REVISION OF THE SAPOTACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

XV.[1]) Payena A. De Candolle

by

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"Une monographie complète ne sera jamais qu'une utopie"
Alphonse De Candolle

GENERAL PART

1. Introduction

Payena as a genus was created by Alphonse De Candolle in his Prodromus Systematis Naturalis Regni Vegetabilis in 1844. He commemorated in it the French chemist A. Payen (1795—1871) in Paris. De Candolle placed in it the species *Mimusops lucida*, first described by G. Don; the latter employed this nomen nudum used by Wallich in his List of specimens in the East India Company's Museum (1858). The famous Swiss botanist characterized the new genus by the following diagnosis on page 196:

"Calyx 4-partitus (nec 8-partitus, ut dixit cl. G. Don), lobis ovatis, obtusis extus et margine puberulis, 2 exterioribus latioribus. Corolla 8-fida, basi tubulosa, superne campanulata, calyce vix longior; lobis 2 ante lobum quemque calycis, ovato-acutis, glabris.

[1]) I—III in Blumea VI, 3, 1952, 547—595; IV—V in Blumea VII, 2, 1953, 364—412; IVa in Blumea VII, 3, 1954, 481—483; IIa, IVb, Va, VI—IX in Blumea VIII, 2, 1957, 201—513; X—XII in Nova Guinea N.S. 8, 1, 1957, 87—128; XIII—XVI in the present issue.

Stamina 8, tubo corollae prope faucem inserta, lobis opposita, denticulis interjectis. Filamenta brevissima. Antherae lanceolatae, angulosae, inclusae, filamento multo longiores, connectivo in acumen obtusiusculum carnosum producto, loculis subextrorsis, longitudinaliter dehiscentibus. Ovarium hirsutum, 8-loculare. Stylus rectus, glaber, calyee duplo longior, apice obscure dentatus. Ovula 8, ovoideo-angulosa, acuta, deinde ovoidea, ex angula superiore cujusve loculi pendentia. Fructus ign. — Frutex? aut arbuscula? foliis ellipticis, basi subacutis, apice obtuse acuminatis, glaberrimis, superne nitidis, subtus pallidioribus; pedicellis 1—3 ex axillis foliorum superiorum, petiolo duplo longioribus, erectis, pilis minimis adpressis subpubescentibus. —"

He placed it between *Isonandra* and *Bassia* and "perhaps near *Azaola*" ("forsanque Azaolae proximum"). Today *Isonandra* is to be considered a genus in the neighbourhood of *Palaquium* (a group with the parts of calyx and corolla isomerous), and *Bassia* and *Azaola* are considered synonymous to *Madhuca*. De Candolle, while correcting the evident mistake of Don concerning the number of parts of the calyx, makes himself another by saying "Stamina 8 ..." (see under *P. lucida*).

The second species, considered to be a member of the newly created genus was *P. sericea* Miquel (Fl. Ind. Bat. 2, 1859, 1039), now *Madhuca sericea* (Miquel) H. J. Lam; the third, described by the same author, *P. sumatrana* (Miquel loc. cit., Suppl. 1860, 582) now *P. acuminata* var. *pulchra*. After the occasional description of some species, a large extension of the genus under discussion was given by L. Pierre (1885), who, however, added a number of species, which appeared to represent for the greater part already known taxa. The first monographer, viz Lam (1925), recognized 26 species, a number which was decreased by 3 by the said botanist in 1927.

The present author holds the opinion that it is unwise to distinguish a large number of taxa in the Madhuceae; the only way to get a fairly good impression of this tribe, characterized by their reticulate interrelationships, is to assume a rather wide species concept. Therefore the author has to apologize for the description of two additional new species, viz, *P. gigas* and *P. lamii*. There can be no doubt, however, as to the validity of these new taxa, as they are among the species most easily recognizable. Already in 1936 they were found to represent hitherto undescribed species by Lam and his then collaborator K. Griffioen, now Professor of Technical Botany in the Technical Institute at Delft. For various reasons they refrained from publishing descriptions of the above-mentioned species, though the specimens examined by them were distributed to various herbaria under the names *P. gigantea* (now *gigas*) and *P. truncata* (now *lamii*), respectively. In accordance with the senior reviewer of 1936 we decided to give new names to these taxa, among others for nomenclatural reasons.

For the student of *Payena* the following literature is indispensable:

Burck, W. — Sur les Sapotacées des Indes Néerlandaises et les origines botaniques de la gutta-percha, Ann. Jard. Bot. Buitenz. 5, 1886, 47—60.

King, G. & J. S. Gamble — Materials for a flora of the Malay Peninsula 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 167—175.

Lam, H. J. — The Sapotaceae, Sarcospermaceae and Boerlagellaceae of the Dutch East Indies and surrounding countries, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 130—151, 260—263, *abbreviated* Lam 1925.

Lam, H. J. — Further studies on Malayan Sapotaceae I, Bull. Jard. Bot. Buitenz., sér. 3, 8, 1927, 430—443, *abbreviated* Lam 1927.

Pierre, L. — Plantes à gutta-percha, Bull. Mens. Soc. Linn. Paris, 1885, 523—531.
Ridley, H. N. — The flora of the Malay Peninsula 2, 1923, 529—531.
Wyatt—Smith, J. — Manual of Malayan timber trees, Sapotaceae, Res. Pamphl. 4, 1954, 47—54.

The last-mentioned publication is particularly interesting since it contains field descriptions of living material.

We consider the papers of Lam (1925, 1927) the basic monographies on *Payena*. Therefore literature and synonymy are recorded only if published after 1927 or if not mentioned by Lam. In all cases concerning species described by Lam in the above-quoted papers or by other authors before the type methode was applied,we choose a lectotype from the material originally cited by the author, not designating syntypes or paratypes. No types were designated for names that have fallen into synonymy.

After the description of the species the specimens reviewed are enumerated, geographically arranged. The following abbreviations are used in this enumeration: diam. for diameter, FD for Forest Department, fl. for flowers, fr. for fruits, FRI for Forest Research Institute Bogor.

The combination of characters, especially the albuminous seed and the branching of the tertiary nerves in the leaf, which together mark the genus *Payena* as recognized by us, makes in general the genus pretty well distinguishable from other Madhuceae. For full generic description of *Payena*, see p. 95.

Payena seems to be fairly constant in the number of its sepals (4), petals (8), stamens (16), and cells of the ovary c. q. ovules (8). Although numerous cases of variation of these flower characters in this genus are reported in the literature (e. g. in several species in Lam 1925) I never found one, except in some plants originating from Indo-China. It is a well known fact that many species of Phanerogams show a more pronounced variation at the borders of their areas. *P. lanceolata* var. *annamensis* shows a variation in the number of corolla lobes (7—8) and the cells of the ovary c. q. ovules (6—8); a correlation with some other characters gives it the rank of a variety. Other previously recorded cases of variation in the flower of *Payena* were apparently rare exceptions which are now drowned in the more numerous material. The shape of the leaves and the stamens, and the number of seeds in the fruits, however, are not very constant. Generally the fruit contains one, but frequently two seeds. Very rarely three or more seeds, all of the same size, are found together. It is reasonable to consider those seeds less viable than normal ones.

It is comparatively difficult to discuss the systematic position of the genus *Payena*. It is obvious that it belongs to the tribe Madhuceae (sensu Lam, Rec. Trav. Bot. Neerl. 36, 1939, 525). In our opinion it certainly has to be placed near *Aesandra* (cf. Van Bruggen, Blumea IX, 1, 1958, 139) and *Madhuca*. It might be possible to consider these three genera forming a series, beginning with *Payena* (not varying in floral characters) through *Aesandra* (slight variation) to *Madhuca* (large amount of variation). Of course it is highly arbitrary to decide which genus shows the most primitive characters, but still it is evident that the genera mentioned are more nearly related to each other than to the remaining genera, viz. *Ganua*, and *Burckella*; Van den Assem (Blumea 7, 2, 1953, 365—366) recorded *Ganua* to be related closely to *Madhuca*.

2. Distribution of the genus *(Fig. 1)*

Payena is known to be represented in the following areas: Burma, Siam, Andamans, Malay Peninsula, Simalur, Sumatra, Riau, Banka, Java, Borneo, Palawan, Tawi Tawi, and Mindanao. It is not known beyond the "line of Wallace" in the original sense, a boundary famous among biogeographers in earlier days.

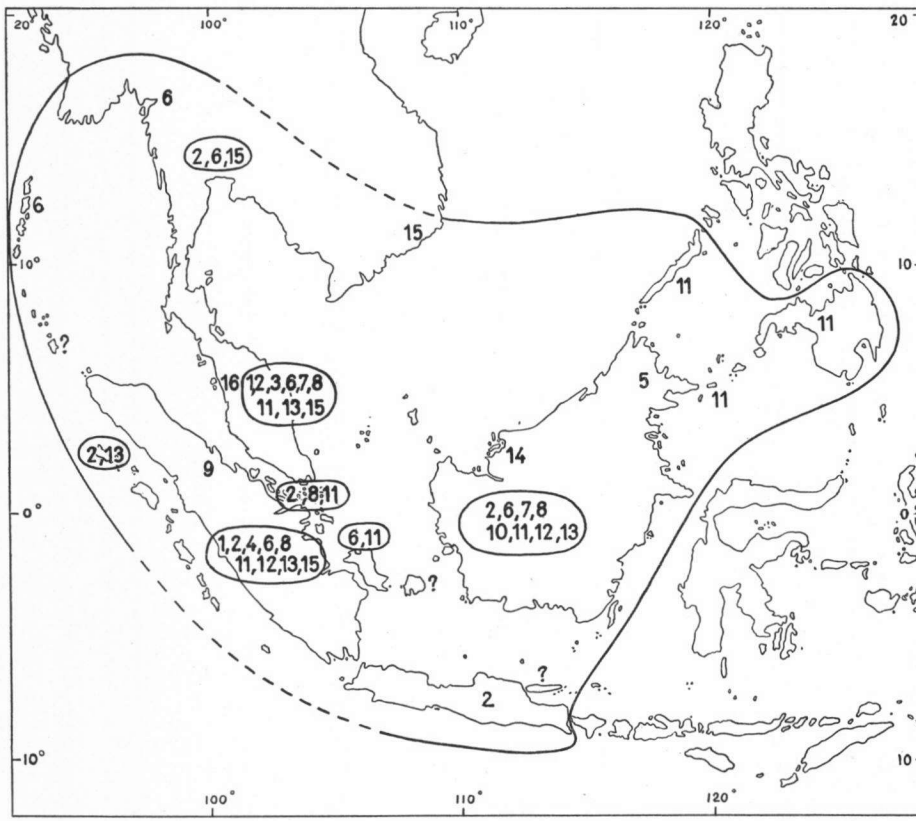

Fig. 1. Areas of *Payena* species. 1. *dasyphylla*; 2. *acuminata*; 3. *maingayi*; 4. *dantung*; 5. *gigas*; 6. *lucida*; 7. *longipedicellata*; 8. *obscura*; 9. *pseudoterminalis*; 10. *microphylla*; 11. *leerii*; 12. *endertii*; 13. *lowiana*; 14. *lamii*; 15. *lanceolata*; 16. *selangorica*. Solitary numbers indicate endemic species or isolated localities of otherwise widespread species; encircled numbers refer to species occurring in a certain region or island.

Apparently the genus is of West-Malaysian origin, having its greatest diversity in the western parts of the Malay Archipelago, notably in the Malay Peninsula and Sumatra. Borneo shows also a fairly large number of species, while one species only (*P. acuminata*) reaches Java, and another (*P. leerii*) the Philippines.

The genus is evidently centered in the Sunda-shelf, and may have reached the Philippines through Borneo, and the Andamans through

Burma. The extension westward goes rather far into the continent of Asia. It is plausible to suppose that *Payena* has spread west- and eastword from a centre in the Malay Peninsula, or rather the now immerged Sunda-shelf.

Some species are widespread, viz., *P. acuminata* (Siam, Malay Peninsula, Sumatra, Simalur, Java, Borneo), *P. lucida* (Burma, Siam, Malay Peninsula, Andamans, Sumatra, Banka, Borneo), *P. leerii* (Malay Peninsula, Riau, Banka, Sumatra, Borneo, Palawan, Tawi Tawi, Mindanao), while others occupy a remarkably restricted area, e. g. *P. maingayi* (Malay Peninsula). The "endemism" of other species, e. g. *P. gigas, P. lamii, P. selangorica,* may be due to insufficient collecting in the regions concerned.

Up to the present no records are known from Madura, Bawean, Karimundjawa Islands, Billiton and the range of islands West of Sumatra, except Simalur. It is likely that in some of these islands at least *Payena* will ultimately be found to be represented.

3. Delimitations and interrelationships of the species

Only one attempt was made to subdivide the genus *Payena,* viz by Lam (1925); he created the sections *Eupayena,* characterized by the tertiary nerves descending from the marginal connections and *Ganuopsis,* distinguishable by the tertiary nerves ascending from the midrib as is the case in *Ganua.* However, in his additional paper of 1927 he dropped this classification. We can completely agree with that opinion. At present we propose to distinguish two sections, viz *Payena* and *Purpureopayena* of which *Purpureopayena* comprises only *P. dasyphylla* with its purplish red flowers and its woolly red ferruginous indumentum, and *Payena* the bulk of the known species, characterized by the whitish flowers and the missing of the above-mentioned indumentum. This group of species, apart from its very close relation to the section *Purpureopayena,* shows a pattern of reticulate interrelationships, very difficult to unravel.

The wide-spread species *P. acuminata* forms, together with three endemic species, *P. maingayi* (Malay Peninsula), *P. dantung* (Sumatra), and *P. gigas* (Mount Kinabalu, North Borneo), a group of species with comparatively large leaves and flowers.

Through *P. acuminata* s. s. this group is related to a second one, comprising *P. lucida* (with the closely allied *P. longipedicellata*), *obscura, pseudoterminalis, microphylla, leerii,* and *endertii.* These species form together a complete series with all possible transitions mutually both in sterile and fertile parts. It possibly represents a taxon which in modern zoology is called a "superspecies".

P. lowiana should be considered a relative of the just mentioned group of species, though it shows also characters, e. g. the conspicuous secondary nerves, which bring it close to *P. acuminata* var. *pulchra.*

Another somewhat obscure species, *P. lamii,* holds a rather isolated position among the numbers of *Payena s. s.* The leaf recalls strongly that of *P. obscura,* except for the comparatively high number of secondary nerves. Besides, the hairy corolla throat in the flower is unique in the

genus under discussion, while moreover the pedicels are very short (0.2—0.3 cm long).

Through *P. lucida,* especially the forms with smaller leaves, the *lucida*-group is allied to *P. lanceolata* and *P. selangorica.*

Thus, besides the somewhat isolated species *P. lowiana* and *P. lamii,* the species belonging to the section *Payena* show reticulate relationships. Such characters as used by Lam in 1927 for directing his scheme of relationships (Lam 1927, 430, fig. 12), as pubescence of the lower surface of the leaves, are in our opinion not essential. The young leaves of all species show some pubescence, while no adult leaf is completely free of hairs below; therefore, it is not advisable to base a classification on these characters only.

From a phylogenetical point of view the differentiation within the Madhuceae may be considered a comparatively young one. In this tribe *Payena* seems still younger than the related genera, since the delimitations between the species are mostly weak. It is therefore not surprising that 107 names (including valid names, synonyms, MS-names, names belonging to other genera and to other families) exist for only 16 species and some others belonging to different genera. In accordance with these ideas we have to consider the more clearly delimited species the older ones: *P. dasyphylla,* the *P. acuminata*-group, *P. lowiana,* and *P. lamii.* As some of these species are geographically isolated, this only strengthens our opinion. In this respect we can not agree with Van Steenis (Fl. Mal. (I), 4^2, 1949, LVIII), who considers the origin and age of groups showing reticulate affinities doubtful.

4. Material and acknowledgements

For the present revision we had the material of the following herbaria at our disposal: Berlin, London, Bogor, Brussels, Calcutta, Florence, Geneva, Kew, Kepong, Leiden, New York, Manila, Paris, Stockholm, Sandakan, Kuching, Singapore, Canton, Utrecht and Washington.

The abbreviations used to indicate these herbaria are those proposed by Lanjouw and Stafleu in the third edition of the "Index Herbariorum", 1956.

It is our pleasant duty to tender our sincerest thanks to the directors of the above-mentioned institues for their most valuable cooperation.

Moreover we are very much obliged to the following botanists. Prof. Dr. H. J. Lam (for putting his notes at our disposal and for his invaluable help and criticism), the members of the staff of the Rijksherbarium and the Flora Malesiana (Leiden), Mr. M. Jacobs (Bogor), Dr. J. Léandri and Prof. Dr. H. Humbert (Paris), Dr. G. Taylor and Mr. J. F. M. Cannon (London), Sir Edward Salisbury, Dr. W. B. Turrill and Mr. L. L. Forman (Kew).

The Board of Curators of the Leiden University were so kind as to enable us to pay a visit to London and Kew by means of a donation from the "Fonds Vollenhoven". We are very much indebted to the directors and the staff members of the herbaria at Paris, London, and

Kew for the hospitality enjoyed during our stay at their respective institutes.

My sincere thanks are also due to Mr. H. J. T. Tammel, who has drawn the figures, or adapted already existing drawings.

The scales added to the drawings is in millimeters.

SPECIAL PART

5. Generic diagnosis

Payena A. De Candolle, Prodr. 8, 1844, 196; Lam 1925, 130; Lam 1927, 430; Lam in Backer, Fl. Java Nooduitg. 7, 1948, 166—8; Wyatt Smith, Res. Pamphl. 4, 1954, 47 — *Keratophorus* Hasskarl, Flora Bot. Zeit., 1855, 579, and Retzia 1, 1855, 100 (errore *Keratephorus*) — *Ceratophorus* De Vriese, Pl. Reinw., 1856, 60, and Tuinb.fl. 3, 1856, 266 (*Ceratophorus*) — *Hapaloceras* Hasskarl, Flora Bot. Zeit., 1859, 639.

Several species were originally described under the generic names of *Azaola* Blanco, *Bassia* Koenig, *Isonandra* Wight, and *Mimusops* L.

Middle-sized to large *trees* with latex; stipules always caducous, rarely still found at the base of young leaves. *Leaves* mostly acuminate, glabrous above, often more or less pubescent below, sometimes nearly or wholly glabrous, young leaves always slightly pubescent above, densely pubescent below; midrib generally prominent above and below, though more so below; secondary nerves straight, near margin of leaf archingly joined, curving towards apex near margin; tertiary nerves much more slender than secondary ones, generally not very conspicuous, mostly descending from marginal conjunctions of secondary nerves and ramifying towards the midrib, sometimes ascending from midrib, more or less parallel to secondary nerves, never distinctly transverse. *Inflorescences* axillary or pseudoterminal, fascicled and 1—pluriflorous; flowers mostly comparatively small, long pedicelled, pedicels incrassate in fruits, flowers bisexual. *Sepals* four, more or less triangular, biseriate, outer ones valvate, thick and fleshy, inner ones imbricate, thinner than outer ones, frequently pubescent outside, glabrous inside, tube very short, sepals persistent and incrassate in fruit. *Corolla* with eight lobes in two whorls, tube short and more or less cylindrical, lobes glabrous. *Stamens* 16, uni- or biseriate, outer ones opposite the petals, inner ones between the petals, filaments comparatively short, anthers with villous and rounded or glabrous and acuminate apex, apex of connective generally rather long and acuminate; *pistillum* long, subulate, glabrous, ovary generally globose or conoidal, gradually merging into style, tomentose, cells eight, never imperfect, rarely six or seven, with one ovulum each, attached a little above the middle of the central axis. *Fruits* a dryish berry, with persistent and enlarged style and calyx, glabrous or pubescent, pericarp fleshy; seeds one or two, with thin crustaceous testa and oblong or linear scar, hilum above the middle; albumen thick, cotyledons flat, foliaceous, radicle inferior, exsert, usually cylindrical.

Type species: *Payena lucida* (Don) DC.

Vern. names: guttah, mayang, nyatoh (Malay). Mostly the vernacular names have been copied from the labels, a uniform transcription being impossible.

Uses: Mostly guttah (latex), sometimes timber and firewood, and occasionally edible fruits.

Ecology: Trees of *Payena* are generally found in primary forest, where they belong to the middle or the uppermost story, and sometimes to the emergent trees. Some species occur also in secondary vegetations or at the edge of the forest, e. g. along rivers. Many species are found up to considerable altitudes, occasionally up to nearly 2000 m (Mount Kinabalu). Most species can stand a variety of soils.

There is no definite time for flowering and fruiting. Flowers and fruits are reported from every month, moreover, it is not uncommon to find a branchlet bearing flowers and fruits at the same time.

Distr.: About 16 species from Eastern Burma to Java, Borneo and the Philippines (*Fig. 1*).

6. Key to the taxa

It is not always easy to identify herbarium specimens of *Payena*, even to the genus, and this is particularly so in sterile specimens. The same or a very similar shape and nervation of the leaves can be found also in other genera (e. g. *Palaquium*), and sometimes even in other families.

There are a few species only that can be recognized at once, viz, *P. dasyphylla, P. gigas, P. maingayi, P. lowiana*; this applies especially to sterile branches. The key is prepared for identification of flowering, and generally also fruiting, specimens; it appeared to be impossible to give a key for sterile specimens only.

The word "glabrous" is to be understood as "completely glabrous, practically glabrous, or glabrous with traces of pubescence along the midrib".

1.a. Branchlets, petioles, pedicels, calyces, fruits and lower surface of leaves densely woolly red ferruginous pubescent; secondary nerves 12—18, angles with midrib about 60°; flowers purplish red (*Malay Peninsula, Sumatra*) Section PURPUREOPAYENA . . . . . **1. P. dasyphylla** (Miq.) Pierre

b. Branchlets, petioles, pedicels, calyces, fruits and lower surface of leaves glabrous or pubescent, but never all these parts together pubescent; flowers withish. Section PAYENA 2

2.a. Leaves large, 17—37 by 8—17.5 cm 3

b. Leaves middle-sized or small 6

3.a. Lower surface of leaves glabrous, flowers and fruits large, fruits 3.7—5 by 2.9—3.7 cm, pedicels of flowers and fruits long, 1.5—6 cm; secondary nerves 27—32, angles with midrib about 70—80°. *Borneo (Mount Kinabalu region)* **5. P. gigas** Van Bruggen

b. Lower surface of leaves pubescent, flowers and fruits middle-sized, pedicels middle-sized 4

4.a. Leaves comparatively broad, 7—15 cm broad, 14—22 very prominent secondary nerves, angles with midrib about 70—80°, stipules caducous, pedicels 0.7—1.3 cm long. *Sumatra, Java, Borneo* **2. P. acuminata** (Blume) Pierre var. **pulchra** (Burck) H. J. Lam

b. Leaves more lanceolate, 20—32 secondary nerves, angles with midrib about 60—75° 5

5.a. Leaves up to 37 cm long, 26—32 secondary nerves, angles with midrib about 70—75°, stipules caducous, pedicels short, 0.4—0.7 cm long, flowers small, sepals 0.5—0.6 by 0.5 cm. *Sumatra* . . . . . **4. P. dantung** H. J. Lam

b. Leaves up to 32 cm long, 20—25 secondary nerves, angles with midrib about 60—75°, stipules caducous, but generally much less than in other species, pedicels longer, 1.2—3.5 cm long, flowers larger, sepals 0.75—1.1 by 0.4—0.6 cm. *Malay Peninsula* . . . . . **3. P. maingayi** Clarke in Hooker

6.a. Leaves with 29—32 secondary nerves and comparatively long apex, up to 2 cm long, lower surface of leaves glabrous; flowers with very short pedicels (0.2—0.3 cm) and hairy corolla throat; angles of secondary nerves with midrib 60—80°. *Borneo (Sarawak)* . . . . . **14. P. lamii** Van Bruggen

b. Leaves with 9—25 secondary nerves, apex long or short, lower surface of leaves glabrous or pubescent, flowers with pedicels longer than 0.3 cm and never with hairy corolla throat 7

7.a. Leaves more or less lanceolate, up to 14 cm long, 1.8—4.5 cm wide, apex not very distinct, secondary nerves 10—17 8

b. Leaves not lanceolate, apex distinct, secondary nerves 9—25 10

8.a. Lower surface of leaves glabrous, apex of leaf gradually merging into blade, 10—16 secondary nerves, angles with midrib about 60—75°, sepals 0.75 by 0.5 cm; fruits small, 2.5 by 1.2 cm, acuminate. *Malay Peninsula (Selangor)* **16. P. selangorica** K. & G.

b. Lower surface of leaves pubescent, apex of leaf discernable, but not very distinct, 15—17 secondary nerves, angles with midrib about 80°, sepals 0.45 by 0.3—0.4 cm; fruits middle sized, 3—4.5 by 1—2.2 cm, frequently beaked . 9

9.a. Leaves with 10—16 secondary nerves; sepals as long as wide, corolla with 8 lobes, filaments of stamens short and rather thick, ovary with 8 cells; fruits bluntly acuminate to beaked, thick. *Siam, Malay Peninsula, Sumatra* **15. P. lanceolata var. lanceolata**

b. Leaves with 13—16 secondary nerves; sepals longer than wide, corolla with 7—8 lobes, filaments of stamens rather long and slender, ovary with 6—8 cells; fruits acuminate to beaked, thin. *Indo-China* **15. P. lanceolata** var. **annamensis** (Lec.) van Bruggen

10.a. Pedicels long, 2—4.5 cm, flowers comparatively large, sepals 0.8—1.5 by 0.8—1 cm, style stout, corolla long exsert; lower surface of leaves glabrous, 12—16 secondary nerves, angles with midrib about 60—70°. *Malay Peninsula, Borneo* **7. P. longipedicellata** Brace ex K. & G.

b. Pedicels long (up to 3.5 cm), middle-sized or short, flowers generally smaller, style thin, corolla slightly exsert; lower surface of leaves glabrous or pubescent 11

11.a. Inflorescences together pseudoracemose and conferted pseudoterminally at tips of short branchlets above region of adult leaves; leaves middle-sized, lower surface pubescent, 9—12 secondary nerves, angles with midrib about 55—60°. *Eastern Sumatra* . . . . . **9. P. pseudoterminalis** H. J. Lam

b. Inflorescences together not pseudoracemose, frequently almost pseudoterminal, usually in upper leaf axils, leaves middle-sized to rather large, lower surface glabrous, 10—15 secondary nerves, angles with midrib about 60—70°. *Malay Peninsula, Sumatra, Riau, Borneo* . . . . . **8. P. obscura** Burck

c. Inflorescences together not pseudoracemose, generally dispersed along branchlets, sometimes conferted below leaves near tips of banchlets 12

