

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

**XXIII<sup>1)</sup>. Palaquium Blanco**

by

**P. VAN ROYEN**

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**Introduction**

This study includes the entire genus *Palaquium* since in the 35 years after the publication of the work of H. J. Lam on the Sapotaceae much new material has come to our disposal to broaden the knowledge of the genus.

The results of the study could not have been obtained without the assistance of the Directors of the following herbaria who put their material available on loan: Berkeley (U. S. A.), Berlin, Brisbane, Bogor, Florence, Cambridge (U. S. A.), Geneva, Kepong, Kew, Kuching, Lae, Leiden, London, Melbourne, Oxford, Paris, Sandakan, Stockholm, Sydney and Washington, to whom I express my most sincere thanks.

The abbreviations of the names of these herbaria are those proposed by Lanjouw and Stafleu in the Index Herbariorum. For the herbarium

<sup>1)</sup> I—III in *Blumea* VI, 1952, 547—595; IV—V in *Blumea* VII, 1953, 364—412; IVa in *Blumea* VII, 1954, 481—483; IIa, IVb, Va, VI—IX in *Blumea* VIII, 1957, 201—509; X—XII in *Nova Guinea* NS 8, 1957, 87—128; XIII—XVI in *Blumea* IX, 1958, 21—152; XVII in *Blumea*, Suppl. IV, 1958, 263—267; IIb, IXa, XVIII, XIX in *Nova Guinea* NS 9, 1959, 131—142; XX—XXII in *Blumea* X, 1960, 1—125; XXIII in the present issue.

of the Forest Department in Manokwari the old abbreviation HOLL is still used.

The sizes of the drawings are given in millimeters.

## GENERAL PART

### Diagnosis of the genus

*Palaquium* Blanco, Fl. Fil., ed. 1, 1837, 403; ed. 2, 1845, 282; Burck, Ann. Jard. bot. Bzg 5, 1886, 22; Engler, Bot. Jahrb. 12, 1890, 511; Boerlage, Handl. Fl. Ned.-Indie 2, 1, 1891, 302; Baillon, Hist. Pl. 9, 1891, 301; Engler & Prantl, Nat. Pfl. fam. 4, 1, 1897, 126 and Nachtr., 1897, 273; King & Gamble, Journ. As. Soc. Beng. 74, 2, Extra Nr 17, 1905, 189; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16; Dubard, Bull. Mus. hist. nat. 15, 1909, 379; Lam, Bull. Jard. bot. Bzg 3, 7, 1925, 14; Lam, Bull. Jard. bot. Bzg 3, 8, 1927, 384; Lam, Nova Guinea 14, 4, 1932, 551, f. 94—98; Lam, Blumea 5, 1, 1942, 31, f. 6—7 — *Isonandra* Wight, Ic. Pl. 2 1842, t. 359—360, p.p.; Miquel, Fl. Ind. Bat. 2, 1859, 1037 — *Dichopsis* Thwaites, Enum. Pl. Zeyl., 1864, 176; Bentham & Hooker, Gen. Pl. 2, 2, 1876, 658; Clarke in Hooker fil., Fl. Br. Ind. 3, 1882, 540 — *Croixia* Pierre, Not. bot. Sapot., 1890, 33, p.p. — *Galactoxylon* Pierre, Not. bot. Sapot., 1890, 6; Baillon, Hist. Pl. 9, 1891, 300; Engler & Prantl, Nat. Pfl. fam. 4, 1, Nachtr., 1897, 272.

Laticiferous trees. Branchlets with distinctly developed terminal cones or these replaced by a terminal inflorescence. Stipules small to very large, usually soon caducous, rarely persisting and ultimately caducous, very rarely entirely absent. Leaves scattered, petiolate, secondary nerves joined by tertiary nerves except when the latter are parallel to the secondary nerves, sometimes the secondary nerves archingly joined. Flowers 3-merous, very rarely not so, solitary or in clusters, axillary to the leaves or their scars, sometimes in a short inflorescence at apex of branchlets, with distinct bracts at base of pedicel. Sepals in two whorls of three, very rarely in two whorls of 2, or 5 or 7 spirally arranged sepals and imbricate. Corolla gamopetalous, 6-, rarely 4- or 5-lobed, imbricate or often contort. Stamens (8—)12—18(—36) in one, two or three whorls inserted in the throat, anthers with prolonged connective. Ovary (5—)6(—11)-celled, each cell with one usually pendulous, anatropous ovule. Style 1. Fruit a berry, with fleshy pericarp, 1—3-seeded. Seeds with a large scar which often covers half the surface, very rarely narrow or larger, hilum apical, testa crustaceous to coriaceous, embryo usually without endosperm, sometimes with a thin layer only.

Type species. *P. lanceolatum* Blanco.

Distribution. About 115 species, but probably more, in southeast Asia, Malaysia and the Pacific islands.

### Abbreviations of some references

- Lam, l. c. 1925 = H. J. Lam, The Sapotaceae etc. of the Dutch East Indies, Bull. Jard. bot. Bzg, sér. 3, 7, 1925, 14—107.  
Lam, l. c. 1927 = H. J. Lam, Further Studies, etc., Bull. Jard. bot. Bzg, sér. 3, 8, 1927, 384—414.

Lam, l. c. 1932 = H. J. Lam, Sapotaceae, Nova Guinea 14, 4, 1932, 551—553.

Lam, l. c. 1942 = H. J. Lam, Wild Pacific Sapotaceae etc., Blumea 5, 1, 1942, 31—36.

### Subdivision of the genus

The last division of *Palaquium* into smaller units is that given by Lam in 1925 where he divides the genus into three sections, viz *Eupalaquium* Dubard to which most species belong, a section *Palaquioides* Dubard, and a section *Galactoxylon* H. J. Lam. Studying this last section it appears that only *P. edeni* is included and not, as one would expect, *Palaquium galactoxylum* (based on *Galactoxylon* sp. Pierre, a synonym of *Bassia galactoxylon* F. Mueller), which is merely mentioned under the heading "extramalayan species". This is the more deplorable since Pierre's addition to von Mueller's description does not make it easy to insert *Galactoxylon* in *Palaquium*. Basing oneself on Pierre's emended diagnosis one would rather keep *Galactoxylon* apart from *Palaquium*. Studying von Mueller's material it appeared that specimens matching it exist in material collected in New Guinea and the Solomons and described by White as *P. salomonense*, which, however, differs consistently from *P. galactoxylon* only in the longer petioles. When flowers of this material are studied there is no doubt that a species of *Palaquium* is at hand and that Pierre's description of the flower is based on entirely different material, which unfortunately could not be retraced. The details of the flowers point to a species belonging to the section *Eupalaquioides* and therefore the necessity to maintain the section *Galactoxylon* does not exist any longer.

On examining the material of *P. edeni* it becomes immediately clear that the characteristics of this species do not warrant the maintaining of a separate section in *Palaquium* owing to its close similarity to e. g. *P. dasyphyllum*, *P. lisophyllum*, *P. macrocarpum* etc., all of which were included by Lam in the section *Eupalaquioides*.

When the genus is studied as regards the group of related species it is striking that the basic leaf-shape is obovate. From this several trends can be distinguished, viz a group with spatulate leaves and a group with elliptic to lanceolate leaves. This combined with the sizes of the leaves, the type of tertiary nervation etc. gives us the possibility to distinguish seven main groups. As is found in *Planchonella*, *Pouteria*, and *Madhuca* there is no sharp distinction between the groups owing to the reticulate relationships.

#### Group 1

*Species 1—4. Found in the entire area.*

In a group with transverse tertiary nerves the true obovate leaves are represented by a number of species, viz *P. obovatum*, *P. grande*, *P. oxy-spermum*, and *P. stehlinii* of which the latter three sometimes have elliptic-obovate leaves and form an intermediate group to a group of 11 species with elliptic or elliptic-obovate leaves which are glabrous or subglabrous below. Among these are *P. hexandrum* and *P. ridleyi*, but this group will be discussed below.

## Group 2

*Species 5—32. Found in the entire area.*

Immediately related to the *P. obovatum*-group is a group of 28 species all with obovate leaves, to be divided into four series, which are, however, not sharply delimited against each other owing to intermediate forms:

- a. obovate leaves, underside pubescent, leafbase rounded, with 10 species, viz *P. abundantiflorum*, *P. beccarianum*, *P. clarkeanum*, *P. elegans*, *P. hispidum*, *P. majas*, *P. montanum*, *P. philippense*, *P. sericeum* and *P. sorsogonense*.
- b. obovate leaves, underside glabrous, leafbase rounded, with 4 species, viz *P. erythrospermum*, *P. fidjiense*, *P. formosanum* and *P. rivulare*.
- c. obovate leaves, underside glabrous, leafbase acute, with 4 species, viz *P. cuprifolium*, *P. gigantifolium*, *P. globosum* and *P. kinabaluense*.
- d. obovate leaves, underside pubescent, leafbase acute, with 10 species, viz *P. barnesii*, *P. decurrens*, *P. eriocalyx*, *P. komakomar*, *P. maingayi*, *P. ottolanderi*, *P. pinnatinervium*, *P. polyandrum*, *P. stipulare*, *P. supfianum*.

About these four series the following can be said.

Series a. Of the species mentioned three are slightly different in their leaves, viz *P. beccarianum* on the one hand and *P. elegans* and *P. sericeum* on the other. *P. beccarianum* is aberrant because of the archingly joined secondary nerves but otherwise much resembles *P. hispidum*. *P. elegans* and *P. sericeum* are different since the leaves are more panduriform than obovate and the apex is rather long acutely acuminate, in contrast with the others which have either rounded, obtuse or short obtusely, or acutely acuminate apices. The number of stamens in this group is in general 12, though *P. beccarianum* has 10—12 and *P. clarkeanum* 12—15. *P. majas* and *P. sorsogonense* have 18 stamens but *P. philippense* has 12—18 stamens. A separation into different groups on account of the number of stamens is therefore not easily feasible.

Series b. The species of this series also have 12(—14) stamens but an exception is *P. rivulare* with 18—21 stamens. Also in other respects this species is aberrant since its leaves are more panduriform than obovate and compared with the other species they are larger. *P. fidjiense* is intermediate to series c. since the leaves, especially the midrib is either glabrous or sparsely pubescent.

Series c. This small group of species is composed of four species with large leaves but are more striking by the large number of stamens (18—24) in *P. gigantifolium* and *P. globosum* correlated with large stipules (over 2 cm long), while *P. kinabaluense* is aberrant by having only 12 stamens and small stipules. The flowers of *P. cuprifolium* are unknown but here also the stipules are small.

Series d. This large series falls apart into two subseries since *P. decurrens* and *P. stipulare* differ from the other eight by having a sericeous pubescence on the underside of the leaves while the others have a more woolly or tomentose pubescence. Moreover *P. stipulare* has large stipules correlated with a large number of stamens (22—27).



Among the other 8 species *P. pinnatinerviium* and *P. polyandrum* differ from the rest by having a panduriform leaf in the former, together with long stipules, and *P. polyandrum* by having also relatively long stipules (0.9—1.2 cm) again correlated with a large number of stamens (24—33). The number of stamens of *P. polyanthum* is unknown.

The remaining 6 species have close affinities to a group of 5 species characterized by i. a. *P. gutta*, *P. calophyllum* and *P. quercifolium* (see below).

### Group 3

*Species 33—37. Malaya, Borneo, Philippines.*

A small group of rather similar species with small, obovate leaves but distinctly different from group 2 and actually more related to group 4 is formed by *P. crassifolium*, *P. elliptilimbium*, *P. herveyi*, *P. multiflorum*, and *P. walsurifolium*. This small group is connected with the genus *Isonandra* by *P. crassifolium* and *P. multiflorum* because of the variable number of sepals (4—7 here, 4 in *Isonandra*) and small number of stamens (9—13 here, 8 in *Isonandra*). At the same time this group is connected with group 4 by *P. cryptocariifolium* in group 4.

### Group 4

*Species 38—48. Ceylon to New Guinea.*

This group comprises 11 species among which *P. ridleyi*, *P. hexandrum*, and *P. macrocarpum*. Other species are *P. cryptocariifolium*, *P. dasyphyllum*, *P. edenii*, *P. laevifolium*, *P. lisophyllum*, *P. petiolare*, *P. pierrei* and *P. vexillatum*. The entire group is characterized by 9—12 stamens and elliptic leaves which often are thin and glossy, and glabrous to subglabrous. *P. macrocarpum* connects this group with the *obovatum*-group (1) by its obovate leaves, while *P. hexandrum* links this group with group 3 by way of *P. herveyi*. *P. ridleyi* connects this group with the group of species with reticulate tertiary nervation. All species of this group are mutually related and a subdivision is difficult to be carried out.

### Group 5

*Species 50, 52—55. Malaya to Solomons.*

This group is composed of 5 species with spatulate leaves and is a direct intermediate to the group of species with a reticulate nervation. The species included are *P. burckii*, *P. firmum*, *P. leiocarpum*, *P. obtusifolium*, and *P. oxleyanum*. Of these *P. burckii* has 20—25 stamens and is at the same time the species most related in its foliar details to *P. rigidum*, *P. sumatranum*, and *P. rostratum* of group 8. All other species in group 5 have 12 stamens except *P. obtusifolium* with 12—18 stamens, while in *P. firmum* this number is unknown. On the other hand this group is connected to group 6 (a. o. *P. rioense*, *P. lobbianum*, etc.) by the shape of the leaf and the tertiary nervation.

## Group 6

*Species 51, 56—85. Entire area from Malaya, Siam and Indo-China eastward.*

This large group of 31 species has a series of 19 species and three smaller series of 3, 5 and 4 species respectively. The species are in the main characterized either by elliptic or elliptic-obovate leaves.

The first series can be divided into two subseries, both with leaves varying in shape from elliptic-obovate to narrowly elliptic, and based on the pubescence of the underside of the leaves.

## a. pubescent underside

*P. warburgianum*  
*P. loheri*  
*P. luzoniense*  
*P. bataanense*  
*P. neo-ebudicum*  
*P. rioense*  
*P. lobbianum*  
*P. pseudocalophyllum*  
*P. maliliense*

## b. glabrous underside

*P. morobense*  
*P. mindanaense*  
*P. tenuipetiolatum*  
*P. foxworthyi*  
*P. glabrum*  
*P. lanceolatum*  
*P. garrettii*  
*P. stellatum*  
*P. merrillii*  
*P. simun*

The number of stamens in the first subseries is 9—14, that of the second subseries 9—18 and is of no use for a further division. In general the species are very closely related and often hard to separate in a sterile state. *P. lobbianum* and *P. pseudocalophyllum* in the first subseries and *P. lanceolatum* and *P. merrillii* in the second subseries connect this group to the second series of five species comprising *P. calophyllum*, *P. ferrugineum*, *P. gutta*, *P. quercifolium*, and *P. tjipetirensis*, to be separated from the main body by the often golden-sericeous pubescence of the underside of the leaves, those of the first 18 being in general more tomentose. The third section of 3 species is formed by *P. cochleariifolium*, *P. hornei*, and *P. karrak*, three rather similar species with large flowers all conferred near the tip of the branchlets, elongate-obovate leaves, a small number of secondary nerves and hardly visible tertiary nervation. *P. cochleariifolium*, though having larger leaves, resembles in some respects (inconspicuous tertiary nerves and thick, leathery leaves) *P. ridleyi*, thus linking up group 6 with group 4.

The fourth series consists of 4 small-leaved, narrowly obovate-elliptic leaves which are closely related to e.g. *P. maliliense*, *P. luzoniense*, *P. bataanense*, etc. and might as well be inserted in the main group except for their small leaves. They comprise *P. confertum*, *P. elongatum*, *P. koratense*, and *P. vitilevuense*.

## Group 7

*Species 49, 86—109. Entire area.*

This group consists of 24 species, all characterized by a reticulate tertiary nervation, sometimes with a few, irregular transverse nerves. Most of the species have obovate leaves but also spatulate or elliptic ones are known, with all intermediate stages.

The two main series in this group are a group with:

- a. tertiary nerves reticulate with a few irregular transverse nerves mainly near the margin of the leaf,
- b. tertiary nerves reticulate-elongate, parallel to the secondary nerves of the leaf.

The first series is restricted to continental Asia and has generally large leaves, often with an irregular intramarginal nerve. The flowers are among the largest of the whole genus. This series is composed by the following species: *P. bourdillonii*, *P. canaliculatum*, *P. ellipticum*, *P. hin-molpedda*, *P. pauciflorum*, *P. polyanthum*, *P. rubiginosum*, *P. sukoei*, and *P. thwaitesii*. In this series the same two trends — obovate or elliptic leaves — as found in all other groups are observable as well, but here also the distinction is not a sharp one. The number of stamens is usually 12, sometimes 15 (*P. polyanthum*) or 18 (*P. ellipticum*). This series is connected with group 4 (*P. ridleyi*, *P. laevifolium*) by *P. hin-molpedda* and *P. sukoei* on the one hand, by *P. thwaitesii* on the other hand. The other species of this series are related to group 5 and 6 in different ways. To group 5 it is related by way of *P. obtusifolium* and by way of e.g. *P. pseudocalophyllum*, *P. lobbianum*, and *P. garrettii* it is related to group 6.

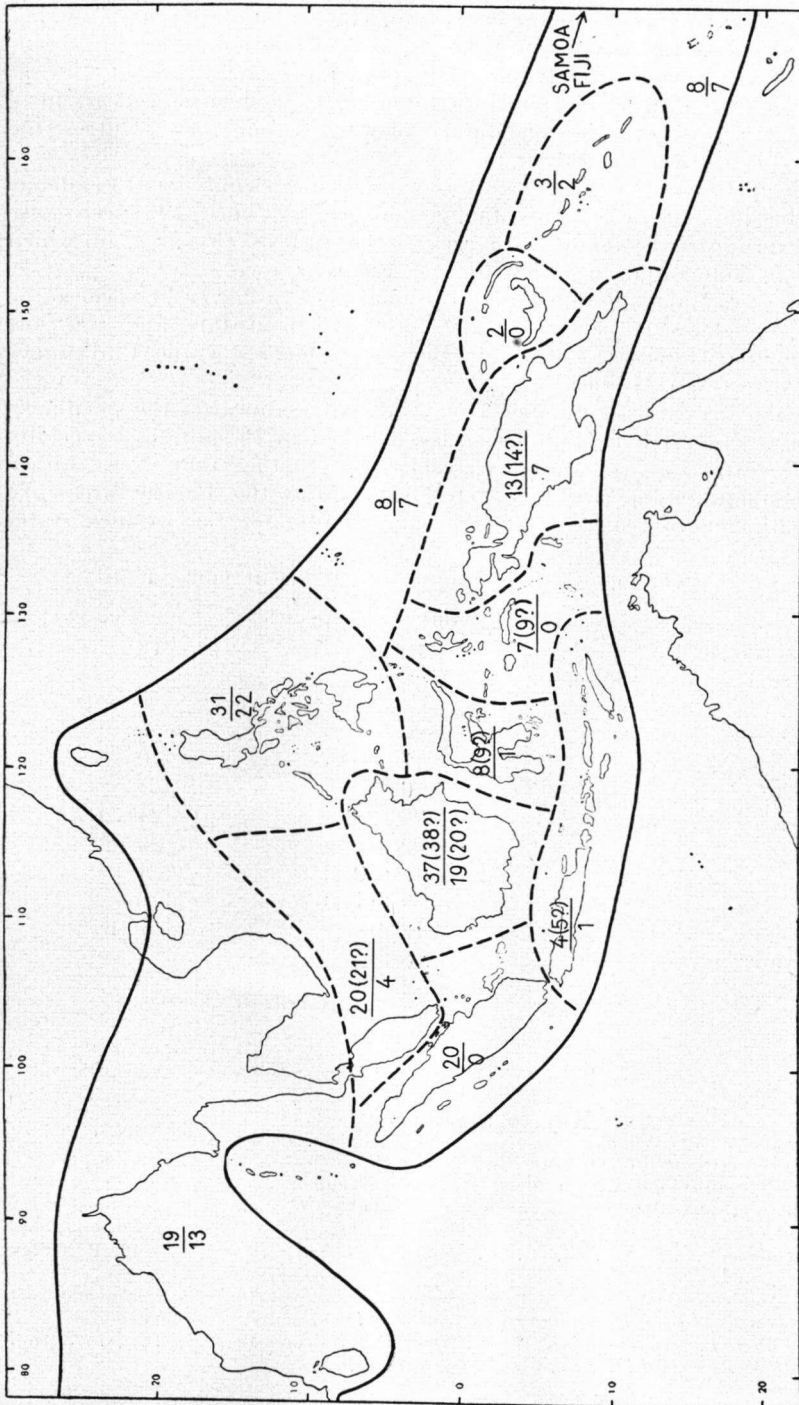
In the second series which includes the remainder of the genus, *P. xanthochymum* is an intermediate species towards group 5; it is especially related to *P. obtusifolium*. The tertiary nervation often has quite a number of transverse nerves, but sometimes hardly any one is present. For this reason this species is inserted here but with as much good reason it could be inserted in group 5. Since its relationship to other species (e.g. *P. sumatranum*, *P. semaram* etc.) in this second series it is placed in group 7. Closely related to *P. xanthochymum* are three species, viz *P. semaram*, *P. galactoxylum*, *P. brassii*, in which an occasional transverse tertiary nerve is still present, but in the sequence given these are found less and less. The number of stamens in this group of four is in all cases 12.

Three more species in the second series can be placed together since they differ by the large leaves from the other species, viz *P. rigidum*, *P. rostratum* and *P. sumatranum*, which form a link to group 5 by way of *P. burckii*. The tertiary nervation is reticulate and subparallel to the secondary nerves. The number of stamens is always 12.

Finally a subseries of 8 species all of them with small, obovate leaves (under 15 cm long) forms the body of the second series. The tertiary nervation is reticulate and subparallel or parallel to the secondary nerves. Two distinct lines can be distinguished in this final series, viz one in which the tertiary nervation is rather sparse and often inconspicuous and comprises *P. cuneifolium*, *P. dubardii*, *P. glabrifolium* and *P. microphyllum*. The second line comprises *P. amboinense*, *P. pseudocuneatum*, *P. rostratum* and *P. rufolanigerum* in which the tertiary nervation is rather dense and always distinct. The number of stamens is in both series 12, but in *P. pseudocuneatum* it is sometimes reduced to 8.

#### Distribution (Map 1)

The distributional pattern of Palaquium clearly shows that this genus is a western Malaysian one with its main centre in Borneo and the Philippines.



Map 1. Distribution of the genus *Palaquium*. Numbers above the bar indicate the number of species, those under it that of the endemics. Neither the western nor the eastern limit has been considered.

With these two areas as the main centre, in which also the highest number of endemics is found, New Guinea should be considered as an important secondary centre though the number of species is about a third of that of Borneo or the Philippines, but the number of endemics appears proportionately to be the same or slightly lower. From these centres the number of species decrease rather quickly.

Surprisingly enough continental Asia with 19 species only has 13 endemic species. The importance of this fact is misleading since 19 species are scattered over an area almost as large as the rest of the area in which Palaquium is found and in which 91 species are known.

Though the Malay Peninsula and Sumatra both have 20 species the number of endemics is very low, 20 % for the peninsula and 0 % for Sumatra, compared with c. 50 % for Borneo, c. 65 % for the Philippines and c. 55 % for New Guinea.

The sharp decrease in number from the centres towards the periphery of the area as observed in Madhuca is less marked in Palaquium, especially towards the eastern areas. Madhuca reaches not further than New Guinea but some Palaquium species penetrate deeply into the Pacific area. To the west both genera reach almost the same limits, viz the western states of India.

In the table given below these points are given in more detail:

	number of species	endemics
Continental Asia .....	19	13
(India, Burma, Ceylon, Siam, Indo-China, Formosa)		
Malay Peninsula .....	23 (24 ?)	6
Sumatra .....	17	0
Java .....	6	1
Borneo .....	37 (38 ?)	21 (20 ?)
Philippines .....	32	23 (22 ?)
Celebes .....	8 (10 ?)	1
Moluccas .....	9 (11 ?)	0
New Guinea .....	12 (13 ?)	7 (6 ?)
Pacific Islands .....	8	7
New Britain .....	2	0
Solomons .....	3	2

TAXONOMIC PART

Key to the species \*)

- 1.a. The terminal cone of the branchlets replaced by flowers or an inflorescence 2
- b. Branchlets provided with a distinct terminal cone . . . . . 3
- 2.a. Sepals acute or subacute, tomentose on outside. Corolla entirely glabrous. Fruits obovoid, 12—14 by c. 7 mm. *Indo-China, Malaya to Sumatra, Philippines and New Guinea* . . . . . 48. *P. ridleyi*

\*) The following species are not included on account of the incomplete material: D. 1. *P. ? annamense*, D. 2. *P. ? densivenium*, 55. *P. firmum*, 100. *P. glabrifolium*, 4. *P. oxyspermum*, D. 3. *P. ? payenifolium* Pierre, D. 4. *P. ? retusum* Beccari, D. 5. *P. ? tenuifolium*, and D. 6. *P. ? vidalii* Pierre.

- b. Sepals obtuse, woolly on outside. Corolla-lobes fimbriate at apex and with a few hairs in the middle-line of each lobe. Fruits ellipsoid, c. 10 by 7 mm. *Borneo*  
46. *P. cryptocariifolium*
- 3.a. Stipules 2—6 by 0.8—1.4 cm . . . . . 4  
b. \*) Stipules 0.1—1.8 by 0.1—0.6 cm, or none . . . . . 5
- 4.a. Stipules up to 6 by 1.2 cm. Leaves glabrous on either side, obovate, obovate-elliptic or oblanceolate, apex obtuse, acute or acuminate, base broadly subrotundate. Petioles 3.5—5 cm long, glabrous. Pedicels in fruit up to 1.8 cm long. *Philippines* . . . . . 20. *P. gigantifolium*  
b. Stipules 2—3.5 by 0.8—1.4 cm. Leaves densely puberulous below, pandurate, sometimes obovate-oblong, apex retuse, rounded or obtuse, base broadly cuneate. Petioles 1—2.5 cm long, tomentose. Pedicels in fruit 3—5 cm long. *Philippines*  
30. *P. pinnatinervium*
- 5.a. Stamens (20—)22—24(—34). Ovary 8—14-celled . . . . . 6  
b. Stamens 8—18(—25). Ovary 6-, rarely 4-, 5- or 7-celled . . . . . 8
- 6.a. Leaves yellowish brown tomentose below. Petioles cinnamomously tomentose. Ovary cinnamomously pubescent, 8—12-celled. Stamens 22—27, filaments and anthers pubescent. *Borneo* . . . . . 32. *P. stipulare*  
b. Leaves glabrous below, sometimes slightly tomentose. Petioles glabrous. Stamens 20—34, filaments pubescent or glabrous, anthers glabrous. Ovary glabrous 7
- 7.a. \*\*) Fruits globose, 3.5—4 by c. 3.5 cm. Stipules oblong-ovate or squamiform, 1—3.5 by 0.8—2 cm. Corolla about twice as long as calyx, 1—1.2 cm long. Filaments of stamens ferruginously puberulous, anthers glabrous. *Philippines*  
21. *P. globosum*  
b. \*\*) Fruits ellipsoid or ovoid, 2—2.2 by c. 1.9 cm. Stipules ovate-lanceolate, 0.9—1.2 by 0.3—0.4 cm. Corolla about 3—4 times as long as calyx, 1.5—1.9 cm long. Filaments of stamens glabrous, anthers glabrous. *Philippines*  
28. *P. polyandrum*
- 8.a. Tertiary nerves reticulate-parallel to the secondary nerves \*\*\*) . . . . . 9  
b. Tertiary nerves transverse or absent . . . . . 31
- 9.a. Anthers glabrous . . . . . 10  
b. Anthers pubescent, sometimes sparsely so . . . . . 28
- 10.a. Sepals glabrous on inside . . . . . 11  
b. Sepals pubescent on inside . . . . . 24
- 11.a. Corolla glabrous on either side . . . . . 12  
b. Corolla pubescent on one or either side, sometimes only partly so . . . . . 17
- 12.a. Midrib dark reddish woolly below, leaves otherwise glabrous, the latter spatulate, obovate-oblong or rarely linear-lanceolate, 9—13.5(—19) by 3—6(—8) cm, rotundate to obtusely acuminate, secondary nerves 18—25 pairs, irregularly archingly joined, at base and apex of leaf hardly distinguishable from the tertiary nerves. *Malaya, Sumatra, Lingga* . . . . . 99. *P. semaram*  
b. Midrib either glabrous or tomentose below . . . . . 13
- 13.a. Ovary glabrous. Leaves often coppery reddish when dry, obovate, elliptic, lanceolate or spatulate, 6—20 by 2.2—6 cm, retuse, rounded, obtuse or obtusely acuminate at apex, narrowly cuneate to subrotundate at base, midrib minutely crested, secondary nerves 12—16(—20) pairs, tertiary nerves usually transverse, rarely subreticulate-parallel. Petioles 7—11(—32) mm long. Pedicels (1.5—) 3—9 mm long. *Malaya, Sumatra, Kiouw, Lingga, Banka, Java, Borneo*  
96. *P. xanthochyllum*  
b. Ovary pubescent. Leaves dark brown, light brown, greenish or reddish when dry, tertiary nerves reticulate-parallel, never transverse . . . . . 14
- 14.a. Flowers almost sessile, pedicel 1—2 mm long, ferruginously tomentose. Leaves

\*) The stipules in 98. *P. rufo-lanigerum* and 29. *P. komakomar* are unknown but both species are included under b.

\*\*) Cf also 22. *P. cuprifolium*.

\*\*\*) Under this item also 91. *P. canaliculatum* (Thw.) Engler and 95. *P. thwaitesii* Trimen from Ceylon, of which no complete flowers are known.

- ovate-elliptic, elliptic, or obovate-elliptic, 12—24 by 3.5—7.5 cm, long obtusely acuminate at apex, narrowly cuneate at base, secondary nerves 11—16 pairs, midrib grooved above, petioles 1—2.6 cm long. *Ceylon* . . . 89. *P. pauciflorum*
- b. Pedicels 3—12 mm long. Petioles 9/10—6 times as long as pedicels . . . 15
- 15.a. Pedicels (6—12 mm) as long as petioles (6—13 mm). Leaves obovate-spathulate to obovate-orbicular, (3—)5—8(—12) by (1.5—)2—3.5(—5) cm, rounded or short obtusely acuminate, sometimes cordate at apex, narrowly cuneate at base, secondary nerves (7—)8—11(—15) pairs, midrib narrowly crested usually in the basal part only. *Philippines* . . . 103. *P. cuneifolium*
- b. Pedicels much shorter than petioles, the former (1.5—)5—10(—12) mm, the latter (0.7—)1.6—4.5(—6.5) cm long. Secondary nerves (9—)16—26(—33) pairs. Midrib of leaves at upper side grooved only . . . 16
- 16.a. Stipules 1—2 mm long. Underside of leaves densely tomentose or sericeous, sometimes ultimately glabrous. Ovary ovoid. *Malaya, Sumatra, Borneo and surrounding islands, cultivated elsewhere* . . . 81. *P. gutta*
- b. Stipules 5—6 mm long. Underside of leaves glabrous. Ovary disciform. *Siam, Sumatra, Bhow, Borneo, Billiton, Java* . . . 109. *P. sumatranum*
- 17.a. Petioles much longer than pedicels of flowers in the axil of the leaf under observation . . . 18
- b. Petioles and pedicels almost equal in length or pedicels longer than petioles . . . 21
- 18.a. Filaments of stamens pubescent. Leaves obovate, spathulate or elliptic, (5—)7—22 by 2.5—7(—9) cm, retuse, rounded, obtuse, short obtusely acuminate or obtusely cuspidate at apex, narrowly cuneate at base, secondary nerves 15—28 pairs, ascending at an angle of 70°—90°, irregularly joined. Corolla reflexed in anthesis. *Malaya to Amboina and Java* . . . 90. *P. rostratum*
- b. Filaments of stamens glabrous . . . 19
- 19.a. Corolla glabrous on one side . . . 20
- b. Corolla ferruginously sericeous on outside in middle-line of lobes and on the tube, densely woolly tomentose in the throat. Leaves obovate, 8—12.5 by 4.5—6 cm, midrib crested above, angular below. *Malaya* 102. *P. calophylloides*
- 20.a. Corolla with a ring of ferruginous hairs between the stamens, otherwise glabrous, reflexed in anthesis. Leaves obovate, obovate-spathulate or spathulate, (3—)7—15 by 1.7—4 cm, rounded or obtuse, rarely obtusely acuminate at apex. Pedicels ferruginously sericeous. Sepals ferruginously appressedly tomentose on outside. *Borneo and Philippines* . . . 104. *P. pseudorostratum*
- b. Corolla ferruginously tomentose on outside in middle-line and apex of lobes, and on the whole tube, glabrous on inside, not reflexed in anthesis. Leaves spathulate, 2.5—8.5 by 1.5—4 cm, short obtusely acuminate, rarely rounded at apex. Pedicels ferruginously pubescent. Sepals ferruginously tomentose on outside. *Malaya to Banka and Borneo* . . . 97. *P. microphyllum*
- 21.a. Filaments of stamens woolly pubescent. Corolla on outside ferruginously pubescent on tube and base of lobes, on inside ferruginously woolly pubescent between the stamens, reflexed in anthesis. Leaves spathulate or obovate, 4—11 by 1.5—4.5 cm, retuse, rounded or short obtusely acuminate. Pedicels ferruginously tomentose. Sepals ferruginously sericeous on outside. *Borneo* . . . 105. *P. pseudocuneatum*
- b. Filaments of stamens glabrous . . . 22
- 22.a. Petioles, pedicels and underside of midrib of leaves densely woolly pubescent. *Borneo* . . . 98. *P. rufolanigerum*
- b. Leaves glabrous on either side, petioles glabrous, pedicels tomentose or sericeous-tomentose . . . 23
- 23.a. Leaves spathulate or obovate, 4—8 by 3—4.5 cm, rounded, obtuse or obtusely acuminate, midrib flat above. Sepals elliptic-oblong or lanceolate, 5—7 by 3.5—4.5 mm. *Ceylon* . . . 93. *P. himalpedda*
- b. Leaves obovate-spathulate to obovate-orbicular, (3—)5—8(—12) by (1.5—)2—3.5(—5) cm, cordate, rounded or short obtusely and broadly acuminate at apex, midrib grooved above and distinctly crested at least in the basal part. Sepals ovate, 2.5—3 by c. 3 mm. *Philippines* . . . 103. *P. cuneifolium*
- 24.a. Tertiary nervation of leaves parallel to the secondary nerves, hardly distinguishable from each other. Leaves spathulate or obovate, 4—11 by 1.5—4.5 cm, retuse,

- rounded or short obtusely acuminate at apex. Corolla 3—4 mm long. *Borneo*
105. *P. pseudocuneatum*
- b. Tertiary nervation reticulate, easily distinguishable from the secondary nerves. Corolla longer than 5.5 mm . . . . . 25
- 25.a. Secondary nerves 16—23 pairs. Leaves oblanceolate, obovate or obovate-oblong, 12.5—20(—35) by 4—8(—12) cm. *East Pakistan, India, Burma* 88. *P. polyanthum*
- b. Secondary nerves 7—13 pairs. Leaves obovate-oblong, spatulate, obovate-elliptic or elliptic . . . . . 26
- 26.a. Stipules linear, up to 8 by 1 mm. Leaves and petioles entirely glabrous. Base of style in fruit enlarged. Leaves elliptic, elliptic-obovate or obovate, 7—14 by 3.5—7 cm. *Burma, Malaya* . . . . . 94. *P. sukoei*
- b. Stipules lanceolate, up to 5 by 2 mm. Leaves and petioles with a pubescence. Base of style in fruit not widened . . . . . 27
- 27.a. Pedicels much longer than petioles, 1.5—3.5 cm long. Flowers in 6—10-flowered clusters. Stipules lanceolate, up to 5 by 2 mm. Apex of leaf rounded, obtuse or indistinct obtusely acuminate. Sepals lanceolate or ovate-lanceolate, 8—11 by 3—4 mm, ferruginously tomentose except on inside on middle-line. Corolla 8—10 mm long. Filaments of stamens in bud S-like curved, glabrous. *Ceylon*
87. *P. rubiginosum*
- b. Pedicels about as long as petioles, c. 1 cm long. Flowers solitary or in 2-flowered clusters. Stipules lanceolate, c. 1 by 0.5 mm. Apex of leaf obtusely acuminate to subcuspidate. Sepals ovate, 5—7 by 3—4 mm, ferruginously woolly-tomentose on inside near apex only. Corolla 5.5—6 mm long. Filaments of stamens in bud straight, densely yellowish pilose on inside. *Travancore* 92. *P. bourdillonii*
- 28.a. Midrib of leaf crested above. Secondary nerves forked at tips or curved back and archingly joined . . . . . 29
- b. Midrib of leaf never crested above. Secondary nerves archingly joined by curving forward . . . . . 30
- 29.a. Fruits oblong or ovoid-oblong, sometimes oblique, 3.6—5 by 1—1.8 cm, 1-seeded, pointed at either end. Leaves elliptic to subelliptic, obovate or obovate-oblong, (5—)7—16 by 2.8—5.5 cm, apex acute, rounded or obtusely acuminate, midrib angular below, secondary nerves 8—16(—25) pairs, tertiary nerves transverse but almost parallel to the secondary nerves, in basal part of leaf reticulate. *Java to Morotai, Timor, New Guinea, New Britain and Solomons* 106. *P. amboinense*
- b. Fruits globose-ellipsoid, c. 1.2 by 1.2 cm, 2- or 3-seeded. Leaves elliptic-obovate, (6—)8—12 by 3—4.5 cm, apex short and indistinct obtusely acuminate, sometimes emarginate, midrib rounded below, secondary nerves 7—14 pairs, tertiary nerves widely reticulate. *Philippines* . . . . . 101. *P. dubardii*
- 30.a. Leaves (8—)12—17(—50) by (2.5—)4.5—6.5(—12) cm, secondary nerves (9—)16—20(—33) pairs, archingly joined very close to the margin of the leaves. Outer sepals ovate, 3—4 by 2—3.5 mm. Style hardly exceeding the corolla. Fruits globose, ellipsoid or ovoid, 2—3.5 by 1—3 cm. *Malaya, Sumatra, Borneo and surrounding islands, often cultivated elsewhere* . . . . . 81. *P. gutta*
- b. Leaves 4.7—8.3 by 2.2—3.7 cm, secondary nerves 9—12 pairs, archingly joined rather far from the margin of the leaf. Outer sepals triangular, c. 2 by 2 mm. Style long exsert. Fruits unknown. *New Guinea* . . . . . 108. *P. brassii*
- 31.(8).a. Stipules broadly ovate-oblong, 3—6 mm wide at base, obtuse, rarely acute (*cf. P. majas*) . . . . . 32
- b. \*) Stipules lanceolate to subacicular, or triangular, up to 3 mm broad at base, almost usually acute or acutely acuminate . . . . . 36
- 32.a. Stipules lanceolate, oblong or oblong-ovate, 9—15 by 4—6 mm, pubescent on outside over the whole surface. Secondary nerves of leaves 18—28 pairs . . . . . 33
- b. Stipules broadly ovate, 4—6 by 3.5—6 mm, often pubescent on outside in the middle only. Secondary nerves (10—)12—18 pairs . . . . . 34
- c. Stipules broadly ovate-oblong, 6—11 by 3—6 mm, obtuse, crested on outside, glabrous on either side. Secondary nerves (13—)16—19 pairs. Leaves obovately

\*) Stipules are unknown in 29. *P. komakomar* but this species is included under item b. If included under & it is to be separated from the 6 species also included there by the 2-sided pubescence of the sepals.



- oblong to spatulate, 22—40 by 8.5—16 cm, rounded and usually short obtusely acuminate. Petioles 1.5—3 cm long, flat above. Fruits ellipsoid, 1.5—2.5 by c. 1.2 cm. *Philippines* . . . . . 22. *P. cuprifolium*
- 33.a. Leaves ovate, ovate-oblong, or subovate, 12—27 by 5—13 cm, obtuse and short obtusely acuminate, acumen up to 5 mm long, underside ferruginously or yellowish hirsute, denser so on nerves and midrib. Petioles 2—4.5 cm long, narrowly grooved above. Pedicels 2—4 cm long. Sepals ovate, triangular or subelliptic, 4.5—10 by 5—8 mm. Stamens 12, entirely glabrous. *Sumatra, Malaya, Borneo* . . . . . 7. *P. hispidum*
- b. Leaves oblong, 24—48 by 8—14.5 cm, obtuse and long obtusely acuminate, acumen up to 25 mm long, underside sparsely brownish puberulous along midrib only. Petioles 0.9—2.6 cm long, flat above. Pedicels 0.3—0.8(—1) cm long. Sepals ovate-triangular, 2.5—4 by 3—5 mm. Stamens 18—21, filaments ferruginously hirsute, anthers ferruginously sericeous. *Borneo* . . . . . 18. *P. rivulare*
- 34.a. Stamens 12. Secondary nerves 9—18 pairs, diminishing until inconspicuous near margin. Leaves obovate or subpanduriform, 18—25(—41) by 8.5—11.5(—18) cm. Corolla-lobes ovate-lanceolate, 3—5 by 1.5—2 mm, obtuse. Ovary pale ferruginously hirsute in the apical half only. Pedicels up to 4 mm long in flower. Petioles (1—)2—4 cm long. *Borneo* . . . . . 19. *P. kinabaluense*
- b. Stamens 18. Secondary nerves 12—18 pairs. Pedicels (3—)7—25 mm long in flower. Petioles 0.9—1.5 cm long . . . . . 35
- 35.a. Leaves obovate or pandurate, 16—25 (—31) by 7—12(—16) cm, secondary nerves 15—18 pairs, diminishing until inconspicuous near margins. Lobes of corolla lanceolate-ovate, 9—12 by 1.5—3 mm, obtuse or truncate at apex. Ovary glabrous. *Philippines* . . . . . 13. *P. sorsogonense*
- b. Leaves broadly obovate, 16—25 by 10—15 cm, secondary nerves 12—17 pairs, archingly joined very close to the margin. Corolla-lobes elliptic-oblong, 6—7 by 2—2.5 mm, acute or subacute at apex. Ovary ferruginously hirsute. *Borneo* . . . . . 14. *P. majas*
- 36.a. Calyx pubescent on inside, often also on the outside . . . . . 37
- b. Calyx glabrous on inside, pubescent or glabrous on outside . . . . . 46
- 37.a. Mature leaves glabrous on either side . . . . . 38
- b. Mature leaves at least on underside pubescent, sometimes on midrib only 41
- 38.a. Secondary nerves 5—7 pairs. Leaves elliptic, obovate or obovate-rotundate, 3—5(—9.5) by 1.5—3(—4.5) cm. Petioles 0.7—0.9 cm long. Pedicels 0.5—0.8 cm long. Corolla in bud c. 2 mm long. *Borneo* . . . . . 36. *P. multiflorum*
- b. Secondary nerves 5—10 pairs, very often grooved above or inconspicuous. Leaves obovate or elliptic-obovate, rarely elliptic, 5—10.5(—16) by 2.3—5(—7.5), in sterile specimens 8—19.5 by 4.5—7.5 cm. Petioles 1—2.8 cm long. Pedicels 3—7(—14) mm long. Corolla 3—4 mm long. *Indo-China, Malaya, Sumatra to Philippines and New Guinea*. . . . . 48. *P. ridleyi*
- c. Secondary nerves (9—)10—20 pairs, never grooved above, but if so then pedicels 1.5—3 cm long, tertiary nervation grooved above. Petioles 1.3—2.8 cm long. Pedicels 0.7—3 cm long. Corolla 9—14.5 mm long . . . . . 39
- 39.a. Anthers caudate and fimbriate at apex, ferruginously tomentose-woolly on inside. Leaves obovate, obovate-oblong, or subelliptic, 8—17.5 by 3.5—7.5 cm, obtusely acuminate at apex. Flowers 1 or 2 in each axil. Fruits oblong or ellipsoid, c. 4 by 1.5 cm. *India* . . . . . 49. *P. ellipticum*
- b. Anthers acutely acuminate or bifid, glabrous. Flowers in 3—7-flowered axillary clusters. Fruits globose, subglobose or ovoid, 1.4—2.5 by 1.2—2.5 cm . . . . . 40
- 40.a. Fruits ovoid, 1.4—1.7 by 1.2—1.3 cm, glabrous. Branchlets dark brown tomentose. Leaves rounded, rarely short obtusely acuminate at apex, secondary nerves 11—13 pairs. Pedicels 1.5—2.2 cm long. Stamens 9—12 mm long, anthers 3.5—4 mm long, bifid at apex. Style up to 22 mm long. *Ceylon* . . . . . 2. *P. grande*
- b. Fruits oblong, 2—2.5 by 1—1.5 cm, densely ferruginously tomentose. Branchlets greyish tomentose. Leaves oblong-obovate, obovate or elliptic, 14—19 by 4—7.5 cm, abruptly short obtusely acuminate at apex, sometimes obtuse or rounded, secondary nerves 9—11 pairs. Pedicels 0.7—1.1 cm long. Stamens 3.5—4 mm long, anthers 2—2.5 mm long, acutely acuminate at apex. Style 8—11 mm long. *Malaya and Stam* . . . . . 50. *P. oxleyanum*  
var. *glabratum*

- 41.a. \*) Anthers and filaments of stamens glabrous . . . . . 42  
 b. Either anthers or filaments pubescent . . . . . 43
- 42.a. Stipules lanceolate-linear, up to 11 mm long. Secondary nerves 12—16(—19) pairs, diminishing until inconspicuous near margin, uppermost nerves sometimes archingly joined. Sepals lanceolate, 5—6 by 2—2.5 mm. Corolla 12—16 mm long, ferruginously tomentose on outside on the tube and in the centre of the lobes. Fruits glabrous. *Sumatra, Borneo, Celebes, Batjan, Amboina*.  
 85. *P. quercifolium*
- b. Stipules lanceolate, up to 2 by 1 mm. Secondary nerves 14—20 pairs, archingly joined. Sepals triangular-ovate, c. 4 by 3.5 mm. Corolla c. 9 mm long, entirely glabrous. Fruits densely ferruginously tomentose. *Malaya* 50. *P. oxleyanum* var. *oxleyanum*
- 43.a. \*\*) Secondary nerves 16—23 pairs, archingly joined near margin of leaf. Throat of corolla ferruginously pilose between the stamens, filaments of the latter with long brown hairs mainly in the basal part. *East Pakistan, India, Burma*  
 88. *P. polyanthum*
- b. Secondary nerves 6—12 pairs, diminishing until inconspicuous near margin of leaf. Throat of corolla glabrous . . . . . 44
- 44.a. Branchlets, leaves on underside of midrib, petioles and pedicels woolly tomentose. Tube of corolla ferruginously sericeous on outside. *Riouw, Borneo*  
 42. *P. dasphyllum*
- b. This pubescence tomentose or hirsute, never woolly. Corolla glabrous or with a few hairs in the middle-line of the lobes . . . . . 45
- 45.a. Leaves oblanceolate, elliptic or oblong, 7—20 by 2.5—5.5 cm, glabrous except dark brown or ferruginously hirsute in the basal half of either side of midrib, the latter grooved above. Sepals ovate, 6—7.5 by 3.5—4.5 mm. Corolla 9—10 mm long, entirely glabrous. *Malaya, Riouw, Sumatra* . . . . . 66. *P. stellatum*
- b. Leaves obovate, rarely elliptic, (7—)11—19 by (3.5—)4.5—9 cm, glabrous above, densely tomentose or sericeous below, midrib with 1 or 2 longitudinal crests densely tomentose or sericeous below, midrib grooved above. Sepals deltoid-ovate, 3—3.5 by 2.5—3 mm. Corolla c. 6 mm long, on outside with a few ferruginous hairs in the middle-line of the lobes. *Malaya, Borneo, Mindoro, Ternate, Batjan, New Guinea and perhaps also on Celebes* . . . . . 83. *P. calophyllum*
- 46.(36).a. Stamens 20—25, filaments with long ferruginous hairs, anthers glabrous. Leaves obovate, 8—23 by 4—8.2 cm, rounded or short obtusely acuminate at apex, secondary nerves (10—)13—19 pairs, diminishing until inconspicuous near margin. Corolla densely ferruginously appressedly tomentose on outside in the centre of lobes and base of tube. *Malaya, Sumatra, Riouw* . . . . . 54. *P. burckii*
- b. Stamens (8—)12—18(—20), filaments glabrous or pubescent. Corolla glabrous or partly sparsely hairy on outside . . . . . 47
- 47.a. Stamens 18—20 . . . . . 48
- b. Stamens 8—12(—15). See also 26. *P. eriocalyx* and 63. *P. foxworthyi* both with 15—18 stamens . . . . . 56
- 48.a. Branchlets glabrous. Leaves obovate-oblong, (8—)12—18 by 3.2—7.2 cm, indistinctly obtusely acuminate, obtuse or rounded at apex, entirely glabrous. Petioles 0.9—2 cm long, glabrous. Pedicels 2.5—3.3 cm long, glabrous. Corolla 3—4 mm long, glabrous. Ovary glabrous. Fruits ovoid, c. 3.5 by 2 cm, glabrous. *Philippines* . . . . . 64. *P. glabrum*
- b. Branchlets with a pubescence, at least at apex . . . . . 49

\*) Here also 58. *P. mindanaense* Merrill and 29. *P. komakomar* van Royen of which no flowers are known but which differ from each other as follows:

Secondary nerves 13—15 pairs. Petioles 2.8—3.7 cm long. *Philippines*

58. *P. mindanaense*

Secondary nerves 17—22 pairs. Petioles 1—2.5 cm long. *New Guinea*

29. *P. komakomar*

\*\*) Cf also 17. *P. erythrospermum* H. J. Lam which has 12—15 pairs of nerves, diminishing until inconspicuous near margin. Flowers unknown. Fruits oblong, 2.5—3.8 by 1—1.8 cm. *Solomons*.

- 49.a. Mature leaves glabrous on either side . . . . . 50  
 b. Mature leaves at least with a pubescence on underside . . . . . 53
- 50.a. Pedicels (2.5—3.8 cm) much longer than petioles (0.9—1.5 cm). Corolla glabrous. *Philippines* . . . . . 72. *P. lanceolatum*  
 b. Pedicels (0.8—3.2 cm) as long as or slightly longer than petioles or shorter (0.5—2.6 cm). Corolla either glabrous or with scattered hairs on outside and/or inside . . . . . 51
- 51.a. Stamens entirely glabrous . . . . . 52  
 b. Filaments glabrous, anthers sparsely ferruginously hairy. Leaves spatulate, obovate, obovate-oblong or elliptic, (10—)14—26(—30) by (4—)7—9.3(—12) cm. Petioles 0.7—1.8(—2.5) cm. Pedicels 0.9—1.5(—3.2) cm. Corolla with few ferruginous hairs on outside in middle-line of lobes and in throat. *Sumatra to New Guinea* . . . . . 53. *P. obtusifolium*
- 52.a. Leaves elliptic, oblong or oblong-lanceolate, 10—20 by 3.5—8 cm. Petioles 1.4—2.6 cm long. Corolla glabrous. *Siam* . . . . . 73. *P. garrettii*  
 b. Leaves obovate or oblong-obovate, 8—12 by 3—5 cm. Petioles 0.5—1.2 cm long. Corolla with scattered ferruginous hairs on outside of tube and in the middle-line of the lobes. *Luzon* . . . . . 63. *P. foxworthyi*
- 53.a. Petioles (1.4—3 cm) longer than pedicels (0.5—0.9 cm). Leaves ovate or obovate, 11.2—20 by 5—12 cm, yellowish ferruginously tomentose-hirsute below. Stamens 15—18, filaments brownish woolly-hirsute, anthers glabrous. Ovary ferruginously woolly puberulous. *Borneo* . . . . . 26. *P. ericalyx*  
 b. Petioles (0.7—3.5 cm) shorter than pedicels (1.3—5 cm) . . . . . 54
- 54.a. Leaves ferruginously or dark reddish brown woolly below, 8—20 by 6—11 cm. Petioles and pedicels densely woolly-tomentose. Stipules lanceolate-acicular, up to 3 by 1 mm. *Philippines* . . . . . 27. *P. barnesii*  
 b. Leaves sericeous pubescent as are petioles and pedicels. Stipules boat-shaped, lanceolate, up to 7 by 3 mm, or lanceolate and 6—8 by 1.5—3 mm large . . . . . 55
- 55.a. Petioles 0.7—2.2 cm long. Stamens entirely glabrous. Ovary glabrous. Leaves obovate, obovate-oblong, spatulate or subelliptic, 17—37 by 6—10 cm, obtuse and acutely or obtusely acuminate, midrib angular below. *Philippines*  
 12. *P. philippense*  
 b. Petioles 2—3.5 cm long. Filaments of stamens glabrous, anthers ferruginously tomentose. Leaves narrowly spatulate or oblanceolate, 18—25 by 4—8 cm, rounded and short obtusely acuminate at apex, midrib rounded below. Ovary ferruginously tomentose. *Philippines* . . . . . 79. *P. elongatum*
- 56.a. Mature leaves glabrous below \*) . . . . . 57  
 b. Mature leaves pubescent below, sometimes on midrib and nerves only, but then with numerous hairs . . . . . 91
- 57.a. Anthers with a pubescence on one or either side . . . . . 58  
 b. Anthers glabrous . . . . . 80
- 58.a. Ovary glabrous . . . . . 59  
 b. Ovary pubescent . . . . . 63
- 59.a. Secondary nerves 10—12 pairs, irregularly archingly joined, tertiary nerves few, widely apart. Petioles with 2—4 longitudinal crests. Fruits narrowly ellipsoid, often oblique, 4—5 by 1.5—2 cm. Leaves obovate-oblong, obovate or spatulate, 10—17 by 4.5—7.5 cm, rounded or cordate at apex. *Formosa and some small surrounding islands, Luzon* . . . . . 16. *P. formosanum*  
 b. Secondary nerves of leaves diminishing until inconspicuous near margin. Petioles flat or grooved above. Fruits obovoid, globose, ovoid or obpyriform, 1.2—3 by 0.7—2.2 cm . . . . . 60
- 60.a. Leaves in general obovate or oblong-obovate, sometimes oblong, (6—)11—25 (—45) by 25—7(—17) cm, rounded, obtuse or obtusely acuminate at apex. Secondary nerves 5—13 pairs. Length of petioles (0.7—3.2 cm) about the same length or slightly longer than pedicels (0.4—2.5 cm). Corolla 8—15 mm long. Style 2—2.5 cm long. *India to Moluccas and Philippines* . . . . . 61

\*) In 65. *P. neo-ebudicum*, 47. *P. pierrei* and 62. *P. tenuipetiolatum* sometimes a few scattered hairs on lower side of midrib, in 44. *P. laevifolium* a few hairs along upper side of midrib.

- b. Leaves in general elliptic, sometimes ovate, oblong-ovate or elliptic-obovate, 5—12(—23) by 2.3—7.5(—9.7) cm, emarginate, rounded, obtuse or obtusely acuminate at apex. Secondary nerves 8—19 pairs. Petioles 2—4 times the length of pedicels. Corolla 3—7.5 mm long. Style 1.5—2.2 cm long . . . . . 62
- 61.a. Corolla in bud glabrous on either side, 8—10 mm long. Tertiary nerves dense, near the midrib arising almost perpendicular to the latter. Pedicels 2—2.5 cm long. Petioles 1.5—3 cm long. *Philippines* . . . . . 34. *P. elliptilimum*
- b. Corolla in bud ferruginously sericeous in alternipetalous lines on the tube, 1—1.5 cm long. Tertiary nerves rather apart, curving backwards from midrib. Pedicels 0.4—2 cm long. Petioles 0.7—5.2 cm long. *India to the Moluccas, Philippines and Lesser Sunda Islands* . . . . . 1. *P. obovatum*
- 62.a. Secondary nerves 5—10 pairs, often grooved above. Tertiary nerves often grooved above. Flowers often in a terminal pseudo-inflorescence, or axillary. Corolla 3—4 mm long, entirely glabrous. Filaments of stamens glabrous. Fruits obovoid, 1.2—1.4 by c. 0.7 cm. *Indo-China, Malaya, Sumatra to Banca, Philippines and New Guinea* . . . . . 48. *P. ridleyi*
- b. Secondary nerves 7—14 pairs, prominulous above and often grooved as well, tertiary nerves prominulous above. Flowers always axillary. Corolla 6—7.5 mm long, tube on outside ferruginously sericeous. Filaments of stamens densely woolly, sometimes at base only. Fruits globose or ovoid, 2—2.7(—3) by 1.5—2(—2.4) cm. *Malaya, Sumatra and islands to the west of the latter, and also on Borneo* . . . . . 45. *P. hexandrum*
- 63.a. Corolla glabrous on either side . . . . . 64
- b. Corolla on one or either side with a pubescence, sometimes only part of the corolla covered . . . . . 74
- 64.a. Petioles and pedicels glabrous. Filaments of stamens with long white hairs in the apical part. *Borneo* . . . . . 74. *P. cochlearifolium*
- b. Petioles and pedicels pubescent or glabrous. Filaments pubescent but never with white hairs, or glabrous . . . . . 65
- 65.a. Petioles glabrous . . . . . 66
- b. Petioles pubescent . . . . . 69
- 66.a. Petioles 2—6 times the length of pedicels. Leaves in general narrower than 10 cm . . . . . 67
- b. Petioles 1—1½ the length of the pedicels. Leaves oblong-elliptic, 19—32 by 10—14.5 cm, obtusely acuminate at apex, glabrous on either side. Filaments of stamens glabrous. *Samoa, Fiji* . . . . . 3. *P. stehlinii* \*)
- 67.a. Secondary nerves archingly joined, 8—12(—16) pairs. *New Guinea, New Britain, Solomons, Northern Australia* . . . . . 107. *P. galactoxylum*
- b. Secondary nerves diminishing until inconspicuous near margin . . . . . 68
- 68.a. Secondary nerves 5—10 pairs, often grooved above. Flowers in 5—11-flowered, axillary clusters or along a terminal shoot. Corolla 3—4 mm long. Filaments of stamens S-shaped at apex. Fruits obovoid, 1.2—1.4 by c. 0.7 cm, scar of seed narrow, c. 2 mm broad. *Indo-China, Malaya, Sumatra to Philippines and New Guinea* . . . . . 48. *P. ridleyi*
- b. Secondary nerves 10—15 pairs. Flowers solitary or in 2—4-flowered, axillary clusters, never along a terminal shoot. Corolla 6—7 mm long. Filaments of stamens straight. Fruits ovoid or fusiform, sometimes oblique, 2.5—2.9 by 1.1—1.7 cm, scar covering half the surface of the seed. *Philippines* . . . . . 62. *P. tenuipetiolatum*
- 69.a. Leaves oblong-elliptic, 19—32 by 10—14.5 cm, secondary nerves 10—12 pairs. Pedicels 3.5—4.5 cm long. *Samoa, Fiji* . . . . . 3. *P. stehlinii*
- b. Leaves narrower than 10 cm, if wider then the number of secondary nerves (9—)16—20(—33) pairs and pedicels 1.5—12 mm long . . . . . 70
- 70.a. Petioles 2—3.5 cm long and pedicels 1.5—3.5 cm, both ferruginously woolly. Leaves obovate-elliptic, 11—15 by 5.5—7.5 cm, secondary nerves 9—11 pairs. *New Hebrides* . . . . . 65. *P. neo-obudicum*
- b. Petioles (0.7—)3—4.5(—6.5) cm long and pedicels 0.3—1.2 cm long, sericeous or tomentose pubescent . . . . . 71

\*) Closely related to *P. stehlinii* is 4. *P. oxyspermum* H. J. Lam with 5—7 pairs of secondary nerves and found on Samoa.

