specimen Janowsky 415 of which a duplicate is in Bogor. The species has simple hairs, but there are only 3 petals; together with the charac-

teristic of racemes makes it evident that this does not belong in *Aglaia*. I transfer it here to *Amoara* as *A. janowskyi* (Harms) Kosterm., comb. nov. (basonym: *Aglaia janowskyi* Harms).

List of Collector's numbers

The number after — refers to the number of the species in the text.

A 78 = 5; A 134 = 5; Abubakar San 18519 = 9; Achmad 553 = 5; 1156, 1272 = 2; 1397 = 5; 1526 = 2; 1592 = 5; Alvarez F. B. 12926 = 1; Alvins 470 = 5; 2219 = 13; 2284 = 7; s.n. = 13;

Backer s.n. = 4; s.n. = 5; Bakhuizen 6911 = 5; Barnes F. B. 59 = 1; bb. 4353, 4524, 6491 = 5; 9114 = *Aphanamixis humile*; 9783, 10034 — 10037 = 5; 1016 = *Aphanamixis humile*; 10321 = 10; 10454 = 5; 22062 = 6; s.n. = 4; s.n. = 5; 27445, 31745, 31751, 32034 = *Aphanamixis humile*; Beddome s.n. = 11; Beguin 564 = 5; Bhive 43 = 11; Blume s.n. = 6; B.N.B.F.D. 4659 = 7; 4853, 5243 = 5; Boot 4091 = 4; Borden F.B. 2060 = 1; Burkill 6400a = 13; Burkill & Haniff 14010 = 6; 17616 = 5; B.W. 6719 = 6;

Cel/IV-173—176, Cel/V-235 = 6; Chew, Corner & Stainton 122 = 8; Clemens 617 = 9; Cuadra B.N.B.F.D. A 1067 et A 2352 = 6; Cultra III B 6 = 4; III B 35 et III B 47 = *Aphanamixis humile*; III C 4 = 4; III E 39 = 6; XI B VIII 202 = 5; XI B 281 = 5; Curtiss 2767 = 5;

Daud & Tachun S.F.N. 36099 = 8; De Vriese s.n. = 5; Diepenhorst H.B. 1326 = 4; s.n. = 15;

Elbert 3761 = 3; Elmer 6332, 6766, 11211 = 6; 13285 = 5; 15198, 15890 = 9; 21737, 21742 = 5; 21836 = 6; 21863 = 5; Endert 2432 = 6;

For. Guard 8954 = 7; 16538 = 13;

Goodenough 1378 = 5; Griffith s.n. = 5;

Hallier 2783, s.n. = 5; Hamid 4971 = 4; Haniff 15851 = 6; Henderson-10730 = 5; Hochreutiner 159 = 4; 160 = *Aphanamixis humile*; Holttum 10907, 37354 = 5; Hossuet s.n. = 6; Howroyd San 29364 = 9;

Iboet 135, 240 = 4;

Ja 1221, 1700 = 5; 1934 = 6; 3950, 4242 = 4; Jacobs 4456 = 12; Jaheri 888, 994 = 6; Janowsky 415 = *Amoara janowskyi*; Junghuhn 27 et 272 = 4; s.n. = 5;

Kalong 20463 = 5; King's Coll. 7457 = 5; 7657 = 2; 10803 = 5; Kochummen Kep. F.N. 94045 = 7; 99015 = 5; Koorders 5127 = 4; 5145 et 5146 = 6; 7569 = 5; 7573, 9904 = *Aphanamixis humile*; 10379 = 4; 19703 = 6; 19713 = 1; 22012, 22253 = *Aphanamixis humile*; 22436 = 6; 23439, 23834 (2932) = 5; 24660 = *Aphanamixis humile*; 30478 = 6; 30480, 39691 = *Aphanamixis humile*; 42237 = 4; 47702 = 6; s.n. = 6; s.n. = 4; s.n. = 8; Korthals s.n. = 4; s.n. = 15; Koster B.W. 1094 = 1; Kostermans 54 A = 5; 622S = 2; 8944, 9574, 9803 = *Aphanamixis humile*; 18243, 18269, 18311 = 3; 18188, 18657, 19067 = 10; 19087 = 3; 19109, 19117 = 10; 19195 = 3; 19125 = 10; 21305, 21140, 21612, 22065 = 6; s.n. = 4; Kostermans & Wirawan 218, 621 = 10; Kunstler 7657 = 5; Kuswata & Soepadmo 97 = 6;

Maingay 1908 (Kew Distr. 339) = 7; 3406 (Kew Distr. 356) = *Aglaia pedicellata*; Maradjo 12 = 14; Merrill 3081 = 9; 3149 = 1; 10448 = 9; Spec. Blanco 53 = 6; Meyer 2089 = 9; 2178, 2271 = *Aphanamixis humile*; 4922 = 14; 5098 = 2; San 21541 = 5; Mikil San 3196 = 8; Motley 685, p.p. = 6;