12.a. Leaves small, 5—7 by 2—3 cm, lower surface glabrous, 10—13 secondary nerves, angles with midrib about 50—70°; flowers small, with comparatively long style, 1.2—1.6 cm long, pedicels 0.6—1.5 cm long. *Borneo* **10. P. microphylla** (De Vr.) Pierre

b. Leaves middle-sized, rarely small 13

13.a. Leaves middle-sized to rather large, with 20—25 secondary nerves, lower surface pubescent 14

b. Leaves middle-sized with 9—17 secondary nerves, lower surface glabrous or pubescent 15

14.a. Leaves comparatively broad, 7—15 cm broad, 14—22 very prominent secondary nerves, angles with midrib about 70—80°, stipules caducous, pedicels 0.7—1.3 cm long. *Sumatra, Java, Borneo* **2. P. acuminata** (Blume) Pierre var. **pulchra** (Burck) H. J. Lam

b. Leaves more lanceolate, 20—25 secondary nerves, angles with midrib about

60—75°, stipules caducous, but generally remaining longer than in other species, pedicels 1.2—3.5 cm long. *Malay Peninsula* **3. P. maingayi** Clarke in Hooker

15.a. Leaves glabrous to subglabrous below, or with traces of pubescence along midrib 16

b. Leaves pubescent below 19

16.a. Leaves comparatively small, 6—12 by 2—4.5 cm, 9—12 secondary nerves, leaves generally shortly appressedly pubescent; apex of connective in stamens longer than anthers; fruits rounded ovoid to spherical. *Sumatra, Borneo* **12. P. endertii** H. J. Lam

b. Leaves middle-sized, 5—23 by 1.5—8 cm, 10—18 secondary nerves; apex of connective in stamens shorter than or rarely as long as anthers; fruits rounded ovoid, sometimes conical, never spherical 17

17.a. Leaves with comparatively robust secondary nerves, style in flowers and fruits rather long, 1.8—2.2 cm long, pedicels of flowers 1.5—2.1 cm long. *Malay Peninsula, Sumatra, Simalur, Borneo* . . . . . **13. P. lowiana** Pierre

b. Leaves with slender secondary nerves, forking practically at edge of leaf, style in flowers and fruits middle sized or short 18

c. Leaves with slender secondary nerves, forking at a comparatively large distance from edge of leaf, style in flowers and fruits middle-sized, pedicels of flowers 0.7—3.5 cm long. *Burma, Siam, Malay Peninsula, Andamans, Sumatra, Banka, Borneo* . . . . . **6. P. lucida** (Don) DC

18.a. Flowers small, calyx 0.2—0.4 by 0.25—0.3 cm, pedicels of flowers 0.8—1.7 cm long; fruits conical or ovoid, glabrous to subglabrous, apex truncate, persistent style short, frequently broken off; tertiary nerves of leaves faint or hardly visible below. *Malay Peninsula, Riau, Banka, Sumatra, Borneo, Palawan, Tawi Tawi, Mindanao* . . . . . **11. P. leerii** (T. & B.) Kurz

b. Flowers comparatively large, sepals 0.4—0.7 by 0.4—0.6 cm, pedicels of flowers 1.2—2.5 cm long; fruits never conical, generally ovoid, pubescent to subglabrous, apex acute, persistent style medium-sized; tertiary nerves of leaves prominent and conspicuous below. *Malay Peninsula, Sumatra, Riau, Borneo* **8. P. obscura** Burck

19.a. Leaves with 9—16 secondary nerves, angles with midrib about 60—70°, petioles 0.7—1.6 cm long 20

b. Leaves with 14—22 secondary nerves, angles with midrib about 70—80°, petioles 1—3 cm long; fruits 2.9—3.6 by 1.2—1.8 cm, persistent style 0.8—1 cm long; leaves 6.5—24 by 4—7 cm. *Siam, Malay Peninsula, Sumatra, Simalur, Java Borneo* **2. P. acuminata** (Blume) Pierre var. **acuminata**

20.a. Leaves small, 6—12 by 2—4.5 cm, 9—12 secondary nerves, forking of secondary nerves practically at edge of leaf; pedicels of flowers middle-sized to short, apex of connective in stamens longer than anthers; fruits glabrous, ovoid to spherical, 2.2—2.3 by 1—1.3 cm, persistent style 1.3 cm long, pistillum in flower 1.1 cm long. *Sumatra, Borneo* . . . . . **12. P. endertii** H. J. Lam

b. Leaves middle-sized, 8—23 by 3—8 cm, 10—16 secondary nerves, forking of secondary nerves at a comparatively large distance from edge of leaf; pedicels of flowers middle-sized to long, apex of connective in stamens shorter than anthers; fruits pubescent, ovoid, never spherical, 1.5—3.7 by 1.1—2 cm, persistent style 0.7—0.8 cm long, pistillum in flower 0.7—1 cm long. *Burma, Siam, Malay Peninsula, Andamans, Sumatra, Banka, Borneo* **6. P. lucida** (Don) DC

7. Taxonomic part

Section PURPUREOPAYENA sect. nov. — floribus rubropurpureis, indumento lanato rubroferrugineo in ramulis, petiolis, pedicellis, calycibus, fructibus, foliisque subtus.

Flowers purplish red, branchlets, petioles, pedicels of flowers and fruits, calyces and lower surfaces of leaves with woolly red ferruginous indumentum.

Type species of section: *Payena dasyphylla* (Miq.) Pierre.

1. Payena dasyphylla (Miquel) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 527; Lam 1925, 143; Lam 1927, 431, *fig. 13*; Wyatt-Smith, Res. Pamphl. 4, 1954, 50 — *Isonandra dasyphylla* Miquel, Pl. Jungh., 1852, 201 — *Bassia caudata* Ridley, Fl. Mal. Pen. 2, 1923, 267 — *Madhuca caudata* (Ridley) H. J. Lam, Lam 1925, 161.

Trees up to 35 m, diameter up to 1 m, girth up to 2 m. Branchlets, petioles, pedicels of flowers and fruits, calyces and lower surfaces of leaves with a dense covering of a red ferruginous woolly pubescence. *Branchlets* not very thin, terete, stipules caducous, small, narrowly triangular, acute, long pubescent. *Leaves* dispersed along branchlets, chartaceo-membranaceous, apex long, abruptly acuminate, base cuneate, petioles 1—2.5 cm long; blade 15—25 by 5—11 cm, elliptical or ovate-oblong, glabrous above, except some traces of the pubescence on the midrib, lower surface with the above mentioned indumentum; midrib sunken above, prominent below, rather conspicuous, a little darker than the blade; secondary nerves idem, 12—18, rather straight, archingly joined near margin, starting from midrib at angles of about 60°, curving towards apex near margin; tertiary nerves much less conspicuous, more or less forming a *Ganua*-like pattern, descending. *Inflorescences* in axils of leaves and below leaf region, 2—8-florous, pedicels 1.5—3 cm long. *Sepals* 0.5—0.9 by 0.45—0.8 cm, thick triangular or broadly ovate-rotundate, acute, inner sepals thinner. *Corolla* generally exsert, 0.7—1.7 cm long, tube 0.2—0.5 cm long, lobes 8, ovate oblong, acute, glabrous. *Stamens* 16, 0.5—0.6 cm long, filaments short, with comparatively long hairs, apex of connective acuminate, generally bifid, thecae oblong. *Pistillum* 0.8—1.6 cm long, glabrous, base villous; ovary conical, villous, cells 8, ovules rounded, small. *Fruits* 1.8—2.5 by 1.5 cm, obovoid-ovoid, with short red ferruginous indumentum; seed 1, 1.7—1.8 by 0.8 cm, oblong, scar linear, narrow, cotyledons flat, narrow, ovate oblong, radicle thick and short; incrassate pedicels 1.6—2 cm long, persistent sepals 0.6—0.8 cm long, persistent style 0.6—0.8 cm long.

Lectotype specimen: *Junghuhn s. n.*, HLB 908225-141, in L.

Vern. names: nyatoh ekor, n. ekur, n. tembaga (Malay Peninsula), balam kerang, b. selendit, kaju balam, madang bungo, njatuh kerah (Sumatra).

Uses: Guttah.

Distr.: Malay Peninsula, Sumatra.

MALAY PENINSULA. Kelantan, Temangan, old forest: *Mal. FD 68769* (KEP), height 19.50 m, girth 1.20 m — Perak, Larut, 1100—1200 m: *King's Collector 2611* (K), height 25—30 m, fl. Dec. — Pahang, Kuantan, Baloh Forest Reserve: *Yeop Mal. FD 3650* (K, KEP, SING), height 28 m, girth 2 m, fl. Mar. (*type* of *Bassia candata* Ridley); Fraser Hill, upon the Selangor border, 1200—1300 m: *Burkill & Holttum SF 7766* (SING), fl. Sept.; Fraser Hill, 1200 m: *Symington Mal. FD 45468* (KEP), girth 1.15 m.

SUMATRA. Atjeh and Dep., Gajo countries, from Gadjah to Blang Kedjeren, forest slope, 1300—1400 m: *Van Steenis 9405* (BO, L), fl. Feb. — Tapanuli, Upper Ankola, forest region, 3—900 m: *Junghuhn s. n.* (L, *lectotype)*; Upper Ankola, Tobing: *Junghuhn s. n.* (U); Upper Ankola, 900 m: *Junghuhn s. n.* (P), fr.; Tapanuli without locality: *Junghuhn s. n.* (L), 1 sterile, 2 fr.; idem: *Anonymous s. n.* (BO, L), fr. (the Bogor specimen with the evidently incorrect locality "Java") — East Coast, Bandar Pulu, Asahan: *Yates 2027* (B, BO, L), fl.; Masihi, Asahan: *Yates 2641* (BO), fl.; Si Djundjung: *Stadtmiller 79* (BO); Unggan: *Stadtmiller 105* (BO); Tapus, Kuantan

river, 100 m: *Koorders 10423* ♀ (BO), height appr. 35 m, diam. 1 m, fr. Feb.; Siluka, Kuantan river, 100 m: *Koorders 10429* ♀ (BO), height appr. 7 m — West Coast, L Kota: *Anonymous s.n.* (BO), fl.

Remarks: This species is characterized by the dense woolly pubescence of branchlets, petioles, pedicels, calyces, fruits, and lower surface of leaves. The colour of this indumentum is red ferruginous when dry. *P. dasyphylla* is a tree of hills and lower mountains, up to 1400 m (Wyatt Smith, loc. cit.: "lowland forest").

The flowers are generally reported to be purplish red, the fruits pale yellowish brown.

Section PAYENA — floribus albidis, deficiente indumento in omnibus partibus simul.

Flowers whitish, indumentum never on all parts of the plant together.

Type species of section: *Payena lucida* (Don) DC.

Fig. 2. *P. acuminata* var. *acuminata*, branchlet with different types of fruits. From *Anonymous s.n.*, Cult. Hort. Bot. Bog. (L).

2. Payena acuminata (Blume) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 528; Merrill, Pl. Elm. Born., Univ. Calif. Publ. Bot. 15, 1929, 238; Lam in Backer, Fl. Java, Nooduitg. 7, 1948, 166—8 — *Mimusops acuminata* Blume, Bijdr. Fl. Ned. Ind., 1825, 672 — *P. sericea* (Blume) H. J. Lam, Lam 1925, 139, 261; Lam 1927, 439; Fletcher in Craib, Fl. Siam. Enum. 2, 4, 1938, 361; Heyne, Nutt. Pl. Indon. 1, 1950, 1229 — *P. sericea* (Blume) H. J. Lam var. *typica* H. J. Lam, Lam 1925, 140, *fig. 38A*; Lam 1927, 441 — *P. sericea* (Blume) H. J. Lam var. *pulchra* (Burck) H. J. Lam, Lam 1925, 142, *fig. 38B*; Lam 1927, 441 — *Isonandra pulchra* Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 21 — *Bassia sericea* Blume, Bijdr. Fl. Ned. Ind., 1825, 674 — *P. sumatrana* Miquel, Fl. Ind. Bat. Suppl. Sum., 1860, 582 — *Isonandra sumatrana* (Miquel) Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 21 — *P. teysmanniana* Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 527; Lam 1925, 151, 263 — *P. suringariana* Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 49 — *P. ornata* Moore, J. Bot. 63, Suppl., 1925, 61. — *Fig. 2.*

Trees up to 42 m, diameter up to 0.92 m, girth up to 1.12 m. *Branchlets* slender, terete, with rough bark, appressed ferruginous pubescent, stipules caducous, narrowly triangular, acute, long red ferruginous pubescent, 0.2—0.35 cm long. *Leaves* dispersed along branchlets, sometimes to a small degree crowded at tips of branchlets, chartaceous to coriaceous, apex acuminate, acute or obtuse acute, base cuneate to rounded, petioles 1—3 cm long, ferruginous pubescent to subglabrous, rough; blade 6.5—24 by 2.8—9 cm, broadly elliptic to more narrow long ovate, in young leaves sometimes lanceolate, glabrous above, (pale) ferruginous pubescent below,

sometimes pubescence sparingly only in basic part of leaf and along midrib and secondary nerves; midrib sunken above, prominent below; secondary nerves to some degree prominent above, inconspicuous to hardly visible below, 14—22, straight, archingly joined near margin, starting from midrib at angles of about 70—80°, curving towards apex near margin; tertiary nerves conspicuous above, inconspicuous below, some more or less parallel to secondary ones, others stretchedly reticulate, generally one of the parallel ones somewhat more conspicuous and placed in the middle between two secondary nerves, descending. *Inflorescences* in axils of leaves or of scars of leaves, 2—13-florous, pedicels 0.7—1.3 cm long, minutely pubescent. *Sepals* 0.4—0.5 by 0.4—0.5 cm, deltoid or long deltoid, obtuse acute, outside appressedly pubescent, inside glabrous, inter ones ciliated along edges. *Corolla* frequently exsert, 0.7—0.9 cm long, tube 0.3—0.4 cm long, lobes 8, long elliptic, acute, glabrous. *Stamens* 16, 0.4—0.5 cm long, filaments long and thin, glabrous, apex of connective long acute to obtuse acute, thecae long elliptic, comparatively thick. *Pistillum* 1.2—1.5 cm long, subglabrous to glabrous, base pubescent; ovary conical, small, villous, cells 8, ovules ovate rounded. *Fruits* 2.9—3.6 by 1.2—1.8 cm, long ovoid to obovate, acuminate, base narrow, subglabrous to glabrous (young ones pubescent); seeds 1 or 2, 2.3—3 by 1.1—1.4 by 0.5—0.7 cm, laterally compressed, scar 0.2—0.4 cm wide, cotyledons flat and foliaceous, radicle cylindrical, 0.2—0.4 cm long, inferior, exsert; incrassate pedicels 1—2 cm long, glabrous, incrassate persistent sepals 0.4—0.5 by 0.4—0.5 cm, subglabrous to glabrous, persistent style 0.8—1 cm long.

Lectotype specimen: *Blume 239* in L.

Uses: Timber, gutta of inferior quality, fruits edible.

Distr.: Siam, Malay Peninsula, Sumatra, Riau, Simalur, Java, Borneo.

Var. **acuminata** — Synonymy as in species, except for the names cited sub var. *pulchra*.

Base of *leaves* attenuate, leaves comparatively narrow, 4—7 cm wide, secondary nerves thin, hardly prominent below, petioles 1—3 cm long.

Vern. names: chakhun, pi kul pa (Siam); balam, b. durian, b. suntek, b. timah, geneng, genong, kaju kentan, kontan, majang bulan, m. damanik, m. lisak, njatuh balam, punti, simartarutung (Sumatra); balam tembaga, b. turian, suri manuk (Simalur); djenggot, djenkot, getta, kellau, ki, k. kepel, kituwah, matak rasberassan, santenan, tandjungan, taun, tendjang (Java); baitis, manatu, matu, monongan najah, natu, nyatoh, n. merah, n. laka, sendi, tinkawang lilin (Borneo).

Distr.: Siam, Malay Peninsula, Sumatra, Simalur, Java, Borneo.

SIAM. Pattani, Bukit Nasi, Toh Moh, evergreen forest, 200 m: *Kerr 648* (K, BM), fl. Apr. — Surat, dipterocarp forest of Bangbao: *Llewelyn Williams 17113* (L), height 15—25 m, fl. Feb.

MALAY PENINSULA. Trengganu, Ulu Brang, 200 m: *Moysey & Kiah SF 33747* (BM, SING), fr. July; ibidem: *Moysey & Kiah SF 33749* (BM, BO, SING), fr. July.

SUMATRA. Atjeh and Dep., Pedie Tjot Ludas, 450 m: *FRI bb 8497* (L). — East Coast, Bandar Pulu, Asahan: *Yates 1687* (L, S, SING), fl.; ibidem: *Yates 2575* (BO); Hutan Padang Estate near Kisaran: *Krukoff 229* (SING, US), fr. Dec.; Labuan Batu, Gunting Sago: *FRI bb 7733* (BO), height 26 m, diam. 0.45 m; Simelungun: *FRI bb 30177* (L, SING), fr. Dec.; ibidem, Marikat Hoita, 700 m: *FRI bb 4869*

(SING), fl. Oct.; ibidem, Perbutaran, old forest, 140 m: *FRI bb 5353* (L), height 27 m, diam. 0.45 m; ibidem, Radja Hombang, 150 m: *FRI bb 8550* (BO), height 29 m, diam. 0.40 m — Tapanuli, Mandailing, 1000 m: *FRI bb 6181* (L), fr. Oct. — West Coast, Ophir, Lub Gadang, Parit, old primary forest, 90 m: *FRI bb 18731* (L), height 42 m, diam. 0.60 m; Painan, Burung Balantai: *FRI SWK 1—10* (L, SING), fl. fr. Oct.; Painan, Lubuk Gangger, 600 m: *FRI bb 5468* (L); Pajakumbuh, 1000 m: *FRI bb 2898* (L) — Palembang, Banjuasin and Kubus countries: *FRI 35 T 1 P 39* (L, SING, U), fl. Aug., fr. Feb.; Lematang Ilir: *FRI T 570* (L, SING, U), fl. Sep., fr. Nov. Dec.; ibidem: *FRI 136 E S P 819* (L, SING, U), fl. fr. Jan.; ibidem, near dusun Megang: *FRI T S P 408* (L, SING, U), fl. Nov., fr. Febr.; Oganhulu: *Teysmann s.n.* (BO); ibidem: *Anonymous s.n.* (L, U); Rawas, 150 m: *Grashoff 1152* (L) — Benkulen, Redjang, 600 m: *FRI bb 2999* (L, SING); Talang Benal, 250 m: *FRI bb 8788* (L), fr. June — Lampong Districts, *Anonymous s.n.* (BO), fl.; Sumatra without locality: *Forbes s.n.* (L), fl.; *Korthals s.n.* (L), fr., sterile; *De Vriese s.n.* (L); *Anonymous s.n.* (L), fl.

Riau. without known loc.: *Rhodine s.n.* (SING), height 21 m, diam. 0.45 m.

Simalur. Tapah district, Defajan: *Achmad 1498* (L); only Simalur: *Achmad 61* (L), fr. Nov.; *Achmad 273* (L); *Achmad 1244* (G, L, SING, U), fl. July; *Achmad 1306* (G, L, U), fl. Aug.

Java. West Java, Bogor: *Heyne s.n.* (L), fl.; Bogor, Handjere, Janglappa, primary forest: *FRI Ja 6220* (L), height 14 m, diam. 0.40 m, fr.; Bogor, Nature Reserve Dungus Iwul near Djasinga, old forest, 220 m: *FRI Ja 1964* (BO), diam. 0.84 m; Cheribon: *Houter s.n.* (BO); Djakarta: *Junghuhn s.n.* (BM), fl.; Djakarta, Depok, 1000 m: *Beumée 6020* (L), fr. Nov.; ibidem, 95 m: *Beumée 5672* (L); Djakarta, Tjampea: *Raciborski 324* (BO); ibidem: *Koorders 30412 β* (L), Gunung Besar, near Tjidadap, S. of Tjibeber, 1000 m: *Winckel 248 β* (BO), fl. Aug.; ibidem: *Winckel 268* (L, SING, U), fl. Aug.; Gunung Gedeh: *Junghuhn 247* (L), fl.; Gunung Salak, near Bogor, 700 m: *Koorders 24402 β* (BO, L, U), height 24 m, diam. 0.56 m, fl. fr. Sep.; Krawang: *Anonymous s.n.* (L); Plabuan Ratu, 400 m: *Koorders 10164 β* (L); Sanggrawa, Sukabumi, 400 m: *Koorders 10165 β* (BO), height 20—25 m, diam. 0.40—0.60 m; Takoka, Tjantjur, 1100 m: *Koorders 10166 β* (BO), fl. July; ibidem: *Koorders 10167 β* (L), fl. July; ibidem: *Koorders 12120 β* (L); ibidem: *Koorders 12121 β* (L); ibidem: *Koorders 15230 β* (L); ibidem: *Koorders 25603 β* (L); ibidem: *Koorders 32672 β* (BO); ibidem: *Koorders 37284 β* (BO, L), fl., fr. Oct.; ibidem: *Koorders 39600 β* (BO); Udpung Kulon, Tjimara, Menen Bantam: *Koorders 10168 β* (BO), height 15—25 m, diam. 0.30—0.35 m — Central Java, Gunung Wruia, Tjolle, E. of Kudus, 700 m: *Kostermans 6266* (L), height 35 m, diam. 0.50 m, fl. Nov.; Japara, Sumanding, old forest, 800 m: *FRI Ja 1877* (L), height 21 m, diam. 0.51 m, fl. May; ibidem: *FRI Ja 3824* (BO, L), height 23 m, diam. 0.50 m, fl. May; S. of Margasari, Pekalongan, 100 m: *Noltée 4018* (BO); Ngarengan, Taju, Djuwana, Japara: *Koorders 35052 β* (BO), height 25 m, diam. 0645 m, fl. May; Pringombo, Singomerto, Bandjarnegara, Banjumas: *Koorders 10162 β* (BO); ibidem, 800 m: *Koorders 33811 β* (BO); Prupuk, Pekalongan, mixed forests: *Wind 4018* (BO), fl. July; Semarang, Unggarang, N. slope: *Junghuhn s.n.* (L), fl. May, June — East Java, Besuki, Pradjekan, Situbondo, Pantjur Idjen, primary forest: *Koorders 14703 β* (BO), height 35 m, diam. 0.92 m; ibidem, 1000 m: *Koorders 10169 β* (BO), height 20 m, diam. 0.62 m; ibidem: *Koorders 14702 β* (BO); Besuki, Tjuramanis: *Koorders 10170 β* (L), fl. fr. Nov.; ibidem: *Koorders 10172 β* (BO); ibidem: *Koorders 10173 β* (L); ibidem: *Koorders 10174 β* (L); ibidem: *Koorders 10175 β* (BO), height 22 m, diam. 0.90 m; ibidem: *Koorders 10176 β* (BO), height 18 m, diam. 0.45 m; ibidem: *Koorders 10177 β* (L); ibidem: *Koorders 10178 β* (BO); ibidem: *Koorders 20799 β* (L); ibidem: *Koorders 20948 β* (L); ibidem: *Koorders 20974 β* (L, SING), fr. Nov.; ibidem: *Koorders 21841 β* (BO); ibidem: *Koorders 21844 β* (L); ibidem: *Koorders 25603 β* (L); ibidem: *Koorders 29084 β* (L); ibidem: *Koorders 38505 β* (BO); ibidem: *Koorders 38567 β* (BO); ibidem: *Koorders 39991 β* (L), fl. June; ibidem: *Koorders 40007 β* (L), fl. June; ibidem: *Koorders 40015 β* (L), fl. June; ibidem: *Koorders 40064 β* (BO), fl. June; Besuki, Rogodjampi: *Koorders 29085 β* (L), fr. Sep.; Bondowoso, Kembang, old forest, 750 m: *FRI Ja 2865* (L), height 23 m, diam. 0.35 m; Gunung Parang, Tjantjur: *Blume 1258* (L), fl. July (*type* of *Bassia sericea* Blume); Pasuruan, Tangkil, Southern Mountains, 400—500 m: *Koorders 23926 β* (BO, L); Java without locality: *Blume 239* (L), fl. (*type*); *Blume s.n.* (BO, L, U), fl. fr. sterile; *De Vriese 23* (L), fl.; *De Vriese s.n.* (L), fl.

BORNEO. West Borneo, Melawi Tjatit, Bukit Tenkujung, 450 m: *FRI bb 26458* (L) — South and East Borneo, Balikpapan, Mentawir, primary forest: *FRI bb 34909* (L), height 10 m, diam. 0.20 m, fl. Sept.; Berau, Domaring, old forest: *FRI bb 18825* (BO, L, SING), height 22 m, diam. 0.75 m; Madjamut, Pulu Laut: *Delmaar 2001* (SING), fl. Sep.; Riam Kanan: *Anonymous 2007* (L, U), fl. Sep.; West Kutai, Longbleh: *FRI bb 16040* (L); ibidem: *FRI bb 16041* (L) — Sandakan, Belaching Reserve: *Castro N. Born. FD 3793* (SING), height 5 m, diam. 0.075 m, fl. Apr.; Bettotan, river bank: *N. Born. FD 4537* (K), height 10 m, girth 0.50 m, fl. Mar.; Elopura, Kabili-Sepilok Forest Reserve: *Enchai Mal. FD 48783* (KEP), height 17 m, girth 0.60 m, fl. June; ibidem: *Enggoh Mal. FD 55118* (KEP), height 13 m, girth 1.12 m, fr. Sep.; ibidem: *Otik N. Born. FD 4353* (K, SING), height 10 m, girth 0.25 m, fl. Mar.; ibidem: *Enggoh N. Born. FD 4608* (K, L), height 6.50 m, fl. Aug.; ibidem: *Keith N. Born. FD 4608* (K, SING), height 5 m, girth 0.25 m, fl. May; ibidem: *Enchai N. Born. FD 9996* (K, L), height 15 m, girth 0.60 m, fl. June; ibidem: *Kadir N. Born. FD A 42* (K, KEP, SING), height 8 m, girth 1 m, fl. Sep.; ibidem: *Kadir N. Born. FD A 659* (KEP, SING), height 20 m, girth 0.80 m, fr. Dec.; ibidem: *Muliadi N. Born FD A 809* (KEP, SING), height 6 m, girth 0.10 m, fl. June; ibidem: *Kadir bin Abdul N. Born. FD A 2881* (KEP, L, SING), height 13 m, girth 0.30 m, fl. July; ibidem flat land near river: *N. Bor. FD 10634* (K), height 13 m, girth 1.12 m, fl. Sep.; Elopura, Supu Forest Reserve, Kinabatangan: *N. Born. FD 10076* (K), height 6.50 m, girth 0.25 m, fl. Oct.; Kinabatangan, Batuh Puteh, flat land: *N. Born. FD 1750* (K), height 9 m, diam. 0.20 m, fl. Apr.; Kinabatangan, Bukit Garam: *Wood N. Born. FD A 4720* (L), height 27 m, fl. June; Kinabatangan Besar, Kori: *Cuadra N. Born. FD A 2163* (KEP, SING), height 7.50 m, girth 0.45 m, fl. Oct.; Sekong River Valley: *Sales N. Born. FD 4311* (SING), fl. Mar.; Tawao, Elphinstone Province: *Elmer 21236* (BO, K, L, S, SING, U), fl. fr.; ibidem: *Elmer 21441* (BO, G, K, L, S, SING, U), fl. fr.