- 71.a. Petioles (0.6—1.8 cm) as long as or  $2\frac{1}{2}$ —3 times the length of pedicels (0.3—0.8 cm). Apex of anthers bifid or obtuse or acute . . . . . 72  
 b. Petioles (0.7—)3—4.5(—6.5) cm  $4\frac{1}{2}$ — $5\frac{1}{2}$  times the length of pedicels (0.1—1.2 cm). Leaves very variable, (8—)12—17(—50) by (2.5—)4.5—6.5 (—12) cm, secondary nerves (9—)16—20(—33). Stamens 4.5—7 mm long, anthers aristulate at apex. Fruits globose, ellipsoid or ovoid, 2—3.5 by 1—3 cm, rounded, obtuse, or acuminate at apex. *Malaya, Sumatra, Borneo, and surrounding islands, cultivated elsewhere* . . . . . 81. *P. gutta*
- 72.a. Petioles (1—2.2 cm) as long as pedicels (1.2—2 cm). *Stam* 78. *P. koratense*  
 b. Petioles (0.6—1.8 cm) much longer than pedicels (0.3—0.8 cm) . . . . . 73
- 73.a. Fruits oblong or ovoid-oblong, sometimes oblique, 3.6—5 by 1—1.8 cm, pointed at either end. Leaves (5—)7—16 by 2.8—5.5 cm, base broadly cuneate, secondary nerves 8—17(—25) pairs, petioles 0.6—1.4 cm long. Anthers obtuse or acute. *Java to Celebes, Morotai and New Guinea* . . . . . 106. *P. amboinense*  
 b. Fruits ovoid or fusiform, 2.5—2.9 by 1.1—1.7 cm, obtusely acuminate at apex, rounded at base. Leaves 5—12 by 3—5.5 cm, base narrowly cuneate, secondary nerves 10—15 pairs, petioles 0.9—2.2 cm. Anthers bifid at apex. *Philippines* . . . . . 62. *P. tenuipetiolatum*
- 74.a. Petioles glabrous or whitish or greyish puberulous but ultimately glabrous . 75  
 b. Petioles brownish or ferruginously tomentose, or brownish or ferruginously woolly-tomentose, if greyish puberulous the pedicels 5—7 mm long and these cinnamomously puberulous . . . . . 77
- 75.a. Corolla 9—11.5 mm long, ferruginously pilose in throat, lobes patent in anthesis. Sepals ovate, 5.5—7 by 4—5.5 mm. Pedicels 2.5—3 cm long, tomentose. Ovary supported by a disk. *Ceylon* . . . . . 41. *P. petiolare*  
 b. Corolla 6—8 mm long, ferruginously sericeous on inside at tips of lobes or with a few hairs in throat, lobes reflexed in anthesis. Sepals broadly ovate to subrotundate, triangular-ovate or triangular, 1.5—3 by 1.5—3 mm. Pedicels 0.4—1.5(—2.8) cm, sericeous. Ovary without a disk . . . . . 76
- 76.a. Stipules up to 8 by 2 mm. Secondary nerves 10—17 pairs. Sepals sericeous pubescent on outside. Filaments of stamens glabrous. Fruits ovoid or obovoid, sometimes oblique, 3—4 by 2—2.5 cm. *Sumatra to Bali, Celebes, Moluccas, and New Guinea* . . . . . 53. *P. obtusifolium*  
 b. Stipules up to 2 by 1 mm. Secondary nerves 7—13 pairs. Sepals puberulous on outside. Filaments of stamens densely woolly, sometimes at base only. Fruits globose or ovoid, 2—2.7(—3) by 1.5—2(—2.4) cm. *Malaya, Sumatra, islands west of the latter, also on Borneo* . . . . .
- 77.a. Pedicels more than 2 cm long, ferruginously tomentose. Petioles 1.5—6.5 cm, brownish tomentose. Secondary nerves (7—)9—14(—22) pairs. *Philippines, Celebes, Talau Islands* . . . . . 60. *P. luzoniense*  
 b. Pedicels at the utmost 1.6 cm long . . . . . 78
- 78.a. Stipules pubescent on either side. Petioles 0.6—2 cm long, brownish or ferruginously woolly-tomentose. Fruits ovoid or obovoid to ellipsoid, 1.2—2.8 by c. 1 cm, rounded at apex. Pedicels 0.8—1.6 cm, brownish or ferruginously woolly-hirsute or tomentose. Secondary nerves 7—12 pairs. *Riouw, Borneo* 42. *P. dasyphyllum*  
 b. Stipules pubescent on outside only . . . . . 79
- 79.a. Petioles (1—)1.5—2.2 cm, flat above and minutely grooved, sometimes in the apical part only. Pedicels cinnamomously puberulous. Corolla 7—9 mm long. Stamens 4.5—5 mm long. *New Guinea* . . . . . 57. *P. morobense*  
 b. Petioles 0.3—0.9 cm, grooved or flat above and sometimes crested as well. Pedicels ferruginously tomentose. Corolla 2—4 mm long. Stamens c. 1.5 mm long. *Fiji* . . . . . 15. *P. fidjense*  
 c. Petioles 0.5—0.8 cm, flat above. Pedicels cinnamomously puberulous. Corolla c. 1.5 mm long. Stamens c. 1 mm long. *New Guinea* . . . . . 51. *P. simun*
- 80.a. Juvenile branchlets woolly pubescent. *Sumatra* . . . . . 77. *P. confertum*  
 b. Juvenile branchlets tomentose, puberulous, sericeous or glabrous . . . . . 81
- 81.a. Juvenile branchlets glabrous . . . . . 82  
 b. Juvenile branchlets not glabrous . . . . . 83
- 82.a. Leaves (15—)20—28 by (5—)8—14 cm, obtusely acuminate. Flowers solitary or in 2- or 3-flowered clusters. Ovary ferruginously puberulous. *Caroline* . . . . . 76. *P. karrak*

- b. Leaves 8.5—18 by 2.5—6 cm, obtuse. Flowers in 6- or 7-flowered clusters. Ovary glabrous. *Fiji* . . . . . 75. *P. hornet*
- 83.a. Secondary nerves 20—26 pairs, ascending at an angle of 60°—90°. Petioles 1.6—3.5 cm. Fruits ovoid, ellipsoid or obovoid. *Siam, Sumatra, Riouw, Borneo, Billiton, Java* . . . . . 109. *P. sumatranum*
- b. Secondary nerves 7—16 pairs, but if up to 33, then ascending at an angle of 45°—50°, or petioles 0.7—1.1 cm . . . . . 84
- 84.a. Petioles (0.8—2.5 cm) and pedicels (0.9—2.4 cm) almost equal in length. Secondary nerves 7—13 pairs. Fruits obovoid, 1—1.7 by 1—1.5 cm, glabrous. *Philippines* . . . . . 61. *P. bataanense* \*)
- b. Petioles much longer than pedicels, but if almost equal then secondary nerves 12—16(—20) pairs . . . . . 85
- 85.a. Leaves narrowly elliptic or elliptic-obovate, 7—15 by 2—4.5 cm, secondary nerves 9—13 pairs. Pedicels 4—7 mm long, densely ferruginously tomentose. *Ceylon* . . . . . 44. *P. laevifolium*
- b. Leaves obovate to spatulate, but if elliptic the secondary nerves 7—10 pairs and pedicels 7—17 mm long, ferruginously puberulous . . . . . 86
- 86.a. Petioles 5—6(—15) times the length of pedicels. *Malaya, Sumatra, Borneo and surrounding islands, cultivated elsewhere* . . . . . 81. *P. gutta*
- b. Length of petioles 1—3.5 times the length of pedicels . . . . . 87
- 87.a. Midrib of leaf crested above . . . . . 88
- b. Midrib of leaf flat or grooved above, (rarely crested in part of the leaf, see 37. *P. walsurifolium*) . . . . . 89
- 88.a. Leaves often coppery red when dry. Secondary nerves irregularly archingly joined near margin. Filaments of stamens glabrous. Fruits obliquely fusiform, 3—5 by 1—1.7 cm. *Malaya, Sumatra, Riouw, Lingga, Banka, Java, Borneo* . . . . . 96. *P. xanthochyllum*
- b. Leaves brownish or greenish when dry. Secondary nerves diminishing until inconspicuous near margin. Filaments of stamens entirely densely woolly or at base only. *Malaya, Sumatra, islands west of it, and also on Borneo* . . . . . 45. *P. hexandrum*
- 89.a. Secondary nerves 13—16 pairs. Leaves 14—22 by 6—8 cm. Petioles (2—) 2.5—4 cm. Pedicels stout. Sepals ovate, 5—6.5 by 3.5—4.5 mm. Stamens (5.5—)7.5—8.5 mm. *Borneo* . . . . . 86. *P. rigidum*
- b. Secondary nerves 7—10 pairs. Leaves 4—16 by 2—6 cm. Petioles 0.8—2.5 cm. Pedicels slender. Sepals suborbicular or ovate, 2—3.5 by 1.5—2.5 mm. Stamens 3.5—5.5 mm long . . . . . 90
- 90.a. Leaves narrowly elliptic, obovate-elliptic or oblanceolate, 7—16 by 3—6 cm, obtusely acuminate. Pedicels 7—17 mm long, sparsely greyish or ferruginously puberulous. Corolla 8—10 mm long. Fruits ovoid, c. 3 by 1.8—2 cm. *Borneo* . . . . . 47. *P. pierrei*
- b. Leaves obovate or rotundate-obovate, 4—9.5 by 2—4.5 cm, emarginate or rounded, rarely short obtusely acuminate. Pedicels 3.5—7 mm long, ferruginously tomentose. Corolla 6—7 mm long. Fruits globose or ellipsoid, 1—2 cm in diam. *Malaya, Sumatra, Borneo* . . . . . 37. *P. walsurifolium*
- 91.(56).a. Mature petioles glabrous . . . . . 92
- b. Mature petioles pubescent, sometimes only partly so . . . . . 97
- 92.a. Corolla at least pubescent or woolly between the stamens . . . . . 93
- b. Corolla glabrous between the stamens . . . . . 94
- 93.a. Secondary nerves 6 or 7. Leaves obovate to elliptic-obovate. Petioles 1—1.6 cm long. Flowers in 2- or 3-flowered clusters. Pedicels 3—7.5 mm long. *Borneo* . . . . . 35. *P. crassifolium*
- b. Secondary nerves (10—)17—20(—22) pairs. Leaves broadly ovate, suboblong, elliptic or obovate. Petioles 1.5—5.5 cm long. Flowers in 3—6-flowered clusters. Pedicels 0.8—1.5(—3) cm long. *Borneo, Celebes* . . . . . 52. *P. leiocarpum*
- 94.a. Anthers glabrous . . . . . 95
- b. Anthers pubescent . . . . . 96

\*) Here also 67. *P. merrillii* Dubard with ellipsoid fruits and smaller corolla (up to 7.5 mm against 10—14 mm).

- 95.a. Secondary nerves 7—13 pairs. Petioles flat above and crested as well. Pedicels 0.9—2.4 cm long. Fruits obovoid, 1—1.7 by 1—1.5 cm. *Philippines*  
61. *P. bataanense*
- b. Secondary nerves 12—16(—20) pairs. Petioles grooved above. Pedicels (0.15—) 0.3—0.9 cm. Fruits obliquely fusiform, 3—5 by 1—1.7 cm. *Malaya to Sumatra, Bangka, Java and Borneo* . . . . . 96. *P. xanthochymum*
- 96.a. Styles 2—2.5 cm long. Ovary conoid, glabrous. Pedicels (4—)9—15 mm long. Stamens 8—12. *India to Moluccas and Philippines* . . . . . 1. *P. obovatum*
- b. Styles 0.3—0.35 cm long. Ovary disciform-obovoid, ferruginously puberulous. Pedicels 5—7 mm long. Stamens 12. *New Guinea* . . . . . 57. *P. morobense*
- 97.a. Anthers glabrous . . . . . 98
- b. Anthers pubescent, sometimes a few hairs only\*) . . . . . 115
- 98.a. Pedicels longer or as long as petioles\*\*) . . . . . 99
- b. Pedicels shorter than petioles . . . . . 107
- 99.a. Secondary nerves (1—)10—12(—16) pairs . . . . . 100
- b. Secondary nerves 16—27 pairs . . . . . 103
- 100.a. Leaves obovate, obovate-oblong, spatulate or subelliptic, 17—37 by 6—10 cm. Petioles with 2 longitudinal crests above. *Philippines* . . . . . 12. *P. philippense*
- b. Leaves 6—20 by 2.2—6 cm, of different shapes. Petioles with one rib, or flat or grooved above . . . . . 101
- 101.a. Fruits ellipsoid to obovoid, c. 3.5 by 2 cm. Pedicels 1.2—3.5 cm long . . . . . 102
- b. Fruits obliquely fusiform, 3—5 by 1—1.7 cm long. Pedicels 0.15—1.2 cm long. *Malaya to Sumatra, Bangka, Java and Borneo* . . . . . 96. *P. xanthochymum*
- 102.a. Petioles 1.5—1.8 cm long, broadly ribbed above. Ovary sparsely ferruginously sericeous at apex only. *Luzon* . . . . . 59. *P. loheri*
- b. Petioles 0.5—1 cm long, flat above. Ovary glabrous. *Luzon, Mindanao*  
9. *P. montanum*
- 103.a. Leaves woolly tomentose below, obovate or obovate-oblong, 12—32 by 6.5—14.5 cm, obtuse or retuse at apex. Secondary nerves 17—23 pairs. *Malaya*  
6. *P. clarkeanum*
- b. Leaves sericeous, appressedly tomentose, hirsute or puberulous below . . . . . 104
- 104.a. Leaves narrowly lanceolate, long acutely acuminate at apex, 13—17 by 4—6 cm. *Borneo* . . . . . 11. *P. elegans*
- b. Leaves neither lanceolate nor acutely acuminate at apex . . . . . 105
- 106.a. Pedicels 1.5—12 mm long. Corolla in bud entirely glabrous. *Malaya to Sumatra, Java, Sumatra* . . . . . 24. *P. ottolanderi*
- b. Petioles much shorter, but if over 2 cm long, leaves smaller than 20 by 6 cm and pedicels 1.5—12 mm long . . . . . 106
- 196.a. Pedicels 1.5—12 mm long. Corolla in bud entirely glabrous. *Malaya to Sumatra, Bangka, Java and Borneo* . . . . . 96. *P. xanthochymum*
- b. Pedicels 15—27 mm long. Corolla in bud with a few hairs in the middle-line of the outside of the lobes. *Borneo* . . . . . 10. *P. sericeum*
- 107.a. Secondary nerves (21—)28—35 pairs. Petioles and pedicels woolly or hirsute. *Borneo* . . . . . 8. *P. beccarianum*
- b. Secondary nerves less than 25, if more than 28 pairs then pedicels and petioles never woolly or hirsute . . . . . 108
- 108.a. Leaves narrowly elliptic or elliptic-obovate, 7—15 by 2—4.5 cm, narrowed at either end. Secondary nerves 9—13 pairs. Petioles 0.7—1.1 cm, dark brown tomentose. Pedicels 0.4—0.7 cm long, ferruginously tomentose. Stamens c. 1 mm long. *Ceylon* . . . . . 44. *P. laevifolium*
- b. Leaves in general much broader, often obovate or elliptic, if of the same size than midrib densely woolly below or secondary nerves (10—)13—16 pairs, petioles 1.5—3.5 cm and pedicels 0.7—0.9 cm long. Corolla exsert. Stamens always longer than 1 mm . . . . . 109

\*) No anthers are known of 9. *P. montanum* and this species is included in both items.

\*\*) The pedicels of the flowers in the axil of a leaf should be compared with the petioles of that leaf, as often the pedicels of the lowest flowers are longer than the petioles of the more apical leaves but shorter than the leaf in the axil of which they are inserted.

- 109.a. Leaves obovate or spatulate, sometimes oblong-obovate, 8—15(—17) by 3.2—6 cm, midrib often woolly below, secondary nerves (10—)13—16 pairs, petioles 1.5—3.5 cm. Sepals ovate-lanceolate, 2.5—4 by 2—3 mm. Fruits globose, obovoid or ovoid, sometimes ellipsoid, 1.8—2.4 by 1.4—1.9 cm, with a distinct finely rugose area around the base of the style. *Sumatra, Malaya* 77. *P. confertum*
- b. Not this combination of characters. Leaves larger. Fruits without a rugose area at apex . . . . . 110
- 110.a. Secondary nerves 11—14 pairs. Corolla 4—6.5 mm long . . . . . 111
- b. Secondary nerves 14—33 pairs, but if less then corolla 7—10 mm long . . . . . 112
- 111.a. Filaments of stamens with long ferruginous hairs. Mature leaves glabrous above. Petioles flat above and crested as well. *Borneo* . . . 40. *P. lisophyllum*
- b. Filaments of stamens glabrous. Mature leaves ferruginously tomentose-hirsute above along midrib, the latter grooved above. *Borneo* . . . . . 26. *P. ericalyx*
- 112.a. Fruits with a lighter coloured, rugose area at apex . . . . . 113
- b. Fruits without such an area . . . . . 114
- 113.a. Secondary nerves 20—25 pairs. Leaves obovate, 20—35 by 9—13 cm. Fruits ellipsoid to subovoid, 2—3 by 1.5—2 cm, surface of embryo smooth. *Borneo* 31. *P. decurrens*
- b. Secondary nerves 17—22 pairs. Leaves subobovate, elliptic or oblong. Fruits obliquely ovoid, 3—3.5 by 1.5—2 cm, surface of embryo deeply irregularly grooved and wrinkled. *Philippines, Moluccas, New Guinea* 70. *P. lobbianum*
- 114.a. Stipules up to 9 mm long, woolly-tomentose on outside. Leaves (14—)20—35 by (5.5—)7—17 cm, woolly-tomentose below. Petioles and pedicels woolly-tomentose. *Malaya* . . . . . 25. *P. maingayi*
- b. Stipules 1—2 mm long, tomentose or sericeous on outside. Leaves (8—)12—17 (—50) by (2.5—)4.5—6.5(—12) cm, tomentose or sericeous below. Petioles and pedicels tomentose or sericeous. *Malaya, Sumatra, Borneo and surrounding islands; cultivated elsewhere* . . . . . 81. *P. gutta*
- 115.a. Filaments of stamens pubescent . . . . . 116
- b. Filaments glabrous \*) . . . . . 120
- 116.a. Leaf-base rounded to truncate . . . . . 118
- b. Leaf-base narrowly cuneate . . . . . 117
- 117.a. Corolla glabrous on either side. Leaves elliptic. *Borneo* 84. *P. ferrugineum*
- b. Corolla ferruginously sericeous on outside. Leaves obovate-oblong. *New Guinea* 71. *P. pseudocalophyllum*
- 118.a. Leaves obovate, 22—28 by 11—12.5 cm, rounded at apex, broadly truncate or cordate at base, brownish hirsute below. Flowers in 7- to many-flowered clusters, pedicels 4—6 cm long, brownish woolly. *Luzon* . . . . . 5. *P. abundantiflorum*
- b. Leaves obovate-oblong, ovate, elliptic or obovate, 5—17 by 2.5—6.5 cm, rounded to subacutely acuminate at apex, broadly cuneate to subtruncate or truncate at base. Flowers in 2—4-flowered clusters, pedicels 0.3—3 cm long, sericeous or appressedly tomentose . . . . . 119
- 119.a. Fruits ellipsoid to obovoid, c. 3.5 by 2 cm, rounded at apex. *Luzon* 9. *P. montanum*
- b. Fruits obovoid, 1.5 by 1.2 cm, rounded and with a rugose area around the remnant of the style. *Siouw, Borneo* . . . . . 69. *P. rioense*
- 120.a. Leaf-base acute or cuneate . . . . . 121
- b. Leaf-base rounded . . . . . 130
- 121.a. \*\*) Apex of fruit smooth . . . . . 122
- b. Apex of fruit rugose. *Philippines* . . . . . 60. *P. luzoniense*
- 122.a. Fruits 11 by 9 cm. *Sumatra, Malaya, Batjan (also Celebes and Amboina?)* 38. *P. macrocarpum*
- b. Fruits up to 3.5 by 3 cm . . . . . 123

\*) Unknown in 9. *P. montanum* and this species included under both items.  
 \*\*) Of 46. *P. cryptocariifolium*, 23. *P. supfianum* and 39. *P. vexillatum* no fruits are known but these species can be distinguished as follows:

- 1.a. Secondary nerves 5—10 pairs . . . . . 2
- b. Secondary nerves 10—16 pairs. *New Guinea* . . . . . 23. *P. supfianum*
- 2.a. Terminal bud replaced by a flowering shoot. Pedicels 5—8 mm long. Sepals 6, 7 or 8. *Borneo* . . . . . 46. *P. cryptocariifolium*
- b. Terminal bud present. Pedicels 1.5—3 mm long. Sepals 6. *Borneo* 39. *P. vexillatum*



- 123.a. Secondary nerves (10—)17—20(—22) pairs. Pedicels 0.8—1.5 cm long. *Borneo, Celebes* . . . . . 52. *P. leiocarpum*  
 b. Secondary nerves 5—15(—33) pairs. Pedicels 0.2—1.6 cm long . . . . . 124
- 124.a. Stipules pubescent on either side. Sepals woolly-tomentose on outside. Fruits ovoid, or obovoid to ellipsoid, 1.2—1.8 by 1—1.5 cm. Ovary yellowish appressedly villose. Midrib of leaf grooved above. Anthers longer than the filaments. *Riouw, Borneo* . . . . . 42. *P. dasyphyllum*  
 b. Stipules pubescent on outside only. Sepals tomentose on outside . . . . . 125
- 125.a. Petioles (0.7—)2—3.5(—6.5) cm long, or fruits up to 3.5 by 3 cm, or ovary glabrous . . . . . 126  
 b. Petioles 0.3—0.9 cm long. Fruits c. 1.8 by 1.3 by 1 cm. Ovary ferruginously villose. Leaves obovate-spathulate, oblong or obovate, 6—12 by 2.5—4 cm, obtuse or obtusely acuminate. Secondary nerves 9—15 pairs. Inflorescences 2—4-flowered clusters or flowers solitary. Pedicels 0.2—0.8 cm long. *Fiji* . . . . . 15. *P. fidjiense*
- 126.a. Ovary pubescent . . . . . 127  
 b. Ovary glabrous. Fruits pruniform to globose or obpyriform, up to 2.8 by 2.2 cm. Leaves obovate, oblong-obovate or oblong, 11—25(—45) by 3—7(—17) cm, secondary nerves 8—15(—19) pairs. Petioles (0.7—)1.2—1.7(—3.2) cm long. Inflorescences 4—12-flowered clusters. Pedicels (0.4—)0.9—1.5 cm. *India to Moluccas and Philippines* . . . . . 1. *P. obovatum*
- 127.a. Corolla glabrous . . . . . 128  
 b. Corolla ferruginously sericeous on outside on tube and base of lobes . . . . . 129
- 128.a. Stipules lanceolate, 2.5—3 mm long. Fruits glabrous. Midrib of leaves crested above. Outer sepals shorter than the inner sepals. *Celebes* 68. *P. maliliense*  
 b. Stipules lanceolate, 1—2 mm long. Fruits ferruginously tomentose. Midrib of leaves grooved above. Outer sepals longer than inner sepals. *Malaya, Sumatra, Borneo and surrounding islands; cultivated elsewhere* . . . . . 81. *P. gutta*
- 129.a. Secondary nerves 5—9 pairs. Fruits ellipsoid, 0.9—1.3 by 0.7—0.9 cm. *Malaya* . . . . . 33. *P. herveyi*  
 b. Secondary nerves 13—17 pairs. Fruits obovoid or obpyriform, 3—3.5 by 1.6—2.3 cm. *Java* . . . . . 82. *P. tjipetirensis*
- 130.a. Ovary glabrous . . . . . 131  
 b. Ovary pubescent . . . . . 133
- 131.a. Fruits narrowly ellipsoid, often oblique, 4—5 by 1.5—2 cm. Leaves obovate-oblong, obovate or spatulate, 10—17 by 4.5—7.5 cm, apex rounded or cordate. Secondary nerves 10—12 pairs. *Formosa and surrounding islands, Luzon* . . . . . 16. *P. formosanum*  
 b. Fruits ellipsoid to obovoid, up to 3.5 by 2 cm . . . . . 132
- 132.a. Fruits ellipsoid, c. 1.5 by 1 cm. Leaves elliptic, 7—10 by 2.2—3.5 cm. Secondary nerves 9 or 10 pairs. Petioles 1.5—2.5 cm, narrowly grooved above. Pedicels 0.8—1.2 cm. *Borneo* . . . . . 43. *P. edenii*  
 b. Fruits ellipsoid to obovoid, c. 3.5 by 2 cm. Leaves obovate-oblong or oblong, 8.5—16 by 3.5—6 cm. Secondary nerves 10—13 pairs. Petioles 0.5—1 cm, flat above. Pedicels 1.2—3 cm. *Philippines* . . . . . 9. *P. montanum*
- 133.a. Secondary nerves 17—25 pairs and pedicels ferruginously woolly pubescent. *Fiji* . . . . . 80. *P. vitilevuense*  
 b. Secondary nerves 9—33 pairs but pedicels never woolly pubescent . . . . . 134
- 134.a. Corolla glabrous on outside and fruit 2—3.5 by 1—3 cm. *Malaya, Sumatra, Borneo and surrounding islands; cultivated elsewhere* . . . . . 81. *P. gutta*  
 b. Corolla brownish sericeous on outside, sometimes on tube only, or with a few scattered hairs only, but if glabrous then the fruits much larger . . . . . 135
- 135.a. Corolla brownish sericeous on outside on the entire surface except for the margins of the lobes. *New Guinea* . . . . . 56. *P. warburgianum*  
 b. Corolla glabrous or with a few scattered hairs, or pubescent on outside of tube only . . . . . 136
- 136.a. Fruit 3.5—6 by 2.5—3 by 1.8—2.3 cm. Corolla with a few hairs only or glabrous. *Sumatra, Malaya, Batjan (also Celebes and Amboina?)* . . . . . 38. *P. macrocarpum*  
 b. Fruit 1.2—1.8 by c. 1 cm. Corolla pubescent on outside of tube only. *Riouw, Borneo* . . . . . 42. *P. dasyphyllum*

1. *P. obovatum* (Griffith) Engler, Bot. Jahrb. 12, 1890, 511; King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr 16, 1905, 190; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, 5; Dubard, Bull. Mus. hist. nat. 15, 1909, 380; Ridley, Fl. Mal. Pen. 2, 1923, 273; Lam, l. c. 1925, 83, full synonymy; Lam, l. c. 1927, 408; Corner, Wayside Trees Mal., 1951, 601, pl. 182, f. 217; Wyatt-Smith, Research Pamphlet 4, 1954, 38—40, 1 fig. — *Isonandra obovata* Griffith, Not. Pl. As. 4, 1854, 293; Kurz, For. Fl. 2, 1877, 120 — *P. theoiderum* Elmer, Leafl. Phil. Bot. 3, 1910, 868, sphalm. *theoidea*; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 283; Lam, l. c. 1925, 66; Lam, l. c. 1927, 411 — *P. krantzianum* Pierre ex Lecomte, Fl. Gén. Indo-China 3, 1930 1899 — *P. punctatum* Fletcher, Kew Bull. 1937, 375.

Trees, up to 45 m. Branchlets stout, usually angular, 3—6 mm in diam., pubescence sericeous to tomentose, varicolored, ranging from pale cinnamonous, grey, blackish grey, reddish grey, over pale brown, brown, reddish brown, dark brown, purplish brown, blackish brown to brownish or reddish ferruginous and coppery, soon glabrous; terminal cone up to 18 mm long with the same pubescence as the branchlets; stipules lanceolate or linear, up to 5 by 1.5 mm, apex acute or acuminate, pubescent on outside, glabrous on inside, caducous. *Leaves* conferted or subconferted at apex of branchlets, obovate, oblong-obovate, or oblong, (6—)11—25(—45) by 2.5—7(—17) cm, apex rounded, obtuse or obtusely acuminate, acumen up to 7 mm long, base narrowly to broadly cuneate, decurrent along adaxial side of petiole; generally glabrous above but sometimes sparsely whitish tomentose along the midrib, rarely so over the whole surface, puberulous or tomentose below in the same colours as the branchlets, chartaceous or coriaceous; midrib grooved and minutely crested above, prominent and rounded below, secondary nerves 7—15(—19) pairs, ascending at an angle of 50°—80°, curved but usually straight and curved at their tips only, diminishing until inconspicuous near the margins, grooved, sometimes prominulous and/or crested above, prominent below, tertiary nerves transverse, slender, but usually distinct on either side, sometimes grooved above. Petioles (7—)12—17(—52) mm long, broadly grooved or flat above, pubescent when young, but sometimes soon glabrous. *Flowers* in 4—12-flowered axillary clusters, pedicels angular, (4—)9—20 mm long in flower and fruit, brownish to ferruginously tomentose. *Sepals* triangular or ovate, (1.5—)2.2—3 by (1.5—)2—2.5 mm, apex acute or acuminate, ferruginously or brownish tomentose on outside, glabrous on inside, inner sepals with membranous, fimbriate margins. *Corolla* 10—15 mm long, in bud ferruginously sericeous in alternipetalous lines on the tube and finely ciliate along the margins of the lobes, but soon glabrous, lobes lanceolate-oblong, 6.5—10.5 by 2.5—3.5 mm, apex obtuse, often reflexed in anthesis. *Stamens* (8—)12, 6.5—7.5 mm long, filaments filiform, glabrous, anthers sagittate-ovoid, c. 2.5 mm long, apex acute or acuminate, ferruginously sericeous at the back, dehiscent extrorsely. *Ovary* conoid, gradually passing into the style, c. 2.5 by 1.5 mm, 12-lobed, 6-celled, glabrous. Style filiform, 2—2.5 cm long, glabrous or subpuberulous at the base. *Fruits* pruniform to globose or obpyriform, up to 2.8 by 2.2 cm, 1- or 2-seeded, apex sometimes with a remnant of the style, pericarp fleshy, glabrous. Seeds ellipsoid, c. 2.5 by 1.2 by 1 cm, acute at either end and sometimes mucronulate, laterally com-

pressed if 2 seeds are present, brown, glossy, scar narrow, c. 20 by 7 mm, brownish, dull, embryo exalbuminous, radicle short, not exsert.

Type specimen. *Griffith 3606* in K.

Vernacular names. Nyatoh by itself is the common name given to this species in Malaya. Others are: Siam: khamun nok chik khao; Indo-China chây, chor; Langkawi: gutta manjato; Malacca: gëtah nyatoh, gëtah taban, nyatoh bunga, pokok sundek, sebang balang putei; Negri Sembilan: nyatoh mayang; Pahang: bilan, nyatoh kekabu; Selangor: nyatoh balam; Sumatra: ampaloo, balam bunga tjinok, balam sugi sugi, balam terupuh, balam tjupah, majang katapong, natu bulam, njatuh sudu sudu; Celebes: belawan lika, getah kuma, nato, poto, pudutan, pulutan, p. raindang, p. sela, p. sulat; Amboina: sikki puti; Sumbawa: sadakala; Ternate: tofiri daun ketjil, t. sedang; Luzon: dulitán.

Ecology: Fairly common species of lowland forests, up to 1300 m.

Distribution: India to the Moluccas and Philippines.

Var. *obovatum* — *P. obovatum* (Griffith) Engler, var. *occidentale* H. J. Lam, l. c. 1925, 83, full synonymy.

Leaves obovate or oblong-obovate, apex usually broadly obtuse. Pedicels in anthesis 1.1–1.5 cm long. Stamens 12.

Type specimen: *Griffith 3606* in K.

Distribution: India to Sumatra and Bangka.

BURMA. Moulmein: *Falconer 34* (K, L).

INDIA. f. Lam 1925.

SIAM. Trat, Koh Charug: *Nilkosol 5909* (L), tree, fl. Oct.; Kaw Tao: *Kerr 16028* (K), tree, c. 20 m, fl. buds, Sept., type specimen of *P. punctatum* Fletcher; Bangbao: *Williams 17114* (L), tree 20 m, fl. buds, Feb.; Surathani, Tha Khanawm: *Dinthaewng 1673* (BKF), tree, fl. Dec.; Kaw Deng: *Ammandale s.n.* (SING), fl. buds.

INDO-CHINA. Cam chay Mts, Phu Quoi: *Pierre 1423* (BO, L, P), tree 30–40 m, fl. & fr. May, type specimen of *Dichopsis krantziana* Pierre.

MALAYA. Langkawi Isl., Mt Raya For. Res.: *Yahya Shaffi 66436* (KEP), tree 15 m, fl. Nov.; Neor Cook: *Curtis s.n.* (SING), Nov.; State Land: *Din 73615* (KEP, L), tree 20 m, fl. yellow, Oct. — K e d a h, Bukit Tanggaa For. Res.: *Din 42142* (KEP), tree 20 m, fl. Jan.; Tampoi For. Res.: *FR 71160* (KEP), tree 13 m, Febr.; Jitra: *Burkill 13350* (A, BO, SING), tree 20 m, fl. March; Pulau Selang: *Corner s.n.* (SING), Nov. — P e n a n g, Botanic Gardens: *Nur s.n.* (SING), Sept.; ibidem: *Nur s.n.* (SING), July — K e l a n t a n, P. Puteh, Semarah State Land: *Rahman 68553* (KEP), tree 17 m, Oct. — T r e n g g a n u, Kuala Trengganu: *Holtum 15153* (A, SING), tree 13–16 m, fl. May — P a h a n g, Botan Jungle For. Res.: *Osman 29271* (KEP), May — S e l a n g o r, Weld Hill For. Res.: *Rahman CF 302* (SING), fl. Jan.; ibidem: *Cubitts CF 854* (SING), fl. Oct.; ibidem: *Rahman CF 1829* (SING), fr. March; ibidem: *Sinclair 40077* (L, SING), fl. Nov.; ibidem: *Rahman 2494* (KEP, SING), fl. Jan.; ibidem: *FR 66453* (KEP), tree 20 m, fl. Sept. — N e g r i S e m b i l a n, Senawang For. Res.: *Joston 18504* (KEP), April; Sungei Mangala: *Symington 43667* (KEP), April — M a l a c c a, Chaban: *Malvius s.n.* (SING), Sept.; Panchor: *Goodenough 1543* (SING), fl. Oct.; Ayer Panas: *Derry 59* (SING), fr. March; Jasin, Maliman For. Res., alt. 16 m: *Sudin 64156* (KEP), tree 6 m, March; Rini: *Ridley 10079* (SING), fl. Dec.; without loc.: *Malvius 763* (SING), fr. Dec.; *Maingay 985* (K, L), fl.; *Curtis 3480* (SING), fl. May; *Curtis 3481* (SING), fl. May; *Curtis 3482* (SING), May; *Malvius 108* (SING); *Egerton s.n.* (SING), March; *Derry 88* (SING), fl. Nov.; without know loc.: *Griffith 3606* (K), type specimen of *P. obovatum* — J o h o r e, Sungai Bahan, on riverbank in Nibong forest: *Corner 28639* (A, BO, KEP, NY, SING), fl. June; Kota Tinggi — Mawai Road, in drier part of swampy forest: *Corner 21324* (A, BO, KEP, SING), fl. Febr.; Pulau Setindan, Mersing: *Corner s.n.* (SING), garbled tree up to 10 m, fl. Aug.; Pasang Isl., secondary forest, hillside: *Wyatt-Smith 80552* (KEP, L), tree 23 m, fl. buds, fl. white, Nov. — S i n g a p o r e, Bot. Gardens: *Ridley 4430* (SING), fl. & fr.; ibidem: *Furtado s.n.* (SING), tree 13 m, fl. Nov.; ibidem: *Henderson s.n.* (SING), fl. Jan.; ibidem: *Nur 1809* (SING),

March; ibidem: *Nur 1900* (SING), March; ibidem: *Kiah s.n.* (SING), fr. Febr.; ibidem: *Nur 1318* (SING), June; ibidem: *Furtado s.n.* (NY, SING), tree 13 m, fl. Nov.; ibidem: *Nur 1489* (SING), March; ibidem: *Nur 1766* (SING), March; ibidem: *Nur 1495 & 1685* (SING), fl. March; Kus island, sea shore: *Teruya 3015* (SING), fl. June; Bukit Timah: *Ngadiman 34653* (BO, SING), fl. Jan.; Changi; *Ridley 2754* (SING), fr.; Pulau Brani: *Ridley 11319* (SING), fl.

LINGGA. f. Lam 1925; Ngina: *NIFS R1/I-13* (BO), tree, Jan.

BORNEO. Sarawak, R. Julan, Usun Apau Plateau, alt. 1000 m: *Pickless S 3889* (SING), tree 6 m, Jan.

RIOUW. f. Lam 1925.

BANGKA. f. Lam 1925.

SUMATRA. S. E. C., Medan, alt. 20 m: *NIFS bb 31166* (A, BO, L), fl. buds Jan.

Var. *orientale* H. J. Lam — *P. obovatum* (Griffith) Engler, var. *orientale* H. J. Lam, l. c. 1925, 84, full synonymy — *P. theoidium* Elmer, l. c.

*Leaves* oblong, apex usually acuminate, sometimes obtuse or rotundate, base acute. *Pedicels* in anthesis 0.9—1.3 cm long. *Stamens* 8—12.

*Type specimen*: *Teysmann 14178* in BO.

*Distribution*: Philippines, Celebes, Sula, Buton, Muna, Amboina, Batjan, Ternate, Halmahera, Sumbawa, Aru, Flores.

SIBUYAN. Capiz prov., Mt Giting-giting: *Elmer 12525* (E, FI, L, NY, SING), fl. May, *type specimen* of *P. theoidium* Elmer.

SAMAR. Catubig river: *Ramos 24372* (K), fl. Febr.

LUZON. f. Merrill 1923.

CAMIGUIN. f. Merrill 1923.

CELEBES. Menado, Bolaang Mongondow, Poöpo, alt. 965 m: *NIFS bb 32473* (BO, L), tree 35 m, fl. buds, Sept.; ibidem, Palu, Gimpubia, alt. 400 m: *NIFS bb 17628* (BO), tree; Palopo Morante, alt. 300 m: *NIFS bb 20891* (BO, L), tree, July; Palopo Batang: *NIFS bb 20901* (BO, L), tree, July; Mamo, Posa Kalora: *NIFS bb 28725* (BO, L), Aug.; Banggai, Bomban, alt. 200 m: *NIFS bb 31839* (BO, L), juv. fr., Dec.; Minahassa: *Lam 2436* (BO, L), April; Donggala, Alindau, alt. 150 m: *NIFS bb 17639* (BO, L); Aug.; Palu Karopu, alt. 600 m: *NIFS bb 17002* (BO, L), July; ibidem, Tomado, alt. 750 m: *NIFS bb 22214* (BO, L, SING), July; without loc.: *Teysmann 14178* (BO, L), fl.

SULA. Mangoli, mountains N. of Tjapalulu, alt. 100 m: *NIFS bb 29910* (BO, L, SING) — Sanana, Fowata, alt. 150 m: *NIFS bb 28842* (BO, L), Aug.; ibidem: Fowater, Lang Way Bussa, alt. 100 m: *NIFS bb 28343* (BO, L), Aug.

MUNA. Raha, Wasalangka, alt. 10 m: *NIFS bb 21313* (BO, L), tree, Aug.; ibidem: *NIFS bb 21351* (BO, L), tree, Aug.

BUTON. Lagundi: *NIFS bb 13552* (BO), tree 25 m, March.

AMBOLINA, TERNATE, HALMAHERA, SUMBAWA. f. Lam 1923.

BATJAN. without known loc.: *Teysmann 5607a* (BO).

ARU. without known loc.: *de Sturber s.n.* (L).

FLORES. Mt Butang: *de Voogd 1794* (L), May.

2. *P. grande* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 577; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 9; Lam, l. c. 1925, 107, 414; King & Alston, Ann. Roy. Bot. Garden Peradiniya 11, 3, 1930, 293, 296, pl. 40 f. 1 — *Isonandra grandis* Thwaites, Enum., 1864, 176 — *Bassia grandis* (Thwaites) Beddome, Fl. Sylv. 2, 1869—1873, t. 254 — *Dichopsis grandis* (Thwaites) Bentham, Gen. Pl. 2, 1876, 658; Clarke in Hooker f., Fl. Br. India 3, 1882, 540.

Trees. Branchlets 2—7 mm in diam., densely dark brown tomentose, glabrescent; terminal cone broadly ovoid, up to 2 by 5 mm, tomentose, stipules ovate, c. 1.5 by 1 mm, acute at apex, whitish tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, obovate or elliptic, 12—27 by 5—13.5 cm, apex rounded, rarely short obtusely acuminate, base broadly

or narrowly cuneate, shortly decurrent; greyish puberulous above but soon glabrous, glabrous below, subcoriaceous; midrib grooved and minutely crested above, prominent and rounded below, secondary nerves 11—13 pairs, ascending at an angle of 60°—65°, curved, archingly joined, sometimes only faintly so, prominulous above, prominent below, tertiary nerves transverse but outnumbered by the reticulate nervation in between, inconspicuous above, distinct below. Petioles 1.5—2.5 cm long, flat above, rounded below but slightly flattened as well, ferruginously tomentose and rugulose below. *Flowers* in 4—7-flowered, axillary clusters on warts below the leaves, pedicels terete, thickened at apex, 1.5—2.2 cm long, ferruginously tomentose, thicker in fruit. *Sepals* lanceolate, 4—8 by 2—4 mm, apex acute, ferruginously tomentose on either side, base of inner sepals membranous and fimbriate. *Corolla* up to 13 mm long, glabrous, lobes elliptic-lanceolate, 8—10 by 2—2.5 mm, apex truncate or obtuse. *Stamens* 12, 9—12 mm long, filaments 6—8.5 mm long, glabrous except for a few hairs at the base, anthers oblong, 3.5—4 mm long, apex bifid, dehiscing extrorsely, glabrous. *Ovary* subglobose, c. 2 mm in diam., 6 celled, sparsely ferruginously hirsute. Style filiform, up to 22 mm long, glabrous. *Fruits* ovoid, 14—17 by 12—13 mm, 1-seeded, glabrous, at apex with a remnant of the style which is circularly broadened at its base, pericarp thin, glabrous; seeds incompletely known.

*Type specimen:* *Thwaites 619* in K.

*Vernacular names:* Ceylon: meeria-gass, kiripedda.

*Use:* An oil is extracted from the seeds and is used medicinally, and when fresh, for cooking (f. Thwaites).

*Ecology:* In forests at medium altitudes.

*Distribution:* Ceylon.

CEYLON. Central Provinces and Saffragam Distr., alt. 1000—2000 m: *Thwaites 619* (BO, CAL, G, K, US), fl. & fr.

3. *P. stehlinii* Christophersen, B. P. Bish. Mus. Bull. 128, 1935, 168, f. 24; Lam, *Blumea* 5, 1, 1942, 34.

Trees c. 15 m. Branchlets stout, c. 10 mm in diam., ferruginously puberulous, glabrescent; terminal cone up to 5 mm long, puberulous; stipules not seen. *Leaves* conferted at apex of branchlets, oblong-elliptic, 19—32 by 10—14.5 cm, apex obtusely acuminate, acumen up to 7 mm long, base broadly cuneate, sometimes oblique, shortly decurrent; entirely glabrous, chartaceous; midrib grooved and with 2 minute crests, prominent below, secondary nerves 10—12 pairs, ascending at an angle of c. 60°, grooved above, prominent below, curved near margin and diminishing until inconspicuous, tertiary nerves slender, transverse, distinct on either side. Petioles 3.5—6 cm, flat or grooved above, sparsely whitish puberulous or glabrous. *Flowers* in 2—3-flowered, axillary clusters or solitary, pedicels angular, 3.5—4.5 cm long, ferruginously tomentose. *Sepals* ovate-triangular, 5—6 by 3.5—4.5 mm, apex obtusely acuminate, the inner ones obtuse, ferruginously puberulous on outside but glabrous along the membranous margins and on inside. *Corolla* 12—14 mm long, glabrous, tube c. 2 mm long, lobes lanceolate, 10—12 by 3—4 mm. *Stamens* 12 (or more?), 6—7 mm long, filaments filiform, 2.5—3 mm long, glabrous, anthers oblong-ovoid,

4—5 mm long, apex acute, ferruginously hirsute, dehiscing laterally. *Ovary* ovoid, 3—5 by 2.5—3.5 mm, 6-celled, 6-lobed, pale yellowish hirsute. *Style* subulate, up to 3 cm long, grooved, glabrous or subglabrous, in the withered flowers up to 4 cm long. *Fruits* obliquely fusiform, c. 5.5 by 2.5 by 1 cm, 1-seeded, acute at apex, rounded at base, pericarp thin, fleshy, glabrous. *Seeds* fusiform, c. 3.5 by 1.5 by 0.7 cm, pointed at either end, pale orange, scar dull grey, covering about half of the seed, embryo exalbuminous, radicle short, exsert.

Type specimen: *Christophersen 3255* in BISH.

Vernacular name: ngasu (Savaii).

Use: The wood is said to be used for houseposts.

Ecology: In foothill forests at low altitude.

Distribution: Samoa (Savaii), Fiji (Vanua Levu).

SAVAII. Forest above Sili, alt. 300 m: *Christophersen 3255* (BISH, BO, L), tree 15 m, fl. Nov.; NW of Sili: *Vaupel 341* (B, L), fr. May.

FJI. Vanua Levu, Mathuata, summit ridge of Mt Numbuiloa, east of Lambasa, alt. 500—590 m, dense forest: *A. C. Smith 6508* (L, US), tree 4 m, fr. Oct./Nov.

4. *P. oxyspermum* H. J. Lam, *Blumea* 5, 1, 1942, 34, f. 7.

Trees up to 25 m. Branchlets angular, 3—5 mm in diam., glabrous, terminal cone and stipules not seen. *Leaves* scattered, ovate or elliptic, 9—15 by 4—7 cm, obtuse or obtusely acuminate at apex, base cuneate, shortly decurrent; chartaceous, glabrous on either side; midrib minutely crested above, prominent below, secondary nerves 5—7 pairs, ascending at an angle of c. 60°, curved, grooved above, prominent and angular below, diminishing until inconspicuous near margin, tertiary nerves slender, transverse, distinct on either side. Petioles 1.5—3.5 cm long, flat, minutely crested in the apical part, glabrous. *Flowers* and *fruits* unknown. *Seeds* obliquely oblong-ellipsoid, 5.8—7 by 2—2.5 cm, apex acutely rostrate and somewhat flattened, base obtuse, testa thick, woody, nitidous, scar covering almost the entire seed leaving free only a linear, 5—7 mm broad part of the testa, embryo exalbuminous, cotyledons very thick, radicle acute, inferior. Pedicel of fruit stout, 2.7—2.8 cm long, glabrous.

Type specimen: *Christophersen 2884* in L.

Ecology: In forests at medium altitudes.

Distribution: Samoa (Savaii, Upolu).

SAVAII. Le To, Salailua, in forest, alt. 750 m: *Christophersen 2884* (BISH, L), tree 25 m, fr. Oct.

UPOLU. Malololelei, alt. 700 m, forest: *Christophersen 29* (BISH, L), tree, fr. Aug., not ripe.

5. *P. abundantiflorum* H. J. Lam, l. c. 1925, 61, f. 11; Lam, l. c. 1927, 37 — *P. barnesii* (non Merrill, 1903) Merrill, *Enum. Ph. Fl. Pl.* 3, 3, 1923, 278.

Trees? Branchlets stout, blackish brown woolly, glabrescent; terminal cone c. 12 mm long, blackish brown woolly; stipules lanceolate, up to 7 by 2 mm, apex acute, greyish brown woolly on outside, glabrous on inside, caducous. *Leaves* conferted at apex of branchlets, obovate, 22—28 by 11—12.5 cm, apex rounded, base broadly truncate or cordate; glabrous above, sparsely brownish hirsute below, thin-coriaceous; midrib grooved above and minutely crested, angular below, secondary nerves 12—14 pairs,

ascending at an angle of c.  $60^\circ$ , grooved above, prominent below, straight, curved at the tips, diminishing until inconspicuous near margin of leaf, sometimes archingly joined, tertiary nerves slender, transverse, inconspicuous above, prominent below. Petioles stout, 12—15 mm long, brownish woolly pubescent. *Flowers* in 7- to many-flowered clusters, axillary, pedicels angular, 4—6 cm long, brownish woolly pubescent. *Sepals* triangular, broadly rotundate-ovate or rotundate, 3—3.5 by 2.5—3.5 mm, apex acute or acutely acuminate, greyish brown woolly on outside, glabrous on inside, inner sepals up to 4.5 by 4.5 mm, apex obtuse, margins membranous, sericeous on outside, glabrous on inside. *Corolla* up to 12 mm long, ferruginously sericeous on outside (according to *Lam glabrous*), glabrous on inside, lobes elliptic-ovate, up to 9 by 4 mm, apex acute, deflexed in flower. *Stamens* 12, c. 8 mm long, filaments filiform, broadened at base, 4—4.5 mm long, sparsely ferruginously sericeous, anthers oblong, 2—4 mm long, apex mucronate, dehiscent extrorsely, ferruginously sericeous on either side. *Ovary* globose, c. 2 by 2 mm, pale ferruginously sericeous (according to *Lam glabrous*), 6-celled. *Style* filiform, 7—15 mm long, sericeous at the base. *Fruits* unknown.

Type specimen: *Barnes 168* in PNH.

Lectotype specimen: *Barnes 168* in SING.

Distribution: Luzon.

Luzon. Bataan prov., Lamao river: *Barnes 168* (SING), fl. Jan.

6. *P. clarkeanum* King & Gamble, J. As. Soc. Bengal 74, 2, Extra Nr. 17, 1905, 191; Ridley, Fl. Mal. Pen. 2, 1923, 274; Lam, l. c. 1925, 106; Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2, 1927, 1233; Lam, l. c. 1927, 403; Heyne, l. c., ed. 3, 1, 1950, 1233; Wyatt-Smith, Research Pamphlet 4, 1954, 31 — Fig. 1.

Trees, up to 50 m. Branchlets terete, 5—12 mm in diam., brownish or ferruginously woolly when young, glabrescent; terminal cone up to 9 mm long, woolly; stipules lanceolate, up to 9 by 2.5 mm, apex acute, woolly on either side, soon caducous. *Leaves* scattered, obovate or obovate-oblong, (12—)17—25(—32) by (6.5—)10—12.5(—14.5) cm, obtuse or retuse (see, however, also under dubious specimens) at apex, base broadly cuneate, sometimes subrotundate; immature leaves scattered ferruginously woolly above, mature ones glabrous except along midrib and sometimes along secondary nerves as well, underside of leaf in all stages ferruginously woolly-tomentose, chartaceous; midrib grooved above, prominent and ribbed below, secondary nerves 17—23 pairs, ascending at an angle of  $70^\circ$ — $80^\circ$ , straight, curved at their tips only, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nervation transverse, slender, inconspicuous above, prominent below. Petioles 1.6—3.5 cm long, grooved above (and sometimes minutely crested?), rounded below with a few shallow grooves, widened at base, ferruginously woolly-tomentose. *Flowers* in 4—9-flowered, axillary clusters, pedicels angular, 3—4.5 cm long, densely ferruginously woolly-tomentose. *Sepals* ovate or ovate-rhombate, 5—7.5 by 5—6.5 mm, apex obtuse or subacute, dorsally broadly crested, ferruginously or brownish woolly-tomentose on outside, glabrous on inside, inner sepals narrowed, with membranous and glabrous margins, fimbriate. *Corolla* 12—14 mm long, glabrous except for a narrow bundle of hairs

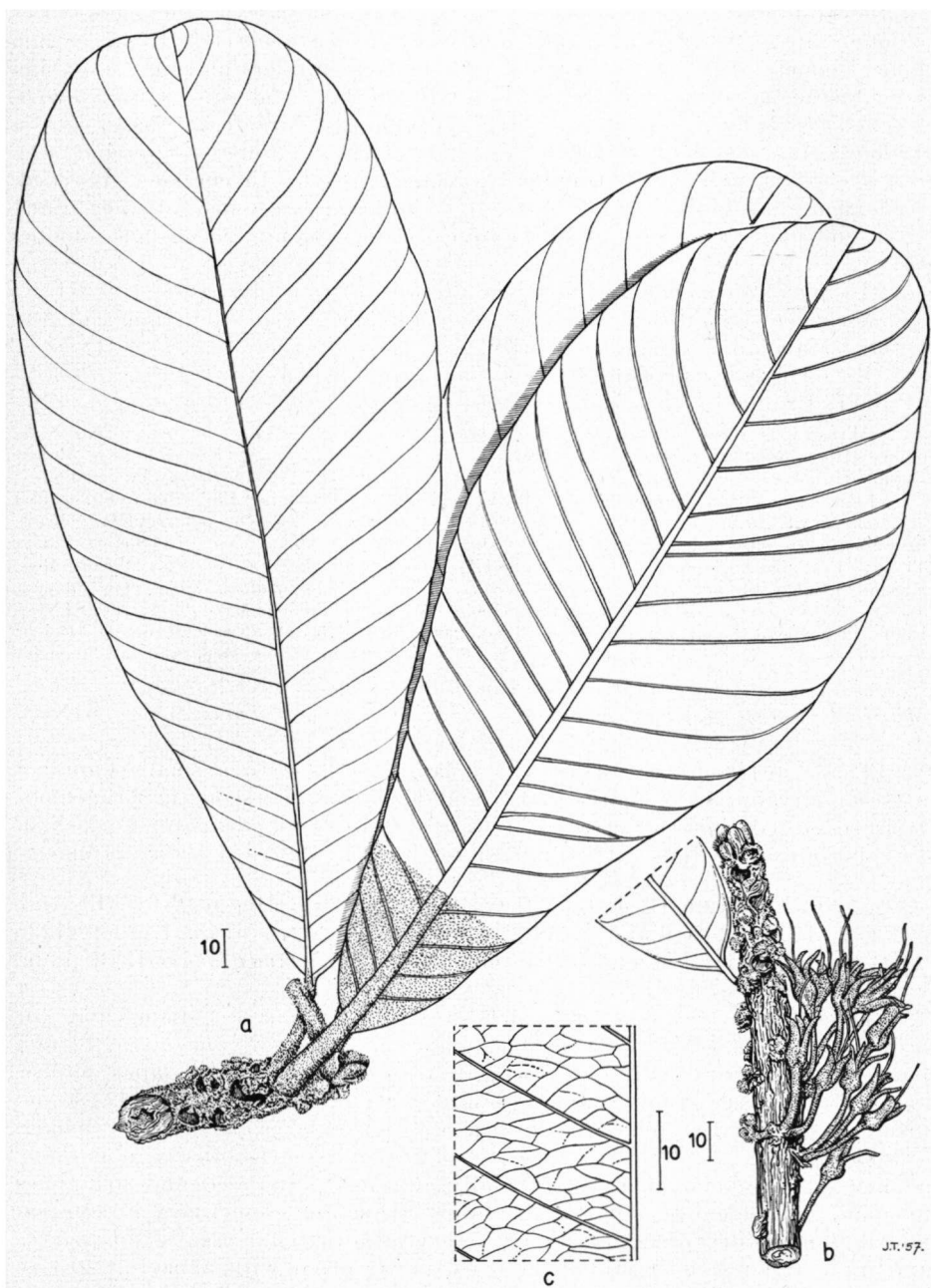


Fig. 1. *P. clarkeanum*, a. branchlet with leaves, pubescence on underside of leaves partly drawn; b. branchlet with flowers; c. tertiary nervation of leaf (*Karangan 31220*).



in the middle-line on the outside of the tube and base of the lobes, lobes oblong-elliptic, 9—10 by 2.5—3.5 mm, subobtusate. *Stamens* 12—15, 7—8 mm long, filaments filiform, 5—6 mm long, glabrous, anthers oblong, 2.5—3 mm long, acute or bifid at apex, dehiscing introrsely, glabrous. *Ovary* ovoid, 6-celled, c. 1 by 1.5 mm, sparsely ferruginously hirsute, at base with a 12-lobed disk. *Style* filiform, 11—15 mm long, glabrous. *Fruits* not seen but according to King & Gamble: "oblong, glossy, c. 5 cm long, 1-seeded, seeds acute at both ends, rounded on the back, flattened at the hilum, c. 3 cm long, testa thin, chartaceous, hilum oblong, cotyledons oblong, fleshy."

*Type specimen*: King's Collector 3796 in K.

*Vernacular names*: gëtah gëtapang, taban ketapang, nyatoh ketiar (Malayan language).

*Ecology*: Uncommon tree of lowland hill forest.

*Distribution*: Malaya.

**MALAYA.** Penang, Larut: King's Coll. 3796 (K), fr. Jan., *ex litt.* — Kedah, Bongsu For. Res.: *Karangan 31220* (KEP), tree 25 m, fl. Dec. — Kelantan, Bunga Raya: *Hamid 33415* (KEP), April — Perak, Waterfall Hill: *Wray 530* (SING); Ulu Laut Lenggong: *Hamid 10553* (KEP, SING), July; Bubu For. Res.: *Symington 30719a* (KEP), April — Pahang, Baloh For. Res.: *Lajis 6843* (KEP), Nov.; Kemansul For. Res., Temerloh: *Hamid 10582* (KEP), Sept. — Negri Sembilan, Triang For. Res.: *Mohammed 18801* (KEP), tree 40 m, fl. July; Pasoh For. Res., Kuala Pilah: *Jaamat 46073* (KEP), Febr.; Tampin Hill: *Ridley 13050* (†) (SING), Jan. — Malacca, Kuanatan, Bukit Goh For. Res.: *Ismail 17310* ((KEP, SING), Febr.; Bt Bintang Hijam For. Res.: *Kangsar 30326* (KEP), tree 20 m, fl. Febr.; Kuala Lumpur, Lig Club: *Pani 7045* (KEP), tree 20 m, fl. white, Febr.

*Dubious specimens*: *Foenander 23041* (KEP), July; *Burn-Murdock 10821* (KEP); *Kehding 126* (FI), Dec.; *Corner 25554* (SING), June.

These specimens are sterile, have large leaves with a smaller number of secondary nerves, acuminate tips and long internodes on the branchlets. It is suspected that they represent watersprouts, and owing to the lack of flowers and fruits it is difficult to state the true status of these specimens.

7. *P. hispidum* H. J. Lam, l. c. 1925, 63, f. 12; Heyne, Nutt. Pl. Ind. ed. 2, 2, 1927, 1236; Lam, l. c. 1927, 400; Heyne, l. c., ed. 3, 1, 1950, 1236 — *P. hispidum* H. J. Lam, var. *typicum* and var. *grandiflorum* H. J. Lam, l. c. 1925, 65; idem, l. c. 1927, 400.