- Noerhadi s.n. = 4; s.n. = 6;
 Ochse s.n. = 5; Osbeck s.n. = *Dysoxylum parasiticum*;
 Paymans 112 = 9; Perrotet s.n. = 6; Phytochem. Survey 884 = 5; 1776 = 9;
 Ploem s.n. = 4; Puasa B.N.B.F.D. 4853 = 6; Purseg-love et Sha P. 4643 = 4;
 Rahmat Si Toroes 5391, 5438 = 12; Ramos 1502 = 9; Ramos B. Sci. 15220 = 9;
 89381 = 1; Ramos & Edano B. Sci. 33899 et 34143 = 9; Reinwardt s.n. = 4; s.n. =
 6; s.n. = 5; Ridley 7390a, 7390, 8256, 10822, s.n. = 5;
 S. 14628 = 9; San A 1629, 19409, 21541 = 6; 22833 = 8; 26986 = 6; 27279 =
 5; 28359 = 9; 29328 = 7; 29812 = 9; 31284 = 9; 31916 = 8; 34416 = 5; Sinclair
 s.n. = 5; Singh San 22820 et 26311 = 9;
 Tahir'San 29673 = 9; Tecson F. B. 24950 = 9; Teijsmann & De Vriese s.n. = 6;
 Valeton 1 = 4; Van Steenis 3444 = 2; 6455 = 15;
 Williams 3076 = 6; Woerjantoro 104 = 5; Wood San A 3995 et 4836 = 9; Wray
 3951 = 5; Wyatt Smith Kep. 76184 = 5;
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Fig. 1. — *Aglaia reinwardtiana* Kosterm. — After Ramos B. Sci. 39381 (BO).



Fig. 2. — *Aglaia steenisii* Kosterm. — type specimen.

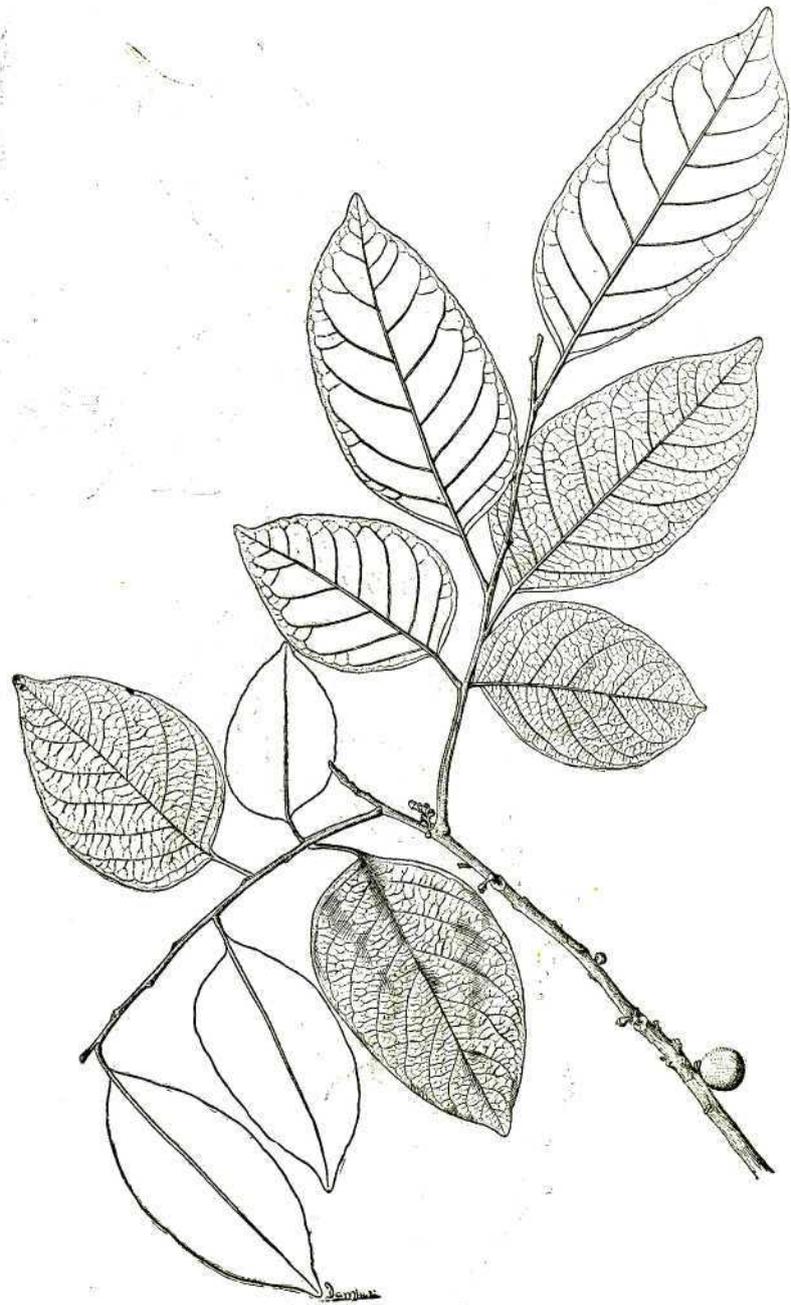


Fig. 3. — *Aglaia breviracemosa* Kosterm. — After Kostermans 18311 (BO).