MALAY ARCHIPELAGO. without known loc.: *Korthals s.n.* (L); *Anonymous s.n.* (BO), fr.

CULTIVATED. Botanical Gardens Bogor: *Becoari s.n.* (FI), fl.; *Hochreutiner 36* (G); *Teysmann s.n.* (L, U), fl. fr. sterile; *Anonymous s.n.* (BO, L, NY, SING), fl. fr. sterile.

Var. **pulchra** (Burck) H. J. Lam, Lam 1925, 142; Lam 1927, 441 — *Isonandra pulchra* Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 21 — *P. sumatrana* Miquel, Fl. Ind. Bat. Suppl. Sum., 1860, 582 — *Isonandra sumatrana* (Miquel) Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 21 — *P. teysmanniana* Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 527; Lam 1925, 151, 263 — *P. ornata* Moore, J. Bot. 63, Suppl., 1925, 61.

Base of leaves broad, leaves comparatively broad, 7—15 cm wide, secondary nerves rather thick, prominent below, petioles 1.5—2 cm long.

Type specimen: *Burck s.n.* in BO, Herbarium Bogoriense 151357—151368.

Vern. names: balam, b. beringin, b. durian, b. kelemangung, b. ketiau, b. ketjil, b. pinang, b. sasak, b. tembaga, b. timah, getah balam, kaju balam, k. tamem, mayang bulan, m. damanik (Sumatra); matu besi (Borneo); djenkot (Java).

Distr.: Sumatra, Java, Borneo.

SUMATRA. East Coast, Simelungun, Marihat Hoita: *FRI bb 4869* (L), fl. Oct. — Tapanuli, Angkola and Sepirok, 1300 m: *FRI bb 6161* (L) — West Coast, Anduring: *Burck s.n.* (BO, L); Kerintji, Indrapura, Air Lebo, 1400 m: *FRI bb 18760* (BO, L), height 22 m, diam. 0.60 m; Muara Labuh, Timulun, 1000 m: *FRI bb 6103* (L); Padang Pandjang, Tambangan: *FRI bb 5506* (L); Supajang, Ajer Busu: *Burck s.n.* (BO, type), fr. — Benkulen, Redjang, Karanganjar, 900 m: *FRI bb 8837* (L); ibidem *FRI bb 8838* (L, U), fr. Feb. — Palembang, Muara Dua: *Anonymous s.n.* (L, U); ibidem, 150 m: *Grashoff 504* (BO), height 28—30 m, diam. 0.60 m; ibidem, Kisau, old forest, 800 m: *FRI bb 9221* (BO), height 23 m, diam. 0.24 m;

ibidem: *FRI bb 9225* (BO), height 16 m, diam. 0.23 m; ibidem, Sungei Pagu: *Teysmann s.n.* (BO); Palembang: *Teysmann 3730* (U), fr.; Rawas, 200 m: *Dumas 1636* (L, SING, U), fl. July; Sumatra without loc.: *Burck s.n.* (BO, CAL, P, U, SING); *Forbes s.n.* (BM); *Korthals s.n.* (L); *Teysmann s.n.* (L, P); *Teysmann & De Vriese* (L); *De Vriese 81* (P); *De Vriese s.n.* (L), fl. fr.; *De Vriese & Teysmann s.n.* (L); *Anonymous s.n.* (L); *Anonymous s.n.* (P).

JAVA. West Java, Gunung Gedeh: *Houtsoorten Gedeh 87* (L) — Central Java, Pringombo, Banjumas, 700—900 m: *Koorders 11103 β* (L) — East Java Pasuruan, Tangkik, Southern Mountains, 400—500 m; *Koorders 23989 β* (L).

BORNEO. West Borneo, Gunung Damar Putih, Tewingan: *FRI 2151* (L), fl.; Sanggau: *Hallier 863* (L, SING, U), fl. — South and East Borneo, Berau, Karai: *FRI bb 19151* (BO, L), height 26 m, diam. 0.45 m; Pasir Lebaran: *FRI bb 2666* (L), fl. Sep.; Sandakan, Elopura, Kabili-Sepilok Forest Reserve: *Puasa N. Born. FD 4887* (K, L), height 12 m, girth 0.60 m, fr. June.

CULTIVATED. Botanical Gardens Bogor: *Anonymous s.n.* (L).

WITHOUT LOCALITY — *Riedel s.n.* (BO, P), labelled Celebes, Minahassa, according to Lam (Lam 1927, 441) and Van Steenis—Kruseman (Fl. Mal. (I), 1, 1950, 438) there is a probability that this specimen originates from Banka or Billiton; *Anonymous s.n.* (L).

Remarks: Generally it is rather easy to distinguish the two varieties of the present species; there are, however, specimens that form a transition between the two, notably from Sumatra. The most reliable character is the nervation of the leaf, especially the secondary nerves below.

Frequently one finds plants with fruits showing different shapes (cf. *Fig. 2*); the smaller fruits invariably have one seed only, which does not look very apt to germinate.

Probably duplicates of the types were distributed at least to Leiden and Utrecht; it is, however, practically impossible to find out what specimens are really duplicates of the type, since the plants in question bear labels with "Burck, Sumatra" in the handwriting of Burck himself only. Some of the synonyms mentioned seem to be based on watershoots, e. g. *P. sumatrana* Miq. and *teysmanniana* Pierre. The types belonging to these names are mostly sterile and have unusually large leaves.

Pierre and Miquel both obviously referred to the same species; therefore a *P. sumatrana* Pierre does not exist. The only difference is that Miquel was in doubt about the genus, i. e. he added a question mark to *Payena*.

Lam (Lam 1927, 442) quoted *P. ornata* as a synonym to *P. dantung*; the type of Moore, which was at our disposal, shows that it rather belongs to *P. acuminata* var. *pulchra*.

In one specimen, viz, *Anonymous s.n.* (L), Cult. Hort. Bot. Bog. sub num. IV D 93, Lampong Districts, Sumatra, I found a fruit of 2.6 by 1.4 cm with 4 small seeds of 1.5 by 0.5 cm, scar 0.1 cm wide. This case should be considered an abnormality, moreover the seeds do not look viable; generally *P. acuminata* has one seed in the fruit, and occasionally two.

The flowers and latex are white, the fruits greenish.

3. Payena maingayi Clarke in Hooker, Fl. Brit. Ind. 3, 1882, 547; Lam 1925, 133; Lam 1927, 442; Heyne, Nutt. Pl. Indon. 1, 1950, 1228; Wyatt-Smith, Res. Pamphl. 4, 1954, 53 — *P. grandiflora* Ridley, J. As.

Soc. Straits 61, 1912, 28 — *Diploknema grandiflora* (Ridley) H. J. Lam, Lam 1925, 185; Lam 1927, 363 — *Fig. 3.*

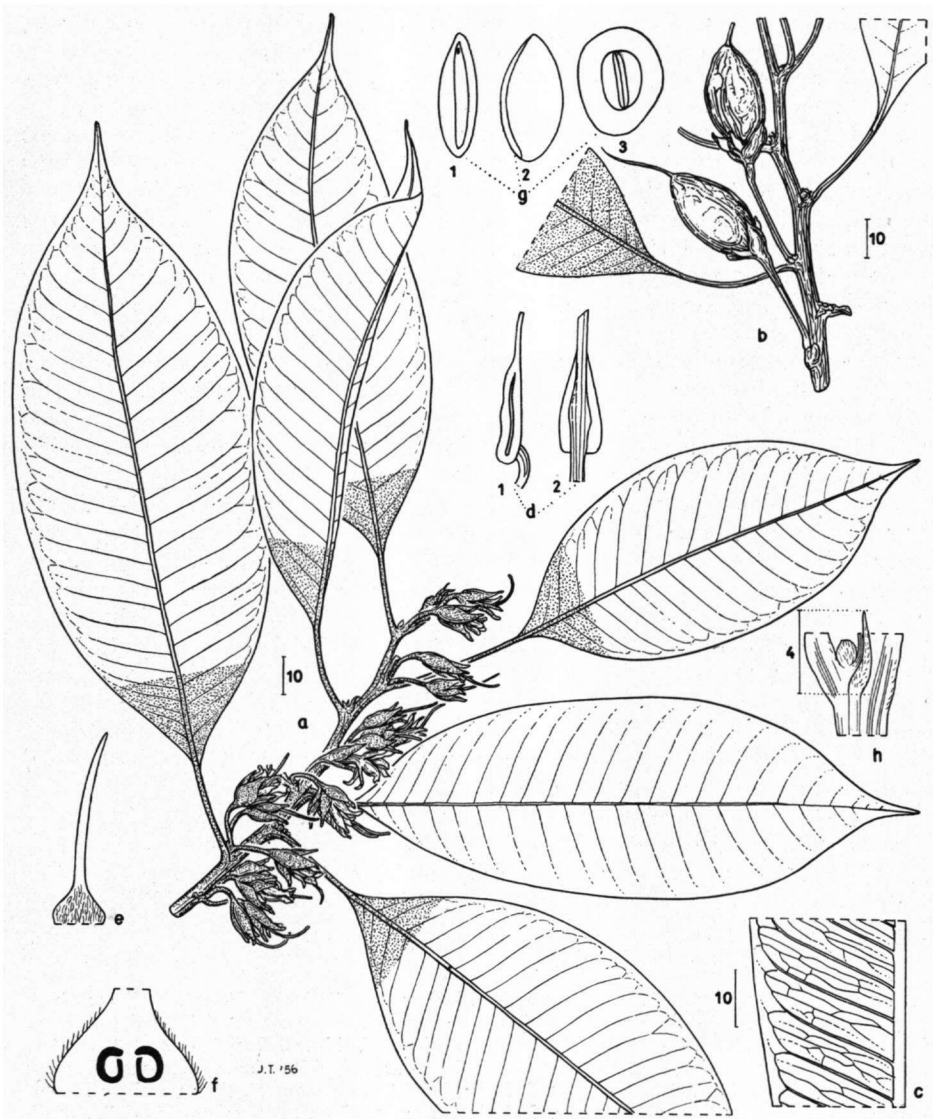

Fig. 3. *P. maingayi*, a. branchlet with leaves and flowers; b. branchlet with fruits; c. nervation of leaf; d. 1. stamen, lateral view; d. 2. stamen, frontal view; e. ovary and style; f. ovary, longitudinal section; g. 1. seed, ventral view; g. 2. seed, lateral view; g. 3. seed, cross-section; h. stipule. a., c. from *SF 21116*, b. from *CF 596*, d.—f. from *Cantley s. n.*, g. from *Kings Collector 7223*, h. from *SF 37734*. Figures d.—g. adapted after an already existing plate in the Icones collection in the Rijksherbarium, Leiden, h. adapted after a sketch of the author.

Trees up to 33 m, girth up to 2.31 m. *Branchlets* slender, terete, rusty tomentose, stipules caducous, though generally longer persistent than in other species, 0.4—0.6 cm long, narrow and acute, long rusty pubescent. *Leaves* dispersed along branchlets, coriaceous, apex acuminate, base cuneate, petioles 1.5—4.5 cm long, red ferruginous pubescent, sometimes slightly alate at apex; blade 10—32 by 3.7—9.5 cm, oblong lanceolate, glabrous above, sometimes a short ferruginous pubescence along the midrib, appressed ferruginous pubescent below; midrib sunken above, prominent below, sometimes with faint grooves; secondary nerves not very conspicuous above, prominent below, 20—25, straight and thin, archingly joined near margin, starting from midrib at angles of about 60—75°, curving towards apex near margin; tertiary nerves inconspicuous above to a small degree prominent below, mostly more or less parallel to secondary ones, frequently near edge of leaf somewhat reticulate, generally one of the parallel nerves somewhat more conspicuous and placed in the middle between two secondary nerves, descending. *Inflorescences* in axils of leaves or in scars of leaves, 2—12-florous, flowers comparatively large, pedicels 1.2—3.5 cm long, somewhat thickened towards the flowers, appressedly pubescent. *Sepals* 0.75—1.1 by 0.4—0.6 cm, long triangular to ovate, acute, pubescent, inside glabrous. *Corolla* exsert, 0.9—1.6 cm long, tube 0.3—0.4 cm long, lobes 8, lanceolate to long ovate, obtuse acute, glabrous. *Stamens* 16, 0.6—0.7 cm long, glabrous, filaments not very short, thick, apex of connective long, thin and acute, thecae elliptic to ovate. *Pistillum* 1.8—2.2 cm long, glabrous, base villous; ovary conical to rounded, long red ferruginous pubescent, cells 8, ovules rounded, 0.05 cm long. *Fruits* 2.5—3.5 by 1.5—2 cm, oblong to elliptic, short pubescent, rarely subglabrous; seeds 1, sometimes 2, 2.5—2.8 by 0.9—1.2 by 0.7—0.8 cm, laterally compressed, scar 0.4—0.6 cm wide, cotyledons flat and foliaceous, radicle inferior; incrassate pedicels 1.5—4 cm long, appressedly pubescent to subglabrous, persistent sepals 0.7—1 by 0.4—0.6 cm, appressedly pubescent to subglabrous, persistent style 0.9—2 cm long.

Neotype specimen: *Maingay 990* in K.

Uses: Timber, firewood.

Vern. names: getah sundik, maiang taban, mayang, mentua nyatoh, m. taban, nyatoh, n. paya, n. tembaga, sawoh, sundik burong (Malay Peninsula).

Distr.: Malay Peninsula.

MALAY PENINSULA. Kedah, Kuala Nerang, Bukit Batu Jajam, 300 m: *Mal. FD 67874* (KEP), height 30 m, girth 1.75 m; Sik: *Mal. FD 73798* (K), height 28 m, girth 1.56 m, fl. Apr. — Penang, Reserve line W. hill, 650 m: *Curtis 1565* (K, SING), fl. Apr. — Perak, Kedah-Perak boundary, Bukit Kuala Ketang, Gunong Bintang: *Moh. Haniff SF 21116* (BO, SING), height 12—15 m, fl. Apr.; Chikus Forest Reserve: *Mal. FD 30118* (KEP), fr. Feb.; Upper Perak, Ulu Kenderong, Grik: *Mal. FD 11604* (K, SING), fl. Apr.; Upper Perak, 100 m: *Wray 3423* (SING), height 18 m, fl. May; Gunong Malacca, open jungle clearing, 100—260 m: *King's Collector 7223* (BM, K, BO) ,height 20—26 m, diam. 0.50—0.66 m, fr. Jan.; Perak, open jungle: *King's Collector 9918* (BO), height 15—23 m, diam. 0.37—0.5 m, fr. July; Perak: *Scortechini 346b* (BM, L, P, SING), fr. — Kelantan, Mengkebang: *Mal. FD 68314* (KEP), height 1.25 m, girth 0.10 m — Selangor: Bukit Endong Reserve, Ulu Langat: *Mal. FD 50440* (KEP), height 2.90 m, girth 0.17 m, fl. Aug.; Kuala Lumpur, Ulu Langat Forest Reserve, 200 m: *Mal. FD 71387* (K, KEP), height 33 m, girth

2.31 m, fl. Aug.; Kuala Lumpur, Sungei Buloh Reserve: *De Zylva Mal. FD 9593* (KEP, SING), fl. Sep.; Kajang, Bukit Tunggal Reserve, Ulu Tangot: *Mitchell Mal. FD 309* (KEP, SING), height 26 m, fl. Mar.; Kajang: *Watson Mal. FD 596* (KEP, SING), fr. July = *Burkill Mal. FD 596*; hill slope, plantation, Kepong: *Mal. FD 37558* (KEP), height 10 m, girth 0.45 m — Pahang, Belingo, Temerloh: *Awang Lela Mal. FD 2688* (KEP, SING), fl. Sep.; ibidem: *Pawangee Mal. FD 13774* (KEP), height 26 m, girth 1.32 m, fl. Sep.; Kemansul Reserve, Temerloh: *Hamid Mal. FD 10615* (K), fl. Sep.; Rumpiu: *Lambah Mal. FD 2713* (K, SING), fl. Apr.; Sang, Lanar Bentong: *Saleh Mal. FD 3926* (K), fl. Sep.; Pahang: *Foxworthy 1155* (KEP), fr. — Negri Sembilan, Durian Tawar, State land: *Tahir Mal. FD 0627* (K), fl. Oct. — Malacca, Ayer Panas: *Curtis 3483* (K), height 23—27 m, girth 0.45—0.60 m; Bukit Senggeh Reserve, 264 m: *Mal. FD 2067* (KEP), height 30 m, girth 0.95 m, fl. May; Malacca Town: *Goodenough 1427* (SING), fr. Sep.; Panchore: *Goodenough 1268* (SING), fr. July; Sungei Udang Forest Reserve, forest by roadside: *Sinclair SF 40588* (L), height 10 m; Malacca: *Cantley s.n.* (BO), fl. — Johore, Gunong Palai: *Mal. FD 7785* (BO, SING), fr. Apr.; Kota Tinggi, Mawai Road, swampy forest: *Corner SF 21318* (BO, K, KEP, SING), fl. Feb. — Singapore, Kruing Path, Bukit Timah Forest Reserve: *SF 39663* (K, L); Bukit Timah: *Ridley 6239* (BM, K, SING), fl. May; Choa Chu Kang: *Ridley 6696* (SING), fr.; Sungei Morai: *Ridley 6497* (K), fr.; Mandai Road: *Corner SF 37734* (BM, BO, K, SING); only Malaya: *Maingay 990* (*type*, BM, K, L, P).

CULTIVATED. Botanic Gardens Singapore: *Ridley 11571* (K), fl. Apr., fr.; *Anonymous s.n.* (K).

Remarks: A very characteristic species with large leaves and flowers, named in honour of A. C. Maingay, a British colonial officer.

On account of Ridley's erroneous remark (Ridley loc. cit., 29): "Sepals ovate subobtuse nearly half an inch long 5, ..." Lam transferred *P. grandiflora* to the genus *Diploknema*. In our opinion it is evident that this species is quite identical with *P. maingayi*. Only once did I find a fruit with three seeds, *viz*, *Scortechini 346b* in SING.

The flowers are white, sometimes yellowish pink; the latex is white.

4. Payena dantung H. J. Lam, Lam 1925, 134, *fig. 37*; Lam 1927, 442; Heyne, Nutt. Pl. Indon. 1, 1950, 1227 — *Fig. 4.*

Trees up to 15 m. *Branchlets* terete, with short ferruginous pubescence, stipules caducous, acuminate, pubescent, 0.4 cm long. *Leaves* dispersed at tips of branchlets, chartaceo-membranaceous, apex obtuse-acuminate, narraw, base cuneate, petioles 2—3 cm long, somewhat channeled, with a short ferruginous pubescence; blade 20—37 by 8—11 cm, oblong elliptic , glabrous above, sericeous ferruginous pubescent below, especially along the nerves; midrib sunken above, sometimes sulcate, very prominent below, same colour as the blade or somewhat darker; secondary nerves comparatively faint, especially above, 26—32, archingly joined near margin, starting from midrib at angles of about 70—75°, straight, curving towards apex

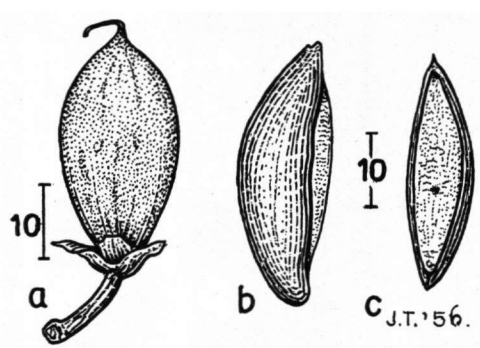

Fig. 4. *P. dantung*, a. fruit; b. seed, lateral view; c. seed, ventral view. From *van Romburgh s.n.*

near margin; tertiary nerves faint, near margin forming a reticulate pattern and near midrib more or less parallel to secondary ones, generally one of the parallel nerves somewhat more conspicuous and placed in the middle between two secondary ones, starting from marginal edges. *Inflorescences* mostly in axils of leaves, 1—3-florous, pedicels 0.4—0.7 cm long, comparatively thick, pubescent. *Sepals* 0.5—0.6 by 0.5 cm, ovate to triangular, acute, outside pubescent, inside glabrous. *Corolla* 0.7 cm long, tube 0.3 cm long, lobes 8, obtuse-rounded to acute, glabrous, mostly at the outside with some pubescence in the middle of each lobe. *Stamens* 16, 0.2—0.3 cm long, filaments thick and short, glabrous, apex of connective very short to invisible, thecae oblong-acute. *Pistillum* 0.9—1 cm long, subulate, glabrous, base pubescent; ovary conoidal, pubescent, cells 8. *Fruits* 3—4.5 by 1.6—2 cm, oblong-ovoid, minutely appressed pubescent; seeds 1—2, 3.7—4 by 1.4 by 1—1.1 cm, oblong, scar 0.7—0.9 cm wide, cotyledons foliaceous, radicle cylindrical, 0.4—0.5 cm long; thickened pedicels 1.2—1.5 cm long, persistent sepals 0.6—0.7 by 0.6 cm, persistent style 0.8—0.9 cm long.

Lectotype specimen: *Van Romburgh s.n.* in BO.

Vern. names: balam kèdjèl, b. kedjil, dantung (Sumatra).

Uses: Guttah of inferior quality.

Distr.: Sumatra.

SUMATRA. West Coast, Oganhulu: *Ten Brummeler 43* (BO); Lubuk Gedang: *Van Romburgh s.n.* (*type*, BO, L), fl. fr. Oct. — Palembang, Rawas: *Grashoff 1109* (BO, K, L).

Remarks: This rare species seems to be confined to a rather restricted part of Sumatra. Although the leaves are large, it is a very moderate-sized tree with comparatively small flowers. Its nearest relatives, *P. acuminata, P. gigas,* and *P. maingayi,* are larger trees with longer pedicels and larger fruits.

5. Payena gigas Van Bruggen, nov. sp. — *P. gigantea* K. Griffioen & H. J. Lam, MS ined. — *Fig. 5.*

Arbores altae, altitudine maxima 30 m, diametro usque ad 0.50 m. *Ramuli* tenues, teretes, ferrugineo-pubescentes, stipulis caducis, longis triangularibus, acutis, dense pubescentibus, 0.8—1 cm longis. *Folia* praeter ramulos dispersa, coriacea, apice acuminata, basi cuneata ad rotundata, petiolis 2.5—5.5 cm longis, teretibus, aliquando canaliculatis, rare pubescentibus ad glabris; lamina 17—36.5 × 9—17.5 cm, ovata, supra glabra, subtus rare pubescens ad glabra, praecipue praeter costam nervosque secundarios; costa supra plana, subtus prominentissima nervi secundarii plani ad demersi supra, prominentissimi subtus, 27—32, recti, marginem versus arcuatim conjuncti, angulo 70—80° de costa adscendentes, prope marginem in apicem curvati; nervi tertiarii vix conspicui supra, plus minusve conspicui subtus, prope costam nervis secundariis paralleli, prope marginem plus minusve reticulati adscendentes descendentesque mixti, generatim unus inter nervos parallelos evidentior in media duorum nervorum secundariorum. *Inflorescentiae* axillares, 5—7-florae, pedicelli 1.5—5 cm longi, graciles, pubescentes. *Sepala* 0.5 × 0.7—0.8 cm, crassa, late deltoidea, latiores quam longa, apice rotundata ad acuminata, extus pubescentes fasci notato pubescentiae in apicibus suffulta, intus glabra; *corolla* juveniles tantum nota, petala 8, longe ovata, apicibus rotundatis-acuminatis, glabra; *stamina* 16, 0.2—

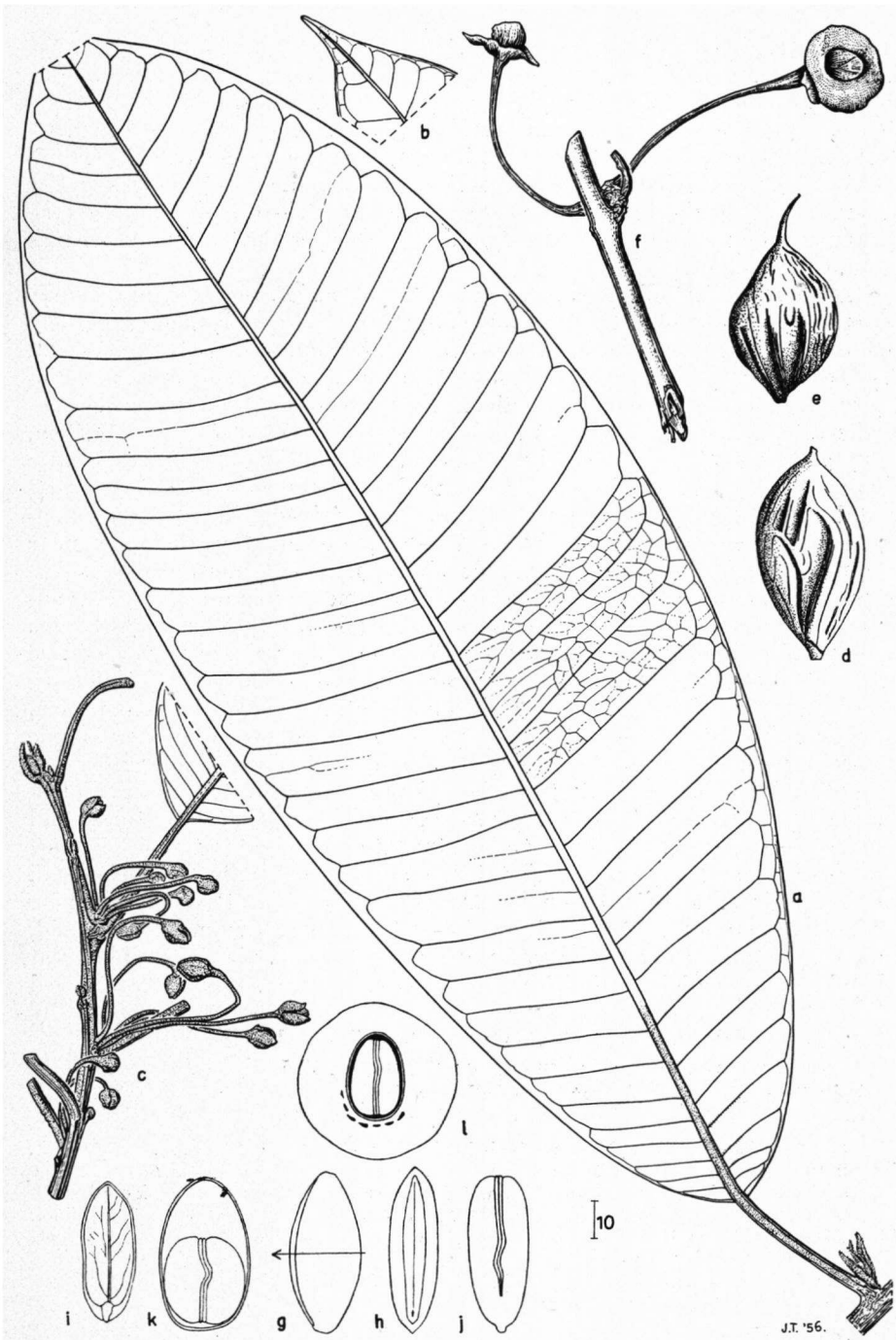

Fig. 5. *P. gigas*, a. leaf, b. apex of leaf, c. part of flowering branch, d. fruit, e. fruit, f. part of a branch with the basal parts of two fruits, g. seed, lateral view, h. seed, scar in the middle, i. embryo with one cotyledon removed, inner view, j. embryo, showing in the middle the two cotyledons, k. transverse section of the embryo in the seed, l. transverse section of a fruit showing the single fertile seed and some reduced ones. a. from *Clemens & Clemens 27316*, c. from *Clemens & Clemens 51322*, the rest from *Clemens & Clemens 27452*.