Trees, up to 50 m. Branchlets terete, 5—8 mm in diam., pale or brown yellowish woolly hirsute, soon glabrous; terminal cone up to 12 mm long, woolly hirsute; stipules lanceolate, up to 12 by 5 mm, apex obtuse, pale or yellowish brown woolly-hirsute on outside, ferruginously so on inside. *Leaves* subconferted near apex of branchlets, ovate or ovate-oblong, or subovate, 12—27 by 5—13 cm, apex obtuse and short obtusely acuminate, acumen up to 5 mm long, base broadly cuneate to rounded and sometimes unequal, almost not decurrent; glabrous above but sometimes hirsute on midrib, underside ferruginously or yellowish hirsute, denser so on nerves and midrib, coriaceous; midrib grooved above, often with a narrow groove in the middle of the larger groove, prominent and rounded below, secondary nerves slender, 20—28 pairs, ascending at an angle of c. 50°, in the basal part up to 90°, slightly curved or straight and curved at their tips only,

diminishing until inconspicuous near margin, or subarchingly joined by thickened tertiary nerves, minutely grooved above, prominent below, tertiary nerves slender, transverse, inconspicuous above and often grooved, more distinct below and prominulous. Petioles 2—4.5 cm long, narrowly grooved above, densely yellowish or brownish hirsute. *Flowers* in 7—25-flowered, axillary clusters, pedicels 2—4 cm long, in fruit usually stouter but not prolonged, densely hirsute. *Sepals* ovate, triangular, or subelliptic, 4.5—10 by 5—8 mm, apex subacute, obtuse or rounded, ferruginously tomentose on outside, glabrous on inside, outer sepals sometimes dorsally slightly crested, inner sepals more rotundate, with membranous and fimbriate margins. *Corolla* 7—18 mm long, ferruginously sericeous on the tube and the base of the lobes only, for the rest glabrous, lobes broadly elliptic or ovate, 5—14.5 by 3.5—4.5 mm, apex rounded, fimbriate. *Stamens* 12, entirely glabrous, 4.5—5.5 mm long, filaments filiform, angular, 2.5—3 mm long, anthers oblong, 3—3.5 mm long, apex bifid, dehiscing extrorsely. *Ovary* ovoid, c. 2 by 2 mm, 6-celled, yellowish or brownish hirsute. Style filiform, angular, up to 10 mm long, in fruit 20—30 mm long, glabrous. *Fruits* globose or ellipsoid, 20—25 by 12—20 mm, 1- or 2-seeded, apex rounded or obtuse, often with a short remnant of the style, pericarp hard-fleshy, glabrous. Seeds ovoid, 15—18 by 10—12 mm, laterally flattened in the 2-seeded fruits, apex obtuse, base subacute, testa cartilaginous, yellowish brown, nitidous, scar covering slightly more than  $\frac{1}{3}$  of the surface of seed, brownish, dull, embryo exalbuminous, radicle subexsert.

Lectotype specimen: *van Delden s.n.* in L.

Vernacular names: Perak: nyatoh; Selangor: mersokong; Malacca: nyatoh tembaga; Sumatra: majang sërikat; Borneo: nyatog puang.

Ecology: In primary rainforests at low altitudes.

Distribution: Sumatra, Malaya, Borneo.

SUMATRA. Sumatra East Coast, Langkat: *Heyne 891* (BO).

MALAYA. Selangor, Kuala Lumpur, Bukit Kubu Res., K. Kubu: *Browne 14364* (KEP), tree 50 m, April, buttressed; ibidem, Subang For. Res.: *KEP 64964* (KEP), March (*dubious specimen*); Ulu Zangat For. Res., low ridge, 200 m: *KEP 71333* (KEP), tree 40 m, Aug.; Kepong, edge of jungle, alt. 130 m: *KEP 56317* (KEP), tree 7 m; Ulu Langat, Sungai Latang For. Res.: *KEP 53603* (KEP), tree, Aug. — Pahang, Bintong, Lintang For. Res., alt. 160 m: *KEP 57904* (KEP), tree 40 m, Nov.; Kuala Lipis: *van Delden s.n.* (BO, L), fl. & fr. Febr. — Kedah, Kokmoi For. Res.: *KEP 47847* (KEP), tree 25 m, fr. Aug.; Poto Tirie: *Curtis s.n.* (SING), very large tree, juv. fr. Sept. — Malacca, Sungai Udang Res.: *CF 2009* (SING), fr. Aug. — Kemaman, Bukit Kajang, alt. 160 m: *Corner SF 30592* (SING), fl. fr. Nov.

BORNEO, Sarawak, without loc.: *Foxworthy 499* (BO), fl. white, July, type specimen of *var. grandiflorum* H. J. Lam.

8. *P. beccarianum* (Pierre) van Royen, *Blumea* 8, 2, 1957, 424 — *Croixia beccariana* Pierre, *Not. bot. Sapot.*, 1890, 33 — *Planchonella beccariana* (Pierre) H. J. Lam, l. c. 1925, 216; Lam, l. c. 1927, 382, 475 — *Planchonella pierreana* Dubard, *Ann. Mus. col. Mars.* 20, 1912, 60 — *Palaquium ferox* H. J. Lam, l. c. 1925, 70, 256, f. 17; Lam l. c. 1927, 401.

Trees, c. 20 m. Branchlets stout, irregularly terete by the numerous leaf-scars, 8—17 mm in diam., densely reddish brown or blackish woolly or hirsute; terminal cone up to 18 by 12 mm, densely woolly or hirsute; stipules lanceolate-oblong, up to 2.5 by 1 mm, apex obtuse, woolly on

outside, glabrous on inside, very soon caducous. *Leaves* oblanceolate, but usually obovate-oblong or obovate, 12—30(—37) by 4—9(—14) cm, apex rounded and acutely or obtusely acuminate, acumen up to 8 mm long, base narrowly acute to subrotundate, not decurrent; coriaceous, glabrous above, densely light or dark brownish or ferruginously woolly or hirsute below, very rarely subglabrous below; midrib grooved above and minutely crested, prominent and rounded below, secondary nerves (21—)28—35 pairs, ascending at an angle of 50°—70°, straight or slightly curved, archingly joined near margin, grooved above and markedly prominent below, the arches between the nerves also grooved above and distinctly prominent below, tertiary nerves transverse, grooved above, prominent below but there often covered by the dense pubescence. Petioles 1—4.5 cm long, densely dark greyish, light brownish, or light or dark ferruginously woolly, grooved above but the groove hidden by the pubescence. *Flowers* in 5—8-flowered, axillary clusters, pedicels angular, 5—9 mm long, in fruit up to 25 mm long, ferruginously or greyish woolly or hirsute. *Sepals* ovate-oblong, ovate or lanceolate, 3.5—5 by 3—4.5 mm, in fruit up to 6 by 5 mm, apex of outer sepals obtuse, the inner ones with acute apex, woolly on outside, glabrous on inside. *Corolla* 8—10 mm long, glabrous except ferruginously tomentose on the outside in the middle-lines of the lobes, the latter ovate to elliptic, 5—6.5 by 2—3 mm, apex obtuse. *Stamens* (10—)12, glabrous, 7—10 mm long, filaments filiform, 6—8 mm long, anthers narrowly ovoid, 2—2.5 mm long. *Ovary* discoid-conoid, c. 1 by 1.5 mm, 6-celled, glabrous. Style subulate, 14—18 mm long, glabrous. *Fruits* ellipsoid, 2.5—3 by 1.5—1.8 cm, apex obtuse, 1-seeded, pericarp fleshy, glabrous. Seeds ellipsoid to subglobose, sometimes laterally compressed, 2—2.5 by 1.4—1.8 by 1—1.3 cm, mucronate at apex, obtusely acuminate at base, testa thin, blackish, nitidous, scar covering about half of the seed, dull greyish, embryo exalbuminous or with a slight remnant of it at its base, radicle exsert.

Type specimen: *Beccari 4069* in P.

Vernacular names: asam babi, asam megkujut, bindjai babi, karikit, njato, njatu tingang, puntik, tengkawang.

Distribution: Borneo.

Sandakan. Sepilok, primary forest, low alt.: *Agama A 1809* (K, KEP, L, SING), tree 20 m, Sept., buttresses low and sharp; ibidem: *Agama SAN 17670* (L, SAN), tree, fl. May; ibidem, lowland forest: *Sinclair c.s. 9319* (L, SAN), tree, June — Sarawak, without loc.: *Beccari 783* (P), fr. Nov.; Mattang: *Beccari 4069* (FI, P), fr. Dec.; Kuching: *Beccari 34* (FI) — W. Borneo, Sintau, near Bungkung, B. Saguk, alt. 150 m: *NIFS bb 32289* (BO, L), May; Sungei Kuwatan, alt. 25 m: *NIFS bb 2610* (BO, L), April — S. W. Borneo, East Kutai, low hills, alt. 40 m, sandy soil: *Kostermans 7244* (BO, L), tree 20 m, fr. green, June; Martapura, Bantau Balai, alt. 50 m: *NIFS bb 8208* (BO, L), March; Martapura, Djungur: *NIFS bb 10410* (BO, L), Sept. — S. E. Borneo, Loa Djanan, west of Samarinda, alt. 30 m, ridge with sandy loamy soil: *Kostermans 6714* (BO, L), tree 20 m, fr. green, April, white latex; Sepaku near Balikpapan: *NIFS bb 24644* (BO, L), June; Sungei Menubar, alt. 10 m: *Kostermans 5401* (BO, L), tree 16 m, June; Bulungan, Nunukan, alt. 3 m: *NIFS bb 26142* (BO, L), June; ibidem: *NIFS bb 29316* (BO, L), May; Long Bleh, Sei Sentakan, alt. 50 m: *NIFS bb 29599* (BO, L), Oct.; Berau Damaring, alt. 50 m: *NIFS bb 13818* (BO, L), May; Tidung Lands, alt. 15 m: *NIFS bb 17801* (BO, L), Aug.; Palawan, alt. 75 m: *NIFS bb 11908* (BO, L), Sept.; Sebulu, alt. 20 m: *NIFS bb 15795* (BO, L), Oct.; Kophiang: *van Romburgh 36* (BO, L), Sept.; Kutai, Sungei Tapiandobang: *NIFS bb 12568* (BO, L), June; Purutjahu, Muara Djaem, alt. 100 m: *NIFS bb 10480* (BO, L), Oct.; Sabintulung: *NIFS bb 15849* (BO, L), Oct. — E. Borneo, without

loc.: *Teysmann s.n.* (BO, L), type specimen of *Planchonella pierreana* Dubard and *Palaquium ferox* H. J. Lam.

**Remark.** Lam's supposition that *P. sambasense* might be synonymous to *P. ferox* (= *P. beccarianum*) is hardly justified as the two species differ in the number of secondary nerves which is 16—20 pairs in the former and 30—35 pairs in the latter and in the ferruginous pubescence of the lower side of the leaves in *P. ferox* against the brownish pubescence in *P. sambasense*.

9. *P. montanum* Elmer, Leafl. Phil. Bot. 8, 1919, 3102; Merrill, Enum. Phil. Fl. Pl. 3, 1923, 281; Lam, l. c. 1925, 59; Lam, l. c. 1927, 400.

Trees. Branchlets stout, 2.5 mm in diam., greyish ferruginously sericeous, glabrescent; terminal cone up to 10 mm long, greyish sericeous; stipules lanceolate, up to 6 by 2 mm, apex acute or acuminate, pubescent on outside, glabrous on inside. *Leaves* conferted at apex of branchlets, obovate-oblong or oblong, 8.5—16 by 3.5—6 cm, apex rounded to subacutely acuminate, acumen up to 3 mm long, base rounded to truncate; glabrous above, brownish or greyish velutinous below, rigidly coriaceous; midrib minutely crested above, prominent and rounded below, secondary nerves 10—13 pairs, ascending at an angle of 55°—65°, slightly curved, diminishing until inconspicuous near margins of leaf, prominulous and grooved above, prominent below, tertiary nerves very slender, transverse, inconspicuous on either side. Petioles stout, 5—10 mm long, flat above, pale greyish brown tomentose. *Flowers* solitary or in 2—4-flowered clusters, axillary, pedicels angular, 12—30 mm long, pale cinnamomously sericeous. *Sepals* triangular, 3—4 by 2—3 mm, outer sepals subacute or obtuse at apex, inner sepals acute at apex and with membranous margins, greyish cinnamomous on outside, glabrous on inside. *Corolla* not seen, but according to Elmer lobes nearly twice as long as the calyx, obovately oblong, apex obtuse or obtusely rounded, narrowed towards the base or subclawed, 4 mm wide, glabrous. *Stamens* not seen, but according to Elmer 10—12, filaments 2—3 mm long, anthers at least as long as the filaments, large, compressed, ovately elongate, 1 mm wide, the connective thick and extended into a minute point, laterally dehiscent. *Ovary* ovoidly globose or conoid, c. 2 by 2.5 mm, 6-celled, glabrous. Style stout, up to 11 mm long, glabrous. *Fruits* ellipsoid to obovoid, c. 3.5 by 2 cm, 1-seeded, apex rounded, pericarp fleshy, glabrous. Seeds incompletely known, probably fusiform, c. 2.5 by 0.8 cm, blackish, dull, scar probably covering half the seed.

Type specimen: *Elmer 17189* in PNH.

Lectotype specimen: *Elmer 17178* in L.

Ecology: In mossy forests at c. 1100 m altitude.

Distribution: Luzon, Mindanao.

LUZON. Laguna prov., Mt Maquiling: *Elmer 17189* (FI, G, L, NY, S), fl. & fr. June; ibidem: *Baker 2872* (f. Merrill).

MINDANAO. Davao prov., Mt Apo: *Elmer 11816* (BO, E, FI, G, L), fl. Sept.

**Remark.** This species closely resembles *P. lisophyllum*.

10. *P. sericeum* H. J. Lam, l. c. 1925, 53, f. 9; Lam, l. c. 1927, 399. Trees? Branchlets slender, 1—3 mm in diam., ferruginously or greyish

sericeous or tomentose; terminal cone up to 5 mm long, dark brown ferruginously woolly; stipules linear, up to 9 by 2 mm, acuminate-acute, ferruginously pubescent on outside, glabrous on inside, persisting, but in the oldest leaves absent. *Leaves* scattered, oblong to obovate, (13—)18—24(—31) by (5—)6.5—12.5 cm, apex acutely or obtusely acuminate and sometimes emarginate, base rounded, sometimes slightly oblique; pale ferruginously sericeous above when young, mature glabrous above, minutely pale golden-coloured to silvery sericeous-tomentose below, but slightly darker on the nerves, subchartaceous; midrib grooved above, prominent and angular or rounded below, secondary nerves (13—)17—24(—27) pairs, ascending at an angle of 50°—60°, slightly curved or straight and curved at tips only, diminishing until inconspicuous near margin, near apex of leaf sometimes archingly joined, impressed above, prominent below, tertiary nerves transverse, hardly visible above, inconspicuous below. *Petioles* stout, 5—12 mm long, flat above, pale ferruginously tomentose. *Flowers* in (2—)7—10-flowered clusters, sometimes in 2 groups, axillary, pedicels angular, 1.5—2.7 cm, in fruit up to 4 cm long, ferruginously appressedly tomentose. *Sepals* deltoid or ovate, 2.5—4.5 by 2—3 mm, apex of outer sepals acute, of inner sepals acute, obtuse or rounded, ferruginously tomentose on outside, glabrous on inside, inner sepals with membranous and scarious margins, whitish or pale ferruginously tomentose on outside, glabrous on inside. *Corolla* 6—9 mm long, in bud glabrous except for a few hairs in the middle-line of the outside and the apex of the lobes, tube 1.5—3 mm, lobes ovate-lanceolate, 4.5—6 by 1.5—2.5 mm, apex subobtuse. *Stamens* 12, glabrous, filaments subulate, angular, up to 0.6 mm long, glabrous, anthers sagittate, 2.5—3.5 mm long, apex long acutely acuminate, glabrous, sometimes bifid, outer stamens dehiscing extrorsely, the inner whorl introrsely. *Ovary* conoid, c. 1 by 2 mm, sparsely ferruginously tomentose, gradually tapering into the glabrous, filiform, up to 8 mm long style. *Fruits* globose, c. 1 cm in diam., or ellipsoid, sometimes oblique and then up to 2.6 by 1.6 cm large, sparsely pubescent but finally glabrous. Seeds unknown.

Type specimen: *Jaheri 716* in BO.

Distribution: Borneo.

Var. *sericeum* — *P. sericeum* H. J. Lam, var. *acutocalyx* H. J. Lam, l. c. 1925, 55, f. 9, a—f.

*Leaves* 24—41 by 6.5—10.5 cm. *Petioles* 1.1—1.2 cm long. Secondary nerves 24—27 pairs. *Pedicels* 1.6—2 cm long, in fruit 3—4 cm long. Inner and outer whorl of sepals acute. *Corolla* 7.5—9 mm long.

Type specimen: *Jaheri 716* in BO.

Ecology: In primary and secondary forests at low altitudes.

Distribution: Borneo.

BORNEO. Sarawak, Rejang: *Haviland 2030* (BM, K, SING), fl. March; Hutan Merit: *Daud & Tachun 35705* (SAB, SING), tree 8 m, fr. Aug., green; Sungei Tau, alt. 100 m, secondary forest: *Purseglove P 5423* (L, SING), tree 8 m, fl. June — Indonesian Borneo, Bloeloe: *Jaheri 716* (PO), fl. & fr.; Sungaibunai: *Jaheri 1321* (BO), fl.; Sungaimagne: *Jaheri 1573* (BO), fl.

Var. *obtusocalyx* H. J. Lam — *P. sericeum* H. J. Lam, var. *obtusocalyx* H. J. Lam, l. c. 1925, 55, f. 9, g—h.

*Leaves* c. 18 by 8.5 cm. *Petioles* 5—9 mm. Secondary nerves (14—)

17—18 pairs. Pedicels 2—2.7 cm. Outer whorl of sepals acute, those of the inner whorl obtuse. Corolla c. 7.5 mm.

Type specimen: *Haviland & Hose 624* in BO.

Ecology: In forests at low altitudes.

Distribution: Borneo.

BORNEO. Sandakan, Miri: *Haviland & Hose 624* (BM, BO), fl. April; Kapit, Upper Rejang river: *Clemens & Clemens 21114* (BO), tree 5 m; Gat, Upper Rejang river: *Clemens & Clemens 21534* (BO), tree, fl. — Indonesian Borneo, Sepan: *NIFS bb 26381* (BO, L, SING), fl. Nov.

11. *P. elegans* K. Griffioen & H. J. Lam, n. sp. — Fig. 2.

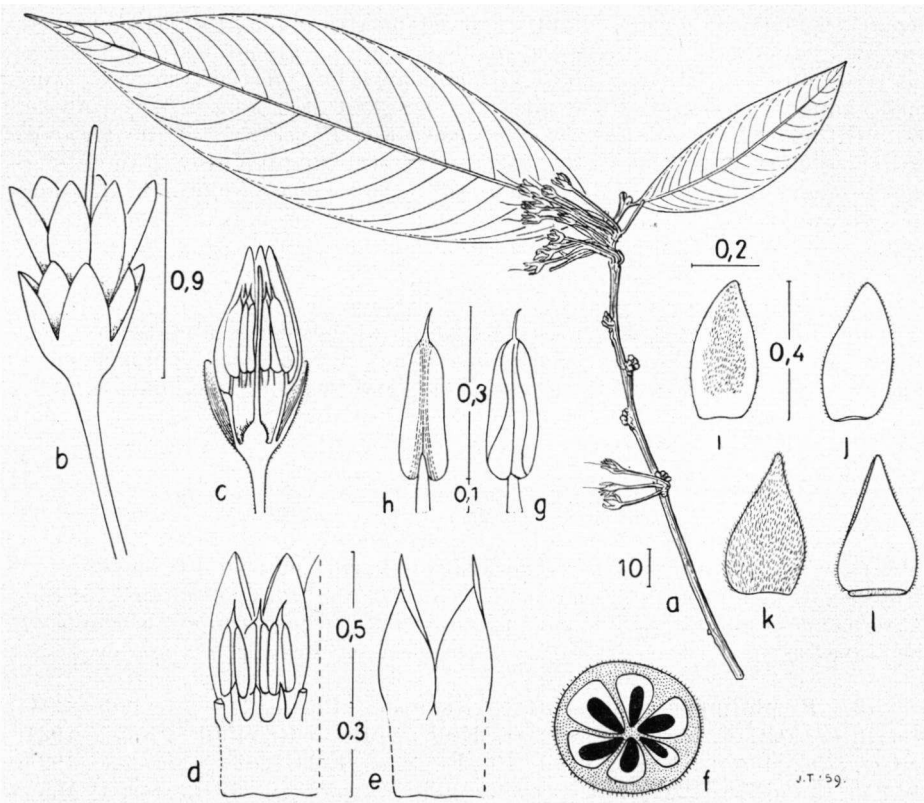


Fig. 2. *P. elegans*, a. branchlet with leaves and flowers; b. flower; c. flower, opened; d. part of corolla, inside; e. part of corolla, outside; f. transverse section of ovary; g-h. stamens; i. inner sepal, outside; j. inner sepal, inside; k. outer sepal, outside; l. outer sepal, inside (*Haviland 898/801*).

Arbor parva. Ramuli graciles, ferrugineo-sericei, glabrescentes; stipulae lanceolatae, acutae, caducae. Folia anguste elliptica, 13—17 × 4—6 cm, longe acute acuminata, utroque latere cinnamomeo subsericeo-tomentosa, sed maturate supra glabra. Nervi secundarii utroque latere 17—19, sursum evanescentes, tertiarii transversi. Petiolus 0.4—0.6 cm longus, ferrugineo-lanato-tomentosus. Pedicellus 1.5—2 cm longus, pallide ferru-

gineo-subsericeo-tomentosus. Sepala 6, extus ferrugineo-subsericeo-tomentosa, intus glabra. Corolla glabra. Stamina 12, glabra. Ovarium 6-loculare, pallide cinnamomeo-tomentosum; stylus glaber. Fructus ignotus. Typus: *Haviland 898/901* in L.

Small trees. Branchlets slender, 2—2.5 mm in diam., ferruginously sericeous, glabrescent; terminal cone up to 3 mm long, ferruginously puberulous; stipules lanceolate, c. 2 by 0.5 mm, apex acute, pubescent on either side, caducous. *Leaves* subconferted at apex of branchlets, narrowly elliptic, 13—17 by 4—6 cm, apex long acutely acuminate, acumen up to 2 cm long, base rounded to broadly cuneate, almost not decurrent along adaxial side of petiole; juvenile ones cinnamomous sericeous-tomentose on either side, mature ones glabrous above, thin-coriaceous; midrib grooved above, prominent and rounded below, secondary nerves 17—19 pairs, ascending at an angle of c. 50°, slightly curved or straight and curved at their tips only, diminishing until inconspicuous near margin of leaf, inconspicuous and minutely grooved above, prominent below, tertiary nerves transverse, hardly visible on either side. Petioles 4—6 mm long, grooved above, rounded below, ferruginously woolly-tomentose. *Flowers* in 3—10-flowered, axillary clusters, sometimes in 2 fascicles, pedicels angular, 15—20 mm long, pale ferruginously appressedly tomentose. *Sepals* lanceolate, c. 4 by 1.8 mm, apex acute, ferruginously appressedly tomentose on outside, glabrous on inside, inner sepals with membranous and glabrous margins. *Corolla* 8—9 mm long, glabrous on either side, lobes ovate-elliptic, c. 6.5 by 2 mm, apex acute. *Stamens* 12, glabrous, filaments subulate, c. 1 mm long, anthers ovoid-oblong, c. 3 mm long, rounded and aristulate at apex, dehiscing lateral-extrorsely. *Ovary* ovoid to globose, c. 1 mm in diam., 6-celled, pale cinnamomous tomentose. Style filiform, 9—10 mm long, glabrous. *Fruits* unknown.

Type specimen: *Haviland 898/801* in L.

Distribution: Borneo.

BORNEO. Sarawak, Rejang, Sibuan: *Haviland 898/801* (L), fl.

Remarks. This species is related to *P. calophyllum*, *P. quercifolium* and *P. sericeum*. It differs from *P. calophyllum* by the narrower and longer flowers, while the leaf-base is round against sharply cuneate. From *P. quercifolium* it differs in its smaller leaves and the round leaf-base. From *P. sericeum* it differs by its golden-brown pubescence of the lower side of the leaves as in *P. sericeum* this pubescence is greyish or ferruginous.

12. *P. philippense* (Perrottet) Robinson, Phil. J. Sc. 3, 1908, 304; Merrill, Sp. Blancoanae, 1918, 300; Brown, Minor Pr. Phil. For. 2, 1921, 168, f. 79; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 282; Lam, l. c. 1925, 59, 255; Lam, l. c. 1927, 400 — *Chrysophyllum philippense* Perrottet, Mém. Soc. Linn. Paris 3, 1824, 109 — *C. macrophyllum* Desfontaines, Cat. Hort. Par., ed. 3, 1829, 132, 398 — *Palaquium latifolium* Blanco, Fl. Fil., ed. 1, 1837, 404; idem, ed. 2, 1845, 282; idem, ed. 3, 2, 1878, 159; Vidal, Sinopsis Atlas-1883, 31, t. 62, f. B; Vidal, Rev. Pl. Vasc. Filip., 1886, 176; Merrill, For. Bur. Bull. 1, 1903, 46; Merrill, Bur. Gvt. Lab. Publ. 6, 1904, 14; idem, 27, 1905, 57; idem, Phil. J. Sc. 1, 1906, Suppl., 114 — *P. oleiferum* Blanco, l. c., ed. 1, 1837, 405; idem, ed. 2, 1845, 283; idem, ed. 3, 2, 1878, 160; Merrill, l. c. 1904, 14; Merrill, Bur. Gvt. Lab. Publ. 27, 1905, 57; idem, Phil. J. Sc. 1, 1906, Suppl., 114; Dubard, Bull. Mus. Hist. nat. 15,

1909, 383 — *Chrysophyllum grandifolium* Steudel, Nomencl., ed. 2, 1, 1840, 359; DC, Prodr. 8, 1844, 163; Miquel, Fl. Ind. Bat. 2, 1859, 1035; F.-Vill., Nov. App., 1880, 124 — ? *Bassia blancoi* DC, l. c. 1884, 199 — ? *B. oleifera* DC, l. c. 1844, 199 — *Dichopsis latifolia* F.-Vill., Nov. App., 1880, 124 — *D. oleifera* F.-Vill., l. c. 1880, 125 — *Palaquium aureum* Elmer, msc. — Fig. 3.

Trees, up to 25 m. Branchlets irregularly terete by the numerous scars, 5–12 mm in diam., greyish, yellowish, brown or ferruginously tomentose or sericeous as are lower side of leaves, pedicels, petioles and outside of calyx, branchlets ultimately glabrous; terminal cone 7–15 mm long, tomentose; stipules lanceolate, 6–8 by 1.5–3 mm, apex acute, tomentose on outside, glabrous on inside and along outside of margin, often crested on outside, caducous. *Leaves* subconferted at apex of branchlets, obovate, obovate-oblong, spatulate, or subelliptic, 17–37 by 6–10 cm, apex obtuse and usually acutely, sometimes obtusely acuminate, acumen up to 10 mm long, or sometimes acute, base rounded, sometimes broadly cuneate, very shortly decurrent but apparently very longly decurrent along adaxial side of the petioles with 2 walls; glabrous above but sometimes pubescent in basal part of midrib, sericeous below, thinly coriaceous; midrib grooved and minutely crested above, prominent and angular below, secondary nerves 10–16 pairs, ascending at an angle of c. 50°, straight, curved or slightly S-shaped, curved at their tips, diminishing until inconspicuous near margin, prominulous above and often grooved, prominent below, tertiary nerves transverse, slender, inconspicuous on either side, below very indistinct by the dense pubescence. Petioles stout, 7–22 mm long, flat and with 2 crests above, angular below, tomentose. *Flowers* in 4–7-flowered, axillary clusters, pedicels angular, 13–45 mm long, in fruit stouter only. *Sepals* elliptic-ovate or broadly ovate, 3.5–4.5 by 4–5 mm, apex obtuse, the inner sepals with rounded apex, ferruginously sericeous-tomentose on outside, glabrous on inside, inner sepals with membranous and fimbriate margins and tomentose on outside in a small triangular-lanceolate central area only. *Corolla* 9–16 mm long, sparsely ferruginously sericeous on the tube in epipetalous lines, lobes elliptic-oblong, 7–11 by 3–5 mm, apex obtuse, rounded or truncate. *Stamens* 12–18, entirely glabrous, filaments filiform, angular, 3.5–4.5 mm long, anthers elliptic-oblong, 3.5–4 mm long, apex rounded and mucronate, dehiscent extrorsely lateral. *Ovary* ovoid, c. 1.5 by 2 mm, 6-celled, 12-lobed at base, glabrous. Style filiform, 10–22 mm long, glabrous. *Fruits* ellipsoid or subovoid, up to 3 by 2 cm, with the marcescent style at the rounded apex, one-seeded (always?), glabrous. Seeds unknown.

Type specimen: *Perrottet s.n.* in P.

Vernacular names: agrado (Bagóbo language); nato-pulá (Bikol language); araka (Ibanág language); dalákan, darákan (Ilóko language); apaka-paka bitok (Negrito language); alakáak, alákau, malasaputi, pakankal, palak-pálak (Pampáangan language); manogtalí-sai (Panay Bisáya language); pakaran (Pangasinán language); tagogong (Sambáli language); agas, alakáak-na-pulá, alákap, dolítan, dolítan-taklóban, manimparog, palak-pálak (Tagalog language).

Ecology: Common in primary forests at low and medium altitudes.



**Distribution:** Philippines (Luzon, Leyte, Mindoro, Panay, Negros, Mindanao).

**LUZON.** Sorsogon prov., Mt. Bulusan: *Elmer 15775* (BO, FI, G, L, NY, S), fr. April, 'type' of *P. aureum* Elmer, msc; ibidem: *Vidal 1560* (FI, L), April; Albay: *Curran 10613* (L), June; Manila prov., Malacañang Palace: *Sulit 5251* (L, PNH), tree 12 m, fl. March; Manila: *Perrottet s.n.* (P), fl.; Tayabas prov., Pagbalao: *Merrill 1919* (SING), fl. April; Rizal prov.: *Ahern's Collector 3250* (BO, SING), fl. Aug.; ibidem: *Ahern's Collector 3350* (GEN), fl. Sept.; Bosoboso: *Ahern's Collector 1853* (BO, SING), fl. Sept.; Antipolo: *Merrill Species Blancoana 662* (BO, L), June; ibidem: *Merrill Species Blancoana 934* (BO, L), June; San Mateo: *Ahern's Collector 1109* (BM), fr. May; ibidem: *Vidal 1564* (MA), fl. buds; Bataan prov., Lamao river: *Barnes 131* (SING), fl. Jan.; Bulacan prov., Angat: *Aguilar 11186* (SING), March/April; Batangas prov., Mt Makiling: *Baker 2216* (SING), fl. Dec.; ibidem: *Baker 2872* (SING), fl. Febr.; Camarines Sur prov., Mt Yearog: *Edaño 76237* (SING), fl. Dec.; Mt Bagacay: *Ramos & Edaño 33914* (K), fl. Nov.-Dec.; Tarlac prov., Concepcion: *Merrill 3617* (L), fl. Nov.; without loc.: *Beñlo 19261* (L), fl. Dec.; ibidem: *Loher 6564* (BO).

**LEYTE.** Ormoc, Lake Danao: *Edaño 11909* (L, PNH), tree 12 m, fl. March.

**MINDORO.** Mt Calavite: *Ramos 39449* (K), fr. April.

**PANAY.** Capiz prov.: *Edaño 45990* (BO, SING), fl. Oct./Nov.

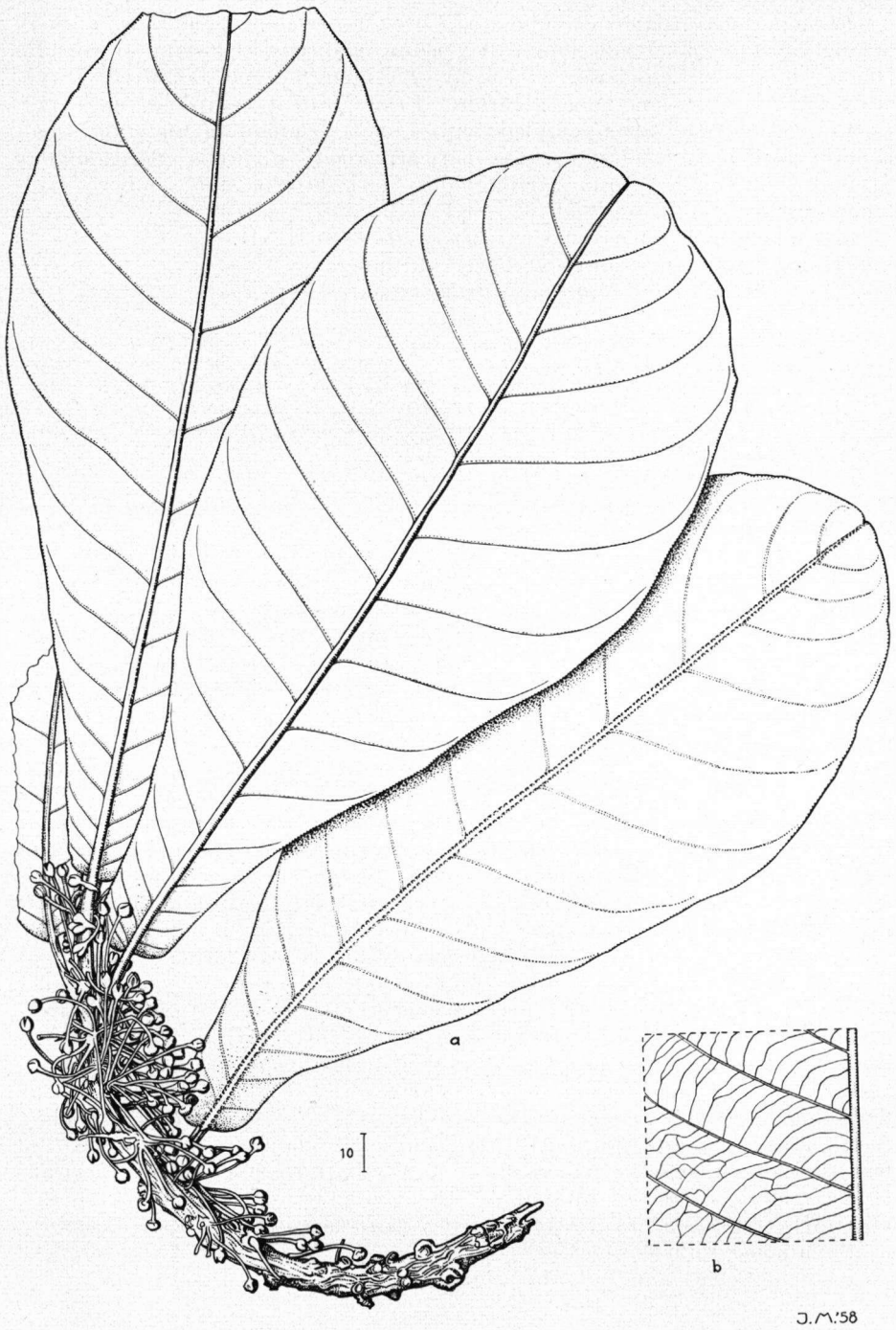
**MINDANAO, NEGROS,** f. Merrill 1923, 282 and Lam 1925, 59.

**Remark.** *Elmer 11816* (f. Lam 1925, 59) is excluded as it represents *P. montanum* Elmer.

**13. *P. sorsogonense*** Elmer ex Lam, l. c. 1925, 65, f. 13; Lam l. c. 1927, 401.

Trees, c. 10 m. Branchlets slender, 3—6 mm in diam., brownish woolly hirsute, glabrescent; terminal cone up to 7 mm long, woolly hirsute; stipules broadly ovate, c. 7 by 6 mm, apex obtuse, crested, ferruginously woolly hirsute on outside but glabrous and cartilaginous along the margins, glabrous on inside. *Leaves* conferted at apex of branchlets, obovate or pandurate, 16—25(—31) by 7—12(—16) cm, apex rounded and acutely acuminate, acumen up to 6 mm long, base broadly to narrowly cuneate or rounded to subtruncate; glabrous above except in the basal part of the midrib, sparsely brownish woolly hirsute below, denser so on nerves and midrib, chartaceous to thin-coriaceous; midrib grooved above, sometimes minutely crested as well, prominent and rounded below, secondary nerves 15—18 pairs, ascending at an angle of c. 60°, straight, curved at their tips, diminishing until inconspicuous near margin of leaf, prominulous and slightly grooved above, prominent below, tertiary nerves slender, transverse, prominulous on either side. Petioles stout, 9—15 mm long, brownish or ferruginously woolly, grooved above, angular or ribbed below. *Flowers* in 3—5-flowered clusters, pedicels angular, (3—)7—25 mm, brownish or ferruginously woolly. Outer *sepals* triangular-ovate, 5—6.5 by 4—5.5 mm, apex acute, crested, ferruginously or greyish brown hirsute on outside, glabrous on inside, inner sepals elliptic-obovate, 5—7 by 4.5—6 mm, apex rounded, crested, glabrous on outside and on inside except for a crested, narrow, linear patch in the basal part, margins membranous. *Corolla* 7—12 mm long, glabrous, lobes lanceolate-ovate, 9—12 by 1.5—3 mm, apex obtuse or truncate. *Stamens* 18,

Fig. 3. *P. philippense*, a. branchlet with leaves and flowerbuds; b. tertiary nervation of leaf (*Edaño 45990*).



5—7.5 mm long, filaments subulate, 1.5—2.5 mm long, glabrous, anthers oblong-sagittate, 4—5 mm long, apex acute, glabrous, dehiscing introrsely. *Ovary* depressedly globose, c. 1.5 by 2.5 mm, 6-celled, glabrous. Style filiform, up to 11 mm long, glabrous. *Fruits* broadly ellipsoid, up to 1.8 by 1.5 cm, 1-seeded, apex rounded, with a short remnant of the style which is starshaped broadened at its base, pericarp woody, glabrous. Seeds similar to fruit but smaller, testa cartilaginous, dark brown, dull, embryo exalbuminous.

Lectotype specimen: *Elmer 16714* in PNH.

Ecology: In swamps at lower altitudes.

Distribution: Luzon, Biliran, Samar, Leyte.

LUZON. Sorsogon prov., Mt Bulusan: *Elmer 16714* (FI, G, L, NY, S), fl. July; Cagayan prov., Lucban, Abulug, swampy places: *Veracon PNH 33433* (L, PNH), tree 7 m, fl. Jan.; Tayabas prov., Malbog: *Oro 30700* (NY, SING), fl. Jan.; Camarines prov., Mt Bagacay: *Ramos & Edaña 33907* (L), fl. Nov./Dec.

BILIRAN. Mt Suiro: *Sulit PNH 21572* (L, PNH), fl. buds, imm. fr., April/May. SAMAR. Catubig river: *Ramos 24379* (K, NY), fl. Febr.; Mt Cansayao, Catarman: *Sulit 14409* (L, PNH), tree 10 m, fl. & fr. April.

LEYTE. Mt Abucayan: *Edaña 41724* (K, L), fl. Febr.

Remark. The fruits have been described from *Sulit 14409* in L.

14. *P. majas* H. J. Lam, l. c. 1925, 66, f. 14; Lam, l. c. 1927, 401.

Trees? Branchlets slender, 3—5 mm in diam., ferruginously woolly-hirsute, ultimately glabrous; terminal cone up to 7 mm long, woolly hirsute; stipules broadly ovate, up to c. 4 by 3.5 mm, apex acute, woolly hirsute on outside, glabrous on inside, caducous. *Leaves* scattered, broadly obovate, 16—25 by 10—15 cm, apex rounded and acutely acuminate, acumens up to 7 mm long, base broadly truncate or rounded, not or almost not decurrent; glabrous above, sometimes ferruginously hirsute at base of midrib, ferruginously woolly-hirsute below mainly on midrib and nerves, chartaceous; midrib grooved above, prominent and rounded below, secondary nerves 12—17 pairs, ascending at an angle of c. 60°, straight, curved at their tips, archingly joined very close to the margin, grooved above, prominent below, tertiary nerves slender, transverse, distinct on either side. Petioles stout, 10—15 mm long, grooved above, ferruginously woolly hirsute. *Flowers* in 5—9-flowered, axillary clusters, pedicels angular, 15—22 mm long, ferruginously woolly-hirsute. *Sepals* lanceolate, 4.5—6 by 2.5—3.5 mm, apex acute, ferruginously woolly-hirsute on outside, glabrous on inside, inner sepals with membranous margins and sometimes crested. *Corolla* entirely glabrous, 7—9 mm long, lobes elliptic-oblong, 6—7 by 2—2.5 mm, apex acute or subacute. *Stamens* 18, entirely glabrous, 5—6 mm long, filaments filiform, 1.5—2 mm long, anthers oblong, 3—3.5 mm long, apex bifid, dehiscing laterally. *Ovary* broadly ovoid, c. 1 by 1.5 mm, 6-celled, 6-lobed, ferruginously hirsute. Style 10—11 mm long, glabrous, subpubescent at base. *Fruits* globose or ellipsoid, 1—2 by 1—1.5 cm, 1-seeded, pericarp fleshy, glabrous. Seeds ellipsoid, 9—18 by 6—13 by 5—11 mm, subobtusate at either end, testa thin, scar covering half the surface of seed; embryo exalbuminous, radicle subexsert.

Type specimen: *Jaheri 1085* in BO.

Distribution: Borneo.

BORNEO. Indonesian Borneo, Sungeibrunei: *Jaheri 1085* (BO, L), fl.; Sungei Bulu: *Jaheri 1054* (BO, L), fl.; ibidem: *Jaheri 1458* (BO, L).

15. *P. fidjiense* Pierre in Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 10; Lam, l. c. 1925, 107; Lam, l. c. 1927, 414; Lam, Blumea 5, 1, 1942, 33.

Trees, up to 30 m. Branchlets slender, 1.5–3.5 mm in diam., ferruginously or cinnamomously puberulous, glabrescent; terminal cone 2–7.5 mm long, puberulous; stipules lanceolate-acicular, c. 3 by 0.5 mm, acute at apex, puberulous on outside, glabrous on inside, caducous. *Leaves* conferred at apex of branchlets, obovate-spathulate, oblong or obovate, 6–12 by 2.5–4 cm, apex obtuse or obtusely acuminate, acumen up to 3 mm long, base cuneate, decurrent along sides of petiole; either entirely glabrous or ferruginously puberulous on either side of the midrib, thin-coriaceous; midrib grooved and minutely crested above, prominent and rounded below, secondary nerves slender, 9–15 pairs, ascending at an angle of c. 70°, slightly curved, diminishing until inconspicuous, rarely joined by some thickened tertiary nerves, prominulous above, stronger so below, tertiary nerves few, transverse, not distinctly marked against the intermediate reticulate nervation, prominulous on either side. Petioles 3–9 mm long, grooved or flat above and sometimes slightly crested as well, thickened in the basal part, ferruginously tomentose, partly glabrescent. *Flowers* in 2–4-flowered, axillary clusters or solitary, pedicels terete, 2–8 mm long, ferruginously tomentose. *Sepals* ovate, 1.5–2.5 by 1.5–2.5 mm, in fruit up to c. 3 by 3 mm, acuminate at apex, ferruginously tomentose on outside, glabrous on inside, inner sepals with membranous margins. *Corolla* 2–4 mm long, pubescent at apex only, lobes ovate-rotundate, c. 1.5 by 1.5 mm, obtuse at apex. *Stamens* 12, c. 1.5 mm long, filaments subulate, c. 0.6 mm, glabrous, anthers oblong, c. 1 mm long, apex obtuse (?), ferruginously villose. *Ovary* ovoid, c. 1 by 1 mm, 6-celled, 6-lobed, ferruginously villose. Style subulate, c. 3 mm long, glabrous. *Fruits* ovoid, c. 1.8 by 1.3 by 1 cm, 2-seeded, apex obtuse, pericarp fleshy, glabrous. Seeds fusiform, c. 13 by 5 by 4 mm, obtuse at either end, yellowish, shiny, scar linear. Embryo unknown.

Type specimen: *Horne 1117* in K.

Vernacular name: souwalu (Viti Levu).

Ecology: In dense forests at low and medium altitudes.

Distribution: Fiji (Viti Levu, Vanua Levu, Ovalou).

VITI LEVU. Tholo North, Nandarivatu, alt. 830 m: *Greenwood 842* (K, NY), tree 5 m, fl. & fr. May; ibidem, eastern slopes of Mt Koroyaniyu, Mt Evans Range, alt. 950–1050 m, dense low forest: *A. C. Smith 4165* (K), tree 15 m, fl. May; ibidem, slopes of Mt Nairoso, Mt Evans Range, dense forest, 700–1050 m alt.: *A. C. Smith 4421* (K), tree 8 m, fl. April; hills between Nandala river and Nukunuku Creek, 750–850 m alt., dense forest: *A. C. Smith 6195* (K), tree 30 m, fr. green, Sept.; ridge between Mt Lomalangi and Mt Namama, east of Nandarivatu, alt. 1050–1120 m, dense forest: *A. C. Smith 4995* (K), tree 8 m, fl. June.

VANUA LEVU. Thakaundrove, Yanaway region, Mt Kasi, alt. 300–430 m, dense forest: *A. C. Smith 1805* (A, BISH, K, L, US), tree 15 m, fl. May, buds brown; without loc., shaded woods: *Horne 1117* (K), tree 5–8 m, fl. Sept.

OVALAU. Hills west of Lovoni Valley, on ridge S. of Korolevu, alt. 400–500 m, dense forest: *A. C. Smith 7543* (L, US), tree 15 m, fl. May; Mt Ngelaiovalau, alt. 575–626 m, dense bush and thickets of crest: *A. C. Smith 7616* (L, US), tree 8 m, fl. May; Mt Tana Lailai, alt. 500–550 m, dense bush and thickets of crest: *A. C. Smith 7689* (L, US), tree 8 m, fl. June.

16. *P. formosanum* Hayata, J. Coll. Sc. Tokyo 30, 1911/1912, 184; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; idem, vol. 4, 1926, 245; Kanehira, Formos. Tr., rev. ed., 1936, 570, f. 520; Liu, Sasaki & Keng, Quart. J. Taiwan Mus. 8, 4, 1955, 313 — *P. polyandrum* Hayata, l. c. 185 — *P. ellipticum* Hayata in Matsumura & Hayata, Enum. Pl. Formos., 1906, 227 — *P. paucivenosum* H. J. Lam, l. c. 1925, 101, f. 29; Lam, l. c. 1927, 412 — *P. hayatae* H. J. Lam, l. c. 1927, 414.

Trees, 5—7 m. Branchlets terete, stout, 5—8 mm in diam., pale cinnamomously tomentose, glabrescent; terminal cone up to 8 mm long, tomentose; stipules lanceolate, up to 3 by 1.5 mm large, apex acute, greyish tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, subconferted or conferted at apex of branchlets, obovate-oblong, obovate or spatulate, 10—17 by 4.5—7.5 cm, apex rounded or cordate, base broadly cuneate, rounded or cordate, not or almost not decurrent; glabrous on either side, or with scattered white hairs or puberulous on midrib only or on the secondary nerves as well, the juvenile leaves sometimes pale cinnamomously puberulous on either side, coriaceous; midrib prominulous above and indistinctly crested, prominent and rounded below, secondary nerves 10—12 pairs, ascending at an angle of c. 50°, slightly curved or straight and curved at tips only and irregularly archingly joined, prominulous above, prominent below, the basal ones inconspicuous on either side, tertiary nerves few, far apart, transverse, with a few nerves in between which are as conspicuous as the tertiary nerves, conspicuous on either side. Petioles stout, 7—12 by 2—3 mm, flat above and with 2—4 longitudinal crests, pale yellowish puberulous. *Flowers* in 3—6-flowered, axillary clusters, pedicels angular, 7—12 mm long, in fruit up to 28 mm long and thickened, ferruginously yellowish tomentose. Flowers seen in bud only. *Sepals* broadly ovate, 4—4.5 by 4—5 mm, apex subacute or obtuse, yellowish puberulous on outside, glabrous on inside, in fruit enlarged up to 6 by 5 mm, inner sepals with glabrous and membranous, sparsely ciliate margins. *Corolla* known young only, glabrous on either side, c. 2.5 mm long, lobes oblong, c. 1.5 by 1.5 mm, apex obtuse. *Stamens* 12, the epipetalous longer than the alternipetalous ones, filaments very short, probably glabrous, anthers ovoid, c. 1.5 mm long, apex subacute, dehiscing extrorsely lateral, sparsely ferruginously sericeous. *Ovary* disciform, c. 1 by 1.5 mm, 6-celled, glabrous. Style subulate, stout, c. 1 mm long, glabrous. *Fruits* narrowly ellipsoid, often oblique, 4—5 by 1.5—2 cm, 1-seeded, apex rounded or subtruncate, often with the up to 15 mm long marcescent style still present, narrowed at base, pericarp fleshy, glabrous. Seeds fusiform, but compressed at either side, up to 3.5 by 1.1 by 0.9 cm, obtuse at apex, acute at base, probably brown and nitidous, scar covering half of the seed, dull, grey, embryo exalbuminous, radicle exsert.

Type specimen: *Makino s.n.* in TI.

Vernacular name: nátu (Ivatán dialect).

Ecology: In thickets and forests at low altitude.

Distribution: Formosa, Botel-Tobago (Lan Yu Islands), Batan Islands, Babuyan Islands, Luzon.

FORMOSA. Without known loc.: *Henry 341* (NY), fr.

BABUYAN. Camaguin, Babuyanes, steep forest-slope: *Fenia 4101* (SING), tree 5—7 m, type specimen of *P. paucivenosum* H. J. Lam.

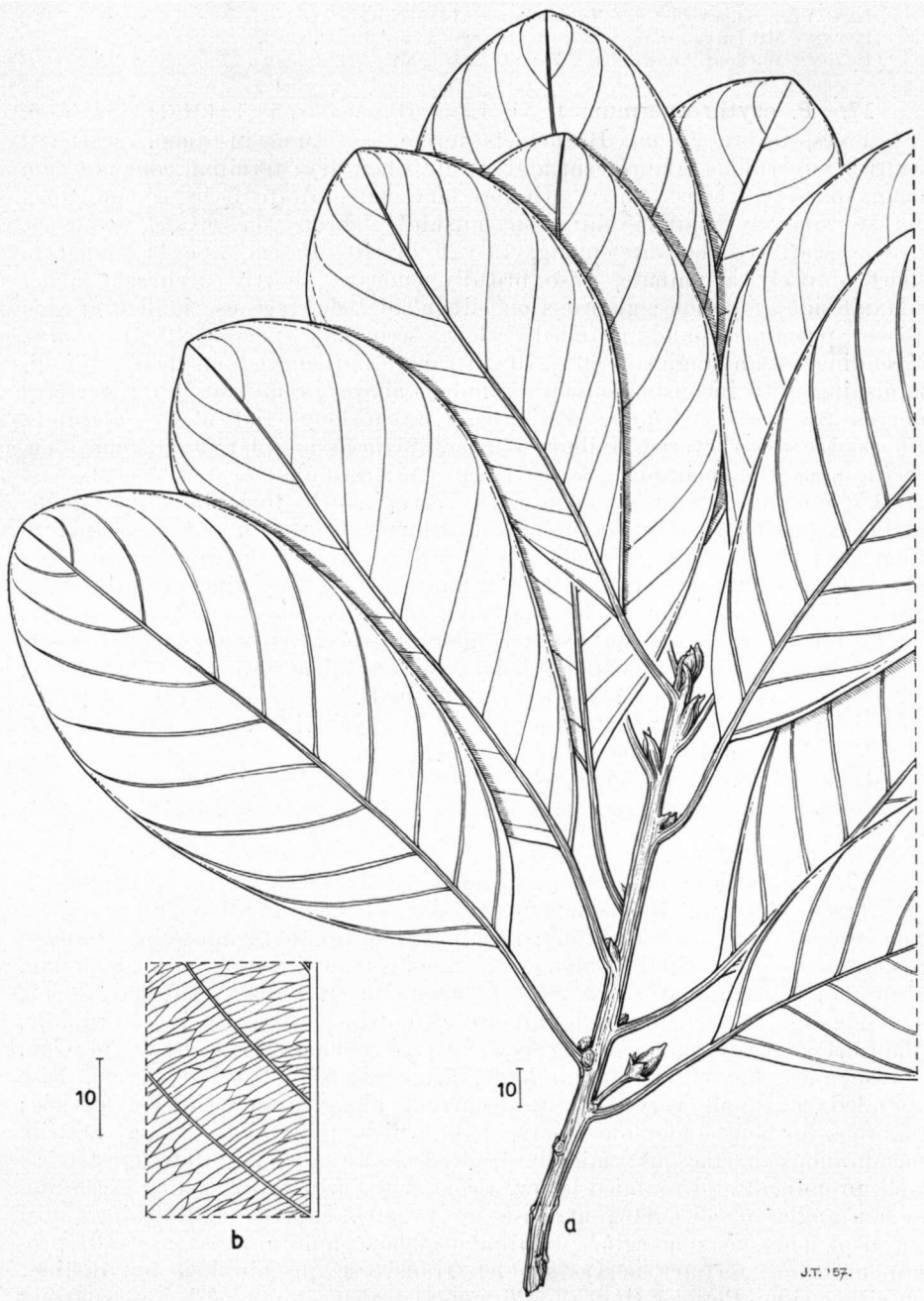


Fig. 4. *P. kinabaluense*, a. branchlet with leaves and fruit; b. tertiary nervation of leaf (Clemens & Clemens 27635).

LAN YU. Sharyoto: *Makino s.n.* (TI), Nov.  
 BATAN. Mt Iraya: *Ramos 80219* (B), fl. & fr. June/July.  
 LUZON. Without known loc.: *Haenke 434* (NY), fl. buds.

**17. *P. erythropermum*** H. J. Lam, *Blumea* 5, 1, 1942, 31—32, f. 6.

Trees, up to 25 m. Branchlets terete, c. 5 mm in diam., scattered whitish puberulous, glabrescent and striate when dry; terminal cone c. 6 mm long, sparsely whitish hairy, stipules lanceolate, up to 5 by 2 mm, apex obtuse, sparsely whitish hairy on outside, glabrous on inside, caducous. *Leaves* scattered, obovate-oblong, 19—26 by 10—15 cm, apex rounded to short obtusely acuminate, base broadly cuneate, shortly decurrent along adaxial side of petiole; glabrous on either side, chartaceous; midrib crested above, prominent and rounded below, secondary nerves 12—15 pairs, ascending at an angle of 60°—70°, straight but curved at their tips, diminishing until inconspicuous, prominulous above, prominent below, tertiary nerves transverse, slender. Petioles 2—3 cm long, flat above, glabrous. *Flowers* in few-flowered, axillary clusters, pedicels angular, 9—12 mm long, ferruginously tomentose. *Sepals* ovate to rotundate-ovate, 2.5—3.5 by 2—2.5 mm, apex obtusely acuminate, ferruginously tomentose on outside, glabrous on inside. *Corolla* unknown. Stamens not seen but according to Lam probably 14, anthers pilose on outside. *Ovary* broadly ovoid, subabruptly tapering into style, c. 1 by 2 mm, 6-celled, ferruginously tomentose. Style filiform, angular, c. 10 mm long, glabrous. *Fruits* oblong, 2.5—3.8 by 1—1.8 cm, apex obtuse, 1-seeded, glabrous, pericarp woody, black, seeds oblong, black, exalbuminous, cotyledons thick, radicle c. 5 mm long, obtuse.

Type specimen: *Kajewski 1903* in L.

Vernacular name: oeko-woru (Bougainville).

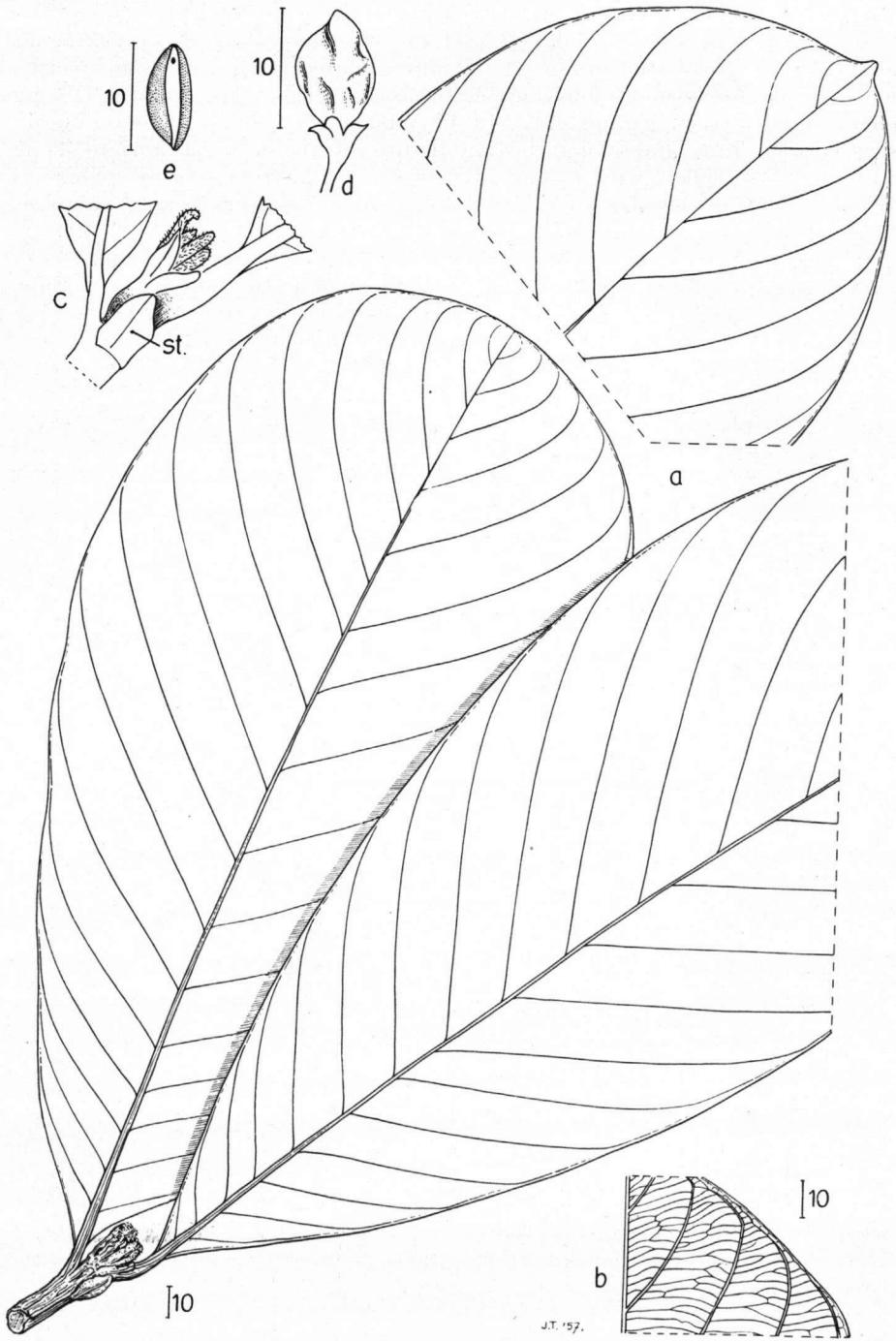
Ecology: In lowland rainforests.