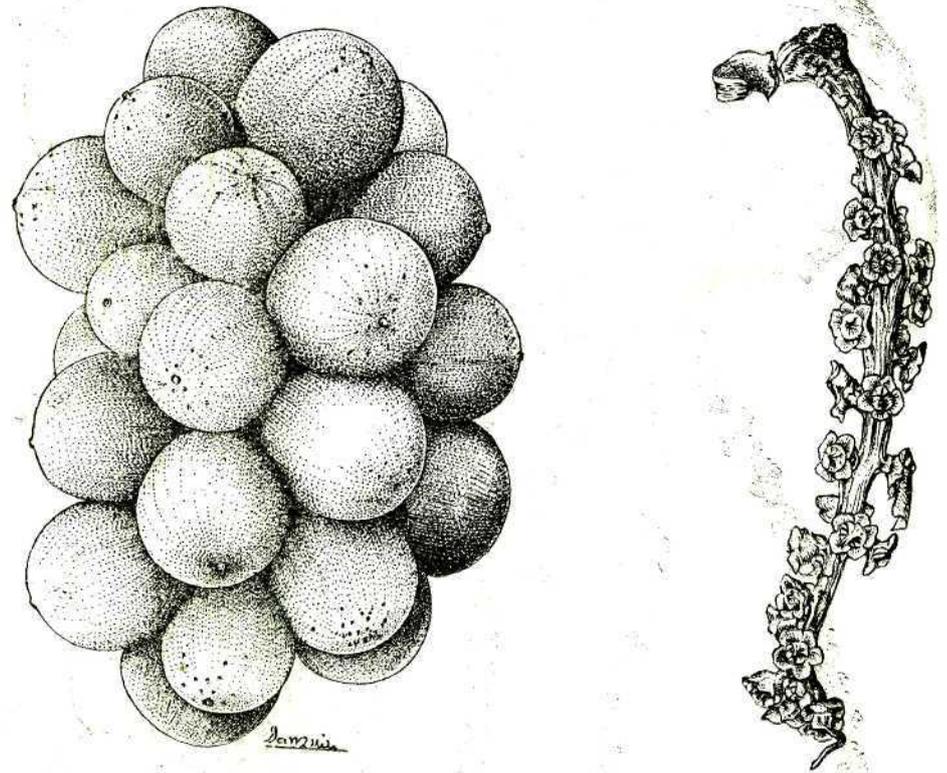


Fig. 4. — *Aglaia aquea* (Jack) Kosterm.

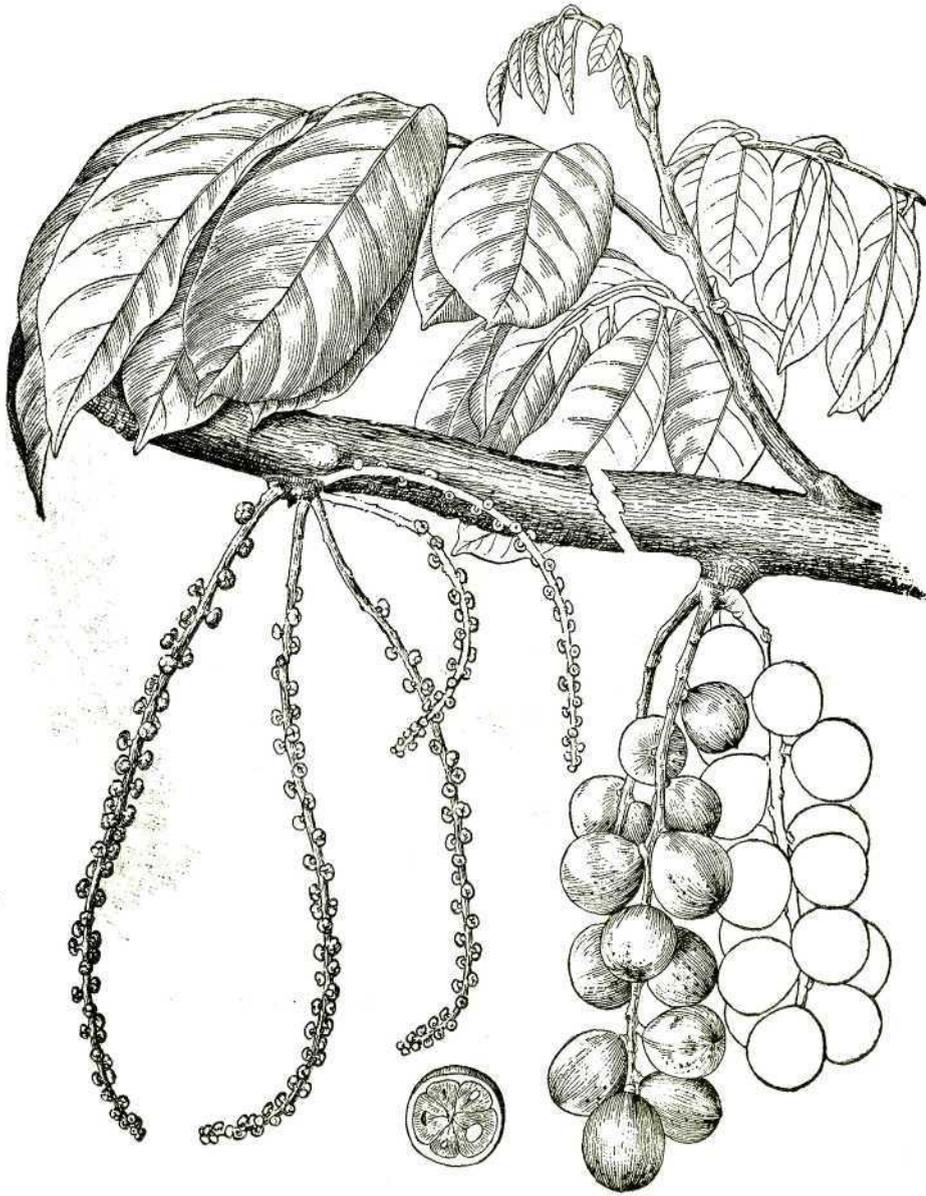


Fig. 5a. — *Aglaia duokkoo* Griff. — After Ochse, Ind. Vruchten.