0.3 cm longa, filamentis crassis brevisque, glabra, apice connectivi obtusa ad acuminata, thecis oblongis; *pistillum* 0.3 cm longum, breve crassumque, glabrum; ovarium late conicum, glabrum, loculis 8. *Fructus* 3.7—5 × 2.9—3.7 cm, pro genere magni, longe ovoidei, glabri; semen 1, 3—4.7 × 1.3—2.3 × 0.9—1.6 cm, longe ovoideum, nitidum, spadiceum, cicatrice variabili, 0.3—3 cm lata, cotyledones planae foliaceaeque, radicula cylindrica, 0.3—0.4 cm longa; pedicelli aliquo modo incrassati, 3.5—6 cm longi, glabri, sepala persistentia incrassata 0.8—1 × 0.7—0.8 cm, glabra, stylus persistens 1.4—1.5 cm longus.

Large *trees* up to 30 m, diameter up to 0.50 m. *Branchlets* thin, terete, ferruginous pubescent, stipules caducous, long triangular, acute, densely pubescent, stipules caducous, long triangular, acute, densely pubescent, 0.8—1 cm long. *Leaves* dispersed along branchlets, coriaceous, apex acuminate, base cuneate to rounded, petioles 2.5—5 cm long, terete, sometimes canaliculate, sparingly pubescent to glabrous; blade 17—36.5 by 9—17.5 cm, ovate, glabrous above, sparingly pubescent to glabrous below, especially prominent below; secondary nerves flat to deeply sunken above, very prominent below, 27—32, rather straight, archingly joined near margin, starting from midrib at angles of about 70—80°, curving towards apex near margin; tertiary nerves hardly visible above, not very conspicuous below, near midrib more or less parallel to secondary ones, ascending and descending ones intermixed, near margin forming a reticulate pattern, mostly one of the parallel nerves somewhat more conspicuous and placed in the middle between two secondy nerves. *Inflorescences* in axils of leaves, 5—7-florous, pedicels 1.5—5 cm long, thin and long, pubescent. *Sepals* 0.5 by 0.7—0.8 cm, thick, broadly deltoid, wider than long, apex rounded to acuminate, outside pubescent with characteristic bundles of hairs at apices, inside glabrous; *corolla* (in bud) 0.23 cm long, tube short, lobes 8, long ovate, apex rounded-acuminate, glabrous; *stamens* 16, 0.2—0.3 cm long, filaments thick and short, glabrous, apex of connective obtuse to acuminate, thecae oblong; *pistillum* 0.3 cm long, short and thick, glabrous; ovary broadly conoidal, glabrous, cells 8. *Fruits* 3.7—5 by 2.9—3.7 cm, comparatively large, long ovoid, glabrous; seed 1, 3—4.7 by 1.3—2.3 by 0.9—1.6 cm, long ovoid, nitidous chestnut brown, scar variable, 0.3—1.3 cm wide, cotyledons flat and foliaceous, radicle cylindrical, 0.3—0.4 cm long; somewhat thickened pedicels 3.5—6 cm long, glabrous, persistent incrassate sepals 0.8—1 by 0.7—0.8 cm, glabrous, persistent style 1.4—1.5 cm long.

Type specimen: *Clemens & Clemens 27452* in L.

Distr.: Borneo, Mount Kinabalu region.

Borneo. Sandakan, Mount Kinabalu, Dallas: *Clemens & Clemens 26330* (BM), height 23 m, diam. 0.20 m, fr. Sep.; ibidem, 1000 m: *Clemens & Clemens 26330—27316* (B, BO, G, K, L), height 26—30 m, diam. 0.45 m, fr. Sep. Nov.; ibidem, Forest Hill, E. of Resthouse, 900 m: *Clemens & Clemens 27316* (BM, BO), height 26—30 m, diam. 0.45—0.50 m, fr. Nov.; ibidem, Mount Ridges, 1000 m: *Clemens & Clemens 27452* (*type*, in L, dupl. in B, BM, BO, G, K, L), fr. Dec.; ibidem, near bridle trail, 1100—1300 m: *Clemens & Clemens 51322* (BM, G, K, L), height 25—27 m, fl. Dec.

Remarks: Large tree of the lower hills, very probably endemic in this region of Borneo. Easily to be distinguished from *P. dantung* by its

practically glabrous leaves, its very prominent nervation below, its long pedicels of flowers and fruits, the sepals with hairtufts and its large fruits. The characters mentioned, distinguish it also from *P. acuminata* var. *pulchra*, to which it is closely allied. Moreover *P. gigas* is a large tree up to 30 m, while *P. dantung* does not exceed 15 m in height. The general shape of the leaves in *P. gigas* is ovate and that of *P. dantung* more oblong. The lower surface of the leaves in sicco shows a chestnut brown colour; those of *P. dantung* are of a characteristic yellowish brown.

It is surprising that this species, the stoutest of the genus, was not discovered until 1931 and not recognized before 1936 by Lam and Griffioen. Perhaps *P. gigas* is one of those cases suspected of polyploidy as are quoted by Van Steenis (Fl. Mal. (I), 4^2, 1949, LI).

The flowers are yet insufficiently known since we had buds only at our disposal. According to the labels the fruits *in vivo* are green and reach the size of a lemon.

6. Payena lucida (G. Don) De Candolle, Prodr. 8, 1844, 197; Lam 1925, 145, 262; Lam 1927, 431, *fig. 14*; Fletcher in Craib, Fl. Siam. Enum. 2, 4, 1938, 360; var. *nigra* King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, 1906, Extra Nr., 173; Lam 1925, 146; var. *typica* H. J. Lam, Lam 1925, 145; var. *wightii* (Hasskarl) Clarke in Hooker, Fl. Brit. India 3, 1882, 548; Lam 1925, 146; Fletcher in Craib, l. c., 361 — *Keratophorus wightii* Hasskarl, Retzia 1, 1855, 101 — *Mimusops lucida* Wallich, Cat., 1828, 4147 (p. p., fide Dubard, Ann. Mus. Col. Marseille (3), 23, 1915, 49, *nomen nudum)*; G. Don, Gard. Dict. 4, 1838, 35 — *P. parallelo-neura* Kurz, J. As. Soc. Bengal 40, 2, 1871, 70; Lam 1925, 151; Lam 1927, 443; Fletcher in Craib, l. c., 361 — *P. griffithii* Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525; Lam 1925, 151, 263; Lam 1927, 443 — *P. glutinosa* Pierre, l. c., 529; Lam 1925, 151; Lam 1927, 443 — *P. puberula* (Miquel) Pierre, l. c., 529; *Isonandra puberula* Miquel, Pl. Jungh., 1852, 201 — *P. dasyphylla* var. *glabrata* King & Gamble, l. c., 184; Lam 1925, 144; Wyatt Smith, Res. Pamphl. 4, 1954, 50 — *P. punctata* Fletcher, Kew Bull., 1937, 379; Fletcher in Craib, l. c., 361; *Bassia braceana* King & Gamble, l. c., 184, p. p., quoad *King's Collector* 3275.

Trees up to 30 m, diameter up to 0.90 m, girth up to 3.30 m. *Branchlets* slender, terete, densely ferruginous pubescent to subglabrous; stipules caducous. *Leaves* dispersed along branchlets, rarely to some degree crowded near tips of branchlets, chartaceous, apex acuminate, base cuneate, petioles 0.7—1.5 cm long, ferruginous pubescent to subglabrous; blade 8—23 by 3—8 cm, elliptic lanceolate to ovate, glabrous above, ferruginous pubescent to glabrous below, especially along the midrib and the secondary nerves, sometimes slightly villous; midrib sunken above, prominent below; secondary nerves inconspicuous above, prominent below, 10—16, straight, archingly joined near margin, starting from midrib at angles of about 50—70°, curving towards apex near margin; tertiary nerves hardly visible above, not very conspicuous below, some more or less parallel to secondary ones, others reticulate, generally one of the parallel ones somewhat more conspicuous and placed in the middle between two secondary nerves, descending. *Inflorescences* in axils of upper leaves, 2—8-florous,

pedicels 0.7—3.5 cm long, minutely pubescent to subglabrous. *Sepals* 0.4—0.5 by 0.5—0.7 cm, long deltoid to triangular, obtuse acute to acute, sometimes rounded, short sparingly pubescent to subglabrous. *Corolla* generally exsert, 0.5—0.8 cm long, tube very short, 0.1—0.2 cm long, lobes 8, oblong anceolate, obtuse acute, glabrous. *Stamens* 16, 0.3 cm long, filaments short and comparatively thick, glabrous, apex of connective broadly obtuse to bifid acuminate, thecae long ovate. *Pistillum* 0.7—1 cm long, glabrous, base villous or short pubescent; ovary rounded, ovoid to depressed conoidal, short appressedly ferruginous pubescent, cells 8, ovules rounded, comparatively small, 0.02 cm long. *Fruits* 1.1—2 by 1.5—3.7 cm, generally ovoid, sometimes oblong, ferruginous pubescent to subglabrous; seed 1, 1.8—2.9 by 0.8—1.2 by 0.5—0.8 cm, generally thick ovoid, sometimes laterally compressed and oblong, scar 0.3—0.4 cm wide, cotyledons flat and foliaceous, radicle comparatively large, inferior; incrassate pedicels 1.5—3 cm long, exceptionally longer (once 5.5 cm, *Clemens & Clemens 26329*), sparingly pubescent to subglabrous, incrassate persistent sepals 0.4—0.5 by 0.4—0.6 cm, persistent style 0.7—0.8 cm long.

Type specimen: *Wallich 4147* in K.

Vern. names: pi kun tuan (Siam); bidara, bidoru, ekor, getah ekor, kaya tanjong hutan, maiang bukit, medang tanjong, mitis, nyatoh, n. balem, n. balam, n. bunga, n. burong, n. hitam, n. metis, n. paya, n. pipit, n. tembaga, pako nyatoh, poko medang puravas, p. niato puteh, p. n. temaga, p. tuboh, purut plandok, sondek, taban, tampang (Malay Peninsula); kalimangong, meang tjingge (Sumatra); baringin djiput, ketiau, niantu, nyatoh, n. hitam, nyatu, n. lilin, n. merah, puntik merah (Borneo).

Uses: Timber.

Distr.: Burma, Siam, Malay Peninsula, Andamans, Sumatra, Banka, Borneo.

BURMA. Thaungyin, *Maung Ba Pe 13046* (K), height 13 m, fl. Jan. — Amherst, Menyaw Chaung Yunzalin Valley: *Parkinson 5299* (K), fl. Mar. — Tenasserim, *Helfer 3611* (BM, P, S, U), fl. — Mergui, forest at sea shore: *Helfer 3611* (K, P), fl. Jan.; without known loc.: *Griffith 3605* (FI, G, P, U), fl.

SIAM. Payap, Me Ping, Chieng Dao, evergreen forest, 400 m: *Kerr 5245* (BM, K), height 10 m. fl. Apr. — Rachaburi, Buw Tai, Petchaburi, evergreen forest: *Kerr 20375* (BM), height 1.80 m, fr. Mar. — Surat, Kaw Samui, evergreen forest, 300 m: *Kerr 12576* (BM, K), height 20 m, fl. Apr. — Puket, Kraburi Ranawng, evergreen forest: *Kerr 16363* (BM, K), height 25 m, fl. Dec.; Satul, Adang, evergreen forest: *Kerr 14087* (BM, K), height 35 m, fl. Jan. (type of *P. punctata* Fletcher) — Nakawn Sritamarat, Ban Pien, Songkla, evergreen forest, 100 m: *Kerr 14845* (BM, K), height 15 m, fl. Mar. — Pattani, Ban Pari, Toh Moh, 170 m: *Lakshnakara 669* (K), height 15 m, fl. Apr.; Kao Kalakiri, on hill: *Lakshnakara 394* (K), fl. Mar.

MALAY PENINSULA. Kedah, Gunung Bongsu: *Mal. FD 66373* (KEP), height 16 m, girth 0.90 m; Perangin Forest Reserve: *Awang Lela Mal. FD 42391* (KEP), height 20 m, girth 1.20 m; Nur Kuah, Langkawi Island: *Curtis 3687* (SING); Pulu Tuba Forest Reserve, Langkawi Island: *Mal. FD 66450* (KEP), height 20 m, girth 1.30 m — Perak, Bukit Kuala Ketang, Gunung Bintang, Kedah-Perak boundary: *Moh. Haniff SF 21095* (BM, BO, SING), fl. Apr.; Bujang Malacca: *Ridley 9701* (SING), fl. Sep.; Goping: *Scortechini 1989* (K, SING), fl. Apr.; Gunung Pateh, Lower Camp: *Wray 1170* (SING); Larut, open jungle, 100 m: *King's Collector 3275* (BO), height 13.50 m, diam. 0.10—0.20 m, fl. Aug. (type of *Bassia braceana* K. & G.); Larut: *King's Collector 3754* (K), height 4.50—6.50 m, diam. 0.075—0.10 m, fr. Jan. (type of *P. costata* King MS ex K. & G.); Larut, dense jungle, 165—265 m: *King's Collector*

4081 (K), height 6.50—10 m, diam. 0.15—0.30 m, fl.; Larut, open jungle, 150—300 m: *King's Collector 6636* (BO, SING), height 10—13 m, diam. 0.25—0.37 m, fl. Sep.; Plus Forest Reserve: *Moh. Yassin Mal. FD 39051* (SING), fl. Feb.; Sumpitau, Upper Perak: *Hamid Mal. FD 10415* (SING); Sungai Sah, Kinta: *Jaamat Mal. FD 28075* (KEP), fl. Mar.; Ulu Kenderong, Grik, near swamp: *Hamid Mal. FD 11045* (KEP), fr. Mar.; near Ulu Kerling, dense bamboo forest, 150—260 m: *King's Collector 8705* (BO, SING), height 10—13 m, diam. 0.20—0.30 m, fl. Mar.; dense jungle, 100—200 m: *King's Collector 7842* (BM, L), height 13—20 m, diam. 0.25—0.37 m, fr. July; open jungle, 100—200 m: *King's Collector 7957* (L), height 13—20 m, diam. 0.25—0.37 m, fr. Aug.; dense jungle, hills; 150—200 m: *King's Collector 10466* (SING), shrub up to 2.50 m, fr. July; dense jungle on mount, 250—330 m: *King's Collector 10496* (SING), height 10—13 m, diam. 0.20—0.30 m, fr. July; dense jungle en mountains, 500—700 m: *King's Collector 10978* (BM, BO, SING), height 3.50—4.50 m, diam. 0.05—0.07 m, fr. Sep.; only Perak: *Wray s.n.* (SING), fl. — Penang, Batu Terenggi: *Curtis 3660* (K, SING), fr. July; ibidem: *Curtis s.n.* (BO, SING), fr. Aug.; Chitty Temple Nursery: *Moh. Haniff SF 3661* (BO, K, SING), height 3—4 m, fl. Apr.; Waterfall: *Curtis 1516* (K, SING), height 6.50—10 m, fl. Mar.; only Pulu Penang: *Curtis s.n.* (SING), fl. May; *Moh. Haniff 88* (SYS), fl. Jan.; *Wallich 4147* (*type*, BM, G, K, L, P), fl. — Selangor, Bukit Lagong Forest Reserve, Kuala Lumpur: *Wyatt Smith Mal. FD 64880* (KEP), height 13 m, girth 0.45 m, fr. May; ibidem: *Sinclair SF 40099* (BM, K, L); Kauching Forest Reserve: *Ahmad Mal. FD 5790* (SING), fr. Jan.; Klang Gates: *Hashim s.n.* (SING), fl. Sep.; Pahang Road, Klang Gates: *Watson Mal. FD 530* (KEP, SING), fl. Apr.; Kuala Lumpur, Circular Road: *Omar Mal. FD 15220* (SING), fl. Oct.; Rantau Panjang Forest Reserve: *Strugnell Mal. FD 12491* (KEP), height 13 m, fl. Sept.; ibidem: *Walton Mal. FD 22085* (KEP, SING), fl. Mar. May; ibidem: *Ngah Mal. FD 32332* (KEP), height 10 m, girth 0.75 m, fr. Feb.; Selam: *Ludin Mal. FD 1874* (KEP), fl. Apr.; Sungai Buloh Forest Reserve: *Moh. Nur SF 11858* (BO, K, SING), height 7—9 m, fr. Dec.; ibidem: *Strugnell Mal. FD 12492* (SING), fl. Oct.; Ulu Gombak: *Hume 8766* (SING), fl. Oct.; Ulu Selangor: *Goodenough 10545* (SING), fl. Apr.; Weld's Hill Reserve, Kuala Lumpur: *Rahman Mal. FD 823* (KEP, SING), fl. fr. July; ibidem: *Moh. Hashim Mal. FD 9562* (SING), fr. Jan.; ibidem: *Moh. Hashim Mal. FD 10840* (K, KEP, SING), height 10—13 m, girth 1—1.3 m, fl. Mar.; ibidem: *Burn Murdoch 11* (SING), fl. Sep.; ibidem: *Burn Murdoch 29* (K), fl. Mar. — Trengganu, Bukit Kajang, Kemaman, 150 m: *Corner SF 30274* (BM, BO, K, SING), height 12 m, fl. Nov.; ibidem: *Corner SF 30276* (BM, BO, SING), fr. Nov.; Bukit Lah off Sungai Nerus near Kampong Merjor, Kuala Trengganu, lowland forest: *Sinclair & Kiah bin Salleh SF 40905* (L, SING), fr. Sep.; Ulu Brang, 200 m: *SF 33749* (K), fr. July — Pahang, Belingo Temeloh: *Awang Lela Mal. FD 2682* (KEP, SING), fl. Sep.; ibidem: *Hamid Mal. FD 5449* (KEP, SING), height 20 m, girth 1 m, fr. Dec.; ibidem: *Idris Mal. FD 6319* (SING), fl. Oct.; 7th mile Barak road, Bentang: *Ahmad Mal. FD 5061* (K, SING), fr. Dec.; Kadondong, Pulu Tawar: *Anonymous 2672* (SING), fr. Aug.; Klau Forest Reserve, Bentang: *Smith Mal. FD 3940* (K, SING), fl. Sep.; ibidem: *Ahmad Mal. FD 5080* (K, KEP, SING), height 10 m, girth 0.66 m, fr. Jan.; Gali near Raub: *Burkill & Moh. Haniff SF 16229* (SING); Raub: *Ahmad Mal. FD 5097* (SING), fr. Jan.; Cameron Highlands, Sungai Parang: *Symington Mal. FD 36230* (SING), fl. Apr.; Kuala Lipis: *Foxworthy Mal. FD 0652* (KEP), fr.; 8 miles S. of Kuala Lipis: *Burkill & Moh. Haniff SF 17195* (BO, SING), fl. Nov.; Kuala Pilah, 100 m: *Mal. FD 62880* (KEP), height 15 m, girth 1.10 m; Kuantan, Tandjong Pasir: *Mahamud Mal. FD 3713* (SING), fl. Sep.; Rotan Tunggeh Reserve: *Osman Mal. FD 29302* (KEP), height 10 m, girth 0.23 m — Negri Sembilan, Bukit Dusun Raya: *Alvins 1167* (SING), height 26—30 m, fl. Mar.; Gunung Angai Forest Reserve: *Sham Mal. FD 23746* (SING), fl. Dec.; Gunung Talan: *Alvins 886* (SING), height 20—23 m, fl. Feb.; Tampiu: *Moh. Nur SF 1310* (SING), fr. July; Tampiu Hill: *Mal. FD 1853* (BM); *Goodenough 1853* (SING), fl. May; Gunung Tampiu, 500 m: *Burkill SF 3240* (BO, K, SING), fl. May; Port Dickson, Sungai M. Forest Reserve: *Mal. FD 66509* (KEP), height 13 m, girth 0.66 m, fr. Dec.; Selaru: *Mal. FD 1874* (SING), fl. Apr.; Senawang Reserve: *Moh. Yakim Mal. FD 1972* (K, SING), fl. fr. Sep. — Malacca, Brisu: *Derry 654* (K, SING), fl. June; Bukit Bruang: *Curtis 3644* (K, SING), fl. Apr.; Bukit Panchor Reserve: *Moh. Isa Mal. FD 10495* (KEP), girth 3.30 m; Bukit Sedanan: *Holmberg 794* (SING), fl. Mar.; Bukit Sedanan Forest Reserve, edge of forest: *Holttum SF 9660*

(BO, SING), height 13 m, fl. Nov.; Chunana Puteh: *Alvins 894* (SING); Kesang Tua: *Goodenough 1278* (BM, SING), fr. July; Merlimau: *Derry 54* (K, SING), fr. July; ibidem: *Alvins 2150* (SING), height 21—25 m, fr. Aug.; ibidem: *Alvins s.n.* (SING), fl. Apr.; Sungai Udang: *Alvins 47* (SING); ibidem: *Holmberg 804* (BM), fl. May; ibidem: *Goodenough 1977* (SING), fr. July; 14—14½ miles Sungai Udang Forest Reserve: *Sinclair SF 40595* (L), fl. Apr.; only Malacca: *Alvins 248* (SING), fl.; *Alvins 569* (SING), fl.; *Alvins s.n.* (SING), height 33 m, fl. Apr.; *Alvins s.n.* (SING), fl.; *Cantley s.n.* (BO), fl.; *Derry 461* (SING), fl.; *Griffith s.n.* (BM, G, L, P, U), fl. sterile; *Kurz s.n.* (BO), fl.; *Anonymous 1636* (SING), fr. July; *Anonymous s.n.* (BO), fl. — Johore, Gunung Palai: *Moh. Nur & Kiah SF 7764* (BO, SING) — Singapore, Bmandi: *Goodenough 3658* (SING), fl. Mar.; Bukit Timah: *Corner SF 34961* = *Ngadiman SF 34961* (BO, K, SING), fl. Apr.; ibidem: *Cantley 2633* (SING); ibidem: *Langlassé 300* (P), height 10—15 m, fr. Sep.; ibidem: *Ngadiman SF 36421* (SING), height 10 m, fl. May; ibidem: *Ridley 6213* (BO), fl.; ibidem: *Ridley 6508* (SING), fr.; ibidem, near bungalow: *Fox 11305* (K, SING), fr. Aug.; Gardens Jungle: *Ahmed s.n.* (SING), fl. Oct.; ibidem: *Ridley s.n.*, fr.; Reservoir Jungle: *Ridley 5070* (SING), fl.; Selitar: *Ridley 5644* (SING), fl. Apr.; ibidem: *Ridley 6135* (SING), fl.; ibidem: *Ridley s.n.* (BM), fl.; Singapore without locality: *Cantley 74* (SING), fl.; *Anonymous s.n.* (SING), fl.; *Anonymous s.n.* (BO), fl.; Malay Peninsula without locality: *Griffith 3605* (FI, G, P, U).

ANDAMANS. Labyrinth Island, forest at sea shore: *Helfer 424* (K), fl.; Andamans without locality: *Helfer 3611* (K, S).

SUMATRA. Atjeh and Dep., Muara Pea: *FRI bb 10257* (U), fl. July — Tapanuli, Upper Ankola, 1000 m: *Junghuhn s.n.* (L), fl.; Ankola: *Teysmann s.n.* (P); ibidem: *Anonymous s.n.* (L), fl.; forests near Tobing: *Junghuhn s.n.* (L, P, U), height 20—26 m, fr. Oct. — West Coast, Priaman: *De Vriese s.n.* (L); near Priaman: *Teysmann s.n.* (P) — Lampong Districts, Kebang: *Teysmann s.n.* (L); unlocalized: Topang Dalam, Pulu Lavau: *Daud 10857* (SING); Sumatra without locality: *Junghuhn 25* (BO), fl.; *Junghuhn s.n.* (BO, L), fl. fr. sterile; *De Vriese XVI* (L); *De Vriese s.n.* (L); *Anonymous s.n.* (L), height 20—27 m.

BANKA. without known loc.: *Horsfield 191* (BM).