Distribution: Solomons.

BOUGAINVILLE. Kugumaru, Buin, alt. 150 m, rainforest: *Kajewski 1903* (A, G, L), fr. July, large tree, up to 25 m.

**18. *P. rivulare*** H. J. Lam, l. c. 1927, 403, f. 4.

Trees, c. 10 m. Branchlets terete, 3.5—6.5 mm in diam., light brown tomentose-hirsute, soon glabrous; terminal cone up to 14 mm long, sparsely tomentose-hirsute; stipules oblong or oblong-ovate, oblique, 9—15 by 4—6 mm, obtuse or subacute at apex, slightly crested at the back, subchartaceous, sparsely light brown tomentose-hirsute on outside, especially in the middle, glabrous on inside, caducous. *Leaves* scattered, oblong, 24—48 by 8—14.5 cm, obtuse and long obtusely acuminate, acumen up to 2.5 by 0.4 cm, base rounded, unequal, very shortly decurrent along upper side of petiole; glabrous or on underside sparsely brownish puberulous along midrib, membranous-chartaceous; midrib grooved above and minutely crested as well, prominent and rounded below, secondary nerves 18—22 pairs, ascending at an angle of 45°—60°, at base up to 80°, curved, diminishing until inconspicuous near margin, prominulous above and grooved as well, prominent below, tertiary nerves slender, transverse, prominulous but distinct on either side. Petioles stout, 9—26 mm, flat above, rounded below, sparsely ferruginously tomentose but soon glabrous, underside rugulose. *Flowers* in (3—)5—8-flowered, axillary clusters, pedicels angular, 3—8(—10) mm





long, ferruginously puberulous, rugose (according to Lam becoming glabrous). *Sepals* ovate-triangular, 2.5—4 by 3—5 mm, subacute or obtuse at apex, ferruginously tomentose on outside, glabrous on inside, inner sepals more rotundate, membranous and glabrous along margins, fimbriate along edges. *Corolla* seen in bud only, 4—4.5 mm long, on outside ferruginously sericeous on tube and along the middle-line of the lobes, fimbriate along tips of lobes; lobes ovate-oblong, 3.5—4 by 2—2.5 mm, obtuse. *Stamens* 18—21, in 2 or 3 whorls, 3.5 mm long, filaments very short, subulate, 0.5—1.5 mm long, ferruginously hirsute, anthers narrowly ovoid, 3—4.5 mm long, acuminate at apex, ferruginously sericeous, dehiscing extrorsely. *Ovary* very low conoid, c. 0.5 by 2 mm, 6-celled, 6-angular, ferruginously hirsute, at base surrounded by a 12-lobed disk. Style cylindrical, stout, 3—4 mm long, glabrous, after anthesis up to 16 mm long. *Fruits* unknown.

Type specimen: *Endert 3021* in BO.

Ecology: In forests at low altitudes.

Distribution: Borneo.

BORNEO. W. Kutai, near L. Liang Leng, on a rock along rivulet in small ravine, in old forest, alt. c. 250 m: *Endert 3021* (BO, L), tree c. 10 m, fl. buds, Aug.; Kelindjau river region near Bentuk: *Kostermans 9701* (BO, L), tree 20 m, fl. white, June.

19. *P. kinabaluense* van Royen, n. sp. — *P. cf. macrocarpum* Burek, Heyne in msc. — Fig. 5.

Arbor magna. Ramuli crassi, pallide ferrugineo-lanato-tomentosi, glabrescentes; stipulae oblongo-ovatae, obtusae, cristatae, caducae. Folia obovata vel subpanduriformia, 18—25(—41) × 8.5—11.5(—18) cm, apice rotundata vel brevissime obtuse acuminata, supra sparse albo-tomentosa, denique glabrescentia, subtus sparse flavido-tomentosa, glabrescentia. Nervi secundarii utroque latere 9—12(—18), sursum evanescentes, tertiarii transversi. Petiolus (1—)2—4 cm longus, ferrugineo-sericeus, (sub)glabrescens. Pedicellus usque ad 4 mm longus, ferrugineo-tomentosus. Sepala extus lanato-tomentosa, intus glabra. Corolla glabra, sed apice loborum fimbriata. Stamina 12, glabra. Ovarium 6-loculare, in parte apicali ferrugineo-hirsutum; stylus glaber. Fructus incompletus. Typus: *Clemens & Clemens 27635* in L.

Large trees. Branchlets stout, 5—7 mm in diam., pale ferruginously woolly-tomentose, glabrescent, terminal cone up to 8 mm long, pale ferruginously woolly-tomentose; stipules oblong-ovate, up to 7 by 3.5 mm, usually obtuse at apex, crested, pale ferruginously tomentose on outside except along margins, glabrous on inside, caducous. *Leaves* subconfered at apex of branchlets, obovate or subpanduriform, 18—25(—41) by 8.5—11.5(—18) cm, rounded or very short obtusely acuminate at apex, broadly cuneate at base and subabruptly narrowed, slightly decurrent along upper sides of petioles; sparsely whitish tomentose above and glabrescent, sparsely yellowish tomentose below, denser so on midrib and nerves, ultimately glabrous, coriaceous; midrib broad and shallowly grooved above, prominent below and rounded in the basal part but flattened in the apical part, secondary nerves 9—12(—18) pairs, ascending at an angle of c. 60°, straight but curved at their tips, diminishing until inconspicuous near margin, prominent above and grooved, very prominent below, tertiary nerves slender, transverse, prominulous on either side. Petioles (1—)2—4 cm long, broad and shallowly grooved above, rounded below, ferruginously sericeous, glabrescent or only partly so. *Flowers* solitary or 2—8 in the apical axils, pedicels terete, up to 4 mm long, in fruit up to 10 mm long, ferruginously woolly-tomentose,

partly glabrous in fruit. *Sepals* triangular or triangular-ovate, 2.5—3 by 2—2.5 mm, obtuse, woolly-tomentose on outside, glabrous on inside, inner sepals more ovate than outer ones, crested, with glabrous and membranous margins. *Corolla* up to 7 mm long, entirely glabrous, except fimbriate at apex of lobes, lobes ovate-lanceolate, 3—5 by 1.5—2 mm, obtuse at apex. *Stamens* 12, c. 3 mm long, entirely glabrous, filaments subulate, c. 1 mm long, anthers lanceolate-oblong, c. 2.5 mm long, connective elongate, acute, dehiscing extrorsely. *Ovary* obovoid-disciform, c. 0.7 by 1.5 mm, 6-celled, pale ferruginously hirsute in the apical half only, style stout, conoid, c. 4.5 mm long, glabrous. *Fruits* known young only, ovoid, up to 9 by 5 mm, one-seeded, glabrous. Seeds unknown.

Type specimen: *Clemens & Clemens 27635* in L.

Ecology: In primary forests at medium altitudes.

Distribution: Borneo.

BORNEO. Sarawak, Mt Kinabalu, Dallas, alt. 1000 m: *Clemens & Clemens 27635* (BM, CAL, G, K, L, SING), tree, fl. Dec., immature fr. green; Gat, Upper Rejang river: *Clemens & Clemens 21532 & 21824* (BO), tree, fl. cream.

Remarks. This species is so closely related to *P. sorsogonense*, that only after some hesitation it was regarded as a separate species and not a mere variety of the first mentioned species. Its main differences are the smaller number of secondary nerves (9—12 pairs against 15—18), the number of stamens (12 against 18), the longer petioles (2—4 cm against 0.9—1.5 cm) and the shorter pedicels (up to 4 mm against (3—)7—25 mm). Moreover the dimensions of leaves and flowers are smaller than those of *P. sorsogonense*. In many respects it resembles *P. macrocarpa* Burek but is distinguished from the latter by the larger stipules and leaves, but with the same number of secondary nerves, however. Also the glabrous anthers and the small number of flowers in each axil distinguish *P. kinabaluense* from *P. macrocarpum*.

20. *P. gigantifolium* Merrill, Bur. Gvt. Lab. Publ. 6, 1903, 14; Dubard, Bull. Mus. Hist. Nat. 15, 1909, 384; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l. c. 1925, 75; Lam, l. c. 1927, 407.

Medium sized tree, c. 18 m tall. Branchlets stout, terete, 9—18 mm in diam., pale yellowish puberulous, glabrescent; terminal cone up to 22 mm long, puberulous; stipules oblong, up to 6 by 1.2 cm, obtuse or aristate, crested dorsally, puberulous on outside, glabrous on inside, long persistent, finally caducous. *Leaves* crowded towards the ends of branchlets, obovate, obovate-elliptic, or oblanceolate, (20—)45—68 by (9—)12.5—22 cm, apex obtuse, acute or acuminate and acumen up to 7 mm long, base broadly subrotundate, shortly decurrent along adaxial side of petioles; glabrous on either side, chartaceous; midrib broadly grooved above and sometimes broadly crested as well but usually in the apical part only, prominent and rounded below, secondary nerves 20—32 pairs, ascending at an angle of c. 50°, straight but curved at their tips and diminishing until inconspicuous, rarely connected by thickened tertiary nerves or archingly joined, promi-

Fig. 5. *P. cuprifolium*, a. leaves; b. tertiary nervation of leaf; c. apex of branchlet, with stipule (st); d. fruit; e. seed (*Elmer 13265*).

nulous and grooved above, prominent below, tertiary nerves slender, transverse, prominulous on either side. *Petioles* stout, 3.5—5 by 0.4—0.7 cm, thickened in the basal part, glabrous. *Flowers* in 4—8-flowered, axillary clusters, pedicels angular, 8—14 mm long, in fruit up to 18 mm long, ferruginously puberulous. *Sepals* ovate, 5.5—10 by 4—8 mm, obtuse or subacute at apex, often dorsally crested, ferruginously tomentose on outside, glabrous on inside, inner sepals more rotundate, with membranous, glabrous margins which are fimbriate. *Corolla* 1.6—2.5 cm long, glabrous, lobes ovate-lanceolate, 1.4—2 by 0.3—0.6 cm, obtuse. *Stamens* 18—24, 10—19 mm long, filaments filiform, 6—16 mm long, glabrous, anthers oblong, 3.5—4.5 mm long, acuminate, with scattered ferruginous hairs, dehiscing laterally, often twisted. Ovary ovoid, 1.5—3.5 by 1—2.5 mm, 6-celled, glabrous. Style filiform, 1.5—2.5 cm long, glabrous. *Fruits* obliquely ellipsoid or obpyriform, 2.2—4.5 by 0.9—3 by 0.8—2.5 cm, 1-seeded, obtuse, often provided with a short remnant of the style, pericarp thin, woody, glabrous. Seeds similar in shape to the fruit, 2—2.8 by 0.7—1.6 by 0.5—1.4 cm, brownish yellow, scar covering  $\frac{1}{3}$  of the surface of the seed, testa crustaceous, embryo exalbuminous.

Type specimen: *Merrill 2845* in PNH.

Lectotype specimen: *Merrill 2845* in NY.

Vernacular names: tagkan (Mabido dialect), alakáa, alakéak, bayátis, dulitan, lakodog (Tagalog dialect).

Ecology: In primary forests at low altitudes.

Distribution: Philippines.

LUZON. Tayabas prov., Pagbilao: *Merrill 2845* (NY), fr.; ibidem: *Bawan 25356* (SING), juv. fr. April; Lucban: *Elmer 9129* (E, FI, G, NY), juv. fr. May.

MENDOZO. Pimamlayan: *Ramos 40992* (BO, SING), fr. June; Alagoa river: *Merrill 5767* (NY), fl. Nov.; Baco river: *Merrill 4055* (NY), March.

CATANDUANES. Without known loc.: *Ramos & Edaña 75577* (NY, SING), tree 8 m, fl. July/Sept.

Remark. As the type specimen in the Manila herbarium became lost during the war a lectotype specimen has been chosen from among the original material distributed to other herbaria.

21. *P. globosum* H. J. Lam, l. c. 1925, 76; Lam, l. c. 1927, 407 — *P. retusum* Merrill, Phil. J. Sc. 3, 1908, 256; Dubard, Bull. Mus. hist. nat. 15, 1909, 384; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 283.

Trees, c. 10 m tall. Branchlets stout, 5—17 mm in diam., glabrous, angular by the numerous leaf scars, rugose; terminal cone large, up to 35 by 15 mm, ferruginously tomentose; stipules oblong-ovate or shieldlike, 1—3.5 by 0.8—2 cm, obtuse, acuminate or aristate at apex, dorsally crested, glabrous, long persistent, even after the leaves have fallen off. *Leaves* crowded towards tips of branchlets, oblanceolate or narrowly oblong-obovate, 19—49 by 6.5—14 cm, obtuse, rounded or retuse at apex, base narrowly cuneate, decurrent along sides of petioles; glabrous, coriaceous; midrib broadly impressed above and minutely crested as well, prominent and rounded below, secondary nerves 12—18 pairs, ascending at an angle of c. 45°, straight but curved at their tips, diminishing until inconspicuous near margin, prominulous above, stoutly prominent below, tertiary nerves transverse, slender, prominulous on either side. *Petioles* 1—5 cm, flat

above, angular or rounded below, slightly thickened in basal part and of different colour, glabrous. *Flowers* in 2- or 3-flowered, axillary clusters, pedicels angular, 1—1.5 cm long, in fruit up to 3 cm long, dark brown or ferruginously tomentose. *Sepals* triangular-ovate, 5—6 by 4.5—5.5 mm, subacuminate or subobtuse at apex, ferruginously tomentose on outside, glabrous on inside, fimbriate. *Corolla* 10—12 mm long, on outside sparsely pubescent on tube, lobes narrowly lanceolate, 8—10 by 2—3 mm, subacute at apex, glabrous on outside, puberulous in throat and on base of petals on inside. *Stamens* 20—24, 3—6 mm long, filaments filiform, 2—5 mm long, ferruginously puberulous, anthers lanceolate, 2.5—3 mm long, apex acute or bifid, dehiscing laterally, glabrous. *Ovary* ovoid, c. 1 by 1.5 mm, 9—24-celled, glabrous. Style filiform, 1.5—2 cm long, glabrous. *Fruits* globose, 3.5—4 by c. 3.5 cm, at apex with a short remnant of the style, 4—6-seeded, pericarp thick, fleshy, glabrous; seeds incompletely known.

Lectotype specimen: *Elmer 8523* in L.

Vernacular names: adagi, arábon (Igorot).

Ecology: In forests and forested ravines, alt. 300—1200 m.

Distribution: Philippines.

LUZON. Pangasinan prov., Labrador: *Fénix 29934* (BO), fr. Nov.; ibidem: *Fénix 29837* (L), fl. Nov.; without known loc.: *Leño 25154* (NY), fl. March. — Benguet prov.: *Elmer 8523* (BO, E, FI, G, L, NY), fl. March; ibidem: *Curran 10917* (NY), fl. Dec.

Remark. As no type specimen has been indicated by Merrill nor Lam the specimen collected by Elmer under No. 8523 in the Leiden herbarium has been chosen as the specimen typifying this species.

**22. *P. cuprifolium*** Elmer, Leafl. Phil. Bot. 8, 1915, 2817; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 279; Lam, l. c. 1925, 77; Lam, l. c. 1927, 407.

Small trees, c. 7 m high. Branchlets terete, 4—7 mm in diam., glabrous, greyish brown and striate; terminal cone 9—15 mm long, brownish woolly; stipules broadly ovate-oblong, 6—11 by 3—6 mm, obtuse, crested dorsally, glabrous. *Leaves* conferted at apex of branchlets, obovately oblong to spatulate, 22—40 by 8.5—16 cm, rounded and usually short obtusely acuminate, acumen 2—5 mm long, base narrowly cuneate, shortly decurrent along adaxial side of petiole; juvenile leaves densely brownish woolly, mature ones glabrous on either side, chartaceous; midrib grooved above, crested, except in the basal part, prominent below, secondary nerves (13—)16—19 pairs, ascending at an angle of 35°—50°, straight but curved at the tips, diminishing until inconspicuous, but archingly joined in the apical nerves, prominulous and minutely grooved above, prominent below, tertiary nerves transverse, few, prominulous on either side. Petioles 1.5—3 cm, flat above, greyish-yellowish puberulous, glabrescent. *Flowers* unknown. Pedicels of fruit 1.5—2 cm long, slightly thickened at apex, yellowish tomentose, glabrescent; sepals deltoid or broadly ovate, 2—3 by 3—3.5 mm, dark brownish tomentose on outside, glabrous on inside. *Fruits* according to Elmer clustered immediately beneath the foliage and pedicels arising from short tubercles or coarse excrescences, ellipsoid, 1.5—2.5 by c. 1.2 cm, 1- or 2-seeded, pericarp thin, fleshy, crustaceous when dry, glabrous. Seeds ellipsoid, slightly smaller than the fruit, brown, nitidous,

scar narrow, 1—2 by 0.2—0.3 cm, greyish, dull, embryo exalbuminous, cotyledons thick.

Type specimen: *Elmer 13263* in PNH.

Vernacular name: Mindanao: takan (Manabo dialect).

Ecology: In humus covered clay of forested ridges at 300 m.

Distribution: Philippines.

MINDANAO, Agusan prov., Cabadbaran (Mt Urdaneta): *Elmer 13263* (BO, E, FI, G, L, NY, PNH), fr. July.

23. *P. supfianum* Schlechter, *Tropenpflanzer* 7, 1903, 469, 1 fig.; Lam, l.c. 1925, 60; Lam, l.c. 1927, 400; Lam, *Nova Guinea* 14, 4, 1932, 552 — *P. inutile* Schlechter, *Guttap. & Kautsch. Exp.*, 1911, 94, *nomen*; Krause, *Engl. Bot. Jahrb.* 58, 1923, 469, *descr.*

Trees, up to 35 m. Branchlets stout, irregularly terete, ferruginously tomentose, glabrescent; terminal cone up to 12 mm long, pale or dark ferruginously tomentose; stipules lanceolate, up to 10 by 3 mm large, apex acute, pubescent on either side, caducous. *Leaves* subconferted at apex of branchlets, obovate, (9—)16—27 by (5—)6—9 cm, apex sometimes rounded, but usually short acutely or obtusely acuminate, acumen up to 10 mm long, sometimes unequal on either side of the midrib, base cuneate, decurrent along adaxial side of petiole; glabrous above, but greyish puberulous on the midrib, ferruginously tomentose below, coriaceous; midrib grooved above, prominent below, secondary nerves 10—16 pairs, ascending at an angle of 50°—65°, straight but curved at their tips, diminishing until inconspicuous, prominulous above but distinct, prominent below, tertiary nerves transverse, distinct, prominent on either side but slightly obscured by the pubescence below. Petioles stout, 10—20 mm long, grooved above, ribbed below, with the same pubescence as the branchlets. *Flowers* solitary or in (2—)4—7-flowered clusters, axillary, pedicels angular, 10—20 mm long, with the same pubescence as the branchlets. *Sepals* broadly ovate or triangular, 4.5—5.5 by 6—7 mm, apex short obtusely acuminate, ferruginously appressedly tomentose on outside, glabrous on inside, inner sepals with glabrous and membranous margins. *Corolla* 9.5—11 mm long, ferruginously sericeous on outside, glabrous on inside, lobes elliptic-ovate, 6—7 by 2.5—3 mm, apex obtuse or truncate, reflexed in anthesis. *Stamens* 12, c. 6 mm long, filaments filiform, 3—4 mm long, glabrous, anthers linear-ovoid, 3—3.5 mm long, apex obtusely or acutely acuminate, with scattered ferruginous hairs, dehiscing extrorsely. *Ovary* subdepressedly globose, c. 2 by 2.5 mm, 6-lobed, 6-celled, densely ferruginously appressedly tomentose. Style stout, angular, 5—12 mm long, pubescent up to a half. *Fruits* known immature only, subglobose, ferruginously sericeous, glabrescent.

Type specimen: *Schlechter 13921* in B.

Lectotype specimen: *Schlechter 13921* in P.

Vernacular names: West New Guinea: sowka (Manikion), kemanak, lageliek (Mooi); Northeastern New Guinea: gemas, kinakin, tua (Amele), aban, kon, ubub (Bilia), begibip, daik, dumpahop, galus, hamip, sankai (Dumpu), fukai, gawe, goga, indo (Faita).

Ecology: In rainforests of the lowlands.

Distribution: Salawati, New Guinea, perhaps also Northern Moluccas?

SALAWATI. Kaloal: *NGBW 1464* (L), tree 17 m, Oct.; *ibidem: NGBW 1497* (L), tree 21 m, Oct.

NEW GUINEA. W. New Guinea, Amursira: *Atasrip 9* (L); without known loc.: *NIFS bb 1189* (BO, L), Aug.; *Atasrip 7, 8, 23, 33, 70* (BO, L); Tami river: *NGBW 828* (L), tree 32 m, Jan.; Warsamson river, E. of Sorong, primary forest on clayey soil: *Iwanggin NGBW 5300, 5679* (L), trees 20—27 m, Aug./Sept.; NE New Guinea, Bismarck Mts.: *Schlechter 13921* (G, P), imm. fr.; Sepik river: *Ledermann 8842* (SING), fl.; in forest near Pro: *Schlechter 20001* (B), fl. Aug., type specimen of *P. inutile* Schlechter; Ramu valley, SE of Faita Airstrip, alt. 230 m: *Saunders 342, 368, 370, 377, 381, 544* (BRI, CAN, L, LAE), trees 10—42 m, June—Aug., all sterile; SE New Guinea, Palmer river, 2 miles below junction Black river, on lower ridges, alt. 100 m, in rainforest: *Brass 7023* (A, L), tree 30 m, fl. June; Normanby Island, Waikaiuna, rainforest, second storey layer: *Brass 25386* (L), tree c. 30 m, fl. white, April.

BATJAN. without known loc.: *Teysmann (?) s.n.* (BO, L), doubtful specimen.

**24. *P. ottolanderi*** Koorders & Valetton, *Bijdr. Boomsorten Java* 1, 1894, 146; *idem*, *Icon. Bogor.* 1, 1897, t. 19; *idem*, *Exkurs. flora Java* 3, 1912, 38; Koorders & Schumann, *Syst. Verz.* 1, 1, 1912, Fam. 239, p. 230; Koorders & Valetton, *Atlas der Baumarten* 4, 1918, t. 611 and 612; Lam, l. c. 1925, 64, 256; Lam, l. c. 1927, 401; Lam, in Backer, *Noodfl. Java* 7, 1948, Fam. 166, p. 9.

Trees, up to 30 m. Branchlets stout, irregularly terete by the numerous scars, 9—15 mm in diam., greyish yellow or pale greyish hirsute, glabrescent; terminal cone up to 18 mm, greyish or brownish yellow or pale greyish hirsute; stipules lanceolate, up to 13 by 4 mm large, apex acute or acuminate, crested and hirsute on outside, denser in the middle than along margins, glabrous on inside, fimbriate, caducous. *Leaves* subconferted at apex of branchlets, elliptic, obovate or oblong, (17—)23—26(—46) by 8—15 (—19) cm, apex rounded or obtusely acuminate, acumen up to 4 mm long, base broadly cuneate or subrotundate, almost not decurrent; glabrous above or yellowish hirsute along midrib only, hirsute below, denser so on the nerves and midrib, coriaceous; midrib grooved and minutely crested above, prominent and rounded below, secondary nerves 16—26 pairs, ascending at an angle of c. 60°, straight but curved at their tips and diminishing until inconspicuous, rarely archingly joined or connected by some thickened tertiary nerves, grooved above, prominent below, tertiary nerves transverse, prominulous above, prominent below. Petioles 2—4 cm long, flat above but often shallowly grooved, yellowish hirsute, ultimately glabrous above. *Flowers* in 7—16-flowered, axillary clusters, pedicels angular, 20—32 mm long, yellowish or brownish woolly hirsute. *Sepals* ovate, or obovate-oblong, 4—5 by 4—5 mm, apex obtuse, yellowish or brownish woolly hirsute on outside, glabrous on inside, inner sepals with membranous and glabrous margins on outside. *Corolla* 12—16 mm long, brownish or yellowish hirsute on outside but the covered area tapering V-shaped towards the base, margins glabrous, glabrous on inside, lobes elliptic-oblong, 11—13.5 by 2.5—3.5 mm, apex obtuse. *Stamens* 12, 7—8 mm long, the epipetalous higher inserted than the alternipetalous, entirely glabrous, filaments filiform, 3.5—5 mm long, anthers oblong, 2.5—3 mm long, mucronate at apex, dehiscing introrsely lateral. *Ovary* subglobose-ovoid, c. 2.5 by 2.5 mm, 6-celled, 6-lobed, yellowish hirsute. Style angular, 5—8 mm long, glabrous. *Fruits* oblong-ovoid, usually slightly curved, 8—10 by 3—4 cm, 1-seeded, apex rounded,

base truncate, pericarp fleshy, glabrous. Seeds fusiform, up to 38 by 12 mm, apex obtuse, base subacute, testa thick, dark brown or black, nitidous, scar covering about half of the seed, pale brown, dull, embryo exalbuminous, radicle punctiform.

Lectotype specimen: *Koorders 10158*  $\beta$  in L.

Vernacular names: wuru santen, ki bengang (Java).

Ecology: In primary and secondary forests at low altitudes, up to 800 m.

Distribution: Java, Sumatra.

JAVA. Banjumas, Pelabuhan Ratus, alt. 300 m: *Koorders 10158*  $\beta$  (BO, L), fl.; Pringombo: *Koorders 12205*  $\beta$  (BO, L), fl. Sept.

SUMATRA. Sumatra East Coast, Asahan, Huta Padang, secondary forest: *Krukoff 4379* (BO, G, L, NY, SING), tree 20 m, fl. fr. Nov.; ibidem, in primary forest: *Krukoff 4433* (BO, G, L, NY, SING), tree 26 m, fl. Nov.

**25. *P. maingayi*** (Clarke) King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr. 17, 1905, 191; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 7; Ridley, Fl. Mal. Pen. 2, 1932, 273; Lam, l. c. 1925, 72; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 123; Lam, l. c. 1927, 402; Heyne, l. c., ed. 3, 1, 1950, 1238; Wyatt-Smith, Research Pamphlet 4, 1954, 36, fig. — *Dichopsis maingayi* Clarke in Hooker f., Fl. Br. Ind. 3, 1882, 543.

Tall up to 25 m high trees. Branchlets stout, irregularly terete, grooved, 6—10 mm in diam., ferruginously woolly-tomentose, glabrescent; terminal cone up to 18 mm long, woolly-tomentose; stipules lanceolate or linear, up to 9 by 2 mm, acuminate or acute, woolly-tomentose on outside, glabrous on inside, soon caducous. *Leaves* obovate or spatulate, (14—)20—35 by (5.5—)7—17 cm, at apex rounded, obtuse or acuminate, acumen up to 12 mm long, base narrowly to broadly acute, sometimes rounded, decurrent; glabrous above, very rarely woolly-tomentose along midrib and scattered over the surface, reddish, brownish or blackish ferruginously woolly-tomentose below, sometimes denser along midrib and secondary nerves, subcoriaceous or coriaceous; midrib grooved above, sometimes minutely crested as well, prominent and rounded below, secondary nerves 14—23 pairs, ascending at an angle of 55°—60°, straight, but rather abruptly curved near margin or leaf and sometimes grooved, prominent below, tertiary nerves slender, transverse, distinct on either side but more prominent below. Petioles (1.5—)2—4.5 cm long, grooved above at least in the apical part, thickened in the basal part, reddish brownish or blackish ferruginously woolly-tomentose, sometimes partly glabrescent. *Flowers* in 3—9-flowered, axillary clusters on one or two tuberculae, pedicels angular, 7—11 mm long, in fruit up to 20 mm long and not thickened, woolly tomentose. *Sepals* ovate, 3—3.5 by 2.5—3.5 mm, acute at apex, brownish appressedly tomentose on outside, glabrous on inside, or very rarely with a few hairs, inner sepals orbicular, rounded at apex, margin membranous, glabrous and fimbriate. *Corolla* 7—10 mm long, glabrous, lobes ovate-lanceolate, 5.5—7 by 2—2.5 mm, irregularly rounded or truncate at apex. *Stamens* 12, 6—7.5 mm long, entirely glabrous, filaments filiform, 3—3.5 mm long, anthers sagittate, 3—3.5 mm long, bifid-acuminate at apex, dehiscent extrorsely. *Ovary* disciform, c. 1 by 2 mm, 6-celled, glabrous. Style filiform, 6.5—7.5 mm long, 6-ribbed, twisted, glabrous. *Fruits* ellipsoid or subglobose, 2—3 by

1.2—2.3 cm, 1-seeded, rounded at apex, pericarp fleshy, glabrous. Seeds obovoid, 12—20 by 6—8 by 3—5 mm, rounded at apex, subobtuse at base, brown, scar covering half of the seed, embryo exalbuminous, radicle small, not exsert.

Type specimen: *Maingay 996/2* in K.

Vernacular names: Malaya: batu, djelutung batu, gētah ketapang, gētah percha burong, gētah simpor, jelutung, nyatoh, nyatoh tembaga, tabang, simpor, terbau-simpor.

Ecology: In lowland forests.

Distribution: Malaya.

MALAYA. Kedah, Bongsu For. Res.: *Sharin 35170* (KEP), tree 13 m, fl. March; K. Muda Singkep For. Res.: *KEP 59622* (KEP), tree 15 m, Aug.; Kinta Ipoh: *KEP 65919* (KEP), tree 25 m, fr. Dec. — Perak, Chankat Serdang: *Wray 524* (SING), fl.; Dindings, Batu Undan For. Res.: *Yahya 34870* (KEP), tree, June; without known loc.: *Wray 2215* (SING), fr. — Pahang, Laka Hill Forest: *Zin 27536* (KEP), tree, Jan.; Rotan Tunggal For. Res.: *Osman 28519* (KEP), tree 23 m, May. — Selangor, Kuala Lumpur: *Hamid 4885* (SING), juv. fr., Sept.; ibidem, Public Gardens: *Burkill 6333* (SING), tree, fr. Sept.; ibidem: *Ahmad 4759* (SING), fl. Aug.; ibidem, Lake Club: *CF 7045* (SING), tree 20 m, fl. white, Febr.; Kanchung: *Ahmad 5709* (SING), tree, juv. fr., Nov.; Bangi Kajang For. Res.: *KEP 21970* (KEP), tree 10 m, juv. fr. Oct.; ibidem: *Bakar 10973* (KEP), juv. fr., Nov.; Kanching: *Walton 14797* (KEP), tree 16 m, fr. Nov.; Bangi Kajang For. Res.: *Somerville 14566* (KEP), tree, fl. Oct.; ibidem: *Somerville 16463* (KEP), fl. Sept.; Kuang: *Walton 21371* (KEP), tree, fr. Dec.; Kuala Lumpur, Weld Hill Res.: *Hamid CF 877* (SING), fr. May. — Negri Sembilan, Kuala Pilah, hill: *Holttum 9806* (A, BO, KEP, SING), tree 20 m, fr. Nov.; Tamoi: *Burkill 3153* (BO, SING), fl. April; Mt Angsi For. Res.: *Saham 23793* (KEP), tree 10 m, juv. fr., Nov.; Bukit Sutu: *Malvius 1906* (SING), fr. July. — Malacca, Bukit Sunggeh For. Res.: *Ghani 2095* (SING), fl. May. — without known loc.: *Maingay 996/2* (K, L), fl. & fr., type specimen; ibidem: *Wray 552* (SING), fr.

26. *P. eriocalyx* H. J. Lam, l. c. 1925, 70, f. 16; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1234; Lam, l. c. 1927, 401; Heyne, l. c., ed. 3, 1, 1950, 1234.

Trees, c. 36 m. Branchlets terete or angular, 2—6 mm in diam., brownish ferruginously hirsute, glabrescent; terminal cone up to 12 mm long, hirsute; stipules linear-lanceolate, 9—11 by 1—1.5 mm, acute at apex, hirsute on outside, glabrous on inside, caducous. *Leaves* scattered, ovate or obovate, 11.2—20 by 5—12 cm, short obtusely or acutely acuminate, or acute at apex, acuminate up to 4 mm long, broadly cuneate at base, sometimes narrowly subtruncate according to Lam; immature leaves yellowish ferruginously tomentose-hirsute on either side, mature leaves glabrous above except sometimes along the midrib, tomentose-hirsute, subchartaceous; midrib grooved above, rounded below, secondary nerves 10—14 pairs, ascending at an angle of 55°, straight and curved at apex only, diminishing until inconspicuous near margin, prominulous above and grooved as well, prominent below, tertiary nerves slender, transverse, prominulous on either side. Petioles 1.4—3 cm long, grooved above, rounded or angular below, ferruginously hirsute. *Flowers* in 4—12-flowered, axillary clusters, pedicels angular, 5—9 mm long, yellowish or brownish ferruginously hirsute-villose. *Sepals* ovate-lanceolate, 3—4 by 2—3 mm, obtuse at apex, ferruginously hirsute-villose on outside, glabrous on inside, inner sepals slightly smaller than the outer ones, with glabrous, membranous margins. *Corolla* 5—6.5 mm long, glabrous on outside, ferruginously hirsute between base of stamens



and at apex, lobes oblong-elliptic, 3—4.5 by 2—2.5 mm, obtusely acuminate or truncate at apex. *Stamens* (15—)18, 3—4.5 mm long, filaments filiform, 1.5—2.5 mm long, sparsely brownish woolly-hirsute, anthers broadly deltoid, compressed, 2—3 mm long, acute, glabrous. *Ovary* conoid, c. 1.5—2 mm, 6-celled, ferruginously woolly puberulous. Style filiform, 5—7 mm long, glabrous. Immature *fruit* subglobose, at apex with a short remnant of the style.

Type specimen: *Labohm 1858* in BO.

Vernacular name: njato.

Use: The timber is used for tubs and boards. The fruit is said to be edible.

Ecology: In lowland forests.

Distribution: Borneo.

BORNEO. Balikpapan, Sungairiko: *Labohm 1858*, ex. litt., fl. Febr.; Berouw Inaran, alt. 50 m: *NIFS bb 12104* (BO, L), Oct.; Mt Sekrat, S of Sangkulirang, coral limestone rocks: *Kostermans 5904* (BO, L), tree 36 m, fl. buds July.

27. *P. barnesii* Merrill, Bur. Gvt. Lab. Publ. 6, 1903, 13; Dubard, Bull. Mus. hist. nat. 15, 1909, 383; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 278; Lam, l. c. 1925, 67; Lam, l. c. 1927, 401.

Trees, up to 40 m. Branchlets stout, 3—6 mm in diam., dark brown to greyish cinnamomously woolly, pubescence long persistent but finally branchlets glabrous; terminal cone broadly conoid, up to 5 mm long; stipules lanceolate-acicular, cartilaginous, up to 3 by 1 mm, acute, woolly without in the middle-line only, glabrous within, relatively long persistent but finally caducous. *Leaves* scattered, obovate to spatulate, 8—20 by 6—11 cm, apex rounded, entire or emarginate, base narrowly cuneate or subabruptly narrowed near petiole, decurrent along upper surface of petiole; woolly on either side but upper surface finally subglabrous, underside of midrib and nerves denser pubescent than the rest of the leaf, coriaceous to membranous; midrib grooved above, prominent and rounded below, secondary nerves 12—14 pairs, ascending at an angle of c. 45°, straight, curved at their tips only, diminishing until inconspicuous near margin of leaf, prominulous and grooved above, prominent below, tertiary nerves very slender, transverse, inconspicuous on either side. Petioles 10—18 mm long, grooved above, with a few ribs below, densely woolly-tomentose. *Flowers* in 5—10 (or more?)-flowered, axillary clusters, pedicels slender, 2.5—3.5 cm long, in fruit up to 5 cm long, woolly tomentose. *Sepals* triangular to ovate, 3—4 by 3—4 mm, apex acute, those of the inner ones obtuse, tomentose on outside, glabrous on inside and on outside along the margin of the inner sepals. *Corolla* c. 6.5 mm long, glabrous, lobes ovate-elliptic, c. 4.5 by 3 mm, apex rounded. *Stamens* 18, 3—4 mm long, entirely glabrous, filaments linear, c. 2 mm long, anthers ovoid, c. 2 mm long, acute, part of them dehiscing introrsely, the others extrorsely. *Ovary* conoid, c. 2.5 by 2.5 mm, brownish puberulous at apex only, passing gradually into the style, the latter 12—15 mm long, glabrous. *Fruits* narrowly ovoid to fusiform, sometimes slightly oblique, 3.5—4 by 1—1.4 cm, rounded at apex but with a short remnant of the style, 1-seeded, pericarp fleshy, glabrous. Seeds fusiform, c. 2.8 by 1.2 by 0.8 cm, obtuse at either end, testa thin, yellowish

brown, nitidous, scar as long as seed, c. 6 mm broad, light brown, embryo exalbuminous, radicle short, hardly exsert.

Type specimen: *Merrill 2757* in PNH.

Lectotype specimen: *Merrill 2757* in L.

Vernacular names: alakáak (Tagalog), nato (Panay Bisaya), palak-palak (Tagalog).

Ecology: In primary forests at low and medium altitudes.

Distribution: Luzon and Masbate.

LUZON. Bataan prov.: *Barnes 62* (= *FB 170*) (A), fl. Jan.; see also Merrill 1923, 278.

MASBATE. without known loc.: *Merrill 2757* (K, L, NY), fr. June.

28. *P. polyandrum* Robinson, Phil. J. Sc., Bot. 3, 1908, 212; Dubard, Bull. Mus. Hist. Nat. 15, 1909, 384; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 282; Lam, l. c. 1925, 76; Lam, l. c. 1927, 407 — *P. lepidotum* Robinson, msc. — *P. wenzelii* Merrill, msc.

Trees, c. 24 m. Branchlets stout, 7–10 mm in diam., covered with numerous leaf scars, ferruginously sericeous, glabrescent; terminal cone up to 12 mm long; stipules ovate-lanceolate, 9–12 by 3–4 mm, obtuse, crested on the back, when young ferruginously sericeous, but soon glabrous, long persistent, sometimes almost intrapetiolar. *Leaves* subconferted or conferted at apex of branchlets, obovate to oblanceolate, 21–43 by 7.5–16 cm, obtuse and short obtusely acuminate at apex, cuneate or subrotundate at base; sparsely ferruginously tomentose on either side (ultimately glabrous?), sometimes stronger so on upper side of midrib, subchartaceous; midrib broadly grooved above and minutely crested as well, prominent and rounded below, secondary nerves (10–)12–19 pairs, ascending at an angle of 40°–65°, curved or slightly S-shaped, stronger curved at their tips, archingly joined or connected by thickened tertiary nerves, prominulous above and grooved as well, prominent below, tertiary nerves slender, transverse, prominulous above, stronger so below. Petioles 1.2–3 cm long, indistinctly crested above, rounded below, glabrous. *Flowers* in 2–6-flowered, axillary clusters, in bud 7–15-flowered, pedicels angular, 15–23 mm long, greyish or ferruginously tomentose. *Sepals* broadly ovate, 4–5.5 by 4–6 mm, subacute or acuminate at apex, tomentose on outside, glabrous on inside, inner sepals with membranous and glabrous margins, fimbriate. *Corolla* 15–19 mm long, glabrous, when young shortly tomentose on outside, lobes oblanceolate, 13–16 by 3–4.5 mm, rounded or retuse at apex, fimbriate. *Stamens* 24–33, 9–11 mm long, glabrous, filaments filiform, 6–8 mm long, anthers lanceolate, 4–5 mm long, apiculate and truncate at apex, dehiscing laterally. *Ovary* broadly ovoid or discoid, c. 1.5 by 2 mm, 6–10-celled, glabrous. Style 2–3 cm long, glabrous. *Fruits* ellipsoid or ovoid, 2–2.2 by c. 1.9 cm, 1–(2–4)-seeded, pericarp thin, fleshy, glabrous. Seeds ellipsoid or obpyriform, 1.7–2 by c. 1.3 by c. 0.6 cm, testa thin, scar covering half the surface of the seed, embryo exalbuminous, radicle not exsert.

Type specimen: *Clemens 1017* in PNH.

Lectotype specimen: *Clemens 1155a* in L.

Vernacular names: bisukan-na-kálu, (Tagaká-ólo language), tagkan (Manóbo language), tipurus (Magindanáo language).

**Ecology:** In primary forests at low and medium altitudes up to 700 m.

**Distribution:** Philippines.

LEYTE. Dagami: *Ramos 15210* (K), fl. & fr. Aug.; Tacloban: *Wenzel 1724* (K), fl. buds, March; without known loc.: *Wenzel 1491* (G), fl. buds, July.

MINDANAO. Agusan prov., Cabadbaran (Mt Urdaneta): *Elmer 13660* (BO, FI, G, K, L), fr. & fl. buds, Aug.; Misamis prov.: *Miranda 17974* (K), fr. Jan./Febr.; Zamboanga prov., Malangas: *Ramos & Edaño 36901* (K), fr. Oct./Nov.; Lake Lanao, Camp Keithley: *Clemens 1155a* (BO, G, K, L), fl. & fr. Sept.

SAMAR. Mt Malignon: *Subit 6186* (L, PNH, SING), fl. April/May.

PANAY. f. Merrill, 1923, 282.

**Remarks.** According to Robinson the upper side of the leaves is said to be glabrous and the lower surface very densely and minutely lepidote, or when young somewhat ferruginous-tomentose, but I am unable to confirm this.

As this type specimen became lost during the war, among the material cited by Robinson *Clemens 1155a* has been chosen to represent the lectotype specimen.

## 29. *P. komakomar* van Royen, n. sp.

Arbor magna. Ramuli crassi, brunneo-nigri, lanato-tomentosi, glabrescentes? Folia obovato-spathulata, 35—41 × 12—15 cm, apice rotundata vel subacute acuminata, matura supra glabra, subtus dense ferrugineo-puberula. Nervi secundarii utroque latere 17—22, sursum evanescentes, tertiarii sparsi, transversi. Petiolus 1—2.5 cm longus, nigro-brunneo-tomentosus. Pedicellus cinereo-tomentosus. Sepala 6, in utroque latere brunneo-tomentosa. Corolla sicut ovarium et stylus ignoto. Fructus immaturus ellipsoideus, 6-locularis. Typus: *Hoogland 4521* in L.

Trees, c. 30 m tall. Branchlets stout, angular, c. 8 mm in diam., brownish black woolly-tomentose, glabrescent?; terminal cone up to 2 cm long, woolly-tomentose; stipules none (always?). *Leaves* subconferted at apex of branchlets, obovate-spathulate, 35—41 by 12—15 cm, rounded and subacutely acuminate at apex, narrowly cuneate at base, tapering along sides of petiole; subcoriaceous, juvenile leaves ferruginously tomentose on either side and woolly above on midrib, mature ones glabrous above, densely ferruginously puberulous below; midrib flat above, prominent and rounded below, secondary nerves 17—22 pairs, ascending at an angle of 70°—75°, curved, diminishing until inconspicuous near margin, distinct and prominulous above, stout and prominent below, tertiary nerves sparse, transverse, recurved near midrib with a reticulate nervation in between, prominulous on either side, but more distinct below. Petioles 1—2.5 cm long, flat above, rounded below, blackish brown tomentose. *Flowers* in many-flowered clusters but no further details known. Pedicel of juvenile fruit angular, c. 2.5 cm long, greyish tomentose. Calyx in fruit up to 6 mm in diam., sepals 6, lanceolate-ovate, up to 4.5 by 2.5 mm, rounded at apex, brownish tomentose on either side. Juvenile fruit ellipsoid, c. 6 by 3 mm, with an up to 5 mm on either side. Petioles stout, 1—2.5 by 0.4—0.7 cm, flat above, rounded long, glabrous, a remnant of the style at the acute apex, 6-celled, brownish tomentose.

Type specimen: *Hoogland 4521* in L.

Vernacular names: komakomar (Wanigela), Mo'a (Onjob language, Koreaf).

**Ecology:** In rainforests at low altitudes.

**Distribution:** New Guinea.

Southeastern New Guinea, Northern distr., near Budi Barracks, Tufi subdistrict, in tall rainforest, alt. 75 m: *Hoogland 4521* (L), tree c. 30 m, fr. young, green, Aug.

**Remarks.** Among the New Guinean species this one is immediately to recognize by its large leaves and by the calyx with its 2-sided pubescence.

**30. *P. pinnatinervium*** Elmer, *Leafl. Phil. Bot.* 8, 1915, 2819; Merrill, *Enum. Phil. Fl. Pl.* 3, 3, 1923, 282; Lam, l. c. 1925, 55; Lam, l. c. 1927, 399.

Trees, up to 25 m. Branchlets stout, up to 8 mm in diam., glabrous; terminal cone up to 4 cm long, glabrous; stipules ovate-lanceolate, 2—3.5 by 0.8—1.4 cm, acute, acuminate or aristate, crested on the back, on outside brownish puberulous in the basal part, glabrous on inside, twisted, rather long persistent but finally caducous. *Leaves* conferted at tips of branchlets, usually pandurate, sometimes obovate-oblong, 40—52 by 12.5—17 cm, retuse, rounded or obtuse at apex, broadly cuneate at base, shortly decurrent along upper surface of petiole; scattered ferruginously puberulous above or glabrous, densely finely greyish or yellowish brown puberulous below, sub-chartaceous; midrib broadly grooved above and minutely crested as well, prominent and rounded below, secondary nerves 25—32 pairs, ascending at an angle of 65°—75°, curved, stronger so at their tips, diminishing until inconspicuous near margin, curved, prominulous above and grooved as well, prominent below, tertiary nerves slender, transverse, rather dense, inconspicuous on either side. Petioles stout, 1—2.5 by 0.4—0.7 cm, flat above, rounded below, thickened in basal part, ferruginously tomentose. *Flowers* unknown. *Fruits* obliquely ellipsoid, 2.5—3.5 by 1.5—2 cm, obtuse, 1-seeded, pericarp thin, fleshy, ferruginously woolly, glabrescent. Seeds broadly ellipsoid, laterally compressed, c. 1.5 by 1.2 by 1 cm, rounded at either end, scar covering about  $\frac{1}{4}$  of the surface of the seed, blackish, embryo exalbuminous, radicle not exsert. Pedicels in fruit 3—5 cm long, ferruginously tomentose.

**Type specimen:** *Elmer 13896* in PNH.

**Lectotype specimen:** *Elmer 13896* in L.

**Vernacular name:** tagkan (Manóbo language).

**Ecology:** In primary forests up to 900 m altitude.

**Distribution:** Philippines.

MINDANAO. Agusan prov., Mt Urdaneta: *Elmer 13896* (BO, E, FI, G, L, NY), tree 20—25 m, fr. Sept.

**Remarks.** Resembles *P. gigantifolium* Merrill but differs in the pandurate leaves, the pubescence on the underside of leaves, and in the longer pedicels, especially in fruit.

As the type specimen in the Manila Herbarium became lost during the war a lectotype specimen is chosen from among the original material distributed to other herbaria.

**31. *P. decurrens*** H. J. Lam, l. c. 1925, 51, f. 8; Lam, l. c. 1927, 398.

Trees? Branchlets subterete to angular, 8—12 mm in diam., brownish sericeous, glabrescent; terminal cone 8—10 mm long, greyish and brownish sericeous; stipules lanceolate, up to 8 by 3 mm, acute, greyish and brownish sericeous, caducous. *Leaves* conferted at tip of branchlets, obovate, 20—35

by 9—13 cm, apex acute, shortly acuminate, rounded or emarginate, base narrowly cuneate, decurrent along upper side of petiole; glabrous above except greyish velutinous along midrib and scattered hairs on the surface, cinnamomously sericeous below, chartaceous-membranous; midrib narrowly grooved above in the basal, broadly grooved in the apical part, secondary nerves 20—25 pairs, ascending at an angle of 50°—60°, straight, curved at their tips only, diminishing until inconspicuous, minutely grooved above, prominent and rounded below, tertiary nervation transverse, prominulous on either side. Petioles 2—3.5 cm long, minutely grooved in the apical part, flat in the basal part, cinnamomous-brown or greyish sericeous, sometimes sparsely so. *Flowers* in few-flowered, axillary clusters, pedicels angular, c. 1.5 cm long, pubescent, in fruit up to 2.5 cm long, thickened at apex. *Sepals* lanceolate, c. 5 by 3 mm, rounded, ferruginously sericeous on outside, glabrous on inside, inner sepals narrower than outer ones, all sepals reflexed in fruit. *Corolla* up to 2 cm long, lobes lanceolate, c. 6.5 by 2 mm, apex obtuse, base on outside appressedly tomentose. *Stamens* 12, glabrous, c. 4.5 mm long, filaments subulate, c. 1 mm long, anthers ovoid, 3—4 mm long, apex obtusely acuminate, dehiscing laterally. *Ovary* subglobose, c. 1.5 by 2 mm, 6-celled, brownish pubescent at apex. *Style* subulate, 7—8 mm long, glabrous. *Fruits* ellipsoid to subobovoid, 2—3 by 1.5—2 cm, subacuminate, apex rugose, narrowed at base, 1-seeded, pericarp fleshy, glabrous. Seeds subglobose-ellipsoid, c. 2 by 1.5 cm, testa cartilaginous, scar covering half of the seed, dull, embryo exalbuminous, cotyledons thick, rugose-like on outside.

Type specimen: *Hallier 357* in BO.

Distribution: Borneo.

BORNEO. Indonesian Borneo, Lumukutan Island: *Hallier 357* (BO, L, NY), fl. & fr.

Remark. The fruit has been described after the Leiden material.

32. *P. stipulare* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 21; Lam, l.c. 1925, 57; Lam, l. c. 1927, 399 — *P. richardsii* K. Griffioen & H. J. Lam, Kew Bull. 1927, 1927, 17.

Trees, c. 24 m. Branchlets stout, (5—)8—10(—12) mm in diam., with distinct scars of stipules, leaves and flowers, cinnamomously tomentose, glabrescent; terminal cone up to 14 mm long; stipules squamiform, up to 12 by 6 mm, obtuse or acute, tomentose on outside in the central part only, glabrous on inside, caducous. *Leaves* scattered, broadly obovate, 14—29 by 7.5—16 cm, rounded at apex, broadly cuneate at base, shortly decurrent along upper side of petiole; glabrous above except sparsely whitish tomentose along the midrib and a few scattered hairs on the surface, yellowish brown appressedly tomentose below, subcoriaceous; midrib broadly grooved above, prominent and rounded below, secondary nerves 15—20 pairs, ascending at an angle of c. 55°, straight, curved near margin and diminishing until inconspicuous, prominulous above, prominent below, tertiary nerves slender, transverse, inconspicuous above, indistinct or invisible below by the pubescence. Petioles 18—23 mm long, grooved above, cinnamomously tomentose. *Flowers* in 2—6-flowered, axillary clusters, pedicels terete, angular at apex, 2—6 cm long, cinnamomously tomentose. *Sepals* 6 or 7, the 3 or 4 inner

ones larger than the outer ones, the latter ovate-elliptic, 5.5—8 by 5.5—7.5 mm, subacute at apex, ferruginously or cinnamomously appressedly tomentose on outside, glabrous on inside, the inner sepals ovate, 9—10 by 6—7.5 mm, obtuse, slightly crested on outside, margins glabrous and membranous. *Corolla* up to 18 mm long, whitish tomentose on outside on the tube and the central part of the lobes, glabrous on inside, lobes elliptic-oblong, up to 16 by 6 mm, obtuse. *Stamens* 22—27, up to 10 mm long, filaments lanceolate-oblong, 2—3.5 mm long, whitish tomentose, anthers narrowly sagittate, 5.5—7 mm long, apex aristulate, sparsely ferruginously pubescent, dehiscing extrorsely or laterally. *Ovary* ovoid, c. 2 by 2 mm, 8—12-celled, cinnamomously pubescent, at base with an annular disk. Style filiform, up to 20 mm long, glabrous except at base. *Fruits* unknown.

Type specimen: *Beccari 1549* in P.

Ecology: In forests at low altitudes.

Distribution: Borneo.

BORNEO. Sarawak, Mattang: *Beccari 1549* (FI, P), fl. May; Mt Dulit, near Long Kapa: *Richards 2605* (L, SING), tree 24 m, fl. white, Febr., type specimen of *P. richardii* Gr. & Lam.

33. *P. herveyi* King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr. 17, 1905, 197; Ridley, Fl. Mal. Pen. 2, 1923, 276; Lam, l. c. 1925, 38; Lam, l. c. 1927, 395; Wyatt-Smith, Research Pamphlet 4, 1954, 35.

Trees, up to 45 m. Branchlets angular, 2—2.5 mm in diam., greyish or greyish ferruginous puberulous, glabrescent; terminal cone up to 3 mm long, puberulous; stipules triangular-lanceolate, c. 3 by 1.5 mm, acute at apex, ferruginously tomentose on outside, glabrous on inside, caducous. *Leaves* subconferted at tip of branchlets, broadly obovate, 5—9(—12) by 3.2—5 cm, rounded, shortly obtusely acuminate at apex, cuneate at base, decurrent along sides of petioles; sparsely greyish puberulous above along midrib and secondary nerves, glabrescent, sparsely ferruginously puberulous below, subcoriaceous; midrib angular on either side, or grooved above and/or rounded below, secondary nerves 5—9 pairs, ascending at an angle of 45°, curved, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves transverse, very slender, inconspicuous above, hardly visible below. Petioles 0.8—2 cm long, crested or flat above, rounded below, sparsely rusty or greyish pubescent, subglabrescent. *Flowers* in 2—6-flowered, axillary clusters, pedicels angular, ferruginously tomentose. *Sepals* ovate, 2—2.5 by 1.5—1.7 mm, subobtuse at apex, ferruginously puberulous-tomentose on outside, glabrous on inside, plumose at apex, inner sepals lanceolate-ovate, c. 2 by 1.5 mm, obtuse, glabrous on outside along the membranous, fimbriate margins, otherwise similar to the outer ones. *Corolla* c. 4 mm long, on outside ferruginously sericeous on tube and base of lobes, on inside hirsute between the filaments, lobes oblong-ovate, c. 3.5 by 1.5 mm, rounded and plumose at apex, patent in anthesis. *Stamens* 12, 3—5 mm long, filaments filiform, 1—2 mm long, glabrous, anthers ovoid-oblong, c. 1.5 mm long, truncate-acuminate at apex, ferruginously hirsute, dehiscing extrorsely. *Ovary* subglobose, c. 0.7 by 1 mm, very sparsely ferruginously tomentose. Style subulate, 5—7.5 mm long, glabrous. *Fruits* ellipsoid, 9—13 by 7—9 mm, 1-seeded, obtuse, pericarp thick, glabrous.

Seeds fusiform, c. 7 by 2.5 mm, blackish, scar covering half of seed, greyish.

Type specimen: *Hervey s.n.* in K.

Vernacular name: nyatoh putih.

Ecology: In rainforests at low altitudes.

Distribution: Malaya.

MALAYA. Malacca, without known loc.: *Hervey s.n.* (K), fl.; Bukit Sedaman For. Res.: *Bakar 25321* (KEP), tree 11 m, Nov. — Perak, Ijok For. Res.: *KEP 65553* (KEP), tree 26 m, Aug.; P. Tanjong For. Res.: *Larut 13238* (KEP), tree 20 m, May; without known loc.: *Azie Budin 363* (KEP), tree 16 m, fr. Febr.; *Symington 37870* (KEP), Aug.; *Symington 37879* (KEP), Aug.; *Symington 68152* (KEP), Oct. — Negri Sembilan, Senaling Inas For. Res.: *Ibrahim 42821* (KEP), tree 45 m, Nov. — Pahang, Kuantan, Bukit Beserat For. Res.: *KEP 65684* (KEP), tree 36 m, Jan. — Selangor, Ulu Gombak For. Res., Kuala Lumpur, *Zainuddin Tuah 75873* (KEP, L), tree 2 m, fl. buds Nov.

34. *P. elliptilimum* Merrill, Phil. Journ. Sc. 27, 1925, 46; Merrill, Enum. Phil. Fl. Pl. 4, 1926, 253; Lam, l. c. 1927, 412.

Trees. Branchlets terete, up to 5 mm in diam., minutely golden-brown pubescent, glabrescent; terminal cone up to 7 mm long, greyish puberulous; stipules lanceolate, up to 5 by 1.5 mm, acute, pubescent on outside, glabrous on inside, caducous. Leaves scattered, elliptic, 6—12 by 3—7 cm, rounded or obtusely acuminate at apex, cuneate at base and shortly decurrent along upper side of petiole; glabrous above, golden-brown tomentose below when young but soon glabrous, coriaceous; midrib broadly grooved above and minutely crested, prominent and rounded below, secondary nerves 8 or 9 pairs, ascending at an angle of c. 45°, curved, stronger so at their tips, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves transverse, slender, grooved above, prominulous below. Petioles 1.5—3 cm long, narrowly grooved above, rounded below, glabrous. Flowers in 3—7-flowered, axillary clusters, pedicels angular or rounded, 2—2.5 cm long, yellowish appressedly puberulous. Sepals ovate to broadly ovate, 3—4 by 2.5—3.5 mm, rounded or obtuse at apex, ferruginously tomentose on outside, glabrous on inside, inner sepals with glabrous and membranous margins, sparsely fimbriate. Corolla 8—10 mm long, glabrous on either side, lobes ovate-elliptic, 5—6.5 by 2.5—3.5 mm, obtuse or sub-obtuse at apex. Stamens 12, 5—6.5 mm long, filaments subulate, 2—3 mm long, glabrous, anthers ovoid, 3.5—4 mm long, ferruginously hirsute, dehiscing extrorsely. Ovary ovoid, c. 1.5 by 2.5 mm, 6-celled, 6-lobed, glabrous, style filiform, 6-ribbed, up to 11 mm long, glabrous. Fruits unknown.

Type specimen: *Loher 13867* in PNH.

Lectotype specimen: *Loher 13867* in K.

Distribution: Luzon, Polillo.

LUZON. Prov. Rizal, Montalban: *Loher 13867* (K), fl. April.

POLILLO ISLAND. Anibawan: *Castro PNH 6517* (A, L, PNH, SING), tree 7 m, fl. Dec.

35. *P. crassifolium* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 23; Lam, l. c. 1925, 35; Lam, l. c. 1927, 391.

Trees? Branchlets subterete, 2—2.5 mm in diam. (or more?), brownish pilose but soon glabrous; terminal cone up to 5 mm long; stipules lanceolate,

up to 4 by 2 mm, apex acute, pale brownish tomentose on outside, ferruginously woolly on inside, caducous. *Leaves* scattered, obovate to elliptic-obovate, 8—10 by 3—2.6—5 cm, apex obtuse to very slightly obtusely acuminate, base cuneate, shortly decurrent along adaxial side of petiole; glabrous above, scattered whitish puberulous below, thin-coriaceous; midrib prominulous above, prominent and rounded below, secondary nerves 6 or 7 pairs, ascending at an angle of (35°—)40°—45°, straight and curved at their tips only, diminishing until inconspicuous, prominulous above, prominent below, tertiary nerves transverse, few, indistinct on either side. Petioles 10—16 mm long, flat above, slightly thickened and rugulose in the basal part, ferruginously pilose, glabrescent. *Flowers* in 2- or 3-flowered, axillary clusters, pedicels 3—7.5 mm, ferruginously tomentose. *Sepals* 4 or 5, ovate, 2—2.5 by 1.8—2.2 mm, obtusely acuminate, ferruginously tomentose on outside, glabrous on inside, inner sepals ciliate along margin. Corolla and stamens not seen but according to Pierre's description and drawings: "*Corolla* 6.5 mm long, tube 2.5 mm, lobes 4 or 6, elliptic-spathulate, c. 4.2 by 2.2 mm, obtuse, margins pilose, villose between the stamens, otherwise glabrous. *Stamens* usually 12, sometimes 9, inserted at the base of the lobes, 4.2—4.6 mm long, filaments subulate, 2—2.3 mm, villose, anthers cordate-ovate, 2—2.4 mm, apex apiculate, sparsely hairy." *Ovary* compressedly globose, c. 1 by 2 mm, glabrous, 6-celled. Style filiform, 6—8 mm long, glabrous. *Fruits* unknown.