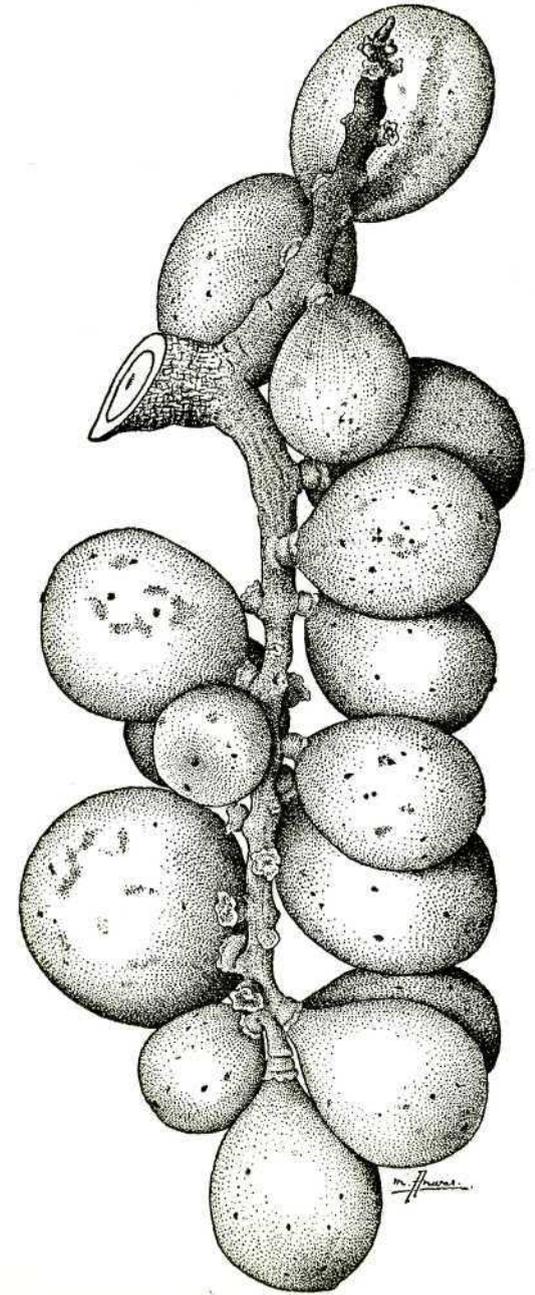


Fig. 5b. — *Aglaia dookkoo* Griff.



Fig. 6. — *Aylaia pseudolansium* Kosterm. — After San 29328.



Fig. 7. — *Aglaiia kinabaluensis* Kosterm. — After Chew et al. 122 (BO), fruit after S.F.N. 36099 (BO).



Fig. 8. — *Aglaia dubia* (Merr.) Kosterm.; after Ramos Bur. Sci. 1502 (BO)

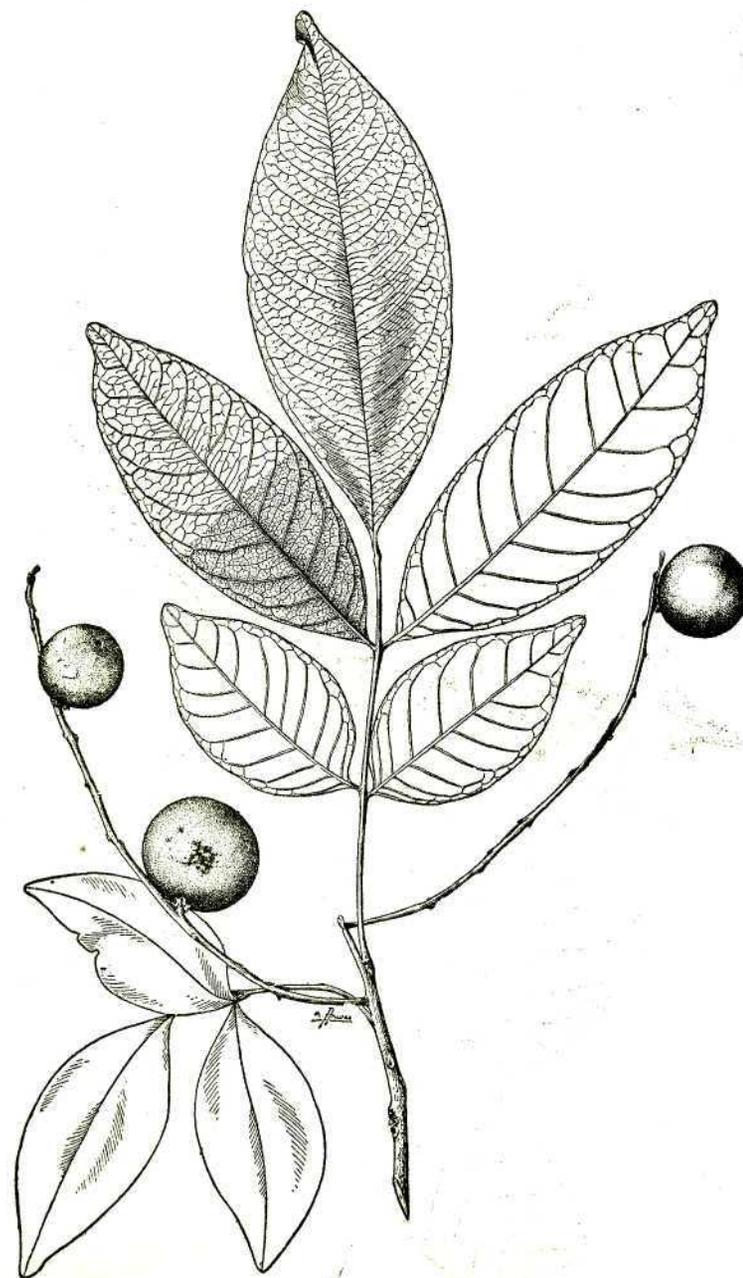


Fig. 9. — *Aglaia-kostermansii* (Prijanto) Kosterm. — After Kostermans 19117 (BO).