BORNEO. Sarawak, Mount Salak: *Beccari 2991* (FI, P), fr. Dec. (type of *P. glutinosa* Pierre); Sibu: *Sar. FD S0528* (SAH), height 15 m, girth 0.47 m; iibdem: *Sar. FD S0534* (SAR), height 11 m, girth 0.35 m; ibidem: *Sar. FD S0684* (SAR), height 20 m, girth 0.90 m; ibidem, swamps: *Anderson 1835* = *Sar. FD 2683* (SAR) — West Borneo, Melawi Tjatit, Bukit Gantuk: *FRI bb 31800* (L); Melawi Tjatit, Bukit Tengkujung, 450 m: *FRI bb 26030* (L); Sekadau, Tamang, old forest: *FRI bb 8022* (L), height 21 m, diam. 0.48 m, fl. Mar. — South and East Borneo, Balikpapan, Sungai Wain, primary forest: *FRI bb 34373* (L), height 17 m, diam. 0.13 m; ibidem: *FRI bb 34445* (L), height 20 m, diam. 0.19 m; Balikpapan, Gunung Sapinggan: *FRI 2017* (BO), fl. Sep.; ibidem, Pembuang: *FRI 2130* (BO), fl. Sep.; Loa Haur, W. of Samarinda, low ridges: *Kostermans 6941* (L), height 30 m, diam. 0.40 m, fl. May; Martapura, Djungun, 350 m: *FRI bb 10408* (BO), height 26 m, diam. 0.35 m; Muara Teweh, Marampan, old forest, 100 m: *FRI bb 11434* (BO), height 26 m, diam. 0.40 m; Nunukan, Bengaris Putih: *FRI bb 33008* (BO), height 25 m, diam. 0.90 m; Nunukan, Bulungan: *FRI bb 29333* (L); ibidem: *FRI bb 26158* (L, SING), fr. July; Nunukan, primary forest, 150 m: *FRI bb 34505* (L), height 30 m, diam. 0.39 m, fl. Mar.; E. Kutai, Sangkulirang island, ridge: *Kostermans 4947* (L), height 30 m, diam. 0.80 m, fr. June; W. Kutai, Sabintulung, forest: *FRI bb 15864* (BO, L), height 18 m, diam. 0.52 m, fl. Nov.; W. Kutai, Sebulu: *FRI bb 15786* (L); ibidem: *FRI bb 15791* (BO), height 17 m, diam. 0.40 m — Sandakan, Bukit Tenom, 1½ miles W. of Tenom, 330 m: *Wood & Wyatt Smith N. Born. FD A 4392* (L), height 36 m, fl. Sep.; Mount Kinabalu, Tuaran: *Clemens & Clemens 11258* (BO, K), fl. Dec.; Mount Kinabalu, Kiau, Dallas, jungle hills, 1000 m: *Clemens & Clemens 26329* (BM, BO, K, L), height 20 m, fl. fr. Sep.; Mount Kinabalu, Dallas, E. ravine, forest hill, 1000 m: *Clemens & Clemens 27405* (BM); Mount Kinabalu, Dallas, Tenompok, 1600 m: *Clemens & Clemens 27405, 27974* (BO, K, L, SING), fl.; Mount Kinabalu, Tenompok, jungle, 1700 m: *Clemens & Clemens 27974* (BM), fl. Jan.; ibidem: *Clemens & Clemens 28688* (BM, BO, K, L), height 8 m, diam. 0.45 m, fl. May; Mount Kinabalu, Penibukan, W. ridge, jungle, 1300 m: *Clemens & Clemens 40778* (BM), height 27 m, diam. 0.66 m, fl. Oct.

CULTIVATED. Botanic Gardens Penang: *Henderson s.n.* (SING); Botanic Gardens Singapore: *Flippance s.n.* (SING), fl. Feb.; *Isaac s.n.* (SING), fl. Aug.; *Moh. Nur SF 405* (SING); *Moh. Nur SF 2247* (SING); *Moh. Nur s.n.* (KEP, SING), fl. Oct., sterile; *Ridley 3995* (SING); *Ridley 6503* (SING), fr.; *Ridley s.n.* (SING), fr. sterile; *Anonymous s.n.* (KEP, SING), height 4 m, fl. Mar., sterile.
WITHOUT LOCALITY — *Anonymous s.n.* (L), fl.

Remarks: Wallich's unvalidly published name was first employed by G. Don in his Gardener's Dictionnary; therefore Don is to be considered the author of *Mimusops lucida* in stead of Wallich. Don (loc. cit., 35) notes that the calyx has "... 4 outer segments ..." and "... 4 inner ones ..."; De Candolle (loc. cit., 196) corrects this evident mistake but himself makes another, viz, by saying "Stamina 8 ...". In the type specimen however, as in all other specimens, we found 16 stamens.

This common and wide-spread species shows a considerable range of variation. Lam already in 1927 (Lam 1927, 433) dropped the subdivisions and the present author also holds the opinion, according to the large material at hand, that it is impossible to distinguish any well delimited variety or form. In general this species is characterized by the rather large leaves (up to 23 cm long), the forking of secondary nerves at a considerable distance from the edge of the leaf (which occurs also in *P. dasyphylla* and *P. acuminata*, and some other species, but which serves as a suitable character to separate *P. lucida* from its near allies), the comparatively long pedicels and medium-sized flowers, and the ovoid or oblong acute fruits. These fruits can grow rather large as we found a field note on *King's Collector 10978* (in BM), stating that the fruit measured 31 by 19 mm (i.s. 20 by 12 mm).

P. punctata very probably belongs to the present species. Fletcher (l.c., 1937, 379—380) attaches importance to the "glandular punctate lower surface of the leaves." In our opinion, however, according to the original material collected by Kerr, the punctation is a consequence of the desiccation of the plant. Looking through material of various herbarium specimens one finds frequently different stages of punctation.

The flowers are whitish, the latex white, and the fruits greenish.

7. Payena longipedicellata Brace ex King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, 1906, Extra Nr., 169; Lam 1925, 148 — *P. longipedunculata* Brace, errore in indice King & Gamble, l.c., 1909, 900 — *Fig. 6.*

Trees up to 40 m, diameter up to 0.25 m. *Branchlets* thin, terete, pubescent to subglabrous, stipules caducous, small, long triangular to ovate, acute, long pubescent. *Leaves* dispersed along branchlets, chartaceo-coriaceous, apex acuminate, base cuneate, petioles 1.7—2.5 cm long, subglabrous to glabrous; blade 5—13 by 2.5—5 cm, oblong to elliptic, glabrous at both surfaces, generally some traces of pubescence along the midrib below; midrib sunken above, prominent below; secondary nerves conspicuous and to a very small degree prominent above, somewhat prominent below, 12—16, archingly joined near margin, starting from midrib at angles of about 60—70°, curving towards apex near margin; tertiary nerves hardly visible above, conspicuous below, generally one only between two secondary ones, ramifying towards midrib, near edge of leaf more or less parallel to

secondary nerves, descending. *Inflorescences* dispersed along branchlets below leaf region, axillary or in scars of leaves, 1—4-florous, flowers comparatively large, pedicels 2—4.5 cm long, slender, pubescent to subgabrous.

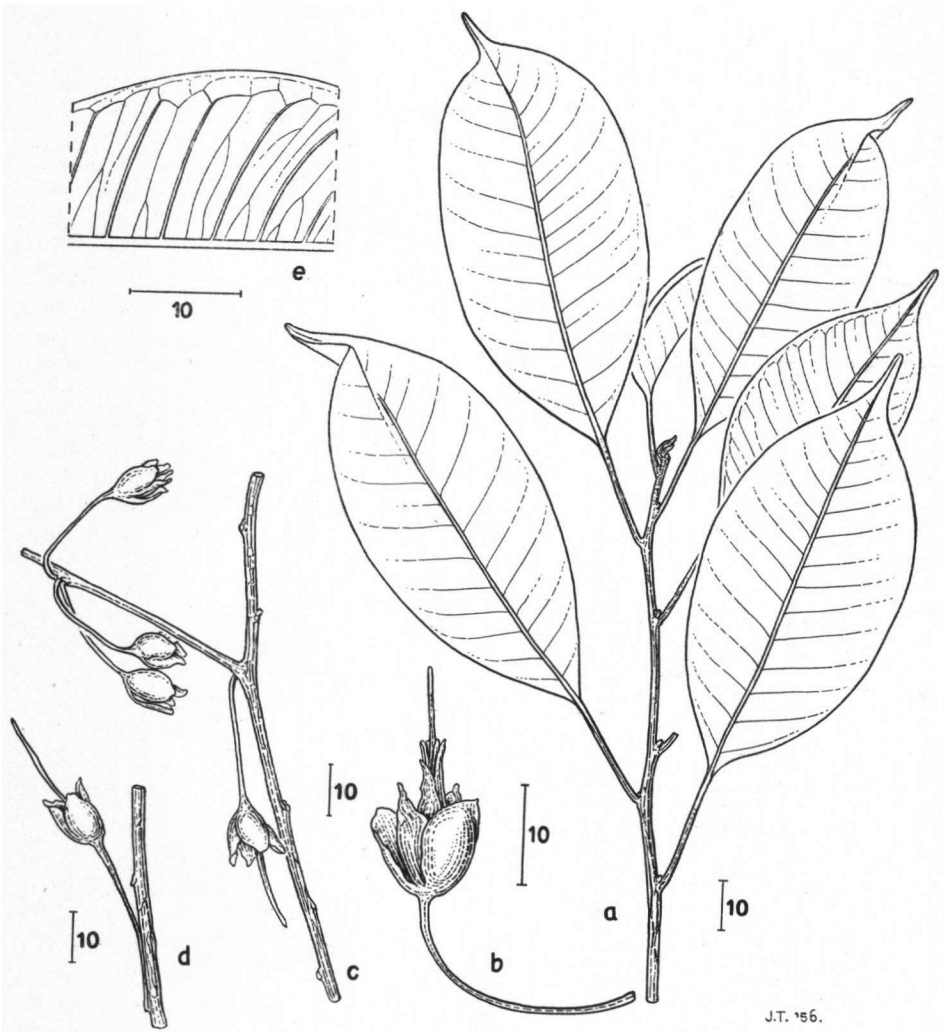

Fig. 6. *P. longipedicellata*, a. branchlet with leaves; b. flower; c., d. branchlet with older flowers; e. nervation of leaf. From *Haviland 3035*.

Sepals 0.8—1.5 by 0.8—1 cm, thick and squamiform, ovate, apex rounded to obtuse acute, pubescent, inside glabrous. *Corolla* exsert, 1.2—2 cm long, tube 0.45—0.75 cm long, lobes 8, long ovate, acute, glabrous. *Stamens* 16, 0.3—0.4 cm long, glabrous, filaments short and thick, apex of connective bifid, rarely laciniate, thecae long ovate to elliptic. *Pistillum* 0.9—2.5 cm

long, comparatively thick, base villous; ovary oblong conical, long pubescent, cells 8, ovules rounded. *Fruits* unknown.

Lectotype specimen: *King's Collector 2940* in K.

Vern. names: impulut, njantu (Borneo).

Distr.: Malay Peninsula, Borneo.

MALAY PENINSULA. Perak, Larut: *King's Collector 2940* (*type*, K), fl. Apr. BORNEO. Sarawak, near Kuching: *Haviland 3035* (BO, K, SING), fl. Mar. — South and East Borneo, Nunukan, primary forest: *FRI bb 34642* (L), height 28 m, diam. 0.25 m, fl. Feb.; ibidem: *Paymans 9* (L), height 20 m, diam. 0.20 m, fl. Jan.

Remarks: This species, closely related to *P. lucida*, is easily recognized by the combination of the following characters: large flowers with largely exsert corolla and very long pedicels, and moderate-sized leaves.

Lam 1927, 443, cites the present species under *P. glutinosa*; the last-mentioned name, however, is a synonym to *P. lucida*.

The flowers are white.

8. Payena obscura Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 60; Lam 1925, 150; Lam 1927, 435, *fig. 15*; Heyne, Nutt. Pl. Indon. 1, 1950, 1229; Wyatt-Smith, Res. Pamphl. 4, 1954, 51 — *P. havilandii* King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Beng. 74, 2, 1906, Extra Nr., 169; Lam 1925, 136; Fletcher in Craib, Fl. Siam. Enum. 2, 4, 1938, 360; Heine, Pfl. Samml. Clemens Mt. Kinab., thesis, 1953, 85.

Trees up to 42.50 m, diameter up to 0.66 m, girth up to 2.80 m. *Branchlets* slender, terete, short sparingly pubescent, sometimes subglabrous, stipules caducous, small. *Leaves* dispersed along branchlets, chartaceo-coriaceous, apex acute, sometimes comparatively long, base cuneate, petioles 0.5—2.5 cm long, subglabrous to glabrous, sometimes sparingly pubescent; blade 5—17 by 2.5—5 cm, ovate to ovate-rotundate, sometimes more or less oblong, glabrous at both surfaces, sometimes sparingly pubescent below, especially along midrib; midrib sunken above, prominent below, secondary nerves faint above, prominent below, 10—15, straight and thin, archingly joined near margin, starting from midrib at angles of about 60—70°, curving towards apex near margin; tertiary nerves hardly visible above, conspicuous and prominent below, more or less parallel to secondary ones, generally one more conspicuous and placed in the middle between two secondary nerves, descending. *Inflorescences* usually in upper leaf axils, frequently almost pseudoterminal, 1—5-florous, pedicels 1.2—3 cm long; thin, rusty pubescent. *Sepals* 0.4—0.7 by 0.4—0.6 cm, oblong rounded to broadly triangular rounded, apex very obtuse acute to rounded, appressedly pubescent to subglabrous, inside glabrous, inner sepals ciliated at edges. *Corolla* to some degree exsert, 0.75—1 cm long, tube 0.2—0.4 cm long, lobes 8, ovate, apex obtuse acute or rounded, glabrous. *Stamens* 16, 0.3—0.5 cm long, glabrous, filaments short and not very thick, apex of connective long and acute or obtuse acute, thecae long ovate to triangular, apex acute, sometimes to some degree adnate to apex of connective. *Pistillum* 0.9—1.6 cm long, glabrous, base pubescent; ovary conical or rounded, short pubescent, cells 8, ovules comparatively large, 0.08—0.1 cm long, rounded triangular. *Fruits* 2—4 by 1—2.3 cm, obpyriform, acuminate, base narrow or broad, slightly pubescent to subglabrous; seed 1, 2.3—2.5 by 0.6—1.4 by 0.5—0.7 cm, laterally compressed, scar 0.3—0.4 cm wide,

cotyledons flat and foliaceous, radicle comparatively large, 0.3—0.4 cm long; incrassate pedicels 1.9—3 cm long, subglabrous, persistent incrassate sepals 0.5—0.7 by 0.5—0.6 cm, sparingly pubescent to subglabrous, persistent style 1—1.3 cm long.

Type specimen: *Burck s.n.* in BO, Herbarium Bogoriense no. 151344 (see under Remarks of *P. acuminata*).

Vern. names: getah sundik, suryau (Malay Peninsula), balam kadidie, njatuh balam simeney (Sumatra), ketiau, nyatoh enkelit, n. riau, ubah (Borneo).

Uses: Timber, gutta of a fairly good quality.

Distr.: Malay Peninsula, Riau, Sumatra, Borneo.

Malay Peninsula. Penang, Government Hill: *Maingay 2259* (K), fr. Feb.; Grace Dieu, 330 m: *Moh. Haniff 16337* (SING), height 10—13 m, fl. Apr.; The Spout, Moniot's Road, 650 m: *Curtis 777* (BO, K, SING), height 16—20 m, fl. Apr. — Perak, Segari Melintang, Dindings: *Strugnell Mal. FD 16570* (K, SING), fr. July; Suriau, Dindings: *Burn-Murdoch 250* (SING), fl.; Kinta Ipoh Forest Reserve, 300 m: *Mal. FD 65927* (KEP), height 41 m, girth 1.85 m, fr. Apr. — Selangor, Subang, Bukit Chivaha, Sungai Plampas basin: *Mal. FD 53689* (KEP), height 21 m, girth 1.75 m — Pahang, Tandjong Tuan Ulu: *Awang Mal. FD 29639* (SING), fr. Dec. — Johore, Gunung Arong Forest Reserve: *Mal. FD 35954* (KEP), girth 2.50 m, fl. June; ibidem, Mersing: *Mal. FD 70077* (KEP), height 39 m, girth 2.15 m, fr. Jan.; Mersing: *Mal. FD 74151* (KEP), height 42.50 m, girth 2.80 m; Kluang Forest Reserve: *Mal. FD 69915* (KEP), height 40 m, girth 2.20 m, fl. Sep.; South Pontian: *Mal. FD 70256* (KEP), height 31 m, girth 1.20 m — Singapore, Bajan: *Ridley 4959* (K, SING), fl.; Bukit Timah Reserve: *Ridley 9203* (K, SING), fl. May; ibidem: *SF 35800* (BO, K, SING), height 13 m, fl. Jan.; ibidem: *SF 35908* (SING), height 15 m; ibidem: *SF 36431* (BO, K, SING), height 20 m, fl. June; ibidem: *SF 36456* (SING).

Riau. Lingga, near Binek: *FRI Bi/I-40* (BO).

Sumatra. Riau and Dep., Indragiri Highlands, Danau Menkuang, primary forest: *Buwalda 6608* (BO, L), fl. Apr.; ibidem: *FRI bb 27500* (L, SING), fl. Apr.; Indragiri Highlands, Muara Padjanki: *FRI bb 27452* (L, SING), fl. Apr. — West Coast, Pankalan, Kota Bahru: *Burck s.n.* (BO), *type*; Sidjungdjung, Pilawas, old forest, 300 m: *FRI bb 6065* (L), height 20 m, diam. 0.35; Sumatra without locality: *Burck s.n.* (L, U); *De Vriese s.n.* (L).

Borneo. Sarawak, Kuching: *Hewitt S.5.1* (BM), fl. Mar.; ibidem: *Hewitt S.5.2* (BM), fl. May; ibidem: *Anonymous s.n.* (BO), fl. Apr.; Kuching, Sungai Semengoh Forest Reserve: *Muas 1745* = *Sar. FD S 235* (SAR), height 8 m, girth 0.30 m, fl. Dec.; near Kuching: *Haviland 2098* (BM, K, L, SING), fl. fr. Jan.; ibidem: *Haviland 2320* (BM, BO, K, L, SING), fl. Mar.; Sibu: *Sar. FD S 0671* (SAR), fr. Jan.; ibidem: *Sar. FD S 2768* (SAR); ibidem, swamps: *Ahmady 1736* = *Sar. FD S 2722* (SAR) — Sandakan, Mount Kinabalu, Dallas, 1000 m: *Clemens & Clemens 26715* (B, BO, G, K, L, SING), height 13 m, fl. Sep.; Mount Kinabalu, Penibukan, 1300 m: *Clemens & Clemens 32127* (BO, L), height 26 m, diam. 0.45 m, fl. Mar.; ibidem, near camp, 1300—1700 m: *Clemens & Clemens 31329* (BM, BO, K, L), height 20 m, diam. 0.66 m, fl. Jan., sterile; ibidem: *Clemens & Clemens 31220* (BM, BO, L), height 25 m, diam. 0.35 m, fl. Jan.; Mount Kinabalu, Penibukan, jungle hillside near camp: *Clemens & Clemens 40623* (BM, K, L), height 25 m, diam. 0.33 m, fl. Oct.; ibidem: *Clemens & Clemens 40761* (B, K, L), fl. fr. Oct.; Mount Kinabalu, Penibukan, jungle ridge near camp, 1300 m: *Clemens & Clemens 32050* (BM, BO, K, L), fl. Feb.; Mount Kinabalu, Penibukan, forest W. of camp near ravine, 1300 m: *Clemens & Clemens 32187* (BM, BO, L), fl. Mar.; Mount Kinabalu, Penibukan, on ridge beyond Dahobang, 1300—1700 m: *Clemens & Clemens 30701* (BM, BO, K, L), fl. fr. Jan.; Mount Kinabalu, Tenompok, near lodge above trail, 1700 m: *Clemens & Clemens 29351* (BO, L), fl. Mar., Apr.; Mount Kinabalu, Tenompok 1700 m: *Clemens & Clemens 28678, 29351* (K), fl. Mar., Apr.

Malay Archipelago. *Anonymous s.n.* (SING).

Remarks: Although some authors (i. c. Lam 1925, l. c., and Wyatt Smith, l. c.) state the branchlets being glabrous, we nearly always found them to be pubescent, sometimes only subglabrous.

It is difficult to see why Fletcher and Heine (*vide supra*) still mention this species under *P. havilandii*, a name which is a synonym to *P. obscura*, as was shown already in 1927 by Lam (Lam 1927, 435).

The flowers and latex are white, the fruits green.

9. Payena pseudoterminalis H. J. Lam, Lam 1925, 260; Lam 1927, 439, *fig. 17* — *P. eugeniaefolia* King ex Moore, J. Bot. 63, Suppl., 1925, 61.

Trees up to 23 m, diameter up to 0.32 m, girth up to 1.50 m. *Branchlets* not very slender, terete, appressedly pubescent to subglabrous, stipules caducous, 0.2—0.3 cm long, narrow triangular, long pubescent. *Leaves* dispersed along branchlets, sometimes with tendency for crowding at tips of branchlets, chartaceo-coriaceous, apex acuminate, base narrowly cuneate, petioles 1.0—1.8 cm long, appressedly pubescent to subglabrous; blade 5—9 by 1.5—4 cm, narrow lanceolate to broadly lanceolate-ovate, glabrous above, minutely appressedly pubescent below; midrib sunken above, more or less prominent below; secondary nerves hardly visible above, not very conspicuous below, 9—12, slender and straight, archingly joined near margin, starting from midrib at angles of about 55—60°, curving towards apex near margin; tertiary nerves very faint to completely invisible, more or less parallel to secondary ones, descending. *Inflorescences* together pseudo-racemose, conferted pseudoterminally at tips of branchlets above adult leaves, 1—3-florous, pedicels 1.2—1.8 cm long, appressedly pubescent. *Sepals* 0.6—0.8 by 0.4—0.5 cm, deltoid, apex acute or obtuse acute, outside pubescent, inside glabrous. *Corolla* not or to a small degree exsert, 0.5—0.6 cm long, tube 0.4 cm long, lobes 8, narrow and long ovate, apex obtuse acute, glabrous. *Stamens* 16, 0.4—0.5 cm long, glabrous, filaments short, apex of connective comparatively long, broad and flat, obtuse rounded. *Pistillum* 1—1.6 cm long, glabrous, base pubescent; ovary conoid, appressedly pubescent, cells 8, ovules ovate-rounded, small. *Fruits* unknown.

Type specimen: *FRI bb 7190* in L.

Vern. names: endreket (Sumatra).

Distr.: Eastern Sumatra.

SUMATRA. East Coast, Karo countries, near Petjeran, young forest, 1500 m: *FRI bb 7190* (*type*, B, K, L, SING), height 23 m, diam. 0.17—0.32 m, fl. Aug. — Riau and Dep., Indragiri, highlands, Muara Padjanki, primary forest: *Buwalda 6430* (BO, L, PNH, SING), fl. Apr. — Palembang, Mount Dempo, 1900 m: *Forbes 2567* (BM, K, L, types of *P. eugeniaefolia* King ex Moore), girth 1.50 m, fl.

Remarks: *P. pseudoterminalis* is a close relative of *P. leerii*, a species which shows almost the same type of inflorescences; generally the tertiary nerves of the leaf are much more faint or completely invisible in the first-mentioned species.

Lam (Lam 1927, 438) considered *P. eugeniaefolia* a synonym to *P. endertii* "e descr.". The Leiden specimens collected by Forbes, however, were identified by Lam in 1936 as *P. pseudoterminalis*, with which identification I can agree. Accordingly *P. eugeniaefolia* falls into the synonymy of the present species.

As both names were published in February 1925, Lam's specific epithet *pseudoterminalis* has been selected as the valid one.

10. Payena microphylla (De Vriese) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 531; Lam 1925, 136; Lam 1927, 437 — *Isonandra microphylla* De Vriese, Nat. Tijdschr. Ned. Ind. 21, 1860, 312 — *Fig. 7.*

Trees up to 27 m, diameter up to 0.42 m. *Branchlets* thin and slender, terete, short-ferruginous pubescent, stipules caducous, small. *Leaves* dispersed along branchlets, subcoriaceous, apex acuminate, base cuneate,

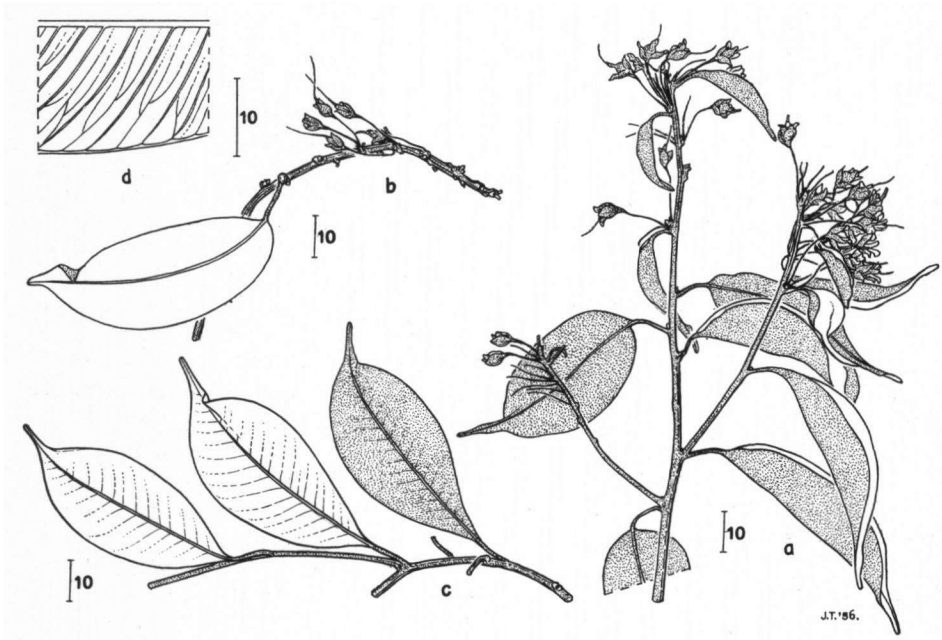

Fig. 7. *P. microphylla*, a. branchlet with leaves and flowers; b. branchlet with leaf and flowers; c. branchlet with leaves; d. nervation of leaf. a. from *FRI bb 28096*, b. from type specimen *Motley VIII (203)*, c. from *Beccari 1848*, d. idem.

petioles 0.8—1.5 cm long, short sparingly pubescent to (sub)-glabrous; blade 5—7 by 2—3 cm, elliptical or ovate, glabrous at both surfaces, sometimes subglabrous below; midrib sunken or slightly prominent above, prominent below; secondary nerves not very conspicuous above, not very prominent to very faint below, 10—13, straight, slender and thin, archingly joined near margin, starting from midrib at angles of about 50—70°, curving towards apex near margin; tertiary nerves faint, more or less parallel to secondary ones, descending. *Inflorescences* crowded at tips of branchlets or axillary, 1—7-florous, pedicels 0.6—1.5 cm long, short pubescent to subglabrous. *Sepals* 0.4—0.5 by 0.3—0.4 cm, long triangular, obtuse acute, sericeous pubescent, inside glabrous. *Corolla* exsert, 0.6—0.7 cm long, tube 0.2—0.3 cm long, lobes 8, lanceolate to elliptical, obtuse acute to laciniate, glabrous. *Stamens* 16, 0.3—0.4 cm long, glabrous, filaments

long, not very slender, apex of connective broad, laciniate to obtuse acute, thecae elliptic or ovate. *Pistillum* 1.2—1.6 cm long, glabrous, base villous; ovary rounded to conical, long pubescent, cells 8, ovules rounded to ovate, small. *Fruits* unknown.