Type specimen: *Beccari 2099* in P.

Distribution: Borneo.

Sarawak, without loc.: *Beccari 2099* (FI, P), fl.

36. *P. multiflorum* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 23; Lam, l. c. 1925, 91, f. 25; Lam, l. c. 1927, 410; Jeuken, Blumea 6, 3, 1952, 579 — *Isonandra emarginata* H. J. Lam, l. c. 1927, 420, f. 8; Jeuken, l. c., 578.

Trees, c. 8 m high. Branchlets slender, angular, 1.5—3 mm in diam., ferruginously sericeous but rather soon glabrous; terminal cone c. 3 mm long, ferruginously sericeous, cone sometimes replaced by flowers; stipules triangular-lanceolate, c. 1.5 by 1 mm, apex acute, sericeous on outside, glabrous on inside. *Leaves* scattered, elliptic, obovate or obovate-rotundate, 3—5(—9.5) by 1.5—3(—4.5) cm, apex rounded, emarginate or short obtusely acuminate, base broadly cuneate, subabruptly narrowed near petiole, decurrent along sides or petioles; young ones ferruginously mainly on the nerves, mature ones glabrous, coriaceous; midrib crested above, prominent and rounded below, secondary nerves 5—7 pairs, curved, ascending at an angle of c. 65°, diminishing until inconspicuous near margin, prominulous or grooved above, prominulous below, tertiary nerves slender, transverse, few, hardly visible above, prominulous below. Petioles 7—9 mm long, flat or broadly grooved above, greyish tomentose when young, mature ones glabrous. *Flowers* in 3—7-flowered, apical or axillary clusters, pedicels angular, 5—8 mm long, ferruginously tomentose. *Sepals* 5, 6 or 7, in 2 whorls of 3, or imbricate, ovate, c. 1.5 by 2 mm, apex subobtuse, ferruginously tomentose on outside, whitish tomentose on inside, inner sepals with membranous margins, on inside sparsely puberulous or almost glabrous.



*Corolla* seen in bud only, c. 2 mm long, glabrous on either side, lobes ovate-elliptic, c. 1.5 by 1 mm, apex obtuse. *Stamens* 9, 10 or 11—13, c. 1 mm long, filaments subulate, c. 0.8 mm long, glabrous, curved downwards at apex, anthers lanceolate, c. 0.6 mm, apex rounded or truncate, ferruginously tomentose, alternipetalous stamens shorter than the epipetalous. *Ovary* ellipsoid, c. 1 by 1 mm, 4—6-celled, ferruginously hirsute. Style subulate, c. 1.2 mm long, glabrous. *Fruits* not seen but according to Lam 1927: "ovoid, c. 1.5 by 1 cm, subacute at apex, glabrous, with a short remnant of the style at apex. Seeds unknown."

Type specimen: *Beccari 1439* in P.

Ecology: In rainforests at low altitudes.

Distribution: Borneo.

BORNEO. Sarawak, Mattang: *Beccari 1439* (FI, G, L, NY, P, S); near Kuching: *Haviland 1890* (BM, L), fl.; Sungei Rambungan: *Omar 114* (f. Lam 1927), tree 18 m, fr. Sept.; without known loc.: *Beccari 2490* (G), doubtful specimen.

Remark. The specimens mentioned by Lam 1925, 91, do not belong to this species but represent *Palaquium ridleyi* King & Gamble. The drawing therefore included in Lam's paper also refer to that species.

37. *P. walsurifolium* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 22, sphalm. *walsuraefolium*; Lam, l. c. 1925, 77, 256, f. 20; Lam, l. c. 1927, 407; Heyne, Nutt. Pl. Ned-Indie, ed. 3, 1, 1950, 1241.

Trees, up to 37 m, with stiltroots. Branchlets slender, 2—3.5 mm in diam., greyish ferruginously tomentose, glabrescent; terminal cone up to 4 mm long, ferruginously tomentose; stipules triangular-lanceolate, up to 3 by 2.5 mm, acute, tomentose on outside, but glabrous along the margins, glabrous on inside, caducous. *Leaves* scattered or subconferted at tip of branchlets, obovate or rounded-obovate, 4—9.5 by 2—4.5 cm, rounded or sometimes short obtusely acuminate at apex, long decurrent along upper side of petiole; subcoriaceous, glabrous on either side, but when immature yellowish brown pubescent below but soon entirely glabrous, subcoriaceous; midrib subimpressed above, prominent and rounded below, secondary nerves 7—10 pairs, ascending at an angle of c. 60°, curved, diminishing until inconspicuous near margin of leaf, grooved above, prominent below, tertiary nervation transverse, invisible to inconspicuous above, prominent below. Petioles 10—25 mm long, broadly grooved or flat above, thickened in the basal half, ferruginously or greyish tomentose when young but soon entirely glabrous. *Flowers* in 2—4-flowered, axillary clusters, pedicels terete, 3.5—7 mm long, in fruit 13—20 mm, ferruginously tomentose. *Sepals* suborbicular or ovate, 2.5—3.5 by 2—2.5 mm, obtuse or obtusely subacuminate, ferruginously or greyish puberulous on outside, but glabrous along the fimbriate margin and on inside, inner sepals more elliptic than outer ones. *Corolla* glabrous on either side (according to Lam, 1925 only slightly villose in the throat), 6—7 mm long, lobes ovate-elliptic, up to 4 by 2 mm, obtuse. *Stamens* 12, c. 3.5 mm long, filaments filiform, c. 2.5 mm long, widened at base, glabrous or slightly woolly at base, anthers ovoid-ellipsoid, 1—1.5 mm long, rounded and bifid at apex, glabrous, dehiscing lateral-extrorsely. *Ovary* discoid, c. 0.5 by 1.5 mm, pale ferruginously tomentose. Style filiform, 5—8 mm long, glabrous. *Fruits* globose or ellipsoid, 1—2 cm in diam.,

1-seeded, obtuse or subobtuse, sometimes with a short remnant of the style, pericarp fleshy, glabrous. Seeds ellipsoid, 7—14 by 5—7 mm, scar linear, covering about  $\frac{1}{3}$  of the surface of the seed, greyish, embryo exalbuminous, radicle small, not exsert.

Type specimen: *Beccari 557* in P.

Vernacular names: Malaya: bunga tanjong, nyatoh kelalang; Sumatra: balam putih, b. séréndit, b. sudu, b. tambaga; Borneo: beitis, mergetahan, njatoh babi, njatoh jangkar.

Ecology: Growing in marshy forests at low altitudes or on peaty, never inundated soils.

Distribution: Malaya, Sumatra, Borneo.

MALAYA. Mt Sedili For. Res.: *Omar 52* (SING).

SUMATRA. Bengkalis, Kempastinggi: *NIFS bb 24445* (BO, L, SING), June; ibidem: *NIFS bb 24448* (BO, L, SING), June; Rantau Pandjang: *NIFS 24440* (BO, L), May; Kelapapali: *NIFS bb 25251* (BO, L), fr. Aug.; Palembang, Lematang Ilir, alt. 100 m: *NIFS bb 31981* (BO, L), fl. buds June; without known loc.: *Daud 11335* (K, SING), tree 30 m, fr.

BORNEO. Sarawak, Kuching: *Beccari 557* (FI, G, L, NY, P, S), fr. Sept.; Setapok For. Res., low-lying forest: *Carroll 7172* (SING), fr. Febr.; ibidem: *SAR 4773* (L, SAR), tree 14 m, June — Indonesian Borneo, Preihari, Kintap, alt. 150 m: *NIFS bb 12888* (BO, L), fl. Sept.; Sibuh, Rejang river: *Haviland 1875* (K, L), fl. & fr. Oct.

38. *P. macrocarpum* Burck, Ann. Jard. bot. Btzg 5, 1886, 32, t. 10, f. 5 & 6; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 17; Lam, l. c. 1925, 79, f. 21 and 22; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1237; Lam, l. c. 1927, 408; Heyne, l. c., ed. 3, 1, 1950, 1237 — *Treubella macrocarpum* (Burck) Pierre, Not. bot. Sapot., 1891, 5; Boerlage, Handl. Fl. Ned.-Ind. 2, 1, 1891, 310.

Trees, up to 45 m. Branchlets angular, 3—5 mm in diam., puberulous at apex, otherwise glabrous; terminal cone up to 6 mm long, puberulous; stipules lanceolate, up to 3 by 1.5 mm long, acute, puberulous on outside, but glabrous along the margins, glabrous on inside, caducous. Leaves scattered, or subconferted at tip of branchlets, obovate, elliptic or oblong, sometimes ovate-oblong, 8—13(—25) by 3.5—6(—10) cm, short or long obtusely acuminate, acumen up to 3 mm long, base broadly cuneate, rarely rounded, shortly decurrent along upper side of petiole; glabrous above, sparsely finely ferruginously tomentose below, but ultimately glabrous, coriaceous; midrib shallowly grooved above, rounded below, secondary nerves 8—12 pairs, ascending at an angle of c. 55°, curved, diminishing until inconspicuous near margin, prominulous above, prominent below, tertiary nerves slender, transverse, prominulous but distinct on either side. Petioles 1.6—3.5 cm long, narrowly grooved above, prominent below, puberulous. Flowers in 5—8-flowered, axillary clusters, sometimes in two groups of 6 or more flowers, pedicels subangular, 5—13 mm long, ferruginously appressedly puberulous. Sepals ovate-triangular, 2—3 by 2—3 mm, subobtuse to acute, ferruginously puberulous on outside, glabrous on inside, inner sepals more roundish, with membranous and glabrous margins, fimbriate. Corolla 8—10.5 mm long, glabrous or rarely with a few scattered hairs on outside of lobes, the latter ovate-oblong, 6—7.5 by 2.5—3 mm, subacuminate or obtuse, recurved when in flower. Stamens 12, 5—6.5 mm long, filaments

3—4 mm long, glabrous, anthers oblong-ovoid, 2.5—3 mm long, acuminate, sparsely ferruginously sericeous, dehiscing extrorsely. *Ovary* semi-globose, c. 1 by 1.5 mm, 6-celled, 12-lobed, ferruginously puberulous, at base surrounded by a thick, annular, glabrous disk. Style slender, 6-grooved, 1.5—2 cm long, glabrous. *Fruits* ovoid or ellipsoid, up to 11 by 9 cm, 1—3-seeded, rounded or obtuse at apex, pericarp fleshy, glabrous. Seeds ellipsoid or ovoid when solitary, rounded at either end, 3.5—6 by 2.5—3 by 1.8—2.3 cm, testa thick, brown, scar covering almost the entire seed, grey, seeds when more together laterally compressed and scar smaller than in the solitary seeds; embryo with strongly wrinkled surface, exalbuminous, radicle short, not exsert.

Type specimen: *Teysmann s.n.* (cultivated as *IV. B. 12*) in BO.

Vernacular names: Malaya: njatu hitam; Sumatra: balam, balam mayang, balam epung, njato kaju balam, njato sudu sudu, pientek kaju, pintak kaju, punti, punti kaju.

Ecology: In primary forests at low altitudes, up to 1000 m.

Distribution: Sumatra, Malaya, Batjan, probably also Amboina and Celebes?

SUMATRA. Tapanuli, Sibolga, Barus, alt. 25 m: *NIFS bb 31569* (BO, L) — Indragirian Uplands, Pagarumbei, Tjenako river: *NIFS bb 26078* (BO, L), Oct., without known loc. and later cultivated in Hortus Bogoriensis: *Teymann s.n.* (= *HB IV. B. 12*) (BO, NY, SING), fl. — Sumatra West Coast, Taram, Bukit Pantai, alt. 508—600 m: *Meyer 7154, 7161* (L), tree 4 m, fl. buds July; ibidem, sandstone region of Tjampo river, alt. 500—1000 m: *Meyer 6802* (L), tree, fl. buds Aug.

MALAYA. Perak, Ulu Kenderong Grik: *Hamid 11032* (KEP, SING), tree 30 m — Singapore, Botanical Gardens: *Nur 1492* (SING) March.

BATJAN. without known loc.: *de Fretes 5616* (BO, L).

CELEBES. f. Lam, 1925, dubious specimen.

AMBOINA. f. Lam, 1925, dubious specimen.

### 39. *P. vexillatum* van Royen, n. sp. — Fig. 6.

Arbor magna. Ramuli graciles, ferrugineo-sericei, glabrescentes; stipulae lineares, acutae, caducae. Folia ovata, ovato-elliptica, elliptico-obovata vel obovata, 5.5—11 × 2.5—6 cm, apice anguste obtuse acuminata, supra glabra, subtus sparse ferrugineo-tomentosa. Nervi secundarii utroque latere 8—10, sursum evanescentes, tertiarii transversari. Petiolus 1.4—2.3 cm longus, sparse ferrugineo-sericeus. Pedicellus 0.15—0.3 cm longus, ferrugineo-sericeo-tomentosus. Sepala 6, extus ferrugineo-tomentosa, intus glabra. Corolla glabra, sed apice loborum fimbriata. Stamina 12; filamenta glabra; antherae dense ferrugineo-sericeae. Ovario 6-loculare, sparse ferrugineo-sericeum; stylus glaber. Fructus ignotus. Typus: *Kosterman 7325* in L.

Trees, c. 35 m tall. Branchlets slender, angular, 2—4 mm in diam., ferruginously sericeous, relatively soon glabrous; terminal cone up to 7 mm long, with the same pubescence as the branchlets; stipules linear, lax, 6—9 mm long, acute, twisted, with long ferruginous hairs on outside, glabrous on inside, caducous. *Leaves* scattered, ovate, ovate-elliptic, elliptic-obovate or obovate, 5.5—11 by 2.5—6 cm, narrowly obtusely acuminate at apex, acumen 2—5 mm long, base broadly cuneate, decurrent along sides of petioles; glabrous above, scattered ferruginously tomentose below, chartaceous; midrib grooved above and minutely crested as well, rounded and prominent below, secondary nerves slender, 8—10 pairs, ascending at an angle of c. 55°, slightly curved but stronger so at their tips and diminishing until inconspicuous along the margin, prominulous on either side, tertiary

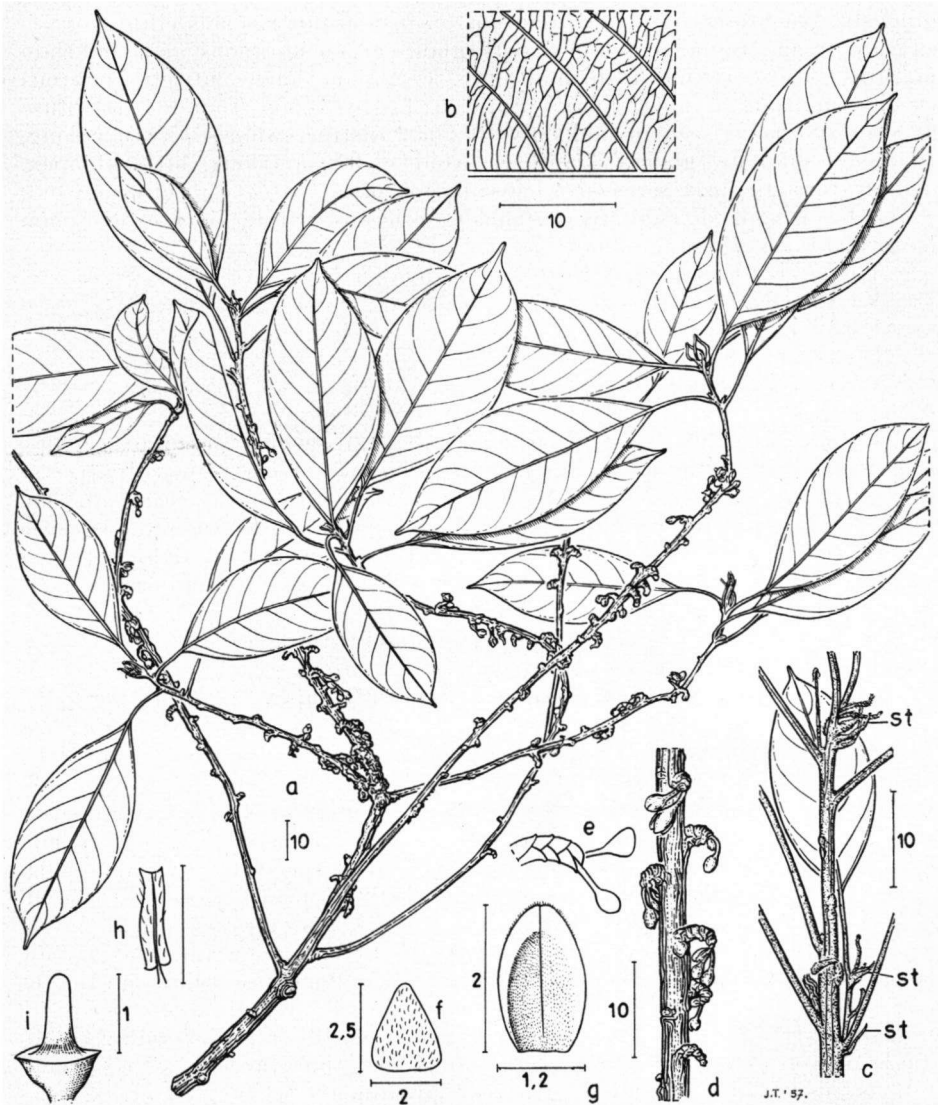


Fig. 6. *P. vexillatum*, a. branchlet with leaves and flowerbuds; b. tertiary nervation of leaf; c. apex of branchlet showing stipules (st); d. part of branchlet with inflorescences; e. part of inflorescence; f. outer sepal, outside; g. inner sepal, inside; h. stamen; i. gynaeceum (*Kostermans 7325*, in a. and d. pubescence omitted).

nerves slender, transverse, prominulous on either side. Petioles 1.4—2.3 cm long, grooved above, rounded below, sparsely ferruginously sericeous. *Flowers* in 2—4-flowered, axillary clusters or along an up to 5 mm long brachyblast with scars of bracts, pedicel 1.5—3 mm long, terete, ferruginously appressedly tomentose. Outer *sepals* triangular-ovate, c. 2.5 by 2 mm, subacute, ferru-

ginously tomentose on outside, glabrous on inside, inner sepals elliptic-ovate, c. 2 by 1 mm, rounded at apex, with glabrous, membranous and fimbriate margins. *Corolla* known in bud only, c. 2 mm long, entirely glabrous except fimbriate at apex, lobes elliptic, c. 1.5 by 1 mm, rounded or obtuse at apex. *Stamens* seen in bud only, 12, in 2 distinct whorls, c. 1 mm long, filaments subulate, glabrous, anthers ovoid, c. 0.8 mm long, bifid at apex, densely ferruginously sericeous, dehiscent extrorsely. *Ovary* disciform-ovoid, c. 0.5 by 1 mm, sparsely ferruginously sericeous. Style clavate, c. 1 mm long, glabrous. *Fruits* unknown.

Type specimen: *Kostermans 7325* in L.

Vernacular name: njato.

Ecology: In forests at c. 600 m altitude.

Distribution: Borneo.

Indonesian Borneo, Peak of Balikpapan, Beoul, alt. 600 m, on sandstone: *Kostermans 7325* (BO, L), tree 35 m, fl. buds brown, July.

Remarks. The most striking of all details which distinguishes this species against all other species, except *P. simun* from New Guinea, are the long, slender, twisted stipules which protrude from the terminal cone like small flags. From this flag-like appearance of these stipules the specific epithet has been derived. From *P. simun* this new species differs in the smaller number of secondary nerves of the leaves (8—10 against 10—12), in the much longer petiole (1.4—2.3 cm against 0.5—0.8 cm), in the sparse pubescence of the underside of the leaves and in the glabrous corolla.

In appearance this species resembles *P. ridleyi* of which, however, it differs by the much longer stipules and the bifid apex of the anthers.

40. *P. lisophyllum* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 7; Lam, l. c. 1925, 73; Lam, l. c. 1927, 403.

Trees. Branchlets terete, 2—4 mm in diam., brownish ferruginously pubescent, glabrescent, greyish and grooved; terminal cone up to 7 mm long, brownish ferruginously pubescent; stipules lanceolate, 4—6 mm long, apex acute, brownish ferruginously pubescent, caducous. *Leaves* scattered, oblong-elliptic, 15—19 by 6—8 cm, apex obtusely acuminate, acumen 2—5 mm, base broadly cuneate to rounded, shortly decurrent along the adaxial side of the petiole, glabrous above, scattered brownish tomentose below but denser and sericeous on the midrib, papyraceous; midrib prominulous above, prominent and rounded below, secondary nerves c. 13 pairs, ascending at an angle of (50°—)60°—65°, curved, diminishing until inconspicuous, prominulous above and shallowly grooved, prominent below, tertiary nerves transverse, slender, rather numerous, distinct on either side but prominulous. Petioles 16—19 mm long, flat above and crested, brownish ferruginously puberulous. *Flowers* solitary or in up to 4-flowered, axillary clusters, pedicels up to 3 mm long, brownish ferruginously puberulous. *Sepals* ovate, 4—5 by 3—3.5 mm, obtuse, brownish puberulous on outside, glabrous on inside, outer sepals woolly at apex, margin of inner sepals fimbriate in the basal part. *Corolla* 4—5 mm long, glabrous on outside, ferruginously tomentose on inside between the stamens, lobes elliptic, 2.5—4 by 2.5—3 mm, obtuse. *Stamens* 11 or 12, c. 2.5 mm long, filaments stout, c. 0.5 mm long, with long ferruginous hairs, anthers sagittate, c. 2 mm long, acute or bifid,

dehiscing extrorsely. *Ovary* obovoid, c. 1 by 1.5 mm, 6-celled, 12-lobed, glabrous in the basal part, ferruginously puberulous in the apical part. Style subulate, c. 4 mm long, with 6 lighter coloured stigmas at apex, ferruginously puberulous at the base. *Fruits* unknown.

Type specimen: *Beccari 3286* in FI.

Distribution: Borneo.

BORNEO. Sarawak, Marop: *Beccari 3286* (FI), fl. April.

41. *P. petiolare* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 9; Lam, l. c. 1925, 107; Lam l. c. 1927, 414 — *Dichopsis petiolaris* Thwaites, Enum., 1864, 176; Bentham & Hooker, Gen. Pl. 2, 1876, 658; Clarke in Hooker f., Fl. Br. Ind. 3, 1882, 541 — *Bassia petiolaris* (Thwaites) Beddome, For. Man., 1871, 140; Beddome, Fl. Sylv., 1869—1873, t. 254.

Tall trees. Branchlets terete, 4—7 mm in diam., glabrous (always?); terminal cone ovoid, up to 6 mm long, greyish puberulous; stipules lanceolate, up to 3 by 1.5 mm, acute, greyish puberulous on outside, glabrous on inside, caducous. *Leaves* scattered, broadly elliptic or elliptic-obovate, (9—)10—14 by (3—)4.5—6.5 cm, apex subabruptly obtusely acuminate, acumen 2—6 mm long, base narrowly cuneate, contracted and long decurrent along sides of petioles; glabrous on either side, subcoriaceous; midrib sub-impressed above, prominent and subangular below, secondary nerves 13—16 pairs, ascending at an angle of 60°—65°, slightly curved, stronger so at their tips and diminishing until inconspicuous, grooved above, prominent below, tertiary nerves transverse, grooved above, distinct but prominulous. Petioles 1.5—4 cm long, flat above, angular or subangular below, glabrous. *Flowers* solitary or 2—5 in each axil of leaf or scar, pedicels angular, 2.5—3 cm long, ferruginously tomentose. *Sepals* ovate, 5.5—7 by 4—5.5 mm, obtuse at apex, ferruginously tomentose-sericeous on outside, glabrous on inside except along the margins, inner sepals with membranous and glabrous margins, fimbriate along outer edge. *Corolla* 9—11.5 mm long, glabrous on outside, ferruginously pilose in throat, lobes ovate-lanceolate, 5.5—7.5 by 2.5—3 mm, obtuse at apex. *Stamens* 12, 5—7.5 mm long, filaments filiform, 2—3.5 mm, densely ferruginously pilose, anthers compressedly oblong-ovoid, 3.5—4 mm long, apex bifid, with a few ferruginous hairs on the back, dehiscing extrorsely. *Ovary* ovoid, c. 1.5 by 2 mm, 6-celled, with a few ferruginous hairs, at base surrounded by an up to 1 mm high disk. Style filiform, c. 1.5 cm long, glabrous, articulate shortly above ovary and differently coloured there. *Fruits* subglobose, up to 3.2 by 2.3 by 1.9 cm, 1-seeded, rounded, pericarp thin, woody, glabrous. Seeds incompletely known, scar covering at least  $\frac{1}{4}$  of the surface of the seed.

Type specimen: *Thwaites 3012* in K.

Distribution: Ceylon.

CEYLON. Ambagamowa distr., Hinidoon & Reigam Corles: *Thwaites 3012* (A, BO, CAL, G, K, L, US), fl. & fr.

42. *P. dasyphyllum* (de Vriese) Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 8; Lam, l. c. 1925, 73; Lam, l. c. 1927, 405 — *Isonandra dasyphylla* de Vriese, Nat. Tijdschr. Ned. Ind. 21, 1860, 307; de Vriese, J. bot. néerl. 1, 1861, 256; Beauvisage, Contr. Etude Org. bot.

Gutta-Percha, 1881, 34 — *Palaquium stenophyllum* H. J. Lam, l. c. 1925, 97, f. 28; Lam, l. c. 1927, 411; Merrill, Pl. Elm. Born. 1929, 238.

Trees, c. 25 m. Branchlets slender, 2—4 mm in diam., ferruginously or reddish tomentose or woolly, as are the terminal cone and stipules, pubescence persisting rather long, finally branchlets glabrous; terminal cone up to 12 mm long; stipules linear-lanceolate, up to 9 by 2 mm large, apex acute, sometimes dorsally crested, tomentose on either side, persisting rather long, finally caducous. *Leaves* scattered, obovate, oblong or elliptic, 12—21 by 5—9 cm, apex obtuse or rounded and obtusely acuminate, acumen up to 10 mm long, base cuneate to subrotundate, rarely rounded, shortly decurrent along adaxial side of petiole, glabrous on either side except sometimes the basal part of upper side of midrib and brownish or ferruginously woolly-tomentose on the lower side of the midrib, and sometimes of the nerves, chartaceous to subcoriaceous; midrib grooved above, prominent and rounded below, secondary nerves 7—12 pairs, ascending at an angle of 45°—70°, slightly curved but usually straight and curved at their tips only, diminishing until inconspicuous near the margin, prominulous and grooved above, prominent below, tertiary nerves very slender, transverse, inconspicuous on either side but sometimes more distinct below than above. Petioles (6—)10—20 mm long, usually flat above, sometimes slightly grooved in the apical part only, brownish or ferruginously woolly-tomentose, sometimes partly glabrescent. *Flowers* in 5—11-flowered, axillary clusters, pedicels angular, 8—16 mm long, brownish or ferruginously woolly-hirsute or tomentose. *Sepals* ovate-oblong to lanceolate-linear, 3—4 by 1.5—2 mm, apex acute or obtuse, ferruginously or brownish woolly-tomentose on outside and glabrous on inside, sometimes sparsely whitish or ferruginously sericeous at base of inside, with a plumule of darker coloured hairs at the tips, inner sepals with glabrous, membranous margins. *Corolla* 6—13 mm long, glabrous except for the outside of the tube which is ferruginously sericeous, lobes ovate-oblong to lanceolate, 4.5—10.5 by 1.5—2 mm, apex rounded. *Stamens* (9—)12, 3—6 mm long, filaments linear, 1—3 mm long, glabrous, anthers oblong, 3—4 mm long, longly acuminate or bifid, dehiscing extrorsely to laterally, ferruginously sericeous. *Ovary* ovoid, 1.5—2.5 by 1.5—2.5 mm, 6-celled, 12-lobed, yellowish appressedly villose. Style filiform, 6-ribbed, 10—15 mm long, gradually passing into the ovary, glabrous except for the basal part which bears the same pubescence as the ovary. *Fruits* ovoid, or obovoid to ellipsoid, 12—28 by 10—15 mm, 1-seeded, apex rounded, usually with a short remnant of the style, pericarp fleshy, thick, scattered yellowish sericeous, ultimately glabrous(?). Seeds fusiform, c. 10 by 4 by 4 mm, testa thin, black, dull, scar covering half of the seed, light brown, dull. Embryo exalbuminous, radicle punctiform, slightly exsert.

Type specimen: *Teysmann s.n.* in BO.

Vernacular names: Borneo: beitis, margetahan, njato batu, njatuh kelintjir.

Ecology: Growing in primary forests on lime-stone containing soils or rocks in the lower regions.

Distribution: Riouw, Borneo.

BORNEO. Sandakan, Elphinstone prov., Tawao, *Elmer* #1170 (G, L, NY, S, SING); ibidem: *Elmer* #1620 (L, NY, SING); Bettotan, logged area: *Orolo* #370

(K, L, SAN), tree 16 m, fr. Febr. — Sarawak, Rejang: *Haviland 508* (K), fl. — Indonesian W. Borneo, Sekadan Pait, alt. 25 m: *NIFS bb 8045* (BO, L), March. — S. E. Borneo, subdistr. Balikpapan, Sungei Wain, alt. 50 m, primary forest: *NIFS bb 34261* (BO, L), tree 25 m, Aug.; Loa Haur, west of Samarinda, low ridge, alt. 40 m: *Kostermans 6798* (BO, L), tree 10 m, fr. green, May; ibidem: *Kostermans 6823* (BO, L), tree 20 m, fr. green, May; ibidem: *Kostermans 6955* (BO, L), tree 15 m, fr. May; Loa Djanan, west of Samarinda, ridge, alt. 30 m: *Kostermans 6624* (BO, L), tree 20 m, fr. April; Berau Betemu air, alt. 50 m: *NIFS bb 19150* (BO, L), June; ibidem: *NIFS bb 19113* (BO, L), June; Bandjermasin: *Teysmann s.n.* (BO, L); Martapura: *NIFS bb 2486* (BO, L), fl. Aug. (*type specimen of P. stenophyllum* H. J. Lam); Pulu Laut, northeast of Stagen, alt. 100 m: *van Slooten 2271* (BO, L), fl. Nov.; P. Laut, Sei Paring, alt. 100 m: *NIFS bb 13210* (BO, L); fr. Dec.; ibidem, Seblimbing: *NIFS bb 31195* (BO, L, SING), fl. Sept.; Pleihari, Ketapang, alt. 400 m: *NIFS bb 13755* (BO, L), fl. Sept.; Mt Pamatton: *Korthals s.n.* (L), fl.; P. Lampe: *Korthals s.n.* (L), fr.; Nunukan Isl.: *Kostermans 10827 & 10828* (BO, L), tree, Dec. — Indonesian E. Borneo, E. Kutei, Mt Tepian Lobang, alt. 150 m: *Kostermans 5410* (BO, L), tree 25 m, fr. green June; Sungei Wain region, north of Balikpapan, alt. 20 m: *Kostermans 4271* (BO, L), tree 12 m, fr. Aug.; Bengalon Rapah: *NIFS bb 15323* (BO, L), April; ibidem: *NIFS 15290* (BO, L), April. — Brouw. Bintang: *de Vriese s.n.* (BO, L), fl.

43. *P. edonii* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 22; Lam, l. c. 1925, 50; Lam, l. c. 1927, 398 — Fig. 7.

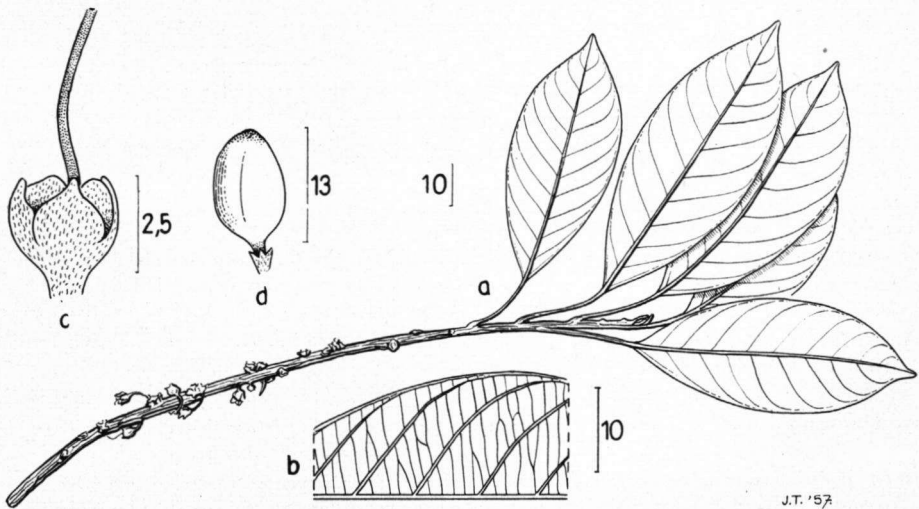


Fig. 7. *P. edonii*, a. branchlet with leaves and flowers; b. tertiary nerves of leaf; c. calyx and gynoecium; d. fruit (*Beccari 361*).

Trees? Branchlets terete, 2.5–4 mm in diam., ferruginously pubescent, glabrescent; terminal cone 5–8 mm long, ferruginously pubescent; stipules lanceolate, 2–3 mm long, apex obtuse, ferruginously pubescent on outside, glabrous on inside, caducous. *Leaves* subconferted at apex of branchlets, elliptic, 7–10 by 2.2–3.5 cm, short obtusely acuminate, acumen 2–4 mm long, base cuneate, subabruptly narrowed, shortly decurrent along upper side of petiole, glabrous above, sparsely ferruginously tomentose below, mainly so on and along the midrib, thin-coriaceous; midrib grooved above,



prominent and rounded below, secondary nerves 9 or 10 pairs, ascending at an angle of 40°—45°, slightly curved, grooved above, prominent below, tertiary nerves transverse, few, inconspicuous above, more distinct below. Petioles 15—25 mm long, narrowly grooved above, rounded below, greyish and ferruginously tomentose. *Flowers* solitary, or in 2- or 3-flowered clusters, axillary, pedicels angular, 8—12.5 mm long, sparsely ferruginously tomentose. *Sepals* ovate, c. 2 by 2.5 mm, obtusely acuminate at apex, ferruginously tomentose on outside, glabrous on inside, inner sepals in basal part with a membranous, fimbriate margin. *Corolla* 7—10 mm long, glabrous, lobes 6, narrowly elliptic, c. 5 by 2.5 mm, obtuse. *Stamens* 12, c. 8 mm long, filaments filiform, c. 5 mm long, glabrous, anthers oblong-cordate, 1.5—2.5 mm long, apex mucronate, ferruginously villose on either side. *Ovary* ovoid, c. 1.5 by 2 mm, 6-celled, 6-lobed, glabrous, borne on a thin, glabrous disk. *Style* filiform, 1—1.2 cm long, glabrous. *Immature fruit* ellipsoid, c. 1.5 by 1 cm, at apex with a short remnant of the style, subattenuate at base, 2-celled, 1-seeded, pericarp fleshy, glabrous. Seeds not seen but according to Pierre: testa coriaceous to subcrustaceous, embryo with copious albumen and thin cotyledons, radicle short.

Type specimen: *Beccari 361* in P.

Distribution: Borneo.

BORNEO. Sarawak: *Beccari 361* (FI, G, P), fl.

Remark. The seeds described by Pierre are most peculiar because they by no means fit into *Palaquium* but rather into *Planchonella*. The 3-merous flowers and the absence of staminodes exclude this species from *Planchonella* and one might wonder what sort of seed has been seen by Pierre.

44. *P. laevifolium* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 8; Lam, l. c. 1925, 107; Lam, l. c. 1927, 414 — *Isonandra laevifolia* Thwaites, Enum., 1864, 177 — *Dichopsis laevifolia* (Thwaites) Benthams & Hooker, Gen. Pl. 2, 1876, 658; Clarke in Hooker f., Fl. Br. Ind. 3, 1882, 541 — *Bassia laevifolia* (Thwaites) Beddome, Fl. Sylv., 1869—1873, 141.

Medium sized tree. Branchlets angular, 1.5—4.5 mm in diam., blackish brown tomentose, glabrescent; terminal cone c. 1.5 mm long, tomentose; stipules lanceolate, c. 1 by 0.5 mm, acute at apex, tomentose on outside, glabrous on inside, soon caducous. *Leaves* scattered, narrowly elliptic or elliptic-obovate, 7—15 by 2—4.5 cm, apex obtusely acuminate, acumen 1—5 mm long, base cuneate; glabrous on either side but sometimes sparsely ferruginously tomentose along midrib, chartaceous; midrib crested above, rounded or angular below, or ribbed in the basal part, secondary nerves slender, 9—13 pairs, ascending at an angle of c. 50°, curved, diminishing until inconspicuous, prominulous above, not prominent at all below but clearly marked, sometimes prominulous, tertiary nerves slender, transverse, prominulous above, hardly or not prominulous below. Petioles 7—11 mm long, crested above, rounded below, sometimes ribbed, dark brown tomentose. *Flowers* in 3- or 4-flowered, axillary clusters, pedicels angular, 4—7 mm long, densely ferruginously tomentose. *Sepals* ovate, 3—4 by 2.5—3 mm, obtuse at apex, ferruginously sericeous-tomentose on outside, glabrous on

inside, inner sepals with membranous and fimbriate margin. *Corolla* 1.5—2 mm long, glabrous, lobes ovate, c. 1 by 0.8 mm, obtuse or rounded at apex. *Stamens* 12, c. 1 mm long, filaments subulate, c. 0.5 mm long, glabrous, anthers oblong, c. 0.5 mm long, truncate at apex, dehiscing introrsely or laterally, when young with a few hairs on inside, but later glabrous. *Ovary* ovoid, c. 1 by 1 mm, 6-celled, ferruginously hirsute. Style conoid, c. 1 mm long, not clearly marked against the ovary. *Fruits* unknown.

Type specimen: *Thwaites 2832* in K.

Distribution: Ceylon.

CEYLON. Saffragam Distr. and Reigam Corles: *Thwaites 2832* (CAL, G, K, L), fl.

45. *P. hexandrum* (Griffith) Baillon, *Traité Bot. Méd. Ph.*, 1884, 1500, Add.; Lam, l. c. 1927, 409; Wyatt-Smith, *Research Pamphlet* 4, 1954, 34, fig. — *P. hexandrum* (Griffith) Engler, *Bot. Jahrb.* 12, 1890, 511; Dubard, *Bull. Soc. bot. Fr.* 56, 1909, *Mém.* 16, p. 8; Lam, l. c. 1925, 85, 257, f. 23; Heyne, *Nutt. Pl. Ned. Ind.*, ed. 2, 2, 1927, 1235; Heyne, l. c., ed. 3, 1, 1950, 1235 — *Isonandra hexandra* Griffith, *Not.* 4, 1851, 292 — ? *Payena griffithii* Kurz, *For. Fl.* 2, 1877, 121; Kurz, *J. As. Soc. Beng.* 46, 2, 1877, 230 — *Dichopsis hexandra* (Griffith) Clarke in Hooker f., *Fl. Br. Ind.* 3, 1882, 543 — *Palaquium pisang* Burek, *Ann. Jard. Bot. Bzg* 5, 1886, 41, p.p. — *P. hexandrum* King & Gamble, *J. As. Soc. Beng.* 74, 2, Extra Nr. 17, 1905, 197, 407; Ridley, *Fl. Mal. Pen.* 2, 1923, 277.

Trees, up to 50 m. Branchlets angular or terete, 2—3.5 mm in diam., finely whitish or ferruginously puberulous, glabrescent; terminal cone up to 10 mm long, puberulous; stipules lanceolate or ovate, up to 2 by 1 mm, acute or acuminate at apex, puberulous on outside, glabrous on inside, caducous, sometimes longer persistent but finally caducous as well. *Leaves* ovate or oblong-ovate, or subobovate, 5—23 by 2.3—9.7 cm, rounded, obtuse or abruptly short obtusely acuminate, acumen to 7 mm long, base usually broadly cuneate, but sometimes narrowly cuneate; glabrous above or sparsely puberulous along midrib, sparsely whitish, ferruginously or brownish puberulous below but soon glabrous, often black or dark brown above when dry, chartaceous or subcoriaceous; midrib grooved above and rarely crested, rounded below, secondary nerves (7—)8—13(—14) pairs, ascending at an angle of 55°—60°, slightly curved but more so at their tips and diminishing until inconspicuous along margin of leaf, prominulous and sometimes grooved above, prominent below, tertiary nerves slender, transverse, prominulous or inconspicuous above, prominent or inconspicuous below. Petioles slender, 8—32 mm long, grooved above, rounded below, sometimes thickened in the basal part, when young finely greyish or ferruginously puberulous, glabrescent. *Flowers* 3—20-flowered, in 1 or 2 axillary clusters, pedicels angular, 4—13 mm long, in fruit up to 22 mm, appressedly whitish, or yellowish, brownish or ferruginously sericeous, but glabrous in fruit. *Sepals* triangular-ovate or deltoid, 1.5—3 by 1.8—3 mm, acute at apex, inner ones rounded at apex, ferruginously puberulous on outside, glabrous on inside, inner sepals membranous on outside, glabrous along margins, fimbriate. *Corolla* 6—7.5 mm long, glabrous, but the tube ferruginously sericeous on outside and in apical part of inside, lobes elliptic-

oblong or lanceolate, 4.5—6 by 1—2 mm, apex truncate, rounded or subacute, sparsely fimbriate along apex but soon glabrous, reflexed in anthesis. *Stamens* 12, 3—4 mm long, filaments subulate, 2—2.5 mm long, densely woolly or glabrous and woolly at base only, anthers broadly ovoid or elliptic-oblong, 2—2.5 mm long, bifid at apex, glabrous or with a few scattered hairs on the back, dehiscing extrorsely. *Ovary* ovoid, c. 0.5 by 1 mm, 6-celled, 6-grooved, glabrous, rarely pubescent at apex. Style slender, 6-grooved, 6.5—12 mm long, glabrous. *Fruits* globose or ovoid, 2—2.7(—3) by 1.5—2(—2.4) cm, 1—2-seeded, rounded or acuminate at apex, pericarp fleshy, when dry often 6-grooved, glabrous. Seeds ovoid or laterally compressed and orbicular, 1.5—2.4(—2.8) by 1.2—1.7(—1.9) by 0.8—1.2 (—1.5) cm, obtuse at both ends, testa crustaceous, brown, glossy, scar covering about half of the seed, greyish, dull, embryo exalbuminous, radicle inferior, not exsert.

Type specimen: *Griffith 3609* in K.

Use: The wood is easy to handle but is durable for building purposes only when sheltered against atmospheric influences. The latex is sometimes used for falsifying other latex products. The fruits are edible and from the seed a fat for cooking purposes is extracted.

Vernacular names: Malaya: njato jambak, poko jungkek, sundik; Sumatra: balam, balam jabut, balam nasih, balam pinang, balam putih, balam putjuk, belam sesudu, balam sudu, balam t̄rung, balam timah, eki-haitu, kaju londir, majang doran, medang balam, njjatuh, papat, tapis; Borneo: nato nasi.

Ecology: This is a rather frequent species of fresh water swamps and lowland forests on peaty and muddy soil near rivers, but is also found in dry forests. Usually found at low altitudes, but is reported up to 100 m.

Distribution: Malaya, Sumatra, Siberut, Simalur, Enggano and Borneo.

Remarks. Contrary to Lam's statement that var. *eriandrum* has a corolla which on the outside except for its base is densely appressedly sericeous-pubescent, only the reverse has been found, the base therefore being pubescent and the rest glabrous. This same detail is found in var. *hexandrum* (= var. *psilandrum* H. J. Lam) contrary to Lam's report when he describes the corolla of that variety as being glabrous on the outside.

As in both varieties too many intermediate stages were found between the forms distinguished by Lam, as well as in the size of leaves, petioles and pedicels, the forms have been dropped here, the two varieties only being maintained therefore.

Var. *hexandrum* — *P. hexandrum* (Griffith) Engler, var. *psilandrum* H. J. Lam, l. c. 1925, 85, forma *minus* H. J. Lam, l. c. 85, f. 23, a—d, f, and forma *majus* H. J. Lam, l. c. 86.

Filaments of stamens glabrous except for a few woolly hairs at their base. Secondary nerves of leaves 7—11 pairs.

Type specimen: *Griffith 3609* in K.

Distribution: Malaya, Sumatra, Borneo (and Siberut?).

MALAYA. Malacca, Nhanguli: *Griffith 3609* (K, L), fl. Jan.; Plantation nursery: *Hamid 38511* and *39889* (KEP), fl. Febr. and fr. May; Bukit Bruang Res.: *Symington 45912* (KEP), fl. Febr.; Kepong, without known loc.: *Anderson 28* (P),

fl.; Singapore, without known loc.: *Bidley 11573* (K, KEP, SING), fl. Aug., type specimen of *P. hexandrum* King & Gamble; without known loc.: *Maingay 934* (K, G, L).

SUMATRA. Asahan, Aek Mutte, alt. 500 m: *Bahmat Si Buca 9348* (L), tree, June/July; Ophir, Lk Gadang, alt. 90 m: *NIFS bb 19486* (BO, L), Oct.

SIBERUT. See below under doubtful specimens.

BORNEO. Sarawak, Setapok For. Res.: *Zarrill 22* (SAR), fr. Febr.; without known loc.: *Hewitt s.n.* (SING), fr. — Indonesian Borneo, Loa Djanan, W. of Samarinda: *Kostermans 6724* (BO, L), tree 40 m, fr. April; Sungei Wain region, N. of Balikpapan: *Kostermans 4262* (BO, L), tree 26 m, fl. & fr. Aug.; Melawi Tjatut, B. Tungkujung, alt. 400 m: *NIFS bb 26431* (BO, L, SING), tree, Nov.; ibidem: *NIFS bb 26860* (BO, L), tree, Febr.; Sg Mentawir near Balikpapan: *Kostermans 9853* (BO, L), tree, Febr.; Sg Susuh (Sangkulirang): *NIFS bb 34706* (BO, L), tree 36 m, fl. June; ibidem: *Kostermans 5509* (BO, L), tree 36 m, fl. & fr. June; ibidem: *Kostermans 5716* (BO, L), tree 35 m, fr. July; Mt Tepian Lobang, Menubar river: *Kostermans 5309* (BO, L), tree 20 m, fl. & fr. June; ibidem: *Kostermans 5292* (BO, L), tree 20 m, fr. June; Sg Kerajaan, N. of Sangkulirang: *Kostermans 5764* (BO, L), tree 40 m, fr. July; Ng Betung, B. Betung kibak: *NIFS bb 31623* (BO, L, SING), Jan.

Var. *eriandrum* H. J. Lam, l. c. 1925, 86 — *P. hexandrum* (Griffith)

Engler, var. *eriandrum* H. J. Lam, forma *minus* H. J. Lam and forma *majus* H. J. Lam, l. c. 1925, 87, f. 23 e, g, h, k, l.

Filaments of stamens densely woolly. Secondary nerves 11—14 pairs.

Lectotype specimen: *Achmad 1216* in L.

Distribution: Simalur (and Siberut and Enggano?).

SIMALUR, in marshy forest: *Achmad 1216* (BO, L), fl. July, white.

SIBERUT, ENGGANO. See below under doubtful specimens.

Doubtful specimens.

Var. *hexandrum* ?

MALAYA. Kedah, Jemiang Rd, 48 mile stone: *Kiah 35980* (SING), tree 18 m, Sept.; Penang, Western Hill, alt. 1000 m: *Nauen s.n.* (SING), tree, fr. Aug.; Kelantan, Mt Stong: *Symington 37659* (KEP, SING), tree, Oct.; Perak, Parit For. Res.: *Lazim 34307* (KEP), tree 44 m, April; ibidem: *KEP 34208* (KEP), tree 30 m, Dec.; ibidem: *KEP 39559* (KEP), tree with galls, April; ibidem: *KEP 34287*, *34289* (KEP), March; Pahang, Ulu Selangor, Ulu Tranam For. Res.: *KEP 52862* (KEEP), tree, 40 m, fl. Febr. — Selangor, Sungei Buloh Res.: *Jaamat 15236* (KEP), tree 13 m, March. — Malacca, K. Pilang, Senaling Inas For. Res.: *KEP 63864* (KEP), tree 30 m, juv. fr., Dec. — Johore, Soga For. Res., sec. forest: *KEP 70176* (KEP), tree 43 m, Jan. — Singapore, Mandai Rd: *Corner 37720* (BO, KEP, SING), tree, fr. Aug.; Bukit Tinjan Laut: *Corner 37076* (SING), tree 50 m, Aug.; Bukit Timah: *Bidley s.n.* (SING), fr. Aug.

SUMATRA. Sum. East Coast, Padang Siantar, alt. 600 m: *NIFS bb 20399* (BO, L), tree 25 m, March. — Tapanuli, Angkola & Sipirak, Panobasan Complex, alt. 600 m: *NIFS bb 23206* (A, BO, L, SING), tree, June. — Sum. West Coast, Pajakumbu, Ulu Air, alt. 1000 m: *NIFS SWK/III-24* (BO), tree 25 m, June. — Riouw and Dependencies, Indragirian Uplands, Sungai Akar, alt. 50 m: *NIFS bb 23694* (BO, L, SING), tree, July; ibidem, Danau Mengkuang, alt. 60 m: *NIFS bb 27567* (BO, L), tree, April. — Djambi, Muara Pidjuan, alt. 85 m: *NIFS bb 15174* (BO, L), tree 30 m, Dec. — Palembang, Lematang Ilir, Semangus, alt. 75 m: *NIFS bb 31691* (BO, L), tree, April; ibidem: *NIFS bb 32064*, *32265* (BO, L), tree, July; ibidem, alt. 75 m: *NIFS bb 31711* (BO, L, SING), tree, May; Palembang, *Castillo & Valderama 18* (L, US), tree March; Musi Ilir and Kubu distr., Talang Semandai For. Res.: *NIFS bb 18631* (BO), tree 21 m, juv. fr., July; ibidem: *Endert P 585* (BO, L), tree; ibidem: *Endert P 423* (BO, L), tree, juv. fr.

MENTAWI ISLANDS. Siberut, Sibiguana, alt. 40 m: *NIFS bb 17466* (BO, L), tree 28 m, Sept.

BORNEO. Indonesian Borneo, Berouw Batemu Ayer, alt. 5 m: *NIFS bb 19050* (A, BO, L, SING), May; Tanah Bumbu, alt. 25 m: *NIFS bb 13073* (BO), tree 15 m, Dec.; Balikpapan, Sungei Wain: *NIFS bb 34267* (BO, L), tree 26 m, fl. buds; Upper Mahakam, Parei, alt. 300 m: *NIFS bb 20702* (BO, L), tree, Febr.

Var. *eriandrum* ?

MENTAWI ISLANDS. Enggano, near Buabua, alt. 100 m: *Lütjeharms 4252* (A, BO, L, NY, SING), tree, June. — Siberut, Katorei, alt. 20 m: *NIFS bb 23368* (BO, L), tree, Oct.

Remark. The specimens mentioned by Lam under the headings "with small leaves" and "with large leaves" probably all belong to the var. *hexandrum* except the specimens from Simalur which belong to the var. *eriandrum*.

46. *P. cryptocariifolium* van Royen, n. sp. — *Palaquium* (*specimen anomale*) *spec.*, Lam, l. c. 1927, 413 — Fig. 8.

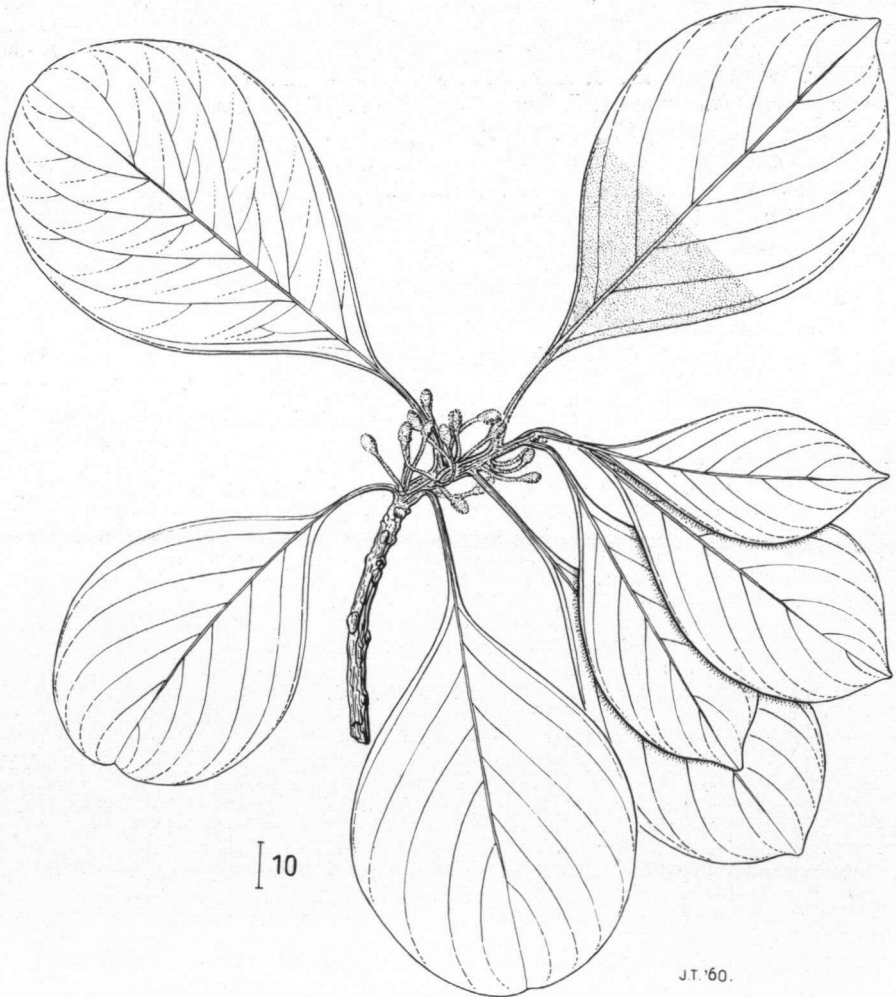


Fig. 8. *P. cryptocariifolium*, habit (*Wyatt-Smith 78841*).

Arbor magna; inflorescentia pseudoracemosa terminalis, vel flores fasciculati, axillares. Ramuli teretes, purpureo-brunnei. Stipulae ignotae. Folia obovato-elliptica vel elliptica, 8—13 × 3—6 cm, obtusa vel indistincte obtuse acuminata; costa supra brunneo-lanata, subtus cum nervis secundariis brunneo-lanata. Nervi secundarii utroque latere 5—10, sursum evanescentes, tertiarii transversi. Petiolus 1.1—2.5 cm longus, brunneo-lanatus. Pedicellus 0.5—0.8 cm longus, pallide brunneo-lanatus. Sepala 6, 7 vel 8, extus brunneo-lanata, intus glabra. Corolla 6-, 7- vel 8-lobata, in lorum linea mediana extus sparse pilosa, intus glabra. Stamina 12, filamenta glabra; antherae sparse pilosae. Ovarium 6- vel 7-loculare, brunneo-hirsutum; stylus glaber. Fructus ellipsoideus, c. 1 × 0.7 cm, glaber, 1-spermus; semen incomplete cognitum. Typus: *Forest Service Sarawak 1* in E.

Trees. Branchlets terete, c. 3 mm in diam., purplish brown woolly, pubescence long persistent, terminal bud not seen, replaced by a flowering branch. *Leaves* scattered, obovate-elliptic or elliptic, 8—13 by 3—6 cm, apex obtuse or indistinctly obtusely acuminate, base cuneate; subcoriaceous, brownish woolly above along midrib only, below on midrib and nerves, secondary nerves 5—10 pairs, curved, ascending at an angle of c. 45°, curved, diminishing until inconspicuous near margin, prominent on either side but stronger so below, tertiary nerves transverse, slender, inconspicuous or absent on either side. Petioles 1.1—2.5 cm long, flat above, rounded below, brownish woolly. *Flowers* densely crowded along a terminal up to 6 cm long shoot, pedicels angular, 5—8 mm long, light brown woolly. *Sepals* 6 (sometimes 7 or 8), outer ones narrowly ovate-lanceolate, c. 5 by 2.5 mm, obtuse at apex, brownish woolly on outside, glabrous on inside, inner sepals slightly smaller than the outer ones, margins membranous and glabrous. *Corolla* 6- (sometimes 7- or 8-)lobed, 3.5—4 mm long, lobes ovate-lanceolate, c. 2.5 by 1 mm, with a few hairs on outside in middle-line of lobes, truncate, fimbriate. *Stamens* 12, c. 2 mm long, filaments subulate, c. 1 mm long, glabrous, anthers sagittate, 1—1.5 mm long, acuminate, with few ferruginous hairs, dehiscent extrorsely. *Ovary* conoid, c. 1.5 by 1.5 mm, 6- or 7-celled, densely dark brown hirsute. *Style* subulate, c. 2.5 mm long, glabrous. *Fruits* ellipsoid, c. 10 by 7 mm, glabrous, 1-seeded, seeds not completely known.

Type specimen: *Forest Service Sarawak 1* in E.

Vernacular names: nyatoh beringin, resak nyatoh.

Distribution: Borneo.

BORNEO. Sarawak, Sungei Semengoh Reserve: *F. S. S. 1* (E), fl. Febr.; ibidem: *Carroll 1166* (SAR), tree 16 m, April; ibidem: *Carroll 205* (SAR), tree, fl. Febr.; ibidem: *Muas 1752* (= *SAR 8168*) (SAR), tree 22 m, Dec.

Remark. As is already remarked by H. J. Lam, this species shows some aberrant flowers. But it is by no means true that this applies to all flowers. Therefore, accepting the most common 3-merous flowers as the normal type, this specimen is regarded as representing a new species of *Palaquium*.

47. *P. pierrei* Burek, Ann. Jard. Bot. Btzg 5, 1886, 31; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 7; Lam, l. c. 1925, 95, f. 27; Lam, l. c. 1927, 410.