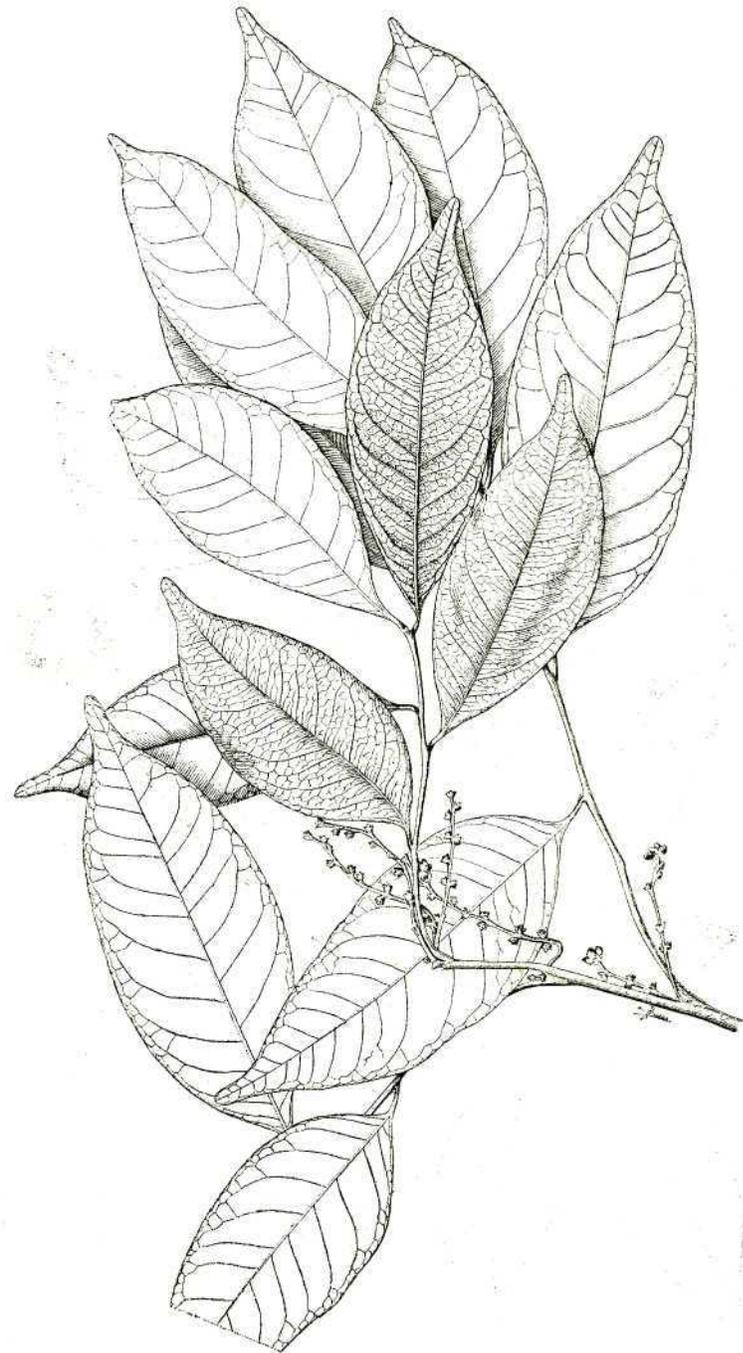


Fig. 10. - *Aglaia ananiallayana* (Bedd.) Kosterm. — After Bhiva 43 (BO).