Type specimen: *Motley VIII (203)* in L.

Vern. names: baringiri, ngiatu wanjie (Borneo).

Distr.: Borneo.

BORNEO. Sarawak, Mattang, 900 m: *Beccari 1848*[1]) (FI, G, K, L, P, S, types of *P. beccarii* Pierre and *P. parvifolia* Engler), fl. June — South and East Borneo, Bandjermasin: *Motley IV (1364)* (L, P); neighbourhood of Bandjermasin: *Motley VIII (203)* (*type*, BO, K, L, P), fl.; Muara-Teweh, Pepas, primary forest: *FRI bb 28095* (BO), height 27 m, diam. 0.42 m, fl. May; ibidem: *FRI bb 28096* (BO, L, SING), height 27 m, diam. 0.40 m, fl. May.

Remarks: A species with small leaves, nearly related to *P. leerii*. The flowers and the latex are white.

11. Payena leerii (Teysmann & Binnendijk) Kurz, J. As. Soc. Bengal 40, 2, 1871, 69; Lam 1925, 137, 261; Lam 1927, 437; Lam in Backer, Fl. Java Nooduitg. 7, 1948, 166—8; Heyne, Nutt. Pl. Indon. 1, 1950, 1227 — *Azoala leerii* Teysmann & Binnendijk, Nat. Tijdschr. Ned. Ind. 6, 1854, 116 — *P. croixiana* Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 524; Lam 1925, 136 — *Fig. 8.*

Trees up to 38 m, diameter up to 0.80 m, girth up to 1.10 m. *Branchlets* thin, terete, subglabrous to short appressed ferruginous pubescent, stipules caducous, narrowly long ovate, acute, 0.3—0.4 cm long. *Leaves* dispersed along branchlets, thin coriaceous to chartaceo-membranaceous, apex (obtuse) acuminate, base cuneate to rounded, petioles 0.5—1.5 cm long, sulcate above, glabrous, with rough epidermis; blade 5—16 by 1.5—8 cm, narrow ovate-lanceolate to ovate-ovoid, even sometimes nearly circular, glabrous above, glabrous, rarely subglabrous, below; midrib sunken above, prominent below; secondary nerves not very conspicuous above, somewhat more conspicuous and prominent below, 11—18, thin and straight, archingly joined near margin, starting from midrib at angles of about 65—75°, curving towards apex near margin; tertiary nerves hardly visible, especially above, more or less parallel to secondary ones, descending. *Inflorescences* generally in axils of leaves, or in scars of leaves in top region of branchlets, sometimes subterminal, 1—8-florous, pedicels 0.8—1.7 cm long, sparingly pubescent to (sub)glabrous. *Sepals* 0.2—0.4 by 0.25—0.3 cm, triangular to ovoid, apex rounded, short pubescent to subglabrous, inside glabrous. *Corolla* generally exsert, 0.4—0.5 cm long, tube 0.1—0.2 cm long, lobes 8, long ovate, apex rounded. *Stamens* 16, 0.2 cm long, filaments short, pubescent, apex of connective long ciliated, thecae long elliptic. *Pistillum* 0.6—0.8 cm long, glabrous, base villous; ovary long conoidal, long pubescent, cells 8, ovules small, 0.015 cm long. *Fruits* 2.5—5 by 1—2.5 cm, long ovoid, frequently to some degree conoidal, apex truncate, glabrous to subglabrous; seed 1, 2—2.5 by 0.8—1 cm, long ovate, scar 0.1—0.2 cm wide, cotyledons flat and foliaceous, radicle short; thickened pedicels 1—

[1]) Errore *Beccari 1818*. See also Van Steenis & Van Steenis-Kruseman, Numberlists of Beccari, Sumatra, Borneo, New Guinea, Flora Malesiana Foundation, 1951—1953.

3 cm long, persistent incrassate sepals 0.4 by 0.4 cm, glabrous, persistent style short, frequently broken off.

Neotype specimen: *Teysmann s. n.* in BM. Herbarium Hance 13935.

Vern. names: getah sundek, gutta sundé (Malay Peninsula); kulan (Riau); getah kulan, kaju kulan, kulan, k. itam, k. ketjil, k. puti, k. tembaga, lating, leting (Banka); balam baringin, b. bringin, b. bunga tandjung, b. sonté, b. sonteh, b. sundek, b. suntei, b. tandjong, b. tanduk,

Fig. 8. *P. leerii*, a. flowering branch with galls along lower side of some leaves, b. fruiting branch. a. from *Haviland 3032*, b. from *Anonymous s. n.*

b. tjabie, b. tjobee, geta sundi, kalemanggong, kalimanggung, majang batu, m. sondek, njatu bringin, n. sundi tua, sundai, sunde, sundei, s. bakau (Sumatra); balam baringin, b. bringin, b. tembaga, beitis, bringin, b. djiput, kolan, mergatahan, nyatoh bukong, n. burang, n. pepit, selangan batu, sundeh bukong (Borneo).

Uses: Timber, important producent of guttah of comparatively good quality, fruits stated to be edible.

Distr.: Malay Peninsula, Riau, Banka, Sumatra, Borneo, Palawan, Tawi Tawi, Mindanao. Cultivated in tropical Asia (e. g. Java), Africa, and South America.

MALAY PENINSULA. Penang, Pulu Penang, 100 m: *Aniff 16337* (BM), fl. fr. Apr. — Perak, Dindings: *Bryant s.n.* (SING), fl. Mar.; Dindings, Bruas at Tanjong Aru: *Curtis 3640* (SING), height 13—17 m, girth 0.25—0.30 m, fr. June; Lahat: *Errington de la Croix 68, -69, -70, -71, -72* (P), fl.; Larut: *St. Pol Lias & De la Croix 317* (P), height 26—33 m, fr., types of *P. croixiana* Pierre; Larut, Kuala Kangsar: *St. Pol Lias & De la Croix s.n.* (L), fr.; Sapetang: *Low 523* (K), fl. fr. Aug.; ibidem: *Wray 523* (SING), fl. fr.; ibidem: *Wray s.n.* (SING), fr.; Taiping: *Barnard Mal. FD 1* (SING), fr. Jan. — Singapore, Bukit Timah Reserve: *Ngadiman SF 35800* (BM, BO, SING), height 13 m; ibidem: *Ridley 11331* (SING); Singapore without locality: *Smith s.n.* (SING), fr.

RIAU. Pulu Djangkang: *Teysmann s.n.* (BO); Karimun, Simpang: *FRI bb 17150* (L); ibidem: *FRI bb 31665* (L, SING), fl. Apr.; Lingga, Ngina: *FRI Ri/I-15* (BO); Pulu Singkep, Gunung Gambang, old forest, 100 m: *FRI bb 4041* (BO), height 26 m, diam. 0.40 m; Pulu Singkep, near Todak: *FRI bb 17347* (L).

BANKA. Blinju: *Grashoff 78* (L); Blinju, Djebus, Sungai Liat: *Berkhout s.n.* (BO), fl. fr. Aug.; Djebus: *Teysmann 3214* (BO), fl.; Lobok Besar: *Andang 19* (BO, L, SING), fl. Sep.; ibidem: *Anta 554* (BO, L, SING), height 8 m, diam. 0.10 m, fl. Sep.; ibidem, primary forest: *Kostermans 113* = *FRI bb 34050* (BO, L, SING), height 25 m, fl. Sep.; ibidem, 200 m: *Anta 218* (L), height 20 m, diam. 0.30 m, fl. Oct.; ibidem: *Anta 1083* = *Anta 2083* (BO, L, PNH, SING), height 18 m, diam. 0.30 m, fr. Oct.; ibidem: *Anta 1218* (BO, PNH, SING), height 22 m, diam. 0.30 m, fl. Oct.; ibidem, Gunung Pading: *Kostermans 903* = *Anta 903* (BO, L), height 25 m, diam. 0.25 m, fl. Sep.; S. Banka, Bakung, primary forest: *Kostermans 215* = *FRI bb 34149* (BO, L), height 16.60 m, diam. 0.32 m, fl. fr. Oct.; S. Banka, Perlang, primary forest: *FRI bb 11642* (BO), height 25 m, diam. 0.35 m; ibidem: *Kostermans 170* = *FRI bb 34104* (BO, L), height 22.40 m, diam. 0.55 m, fl. Sep.; S. Banka, Rindik: *FRI bb 11566* (L), fl. May; without locality: *Teysmann s.n.* (BO, FI), fl.; *Anonymous 11* (BO, L); *Anonymous s.n.* (BO).

SUMATRA. East Coast, Asahan, Bandar Pulu: *Stadtmiller s.n.* (BO), height 5 m; Bengkalis: *Bruinier s.n.* (BO), fl. Apr.; ibidem, Tamberan: *Beguin 235* (BO, L, U), height 17 m, diam. 0.80 m, fr. Aug.; ibidem, Tandjung: *FRI bb 17552* (L); Gunung: *Stadtmiller 47* (BO); Labuan Batu, Masihi, 300 m: *FRI bb 5299* (L), height 10 m, diam. 0.30 m; Langkat: *Heyne s.n.* (BO); Mangsang: *Stadtmiller 113* (BO); Senawar: *Stadtmiller 119* (BO); Siak River: *Seligmann s.n.* (P); Unggan: *Stadtmiller 102* (BO) — Riau and Dep., Indragiri: *Curtis 3631* (SING); ibidem: *Curtis s.n.* (SING) — Djambi, Muara Pindjuan: *FRI bb 12824* (BO), height 25 m, diam. 0.45 m — West Coast, Balai Selasa: *Anonymous s.n.* (BO); Air Bangis: *Anonymous 5* (L); Halaban, L Kota: *Burck s.n.* (BO); Pankalan, L Kota: *Burck s.n.* (BO), fl. Oct.; Lubuk Gedang: *Van Romburgh s.n.* (BO); Supajang: *Anonymous s.n.* (BO), fr.; ibidem, Air Busuk: *Burck s.n.* (BO); only West Coast: *Anonymous s.n.* (P) — Palembang, Banjuasin and Kubus countries: *Grashoff 736* (L), fr.; Kubus countries, primary forest: *Endert 227* (BO); Batu Radjah: *Teysmann 3912* (BO); ibidem: *De Vriese s.n.* (L, P, U); ibidem: *Anonymous 3912* (L); Lematang Ilir: *FRI T 1007* (G, L, SING, U), fl. fr. July; ibidem, Semangus, 100 m: *FRI bb 31976* (L); Lematang Ulu, 150 m: *Lambach 1353* (L), fr. Dec.; Penduduan forest: *Buurman van Vreeden 218* (BO), height 16 m, diam. 0.20 m; ibidem: *Buurman van Vreeden 246* (BO); Pulu Rimau: *Price s.n.* (SING); ibidem: *Anonymous s.n.* (SING); Rawas: *Dumas 1531* (G, L, SING), height 20 m, girth 1.10 m, fl. Mar. Apr.; ibidem: *Dumas 1558* (L), fl. May; ibidem, 150 m: *Grashoff 1083* (L); only Palembang: *Buurman van Vreeden 177* (BO), height 18 m, diam. 0.20 m; *Buurman van Vreeden 179* (BO), height 18 m, diam. 0.20 m; *FRI T 484* (L, SING); *Teysmann s.n.* (BM), fl., *neotype*; *Anonymous s.n.* (BO), fl. — Lampong Districts, Balambagan: *Van Romburgh s.n.* (BO), fl. Aug.; Kebang: *Teysmann s.n.* (U); Lampong Districts without locality: *Teysmann s.n.* (BO); *Anonymous 2* (BO), fl.; Sumatra without locality: *Burck s.n.* (BO, SING, U), fl., fr., sterile; *Forbes 2947* (FI), fl.; *Teysmann s.n.* (L, P); *De Vriese s.n.* (P); *Anonymous s.n.* (BO, L), fl.

BORNEO. Sarawak, Kuching: *Bartlett s.n.* (BM), fl.; near Kuching: *Haviland 3032* (BO, L, SING), fl. May; ibidem: *Haviland s.n.* (BM), fl. May; Setapoh Forest Reserve near Kuching: *Egon 1020* = *Sar. FD A 0809* (SAR), fr. Dec.; ibidem, swamps: *Omar 131* = *Sar. FD 00077* (SAR, SING), fl. May — West Borneo, Gunung Klam: *Hallier 2310* (L); Kophiang: Van Romburgh 31 (BO); ibidem: *Van Romburgh*

37 (BO); Melawi Tjatit, Bukit Tenkujung, 400 m: *FRI bb 26347* (L, SING), fl. Nov.; Pamangkat, Kamak Bekumpai: *Van Romburgh 5* (BO); Pangkala Lohan Paloh: *Van Romburgh 3* (BO); *Wight s.n.* Sambas (SING); Sungai Lohanmendjawa: *Van Romburgh 17* (BO); Telukkemaning: *Van Romburgh 66* (BO) — South and East Borneo, Buntok, Sungai Ajoh: *FRI 2121* (BO), fr. Jan.; Loa Djanan, W. of Samarinda: *Kostermans 6747* (L), height 40 m, diam. 0.70 m, fl. Apr.; Lower Dajak, Danan Rawah, old forest: *FRI bb 13474* (BO), height 24 m, diam. 0.15 m, fl. Oct.; Lower Dajak, central basin Little Dajak River near Pedah Ketapi, swamps: *Meegan IV* (BO), fl. Febr.; Lower Dajak, Little Dajak River, Pedah Ketapi, in swamps and forest: *Meegan X* (BO); Kutai: *Tromp s.n.* (BO); Medara: *Van Romburgh 19* (BO), fr. Mar.; Muara Teweh, Pepas: *FRI bb 28093* (BO), height 22 m, diam. 0.23 m, fl. May; ibidem: *FRI bb 28094* (BO, L, SING, U), height 18 m, diam. 0.14 m, fl. May; Muara Teweh, Kali Prarawen: *Van Romburgh 62* (BO); Muka Hadji: *Van Romburgh 32* (BO); Peak of Balikpapan, Beoul, 600 m: *Kostermans 7331* (L), height 30 m, diam. 0.80 m, fl. July; Pulu Laut, Madjamut: *Delmaar 2001* = *FRI 2001* (BO), fl. July; Puruk Tjahu, Tahudjan, primary forest, 500 m: *FRI bb 21152* (BO, L); Sudarane, Aju River: *Van Romburgh 27* (BO); Sungai Kapuas: *Labohm 68b* (BO), fl. — Sandakan, 3½ miles SSW of Sipitang, Sibutu River, Mengalong Forest Reserve: *Wood N. Born. FD 15145* (L), height 28 m, fl. May; St. Lucia, Sawau, Tinagat Forest Reserve: *Cuadra N. Born. FD A 2463* (L).

PALAWAN. *Cenabre, Gellidon & Paras For. Bur. 27877* (K, P), fr. Jan. Feb.

TAWI TAWI. f. Brown, Min. Prod. Phil. For. 2, 1921, 82; Merrill, Enum. Phil. Pl. 3, 1923, 277.

MINDANAO. *Ahern 5674* (BO), fl.

MALAY ARCHIPELAGO. without known loc.: *Teysmann s.n.* (BO), fl. fr.; *Anonymous s.n.* (BO).

CULTIVATED. Botanical Gardens Bogor: *Beccari s.n.* (BM, FI), fl., sterile; *Van Harreveld HT 6353* (L), fl. fr. Sep.; *Hochreutiner 35* (G), fr. Dec.; *Teysmann 14610* (BO). fl.; *Anonymous s.n.* (B, BO, L, U), fl., fr., sterile; Tjipetir Estate, Java: *Boerlage s.n.* (L), fl.; *Van Romburgh s.n.* (BO), fl. Dec.; Belgian Congo, Botanical Gardens Eala: *Vermoesen 2151* (S), fl. May; East Africa, East African Agricultural Research Station, Amani: *Anonymous s.n.* (BM, K), fl. Feb.

WITHOUT LOCALITY. *Anonymous s.n.* (BO), fl., labelled "Ambon", cultivated?

Remarks: This species shows a wide range of variation, especially in the shape of the leaves; these vary from long, narrow and sublanceolate (up to 14 cm long) to nearly circular or ovoid (up to 5 cm long). The truncate apex of the fruit is very characteristic and is present in nearly every fruit we had at our disposal. The conical fruits, unique among the members of *Payena,* are specific for *P. leerii.*

The flowers are white or yellowish white, the latex white, the fruits are green.

Mr M. Jacobs, botanist at the Bogor Herbarium, at our request communicated that the type specimen of this species could not be traced. As no other material also could be found a neotype specimen has been chosen from material evidently seen by Teysmann at least and corresponding as much as possible with the original description.

12. Payena endertii H. J. Lam, Lam 1925, 144; Lam 1927, 438 — *Fig. 9.*

Trees up to 38 m. *Branchlets* thin, terete, mostly with short ferruginous pubescence, stipules caducous, very small. *Leaves* dispersed along branchlets, chartaceous, apex long, obtuse acute, base cuneate, petioles 1.2—1.6 cm long, somewhat sulcate above, with dense ferruginous pubescence, those of older leaves sparingly pubescent; blade 6—12 by 2—4.5 cm, ovate-oblong, glabrous above, appressed short ferruginous sericeous pubes-

cent below, sometimes subglabrous; midrib sunken above, prominent below; secondary nerves idem, comparatively thin, 9—12, archingly joined near margin, starting from midrib at angles of about 60—65°, straight, curving towards apex near margin; tertiary nerves comparatively faint, both above and below, descending from marginal conjunctions of secondary nerves, ramifying towards midrib. *Inflorescences* in axils of leaves, in scars of leaves or sometimes scattered along branchlets, 1—4-florous, pedicels 1.5—1.6 cm long, appressedly pubescent. *Sepals* 0.55—0.6 by 0.5 cm, deltoid to triangular, acute, outside pubescent, inside glabrous. *Corolla* exsert, 1—1.2 cm long, tube 0.4—0.5 cm long, lobes 8, acute lanceolate, glabrous. *Stamens* 16, 0.3 cm long, filaments rather short, thecae ovoid, apex of connective longer than anthers, truncate, acute, bifid or lacerate. *Pistillum* 1.1 cm long, subulate, glabrous, base pubescent; ovary small, globose, pubescent, cells 8. *Fruits* 2.2—2.3 by 1—1.3 cm, generally rounded, sometimes ovoid, glabrous; seed 1, 1.9 by 0.8 by 0.65 cm, oblong, scar 0.2—0.22 cm wide, cotyledons foliaceous, radicle inferior, small; incrassate pedicels 1.3—1.4 cm long, glabrous, persistent sepals 0.5 by 0.5 cm, pubescent to subglabrous, persistent style 1.3 cm long.

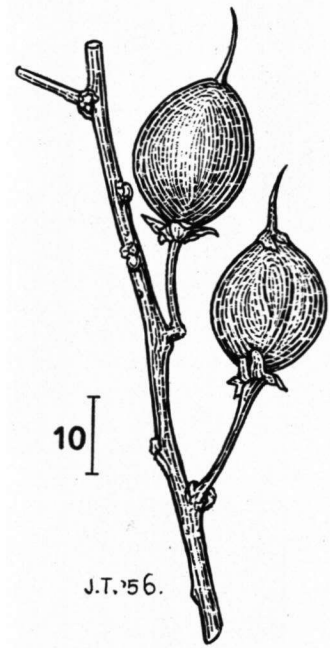

Fig. 9. *P. endertii*, branchlet with fruits. From *FRI bb 14197*.

Lectotype specimen: *FRI E 1051* in BO.

Vern. names: balam terung (Sumatra), beitis, nato mergotahan, njato burung, njatu, repuk rawas (Borneo).

Distr.: Sumatra, Borneo.

SUMATRA. Bengkulen, Redjang, Tjurup, northern slope of Bukit Kaba, 1100 m: *FRI E 1051* (*type*, BO, K, L), height 30 m, diam. 0.80 m, fl. fr. — Palembang, Pasemah countries, 1000—1500 m: *FRI TB 452* (L, SING), fl. July.

BORNEO. South and East Borneo, Berau near Inaran: *FRI bb 12118* (BO), height 33 m, diam. 0.50 m, fr. Oct.; West Kutei, Mount Antjalung: *FRI bb 16499* (L); ibidem: *FRI bb 16522* (L); ibidem: *FRI bb 16538* (L); West Kutei, near Kiham Batu Bong: *Endert 2335* (L, U), fr. July; West Kutei, near L. Petah: *Endert 3453* (L), fr. Sep.; Gunung Bulu Lembok near Pleihari: *Delmaer 1150* (L), fr.; Pleihari, Katapang, 450 m: *FRI bb 13779* (L), fl. Sep.; Pleihari, S. Alang: *FRI bb 14197* (L, SING), fr. Feb.

Remarks: The most important character of *P. endertii* is the habitus of the stamina in which the apex of the connective is longer than the anthers. In our opinion, however, the value of this character is rather doubtful, as most of the species of *Payena* show a considerable range of variation in the form of their stamens. Perhaps, if combined with the typical rounded fruit, these are suitable characteristics for *P. endertii*.

Lam (Lam 1927, 438, fig. 16) figured ovoid fruits; the present author generally found rounded fruits, once only ovoid ones.

The flowers and latex are wihte, the fruits green.

13. Payena lowiana Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525; Lam 1925, 150, 263; Lam 1927, 436 — *P. glabra* H. J. Lam, Lam 1925, 148, 262; Lam 1927, 438; Heyne, Nutt. Pl. Indon. 1, 1950, 1227.

Trees up to 42 m, diameter up to 0.40 m, girth up to 2 m. *Branchlets* rather thin, terete, appressed sericeous pubescent to subglabrous, stipules caducous, deltoid, narrowly acute, pubescent, 0.2—0.3 cm long. *Leaves* dispersed along branchlets, sometimes to some degree concentrated near tips of branchlets, membranaceo-chartaceous, apex acuminate, base cuneate, petioles 1.5—2.5 cm long, terete, short sericeous pubescent to subglabrous; blade 10—17 by 3—5 cm, ovate to ovate-lanceolate, glabrous above, glabrous to subglabrous below, young leaves sericeous pubescent below; midrib sunken above, prominent below; secondary nerves inconspicuous above, prominent below, 11—16, straight, archingly joined near margin, starting from midrib at angles of about 50—60°, curving towards apex near margin; tertiary nerves hardly visible, reticulate near margin, more or less parallel to secondary ones near midrib, sometimes one of the parallel nerves somewhat more conspicuous and placed in the middle between two secondary nerves, descending. *Inflorescences* dispersed along branchlets, 2—5-florous, pedicels 1.5—2.1 cm long, glabrous to subglabrous. *Sepals* 0.4—0.5 by 0.4—0.5 cm, broadly deltoid to triangular, tips rounded, with very short appressed pubescence, especially the outer ones. *Corolla* frequently exsert, 0.7—0.8 cm long, tube 0.45—0.5 cm long, lobes 8, acute ovate lanceolate, glabrous. *Stamens* 16, 0.35—0.4 cm long, filaments thin and very short, glabrous, apex of connective rather long, broadly obtuse to obtuse acute, laterally compressed, thecae long ovate. *Pistillum* 1.8—2.2 cm long, glabrous, base pubescent; ovary long conoidal, with rather long appressed chryso-brownish pubescence, cells 8, ovules long ovate to rounded. *Fruits* 2.8—3.5 by 0.9—2 cm, ovoid acuminate, short appressed pubescent to (sub)glabrous; seeds 1, rarely 2, 2.5—2.8 by 1.1 by 0.6—0.7 cm, long ovate ovoid, nitidous fulvous, scar 0.45—0.5 cm wide, cotyledons flat and foliaceous, radicle inferior, cylindrical, 0.3 cm long; incrassate pedicels 1.5—2.4 cm long, glabrous, persistent sepals 0.4—0.5 by 0.4—0.5 cm, subglabrous to glabrous, persistent style long, up to 2 cm long.

Type specimen: *St. Pol Lias & De la Croix 292* in P (errore *272*, Pierre l. c.).

Vern. names: balam, b. puntie kaju, majang rata (Sumatra); awa sau-uding, balam tembaga, b. tundjang, balem sito bulung, sau pajo (Simalur); simpur, taipalat karing = natu djalet (Borneo).

Uses: Timber, fruits edible.

Distr.: Malay Peninsula, Sumatra, Simalur, Borneo.

Malay Peninsula. Perak, Bukit Berapi: *St. Pol. Lias & De la Croix 292* (*type*, P), fr.

Sumatra. Atjeh and Dep., Gajo Loeëus, Penosan, Gunung Gerupal, 1900 m: *FRI bb 22373* (L, SING); ibidem, 2000 m: *FRI bb 22372* (U); island Bras, near Laping, 180 m: *Koorders 10567 β* (BO), height 25 m, diam. 0.40 m — Tapanuli, Angkola and Sepirok: *FRI bb 3143* (L) — West Coast, Air Bangis: *Anonymous 3*

(L); ibidem: *Anonymous s.n.* (P); Ophir, Simpang Parit, 90 m: *FRI bb 19624* (L).

SIMALUR. marshy forest: *Achmad 544* (BO, L, U), height 24 m, girth 0.86 m, fr. July; ibidem: *Achmad 1327* (K, L, SING), height 26 m, girth 0.86 m, fl. Aug.; ibidem, forest: *Achmad 1079* (G, L, SING, height 31 m, girth 2 m, very young fr. Apr.; ibidem: *Achmad 1129* (L, SING, U), height 25 m, girth 0.80 m, fr. May; North Simalur, forest: *Van Herwaarden 19* (BO), height 30—50 m, fl. July.

BORNEO. South and East Borneo, West Kutei, Mount Antjalung: *FRI bb 16574* (L), fr. Mar.; ibidem: *FRI bb 16580* (L), fr. Mar.; Puruktjahu, Kalapeh, old forest, 200 m: *FRI bb 11106* (BO), height 19 m, diam. 0.25 m; Puruktjahu, Puru, old forest, 100 m: *FRI bb 11119* (L), height 25 m, diam. 0.16 m; Sungei Wain region, N. of Balikpapan: *Kostermans 4153* (L), height 10 m, diam. 0.10 m, fl. Oct.; ibidem: *Kostermans 4408* (BO), height 12 m, fl. Oct.; Borneo without locality: *De Vriese s.n.* (U).