Trees. Branchlets slender, terete, 1.5—3 mm in diam., sparsely greyish puberulous, glabrescent; terminal cone conoid, up to 3 mm long, ferruginously tomentose; stipules lanceolate, up to 1.5 by 0.5 mm, acute, tomentose

on outside, glabrous on inside, relatively long persistent but finally caducous. *Leaves* scattered, narrowly elliptic, obovate-elliptic, or oblanceolate, 7—16 by 3—6 cm, obtusely acuminate at apex, acumen up to 7 mm long, base broadly cuneate, decurrent along sides of petiole; glabrous on either side but underside rarely with a few scattered ferruginous hairs, chartaceous; midrib grooved above, prominent below and angular or rounded, secondary nerves slender, 7—10 pairs, ascending at an angle of c. 50°, slightly curved, diminishing until inconspicuous near margin, prominulous above, slender below, tertiary nerves few, slender, transverse, inconspicuous above or not visible at all, inconspicuous below. Petioles 8—15 mm long, narrowly grooved above, rounded or angular below, sparsely greyish or ferruginously puberulous or glabrous. *Flowers* in 2—4-flowered, axillary clusters towards tips of branchlets, pedicels slender, angular, 7—17 mm long, sparsely ferruginously puberulous. *Sepals* ovate, 2—2.5 by 1.5—2 mm, acute at apex, sparsely ferruginously puberulous on outside, glabrous on inside, fimbriate. *Corolla* 8—10 mm long, entirely glabrous, lobes linear-oblong, 6—8 by 1—2 mm, acute at apex, reflexed in anthesis. Stamens 12, 4.5—5.5 mm long, entirely glabrous, filaments filiform, 2.5—3.5 mm long, anthers lanceolate, 2.5—3.5 mm long, mucronate at apex, dehiscent introrsely. *Ovary* conoid, c. 1.5 by 1.5 mm, 6-celled, 6-lobed, ferruginously sericeous, at base with a glabrous, 12-lobed disk. Style filiform, 9—15 mm long, subabruptly widening into ovary, glabrous. *Fruits* not seen but according to Burek and Lam: "ovoid, c. 3 by 1.8—2 cm, obtuse at apex, 1-seeded, pericarp fleshy, ultimately glabrous, slightly puberulous when immature. Seeds ovoid, testa nitidous, relatively thick, scar about 1/2 of its surface, exalbuminous, radicle exsert".

Type specimen: *van der Horst s.n.* in BO.

Vernacular name: bangkal.

Ecology: In forests at low altitudes.

Distribution: Borneo.

BORNEO. Indonesian Borneo, Perigi Limus, alt. 200: *NIFS bb 7077* (BO, L), tree, Aug.; Sambas: *van der Horst s.n.* (1?) (FI), cult. in Hort. Bog.

48. *P. ridleyi* King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr. 17, 1905, 196; Ridley, Fl. Mal. Pen. 2, 1923, 276; Lam, l. c. 1925, 92, 257, f. 26; Heyne, Nutt. Pl. Ned. Indie, ed. 2, 2, 1927, 1239; Lam, l. c. 1927, 410; Heyne, l. c., ed. 3, 1, 1950, 1239; Wyatt-Smith, Research Pamphlet 4, 1954, 40, fig. — *P. ledermannii* Krause, Engl. Bot. Jahrb. 58, 1923, 552; Lam, Nova Guinea 14, 4, 1932, 552, t. 94 — *P. poilanei* Lecomte, Fl. Gen. Indo-Chine 3, 7, 1930, 900.

Trees, up to 30 m. Branchlets terete or angular, often marked by numerous leaf scars, 2—5 mm in diam., ferruginously or greyish puberulous when young, but soon glabrous; terminal cone up to 5 mm long, puberulous, often replaced by a short flowering branchlet; stipules ovate-lanceolate, 1—2 by 0.5—1 mm, acute or acuminate at apex, puberulous on outside, glabrous on inside, caducous. *Leaves* scattered, subconferted or conferted towards tip of branchlets, obovate or elliptic-obovate, rarely elliptic, in sterile specimens 8—19.5 by 4.5—7.5 cm, in fertile specimens 5—10.5 (—16) by 2.3—5 (—7.5) cm, at apex emarginate, rounded or obtuse, rarely short obtusely acuminate, acumen up to 4 mm long, base abruptly narrowed and

cuneate, tapering along the sides of the petioles; glabrous on either side, coriaceous or chartaceous; midrib slightly impressed above and sometimes crested as well, not strongly prominent below, angular, sometimes slightly rounded, secondary nerves 5—10 pairs, ascending at an angle of c. 45°, curved, diminishing until inconspicuous near margin, grooved above, hardly prominulous below, tertiary nerves transverse, slender, grooved or hardly visible above, slightly stronger developed below, in sterile specimens this nervation often stronger developed. Petioles 1—2.8 cm long, flat above, angular or rounded below, glabrous. *Flowers* in 5—11-flowered, axillary clusters or in clusters along a leafless short, terminal shoot, pedicels slender, filiform, 3—7(—14) mm long, sparsely greyish or ferruginous tomentose. *Sepals* 5 or 6, ovate or triangular, 2—3 by 2—3 mm, acute or subacute at apex, ferruginously or greyish appressedly tomentose on outside, inner sepals more rotundate and on outside pubescent except for the membranous, fimbriate margins, pubescent or glabrous on inside. *Corolla* 3—4 mm long, entirely glabrous, in bud lobes on outside ferruginously sericeous in the middle, lobes 5 or 6, spreading campanulate, ovate or ovate-lanceolate, 2—2.5 mm c. 1 mm, rounded or obtuse at apex. Stamens 10—12, 2.5—3.5 mm long, filaments filiform, S-shaped at apex, 2—2.5 mm long, glabrous, anthers oblong, c. 1 mm long, acute at apex, with scattered long ferruginous hairs, dehiscing extrorsely. Ovary ellipsoid, c. 1.5 by 1 mm, 5- or 6-celled and -lobed, glabrous or ferruginously hirsute, at base with an annular, glabrous disk. Style stout, 5- or 6-grooved, 1.5—2.5 mm long, glabrous. *Fruits* obovoid, 12—14 by c. 7 mm, 1- or 2-seeded, rounded at apex but usually with a short remnant of the style, pericarp thin, fleshy, glabrous. Seeds with the same shape as the fruit, c. 11 by 5 by 4 mm, testa thin, scar narrow, about 2 mm wide, embryo exalbuminous, radicle not exsert.

Type specimen: *Ridley 3591 a* in K.

Vernacular names: Malaya: bitis paya; Sumatra: balam rambai, b. sanginai, b. seminai, b. téginaï, b. tênginan, kepingis, kurut, njatu undus, pitis; Banka: kaju arêng, njatoh bindah, n. bindu; Borneo: bidaru, bintan, jara buko, kaju kong, lamejang, njatoh aendus, n. babi, n. jangkar, n. merah; Celebes: kandole; New Guinea: komhom (Asmat language).

Use: Sometimes used for building purposes.

Ecology: In mixed swamp forests or in peatforests.

Distribution: Indo-China, Malaya, Sumatra to Philippines and New Guinea.

INDO-CHINA. Annam, prov. Nhatrang, Minh Hoa, alt. 1500 m: *Poilane 6486* (P, L, NY), shrub, 3 m, fl., type specimen of *P. poilanei* H. Lec.

MALAYA. Penang, West Hill: *Ridley s.n.* (BM), fl. March — Selangor, Bukit Changgang, Klang: *Nur 53954* (A, S, SING), tree, fl. Oct.; ibidem: *Nur 53958* (A, KEP, S, SING), tree, fl. Oct. — Malacca, Selandar: *Malvus 348* (SING), fl. March; Olar Limpit: *Symington 43677* (KEP), tree, fl. April — Singapore, Kranji: *Ridley 4796* (SING), fl. galls, Fabr.; ibidem: *Ridley 3591a* (K), fl.

SUMATRA. Bengkalis, Tamansari: *Beguin 246* (BO, L), fl. Aug. — Palembang, Musi Ilir and Kubu regions, Magsang: *NIFS bb 18657* (BO), tree 22 m, fl. green, fr. greyish, Aug.

BANKA. Lobok Besar: *Kostermans 234, 560, 1123* (BO, L, PNH), tree 18—30 m, fl. Sept.-Oct.; Air Terap: *NIFS bb 26317, 26318, 26319, 26879* (BO, L), fl. Nov.-Dec.

REOUW. Karimun, Sungei Guntung, alt. 25 m: *NIFS bb 20380* (BO, NY, L, SING), fl. Dec.



PHILIPPINES. Luzon, Tayabas prov., Kagasac: Oro 30872 (NY, SING), fl. April; prov. Laguna, Mt Maquilang: *Escritor 11852* (K), fl. Dec.

BORNEO. Sandakan, Kimanis For. Res.: Wood SAN 44597 (A, KEP, L, MEL, SAN), tree 10 m, fl. Aug.; Ulu Mendalong, SSE of Malaman: Wood SAN 16775 (A, BO, K, L, SING), tree 18 m, fr. Sept.; ibidem: Wood SAN 16812 (A, BO, K, L, SING), tree 40 m, fr. Oct. — Sarawak, Naman For. Res.: Anderson S 680 (L, SAN, SING), fl. Jan.; Sibu, swamps: Anderson S 472 (SAR), tree 23 m, fr. Febr.; Pulau Bruit: Anderson 7921 (L, SAR), tree 16 m, fl. June; ibidem: Anderson 8040 (L, SAR), tree 30 m, fl. May; Binatang, Sg Kelepu: Anderson 9013 (L, SAR), tree 13 m, fl. Sept. — Brunei, Buakas For. Res., Anderson S 2196 (SING), tree, fl. Febr.; Bukit Belalong area, Temburong, alt. 700 m, leached yellow sandy soil, primary forest: Ashton BRUN 416 (L), tree 13 m, fl. buds, Sept. — Indonesian Borneo, SE district, Hayup: Winkler 3489 (L), fl. June; Sampit: Buwalda 7757 (BO, L, SING), tree, juv. fr. Sept.; ibidem: NIFS bb 10706 (BO, L), fl. Dec.; W. Kutai, Majup, alt. 30 m: NIFS bb 16803 (BO, L), fr. April.

CELEBES. Malili, near Usu, alt. 200 m: NIFS Cel./II-372 (BO, L), tree 30 m, fl. June; ibidem: NIFS Cel./II-99 (BO), tree 25 m; ibidem: Cel./II-297 (BO), tree; ibidem: NIFS Cel./II-298 (BO), tree; ibidem: NIFS Cel./II-299 (BO), tree 20 m; ibidem: Cel./II-372 (BO), tree 25 m.

NEW GUINEA. Western New Guinea, distr. Geelvink Bay, Japen Isl., Seroei, alt. 50 m: NIFS bb 30667, 30733 (A, BO, L, SING), fl. Sept.; ibidem: NIFS bb 30873, 30883, 30905 (A, BO, L), fl. Sept.; ibidem: NIFS bb 30636, 30641 (BO, L), fl. Sept.; without known loc.: Aet & Idjan 872 & 910 (BO, L, SING), fl. Sept.

The following sterile specimens might also belong to this species, but the close resemblance to e.g. *P. pseudorostratum* and *P. pseudocuneatum* makes a proper identification almost impossible:

MALAYA. Selangor, Telok For. Res., Kuala Langat: Wazir 53902 (KEP), tree 23 m, April; ibidem: Symington 45810 (KEP), tree, Jan. — Malacca, Telok F. R.: Wyatt-Smith s.n. (KEP), Jan. — Johore, Pengkalan Raja, Pontiam: Ngadiman SF 36699 (BO, SING), fl. galls, July; ibidem: KEP 10258 (KEP), tree 30 m, Dec.; Kuala Pilah, Senaling Ilas For. Res.: KEP 63856 (KEP), tree 26 m, Nov.

SUMATRA. Djamboi, Muara Pidjuan, alt. 85 m: NIFS bb 13183 (BO, L), Dec.; without known loc.: NIFS bb 12291 (BO), tree 30 m, Nov. — East Coast, Selat-pandjang, Tj Rumbia, P. Padang, alt. 5 m: NIFS bb 21289 (BO, L), June; Tg Sei Lakar: NIFS bb 12349 (BO), tree 21 m, Oct. — Bengkalis, Serapung Isl., Serapung: NIFS bb 12493 (BO), tree 18 m, June — Indragiri Uplands, Gelang Isl., alt. 4 m: NIFS bb 29163 (BO, L, SING), Sept.; ibidem, Danau Mangkoang, primary forest: Buwalda 6610 (BO, L), April, fl. galls; ibidem: NIFS bb 27549 (BO, L), April; ibidem, Simpang: NIFS bb 22279 (BO, L), March; Kariah Mawah: NIFS bb 13343 (BO, L), tree 20 m, Nov.

LINGGA, without known loc.: NIFS bb EI/I-55 (BO), Febr.

BANGKA. Lobok Besar: Kostermans 89 (BO), tree 28 m, Sept.; Rias: NIFS bb 15411 (BO), tree 18 m, June.

BORNEO. Brunei, Badas swamps: Anderson 2227 (SAN), tree, June — Sarawak, Sibu: SAN S 872, 874 (SAN), tree 23 m, Febr.; ibidem: SAN S 680 (SAN), tree 15 m, Jan.; Loba Kabang South P. F.: Anderson S 441 (L, SAN), tree, March; ibidem: Anderson S 2619 (SAN), tree; Sg Kelepu, Pulau Bruit: Morshidi S 801 (SAN), tree, Febr.; Kawang: Mail 6271 (K, L, SAN), tree 5 m, Sept.; Sg Tissak, Tuso, low swamp forest: Anderson S 2345 (SING), tree, Nov.; Tg Kigong: Anderson 56 (KEP, SAN), tree, fl. July; Setapok For. Res., swampy land: Egon 373 (= F 335) (SAR), tree 20 m, fl. (galls) May; Temburong distr., Kuala Belalong: SAN 77076 (A, BO, BRI, K, KEP, L, SING), tree 35 m, March — Indonesian Borneo, Lower Dajak river, Tuanan: NIFS bb 9450 (BO, L), Oct.; W. Kutai, Mujup, alt. 20 m: NIFS bb 16779 (BO, L), April; ibidem, Kemkang: NIFS bb 15632 (BO, L), Sept.; Tdg Bangko Sangasanga region near Samarinda: Kostermans 7712 (BO, L), tree 15 m, Aug.; Pontianak, Suka Lanting: NIFS bb 12619 (BO, L), tree 22 m, June.

CELEBES. Manado, Banggai, Pongian: NIFS bb 31873 (BO, L), tree, March; Kolonodale, Tambajali, alt. 20 m: NIFS bb 31509 (BO, L, SING), Jan.; Kolaka, Neha, alt. 25 m: NIFS bb 31672, 31822, 31917 (BO, L, SING), May; ibidem, alt. 50 m: NIFS bb 32544 (BO, L, SING), tree 25 m, fl. Febr.

SULA ISLANDS. Mangoli, Wai Tamila, alt. 250 m: *NIFS* bb 29919 (BO, L, SING), Sept.

NEW GUINEA. Western New Guinea, distr. Geelvink Bay, Japen Island, Seroei, alt. 50 m: *NIFS* bb 30795, 30834, 30847, 30785, 30637, 30718 (BO, L, SING), Aug.-Sept.; ibidem, Seroei, Mariatoo, alt. 500 m: *NIFS* bb 30478 (A, BO, L, SING), Aug.; ibidem: *NIFS* bb 30373 (BO, L), tree, Aug.; Seroei, alt. 800 m: *NIFS* bb 30356 & 30332 (BO, L), Aug.; Genofa, alt. 450 m: *NIFS* bb 22575 (BO, L), April; distr. Hollandia, Hollandia: *Kalkman* NGBW 3752 & 6222 (L), tree, fl. fr. Oct. — Southern New Guinea, Asmat distr., Erma: *Nautje* NGBW 6551 (L), tree 15 m — Southeastern New Guinea, Fly river: *Brass* 6589 (A, L), fl. May.

Remarks: This species is remarkably variable in the pubescence of the inside of the calyx and of the ovary. In the type specimen and many specimens from the Malay Peninsula, Sumatra and Borneo both are pubescent. In Indo-China, however, a specimen is found with a glabrous ovary and the inside of the sepals also glabrous. This specimen has been described as *Palaquium poilanei* by Lecomte. In New Guinea specimens are found also with a glabrous ovary and a glabrous inside of the calyx but the leaves show a clear transverse tertiary nervation, whereas in the specimen of Indo-China these are entirely absent. The New Guinean specimens could be referred to *Palaquium ledermannii* Krause provided that the latter had been maintained. In Celebes one specimen was found (*NIFS* Cel. II-372) in which the ovary is pubescent and the inside of the calyx glabrous. With these variations in mind it seems irrelevant to maintain *P. poilanei* H. Lec. and *P. ledermannii* Krause as separate species and even the reduction to varietal rank only seems not to be warranted, the more so since in *Brass* 6589 from New Guinea the tertiary nervation is absent. The specimens mentioned from Celebes by Lam 1925, p. 91, all referred to *P. multiflorum*, *NIFS* bb 1874, 2317, 2342, 2346, 2348, 2353, 2355, 2377, 2379, 2385, 2391, 2392, 2415, all specimens from distr. Malili, near Larona, belong to the present species. Some specimens from Celebes (*NIFS* 31509, 31672, 31822, 31917, 32544) differ from all other specimens by the 5-merous flowers with slightly longer pedicels.

49. *P. ellipticum* (Dalz.) Baillon, *Traité Bot. Méd. Phan.*, 1884, 1500; Lam, l. c. 1927, 414 — *P. ellipticum* (Dalz.) Engler, *Bot. Jahrb.* 12, 1890, 511; Brandis, *Indian Trees*, 1906, 424; Dubard, *Bull. Soc. bot. Fr.* 56, 1909, *Mém.* 16, p. 20; Gamble, *Fl. Madras* 4, 1921, 764; Lam, l. c. 1925, 107, 258 — *Bassia elliptica* Dalzell in Hooker's *J. of Bot. and Kew Misc.* 3, 1851, 36; Dalzell & Gibbs, *Bombay Fl.*, 1861, 139; Beddome, *Fl. Sylv.*, 1869, t. 43 — *Dichopsis elliptica* Bentham, *Gen. Pl.* 2, 1876, 658; Clarke in Hooker f., *Fl. Br. India* 3, 1882, 542 — *Isonandra acuminata* Drury, *Useful Indian Pl.*, 1858, 260.

Trees, up to 30 m. Branchlets terete, angular, or irregularly terete, 2—5 mm in diam., ferruginously tomentose, glabrescent; terminal cone up to 3 mm long, greyish or ferruginously tomentose; stipules lanceolate, up to 2 by 1 mm, acute, tomentose on outside, glabrous on inside, caducous. *Leaves* obovate, obovate-oblong, or subelliptic, 8—17.5 by 3.5—7.5 cm, apex obtusely acuminate, acumen up to 7 mm long, cuneate at base, decurrent along sides of petioles; juvenile leaves greyish, yellowish or ferruginously puberulous on either side, mature leaves glabrous on either side, or glabrous above and subglabrous below, subcoriaceous; midrib slightly grooved above,

subangular or rounded below, secondary nerves 10—13 pairs, ascending at an angle of c. 55°, slightly curved, but sometimes straight and curved at their tips only, irregularly archingly joined, prominulous above and sometimes grooved, prominent below, tertiary nerves transverse, few, the reticulate nervation in between the tertiary nerves outnumbering the latter, prominulous above, prominent below. Petioles 1.3—2 cm, flat above, rounded below, puberulous when young, glabrous when mature. *Flowers* one or two in each axil; pedicels angular, 1.5—3 cm, in fruit thickened, cinnamomously tomentose. *Sepals* ovate, 7—8.5 by 5—6.5 mm, apex subobtusate or obtusely acuminate, ferruginously or pale cinnamomously tomentose on outside, densely ferruginously appressedly tomentose on inside, fimbriate, inner sepals usually narrower than the outer ones. *Corolla* 12—14.5 mm long, 5- or 6-lobed, lobes 7—9 by 4.5—5 mm, apex obtuse and fimbriate, otherwise glabrous. *Stamens* 12—18, in 2 whorls, 9—11 mm long, filaments 4.5—5.5 mm long, almost entirely united with each other and the corolla, anther ovoid, 5.5—6.5 mm long, compressed, caudate and fimbriate at apex, appendix spoon-shaped at apex and only slightly shorter than the anthers, ferruginously tomentose-woolly on inside, dehiscing extrorsely. *Ovary* conoid, c. 2 by 1 mm, 6-lobed, ferruginously hairy. Style filiform, 1.5—1.8 cm long, glabrous. *Fruits* oblong or ellipsoid, c. 4 by 1.5 cm, 1-seeded, apex rounded, pericarp cartilaginous-woody, glabrous, except at the base, seeds almond-shaped, c. 3 by 1 by 0.7 cm, acute at either end, testa blackish, dull, thin, scar covering half of the seed, light brown, dull, embryo exalbuminous, radicle acute, shortly exerted.

Type specimen: *Dalzell s.n.* in K.

Vernacular names: India: kat illupei (Tamil), panchoti, panchota (Kamala), pala (Malayan).

Ecology: In evergreen forests, at 300—1300 m altitude.

Distribution: Western Ghats from Northern Kanara southwards, common in Wainad, India.

INDIA. Bombay, Canara: *Dalzell s.n.* (K), fl. & fr. Febr.; Madras: *Drew s.n.* (E), fl.; Northern Division: *Cullen s.n.* (E), fl.; Annamalays, Berpadi to Paralui: *Barber 8464* (CAL), tree, fl. & fr. April; Tinnevelly distr., 800 m alt.: *Hooper & Bamaswami 39432* (CAL), tree, fr. Febr.; Monica: *Barber 3894* (CAL), tree, fl. Oct.; Coorg: *Hole 1* (CAL), fl. Febr.; Duilon, alt. 1100 m: *Bourdillon 186* (CAL), tree, fl. April; Travancore, Udumbanshala, 1600 m alt.: *Meebold 13232* (CAL), juv. fr. Dec.; Malabar: *Hooker f. & Thomson s.n.* (CAL, L), fl.

50. *P. oxleyanum* Pierre, Bull. Soc. Linn. Paris 1, 1885, 498; King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr 17, 1905, 194; Ridley, Fl. Mal. Pen. 2, 1923, 275; Lam, l. c. 1925, 106; Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2, 1927, 1239; Lam, l. c. 1927, 413; Heyne, l. c., ed. 3, 1, 1950, 1239 — *P. pustulatum* (Hemsley) Dunstan, Bull. Imp. Inst. 2, 1904, 14 — *Dichopsis pustulata* Hemsley ex King & Gamble, l. c. 194.

Medium sized to tall trees, up to c. 20 m. Branchlets terete to angular, 3—8 mm in diam., often with numerous scars of leaves, dark brown or ferruginously, sometimes greyish tomentose, glabrescent; terminal cone up to 7 mm, tomentose; stipules lanceolate, often falcate, up to 2 by 1 mm, acute, tomentose on outside, glabrous on inside, caducous. *Leaves* oblong-obovate, obovate or elliptic, 10—23 by (3.5—)5—10.5 cm, abruptly short

obtusely acuminate, sometimes obtuse or rounded, base narrowly cuneate or broadly cuneate and rather abruptly narrowed close to the petiole; glabrous above, ferruginously, dark brown or greyish brown tomentose below, sometimes entirely glabrous, coriaceous; midrib grooved above, prominent and angular below, secondary nerves slender, 9—20 pairs, ascending at an angle of 60°—70°, straight, curved at their tips and archingly joined, prominent above, prominent below, tertiary nerves transverse but subparallel to secondary nerves, inconspicuous to distinct above, stronger marked below. Petioles 2—3.8 cm long, grooved above at least in the apical third, angular below, slightly thickened in the basal part, greyish, dark brown or ferruginously tomentose. *Flowers* in 3—6-flowered, axillary clusters at apex of branchlets, pedicels angular, 7—11 mm long, ferruginously tomentose, slightly thickened at apex. *Sepals* 6, united at base only, triangular-ovate, c. 4 by 3.5 mm, subacute at apex, ferruginously tomentose on either side but on inside glabrous in the basal part. *Corolla* c. 9 mm long, glabrous, lobes as long as the tube, oblong, obtuse, reflexed when flowering. *Stamens* 12, 3.5—4 mm long, entirely glabrous, filaments filiform, angular, 2.5—3 mm long, anthers oblong, 2—2.5 mm long, acutely acuminate, dehiscent laterally. *Ovary* conoid, c. 1.5 mm in diam., 6-celled, ferruginously tomentose. *Style* filiform, 8—11 mm long, glabrous except for a few hairs at the base. *Fruits* oblong or globose, or subglobose, 2—2.5 by 1.5—2.5 cm, 1-seeded, pericarp fleshy, densely ferruginously tomentose, seeds subglobose or ellipsoid, 1.6—1.8 by 1.3—1.8 cm, testa crustaceous, dark brown, scar covering half of the seed, greyish, embryo exalbuminous.

Lectotype specimen: *Maingay* 983 in K.

Distribution: Two varieties, both in Malaya.

#### Var. *oxleyanum*

Branchlets dark brown or ferruginously tomentose, glabrescent. *Leaves* 10—23 by 3.5—10.5 cm, glabrous above, tomentose below; secondary nerves 14—20 pairs. *Fruits* globose.

Lectotype specimen: *Maingay* 983 in K.

Vernacular names: gëtah terban, taban putih, taban sutra, gëtah taban, guttah sundik, guttah chaier.

Ecology: In primary forests at low altitudes.

Distribution: Malaya.

MALAYA. Perak, Waterfall Hill, alt. 800 m: *Low* 511, 518 (K), large tree, fr. Aug.; ibidem: *Wray* s.n. (SING), fr.; Kuala Langsar: *Curtis* 3631 (K, SING), fr. Dec.; Taiping Hill, alt. 1000 m: *Curtis* 3638 (K, SING), fr. Oct.; Larut Waterfall: *Curtis* 3724 (SING), Dec.; ibidem: *Wray* s.n. (SING); Parit Kinta: *Burn-Murdock* s.n. (SING), May; Maxwell's Hill: *Ridley* 5505 (SING), abnormal form; without known loc.: *Wray* 590 (K), Jan.; ibidem: *Philips* 1, 2, 3, and 4 (SING), April; Selangor, Kuala Lumpur, Weld Hill: *CF* 4940 (SING), fr.; Sungei Rengam Estate: *Curtis* 3763, 3764 (SING), tree, May; Singapore, Little Hill: *Maingay* 983 (K), June; ibidem: *Collins* s.n. (K), June; Surop: *Hodgson* *CF* 9570 (SING), May; Sungei Nenap, Ulu Tembeling: *Craddock* s.n. (SING), *dubious specimen*; Bukit Timah For. Res.; *Sinclair* *SF* 40036 (L, SING), Oct.; Botanical Garden, Nursery: *Kiah* s.n. (SING), fl. March; ibidem, Old Tamil Lines: *Nur* s.n. (SING), tree 13 m; ibidem: *Sinclair* s.n. (SING), fl. May.

Var. *glabratum* King & Gamble, l. c., 194; Lam, l. c. 1925, 106.

Branchlets greyish tomentose, glabrescent. *Leaves* 14—19 by 4—7.5 cm,

glabrous on either side, rarely ferruginously or brownish tomentose below; secondary nerves 9—11 pairs. *Fruits* oblong.

Lectotype specimen: *Wray 511* in K.

Vernacular names: gëtah menjatoh, gëtah taban putih.

Ecology: In forests at low altitudes.

Distribution: Malaya and Siam.

MALAYA. Perak, Waterfall Hill: *Wray s.n.* (SING), fr.; ibidem, Larut: *Wray 511* (K, SING); ibidem: *Wray 518* (K, SING), fr.

SIAM. Kopah: *Haniff 3836* (SING), tree c. 20 m, fl. buds, Febr.

### 51. *Palaquium simun* n. sp. — Fig. 9.

Arbor magna. Ramuli teretes, cinnamomeo-puberuli, glabrescentes; stipulae lineariae, longe acuminatae, caducae. Folia obovato-spathulata, 8—11.5 × 4—5.2 cm, apice rotundata, glabra. Nervi secundarii utroque latere 10—12, tertiarii transversi. Petiolus 0.5—0.8 cm longus, cinnamomeo-puberulus. Pedicellus 0.3—0.7 cm longus, flavido-puberulus. Sepala 6, extus margine loborum glabro excepto ferrugineo-sericea, intus glabra. Stamina 12; filamenta glabra; antherae ferrugineo-tomentosae. Ovarium 6-loculare; stylus glaber. Fructus ignotus. Typus: *L. S. Smith NGF 1295* in L.

Trees, c. 35 m tall. Branchlets terete, 2—5 mm in diam., cinnamomously puberulous, soon glabrous; terminal cone up to 9 mm long, puberulous; stipules linear, up to 8 by 1.5 mm long, long-acuminate, puberulous on outside, glabrous on inside, caducous. *Leaves* subconferted at tip of branchlets, obovate-spathulate, 8—11.5 by 4—5.2 cm, rounded at apex, cuneate at base and tapering along sides of petioles; membranous-chartaceous, glabrous on either side; midrib minutely crested above, subangular below, secondary nerves 10—12 pairs, ascending at an angle of c. 60°, slightly curved, diminishing until inconspicuous near margin, distinct and prominent on either side, tertiary nerves transverse, slender, prominulous but distinct on either side. Petioles 5—8 mm long, flat above, rounded below, cinnamomously puberulous. *Flowers* seen in bud alone, in 3—7-flowered, axillary clusters, pedicels 3—7 mm long, cinnamomously puberulous. *Sepals* ovate-elliptic, 1.5—2 by 1—1.5 mm, rounded at apex, appressedly tomentose on outside, glabrous on inside, inner sepals with glabrous, membranous and ciliate margins. *Corolla* c. 1.5 mm long, ferruginously sericeous on outside except for the marginal part of the lobes, the latter fimbriate at apex, glabrous on inside. *Stamens* 12, c. 1 mm long, filaments subulate, glabrous, anthers lanceolate, ferruginously tomentose on outside, dehiscing extrorsely. *Ovary* ovoid-disciform, c. 0.5 by 1 mm, ferruginously hirsute; style c. 2 mm long, glabrous. *Fruits* unknown.

Type specimen: *L. S. Smith NGF 1295* in L.

Vernacular name: simun (Upper Waria), perta-perta (Waigani).

Ecology: In forests at low altitudes.

Distribution: New Guinea.

Southeastern New Guinea, Milne Bay, north of Waigana plantation, on ironstone gravel capped ridge in comparatively open forest, alt. 30 m: *L. S. Smith NGF 1295* (BRI, L, LAE), tree 35 m, fl. March; Normandy Isl., Waikaiuna Bay, inland c. ½ mile from coast: *Womersley & Brass NGF 8630* (L, LAE), tree 23 m, fl. April.

Remark. Very closely related to *P. obtusifolium* Burek but differing in the smaller number of secondary nerves, in the pubescence on the outside of the corolla, in the shorter pedicels, and in the smaller leaves.

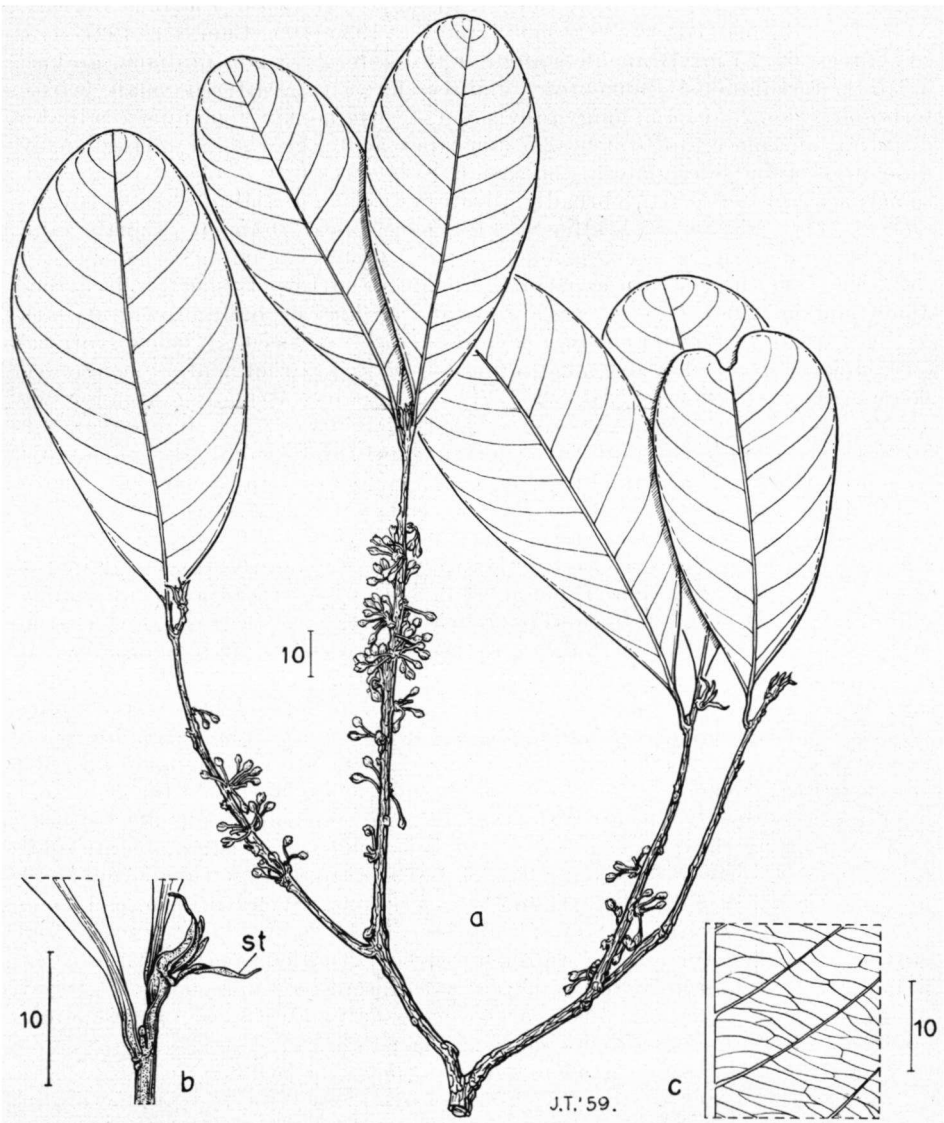


Fig. 9. *P. simun*, a. branchlet with leaves and flowers; b. apical part of branchlet, st. stipule; c. part of leaf with tertiary venation (*L. S. Smith NGF 1895*).

52. *P. leiocarpum* Boerlage, Bull. Inst. Bot. Btzg 5, 1900, 24; Lam, l. c. 1925, 27; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1236; Lam, l. c. 1927, 387; Heyne, l. c., ed. 3, 1, 1950, 1223, 1236 — *P. molle* Pierre in Beccari, Nelle For. Borneo, ed. 1, 1902, 559; Lam, l. c. 1925, 105; Lam, l. c. 1927, 413.

Trees, 6—25 m. Branchlets angular to terete, 2—8 mm in diam., greyish or dark ferruginously tomentose, glabrescent, with scattered small warts; terminal cone 2—7 mm long, greyish or ferruginously tomentose; stipules ovate to lanceolate, up to 5 by 2.5 mm, apex acute, greyish or ferruginously tomentose on outside, glabrous on inside, caducous. *Leaves* usually scattered, sometimes subconferted, broadly ovate, suboblong, elliptic or obovate, (5—)8—20(—27) by (4—)5—8(—10) cm, apex rounded, shortly and bluntly or acutely acuminate, or long and acutely acuminate, acumen up to 1 cm long, base cuneate, usually abruptly narrowed, shortly decurrent along adaxial side of petiole; glabrous above, dark or light brown, or dark or light reddish ferruginously tomentose (rarely sericeous) below, coriaceous; midrib grooved above and minutely crested, prominent and rounded below, secondary nerves (10—)17—20(—22) pairs, ascending at an angle of 50°—65°(—75°), straight and curved at their tips or slightly curved, or S-shaped, diminishing until inconspicuous, rarely archingly joined, inconspicuous above, prominent below, tertiary nerves transverse but almost parallel to the secondary nerves, few and with a transverse reticulate nervation in between, inconspicuous above, prominent below. Petioles 1.5—5.5 cm, minutely grooved in the apical part, slightly thickened in the basal part, with the same type of indumentum as the leaves, ultimately glabrous. *Flowers* in 3—6-flowered clusters, axillary, pedicels 0.8—1.5 cm long, in fruit up to 3 cm long, with the same type of indumentum as of the leaves. *Sepals* triangular-ovate, outer ones 2—3.5 by 2—3 mm, inner ones slightly smaller, apex of outer ones acuminate and obtuse, inner ones subacute to rounded, ferruginously velutinous on outside, glabrous on inside. *Corolla* 7—9 mm long, ferruginously tomentose on outside on tube only, sparsely tomentose in throat on inside, lobes lanceolate-linear, c. 6.5 by 1.5 mm, obtuse, fimbriate. *Stamens* 12, c. 7 mm long, filaments filiform, c. 3.5 mm long, anthers sagittate, c. 4 mm long, long-acuminate at apex, ferruginously sericeous on outside, dehiscent introrsely. *Ovary* ovoid, c. 1 by 1 mm, 6-lobed, 6-celled, ferruginously sericeous. Style filiform, c. 12 mm long, 6-ribbed. *Fruits* globose to ellipsoid, 1.4—2 by 1.2—2.5 cm, often crowned by the style or its rudiment, 1- or 2-seeded, pericarp fleshy or woody, thick, glabrous. Seeds obliquely ellipsoid or subglobose, 6—18 by 4—15 mm, testa cartilaginous, scar covering half of the seed, whitish, dull, embryo exalbuminous, radicle not seen.

Lectotype specimen: *Romburgh 2* in BO.

Use: The latex of this tree is extensively used for the production of rubber. Sometimes it is used for mixing with superior types.

Vernacular names: Sandakan: nyatoh; Sarawak, jangkai, nyatoh jangkai, tangkai; Indonesian Borneo: djongkang (Western Div.), gétah hangkang (S. and E. Div.); hangkang (all divisions).

Ecology: In primary forests, usually at low altitudes.

Distribution: Borneo, Celebes.

BORNEO. Brunnei, R. Ingei, primary forest, karangas: Ashton BRUN 149 (L),

tree 38 m, fl. buds white, July — Sandakan, Sipitang, Mengalong Forest Reserve, c. 14 km SW of Sipitang, alt. 3 m: Wood & Wyatt-Smith SAN A 4565 (A, KEP, L, MEL, SAN, SING), tree c. 25 m, fr. July; ibidem, Ulu Moyah, SSE of Malaman, alt. 900 m: Wood SAN 16694 (L, SAN), tree 25 m, Sept. — Sarawak, Sungai Semap, rain forest: Anderson 40 (OXF), Nov.; Baram IV Div.: Tready S 1239 (SING), Febr.; Batu 6 For. Res.: Egon A 925 & A 926 (KEP), tree, fl. May; Matang Rd, Kuching: Omar 359 (SING), fr. Jan.; Kuching: Bedcari 1362 (FL, P), fr. Febr., type specimen of *P. molle* Pierre; Sg Kigong: Anderson 55 (KEP), fl. July — Indonesian Borneo, without loc.: Romburgh 2 (BO), fr.; Southern and Eastern Div., Moeara Teweh, Papas, alt. c. 25 m: NIFS bb 28091 (BO, L, SING), May; ibidem: NIFS bb 28092 (BO, L), May; ibidem: NIFS bb 29671 (BO, L, SING), juv. fr. Oct.; ibidem: NIFS bb 29689 (BO, L, SING), juv. fr. Nov.; ibidem: NIFS bb 21259 (BO), tree 19 m, June; Poeroek Tjahoe, Tb. Djolor, alt. 250 m: NIFS bb 21219 (BO, L), bb 21220 (BO), July; Boentok Riam Batoe, alt. 20 m: NIFS bb 21265 (BO, L), June; Lower Dajak river, Danau Rawak: NIFS bb 13475 (BO), tree 18 m, Nov.

CELEBES. Malili, Larona: NIFS bb 2363 (BO, L).

53. *P. obtusifolium* Burek, Ann. Jard. bot. Btzg 5, 1886, 33; Koorders, Med. 's Lands Plantentuin 19, 1898, 519; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 20; Lam, l. c. 1925, 100; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1239; Lam, l. c. 1927, 411; Heyne, l. c., ed. 3, 1, 1950, 1239 — *P. negrosense* Merrill, Phil. J. Sc. 10, 1915, 63; Dubard, Bull. Mus. hist. nat. 15, 1909, 381 (sub *P. obovatum* ? Engler); Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 281; Lam, l. c. 1925, 99; Lam, l. c. 1927, 411 — *P. ternatense* H. J. Lam, l. c. 1925, 103, f. 30; Heyne, l. c. 1241 in both ed. 2 and 3.

Trees, up to 45 m. Branchlets subterete, 2—6 mm in diam., with a variously coloured pubescence, glabrescent; terminal cone up to 8 mm long, pubescent in the same colours as the branchlets; stipules lanceolate or ovate-lanceolate, up to 8 by 2 mm, apex acute, pubescent on outside but often along the margins glabrous, the latter fimbriate, inside glabrous, semi-permanent or caducous. *Leaves* scattered to subconferted at apex of branchlets, spatulate, obovate, obovate-oblong or elliptic, (10—)14—26(—30) by (4—)7—9.3(—12) cm, apex usually subacute but sometimes emarginate, rounded, obtuse, obtusely or acutely acuminate, acumen up to 5 mm long, base narrowly cuneate to rounded or truncate, decurrent along sides of petioles; glabrous above, sparsely pubescent below when young but soon glabrous, thinly coriaceous; midrib grooved above and sometimes crested as well, prominent and angular below, secondary nerves 10—17 pairs, ascending at an angle of 45°—60°, but in the basal part up to 90°, straight but curved at their tips and diminishing until inconspicuous near margin of leaf, grooved above, prominent below, tertiary nerves very slender, transverse, sometimes rather inconspicuous on either side. Petioles 7—18(—25) mm long, flat above, finely whitish, greyish or ferruginously pubescent but ultimately glabrous. *Flowers* in 2—5-flowered, axillary clusters, sometimes at apex of up to 2 mm long brachyblasts, pedicels angular, 9—15(—32) mm, ferruginously or cinnamonously brown sericeous. *Sepals* broadly ovate to subrotundate, 3—3.5 by 2.5—3.5 mm, sericeous on outside, glabrous on inside, apex of outer sepals subacute, the inner sepals rounded and with glabrous margins. *Corolla* 6—8 mm long, glabrous except on outside sometimes with a few ferruginous hairs in the middle-line of the lobes, and always with a few hairs in the throat, lobes reflexed in anthesis, ovate-oblong 5—7.5 by 2—3 mm, apex truncate. *Stamens* (12—)18, 4—5.5 mm



long, filaments filiform, 2.5—3.5 mm, glabrous, anthers ovoid-oblong, 2.5—3.5 mm long, apex mucronate, sometimes bifid, sparsely ferruginously hairy. *Ovary* conoid, c. 1.5 by 2.5 mm, 12-lobed, 6-celled, minutely yellowish tomentose. *Style* filiform, 10—15 mm long, glabrous. *Fruits* ovoid or obovoid, sometimes oblique, 3—4 by 2—2.5 cm, acute at apex and usually bearing a remnant of the style, 1-seeded, pericarp thin-fleshy, glabrous. Seeds slightly smaller than the fruit, fusiform, 2.5—3.5 by 1.6—2.2 cm, laterally slightly compressed, acute at either end, pale greyish-brown, scar as long as seed, covering a fourth of the total surface, brownish, embryo exalbuminous, radicle inferior, not exsert.

Type specimen: *Teysmann s.n.* in BO.

Vernacular names: Sumatra: nyatoh balam, n. bunga tandjung; Bali: ngantoh; Flores: wenana; Buton: bokoroero, tagimanu; Celebes: kumé moputé, k. motaha, natu buja, natog, nantu, tataha-an, tata-an, weloan; Muna: taim anu; Ternate: tofiri modjiu, t. modjiui; Morotai: tehiriki, tewiring; Garat: nato; Philippines: bagoy, nato; Wiageo: naat.

Ecology: In primary forests at low altitudes.

Distribution: Sumatra, (Java, cultivated), Bali, Sumbawa, Philippines, Selayar, Buton, Celebes, Sula Islands, Talaud, Ternate, Buru, Ceram, Morotai, Tanimbar Islands, New Guinea.

SUMATRA. Atjeh, Krung Luas, alt. 25 m: *Asdat 86* (BO, L), Aug.

JAVA. cult. in Hort. Bog.

BALI. f. Lam 1925.

SUMBAWA. f. Lam 1927.

NEGROS. San Carlot, alt. 200 m, on riverbank: *Tamesis & Contreras 28* (PNH?), tree 18 m, fl.; without known loc.: *Everett 7325* (PNH?); near San Carlos: *Tamesis 20696* (L), juv. fr., Sept., type specimen of *P. negrosense* Merrill.

MENDANA O. f. Merrill 1923, 281.

SELAYAR. Labuan Marege, Djampea Isl., alt. 270 m: *NIFS bb 22958* (BO, L, SING), Aug.

BUTON. f. Lam 1925.

SULA ISL. Samana, Upper Wai Towata river, alt. 100 m: *NIFS bb 28226* (BO, L, SING), fl. Aug. — Mangoli, north of Wai Tamila, alt. 100 m: *NIFS bb 29912* (BO, L, SING), fl. Oct.; ibidem: *NIFS bb 29756* (BO, L, SING), fl. Aug.

CELEBES. Menado, Poso, Kalora, alt. 15 m: *NIFS bb 28752* (BO, L, SING), fl. Aug.; Banduga, alt. 5 m: *NIFS bb 31905* (BO, L), fl. March; ibidem: *NIFS bb 31843* (BO, L, SING), Febr.; Mawuroto, Tg Kajunjole: *NIFS bb 31848* (BO, L, SING), Febr.; Kolonedale, Tambajoli: *NIFS bb 31523* (BO, L, SING), Dec.; Banggai, Sampaka: *NIFS bb 31836* (BO, L, SING), Nov.; Gorontalo, alt. 200 m: *NIFS bb 19413* (BO, L), Dec.; Molinggapato: *NIFS bb 18016* (BO), tree 40 m, fl. buds, Dec.; Boalema, Batumotolohu: *NIFS bb 13802* (BO), tree 20 m, Sept.; Kwandang, Tititdu: *NIFS bb 7493* (BO), tree 20 m, Sept.; Bolaänf Mongomdow, Solimandungan, alt. 200 m: *NIFS bb 32481* (BO, L, SING), tree 38 m, fl. yellow, Oct., fr. green; Malili, Usu, alt. 100 m: *NIFS Cel./II-308* (BO, L, SING), juv. fr., May; ibidem: *NIFS bb 32606* (BO, L), tree 25 m, March; Pasir Manangui: *NIFS bb 23261* (BO, L, SING), Sept.; ibidem: *NIFS Cel./II-280* (BO), tree 30 m, June; ibidem: *NIFS bb 13576* (BO), tree 23 m, April; ibidem: *NIFS Cel./II-427* (BO, L), Aug.; Masamba, Patila, alt. 25 m: *NIFS bb 24505* (BO, L), May; Minahassa: *Teysmann s.n.* (BO), type specimen of *P. obtusifolium* Burck.

TALAUD. f. Lam 1925.

TERNATE. f. Lam 1925.

BURU. Balo Balo, alt. 50 m: *NIFS bb 31365* (BO, L, SING), Dec.

CERAM. f. Lam 1925.

MOROTAI. Tobelo. Toto dokoe, alt. 30 m: *NIFS bb 33814* (A, BO, L, LAE, SING), tree 25 m, juv. fr., May.

TANIMBAR ISL. Lurumbun, alt. 60 m: *NIFS bb 24428* (BO, L), April.

WANGEO. Majalibit Bay, eastern shore near Waifoi, Bam Creek, in primary forest along creek dominated by *Alstonia* sp.: *van Royen 5148* (L), tree c. 45 m, fl. blackish brown, anthers orange, Jan.

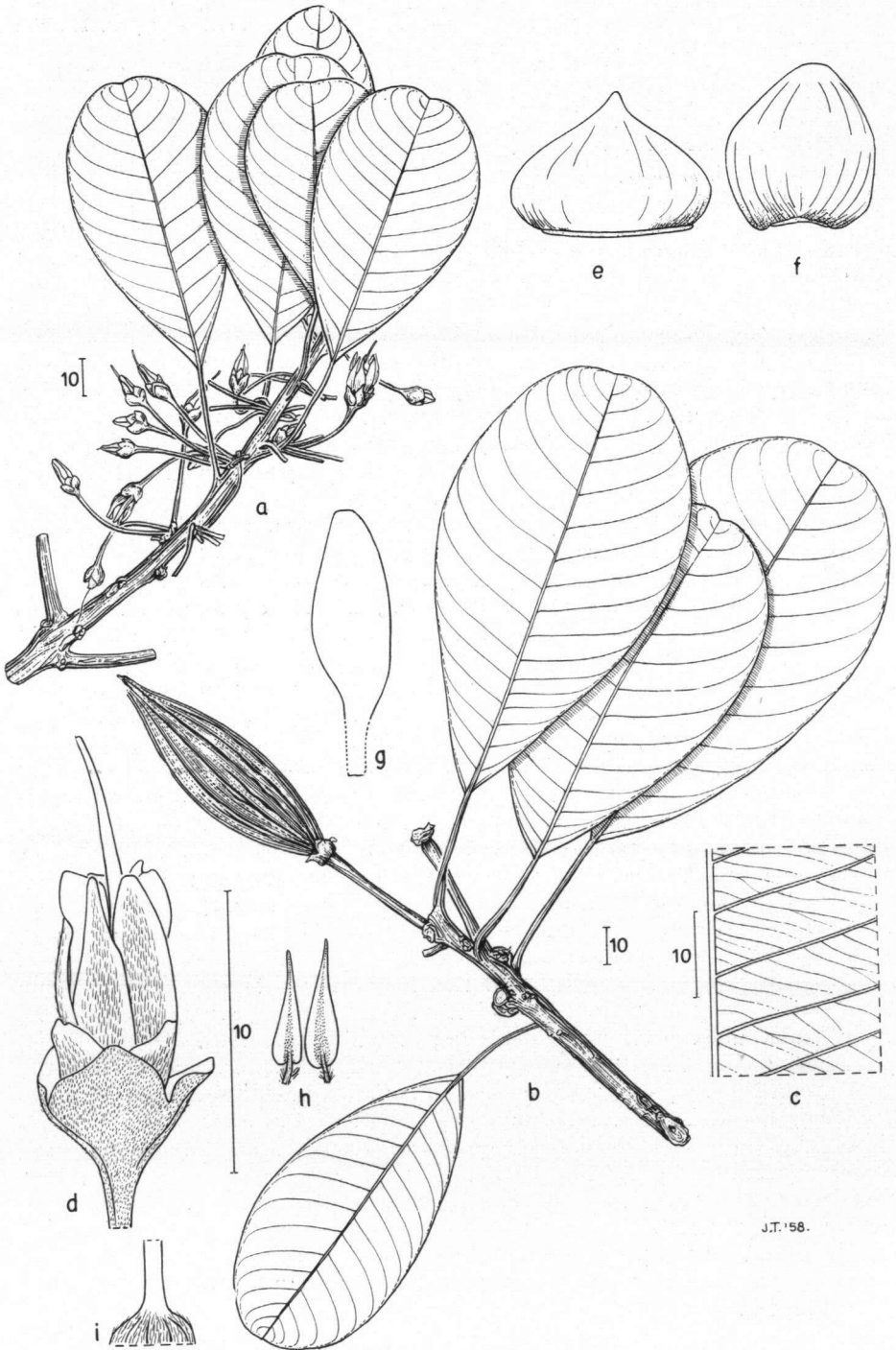
NEW GUINEA. Western New Guinea, Geelvink Bay distr., Momi S of Manokwari: *Yasutake 22* (BO), Oct.; distr. Hollandia, Holtekang: *NGBW 1605* (L), tree 30 m, Oct.

54. *P. burckii* H. J. Lam, l. c. 1925, 57, 255, f. 10; Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2, 1927, 1232; Lam, l. c. 1927, 399; Heyne, l. c., ed. 3, 1, 1950, 1232 — Fig. 10.

Trees, up to 40 m. Branchlets terete or angular, 3–6 mm in diam., ferruginously tomentose, but ultimately glabrous; terminal cone up to 4 mm long, ferruginously tomentose; stipules lanceolate, up to 3 by 1.5 mm, aristulate or acute at apex, ferruginously tomentose on outside, glabrous on inside, long persistent but ultimately caducous. *Leaves* scattered, obovate, 8–23 by 4–8.2 cm, apex rounded, sometimes short obtusely acuminate, acumen up to 3 mm, base narrowly cuneate, subobtusate, or subtruncate, decurrent along adaxial side of petiole; dark brown ferruginously tomentose, but mature leaves glabrous above, sometimes along underside of midrib greyish or ferruginously tomentose, thin-coriaceous; midrib grooved above, prominent and angular below, secondary nerves (10–)13–19 pairs, ascending at an angle of 60°–65°, curved or straight and curved at tips only, diminishing until inconspicuous near margin, prominulous above and sometimes grooved, prominent below, tertiary nerves transverse, slender, prominulous on either side but obscured below by the dense pubescence. Petioles 2–4.5 cm, grooved above, ferruginously or greyish tomentose. *Flowers* in (3–)5–10-flowered, axillary clusters, sometimes in 2 clusters, pedicels angular, (1.5–)3–3.5 cm, patent or bent downwards, ferruginously tomentose, in fruits thickened and up to 4 cm long. Outer *sepals* broadly ovate, 3–3.5 by 3.5–5 mm, apex rounded, subacuminate, or subacute, ferruginously tomentose on outside, glabrous on inside, but usually one sepal partly tomentose on inside but ultimately becoming also glabrous, inner sepals ovate to elliptic-ovate, slightly longer and narrower than outer ones, apex obtuse to subacute, membranous and glabrous along margin, tomentose on outside, glabrous on inside. *Corolla* 7–14 mm long, densely ferruginously appressedly tomentose on outside but glabrous along margin and at base of the tube, glabrous on inside, lobes lanceolate, lanceolate-ovate or oblong, 4–6.5 by 2.5–4 mm, apex subacute, obtuse or truncate, sometimes fimbriate. *Stamens* 20–25, in 2 whorls, 3–5 mm long, filaments subulate, c. 1 mm long, with long ferruginous hairs, anthers oblong-ovoid, compressed, 2.5–4 mm, apex acuminate, dehiscing laterally, glabrous. *Ovary* ovoid, c. 1.5 by 2 mm, 6-lobed, 6-celled, ferruginously tomentose. Style filiform, 9–17 mm long, grooved, glabrous. *Fruits* ovoid-ellipsoid, 4.3–7.5 by 2–3 cm, 1-seeded, apex subacuminate, acuminate or acute, pericarp thin, fleshy, ferruginously tomentose, endocarp woody, thin. Seeds the same shape as fruit, slightly smaller, acute at either end, light brown, scar covering half of the seed, pale brown; embryo exalbuminous, radicle small, not or hardly exsert.

Lectotype specimen: *Beguïn 486* in L.

Vernacular names: suntei; Sumatra: suntei hitam; siak illipe nuts, English.



**Ecology:** In marshy or peat-forests at low altitudes.

**Distribution:** Malaya, Sumatra, Riouw Islands.

**MALAYA.** Johore, Pangkalan Raja, Pontian: *Ngadiman SF 36683* (L, SING), fl. July; Ayer Masim Malay Res.: *KEP 76602* (KEP), tree, Oct.

**SUMATRA.** Sumatra East Coast, Asahan: *NIFS bb 33098* (BO, L), tree, fr. Nov.; Labuan Batu, Serdang, alt. 5 m: *NIFS bb 33093* (BO, L), Oct. — Indragiri, Sg Gareng, peat-forest: *Polak 530* (BO, L), Sept. — Bengkalis, Rangsang Island: *Beguin 486* (BO, L), fr. Nov.; Sebank, marshy forest: *Beguin 423* (BO, L), tree 28 m, fl.; Mendal Island: *NIFS bb 12474* (BO, L), tree, fl. May; Rantau Pandjang: *NIFS bb 24441 & 24444* (BO, L, SING), tree 36 m, fl. May; Sg Kembang, alt. 1 m: *NIFS bb 17364* (BO, L), tree, fl. April; ibidem: *NIFS bb 17365* (BO, L), tree, fl. May; Kempastinggi: *NIFS bb 24447* (BO, L), tree, fl. June; Kelapapati: *NIFS bb 25561* (BO, L), tree, Sept.; ibidem: *NIFS bb 26507-26522* (BO), tree 34-38 m, Oct.; ibidem: *NIFS bb 23120* (BO, L), tree 24 m, Sept.; ibidem: *NIFS bb 23123* (BO, L), tree, Sept.; Sei Sago: *NIFS bb 23115* (BO, L), tree, Sept. — Tapanuli, Sibolga and environments, Barus, Pankalan Tapus: *NIFS bb 28458* (BO, L), Aug. — Indragiri Lowlands, Simpang, alt. 10 m: *NIFS bb 23285, 23286, 23287* (BO, L, SING), tree Sept. — Indragiri Uplands, Pagarumbei, Tjenako river, alt. 8 m: *NIFS bb 25764* (BO, L), Oct.; Keritan, alt. 5 m: *NIFS bb 28708* (BO, L), tree, Aug.

**RIOUW ISL.** Karimun: *NIFS bb 17151* (BO, L), tree, fr. Nov.; ibidem: *NIFS bb 5392* (BO, L), May; Gelang Isl.: *NIFS bb 29102* (BO, K, L, SING), tree, Sept.

**Remark.** Lam's suggestion that two varieties might be distinguished is not supported by the recent collections as intermediate stages between the more roundish fruits (as reported in *Beguin 423*) and the elongate ellipsoid fruits (as in the type specimen *Beguin 486*) are found.

**55. *P. firmum* White, Journ. Arn. Arb. 31, 1950, 106 — Fig. 11.**

Tall trees, up to 33 m. Branchlets irregularly terete, 3-5 mm in diam., ferruginously tomentose, but soon glabrous; terminal cone up to 8 mm long, greyish tomentose; stipules linear, up to 5 by 1 mm long, acute, tomentose on outside, fimbriate along margin, glabrous on inside, caducous. *Leaves* conferted at tip of branchlets, obovate, 12-15 by 5.5-8 cm, obtuse at apex, broadly cuneate at base, decurrent along upper side of petiole; glabrous on either side, coriaceous; midrib minutely crested above, prominent and rounded below, secondary nerves 5-8 pairs, ascending at an angle of c. 45°, curved, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves very slender, transverse, hardly visible on either side. Petioles 1.5-3 cm long, crested above, rounded below, greyish puberulous above, brownish puberulous below but partly glabrescent mainly in the apical part. *Flowers* unknown. Pedicel of fruit terete, 2-3 cm long, incrassate at apex, ferruginously puberulous, but partly glabrescent; sepals in fruit broadly ovate, up to 4 by 4 mm, obtuse at apex, ferruginously tomentose on outside, glabrous on inside, inner sepals with glabrous and membranous margins. *Fruits* (immature) ellipsoid, 1.5-2.5 by 1.2-1.5 cm, 1-seeded, rounded at either end, pericarp thin, glabrous, shining. Seeds incompletely known, scar probably covering half the seed.

Fig. 10. *P. burakii*, a. branchlet with leaves and flowerbuds; b. branchlet with leaves and fruit; c. tertiary nervation of leaf; d. flowerbud; e. outer sepal; f. inner sepal; g. corolla-lobe; h. stamens; i. basal part of gynaecium (*NIFS bb 24441*, except b. which is after *Beguin 486*).

Type specimen: *Walker BSIP 246* in BRI.

Ecology: In hill rainforests at low altitudes.

Distribution: Solomons.

GUADALCANAL. Beaufort Bay, Kombau river, hill rainforest: *Walker BSIP 246* (A, BRI, K), tree 33 m, fr. Febr.