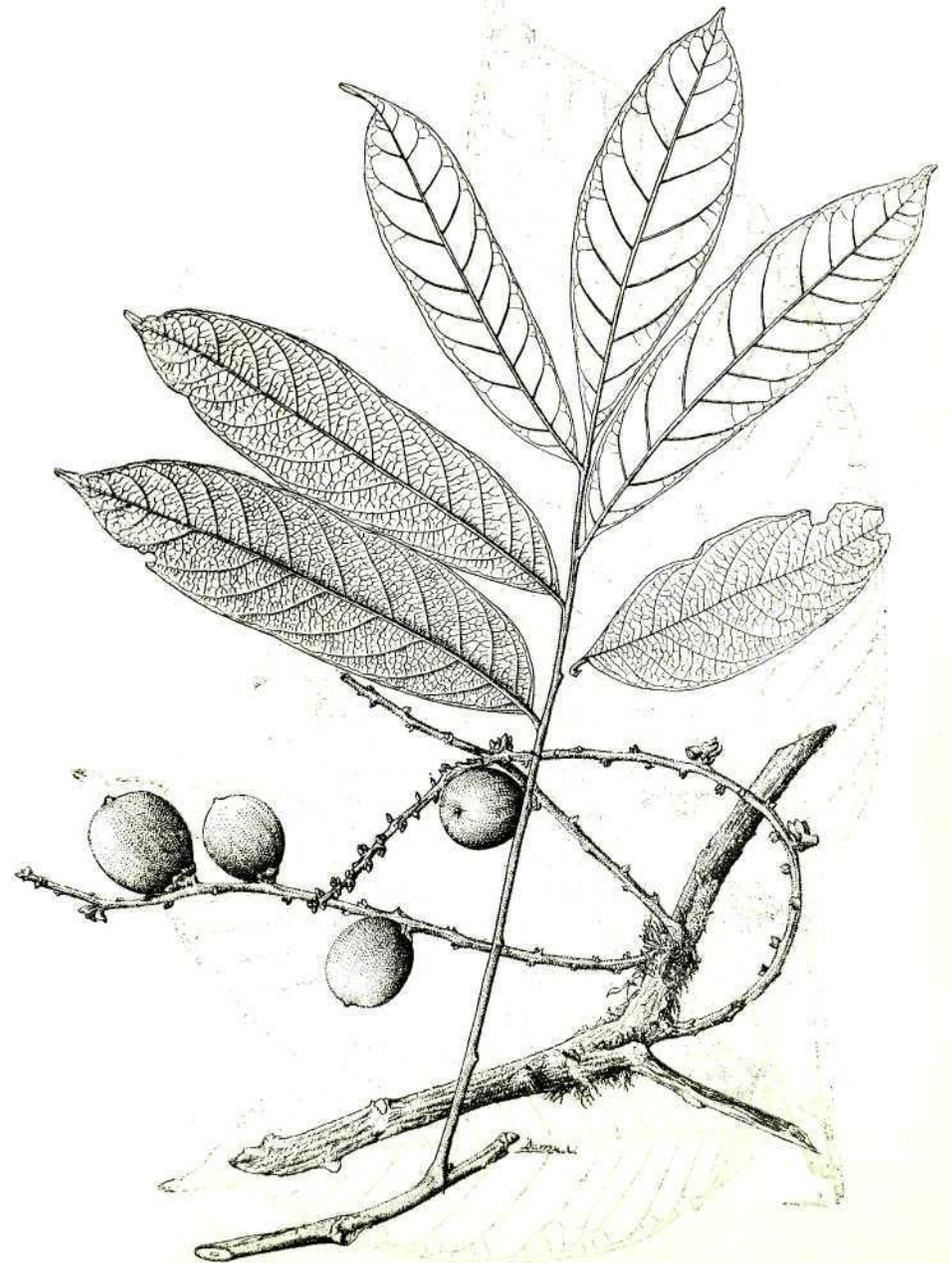


Fig. 11. — *Aglaia sepalina* (Kosterm.) Kosterm.—type specimen.

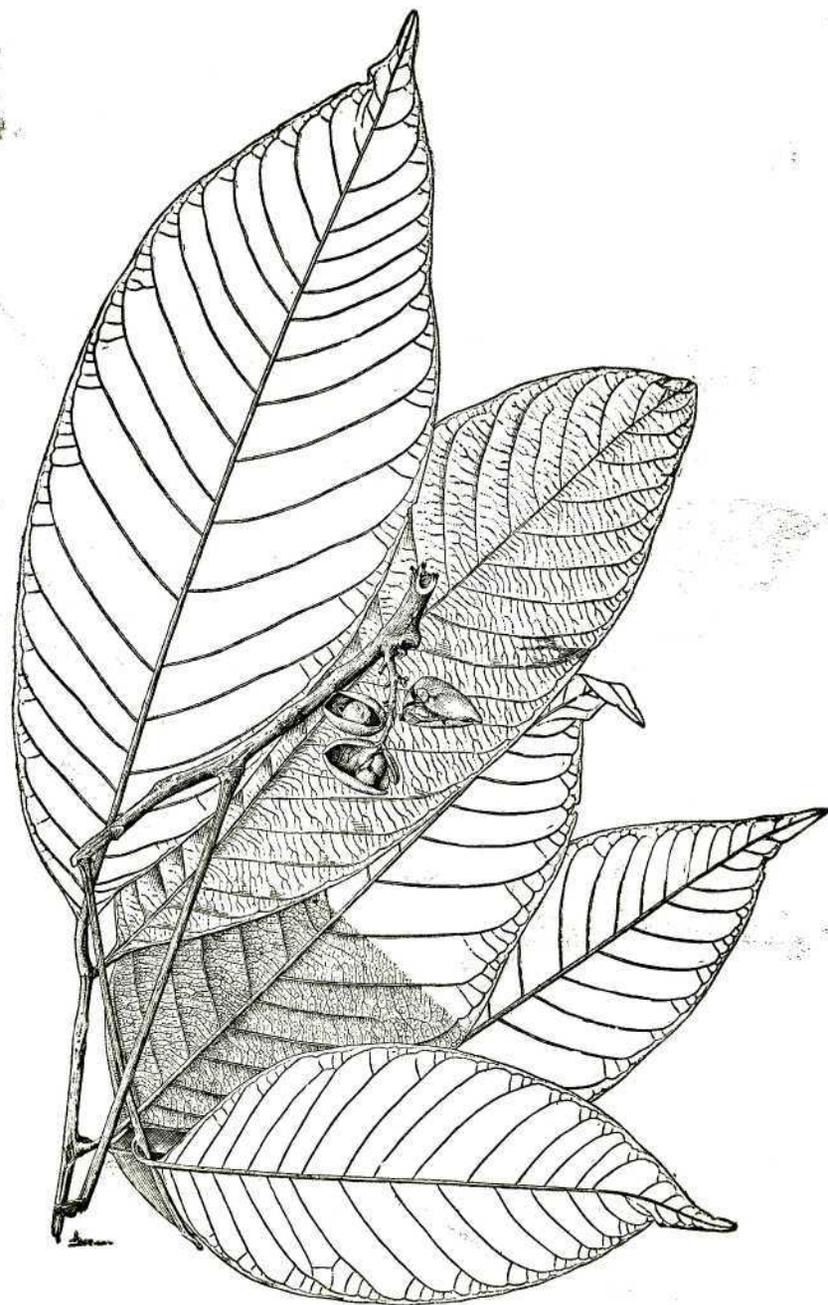


Fig. 12. — *Aglaia intrieatoreticulata* Kosterm. — Holotypus (SING).