Remarks: The fruit is not always glabrous as Lam mentions in his description of *P. glabra* (Lam 1925, 149); sometimes clearly shows a short pubescence.

The abundant latex and the flowers are white, the fruits are green.

14. Payena lamii Van Bruggen, nov. sp. — *P. truncata* K. Griffioen & H. J. Lam MS ined. — *Fig. 10.*

Arbores. Ramuli graciles, teretes, glabri. *Folia* in regione terminali ramulorum dispersa, crasse coriacea, apice longe obtuse acuminata, basi cuneata, petiolis 3—4.5 cm longis, sulcatis vel teretibus, glabris; lamina 15—19 × 5—7 cm, ovata, fere glabra, indiciis pubescentiae brevis raraeque praeter costam; costa supra plana, subtus prominens; nervi secundarii subgraciles, maxima supra, 29—32, recti, marginem versus obscuri sed arcuatim conjuncti, angulo 60—80° de costa adscendentes, apicem versus prope marginem curvati; nervi tertiarii vix conspicui, prope marginem plus minusve reticulati, prope costam nervis secundariis paralleli, descendentes, plerumque unus inter nervos parallelos evidentior in medio duorum nervorum secundariorum. *Inflorescentiae* axillares vel in ramulis dispersae, 7—10-florae, pedicelli breves, 0.2—0.3 cm longi, pubescentes, apice dilatati. *Sepala* 0.4—0.45 × 0.2—0.35 cm, ovata, apice rotundata vel acuta, extus adpresse fulvo-pubescentes, intus glabra vel subglabra, interiora praeter marginem valde ciliata; *corolla* 0.4 cm longa, tubus 0.15 cm longus, petalis 7—8, ovatis-oblongis, apicibus rotundatis, utrimque glabris medio linea pubescentiae apice dilatata munitis, fauce pubescens; *stamina* 16, 0.2—0.25 cm longae, filamentis crassis brevibusque, plerumque longe pubescentibus, maxime in floribus juvenilibus, apice connectivi acuta, thecis longis triangularibus; *pistillum* 1 cm longum, subulatum, glaber, basi pubescente; ovarium conicum, pubescens, loculis 8. *Fructus* ignoti.

Trees. Branchlets thin, terete, glabrous. *Leaves* dispersed in terminal region of branchlets, thick coriaceous, apex long, obtuse acuminate, base cuneate, petioles 3—4.5 cm long, sulcate or terete, glabrous; blade 15—19 by 5—7 cm, ovate, practically glabrous, with traces of a short sparingly pubescence along the midrib; midrib sunken above, prominent below; secondary nerves comparatively faint, especially above, 29—32, straight, near margin faint and archingly joined, starting from midrib at angles of about 60—80°, curving towards apex near margin; tertiary nerves hardly conspicuous, near margin to some degree forming a reticulate pattern, near midrib parallel to secondary ones, starting from marginal edges, generally one of the parallel nerves somewhat more conspicuous and placed

i nthe middle between two secondary nerves. *Inflorescences* in axils of leaves or scattered along branchlets, 7—10-florous, pedicels short, 0.2—0.3 cm long, pubescent, thickened towards flower. *Sepals* 0.4—0.45 by 0.2—0.35 cm, ovoid, apex rounded or acute, outside appressed yellowish brown pubescent ,especially long ciliated along margin at inner ones, inside glabrous to subglabrous. *Corolla* 0.4 cm long, tube 0.15 cm long, lobes 7—8, ovate-oblong, obtuse rounded at tips, glabrous with at both surfaces a towards the apex widening line of pubescence in the middle of each lobe, throat very pubescent. *Stamens* 16, 0.2—0.25 cm long, filaments thick and short, mostly long pubescent, especially in immature flowers, apex of connective acute, thecae long triangular. *Pistillum* 1 cm long, subulate, glabrous, base pubescent; ovary conoidal, pubescent, cells 8. *Fruits* unknown.

Type specimen: *H. H. Everett s.n.* in SAR.

Vern. names: njato berlali (Borneo).

Distr.: Borneo, Sarawak.

BORNEO. Sarawak, Bintulu: *H. H. Everett s.n.* (*type*, L, SAR), fl. May.

Remarks: Although we have at present one specimen only at our disposal we do not hesitate to attribute it to an as yet unknown species, which is characterized by the pubescent throat, the very short pedicels, the large number of secondary nerves in a comparatively small leaf, and the very long apex of the leaf. It is named in honour of Prof. Dr. H. J. Lam, director of the Rijksherbarium at Leiden.

15. Payena lanceolata Ridley, J. As. Soc. Straits 79, 1918, 93; Lam 1925, 147; Lam 1927, 438 — Fletcher in Craib, Fl. Siam. Enum. 2, 4, 1938, 360; *P. lancifolia* H. J. Lam, Lam 1925, 147; Lam 1927, 438; Wyatt Smith, Res. Pamphl. 4, 1954, 52 — *P. annamensis* Lecomte, Fl. Gén. Indoch. 3, 7, 1930, 909 — *P. leerii* Fletcher nec (Teysmann & Binnendijk) Kurz, Fletcher in Craib, l. c., 360.

Trees up to 35 m, diameter up to 0.40 m, girth up to 2.50 m. *Branchlets* thin, terete, ferruginous pubescent to (sub)glabrous, stipules caducous, long acute, ferruginous pubescent, 0.4—0.5 cm long. *Leaves* dispersed along branchlets, chartaceous to (sub)coriaceous, apex more or less acuminate, base cuneate, petioles 1—2 cm long, terete to sulcate above, glabrous to ferruginous pubescent; blade 5.5—12 by 1.8—4 cm, lanceolate to ovate-lanceolate, glabrous above, glabrous to sparingly tomentose along the basic part of the midrib below; midrib sunken above, prominent below; secondary nerves inconspicuous above, not prominent below, 10—16, straight, archingly joined near margin, starting from midrib at angles of about 60—75°, curving towards apex near margin; tertiary nerves hardly visible, especially above, more or less parallel to secondary ones, descending. *Inflorescences* in axils of leaves, 2—7-florous, pedicels 0.7—1.2 cm long, sparingly pubescent. *Sepals* 0.45 by 0.3—0.4 cm, triangular, as long as wide or longer than wide, apex acute to rounded, pubescent to subglabrous, to some degree ciliated at margins, especially inner ones. *Corolla* sometimes exsert, 0.5—0.7 cm long, tube 0.2—0.3 cm long, lobes 7—8, oblong, apex obtuse acute to rounded. *Stamens* 16, 0.2—0.3 cm long, filaments short or longer and slender, pubescent, apex of connective acute to

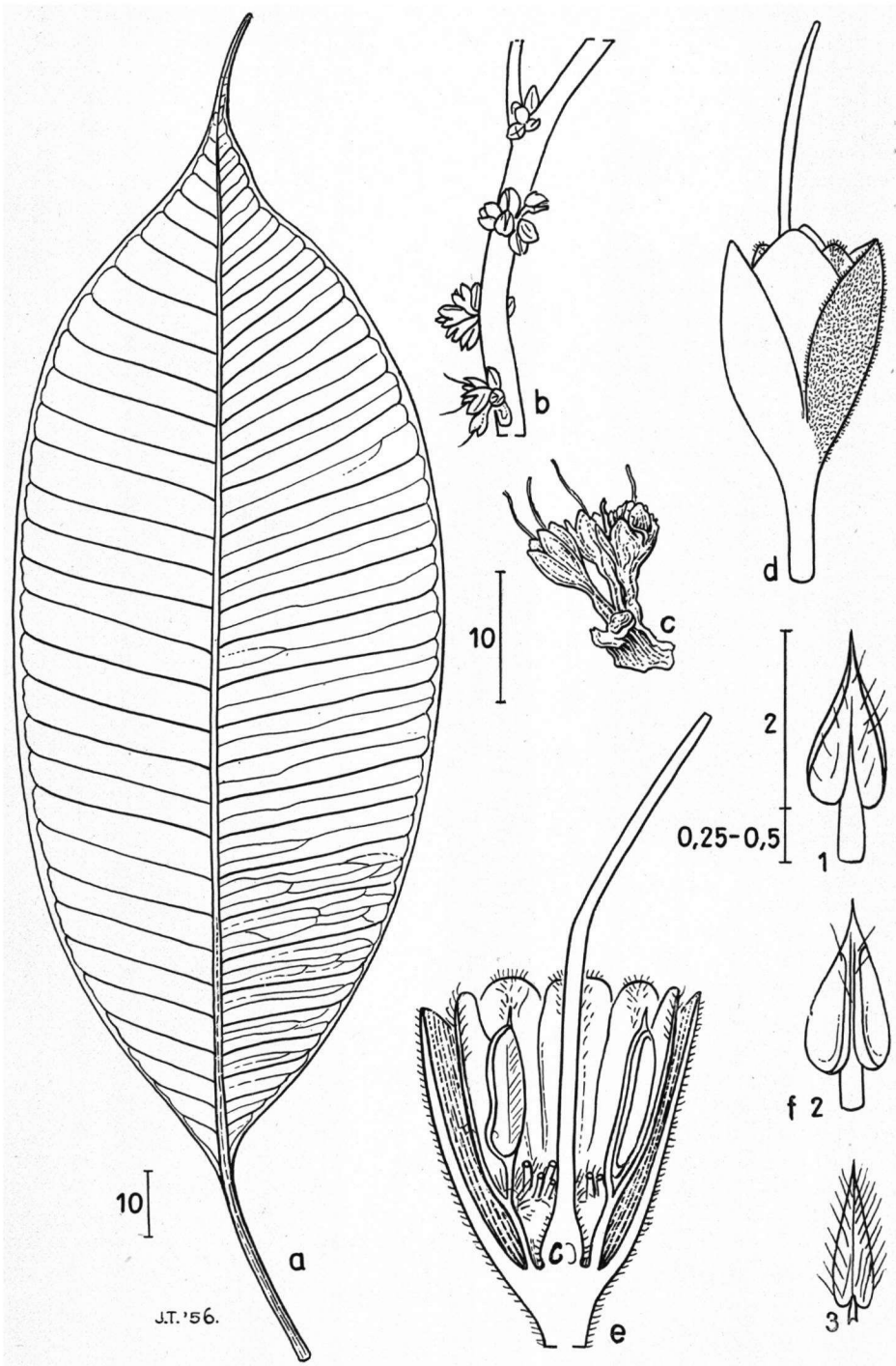

Fig. 10. *P. lamii,* a. leaf; b. branchlet with inflorescences; c. inflorescence with four olfwers; d. flower; e. longitudinal section through flower; f. stamens, 1. ventral, 2. dorsal view, 3. stamen from immature flower. From *Everett s.n.,* b., d.—f. from drawings by Griffioen.

obtuse, thecae ovate oblong. *Pistillum* 0.7—1.2 cm long, subglabrous to ferruginous pubescent, base villous; ovary broadly conoidal, pubescent, cells 6—8, ovules 0.04 cm long. *Fruits* 3—4.5 by 1—2.2 cm, acuminate rounded to beaked, appressed pubescent to glabrous; seed 1, 2.2—2.7 by 0.9—1.3 cm, long ovoid, laterally compressed, nitidous dark brown, scar 0.75 cm wide, cotyledons flat and foliaceous, radicle short, cylindrical; somewhat thickened pedicels 1—2 cm long, glabrous, persistent sepals 0.3—0.5 cm, subglabrous to glabrous, persistent style very short, gradually merging into apex of fruit.

Type specimen: *Aniff 15541* in K.

Distr.: Indo-China, Siam, Malay Peninsula, Sumatra.

the basic part of the midrib below; midrib sunken above, prominent below;

Var. **lanceolata** — Synonymy as in species, except *P. annamensis*.

Leaves with 10—16 secondary nerves; *sepals* as long as wide, *corolla* with 8 lobes, filaments of *stamens* short and rather thick, *ovary* with 8 cells; *fruits* acuminate-rounded to beaked, thick

Type specimen: *Aniff 15541* in K.

Vern. names: chakhun, koon, pikul nok, p. thuan (Siam); beliau, ekor, ikor, mayang, nyatoh tanjong (Malay Peninsula); balam (Sumatra).

Distr.: Siam, Malay Peninsula, Sumatra.

SIAM. Suret, Bangbao: *Llewelyn Williams 17110* (L), height 30 m, fl. Feb. — Nakawn Sritamarat, Trang, Chawng, evergreen jungle, 120 m: *Smitinand & Williams 17037* (L), height 20 m, fl. Jan.; Trang, Kachong, edge of forest: *Llewelyn Williams 17037* (L), height 35 m, fl. fr. Feb. — Puket, Kopah Bangsack: *Moh. Haniff & Moh. Nur 2940* (BM, BO, KEP), height 17—20 m, fr. Dec. (types of *P. lanciifolia* H. J. Lam).

MALAY PENINSULA. Kedah, Bukit Dendong Reserve, Langkawi Isl.: *Rahim Mal. FD 12426* (K, KEP, SING), height 20 m, girth 1.80 m, fl. fr. Apr. Sept.; Bukit Malut, Langkawi Isl.: *Wilkinson Mal. FD 17732* (KEP), height 21 m, girth 2 m, fl. Oct.; Gunong Raya Forest Reserve: *Abdul Ghani Mal. FD 47380* (KEP), height 13 m, girth 1.20 m, fr. Dec.; ibidem, 300 m: *Aniff 15541* (K), fl. Feb.; ibidem: *Dolman Mal. FD 6780* (K, KEP, SING), fl. fr. Dec.; ibidem: *Ishak Mal. FD 7686* (K, KEP, SING), fl. Jan.; ibidem, 170 m: *Mal. FD 71190* (KEP), height 40 m, girth 2.50 m, fl. fr. Feb.; ibidem: *Moh. Yussoff Mal. FD 47674* (KEP), height 20 m, girth 1.20 m, fl. Feb.; Kolam Ayer, Langkawi Isl.: *Mohamed Mal. FD 42523* (KEP), height 10 m, girth 2 m, fl. Dec.; Pulau Tuba Forest Reserve, Langkawi Isl.: *Dris Mal. FD 32909* (KEP), height 13 m, girth 1 m, fr. Aug.; ibidem: *Haron Mal. FD 59650* (KEP), height 22 m, girth 1.15 m, fl. Apr. — Kelantan, Kemahang North Forest Reserve, primary forest: *Mal. FD 65185* (KEP), height 25 m, girth 1.15 m; Panyik: *Bahty Mal. FD 68765* (KEP), height 20 m, girth 1.10 m; Pahang: Fraser Hill, 1300 m: *Moh. Nur SF 11327* (BM, BO, K, SING), height 13—17 m, fr. Sep.

SUMATRA. West Coast, Ophir, Watas Panti, Tjubadak, 930 m: *FRI bb 6558* (BO), height 31 m, diam. 0.40 m.

Var. **annamensis** (Lecomte) Van Bruggen, nov. comb. — *P. annamensis* Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 909.

Leaves with 13—16 secondary nerves; *sepals* longer than wide. *Corolla* with 7—8 lobes, filaments of *stamens* rather long and slender, *ovary* with 6—8 cells. *Fruits* long acuminate to beaked, thin.

Type specimen: *Poilane 10170* in P (lectotype of *P. annamensis* Lecomte).

Vern. names: ca ta (Annamite).

Distr.: Indo-China.

INDO-CHINA. Nha-trang, road from Nha-trang to Ninh-hoa, km 26: *Poilane 8319* (P), fr. Oct. — Phanrang, Baran: *Poilane 10170* (P), fl. Mar.

Remarks: We do not hesitate to unite as one species what has been considered to represent three different ones, viz, *P. annamensis, P. lanceolata,* and *P. lancifolia.* The present species has a rather wide range of variation, sometimes coming very near *P. lucida.* However, it can be distinguished immediately from that species by the forking of the secondary nerves, which occurs comparatively near the edge of the leaf (in contrast with *P. lucida,* where it occurs at some distance of the edge of the leaf).

In our opinion, according to the material at hand, we can subdivide it into two varieties, one of which represents a taxon that is the most variable in the genus *Payena.* At the boundaries of their areas the taxa of many plants show a higher grade of variation. *P. lanceolata* var. *annamensis* is the only member of *Payena* that has 7—8 lobes in the corolla and 6—8 cells in the ovary.

Ridley's remark (Ridley l. c., 93) "style and ovary glabrous" is not correct since I found these parts of the f lower to be pubescent in his type specimen. Wyatt Smith (l. c., 52) attaches importance to the pubescence of branchlets and leaves; we consider these characters in this case of less value, since older parts of the tree do no longer show this pubescence, which in young leaves only covers the basal part of the blade at the lower surface near the midrib and sometimes also near the secondary nerves.

In the Bogor Herbarium a specimen, *Bosch 4584,* labeled Java, Banjuwangi certainly belongs to the species under discussion, but I doubt very much whether the locality is correct.

The flowers and latex are white, the fruits green.

16. Payena selangorica King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 175; idem, Addenda-Corrigenda, 1908, 873; Ridley, Fl. Mal. Pen. 2, 1923, 264; Lam 1925, 132; Lam 1927, 439 — *Fig. 11.*

Trees up to 7 m. *Branchlets* slender, terete, light brown, rough, short sparingly pubescent, stipules caducous. *Leaves* dispersed along branchlets, chartaceo-coriaceous, apex acuminate, base cuneate, narrowly attenuate, petioles 1.5—2 cm long, channeled, short sparingly pubescent; blade 11—14 by 2.5—4 cm, oblong-lanceolate, glabrous above, red ferruginous pubescent below, especially along the midrib; midrib impressed and to some degree keeled above, prominent below; secondary nerves indistinct, especially below, 15—17, archingly joined near margin, starting from midrib at angles of about 80°, more or less straight, curving towards apex near margin; tertiary nerves visible but not prominent, near margin forming a *Ganua*-like pattern, near midrib more or less parallel to secondary ones, descending. *Inflorescences* in axils of leaves, 2—3-florous, pedicels 0.5—2 cm long, channelled, short sparingly pubescent. *Sepals* 0.75 by 0.5 cm, ovate-acute, rather thick, pubescent. Other parts of flower unknown. *Fruits* 2.5 by 1.2 cm, elliptic, pedicels 1.6—1.9 cm long, persistent sepals 0.6—0.7 cm long, style persistent.

Type specimen: *Ridley 7387* in SING.
Distr.: Malay Peninsula, Selangor.

MALAY PENINSULA. Selangor, Bukit Kutu woods: *Ridley 7387* (*type*, SING), height 7 m, fr. May, annot.: "In fruit no gutta".

Remarks: Only the type specimen of this evidently very rare

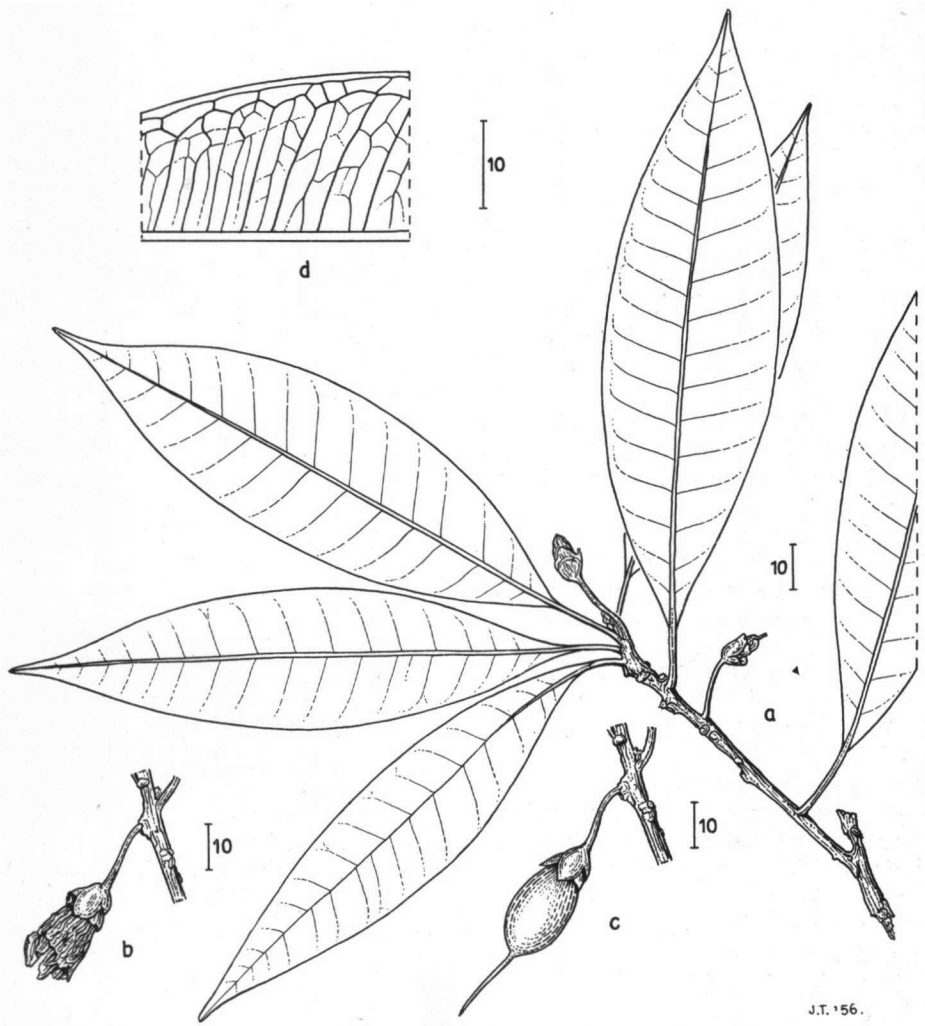

Fig. 11. *P. selangorica*, a. branchlet with leaves and very young fruits; b. mature fruit; c. reconstruction of mature fruit; d. nervation of leaf. From type specimen, *Ridley 7387*.

species is known. Unfortunately it contains, besides some leaves, only three fruits (two immature, one mature) in very bad condition. Therefore the description had to be extracted partly from the above-cited literature.

The species was described as a *Payena.* However, the status is still doubtful. According to the present material it could belong to *Madhuca* or *Ganua* as well. If it is a species of *Payena* at all it should be placed in the neighbourhood of *P. lanceolata,* differing from that species by its larger leaves with no conspicuous acumen and the smaller fruits.

Doubtful species

P. ridleyi Gandoger, Bull. Soc. Bot. France 65, 1918, 56.

The original description runs as follows:

"*Payena Ridleyi* Gdgr. — A *P. costata* distincta foliis duplo majoribus non acuminatis sed breviter acutis basi truncatis subtus glaucis, floribus 3—5-fasciculatis, pedicellis glabris duplo brevioribus, calyce non dentato styloque longiore.

HAB.: Asia merid., ad Singapore (*Ridley* n. 6698!).

Ex eodem cl. collectore, qui ingentem copiam plantarum peninsulae Malacca, Malaisia, etc. benevole mihi transmisit, specimina a praecedentibus notis diversis typum ipsum referentia."

Not having seen the type specimen we can not refer it to one of the known species; moreover, the description is quite insufficient. There is a possibility that it is identical with *P. maingayi* (1882), according to the remark that the leaves are twice as long as those of *P. costata* = *P. lucida.*

8. New combinations

Payena cambodiana Lecomte = *Madhuca cambodiana* (Lecomte) Van Bruggen.

9. Index of collectors numbers

Species have been indicated by their number between brackets.

Abdul Ghani Mal. FD 47380 (15); Achmad 61 (2), 273 (2), 544 (13), 1079 (13), 1129 (13), 1244 (2), 1306 (2), 1327 (13), 1498 (2); Ahera 5674 (11); Ahmad Mal. FD 5061 (6), 5080 (6), 5097 (6), 5790 (6); Ahmady 1736 = Sar. FD S 2722 (8); Ahmed s. n. (6); Alvins 47 (6), 248 (6), 569 (6), 886 (6), 894 (6), 1167 (6), 2150 (6), s. n. (6); Anderson 1835 = Sar. FD 2683 (6); Andang 19 (11); Aniff 15541 (15), 16337 (11); Anonymous 2 (11), 3 (13), 5 (11), 11 (11), 1636 (6), 2007 (2), 2672 (6), 3912 (11), s. n. (1, 2, 6, 8, 11); Anta 554 (11), 903 = Kostermans 903 (11), 1083 = 2083 (11), 1218 (11), 2083 = 1083 (11); Awang Mal. FD 29639 (8), 42391 (6); Awang Lela Mal. FD 2682 (6), 2688 (3).

Bahty Mal. FD 68763 (15); Barnard Mal. FD 1 (11); Bartlett s. n. (11); Beccari 1818, vide Beccari 1848, 1848 (10), 2991 (6), s. n. (2, 11); Beguin 235 (11); Berkhout s. n. (11); Beumée 5672 (2), 6020 (2); Blume 239 (2), 1258 (2), s. n. (2); Boerlage s. n. (11); Bosch 4584 (15); Bruinier s. n. (11); ten Brummeler 43 (4); Bryant s. n. (11); Burck s. n. (2, 8, 11); Burkill Mal. FD 596 = Watson Mal. FD 596 (3); Burkill SF 3240 (6); Burkill & Holttum SF 7766 (1); Burkill & Haniff SF 17195 (6); Burkill & Moh. Haniff SF 16229 (6); Burn-Murdoch 11 (6), 29 (6), 250 (8); Buurman van Vreeden 177 (11), 179 (11), 218 (11), 246 (11); Buwalda 6430 (9), 6608 (8).

Cantley 74 (6), 2633 (6), s. n. (3, 6); Castro N. Born. FD 3793 (2); Cenabre, Gellidon & Paras For. Bur. 27877 (11); Clemens & Clemens 11258 (6), 26329 (6), 26330 (5), 26330—27316 (5), 26715 (8), 27316 (5), 27405 (6), 27405—27974 (6), 27452 (5), 27974 (6), 28688 (6), 29351 (8), 30701 (8), 31220 (8), 31329 (8), 32050 (8), 32127 (8), 32187 (8), 40623 (8), 40761 (8), 40778 (6), 51322 (5); Corner SF 21318 (3), 30274 (6), 30276 (6), 34961 = Ngadiman SF 34961 (6), 37734 (3); Cuadra N. Born. FD A 2163 (2), A 2436 (11); Curtis 777 (8), 1516 (6), 1565 (6), 3483 (3), 3631 (11), 3640 (11), 3644 (6), 3660 (6), 3687 6), s. n. (6, 11).