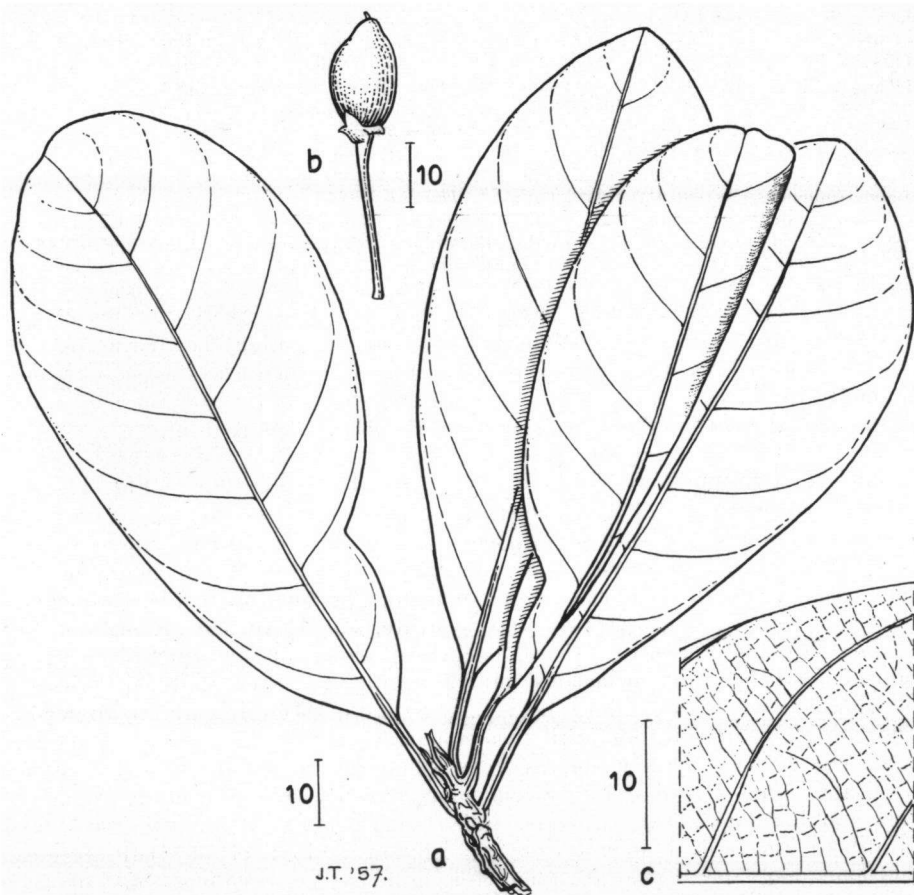


Fig. 11. *P. firmum*, a. branchlet with leaves; b. fruit; c. tertiary nervation of leaf (*Walker BSIP 246*).

56. *P. warburgianum* Schlechter, *Guttapercha und Kautsch. Exp.*, 1911, 94, *nomen nudum*; Krause, *Bot. Jahrb.* 58, 1923, 471, *descr.*; Lam, *Nova Guinea* 14, 4, 1932, 553, t. 97. — Fig. 12.

Trees, 30–40 m. Branchlets stout, terete, 4–10 mm in diam., cinnamonously tomentose, glabrescent; terminal cone up to 12 mm, reddish brown tomentose; stipules linear, up to 3 by 0.5 mm, acute, brownish tomentose, caducous. *Leaves* scattered to subconferted at tip of branchlets, elliptic or subobovate, 14–20 by 6–9 cm, apex indistinctly obtusely

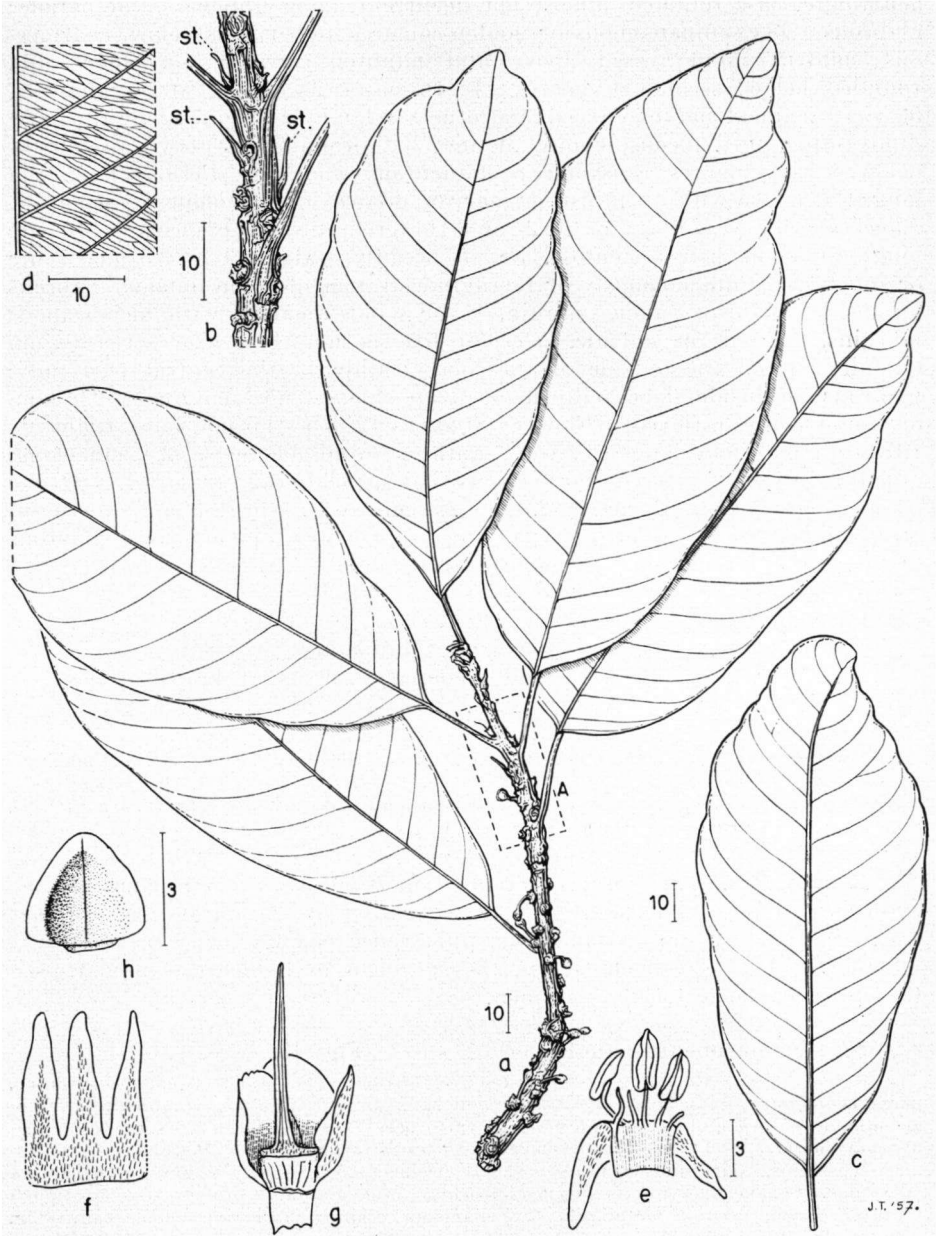


Fig. 12. *P. warburgianum*, a. branchlet with leaves and flowerbuds (part A enlarged in b); b. part of branchlet enlarged (st. stipules); c. leaf; d. tertiary nervation of leaf; e. part of corolla, inside, with a few stamens; f. part of corolla, outside; g. part of colyx, with gynaecium (a-d. Brass & Versteegh 13543, e-h. Schlechter 16313).

acuminate, base rounded, almost not decurrent along upper side of petiole; glabrous above, cinnamomous or golden-coloured puberulous below, chartaceous; midrib subimpressed above and minutely crested, prominent and rounded below, secondary nerves 14—16 pairs, ascending at an angle of 50°—70°, apical nerves curved, the others straight and curved at tip only, diminishing until inconspicuous, distinct but prominulous above, prominent below, tertiary nerves transverse, prominent on either side. Petioles 1—2.2 cm long, flat above with an indistinct narrow groove, cinnamomously tomentose. *Flowers* axillary, solitary or in 2- or 3-flowered clusters, pedicels 6—10 mm long, cinnamomously tomentose. *Sepals* broadly ovate, c. 4 by 3.5 mm, acute or subobtusate, cinnamomously or ferruginously tomentose on outside, glabrous on inside, fimbriate along margin, inner sepals smaller, with membranous margins, crested on outside. *Corolla* 6.5—9 mm, brownish sericeous on outside, but on the outside of the lobes mainly in the central part only, glabrous on inside, lobes elliptic or ovate-oblong, 3.5—5.5 by 2—2.5 mm, obtuse or acute, reflexed in flower. *Stamens* 12, 3.5—4.5 mm long, filaments filiform, c. 3 mm long, glabrous, anthers ovoid-oblong, c. 2.5 mm long, apiculate, with scattered ferruginous hairs, dehiscent extrorsely. *Ovary* ovoid-globose or disciform, c. 2.5 by 2.5 mm or 0.5 by 2.5 mm, ferruginously pilose. Style subabruptly passing into ovary, 8—15 mm long, glabrous except for a ferruginous pubescence at the base. *Fruits* unknown.

Type specimen: *Schlechter 16313* in B.

Lectotype specimen: *Schlechter 16313* in L.

Venacular name: sowkwa (Manikiong).

Ecology: In primary and secondary forests at low altitudes.

Distribution: New Guinea.

NEW GUINEA. West New Guinea, Oransbari: *NGBW 1138, 1599* (L), tree 35—38 m, fl. Sept.; Idenburg river, Bernhard Camp, secondary forest on lower mountain slopes, alt. 100 m: *Brass & Versteegh 13543* (A, L), tree 34 m, fl. yellow-green, April — Northeast New Guinea, Wobbe, alt. 200 m: *Schlechter 16313* (G, L, S), fl. July — *doubtful specimen*: *NGBW 5354* (L), from Sarmi, vern. names: kanodjau (Itik, Mander), toerti (Berik).

Remarks. This species is related to *P. obtusifolium* but has shorter pedicels and less stamens. It can be recognized by the dark upper surface when dry and by the cinnamomous pubescence below.

As the type specimen is lost, the specimen in Leiden has been chosen to represent the lectotype specimen.

### 57. *P. morobense* van Royen, n. sp. — Fig. 13.

Arbor magna. Ramuli gracili, cinereo-vel ferrugineo-puberuli; stipulae lanceolatae, longe acuminatae, caducae. Folia elliptico-obovata, 10—15 × 4—5.5 cm, breviter obtuse acuminata, matura glabra, sed interdum in parte basali costae puberula. Nervi secundarii utroque latere 10—14, sursum evanescentes, tertiarii transversi. Petiolus (1—)1.5—2.2 cm longus, puberulus, glabrescens. Pedicellus 0.5—0.7 cm longus, cinnamomeo-puberulus. Sepala 6, extus ferrugineo-puberula, intus glabra. Corolla extus ad tubum tantum sparse puberula. Stamina 12; filamenta glabra; antherae oblongo-sagittatae, intus sparse ferrugineo-hirsutae. Ovario 6-loculare, ferrugineo-puberulum; stylus glaber. Fructus ignotus. Typus: *Clemens 8293* in L.

Tall trees. Branchlets slender, 2—4 mm in diam., greyish or ferruginously puberulous, glabrescent; terminal cone 5—10 mm long, puberulous; stipules lanceolate, up to 7 by 2 mm, long-acuminate at apex, puberulous

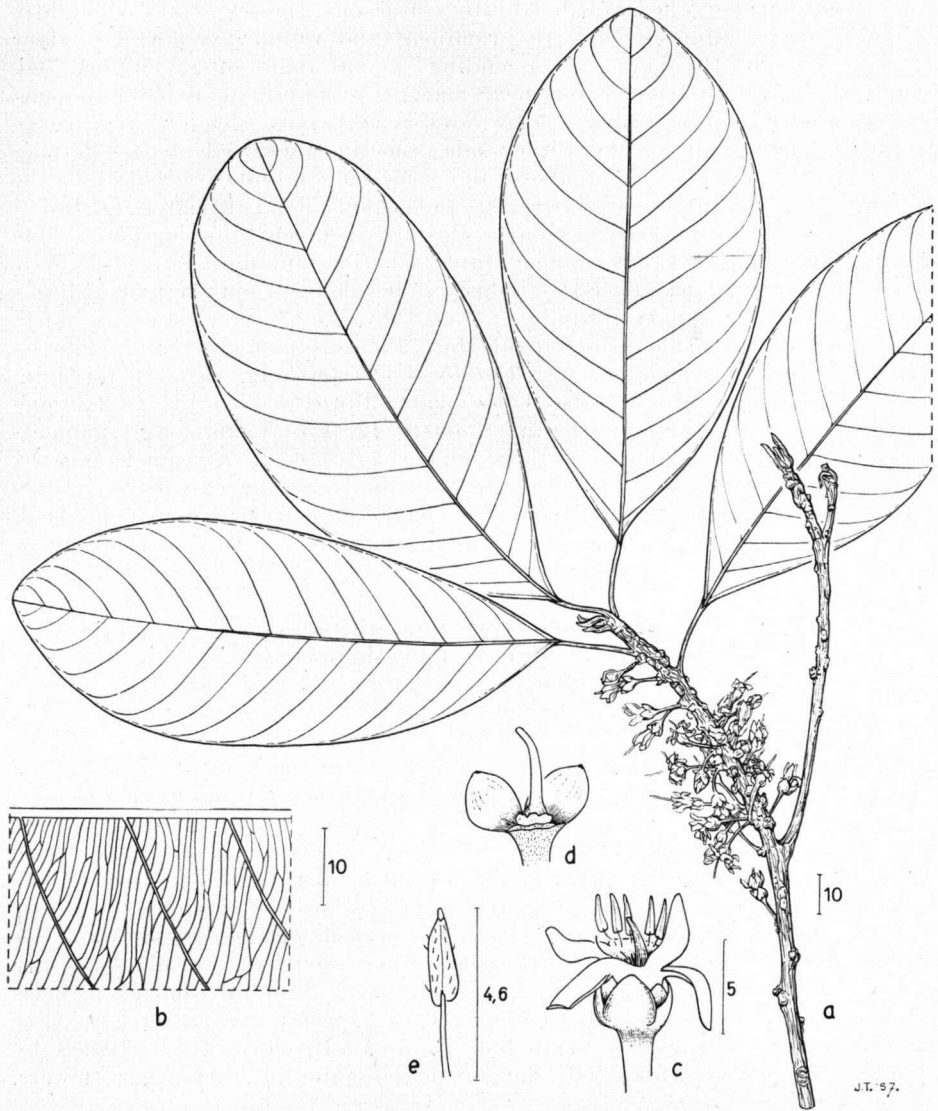


Fig. 13. *P. morobense*, a. branchlet with leaves and flowers; b. tertiary nervation of leaf; c. flower, only some stamens drawn; d. part of calyx, with gynaecium; e. stamen (Clemens 8293, pubescence of flowers in a. omitted).

on outside, glabrous on inside, caducous. *Leaves* scattered, elliptic-ovate, 10—15 by 4—5.5 cm, apex short obtusely acuminate, acumen up to 4 mm long, base broadly cuneate, abruptly narrowed near petiole and decurrent along the sides of the latter; juvenile leaves sparsely puberulous below, mature ones glabrous on either side but sometimes puberulous below along



the basal part of the midrib, thinly coriaceous; midrib flat or slightly grooved above, minutely crested, prominent and rounded below, secondary nerves slender, 10—14 pairs, ascending at an angle of c. 60°, curved, diminishing until inconspicuous near margin, prominulous above and sometimes grooved, prominulous below, tertiary nerves slender, transverse, rather numerous, distinct on either side, sometimes grooved above. Petioles (10—)15—22 mm long, flat above and sometimes minutely grooved in the apical part, ferruginously or greyish puberulous, but ultimately glabrous. *Flowers* in 2—5-flowered, axillary clusters, pedicels angular, 5—7 mm long, cinnamomously puberulous. Outer *sepals* triangular-ovate, 3—3.5 by 3—3.5 mm, apex subacute, ferruginously puberulous on outside and glabrous on inside, inner sepals rotundate, 2.5—3 by 2.5—3 mm, apex rounded, ferruginously puberulous on outside but glabrous along margin, glabrous on inside, margins membranous. *Corolla* 7—9 mm long, sparsely ferruginously puberulous on the tube, lobes ovate-elliptic, 5—5.5 by 2—2.5 mm, apex obtuse, reflexed in anthesis. *Stamens* 12, 4.5—5 mm long, filaments linear, 2.5—3 mm, glabrous, anthers oblong-sagittate, 2—2.5 mm long, apex obtuse, sparsely ferruginously hirsute dorsally, dehiscent extrorsely. *Ovary* disciform-obovoid, c. 1 by 1.5 mm, 6-celled, 6-lobed, ferruginously puberulous. Style stout, 3—3.5 mm long, terete, glabrous, with blackish stigmas. *Fruits* unknown.

Type specimen: *Clemens* 8293 in L.

Ecology: In rainforests at medium altitudes.

Distribution: New Guinea (and Manus?).

NEW GUINEA. Northeast New Guinea, Morobe distr., Sattelberg, 1100 m alt.: *Clemens* 8293 (A, B, L), fl. creamy brown, May.

MANUS. Loniu: *Hebblethwaite* 548 (LAE), tree 30 m, Febr., dubious specimen.

Remarks. It was first supposed, when studying the specimens mentioned above, that they could be inserted in *P. warburgianum* Schlechter. On closer study it appeared that there were some distinct differing details sufficient to establish the present new species. Its main difference with *P. warburgianum* is the smaller number of nerves. Also the base of the leaf is decurrent along the sides of the petioles instead of along the upper surface. The pubescence on the outside of the tube of the corolla is another detail different from the related species since there the corolla lobes are pubescent, though mainly in their central part. Also the shorter pedicels and the more robust buds distinguish the two species.

This species is closely related to *P. simum* from which it differs by the thicker, glossy leaves with longer petioles and by the larger flowers.

58. *P. mindanaense* Merrill, Bur. Gvt. Lab. Publ. 6, 1904, 15; Dubard, Bull. Mus. hist. nat. 15, 1909, 380; Merrill, Enum. Phil. Pl. 3, 3, 1923, 281; Lam, l. c. 1925, 105; Lam, l. c. 1927, 413.

Trees. Branchlets angular, 2—5 mm in diam., ferruginously tomentose, glabrescent; terminal cone up to 3 mm long, ferruginously tomentose; stipules lanceolate, up to 2.5 by 1 mm, acute, ferruginously tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, elliptic or elliptic-obovate (according to Merrill ovate), 11—16 by 4—6 cm, indistinctly obtusely acuminate (according to Merrill acute), base broadly cuneate, sub-

abruptly constricted into the petiole, decurrent along adaxial side of petiole; immature leaves cinnamomously puberulous on either side, mature ones glabrous, thin-coriaceous; midrib crested above, prominent and rounded below, secondary nerves slender, 13—15 pairs, ascending at an angle of 60°—70°, slightly curved or straight and curved at tips only, diminishing until inconspicuous near margin, prominulous above, prominent below, tertiary nerves transverse, slender, prominulous on either side. Petioles 28—37 mm long, thickened and wrinkled in the basal part, narrowly grooved above, young ones pubescent, mature ones finally glabrous. *Flowers* in 3- or 4-flowered, axillary clusters. *Sepals* ovate, c. 1 by 1.5 mm, obtuse, cinnamomously puberulous on outside, glabrous on inside. *Corolla*, *stamens* and *gynaecium* unknown. *Fruits* known immature only, depressedly-ovoid, c. 6 by 5 mm, glabrous.

Type specimen: *Ahern 837* in PNH.

Lectotype specimen: *Ahern 837* in NY.

Vernacular names: náto (Lanao), calapia (Moro)

Ecology: In primary forests at low altitudes.

Distribution: Philippines.

MINDANAO. Cottabato: *Ahern 837* (NY), imm. fr.

59. *P. loheri* Merrill, Phil. Journ. Sc. 27, 1925, 47; Merrill, Enum. Phil. Fl. Pl. 4, 1926, 253; Lam, l. c. 1927, 413.

Trees. Branchlets terete, 3—5 mm in diam., brownish woolly tomentose, glabrescent, finely grooved; terminal cone up to 7 mm long, brownish tomentose; stipules lanceolate, up to 3 by 1 mm, acute, brownish woolly tomentose on outside, glabrous on inside, caducous. *Leaves* subconferted at apex of branchlets, spatulate or oblong-obovate, 8—15 by 3—5.5 cm, short obtusely acuminate at apex, sometimes obtuse, base narrowly cuneate, shortly decurrent along sides of petiole; glabrous above except brownish woolly-tomentose along midrib but finally glabrous, sparsely tomentose below but denser so on midrib, subcoriaceous; midrib narrowly crested above, prominent and rounded below, secondary nerves 7 or 8 pairs, ascending at an angle of 40°—55°, almost straight, stronger curved at their tips, diminishing until inconspicuous near margin, slightly grooved above, prominent below, tertiary nerves transverse, few, invisible above, very inconspicuous below. Petioles 1.5—1.8 cm long, broadly ribbed above, angular below, brownish woolly tomentose. *Flowers* in 3—7-flowered, axillary clusters, pedicels angular, 1.5—2.5 cm long, brownish woolly-tomentose. Outer *sepals* triangular-ovate, c. 3 by 3 mm, subacute, brownish woolly-tomentose on outside, glabrous on inside, inner sepals suborbicular, c. 2.5 by 2.5 mm, on outside glabrous along the membranous margins, otherwise similar to the outer sepals. *Corolla* 5—9 mm long, lobes broadly ovate, 5—6 by 3—3.5 mm, obtuse at apex, reflexed in anthesis, on outside ferruginously sericeous on tube on the middle-line of the lobes, on inside with a few hairs between the stamens. *Stamens* 12, 4—5 mm long, entirely glabrous, filaments filiform, c. 3 mm long, anthers oblong, c. 2 mm long, obtuse at apex, dehiscing introrsely. *Ovary* disciform or depressedly globose, c. 1 by 3 mm, 6-celled, 12-lobed, sparsely ferruginously sericeous at apex only, at base with an

irregularly lobed, glabrous disk, style filiform, c. 12 mm long, glabrous. *Fruits* unknown.

Type specimen: *Loher 13396* in PNH.

Lectotype specimen: *Loher 13396* in K.

Distribution: Luzon.

Rizal prov., Montalban: *Loher 12633* (CAL), fl. buds Oct. and *Loher 13396* (K), fl. April; without known loc.: *Loher 13864* (CAL), imm. fruit Jan.

Remark. Since the type specimen in Manila has been lost a new one had to be chosen from other material present in the Kew Herbarium.

60. *P. luzoniense* (F.-Vill.) Vidal, Rev. Pl. Vasc. Fil., 1886, 176; Merrill, Bur. Gvt. Lab. Publ. 6, 1904, 15; Merrill, Phil. J. Sc. 1, 1906, Suppl., 114; Dubard, Bull. Mus. hist. nat. Paris 15, 1909, 380; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 281; Lam, l. c. 1925, 60; Lam, l. c. 1927, 400 — *Dichopsis luzoniensis* F.-Vill., Nov. App., 1880, 125 — *Palaequium latifolium* Naves in Blanco, Fl. Fil., ed. 3, 2, 1880, 125, t. 423, *excl. syn.* *Bassia argentea* de Vriese, figure only — *P. ahernianum* Merrill, Phil. For. Bur. Bull. 1, 1903, 46; Merrill, Bur. Gvt. Lab. Publ. 6, 1904, 14; Dubard, Bull. Mus. hist. nat. Paris 15, 1909, 384.

Trees. Branchlets terete to subterete, 3–6 mm in diam., pale yellowish greyish, glabrous, striate; terminal cone 5–10 mm long, brownish puberulous; stipules lanceolate, up to 10 by 2 mm, apex acute, brownish puberulous, caducous. *Leaves* conferted or subconferted at apex of branchlets, oblong to subobovate, obovate or elliptic, (11–)14–17(–20) by (2.5–)4.5–6.5 (–9.5) cm, apex rarely rounded, usually obtusely to subacutely or rarely acutely acuminate, acumen 2–5(–7) mm, base cuneate, shortly decurrent along adaxial side of petiole; glabrous above, minutely brownish or dark ferruginously tomentose below, chartaceous; midrib grooved above and minutely crested, prominent and rounded below, secondary nerves (7–)9–14(–22) pairs, ascending at an angle of 60°–65°, curved or straight and curved at their tips only, diminishing until inconspicuous, prominulous above, prominent below, tertiary nervation transverse to secondary nerves but reticulate, inconspicuous or prominent on either side. Petioles 1.5–4 (–6) cm long, flat above and sometimes minutely grooved in the apical part, thickened in the basal half, minutely brownish tomentose. *Flowers* solitary or in 2–4-flowered, axillary clusters, pedicel slender, (2–)3–6.5 cm long, angular, thickened at apex, twisted and minutely ferruginously tomentose, in fruit not prolonged. *Sepals* ovate, 3–4.5 by 2.5–3.5 mm, outer ones subacute, inner ones with membranous margins and obtuse, minutely brownish or yellowish greyish tomentose on outside, glabrous on inside. *Corolla* 6-lobed, rarely 5-lobed, 10–12 mm long, lobes lanceolate, 7–8 by 1.5–3 mm, acute or subacute at apex, outside with a narrow line of ferruginous hairs in the centre, glabrous on inside, reflexed in anthesis, tube ferruginously sericeous on outside, glabrous on inside. *Stamens* 12 or 13; 9–11 mm long, filaments slender, 5–6.5 mm long, glabrous, anthers sagittate, 3–4 mm long, apex acute or bifid, densely covered with short ferruginous hairs, dehiscing laterally to subextrorsely. *Ovary* globose, c. 1.5 by 2 mm, gradually passing into the style, 6-celled, minutely ferruginously tomentose. Style subulate, c. 15 mm long, glabrous. *Fruits* when young

crowned by the long persisting style, when mature ellipsoid, c. 3.5 by 2 by 1 cm, apex mucronate, minutely brownish tomentose but soon glabrescent, one-seeded, pericarp thin, woody when dry. Seeds slightly smaller than fruit, testa crustaceous, nitidous, scar covering half of the seed, pale greyish, dull. Embryo exalbuminous, cotyledons thick.

Type specimen: *Vidal 1562* in PNH.

Lectotype specimen: *Vidal 1562* in K.

Vernacular names: salukut (Bukidnon language); araka (Ibagan language); gasatan-panalipaen, niket (Ilocos language); salukutak (Magindanao language); tipdus, tipulo, tipulok (Manobo language); dulitan (Pampangan language); natoŋga-puti (Panay Bisaya language); takarang (Pangasinan language); lahas (Subanon language); kalapia, kalipaya (Sulu language); bagalaŋgit, dolitan, nato, palak-palak (Tagalog language).

Ecology: In primary forests at low and medium altitudes.

Distribution: Philippines.

LUZON. Ilocos Sur prov.: *Klemme 5242* (BO), fl. buds, Aug. — Zambolez prov.: *Curran 5242* (SING), fl. buds, Jan. — Tayabas prov., Kinataktan: *Oro 30337* (SING), juv. fr., March; without known loc.: *Tabat 22798* (BO), fl. buds, April — Bataan prov., Lamao river: *Borden 598* (SING, fl. May; ibidem: *Borden 1918* (E), fl. buds; ibidem: *Borden 2325* (E, SING), fl.; ibidem: *Barnes 486* (BO, SING), juv. fr., Jan.; ibidem: *Barnes 179* (BO, G, SING), fl. Jan.; ibidem: *Barnes 155* (BO, SING), fl. Jan.; ibidem: *Curran 5274* (BO); Mt Mariveles: *Meyer 2254* (BO, SING), fl. Dec.; ibidem: *Meyer 2277* (SING), fl. Dec.; without known loc.: *Udasco 27188* (L, PNH), fr. April — Rizal prov., Boso-boso: *Ahern's Collector 1968* (BO, SING), fl. Nov.; San Isidro: *Vidal 1562* (K) — Manila prov., *Perrottet s.n.* (G), fl.

MINDORO. Bongabong river: *Whitford 1462* (BO, SING), fr. March; without known loc.: *Merritt 6788* (SING), juv. fr., March.

MINDANAO. Ayusan prov.: *Miranda 1915* (G, L, NY, SING), fl. buds, Oct.; Zamboanga distr.: *Stadtmitter o.s. 20098* (L), fl. buds, Sept.; ibidem: *Ahern 608 & 841* (NY), fl. buds, 841 type specimen of *P. ahernianum* Merrill; ibidem: *Beillo 16497* (BM, BO, L, SING), Sept.; Surigao prov., Agusan valley: *Hutchinson 7579* (NY), July/Aug.; ibidem, Sukailang: *Mendoza & Convozar PNH 10239* (L, PNH), tree 25 m, fl. Febr.; ibidem: *Mendoza & Convozar 10291* (L, PNH), tree 15 m, fl. buds. Febr./March; Lake Lanao: *Clemens 1033* (G), fr.

MASBATE. Palanoc: *Vidal 3193* (K), fl. March.

GUMARAS. Sulaŋgun Hill, alt. 200 m: *Suhit 3666* (L, PNH), tree 7–8 m, juv. fr. March; without known loc.: *Gammill 222* (BO, SING), fl. Jan.

PANAY. Ilo-ilo prov., Mt Balutinao, Miagao: *Vidal 3186* (K), fl. March.

SURIGAO. without known loc.: *Wenzel 2981* (BO, G), fr. July; ibidem: *Wenzel 3067* (BO, G), fl. July.

Remarks. In this species two extreme forms linked by a number of intermediate forms can be found. The first one, described as *P. luzoniense* is characterized by up to 6.5 cm long, slender pedicels and the corolla exerted; a characteristic specimen is found in *Borden 2325*. The second form, described formerly as *P. ahernianum* is characteristic by up to 2 cm long, stout pedicels and corolla enclosed, as can be observed in *Ahern 608*.

61. *P. bataanense* Merrill, Bur. Gvt. Lab. Publ. 17, 1904, 44; Dubard, Bull. Mus. hist. nat. 15, 1909, 380; Elmer, Leaflet Phil. Bot. 3, 1910, 867; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 278; Lam, l. c. 1925, 37; Lam, l. c. 1927, 395 — *P. whitfordii* Merrill, Bur. Gvt. Lab. Publ. 35, 1905, 55; Merrill, Phil. Journ. Sc. 1, 1906, Suppl. 14; Dubard, l. c. 380 — Fig. 14.

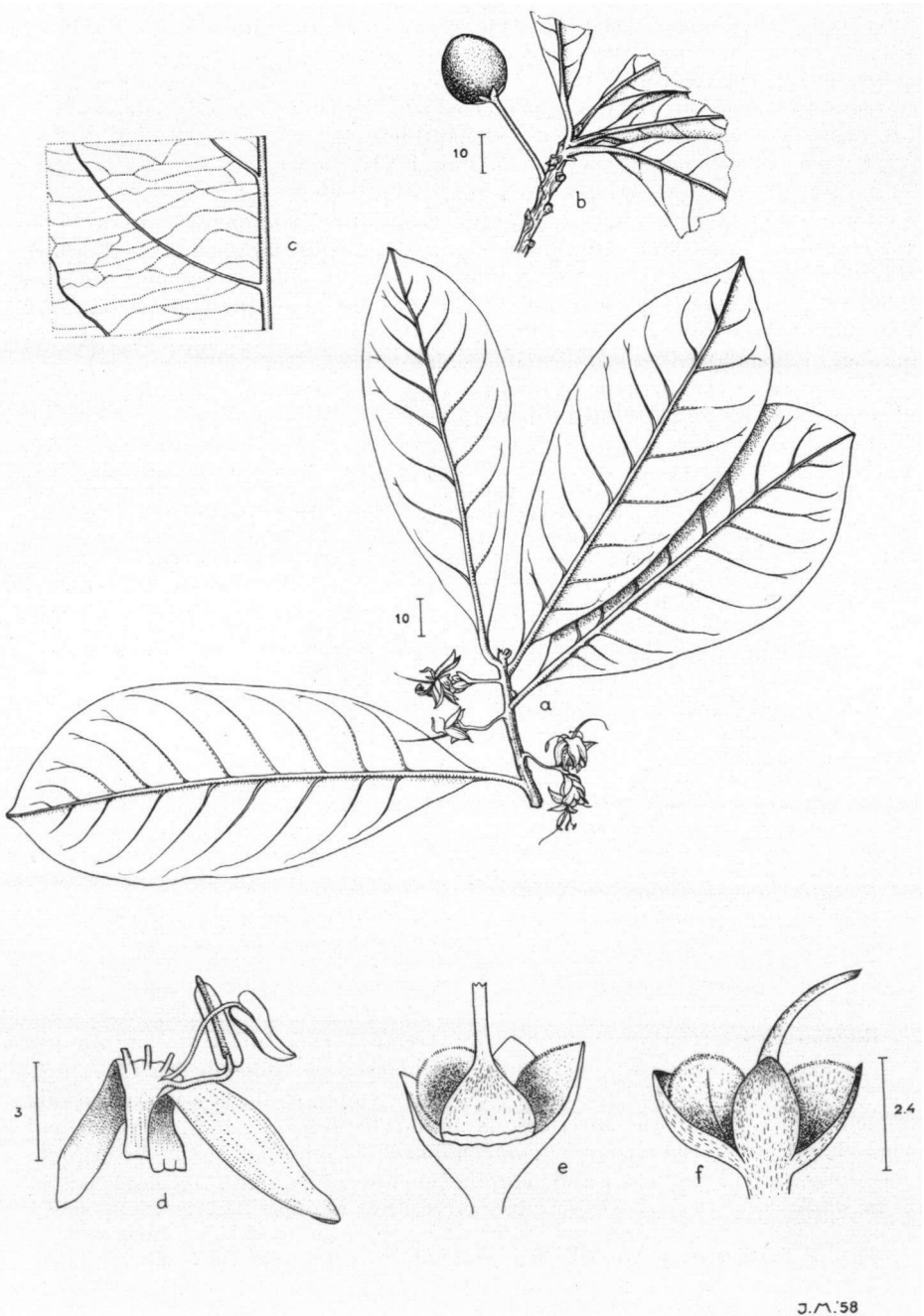


Fig. 14. *P. bataanense*, a. branchlet with leaves and flowers; b. fruit; c. tertiary nervation of leaf; d. part of corolla; e-f. part of calyx, with gynaeceum (a-c. *Whitford 1204*, d-f. *Barnes 169*).

Trees, up to 45 m. Branchlets terete, 2.5—4 mm in diam., ferruginously tomentose at apex but soon glabrous; terminal cone 3—7 mm long, brownish puberulous; stipules lanceolate, 2.5—7 mm long, apex acute, brownish or greyish puberulous on outside, glabrous on inside, caducous. *Leaves* subconfered at apex of branchlets, spatulate-obovate, 8—15 by 3—6.5 cm, apex obtuse or obtusely acuminate, acumen up to 5 mm long, base cuneate, sometimes rather narrowly so; sparsely whitish or golden tomentose above, denser so below, ultimately completely glabrous, coriaceous; midrib slightly impressed above and minutely crested, prominent and rounded below, secondary nerves 7—13 pairs, ascending at an angle of c. 60°, straight or slightly curved, indistinctly archingly joined near margins of leaf by tertiary nerves, impressed above, prominent below, tertiary nerves transverse, few, inconspicuous above, prominent below but slender. Petioles 8—25 mm long, flat above and crested, glabrous. *Flowers* solitary, or 2 or 3 in the axil of leaves or their scars, pedicels 9—24 mm long, ferruginously puberulous. Outer *sepals* ovate, 2—2.5 by 3—4 mm, apex acute, ferruginously tomentose on outside, glabrous on inside, inner sepals connate, 3—3.5 mm in diam., apex rounded to subacute, margins membranous and ciliate, ferruginously tomentose on outside, glabrous on inside. *Corolla* 10—14 mm long, glabrous on either side, lobes elliptic-oblong, 7.5—10 by 2—3 mm, apex acute, obtuse or obtusely acuminate, reflexed in anthesis. *Stamens* 12 or 13, 7—9 mm long, filaments subulate, 4—6 mm long, glabrous, anthers elliptic-oblong, 3—3.5 mm long, apex mucronate, dehiscing laterally-introrsely, glabrous. *Ovary* ovoid, c. 2 by 3 mm, 6-celled, 6-lobed, ferruginously tomentose in the apical half only, subabruptly passing into the style which is 10—15 mm long, glabrous. *Fruits* obovoid, glabrous, 1—1.7 by 1—1.5 cm, seeds unknown.

Lectotype specimen: *Barnes 169* in K.

Ecology: A species growing in dry hill forests at low altitude.

Distribution: Luzon, Mindanao, Sibuyan, Palawan, Camiguin, Batanes.

LUZON. Bataan prov., Lamao river: *Barnes 156 & 169* (K, NY, SING), fl. Jan.; ibidem: *Barnes 496* (NY), fl.; ibidem: *Whitford 1204* (NY), fr. March; ibidem: *Whitford 1015* (PNH†), type of *P. whitfordii* Merrill.

MINDANAO. Lanao prov., vicinity of Butig, alt. 700—850 m: *Lynn Zwickey 296* (NY), tree 30 m, fl. buds, Oct.

SIBUYAN, CAMIGUEN. f. Lam, l. c. 1925, 37.

PALAWAN. f. Merrill, l. c. 1923, 279.

BATANES. without known loc.: *Fenix 3668* (NY), fr. May/June.

Remark. Since never a type specimen has been indicated from among the original material *Barnes 169* is chosen.

62. *P. tenuipetiolatum* Merrill, Bur. Gvt. Lab. Publ. 17, 1904, 45; Merrill, Phil. J. Sc. 1, 1906, Suppl. 114; Dubard, Bull. Mus. hist. nat. 15, 1909, 382; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 283; Lam, l. c. 1925, 95; Lam, l. c. 1927, 410 — *P. vulcanicum* Elmer, msc.

Trees, up to 35 m. Branchlets slender, pale ferruginously tomentose at the utmost apical part, very soon glabrous; terminal cone up to 4 mm long, tomentose; stipules lanceolate-triangular, 1.5—2 by 1—1.5 mm, apex acute, tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, lanceolate, oblanceolate or obovate, 5—12 by 3—5.5 cm, rounded and obtusely

or subacutely acuminate or caudate, acumen up to 10 mm long, base narrowly cuneate, sometimes abruptly narrowed, decurrent along adaxial side of petiole; immature scattered ferruginously tomentose, when mature entirely glabrous, or the midrib below with few appressed, ferruginous hairs, chartaceous; midrib slightly and broadly grooved above and minutely crested, prominent and rounded below, secondary nerves 10—15 pairs, ascending at an angle of 60°—65°, straight or curved, diminishing until inconspicuous near margin, prominulous on either side but slightly more so below, sometimes grooved above, almost inconspicuous at apex and base of leaf, tertiary nerves few, transverse, almost invisible on either side. Petioles 9—22 mm long, grooved and often crested above, glabrous, rarely scattered whitish or ferruginously puberulous above. *Flowers* axillary, solitary or in 2—4-flowered clusters, pedicels angular, 3—8 mm long, ferruginously pubescent. *Sepals* ovate-triangular, 2.5—3 by 1.5—2.5 mm, the outer ones smaller and thicker than inner ones, apex obtuse or subacute, inner sepals with membranous margins and sometimes crested dorsally, ferruginously tomentose on outside, glabrous on inside. *Corolla* 6—7 mm long, glabrous, lobes lanceolate or elliptic, c. 5 by 2 mm, obtuse at apex, reflexed in anthesis. *Stamens* (9—)12, c. 4.5 mm long, filaments filiform, c. 3.5 mm long, glabrous, anthers ovoid to ellipsoid, c. 2 mm long, apex bifid, ferruginously tomentose, dehiscing extrorsely. *Ovary* discoid, c. 1.5 by 0.5 mm, 6-celled, 12-lobed, ferruginously hirsute. Style subulate, grooved, 7—11 mm long, glabrous but ferruginously hirsute at base. *Fruits* ovoid or fusiform, sometimes oblique, 2.5—2.9 by 1.1—1.7 cm, 1-seeded, obtusely acuminate at apex, with a short remnant of the style, pericarp fleshy, glabrous. Seeds slightly smaller than fruit, obtuse at either end, testa thin, brownish, scar covering half of the seed, greyish, dull, embryo exalbuminous, radicle exsert, punctiform.

Type specimen: *Barnes 154* in PNH.

Lectotype specimen: *Barnes 154* in NY.

Vernacular names: akátan (Kalínga language); dolitan, dulitanapulá, mamenik, maniknik, maniknip, mayusip (Tagalóg language); maliknik, maniknik, manipnip (Sambáli language); manipnip (Pampáangan language); pañgo (Ibanág language); yañgauan (Mangyán language).

Ecology: Common in primary forests and dry hill forests at low and medium altitude.

Distribution: Luzon and Mindoro.

Luzon. Bataan prov., Lamao river: *Barnes 154* (NY, SING), fl. Jan.; Mt Mari-veles, Lamao river: *Borden 1247* (SING), fl. June; Laguna prov., Mt Makiling, alt. 300 m: *Sulit 7030* (A, L, PNH), tree 20—25 m, fl. March; Sorsogon prov., Mt Bulusan: *Elmer 16303* (FI, G, L, NY, S), fr. June; ibidem: *Sulit 2686* (L, PNH), tree 20 m, fr. brownish, Aug.; Camarines Sur prov., Mt Madooy: *Edaño 76043* (SING), fl. Nov.; Tayabas prov., Pagbalao: *Merrill 1991* (SING), fl. April.

Mindoro. Without loc.: *Merritt 8599* (SING), Jan.

63. *P. foxworthyi* Merrill, Phil. J. Sc., Bot. 10, 1915, 50; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l. c. 1925, 98; Lam, l. c. 1927, 411.

Large trees. Branchlets slender, 1.5—3 mm in diam., sparsely ferruginously sericeous, soon glabrous; terminal cone up to 5 mm long; stipules lanceolate, up to 2.5 by 1 mm, acute, tomentose on outside, glabrous on

inside, caducous. *Leaves* scattered, obovate or oblong-obovate, 8—12 by 3—5 cm, obtusely acuminate at apex, cuneate at base, decurrent along side of petiole; glabrous on either side, coriaceous; midrib broadly grooved above and minutely crested as well, prominent and angular or subangular below, secondary nerves 12—14 pairs, ascending at an angle of c. 60°, curved or straight and curved at their tips only, archingly joined or diminishing until inconspicuous, prominulous above and grooved as well, prominent below, tertiary nerves transverse, hardly visible above, more so below. Petioles 5—12 mm long, flat above, angular below, glabrous. *Flowers* in 2—5-flowered, axillary clusters, pedicels angular, 8—16 mm long, sparsely ferruginously sericeous. *Sepals* ovate, 2.5—3.5 by 2.5—3.5 mm, outer ones acute or subacuminate at apex, ferruginously appressedly tomentose on outside, glabrous on inside, inner ones obtuse at apex and with glabrous, membranous margins, otherwise similar to the outer ones. *Corolla* 6.5—9 mm long, with scattered ferruginous hairs on the outside of the tube and in the middle-line of the lobes, the latter ovate-lanceolate, 5—7 by c. 2 mm, obtuse, truncate or retuse at apex, reflexed in anthesis. *Stamens* (16—)18, entirely glabrous, 5—7 mm long, filaments filiform, 3—4.5 mm long, anthers ovoid-sagittate, c. 2.5 mm long, acute or bifid, dehiscing extrorsely. *Ovary* ovoid-semi-globose, 1.5—2 mm in diam., 6-celled, 6-lobed, appressed ferruginously tomentose except for the basal part. Style filiform, 9—12 mm long, glabrous. *Fruits* unknown.

Type specimen: *Foxworthy & Ramos 13112* in PNH.

Lectotype specimen: *Foxworthy & Ramos 13112* in K.

Vernacular names: danlig, tagatoi-laláki (Tagalog).

Ecology: In primary forests at low altitudes.

Distribution: Luzon.

LUZON. Prov. of Tayabas: *Foxworthy & Ramos 13112* (K), fl. March.

64. *P. glabrum* Merrill, Phil. Journ. Sc. 10, 1915, 61 and Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l. c. 1925, 102; Lam, l. c. 1927, 412.

Trees, up to 25 mm tall. Branchlets angular, 5—8 mm in diam., glabrous; terminal cone up to 5 mm long, ferruginously puberulous; stipules lanceolate, up to 4 by 2 mm, acute, ferruginously puberulous on outside, glabrous on inside, caducous. *Leaves* conferted at tip of branchlets, obovate-oblong, (8—)12—18 by 3.2—7.2 cm, indistinctly obtusely acuminate, obtuse or rounded at apex, narrowly cuneate at base, decurrent along adaxial side of petiole; glabrous on either side, subcoriaceous; midrib grooved and minutely crested as well, prominent and rounded below, secondary nerves slender, 8—10 pairs, ascending at an angle of c. 60°, straight and curved at their tips only, or curved, diminishing until inconspicuous near margin, slightly grooved above, prominent below, tertiary nerves slender, transverse, inconspicuous and sometimes hardly visible above, prominulous below. Petioles 9—20 mm long, grooved and broadly crested as well above, angular below, thickened except for the apical fourth, glabrous. *Flowers* known in bud only, in 4—6-flowered, axillary clusters at apex of branchlets, pedicels slender, angular, 2.5—3.3 cm long, widened at apex, glabrous. *Sepals* ovate, 3—3.5 by 3—4 mm, subobtuse at apex, sparsely puberulous on outside, glabrous on inside, inner sepals more elliptic, with membranous and fimbriate



margins. *Corolla* 3—4 mm long, glabrous, lobes ovate-lanceolate, 2.5—3 by 1—1.5 mm, obtuse. *Stamens* 18, c. 3 mm long, filaments subulate, c. 1.5 mm long, glabrous, anthers oblong, c. 2.5 mm long, dehiscent laterally, ventrally with scattered ferruginous hairs. *Ovary* ovoid, c. 1.5 by 2.5 mm, 6-celled, glabrous; style cylindrical, c. 2 mm long, glabrous. *Fruits* not seen but according to Lam, 1927, "ovoid, c. 3.5 by c. 2 cm, 1-seeded, glabrous; pedicels 3.1 cm long, seed exalbuminous".

Type specimen: *Ramos 13582* in PNH.

Lectotype specimen: *Ramos 13582* in L.

Vernacular name: alacáac na putí (Tagalog dialect).

Ecology: In primary forests at low altitudes.

Distribution: Philippines.

LUZON. Rizal prov., back of Bosoboso, in forests along streams: *Ramos 13582* (BM, BO, L, SING), juv. fl. Aug.; Tayabas prov., Mt Dingalem: *Ramos & Edaña 26627*, ex litt., fr.

Remark. As the type specimen in the Manila Herbarium became lost during the war a lectotype specimen has been chosen from among the material available.

65. *P. neo-ebudicum* Guillaumin, J. Arn. Arb. 13, 1932, 15; Lam, Blumea 5, 1, 1942, 34.

Trees, up to 25 m. Branchlets densely covered with scars of leaves and flowers, 3—6 mm in diam., ferruginously woolly as are the terminal cone and outside of stipules, glabrescent; terminal cone up to 6 mm long; stipules lanceolate-acicular, c. 2 by 1 mm, ferruginously tomentose on outside, glabrous on inside, caducous. *Leaves* conferted at apex of branchlets, obovate-elliptic, 11—15 by 5.5—7.5 cm, rounded or subcordate at apex, broadly cuneate at base, decurrent along adaxial side of petiole; entirely glabrous or with a few scattered hairs on either side, mainly along the midrib thinly coriaceous; midrib minutely crested above, prominent below, secondary nerves 9—11 pairs, ascending at an angle of c. 55°, straight, curved at their tips, diminishing until inconspicuous near margin or indistinctly archingly joined, above prominulous or flat and yet distinct, prominent below, tertiary nerves slender, transverse, conspicuous on either side. Petioles 2—3.5 cm long, flat and minutely crested above, ferruginously woolly. *Flowers* in 2—5-flowered, axillary clusters, pedicels slender, angular, 1.5—3.5 cm long, ferruginously woolly. *Sepals* elliptic-ovate, 4.5—5 by 3—3.5 mm, apex subacute, the inner sepals obtuse, glabrous on outside, ferruginously woolly on inside. *Corolla* seen in bud only, c. 3.5 mm long glabrous, lobes elliptic-ovate, c. 3 by 1 mm, apex obtuse. *Stamens* 12(—14), c. 2.5 mm long, filaments subulate, c. 1 mm long, glabrous, anthers oblong-sagittate, c. 1.5 mm long, apex obtusely acuminate, on inside densely ferruginously hirsute, dehiscent extrorsely. *Ovary* disciform, c. 0.5 by 1 mm, 6-celled, covered with some ferruginous hairs. Style subulate, c. 2 mm long, grooved, glabrous, mature up to 2 cm long. *Fruits* unknown.

Lectotype specimen: *Kajewski 756* in A.

Vernacular name: ney-more-yetu (Eromanga).

Ecology: In primary forests at low altitude.

Distribution: New Hebrides (Aneityum, Eromanga).

ANERFYUM, Amelgauhat Bay, alt. 60 m, rainforest: *Kajewski 756* (A, NY), tree 20 m, fl. Febr.

EROMANGA, Dillon Bay, alt. 400 m, rainforest: *Kajewski 344* (A, NY), tree 25 m, old fl., June.

66. *P. stellatum* King & Gamble, J. As. Soc. 74, 2, Extra Nr 17, 1905, 198; Ridley, Fl. Mal. Pen. 2, 1923, 277; Lam, l. c. 1925, 71, f. 18; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1240; Lam, l. c. 1927, 402; Heyne, l. c., ed. 3, 1, 1950, 1240; Wyatt-Smith, Research Pamphlet 4, 1954, 43, fig. — *Bassia watsoni* Ridley, Fl. Mal. Pen. 2, 1923, 267 — *Madhuca watsoni* (Ridley) H. J. Lam, l. c. 1925, 179; Lam, l. c. 1927, 462.

Trees, up to 45 m. Branchlets irregularly angular, 3–5 mm in diam., ferruginously hirsute, glabrescent; terminal cone up to 4 mm long, hirsute; stipules lanceolate-acicular, c. 3 by 1 mm, acute at apex, ferruginously hirsute without, glabrous within, caducous. *Leaves* subconferted at apex of branchlets, oblanceolate, elliptic, or oblong, 7–20 by 2.5–5.5 cm, apex obtusely acuminate, acumen up to 9 mm long, base cuneate, sometimes rather narrow, decurrent along sides of petioles; subcoriaceous to chartaceous, glabrous except dark brown or ferruginously hirsute in the basal half of either side of the midrib, subcoriaceous to chartaceous; midrib above with one, sometimes with 2 minute crests, prominent and rounded below, secondary nerves slender, 9–12 pairs, ascending at an angle of 50°–60°, curved, diminishing until inconspicuous and often united by some thickened tertiary nerves near margin, prominulous but distinct on either side, tertiary nerves transverse, slender but distinct on either side. Petioles 15–36 mm long, broadly and shallowly grooved in the apical part, subincrassate at the base, densely dark brownish or ferruginously hirsute. *Flowers* in 3–5-flowered, axillary clusters, pedicels terete or angular, 12–22 mm long, brownish or ferruginously hirsute, in fruit not prolonged but slightly thickened only. *Sepals* ovate, 6–7.5 by 3.5–4.5 mm, apex obtuse or rounded, inner sepals with membranous, scarious, fimbriate margin, dark brownish or ferruginously hirsute on outside, on inside hirsute except for the central part. *Corolla* 9–10 mm long, glabrous, lobes elliptic-oblong, c. 4 by 2.5 mm, apex rounded. *Stamens* 12, 5.5–7 mm long, filaments lanceolate, angular, 3–4 mm long, glabrous, anthers oblong-lanceolate, 2–2.5 mm long, apex rounded, mucronate, sparsely brownish or ferruginously tomentose, dehiscent extrorsely. *Ovary* subglobose, c. 1.5 by 2 mm, 6-celled, dark brownish or ferruginously hirsute. Style 6–11 mm long, 6-ribbed, grooved, truncate at apex. *Fruits* subglobose (3-seeded) or ellipsoid (1- or 2-seeded), c. 2 by 2 cm or c. 2.2 by 1.2 cm, apex obtuse or rounded, with a short remnant of the style, pericarp fleshy or slightly woody, scattered brownish velutinous, ultimately glabrous (?). Seeds fusiform, laterally compressed in the more-seeded fruits, 1.5–1.8 by 0.4–0.7 cm, obtuse at apex, subobtuse at base, testa thin-cartilaginous, yellowish, nitidulous, scar linear, 2–4 mm broad, dull, greyish, embryo unknown.

Type specimen: *Scortechini 1855* in SING.

Vernacular names: Malaya: betis, bitis (Perak); nyatoh, nyatoh putat, putat bukit (Pahang); nyatoh (Malacca); belian, malung (Selangor); Sumatra: balam seinai.

Use: The taller trees are used for the construction of canoes. Fruits edible. From the seeds a vegetable butter is extracted.

**Ecology:** An uncommon tree of low and medium altitudes.

**Distribution:** Malaya, Riouw, Sumatra.

**MALAYA.** Perak, Ulu Laut, Lenggong: *Hamid 10367* (KEP), tree 42 m, July; without loc.: *Scortechini 1855* (SING), fl. March — Malacca, Merliman For. Res.: *Arnot 14185* (KEP), tree 5 m, Nov.; Ayer Panas For. Res.: *Malacca 25204* (KEP), tree 16 m, fl. white; Sungei Lalang For. Res., Kajang: *Symington 24054* (KEP), tree 30 m, March — Negri Sembilan, Sungei Menyala For. Res.: *Foston 18881* (KEP), tree 25 m, fl. March — Pahang, Sungei Baloh Res.: *Abu 11002* (KEP), fl. Febr., white with disagreeable odour; ibidem: *Yeop 869* (KEP), tree 23 m, fl. March; ibidem: *Mahamud 8150* (KEP), tree 40 m, fr. July; Kuantan: *Watson s.n., ex litt., type specimen of Bassia watsonii* Ridley.

**RIOUW.** Kuanatan distr., Pulau Kedondong, alt. 100 m: *NIFS bb 24807* (BO, L), fr. June.

**SUMATRA.** Palembang, Rawas, forest on hills, alt. 100 m: *Grashoff 1010* (BO, L), tree 35 m, fr. green, March.

67. *P. merrillii* Dubard, Bull. Mus. hist. nat. 15, 1909, 381; Fedde, Repert. 11, 1912, 47; Merrill, Phil. J. Sc. 10, 1915, 62; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 281; Lam, l. c. 1925, 96; Lam, l. c. 1927, 411 — *P. lanceolatum* Merrill, Bur. Gvt. Lab. Publ. 6, 1904, 14 — Fig. 15.

Trees, up to 20 m. Branchlets slender, 1.5–3 mm in diam., sparsely ferruginously or blackish tomentose, glabrescent; terminal cone up to 3 mm long, tomentose; stipules lanceolate, up to 4 by 1.5 mm, apex acuminate, tomentose on outside but glabrous along margin, glabrous on inside, caducous. *Leaves* scattered, obovate, obtuse, or oblanceolate, 5.5–14 by 2–6 cm, apex rounded or obtusely acuminate, acumen up to 2 mm long, base cuneate, decurrent along adaxial side of petioles; juvenile leaves ferruginously tomentose on either side, mature ones glabrous on either side, subcoriaceous; midrib grooved above and minutely crested, prominent and rounded below, secondary nerves 8–11 pairs, ascending at an angle of c. 50°, straight or curved, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves rather numerous, slender, transverse, subconspicuous on either side. Petioles 8–14 mm long, flat or grooved above, and crested, young blackish or ferruginously villose, ultimately glabrous. *Flowers* in 2–4-flowered, axillary clusters; pedicels angular, 5–12 mm long, ferruginously or blackish villose, in fruit up to 15 mm long. *Sepals* triangular-ovate, c. 2 by 2 mm, apex acute, blackish villose on outside, glabrous on inside, inner sepals with membranous, glabrous and fimbriate margins and obtuse apex. *Corolla* up to 7.5 mm long, entirely glabrous or ferruginously tomentose at base of tube only, lobes elliptic-oblong, c. 5.5 by 2 mm, apex obtuse or subacute, reflexed in anthesis. *Stamens* 10–12, entirely glabrous, 3–4 mm long, filaments filiform, c. 2 mm long, anthers oblong-ellipsoid, c. 2 mm long, apex obtuse and emarginate, dehiscing introrsely. *Ovary* conoid, c. 1.5 by 1 mm, 6-lobed, 6-celled, ferruginously puberulous. *Style* 7–8 mm long, ribbed, glabrous. *Fruits* ellipsoid, c. 2 by 1.4 cm, glabrous, 1-seeded? Seeds incompletely known.

Type specimen: *Ahern 42* in PNH.

Lectotype specimen: *Ahern 42* in P.

Vernacular names: tadkan, tagkán (Bikol language); akatan, mihat, mikat, miko (Ibanág language); yangauan (Mangyan language); bulau-búlau (Panay Bisáya language); tipudos (Sámal language); baliuhod, dolittán, dúlitan, halibis, manung-kálou, náto, palak-palák (Tagalog language).

**Ecology:** In primary forests at low altitudes.  
**Distribution:** Philippines.

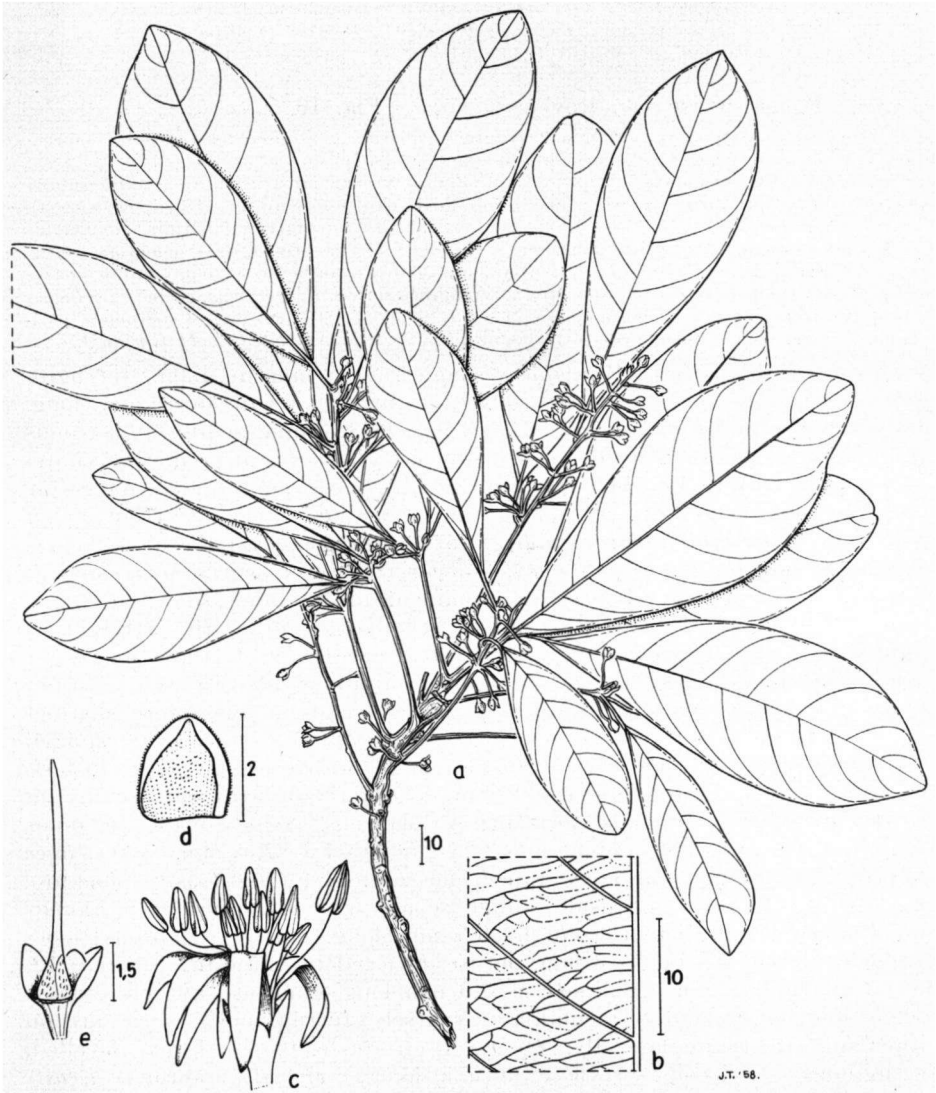


Fig. 15. *P. merrillii*, a. branchlet with leaves and flowerbuds; b. tertiary nervation of leaf; c. flower; d. inner sepal, inside; e. part of calyx; f. part of calyx and gynoecium (Fox PNH 9017).