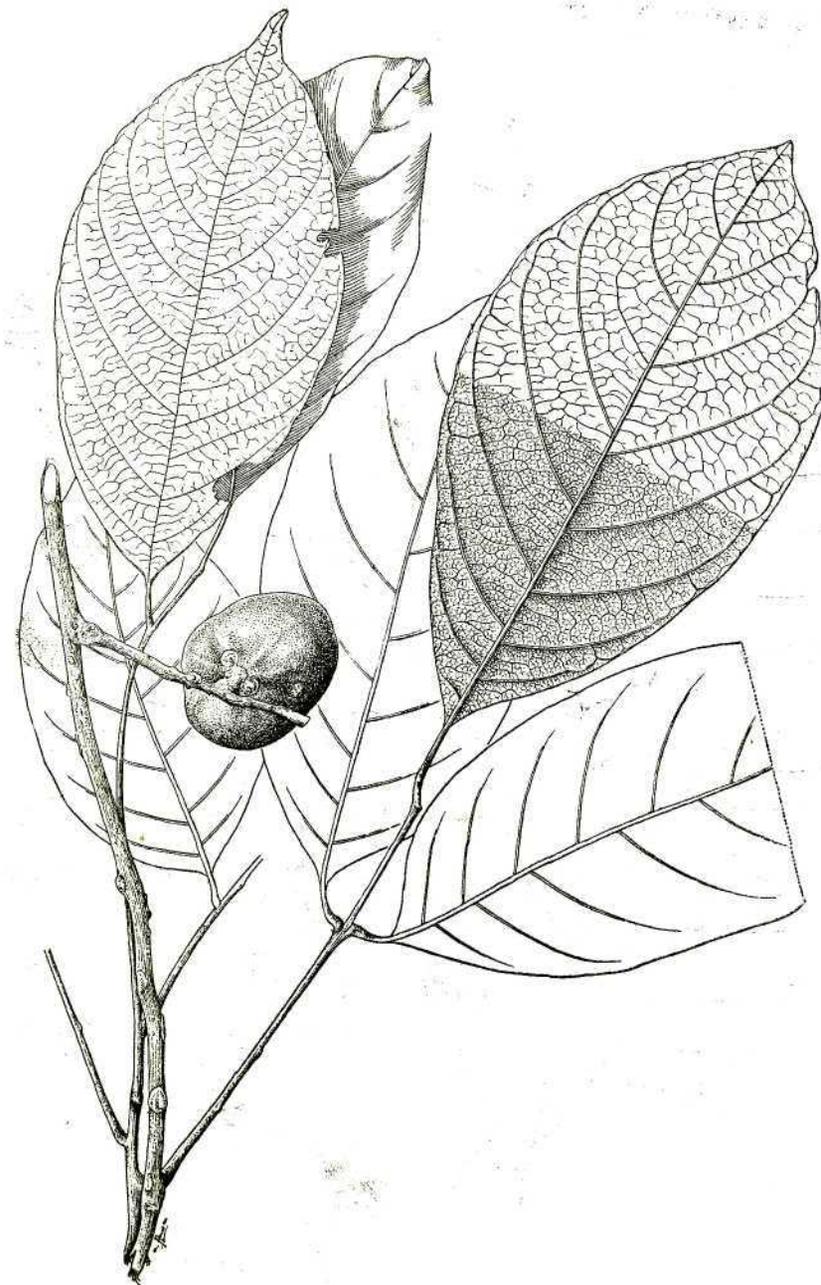


Fig. 13. — *Aglaia membranacea* Kosterm. — Holotypus (L).