Daud 10857 (6); Delmaar 1150 (12), 2001 (11); Derry 54 (6), 461 (6), 654 (6);

Dolman Mal. FD 6780 (15); Dris Mal. FD 32909 (15); Dumas 1531 (11), 1558 (11), 1636 (2);

Egon 1020 = Sar. FD A 0809 (11); Elmer 21236 (2), 21441 (2); Enchai Mal. FD 48783 (2); Endert 227 (11), 2335 (12), 3453 (12); Enggoh Mal. FD 55118 (2); Enggoh N. Born. FD 4608 (2); Errington de la Croix 68 (11), 69 (11), 70 (11), 71 (11), 72 (11); Everett s. n. (14).

Flippance s. n. (6); Forbes 2567 (9), 2947 (11), s. n. (2); For. Bur. 27877 (11); Fox 11305 (6); Foxworthy 1155 (3), Mal. FD 652 (6); FRI 35 T 1 P 39 (2), 136 E 3 P 819 (2), 2001 (11), 2017 (6), 2121 (11), 2130 (6), 2131 (2), 11642 (11), bb-numbers 2666 (2), 2999 (2), 3143 (13), 4041 (11), 4869 (2), 5299 (11), 5353 (2), 5468 (2), 5506 (2), 6065 (8), 6103 (2), 6161 (2), 6181 (2), 6558 (15), 7190 (9), 7733 (2), 8022 (6), 8497 (2), 8550 (2), 8788 (2), 8837 (2), 8838 (2), 9221 (2), 9225 (2), 10257 (6), 10408 (6), 11106 (13), 11119 (13), 11434 (6), 11566 (11), 12118 (12), 12824 (11), 13474 (11), 13481 (11), 13779 (12), 14197 (12), 15786 (6), 15791 (6), 15864 (6), 16040 (2), 16041 (2), 16499 (12), 16522 (12), 16538 (12), 16574 (13), 16580 (13), 17150 (11), 17347 (11), 17552 (11), 18731 (2), 18760 (2), 18825 (2), 19151 (2), 19624 (13), 21152 (11), 22372 (13), 22373 (13), 26030 (6), 26154 (6), 26158 (6), 26347 (11), 27452 (8), 27500 (8), 28093 (11), 28094 (11), 28095 (10), 28096 (10), 29333 (6), 30177 (2), 31665 (11), 31800 (6), 31976 (11), 33008 (6), 34050 = Kostermans 113 (11), 34104 = Kostermans 170 (11), 34149 = Kostermans 215 (11), 34373 (6), 34445 (6), 34505 (6), 34642 (7), 34909 (2), E 1051 (12), Ja 1877 (2), Ja 1964 (2), Ja 2865 (2), Ja 3824 (2), Ja 6220 (2), Ri/I-15 (11), Ri/I-40 (8), SWK/I-10 (2), T 3 P 408 (2), T 484 (11), T 570 (2), T 1007 (11), TB 452 (12),

Goodenough 1268 (3), 1278 (6), 1427 (3), 1853 (6), 1977 (6), 3658 (6), 10545 (6); Grashoff 78 (11), 504 (2), 736 (11), 1109 (4), 1152 (2); Griffith 3605 (6), s. n. (6).

Hallier 863 (2), 2310 (11); Hamid Mal. FD 1591 (6), 5449 (6), 10615 (3), 11045 (6); Haron Mal. FD 59650 (15); van Harreveld HT 6353 (11); Hashim s. n. (6); Haviland 2098 (8), 3220 (8), 3032 (11), 3035 (7); Helfer 424 (6), 3611 (6); Henderson s. n. (6); van Herwaarden 19 (13); Hewitt S. 5.1 (8); S. 5.2 (8); Heyne s. n. (2, 11); Hochreutiner 35 (11), 36 (2); Holmberg 794 (6), 804 (6); Holttum SF 9660 (6); Horsfield 191 (6); Houter s. n. (2); Houtsoorten Gedeh 87 (2); Hume 8766 (6).

Idris Mal. FD 6319 (6); Isaac s. n. (6); Ishak Mal. FD 7686 (15).

Jaamat Mal. FD 28057 (6); Junghuhn 25 (6), 87 (2), 247 (2), s. n. (1, 2, 6); Kadir N. Born. FD A 42 (2), A 659 (2); Kadir bin Abdul N. Born. FD A 2881 (2); Keith N. Born FD 4608 (2); Kerr 648 (2), 5245 (6), 12576 (6), 14027 (6), 14845 (6), 16363 (6), 20375 (6); King's Collector 2611 (1), 2940 (7), 3275 (6), 3734 (6), 4081 (6), 6636 (6), 7223 (3), 7842 (6), 7957 (6), 8705 (6), 9918 (3), 10466 (6), 10496 (6), 10978 (6); Koorders 10162 β (2), 10164 β (2), 10165 β (2), 10166 β (2), 10167 β (2), 10168 β (2), 10169 β (2), 10170 β (2), 10172 β (2), 10173 β (2), 10174 β (2), 10175 β (2), 10176 β (2), 10177 β (2), 10178 β (2, 10423 β (1), 10429 β (1), 10567 β (13), 11103 β (2), 12120 β (2), 12121 β (2), 14702 β (2), 14703 β (2), 15230 β (2), 20779 β (2), 20948 β (2), 20974 β (2), 21841 β (2), 21844 β (2), 23926 β (2), 23989 β (2), 24402 β (2), 25603 β (2), 29084 β (2), 29085 β (2), 30412 β (2), 30878 β (2), 32672 β (2), 33811 β (2), 35052 β (2), 37284 β (2), 38505 β (2), 38567 β (2), 39600 β (2), 39991 β (2), 40007 β (2), 40015 β (2), 40064 β (2), Korthals s. n. (2); Kostermans 113 = FRI bb 34050 (11), 170 = FRI bb 34104 (11), 215 = FRI bb 34149 (11), 903 = Anta 903 (11), 4153 (13), 4408 (13), 4947 (6), 6266 (2), 6747 (11), 6941 (6), 7331 (11); Krukoff 229 (2); Kurz s. n. (6).

Labohm 68b (11); Lakshnakara 394 (6), 648 (2), 669 (6); Lambach 1353 (11); Lambah Mal. FD 2713 (3); Langlassé 300 (6); Low 523 (11).

Mahamud Mal. FD 3713 (6); Maingay 990 (3), 2259 (8); Mal. FD 1 (11), 309 (3), 530 (6), 596 (3), 627 (3), 652 (6), 823 (6), 1591 (6), 1853 (6), 1874 (6), 1972 (6), 2067 (3), 2682 (6), 2688 (3), 2713 (3), 3650 (1), 3713 (6), 3926 (3), 3940 (6), 5061 (6), 5080 (6), 5097 (6), 5449 (6), 5790 (6), 6319 (6), 6780 (15), 7686 (15), 7785 (3), 9562 (6), 9593 (3), 10495 (6), 10615 (3), 10840 (6), 11045 (6), 11604 (3), 12426 (15), 12491 (6), 12492 (6), 13774 (3), 15220 (6), 16570 (8), 17732 (15), 22085 (6), 23746 (6), 28057 (6), 29302 (6), 29639 (8), 30118 (3), 32332 (6), 32909 (15), 35954 (8), 36230 (6), 37558 (3), 39051 (6), 42391 (6), 42523 (15), 45468 (1), 47380 (15), 47674 (15), 48783 (2), 50440 (3), 53689 (8), 55118 (2), 59650 (15), 62880 (6), 64880 (6), 65185 (15), 65927 (8), 66373 (6), 66450 (6), 66509 (6), 67874 (3), 68314 (3), 68763 (15), 68769 (1), 69915 (8), 70077 (8), 70256 (8), 71190 (15), 71387 (3), 73798 (3), 74151 (8);

Maung Ba Pe 13046 (6); Meegan IV (11), X (11); Meijer 2565 (2); Mitchell Mal. FD 309 (3); Mohamed Mal. FD 42523 (15); Moh. Haniff 88 (6), 16337 (8), SF 3661 (6), SF 21095 (6), SF 21116 (3); Moh. Haniff & Moh. Nur 2940 (15); Moh. Hashim Mal. FD 10840 (6); Moh. Isa Mal. FD 10495 (6); Moh. Nur SF 405 (6), 1310 (6), 2247 (6), 11327 (15), 11858 (6), s. n. (6); Moh. Nur & Kiah SF 7764 (6); Moh. Yakim Mal. FD 1972 (6); Moh. Yassin Mal. FD 39051 (6); Moh. Yussoff Mal. FD 47674 (15); Motley IV (1364) (10), VIII (203) (10); Moysey & Kiah SF 33747 (2), 33749 (2); Muas 1745 = Sar. FD S 235 (8); Muliadi N. Born. FD A 809 (2); N. Born. FD 1750 (2), 3793 (2), 4311 (2), 4353 (2), 4537 (2), 4608 (2), 4887 (2), 2996 (2), 10076 (2), 10634 (2), 15145 (11), A 42 (2), A 659 (2), A 809 (2), A 2163 (2), A 2436 (11), A 2881 (2), A 4392 (6), A 4720 (2); Ngadiman SF 34961 = Corner SF 34961 (6), 35800 (11), 36421 (6); Ngah Mal. FD 32332 (6); Noltée 4018 (2).

Omar 131 = Sar. FD 00077 (11); Omar Mal. FD 15220 (6); Osman Mal. FD 29302 (6); Otik N. Born. FD 4353 (2).

Parkinson 5299 (6); Paymans 9 (7); Pawangee Mal. FD 13774 (3); Poilane 8319 (15), 10170 (15); Price s. n. (11); Puasa N. Born. FD 4887 (2).

Raciborski 324 (2); Rahim Mal. FD 12426 (15); Rahman Mal. FD 823 (6); Rhodine s. n. (2); Ridley 3995 (6), 4959 (8), 5070 (6), 5644 (6), 6135 (6), 6213 (6), 6239 ((3), 6497 (3), 6503 (6), 6508 (6), 6696 (3), 7387 (16), 9203 (8), 9701 (6), 11331 (11), 11371 (3), s. n. (6); Riedel s. n. (2); van Romburgh 3 (11), 5 (11), 17 (11), 19 (11), 27 (11), 31 (11), 32 (11), 37 (11), 62 (11), 66 (11), s. n. (4, 11).

Saleh Mal. FD 3926 (3); Sales N. Born. FD 4311 (2); Sar. FD 00077 = Omar 131 (11), 2683 = Anderson 1835 (6), A 0809 = Egon 1020 (11), S 235 = Muas 1745 (8), S 0528 (6), S 0534 (6), 0671 (8), S 0684 (6), S 2722 = Ahmady 1736 (8), S 2768 (8); Scortechini 346b (3), 1989 (6); Seligmann s. n. (11); SF 405 (6); 1310 (6), 2247 (6), 3240 (6), 3661 (6), 7764 (6), 7766 (1), 6990 (6), 11327 (15), 11858 (6), 16229 (6), 17195 (6), 21095 (6), 21116 (3), 21318 (3), 29663 (3), 30274 (6), 30276 (6), 33747 (2), 33749 (2), 34961 (6), 35800 (11), 35908 (8), 36421 (6), 35431 (8), 36456 (8), 37734 (3), 39663 (3), 40099 (6), 40588 (3), 40595 (6), 40905 (6); Sham Mal. FD 23746 (6); Sinclair SF 40099 (6), 40588 (3), 40595 (6); Sinclair & Kiah bin Salleh SF 40905 (6); Smith Mal. FD 3940 (6), s. n. (11); Smitinand & Williams 17037 (15); St. Pol Lias & de la Croix 272 vide St. Pol Lias & de la Croix 292, 292 (13), 317 (11), s. n. (11); Stadtmiller 47 (11), 79 (1), 102 (11), 105 (1), 113 (11), 119 (11), s. n. (11); van Steenis 9405 (1); Strugnell Mal. FD 12491 (6), 12492 (6), 16570 (8); Symington Mal. FD 36230 (6), 45468 (1).

Tahir Mal. FD 627 (3); Teysmann 3214 (11), 3730 (2), 3912 (11), 14610 (11), s. n. (2, 6, 11); Teysmann & de Vriese s. n. (2); Tromp s. n. (11).

Vermoesen 2151 (11); de Vriese XVI (6), 81 (2), s. n. (2, 6, 11, 13); de Vriese & Teysmann s. n. (2).

Wallich 4147 (6); Walton Mal. FD 22085 (6); Watson Mal. FD 530 (6), 596 = Burkill Mal. FD 596 (3); Wight s. n. (11); Wilkinson Mal. FD 17732 (15); Llewelyn Williams 17037 (15), 17110 (15), 17113 (2); Winckel 248 β (2), 268 (2); Wind 4018 (2); Wood N. Born. FD 15145 (11), A 4720 (2); Wood & Wyatt Smith N. Born. FD A 4392 (6); Wray 523 (11), 1170 (6), 3423 (3), s. n. (6, 11); Wyatt Smith Mal. FD 62880 (6,) 64880 (6).

Yates 1687 (2), 2027 (1), 2575 (2), 2641 (1); Yeop Mal. FD 3650 (1).

De Zylva Mal. FD 9593 (3).

10. Index of species described under Payena

acuminata (Blume) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 528, this publication species no. 2.

annamensis Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 909 = P. lanceolata Ridley var. annamensis (Lecomte) Van Bruggen, sp. 15.

balansae Lecomte, MS-name in Paris Herbarium, no corresponding specimen.

balem (Miquel) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 530 = P. acuminata, fide Lam 1925, sp. 2.

bankensis Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 54 = *Ganua motleyana* (de Vriese) Pierre ex Dubard, fide Lam 1925.

bawun Scheffer, Ann. Jard. Bot. Buitenz. 1, 1876, 33 = *Burckella obovata* (Forster) Pierre, vide Lam & Van Royen, Blumea 6, 1952, 588.

beccarii Engler, Bot. Jahrb. 12, 1890, 508 = *Madhuca beccarii* (Engler) H. J. Lam, fide Lam 1925.
beccarii Lecomte, MS-name in Paris Herbarium, type of *Ganua beccarii* Pierre (label by Lam).
beccarii Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525 = P. microphylla (De Vriese) Pierre, sp. 10.
benjamina (De Vriese) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 524 = P. leerii (Teysmann & Binnendijk) Kurz, sp. 11.
betis (Blanco) Villar, Nov. App., 1880, 125 = *Madhuca betis* (Blanco) Macbride, fide Lam 1925.
boerlageana Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 54 = *Ganua boerlageana* (Burck) Pierre ex Dubard, fide Van den Assem, Blumea 7, 1953, 385.
cambodiana Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 912 = *Madhuca cambodiana* (Lecomte) Van Bruggen, comb. nov.
chrysocarpa Lecomte, MS-name in Paris Herbarium, no corresponding specimen.
clarkii Pierre, MS-name in British Museum (Natural History) = *Madhuca sericea* (Miquel) H. J. Lam, fide label.
cochinchinensis Pierre, MS-name in Paris Herbarium = *Madhuca cochinchinensis* (Pierre ex Dubard) H. J. Lam.
costata King MS ex King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 172 = P. lucida (Don) DC, sp. 6.
croixiana Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 5254 = P. leerii (Teysmann & Binnendijk) Kurz, sp. 11.
dantung H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 134, sp. 4.
dasyphylla (Miquel) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 527, sp. 1.
dongnaiensis (Pierre) Engler, Nat. Pfl. Fam. 4, 1, Nachtr., 1897, 272 = *Aesandra dongnaiensis* Pierre.
elliptica (Pierre ex Dubard) Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 913 = *Madhuca elliptica* (Pierre ex Dubard) H. J. Lam.
endertii H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 144, sp. 12.
engleri Merrill, J. As. Soc. Straits, Spec. Nr., 1921, 477 = *Madhuca beccarii* (Engler) H. J. Lam, fide Lam 1925.
eugeniifolia (eugeniaefolia) King ex Moore, J. Bot. 63, Suppl., 1925, 61 = P. pseudoterminalis H. J. Lam, sp. 9.
firma (Pierre ex Dubard) Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 913 = *Madhuca firma* (Pierre ex Dubard) H. J. Lam.
floribunda (Pierre ex Dubard) Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 910 = *Madhuca floribunda* (Pierre ex Dubard) H. J. Lam.
fusicarpa Elmer, Leafl. Phil. Bot. 8, 1915, 2820 = *Madhuca burckiana* (Koorders) H. J. Lam, fide Lam 1925.
gigantea K. Griffioen & H. J. Lam MS = P. gigas Van Bruggen, sp. 5.
gigas Van Bruggen, sp. 5.
glabra H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 148 = P. lowiana Pierre, sp. 13.
glabrata King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 174 = P. lucida (Don) DC, sp. 6.
glutinosa Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 529 = P. lucida (Don) DC, sp. 6.
grandiflora Ridley, J. As. Soc. Straits 61, 1912, 28 = P. maingayi Clarke in Hooker, sp. 3.
griffithii Kurz, For. Fl. Brit. Burma 2, 1877, 121 = *Palaquium hexandrum* (Griffith) Engler.
griffithii Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525 = P. lucida (Don) DC, sp. 6.
havilandii (havilandi) King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 169 = P. obscura Burck, sp. 8.
hillii (hilli) J. G. Baker, J. Linn. Soc. London, 20, 1883, 368 = *Burckella hillii* (J. G. Baker) H. J. Lam, vide Lam & Van Royen, Blumea 6, 1952, 583.
insignis Radlkofer, MS-name in Geneva Herbarium = *Madhuca insignis* (Radlkofer) H. J. Lam.
junghuhniana (De Vriese) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 530 = P. acuminata (Blume) Pierre var. acuminata, sp. 2.
koelas Pierre, MS-name in Paris Herbarium = P. cf. lucida (Don) DC, sp. 6.

korthalsii Pierre, MS-name in Kew Herbarium, errore *korthalsiana* = *Madhuca korthalsii* (Pierre) H. J. Lam.
lamii Van Bruggen, sp. 14.
lamponga (Miquel) Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 59 = P. leerii (Teysmann & Binnendijk) Kurz, sp. 11.
lanceolata H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 146, forma of P. lucida (Don) DC var. *wightii* (Hasskarl) Clarke in Hooker = P. lucida (Don) DC, sp. 6.
lanceolata Merrill, Bur. Gov. Lab. Bull. 17, 1904, 42 = *Madhuca lanceolata* (Merrill) Merrill, Enum. Phil. Flow. Pl. 3, 3, 1923, 276.
lanceolata Ridley, J. As. Soc. Straits, 79, 1918, 93, sp. 15.
lancifolia Burck, Med. Lands Pl. tuin Buitenz. 3, 1886, 41 = *Madhuca lancifolia* (Burck) H. J. Lam, fide Lam 1925.
lancifolia H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 147 = P. lanceolata Ridley, sp. 15.
latifolia Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 58 = *Ganua motleyana* (De Vriese) Pierre ex Dubard, fide Lam 1925.
leerii (Teysmann & Binnendijk) Kurz, J. As. Soc. Bengal 40, 2, 1871, 69, sp. 11.
longipedicellata (*longipeduncula*ta Brace, in indice 1909, 900), Brace ex King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 169, sp. 7.
longipetiolata Kurz, J. As. Soc. Bengal 40, 2, 1871, 69 = *Ganua motleyana* (De Vriese) Pierre, fide Lam 1925.
lowiana Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525, sp. 13.
lucida (Don) DC, Prodr. 8, 1844, 197, sp. 6.
lucida Herb. Traj. ex Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 526 = P. lucida (Don) DC, sp. 6.
lucida Herb. Paris ex Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 525 = P. lowiana Pierre, sp. 13.
macrophylla (Hasskarl) Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 51 = *Madhuca macrophylla* (Hasskarl) H. J. Lam, fide Lam 1925.
maingayi Clarke in Hooker, Fl. Brit. India 3, 1882, 547, sp. 3.
malabarica (Beddome) Pierre ex Dubard, Rev. Gén. Bot. 20, 1908, 200 = *Madhuca neriifolia* (Moon) H. J. Lam, fide Lam 1925.
malaccensis Clarke in Hooker, Fl. Brit. India 3, 1882, 547 = *Madhuca malaccensis* (Clarke in Hooker) H. J. Lam, fide Lam 1925.
mentzelii K. Schumann, Notizbl. Berl. Bot. Gart. 1, 1895, 102 = *Burckella obovata* (Forster) Pierre, fide Lam & Van Royen, Blumea 6, 1952, 588.
microphylla (De Vriese) Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 531, sp. 10.
mollis Pierre ex Dubard, Rev. Gén. Bot. 20, 1908, 204 = P. maingayi Clarke in Hooker, fide Lam 1925, sp. 3.
moonii sine auctore, MS-name in Paris Herbarium, sheet with damaged fruit only; cf. *Madhuca moonii* (Thwaites) H. J. Lam.
multilineata Burck, Med. Lands. Pl. tuin Buitenz. 3, 1886, 42 = ? *Tristania* spec. (Myrtaceae), fide Lam 1925. Non Sapotaceae.
nanil Pierre, MS-name in British Museum (Natural History) = *Madhuca insignis* (Radlkofer) H. J. Lam.
neriifolia Radlkofer, MS-name in Geneva Herbarium = *Madhuca neriifolia* (Moon) H. J. Lam.
nigra King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 173, var. of P. lucida (Don) DC = P. lucida (Don) DC, sp. 6.
nigropunctata Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 53 = *Neesia altissima* Blume (Bombaeaceae), fide Lam 1925.
obscura Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 60, sp. 8.
obtusifolia King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 175 = *Madhuca spec.*
oleifera Prain & Watt, MS-name in Kew Herbarium = *Ganua motleyana* (De Vriese) Pierre ex Dubard, det. Lam & Van Bruggen.
ornata Moore, J. Bot. 63, Suppl. 1925, 61 = P. acuminata (Blume) Pierre var. pulchra ((Burck) H. J. Lam, sp. 2.
ovata H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 146, forma of P. lucida (Don) DC var. *wightii* (Hasskarl) Clarke in Hooker = P. lucida (Don) DC, sp. 6.
paralleloneura Kurz, J. As. Soc. Bengal 40, 2, 1871, 70 = P. lucida (Don) DC, sp. 6.

parvifolia Engler, Bot. Jahrb. 12, 1890, 508 = P. microphylla (De Vriese) Pierre, sp. 10.
polyandra (Wight) Bentham & Hooker, Gen. Plant. 2, 1876, 659 = P. lucida (Don) DC, sp. 6.
poutie Pierre, MS-name in Paris Herbarium = P. lowiana Pierre sp. 13.
prolixa (Pierre ex Dubard), MS-name in Paris Herbarium = *Ganua prolixa* Pierre ex Dubard.
pseudoterminalis H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 260, sp. 9.
puberula (Miquel) Pierre Bull. Mens. Soc. Linn. Paris, 1885, 529 = P. lucida (Don) DC, sp. 6.
pulchra (Burck) auctores, MS-name in Leiden Herbarium = P. acuminata (Blume) Pierre var. pulchra (Burck) H. J. Lam, sp. 2.
punctata Fletcher, Kew Bull., 1937, 379 = P. lucida (Don) DC, sp. 6.
ridleyi Gandoger, Bull. Soc. Bot. France 65, 1918, 56 = ?
rigosopunctata sine auctore, MS-name in Bogor Herbarium = *Neesia cf. altissima* Blume (Bombacaceae), fide R. C. Bakhuizen van den Brink Jr.
rubropedicellata Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 55 = *Ganua motleyana* (De Vriese) Pierre, fide Lam 1925.
selangorica King & Gamble, Mat. Fl. Mal. Pen. 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 175, sp. 16.
sericea De Vriese errore in Indice Kewense, fide Lam 1925.
sericea Bentham & Hooker, errore quoad auctores, fide Lam 1925.
sericea (Blume) H. J. Lam, Bull. Jard. Bot. Buitenz., sér. 3, 7, 1925, 139 = P. acuminata (Blume) Pierre var. acuminata, sp. 2.
sericea Miquel, Fl. Ind. Bat. 2, 1859, 1039 = *Madhuca sericea* (Miquel) H. J. Lam, fide Lam 1925.
sessilis King & Gamble, Mat. Fl. Mal. Pen., 17, J. As. Soc. Bengal 74, 2, Extra Nr., 1906, 174 = *Ganua sessilis* (King & Gamble) H. J. Lam, vide Van den Assem, Blumea 7, 1953, 387.
stipularis Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 48 = P. acuminata (Blume) Pierre var. pulchra (Burck) H. J. Lam, sp. 2.
sumatrana Miquel, Fl. Ind. Bat. Suppl., 1860, 582 = P. acuminata (Blume) Pierre var. pulchra (Burck) H. J. Lam, sp. 2.
suringariana Burck, Ann. Jard. Bot. Buitenz. 5, 1886, 49 = P. acuminata (Blume) Pierre var. acuminata, sp. 2.
teysmanniana Pierre, Bull. Mens. Soc. Linn. Paris, 1885, 527 = P. acuminata (Blume) Pierrre var. pulchra (Burck) H. J. Lam. sp. 2.
thorellii (Pierre ex Dubard) Lecomte, Fl. Gén. Indo-Ch. 3, 7, 1930, 910 = *Madhuca thorellii* (Pierre ex Dubard) H. J. Lam.
truncata K. Griffioen & H. J. Lam MS = P. lamii Van Bruggen, sp. 14.
utilis Ridley, J. As. Soc. Straits 79, 1918, 94 = *Madhuca utilis* (Ridley) H. J. Lam, fide Lam 1925, 1927.
vulcanica Ridley, J. As. Soc. Mal. Br. 1, 1923, 77 = *Madhuca* spec.
wightii (Hasskarl) Clarke in Hooker, Fl. Brit. India 3, 1882, 548, var. of P. lucida (Don) DC = P. lucida (Don) DC, sp. 6.

11. Synonyms described under genera other than Payena

Azaola Leerii Teysmann & Binnendijk = P. leerii (T. & B.) Kurz.
Bassia braceana King & Gamble = (partim) *P. lucida* (Don) DC.
Bassia caudata Ridley = P. dasyphylla (Miq.) Pierre.
Bassia sericea Blume = P. acuminata (Bl.) Pierre var. acuminata.
Diploknema grandiflora (Ridley) H. J. Lam = P. maingayi Clarke in Hook.
Isonandra dasyphylla Miquel = P. dasyphylla (Miq.) Pierre.
Isonandra microphylla De Vriese = P. microphylla (De Vr.) Pierre.
Isonandra puberula Miquel = P. lucida (Dn) DC.
Isonandra pulchra Burck = P. acuminata (Bl.) Pierre var. pulchra (Burck) H. J. Lam.
Isonandra sumatrana (Miq.) Burck = P. acuminata (Bl.) Pierre var. *pulchra* (Burck) H. J. Lam.
Keratophorus wightii Hasskarl = *P. lucida* (Don) DC.
Madhuca caudata (Ridley) H. J. Lam = P. dasyphylla (Miq.) Pierre.
Mimusops acuminata Blume = P. acuminata (Bl.) Pierre var. acuminata.
Mimusops lucida Don = P. lucida (Don) DC.