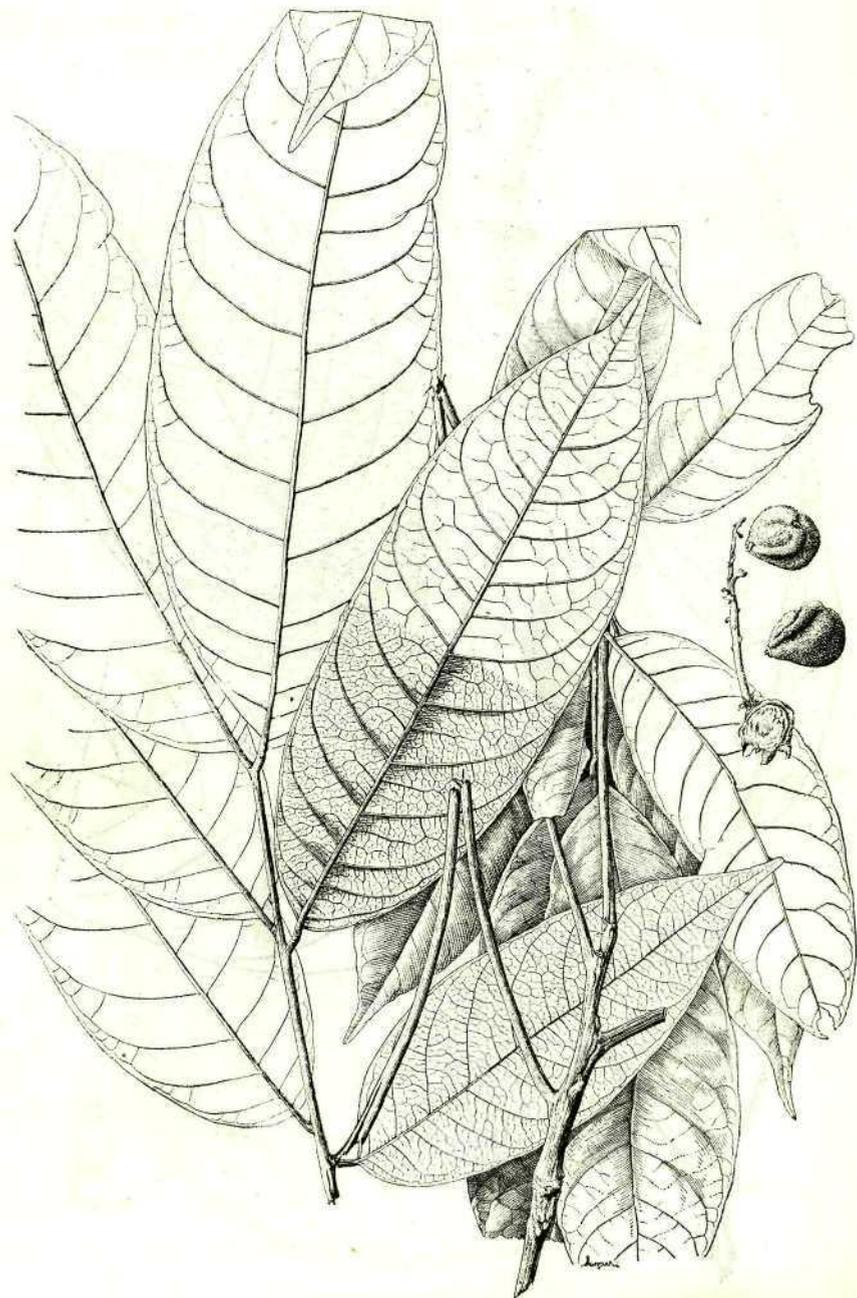


Fig. 14. — *Aglaia chartacea* Kosterm. — Holotypus (BO)*.

PUBISTYLUS THOTH. — AN INTERESTING NEW GENUS OF
RUBIACEAE FROM ANDAMAN ISLANDS

K. THOTHATHRI *)

INTRODUCTION.

The tribe *Alberteae* of *Rubiaceae* consists of genera like *Cremaspora* Benth., *Polysphaeria* Hook. f., *Belonophora* Hook. f., *Aulacocalyx* Hook. f., *Rhabdostigma* Hook. f., *Alberta* E. Mey., *Nematostylis* Hook. f. and *Octotropis* Bedd. All the above mentioned genera are natives of Africa and Madagascar except *Octotropis* Bedd. which is a monotypic Indian genus, described from Travancore Hills. A new genus, *Pubistylus* Thoth. from the Andaman Islands is now added to this tribe. It is interesting to point out that there is no representative genus of this tribe in Malaysia whose flora has greatly influenced the Andaman and Nicobar Islands.

PUBISTYLUS Thoth., gen. nov.

Pertinet ad Alberteas e familia Rubiacearum, affinisque est Octotropi Bedd., a qua tamen differt cymis axillaribus paniculatis, calycis tubo tenuiter lobato, stylo clavato, ovario biloculari. Affinis quoque Cremasporae Benth., a qua differt inflorescentia sat laxa, corollae lobis intus villosis.

Frutex glaber, ramis pendulis. Folia petiolata, opposita, integra, stipulata. Inflorescentia paniculatim, cymosa, axillaris et terminalis; bracteae et bracteolae parvae. Calycis tubus turbinatus, indistincte lobatus. Corolla campanulata, 5-loba, lobis ad sinistram contortis, extus glabris, intus villosis. Stamina 5, petalis alternu, filamentis brevibus, antheris lineari-oblongis, bilocularibus, dehiscentibus per scissuram longitudinalem. Ovarium biloculare, ovule unico in singulis loculis, pendulo; stylo clavato, pubescenti; stigmatе bifido. Frwstus ignotus. Species typica sequens.

PUBISTYLUS ANDAMANENSIS Thoth., spec. nov. — Fig.

Frutex 2—2.5 m altus, ramis pendulis glabris, trunco quadrangulati. Folia simplicia, opposita, elliptico-lanceolata, 7.5—10 X 2—3.2 cm, membranacea, integra, ad apicem caudato-acuminata, ad basin cuneata, glabra; nervis lateralibus 6—8 jugis, ascendentibus atque prope marginem unitis; petiolis 5—9 mm longis; stipulis interpetiolaribus, late ovatis, acutis. Inflorescentia paniculatim cymosa, axillaris et rarius terminalis, 3.5—5 cm longa. Flores albi 3.5—5.5 mm longi, pedicellis gracilibus, U—8 mm longis; bracteis parvis, ovatis, ciliatis; bracteolis sub ipso medio pedicelli. Calycis

*) Central National Herbarium, P.O. Botanic Garden, Howrah, India.