LUZON. Sorsogon prov., Mt Bulusan: *Elmer 15370* (FI, G, L, NY, S), fl. Dec.; *ibidem*: *Elmer 16029* (FI, G, L, NY, S), fl. May — Laguna prov., Mt Makiling: *Navarro PNH 9609* (L, PNH), fl. Febr.; *ibidem*: *Catalan 26386* (NY), fl.,

juv. fr., Febr. — Tayabas prov., Calauag: *Labaco & Masias 29350* (L, NY, PNH, SING), fl. Aug. — Camarines prov., Dalupaan, Pasacao: *Ahern 42* (P), fl.

MINDANAO. Agusan prov., Butuan: *Mallonga 31210* (L, NY), tree 25 m, fl. Jan.

POLILLO. Karlagan: *Fox PNH 9017* (L, PNH), tree 20 m, fl. Dec.

BATAN. Batanes prov.: *Ramos 80609* (BO, SING), fl. June.

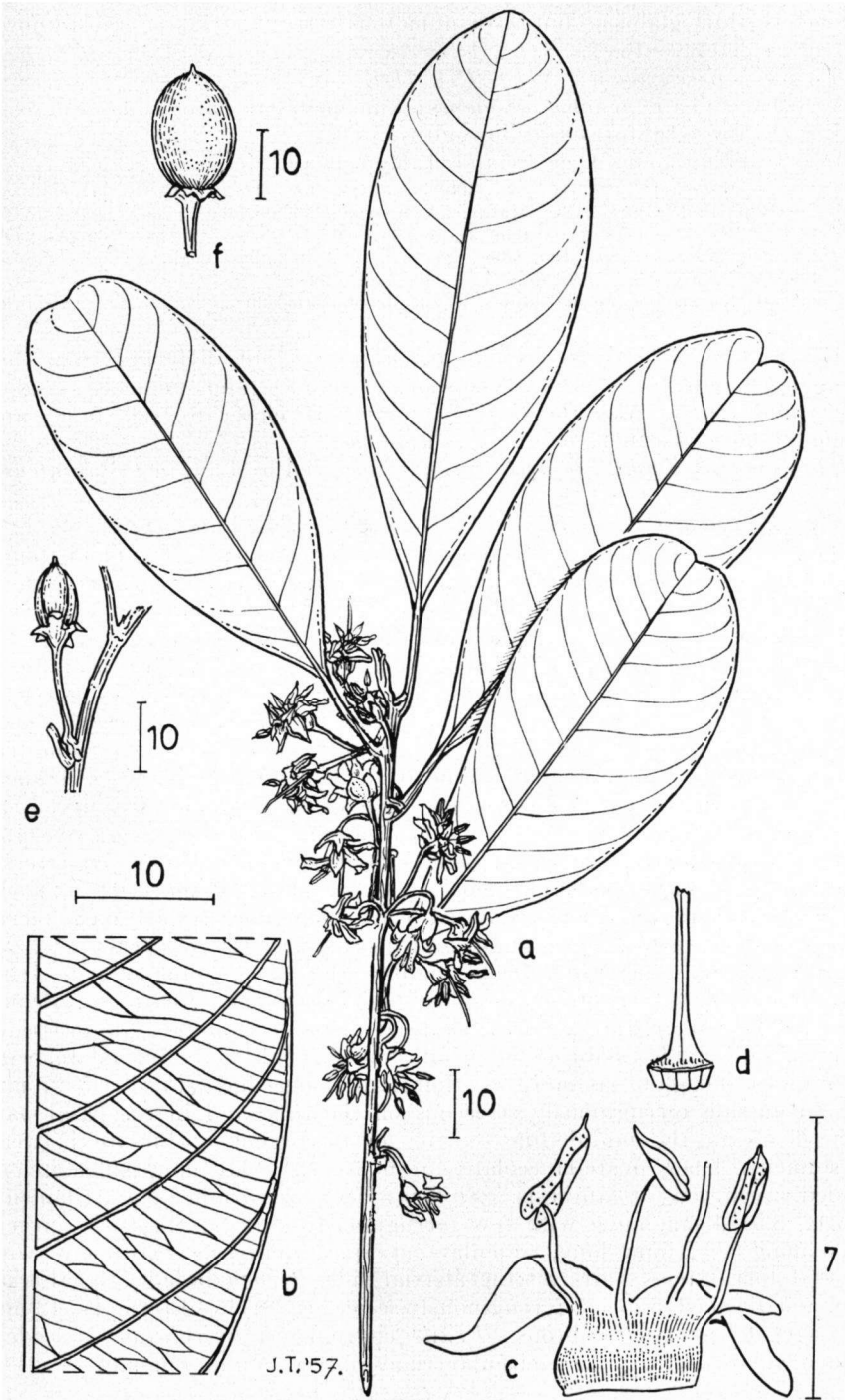
MINDORO, GUEMARAS. f. Merrill 1923, 281.

**68. *P. maliliense* van Royen, n. sp. — Fig. 16.**

Arbor magna. Ramuli graciles, ferrugineo-puberuli, glabrescentes; stipulae lanceolatae, acutae, caducae. Folia spatulato-oblonga vel subelliptica, 7—14(—17) × 2.3—4(—5.5) cm, apice rotundata, obtusa vel breviter obtuse acuminata, supra glabra, subta puberula, costa interdum glabra. Nervi secundarii utroque latere 11—15, apice connati, tertiarum transversis. Petiolus 1.2—1.8(—2.5) cm longus, ferrugineo-puberulus. Pedicellus 0.7—1.1 cm longus, ferrugineo-puberulus. Sepala 6, extus ferrugineo-tomentosa, intus glabra. Corolla glabra. Stamina 12; filamenta glabra; antherae utroque latere sparse ferrugineo-sericeum. Ovario 6-loculare, ferrugineo-sericeum; stylus glaber. Fructus ellipsoideo-ovoideus, interdum obliquus, 2—2.5(—3.5) × 1.4—1.8 cm, 1-spermus; pericarpium crustaceum; semen incomplete cognitum. Typus: *NIFS Cel. II-474* in L.

Trees, c. 30 m tall. Branchlets slender, 2—5 mm in diam., ferruginously puberulous, but soon glabrous; terminal cone up to 5 mm long, puberulous; stipules lanceolate, 2.5—3 by 1—1.5 mm, acute, puberulous on outside, glabrous on inside, soon caducous. *Leaves* scattered, spatulate-oblong or subelliptic, 7—14(—17) by 2.3—4(—5.5) cm, rounded, obtuse or short obtusely acuminate at apex, cuneate at base and decurrent along upper side of petiole; glabrous above, dark ferruginously puberulous below, sometimes midrib glabrous below, subcoriaceous or coriaceous; midrib grooved above and minutely crested, prominent and rounded below, secondary nerves slender, 11—15 pairs, ascending at an angle of c. 70°, straight or slightly curved, stronger so at apex and connected by tertiary nerves or sometimes indistinct archingly joined, prominulous above, more distinct below, tertiary nervation transverse, inconspicuous above, more distinct below. Petioles 12—18(—25) mm long, narrowly grooved above, rounded below, ferruginously puberulous. *Flowers* in 2—5-flowered, axillary clusters, or solitary, pedicels angular, 7—11 mm long, ferruginously puberulous, in fruit up to 3 cm long and almost entirely glabrous. *Sepals* ovate, the inner sepals larger than the outer ones, 2—2.5 by 1.5—2.5 mm, outer ones obtusely subacuminate at apex, inner ones obtuse, ferruginously tomentose on outside, glabrous on inside, inner sepals with glabrous, membranous and fimbriate margins. *Corolla* 6—6.5 mm long, entirely glabrous, lobes ovate-elliptic, 4—4.5 by 2—3 mm, obtuse, reflexed in anthesis. *Stamens* 12, 4—4.5 mm long, filaments linear, c. 2.5 mm long, glabrous, anthers oblong, c. 2.5 mm long, acutely acuminate, sparsely ferruginously sericeous on either side, dehiscing laterally. *Ovary* disciform, c. 0.5 by 1 mm, 6-celled, ferruginously sericeous. *Style* c. 9 mm long, 6-ribbed, glabrous. *Fruits* ellipsoid or ellipsoid-ovoid, sometimes oblique, 2—2.5(—3.5) by 1.4—1.8 cm, 1-seeded (?), obtuse at apex, with a short remnant of the style, pericarp

Fig. 16. *P. maliliense*, a. branchlet with leaves and flowers; b. tertiary nervation of leaf; c. part of corolla, with some stamens; d. gynaecium; e-f. fruit (*NIFS Cel. II-474*).



crustaceous, thin, glabrous but with numerous irregular flakes; seeds known very incompletely only.

Type specimen: *NIFS Cel. II-474* in L.

Vernacular name: Celebes: kumemotaha, nato kumé.

Ecology: In forests at low altitudes.

Distribution: Celebes and Talaud Island.

CELEBES, Menado, Pandai, alt. 400 m: *NIFS bb 33118* (BO, L), tree 40 m, Oct. — Central Celebes, Malili: *NIFS bb 1855, 1883, 2368, 2388, 13577, 23253, 2465* (BO, L), trees 24—30 m, fl. April—Oct., fr. Nov.—April; ibidem: *NIFS Cel. II-277, 278, 279, 474, 495* (BO, L, SING), tree 25—30 m, fl. April—Oct., fr. Nov.—April; Kolaka, Anaiwoi: *NIFS bb 31830* (BO, L), May.

TALAUD, Karakelong, south slope of Mt Duata, alt. 60 m: *Lam 2736* (B, BO, L, SING), fl. May.

Remarks. Closely related to *P. luzoniense* but differing from that species by having smaller leaves, shorter petioles and pedicels, smaller flowers and fruits. Also the tertiary nerves are closer to each other and in general more distinct than in *P. luzoniense*.

The specimen *Lam 2736* was originally inserted by Lam in *P. luzoniense*.

69. *P. rioense* H. J. Lam, l. c. 1925, 89, f. 24; Lam, 1925, 409, f. 5.

Trees, up to 42 m high. Branchlets slender, terete, 2—5 mm in diam., orange-brown sericeous, glabrescent; terminal cone up to 9 mm long, orange-brown sericeous; stipules lanceolate, up to 7 by 3 mm, acute or acuminate at apex, sericeous on outside, glabrous within, caducous. Leaves scattered, ovate, elliptic or obovate, 5—17 by 2.5—6.5 cm, short obtusely acuminate at apex, broadly cuneate to subrotundate at base and sometimes unequal, shortly decurrent along upper side of petiole; coriaceous, glabrous above, cinnamomous or brownish orange appressedly tomentose below; midrib grooved above, prominent and rounded or subangular below, secondary nerves 11—14 pairs, ascending at an angle of c. 60°, slightly curved, at apex diminishing until inconspicuous near margin, prominulous above and slightly grooved above, prominent below, tertiary nerves slender, transverse, prominulous on either side but more distinct below. Petioles 0.8—2.2 cm long, narrowly grooved above, rounded below, sometimes ribbed, dark ferruginous, greyish brown or orange brownish sericeous. Flowers in 2—4 flowered, axillary clusters, pedicels angular, (3—)6—16 mm long, in fruit up to 20 mm, dark ferruginously or brownish appressedly tomentose. Sepals lanceolate, 3—3.5 by 1.5—2.5 mm, acute at apex, ferruginously appressedly tomentose on outside, glabrous on inside, inner sepals more rotundate, with membranous and glabrous margins, fimbriate along edges. Corolla 5—7 mm long, on outside ferruginously sericeous on the tube and in the basal part of the lobes in the middle-line, on inside ferruginously hirsute between the stamens, lobes ovate-lanceolate, 5—6 by 2.5—3.5 mm, subacute or rounded, recurved at anthesis. Stamens 12, 4.5—5 mm long, filaments filiform, 3.5—4 mm long, with few ferruginously hairs at the base, anthers ovate-oblong, c. 2 mm long, apiculate at apex, dehiscing extrorsely, with scattered ferruginous hairs on the abaxial side. Ovary broadly ovoid, c. 1 by 1.5 mm, 6-celled, 6-lobed, ferruginously sericeous. Style filiform, 9—12 mm long, with 6 grooves, glabrous. Fruits obovoid, 15 by 12 mm, 1-seeded, rounded at apex and with a circular rugose area around remnant of style,

pericarp fleshy, black, glabrous. Seeds obpyriform, slightly smaller than fruits, testa thin, scar covering about  $\frac{1}{3}$  of surface of seed, embryo exaluminous, radicle short, not exsert.

Type specimen: *Hortus Bog. IV.C.23* in BO.

Vernacular names: gĕtah keras, ketipei pau, pau.

Ecology: In primary forests, mainly at high altitudes, 1200—3000 m.

Distribution: Riouw, Borneo.

RIOUW. Cultivated in Hortus Bog.: *IV.C.23* (BO, NY), fl., said to be collected on Riouw.

BORNEO. Sandakan, Mt. Kinabalu, Tenampok, Kundasang, alt. 1600 m: *Clemens & Clemens 29022* (B, BM, G, K, L, SING), tree 50 m, fr. April; ibidem, alt. 1000 m: *Clemens & Clemens 29208* (BM, G, K, L, SING), tree 50 m, fr. green, April; ibidem, Penibukan, alt. 1300 m: *Clemens & Clemens 32080* (BM, BO, L), tree 42 m, March; ibidem: *Clemens & Clemens 40446* (B, BM, CAL, G, K, L), tree 65 m, green fl., Sept., anthers pinkish; ibidem, alt. 1300 m: *Clemens & Clemens 40605* (BM, CAL, G, K, L), tree 23 m, fl. brown, Oct.; ibidem, alt. 1300 m: *Clemens & Clemens 40646 A* (BM), tree, Oct.; ibidem, Gurulau Spur, alt. 1600 m: *Clemens & Clemens 50445* (BM, CAL, G, K, L), tree 30 m, fl. Nov.; Penampang-Sensurum Track, alt. 1500 m: *Clemente 6218* (BO, SAN), tree 45 m; Bukit Kinasaraban, above Kundasan, alt. 1500 m, wooded ridge: *Sinclair, Tassim & Sisiron 8973* (E, K, L, SAN), tree 28 m, fl. greenish, June — Indonesian Borneo, W. Kutai, near Kensul river, alt. 1200 m: *Endert 3643* (BO, L), fl. Sept.; ibidem: *Endert 3620* (BO, L), juv. fr., Sept.; ibidem: *Endert 3550* (BO, L), juv. fr. & fl., Sept.

Remark. Contrary to the original description the corolla and stamens appear to be ferruginously hirsute or tomentose and not glabrous.

70. *P. lobbianum* Burek, Ann. Jard. Bot. Bzg 5, 1886, 29; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 9; Lam, l. c. 1925, 50; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1237; Lam, l. c. 1927, 398; Heyne, l. c., ed. 3, 1, 1950, 1237.

Trees, up to 34 m. Branchlets angular to terete, 2—5 mm in diam., yellowish or brownish cinnamomous to reddish ferruginously puberulous to tomentose, glabrescent and striate; terminal cone 3—8 mm long, with the same pubescence as the branchlets; stipules lanceolate to subacicular, 3—7 mm long, apex acute, on outside with the same pubescence as the terminal cone, glabrous on inside, caducous but some stipules persisting but finally also falling off. Leaves scattered to subconferted at apex of branchlets, subobovate, elliptic or oblong, 10—18 by (3.5—)5—7.5 cm, apex rounded or obtusely subacuminate, or acuminate, acumen 1—5 mm long, base broadly cuneate to rounded, very shortly decurrent along the adaxial side of petioles; brownish sericeous above but soon glabrous except in the basal part of the midrib, yellowish or brownish cinnamomous or reddish ferruginously appressedly tomentose below, thinly coriaceous; midrib narrowly to broadly grooved above and usually minutely crested in the basal part only, prominent and rounded below, secondary nerves 17—22 pairs, ascending at an angle of c. 60°, usually slightly curved, sometimes straight, curved at tips, diminishing until inconspicuous, prominulous above and sometimes grooved, prominent below, tertiary nerves transverse, slender, rather numerous, inconspicuous on either side but sometimes stronger developed below, sometimes grooved above. Petioles (1.5—)2—2.5 cm, flat above and minutely grooved in the apical part, crested below, thickened in the basal part, with



the same type of indumentum as the leaves and petioles. *Flowers* in 1—10-flowered, axillary clusters, borne on brachyblasts, pedicels in flower and fruit 5—10(—15) mm long, cinnamomous or reddish or brownish tomentose, partly glabrescent. *Sepals* broadly deltoid, 2—4 by 1.5—3 mm, apex subacute (outer sepals) or obtuse (inner sepals), ferruginously puberulous or tomentose on outside, glabrous on inside, woolly along margins, inner sepals sometimes slightly smaller than outer ones. *Corolla* up to 7 mm long, lobes narrowly elliptic, 3.5—4 by 1—2 mm, apex obtuse, scattered ferruginously sericeous on outside mainly at the base of the lobes. *Stamens* 9—12, 2.5—5 mm long, filaments angular, 1—2.5 mm long, glabrous, anthers ovoid, 2—3.5 mm long, truncate or with two short teeth, glabrous, dehiscing laterally. *Ovary* short-cylindrical, c. 1 by 1.5 mm, ferruginously pubescent, 6-celled. *Style* filiform, 6—12 mm long, sparsely ferruginously sericeous at the base. *Fruits* obliquely ovoid, 3—3.5 by 1.5—2 cm, 1-seeded, apex obtuse, with a lighter coloured rugose area of 8—12 mm in diam., attenuate at base, pericarp thin, woody, glabrous except ferruginously pubescent at the base. *Seeds* obliquely ovoid, slightly shorter than the fruit, testa very thin, cartilaginous, brown, nitidous, scar covering half of the seed, dull, pale brown. *Embryo* exalbuminous, cotyledons thick, with a deeply irregularly wrinkled surface.

Type specimen: *Resident Ternate s.n.* in BO.

Use: Straight stems are often used for the construction of canoes.

Vernacular names: Tobelo: teheriki, tehiriki; Galelo: tiwiring; Ternate: tofiri lobi-lobi; Numfoor: moref frewen; New Guinea: tiurring (Tobaru language), mora, rubia (Wokam language), sowkwa (Manikion language).

Ecology: Growing on clayey or sandy soil on flat country; in lower regions up to 250 m.

Distribution: Surigao, Batjan, Ternate, Halmaheira, Morotai, Aru Islands, Salawati, New Guinea.

SURIGAO. without loc.: *Wenzel 2975* (BO, CAL, G, K, NY), fl. June; *ibidem: Wenzel 3 L* (CAL), fl. buds July.

BATJAN. Waringin Isl., alt. c. 250 m: *NIFS bb 23158* (BO, L) and *NIFS bb 23159* (BO, L, SING), juv. fr. Aug.; Tawa Isl., Karisoeta, alt. c. 100 m: *NIFS bb 23225* (BO, L), fr. Sept.

TERNATE. without loc.: *Resident Ternate s.n.* (BO, L, SING), fl. & fr.

HALMAHEIRA. Saee, Tobaroe, alt. 60 m: *Beguim 2087* (BO, L), tree 39 m, fr. July.

MOROTAI. Subdistr. Tobelo, old forest, alt. 30 m: *NIFS bb 33798* (BO, L, SING), tree 34 m, fl. May.

ARU ISL. Wokam, Dosinamalaoe: *Buwalda 4963* (BO, K, L, LAE, SING), fl. buds May; *ibidem: Buwalda 5119* (BO, L, PNH) fl. Jan.

SALAWATI. Kaloal, primary forest: *NGBW 4211* (HOLL, L), tree 17 m, fl. buds Oct.; Mios Waar: *NGBW 1232* (HOLL, L), tree 22 m, June; *ibidem: NGBW 1244* (HOLL, L), tree 20 m, June; *ibidem: NGBW 1298* (HOLL, L), tree 14 m, June; *ibidem: NGBW 1304* (HOLL, L), tree 18 m, June.

NEW GUINEA. West New Guinea, Vogelkop Peninsula, Inanwatan, Tisa, alt. c. 3 m, primary forest: *NIFS bb 32630* (BO, L), tree 30 m, juv. fr., May; *ibidem: Act 7* (BO, L, SING), tree, fl. buds yellow, May; Sidai, c. 65 km W of Manokwari: *Koster NGBW 6786* (L), tree 16 m, Oct.

Remark. Sterile specimens are not easily or almost not to distinguish from those of *P. warburgianum*.

71. *P. pseudocalophyllum* H. J. Lam, Nova Guinea 14, 4, 1932, 552, t. 95 — *P. montanum* Schlechter, Gutt. u. Kautsch. Exped. etc., 1911, 94, *nomen nudum*; Krause, Bot. Jahrb. 58, 1923, 470, *descr.*

Trees, c. 35 m. Branchlets angular, 3—6 mm in diam., ferruginously appressedly tomentose, glabrescent; terminal cone up to 6 mm long, appressedly tomentose; stipules lanceolate-linear, up to 5 by 1.5 mm, acute at apex, ferruginously tomentose on outside, glabrous on inside, long persistent but finally caducous. *Leaves* conferted at apex of branchlets, obovate-oblong, (7—)12—15(—18) by 4—6 cm, rounded and short obtusely acuminate, acumen up to 3 mm long, base cuneate, decurrent along upper side of petiole; glabrous and often almost black above, ferruginously sericeous below, subcoriaceous; midrib grooved above and minutely crested in the basal part, prominent and subangular below, secondary nerves 10—13 pairs, ascending at an angle of 50°—55°, straight but curved at their tips, diminishing until inconspicuous near margin, prominent above and grooved as well, prominent below, tertiary nerves slender, transverse, prominent but distinct on either side. Petioles 12—15 mm long, grooved above, angular below, ferruginously sericeous. *Flowers* in 2—5-flowered, axillary clusters, pedicels 1—1.5 cm long, brownish appressedly pilose. *Sepals* ovate, 2—4 by 2—4 mm, acute at apex, densely dark brown sericeous on outside, glabrous on inside, fimbriate at apex, inner sepals with glabrous and membranous margins and fimbriate. *Corolla* 7—8 mm long, ferruginously sericeous on outside, lobes oblong-ovate, 4—5 by 2—2.5 mm, acute. *Stamens* 12, 2.5—3.5 mm long, filament slender, 1.5—2.5 mm long, sparsely brownish woolly, anthers ovoid, 1.5—2 mm long, minutely acuminate, dehiscing extrorsely, ferruginously appressedly hirsute. *Ovary* semi-globose, c. 2 by 2 mm, 6-celled, brownish sericeous; style slender, up to 10 mm long. *Fruits* unknown.

Type specimen: *Schlechter 17750* in B.

Neotype specimen: *Hoogland 3981* in L.

Vernacular name: gamo (Orokaiva language).

Ecology: In forests at low and medium altitudes.

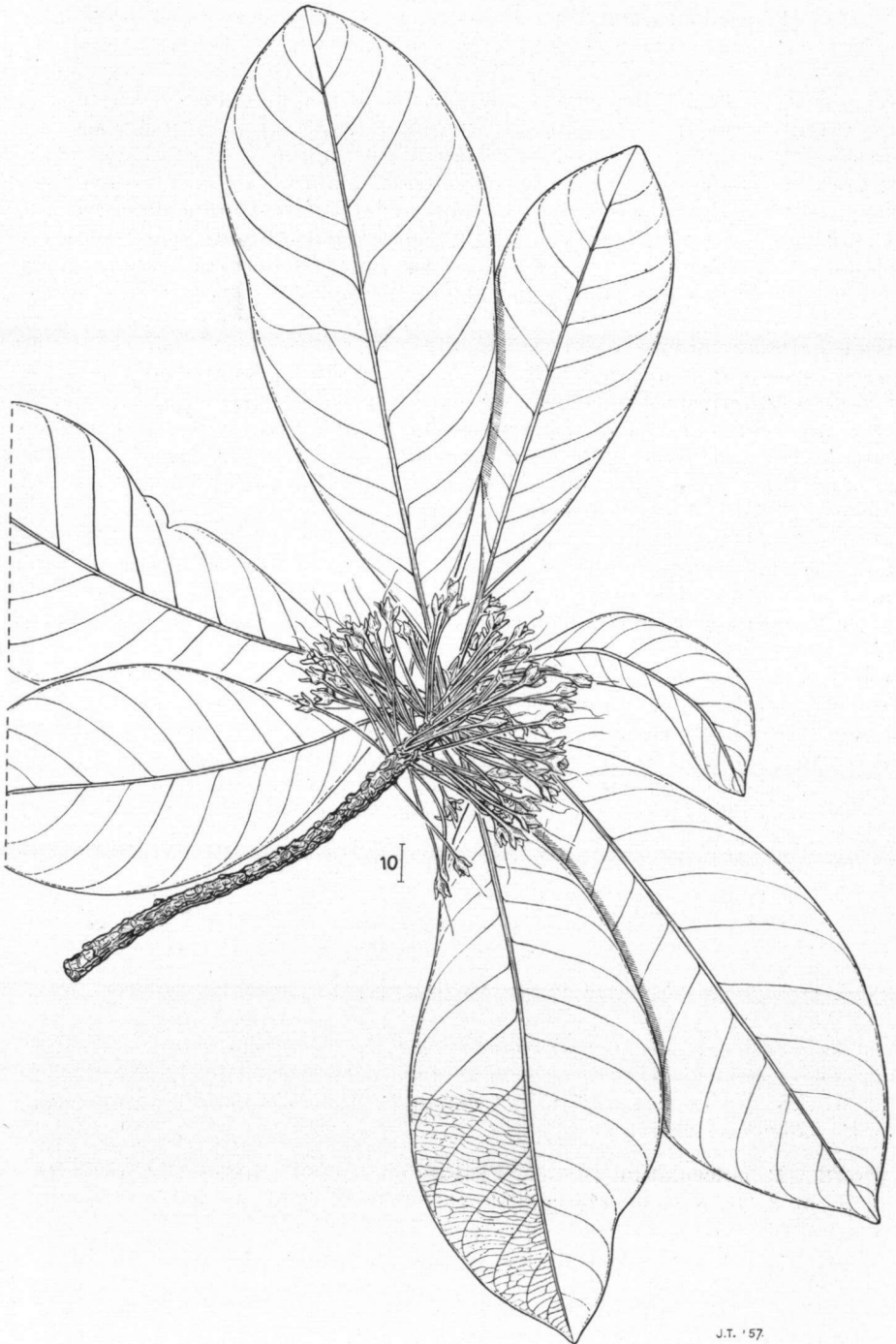
Distribution: New Guinea.

NEW GUINEA. Western New Guinea, along north coast: *Atasrip 48* (BO, L) — Northeastern New Guinea, Kami Mts, alt. 1000 m: *Schlechter 17750*, ex litt. — Southeastern New Guinea, near Pitoki village, S of Kokoda, alt. 400 m, in rainforest: *Hoogland 3981* (CAN, L), tree 35 m, fl. & juv. fr. Sept.

Remarks. The type specimen has been destroyed during the war and as a neotype specimen *Hoogland 3981* has been selected.

The specimens *Atasrip 7, 8, 9, 23* and *70* mentioned by Lam as belonging to this species certainly do not match *P. pseudocalophyllum* and belong to *P. lobbianum* Burck.

72. *P. lanceolatum* Blanco, Fl. Fil., ed. 1, 1837, 403; ed. 2, 1845, 282; ed. 3, 3, 2, 1878, 159; Merrill, Bur. Gvt Lab. Publ. 6, 1904, 15; ibidem 27, 1905, 57; Dubard, Bull. Mus. hist. nat. 15, 1909, 384; Merrill, Phil. J. Sc. 10, 1915, 62; Merrill, Sp. Blancoana, 1918, 301; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l. c. 1925, 103; Lam, l. c. 1927, 412 — *Bassia lanceolata* (Blanco) DC, Prodr. 8, 1844, 199 — *Dichopsis lanceolata* (Blanco) F.-Villar, Nov. App., 1883, 124 — *P. pacificum* Elmer in msc. — Fig. 17.



J.T. '57

Fig. 17. *P. lanceolatum*, branchlet with leaves and flowers (Ramos 19483).

Tall trees. Branchlets terete, 3—5 mm in diam., ferruginously tomentose, glabrescent; terminal cone up to 6 mm long, ferruginously tomentose; stipules lanceolate, c. 2.5 by 1 mm, acute, light ferruginously tomentose on outside, often glabrous along margins, glabrous on inside, soon caducous. *Leaves* subconferted at tip of branchlets, obovate-spathulate, 16—19 by 5—7.5 cm, obtuse and obtusely acuminate at apex, acumen 4—7 mm long, base cuneate, sometimes subabruptly narrowed close to the petiole; glabrous on either side, chartaceous; midrib slightly grooved above and narrowly crested as well, rounded below, secondary nerves 11—13 pairs, ascending at an angle of 60°—65°, curved, or straight and curved at the tips only, diminishing until inconspicuous near margin, prominulous and grooved above, prominent below, tertiary nerves transverse, very slender but distinct, more prominent below than above. Petioles 9—15 mm long, flat above and with a crest in the upper half, thickened except for the apical part, often rugose above, greyish or pale ferruginously appressedly tomentose, partly glabrescent. *Flowers* in 5—8-flowered, axillary clusters, pedicels angular, 2.5—3.8 cm long, greyish ferruginously tomentose or sericeous. *Sepals* ovate, 3—4.5 by 2.5—4 mm, subacute or obtuse, greyish or ferruginously tomentose on outside, glabrous on inside, inner sepals slightly narrower and with membranous, glabrous margins, all sepals fimbriate at apex or only slightly so. *Corolla* 8—10 mm long, glabrous, lobes linear, 7.9 by 1.5—2.5 mm, acute or subtruncate at apex, reflexed in anthesis. *Stamens* 18, 6—7.5 mm long, glabrous, but in bud the anthers with scattered ferruginous hairs, filaments filiform, 4—6 mm long, anthers sagittate-ovoid, c. 2.5 mm long, acute or truncate, dehiscing extrorsely. *Ovary* depressedly ovoid, c. 2 by 3 mm, glabrous. Style stout, filiform, 12—19 mm long, glabrous. *Fruits* fusiform or ellipsoid, 2.5—3.5 by 1.2—1.7 cm, pointed or rounded at apex, 1-seeded, pericarp thin, fleshy, glabrous. Seeds ellipsoid, 2—2.2 by 0.8—1.2 cm, testa crustaceous, scar covering about  $\frac{1}{4}$  of the surface, embryo unknown.

Neotype specimen: *Ramos 19483* in K.

Vernacular names: upong-úpong (Bikol language), araka, miko (Ibanág language), gasátan-panahipáuen, niket (Ilóko language), dulítan (Pampángan language), náto, náto-ñga-puti (Panay Bisáya language), takaran (Pangasinán language), bagalangit, dolitan, palak-pálak, tagatoi, uban (Tagalog language).

Ecology: In rainforests at low altitudes.

Distribution: Luzon, Catanduanes.

LUZON. Bataan prov., Lamao river: Borden river: *Borden 1918* (E), fl. buds; ibidem: *Borden 2325* (BO, E, SING), fl.; ibidem, Mt Mariveles: *Meyer 2277* (BO, SING), fl. Dec. — Manila prov., San Mateo: *Vidal 3189* (K), fl. buds, March — Morong prov., Baras: *Vidal 1556* (K), fl. buds, Nov. — Sorsogon prov., Irosin (Mt Buhusan): *Elmer 17196* (BO, FI, G, L, NY, S), fl. buds, Sept. — Tayabas prov., Mauban: *Ramos 19483* (K, P), fl. Jan. — without known loc.: *Vidal 7* (P), fl. buds; ibidem: *Vidal 2235* (K), fr.

CATANDUANES. without known loc.: *Ramos & Edaña 75240* (SING).

Remarks. The fruit has been described after *Ramos & Edaña 75240*.

Checking up the original description of *P. lanceolatum* Blanco it is difficult to discern which species is meant by Blanco. The problem is made still more difficult by the absence of a specimen on which his

description could have been based. According to Merrill (1918) no material of Blanco seems to be preserved.

When we try to find out whether *P. lanceolatum* Blanco was typified by later authors we find that Merrill, 1903, regards *P. lanceolatum* as the type species of the genus and subsequently mentions five specimens which belong to this species. One of them, *Merrill 1991* is according to Merrill, 1904, the type specimen of *P. tenuipetiolatum* Merrill, and the other four, according to Dubard, 1909, and Merrill, 1923, belong to *P. merrillii* Dubard (incl. *P. bataanense* Merrill). Dubard, at the same time refers *Vidal 7* to *P. lanceolatum* but according to Merrill, 1915, this specimen differs from the original description by Blanco in the corolla-lobes being rounded and elliptic instead of oblong and acute. Merrill mentions then two specimens, *Ramos 19483* and *22135* which certainly match Blanco's description. Thus still a choice has to be made which specimen should be indicated as type specimen, for which *Ramos 19483* seems to match Blanco's description in all respects.

73. *P. garrettii* Fletcher, Kew Bull. 1937, 374.

Trees, c. 28 m high. Branchlets subangular, often irregular by the numerous leaf-scars, 3.5—4.5 mm in diam., ferruginously puberulous, glabrescent, terminal cone up to 3 mm long, puberulous; stipules lanceolate, c. 1.5 by 0.5 mm, acute at apex, puberulous on outside, glabrous on inside, caducous. *Leaves* scattered, or subconferted, elliptic, oblong, or oblong-lanceolate, 10—20 by 3.5—8 cm, apex rounded, obtuse or obtusely acuminate, acumen up to 3 mm long, base cuneate; glabrous on either side; chartaceous to subcoriaceous; midrib grooved above and sometimes indistinctly crested as well, subangular or rounded below, secondary nerves 12—16 pairs, ascending at an angle of c. 60°, straight but curved at their tips, archingly joined, or diminishing until inconspicuous and connected by thickened tertiary nerves, prominulous above, prominent below, tertiary nerves transverse but subparallel to the secondary nerves, prominulous on either side. Petioles 14—26 mm long, grooved and distinctly crested above, angular below, glabrous. *Flowers* in 3—6-flowered, axillary clusters, pedicels angular, 10—20 mm long, cinnamomously puberulous. *Sepals* ovate, 3—3.5(—4) by 2.5—3(—3.5) mm, apex subacute, puberulous on outside, glabrous on inside, inner sepals slightly larger than the outer ones, membranous, glabrous and fimbriate along margin and usually more rounded at apex. *Corolla* 7—10 mm long, entirely glabrous, lobes ovate or elliptic, 5—7 by 3—4 mm, apex obtuse and ciliate. *Stamens* 18—20, in 3 whorls, 4.5—6 mm long, entirely glabrous, filaments subulate, 2.5—3 mm long, anthers sagittate, 2.5—4 mm long, aristate at apex, dehiscing extrorsely. *Ovary* conoid, c. 1.5 by 1 mm, gradually passing into the style, 6-celled, 6-lobed, ferruginously puberulous. Style linear, 6-grooved, 9—11 mm long, glabrous, *Fruits* unknown.

Type specimen: *Garrett 113* in K.

Ecology: In rainforests at medium altitudes.

Distribution: Siam.

SIAM. Chiangmai, Doi Pa Kao, east slope, MeNya river, right bank, alt. 1055 m: *Garrett 113* (BKF, K), tree, fl. Jan., pale yellow green.

74. *P. cochleariifolium* van Royen, n. sp. — Fig. 18.

Arbor magna. Ramuli irregulariter teretes, glabri; stipulae triangulares, acutae, glabrae, caducae. Folia cochleata vel obovata, (7—)10—22 × 4—8 cm, rarius obtuse acuminata, glabri. Nervi secundarii utroque latere 6—9, sursum evanescentes, tertiarii

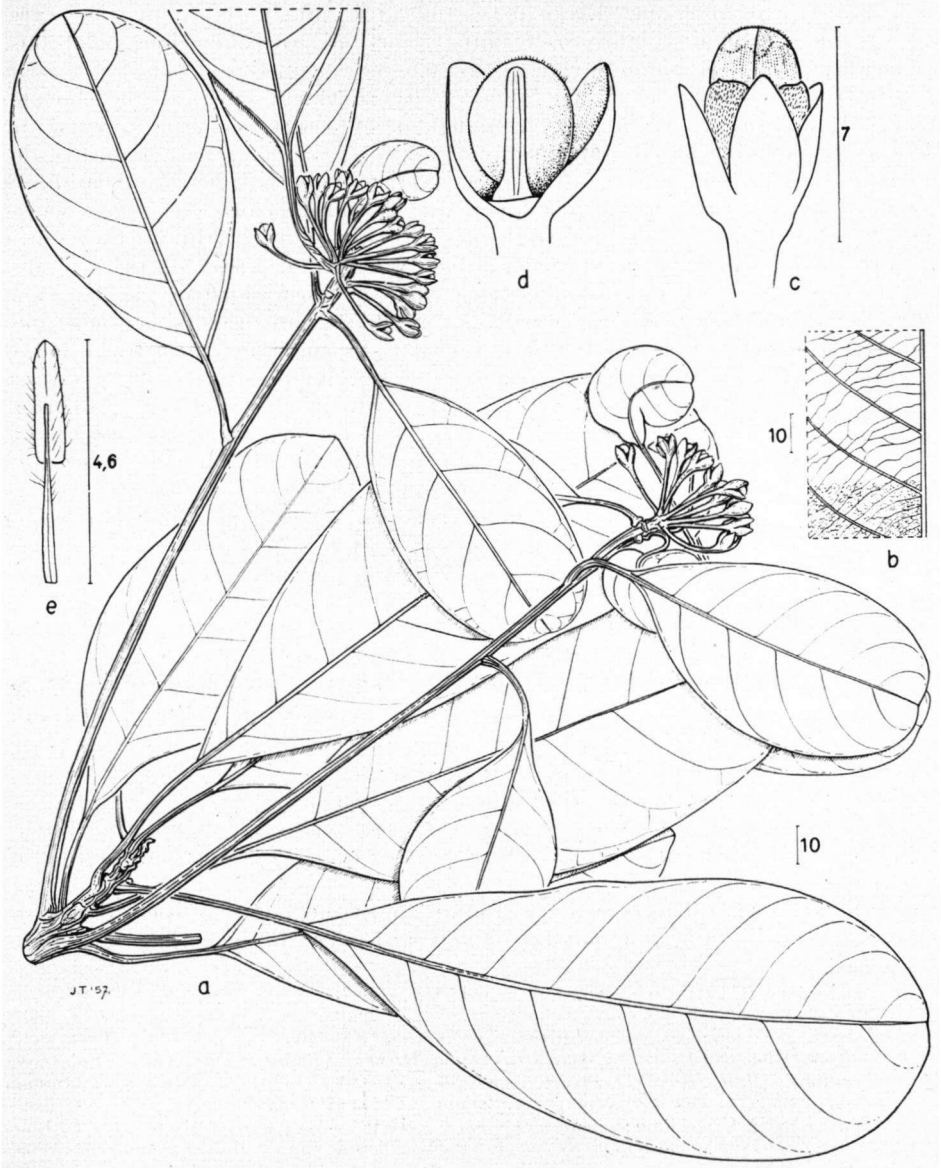


Fig. 18. *P. cochleariifolium*, a. branchlet with flowerbuds; b. tertiary nervation of leaf; c. flowerbud; d. inside of calyx, with gynaecium; e. stamen (*Buwalda 7810*, in a. and b. pubescence omitted).

transversi. Petiolus 1.5—4(—5) cm longus, glaber. Pedicellus 1.5—3.5 cm longus, glaber. Sepala 6, exteriora glabra. Stamina 12; filamenta distaliter longepilosa; antherae dorso longepilosae. Ovarium 6-loculare, basi sericeum; stylus glaber. Fructus ellipsoideus vel subglobosus, 2—2.5 × 1.5—2.5 cm, (semper?) 1-spermus, apice longe acuminatus, pericarpio carnosus; semen incomplete cognitum. *Typus: Buwalda 7810 in L.*

Trees, up to 28 m. Branchlets stout, irregularly terete by the scars, 4—8 mm in diam., glabrous; terminal cone up to 4 mm long, glabrous, blackish; stipules triangular, c. 1 by 0.5 mm, acute, glabrous, very soon caducous. *Leaves* subconferted at apex of branchlets, cochleate or obovate, (7—)10—22 by 4—8 cm, apex rounded or subobtuse, sometimes retuse, or obtusely acuminate with an up to 1 cm long acumen, base cuneate, decurrent; coriaceous, glabrous on either side; midrib flat above and minutely crested, with 1 or 2 crests, prominent and rounded below, secondary nerves 6—9 pairs, ascending at an angle of 70°—90°, curved, diminishing until inconspicuous near margin, prominulous above and grooved, prominulous below, tertiary nerves transverse, few, usually almost indistinguishable from the reticulate nervation in between, prominulous on either side, sometimes distinct on either side. Petioles 1.5—4(—5) cm long, broadly grooved above and distinctly minutely crested, thickened in the basal part, glabrous. *Flowers* in 5—12-flowered, axillary or terminal clusters, conferted near apex of branchlets, pedicels angular, 1.5—3.5 cm long, thickened near apex, glabrous. *Sepals* ovate, 4—6 by 3—5.5 mm, apex acute but the inner ones obtuse or rounded, the outer ones glabrous on either side, the inner ones pale yellowish puberulous on outside, glabrous on inside, fimbriate along apex, margins membranous and glabrous. *Corolla* 5—11 mm long, glabrous on either side, lobes elliptic, 5—5.5 by 3—3.5 mm, apex rounded. *Stamens* 12, inserted at the base, 4.5—11.5 mm long, filaments linear, angular, 3—9.5 mm long, with long white hairs in the apical part, anthers oblong, 2.5—3 mm long, apex mucronate, with long white hairs at the back, dehiscent extrorsely. *Ovary* narrowly conoid, with the style 4—9 mm long, 6-celled, 6-lobed, whitish sericeous at the base. *Fruits* ellipsoid to subglobose, 2—2.5 by 1.5—2.5 cm, probably 1-seeded, apex long acuminate, pericarp fleshy, glabrous. Seeds unknown.

Type specimen: *Buwalda 7810 in L.*

Vernacular names: Brunei: paga; Sarawak: samundo; Indon. Borneo: kain terong, kaju terong, ketiau, njatu jehrong, n. undus, n. temiang, tempang gagas.

Ecology: This species is found along the edges of peatforests, in fresh water swamps and marshes at low altitudes and sometimes along the seacoast.

Distribution: Borneo (and Malaya ?).

BORNEO. Sandakan, Beaufort distr., Klias For. Res., alt. c. 3 m: *Wood SAN A 1731* (A, BRI, KEP, L, SING), tree 23 m, fl. Oct.; Padas Swamp, alt. 5 m, fresh-water swamp: *Melegrito 2827* (K, L), tree 16 m, juv. fr. Febr. — Sarawak, Sungei Pak, Btg. Rejan, freshwater swamp: *Anderson S 64* (FHO, KEP), tree with buttresses, fl. Aug.; Miri, G. Dalam: *Zehnder S 1418* (KEP, SAN), tree 21 m, Dec.; Loha Kabang South P. F.: *Anderson S 653* (KEP), small tree, Jan.; ibidem: *Anderson S 657* (KEP, L, SING), small tree, Jan.; Sungei Semengon For. Res., lowland forest hills, 50 m alt.: *SAN S 207* (SAN), tree 22 m, Dec.; Sibul: *SAN S 432* (SAN), tree 10 m, March; ibidem: *SAN S 441* (SAN), tree 20 m, March; ibidem: *SAN S 653* (SAN), tree 10 m, Jan.; ibidem: *SAN S 657* (SAN), Jan.; Baram, swamp forest: *Anderson*

*S 4156* (=2053) (SING), tree, Oct., *S 4192* (= 2089) (SING), tree, Oct. and *S 2367* (= 1953) (SING), tree 6 m, fl. Sept.; Tanjong Po, on shore: *Brooke 10596* (L), fl. Sept.; Badas: *Andersen 5647* (KUCH, L), tree 16 m, fl. buds Nov.; ibidem: *Wood SAN 17443* (A, BO, BRI, K, KEP, L, SING), tree 13 m, fr. April; Lingga, peat swamp forest: *Yakup 4809* (L, SAR), tree 13 m, fl. July — Brunei, Seria, Shorea albida peat swamp: *Smythus, Wood & Ashton 5360* (L), fr. green, April, tree 22 m — S. E. Borneo, Sampit, peatforest c. 10 km NW of Sampit, alt. c. 5 m: *Buwaldta 7810* (BO, L, PNH, SING), tree, fl. buds green-yellow, Sept.; ibidem, alt. 9 m: *NIFS bb 33043* (BO, L), tree, fl. Sept.; near Danau Rawah: *NIFS bb 13476* (BO, L), tree 24 m, juv. fr. green, Nov.; W. Kutai, near Hambau, inundated area: *NIFS bb 15688* (BO, L, SING), tree 28 m, fl. yellowish, Oct.

MALAYA. Pahang, Mt Tahan: *Woolley 8225* (KEP), tree 15 m, Febr. (*dubious specimen*).

**Remarks.** This species is closely related to *P. hornei*. It differs from that species in the smaller number of secondary nerves and the hairy filaments and anthers.

**75. *P. hornei*** (Hartog) Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, 10; Lam, l. c. 1925, 107; Lam, l. c. 1927, 414; Lam, Blumea 5, 1, 1942, 33 — *Dichopsis hornei* Hartog in Baker, J. Linn. Soc. 20, 1883, 367 — Fig. 19.

Trees, up to 20 m. Branchlets stout, terete, 6—8 mm in diam., glabrous; terminal cone broadly conoid, c. 3 by 4 mm, subglabrous with a few white hairs; stipules lanceolate, c. 1.5 by 1 mm, apex acute, subglabrous on outside, glabrous on inside, caducous. *Leaves* crowded at apex of branchlets, oblanceolate-oblong or elliptic, 8.5—18 by 2.5—6 cm, apex obtuse, base narrowly cuneate, decurrent along sides of petioles; glabrous, coriaceous; midrib distinctly prominent and rounded on either side, secondary nerves 12—15 pairs, ascending at an angle of c. 75°, curved, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves few and slender, transverse, inconspicuous on either side, with an at the upper surface distinct reticulate nervation in between. Petioles 2—4 cm long, terete, glabrous. *Flowers* in 6- or 7-flowered, axillary clusters, pedicels terete, 2—2.5 cm long, glabrous. *Sepals* broadly ovate, 5—6 by 4—5 mm, apex obtuse, glabrous or with a few ferruginous hairs on outside, glabrous on inside, inner sepals with membranous margins and densely pale ferruginously tomentose without. *Corolla* 8—10 mm long, glabrous but for a few hairs in the centre of each lobe, tube c. 4 mm long, lobes ovate, 4—5 by 3—4 mm, apex obtuse, sometimes scarious, constricted at base. *Stamens* 12—15, entirely glabrous, 7—7.5 mm long, filaments filiform, 6—6.5 mm long, anthers oblong, 2—2.5 mm long, acuminate at apex, dehiscent introrsely. *Ovary* conoid-ovoid, c. 2 by 1.5 mm, 6-celled, 12-lobed, glabrous. Style stout, subulate, c. 5 mm long, grooved, glabrous. *Fruits* unknown.

**Type specimen:** *Horne 717* in K.

**Vernacular name:** mbulu.

**Use:** Good timber for building-purposes.

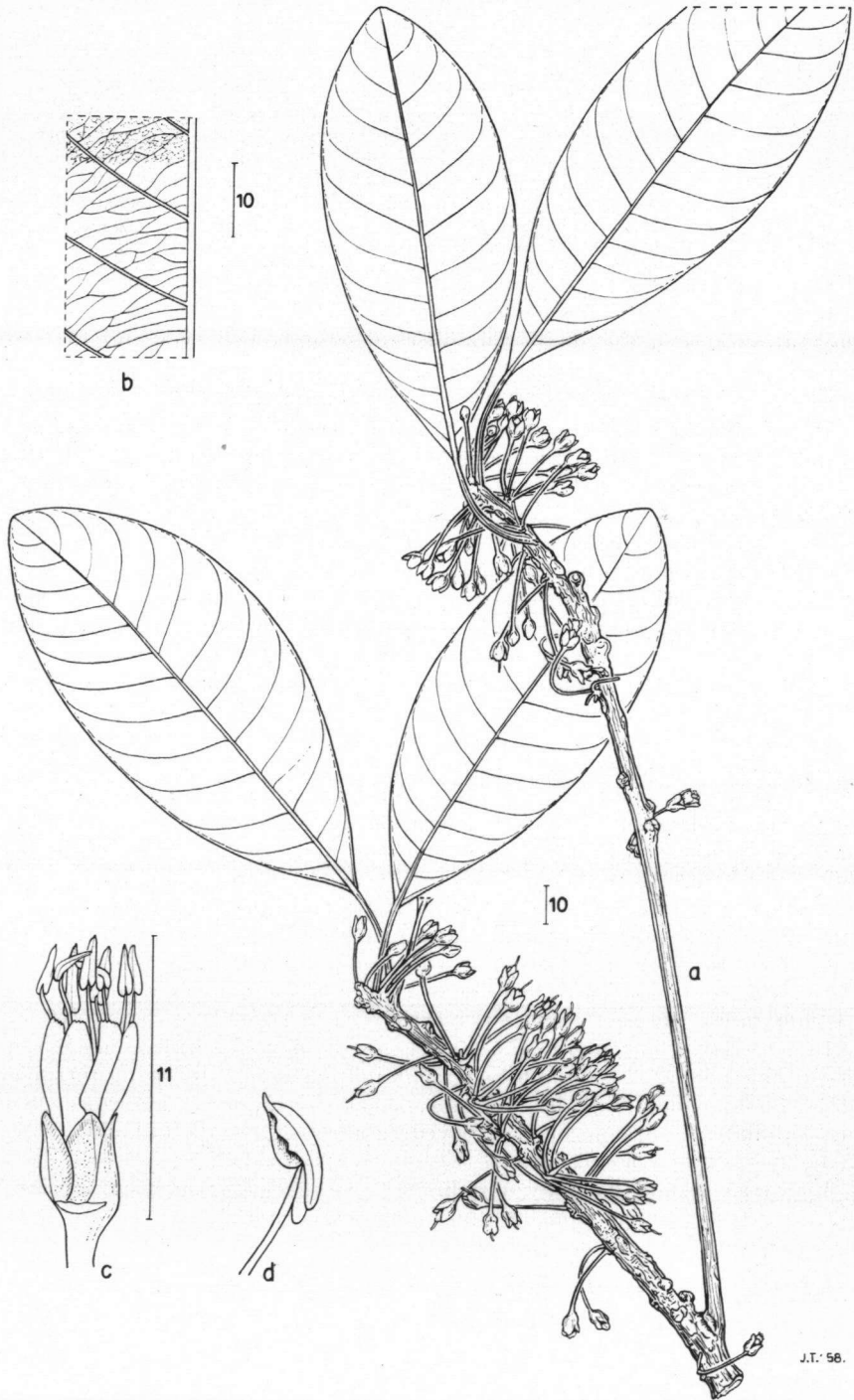
**Ecology:** In primary forests at low altitudes.

**Distribution:** Fiji (Viti Levu, Vanua Levu).

VITI LEVU. Navesi Suva forests: *Horne 717* (BO, K), fl.

VANUA LEVU. Thakaundrove, Yanawi river region, Mt Kasi, alt. 300—430 m: *A. C. Smith 1793* (A, L, S, US), tree 12—20 m, fl. white, May.





76. *P. karrak* Kanehira, Bot. Mag. Tokyo 45, 1931, 339; Kanehira, Fl. Micron., 1933, 305, f. 153; Lam, Blumea 5, 1, 1942, 34.

Trees, up to 15 m. Branchlets stout, terete, 5—8 mm in diam. glabrous, black at their tips; terminal cone up to 8 mm long, ferruginously tomentose; stipules lanceolate, up to 4 by 2 mm, acuminate at apex, crested, ferruginously tomentose on outside, glabrous on inside, caducous. *Leaves* subconferted at apex of branchlets, obovate, (15—)20—28 by (5—)8—14 cm, apex obtusely acuminate (obtuse or rotundate according to Kanehira), base cuneate, decurrent along sides of petiole; glabrous on either side, chartaceous-coriaceous; midrib crested above, prominent and rounded below, secondary nerves 10—13 pairs, ascending at an angle of c. 60°, curved, diminishing until inconspicuous near margin, crested above, prominent below, tertiary nerves slender, transverse, prominulous on either side, with an at the upper surface distinct, reticulate nervation in between. Petioles 2.5—4 cm, flat above and with 2 prominent crests, glabrous. *Flowers* in 2- or 3-flowered, clusters or solitary, axillary, pedicels terete, 2—3.5 cm long, glabrous. *Sepals* elliptic-ovate, 6—7 by 4.5—5.5 mm, apex obtuse or rounded, margins membranous and glabrous, sparsely ferruginously woolly on outside, glabrous on inside, inner sepals densely ferruginously appressedly without and with broader membranous margin than the outer sepals. *Corolla* glabrous, 9—10 mm long, lobes broadly elliptic-ovate, 4—4.5 by 3.5—4 mm, apex rounded, subattenuate at base. *Stamens* 12, entirely glabrous, filaments filiform, angular, 4.5—5.5 mm long, anthers oblong-sagittate, 2.5—3 mm long, apex acuminate, dehiscing introrsely. *Ovary* ovoid-conoid, c. 1.5 by 2.5 mm, 6-lobed, 6-celled, ferruginously puberulous. Style stout, 2.5—3.5 mm long, glabrous except at base. *Fruits* fusiform or ellipsoid, 3.8—5 by 1.5—2.2 by c. 1 cm, 1-seeded, pointed at apex, narrowed at base, pericarp fleshy, glabrous. Seeds unknown. Pedicel of fruits up to 6 cm long, glabrous.

Type specimen: *Kanehira 794* in TI.

Vernacular names: karrak (Kohle and Beni-shitan dialect).

Use: The wood is used for building houses and making furniture.

Ecology: In rainforests at low altitudes.

Distribution: Carolines (Ponape).

PONAPE, Niimoani-zan, alt. 350 m: *Kanehira 794* (L, NY, TI), fr. Aug.; ibidem, near Kolonia: *Kanehira 1478* (NY), fr. July; ibidem, near Nanipier: *Kanehira 1669* (L, NY), fr. July; without known locality: *Ledermann 13299, 13555, 13796* (f. Lam, 1942).

77. *P. confertum* H. J. Lam, l. c. 1925, 68, 256, f. 15; Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2, 1927, 1233; Lam, l. c. 1927, 401; Heyne, l. c., ed. 3, 1, 1950, 1233.

Trees, up to 35 m. Branchlets irregularly terete, 5—8 mm in diam., brownish woolly, glabrescent; terminal cone up to 13 mm long, densely woolly; stipules lanceolate, up to 7 by 2 mm, apex obtuse, woolly on outside, glabrous on inside, very soon caducous. *Leaves* subconferted or con-

Fig. 19. *P. hornet*, a. branchlet with flowerbuds; b. tertiary nervation of leaf; c. flower, not all stamens drawn; d. stamen (A. C. Smith 1795).

ferted at apex of branchlets, obovate, oblong-obovate or spatulate, (8—)10—15(—17) by 3.2—6 cm, apex rounded or shortly obtusely acuminate, acumen up to 3 mm long, base cuneate, sometimes very narrow; decurrent, glabrous above, glabrous below except densely greyish, ferruginous or brownish, or cinnamomous hirsute-woolly on midrib and nerves, thin-coriaceous; midrib slightly grooved above and minutely crested, prominent and angular below, secondary nerves (10—)13—16 pairs, ascending at an angle of 60°—70°, curved or straight and curved at their tips only, diminishing until inconspicuous near margin of leaf, minutely grooved above, prominent below, tertiary nerves slender, transverse, prominulous on either side. Petioles 1.5—3.5 cm long, flat above, with the same pubescence as the lower side of the midrib. *Flowers* in 6—12-flowered, axillary clusters, pedicels stout, 7—9 mm long, in fruit up to 12 mm long, with the same pubescence as the petioles. *Sepals* ovate-lanceolate, 2.5—4 by 2—3 mm, apex subacute or obtuse, ferruginously appressedly woolly on outside, glabrous on inside, inner sepals with scarious margins. *Corolla*, *stamens* and *gynaecium* not seen but according to Lam, 1927: "glabrous (in 1925, however, sericeo-pubescent on outside), lobes 6, narrowly oblong, apex obtuse, stamens 12, villose at the base, anthers glabrous, acuminate, ovary pubescent, style short, cylindrical, almost not exerted". *Fruits* globose, obovoid or ovoid, sometimes ellipsoid, 1.8—2.4 by 1.4—1.9 cm, 1- or 2-seeded, apex rounded, with a distinct, c. 6 mm in diam., finely rugose area, pericarp woody, glabrous. Seeds ellipsoid, c. 18 by 7 by 4 mm, mucronate, at either end, yellowish brown, nitidous, scar covering half of the seed, brownish, dull, testa thin, cartilaginous, embryo exalbuminous, radicle cylindrical, exsert.

Lectotype specimen: *NIFS bb T 927* in L.

Distribution: Sumatra, Malaya.

Var. *confertum* — *P. confertum* H. J. Lam, var. *typicum* H. J. Lam, l. c. 1927, 401.

Petioles, underside of midrib, and secondary nerves densely hirsute-woolly.

Lectotype specimen: *NIFS bb T 927* in L.

Vernacular names: Sumatra: balam, balam sudu.

Distribution: Malaya, Sumatra.

SUMATRA. Palembang, Lematang Ilir near Mt Megang: *NIFS T 548* (BO, L), fr.; ibidem: *NIFS bb T 927* (BO, L), fr. Nov.; ibidem: *NIFS bb T 3 P 927* (BO, L), fr. Jan.; Lematang Hulu: *Grashoff 246* (BO, L), March.

MALAYA. Johore, Kota Tinggi-Mawai Rd: *Corner SF 30789* (SING), March.

Var. *glabrum* H. J. Lam, l. c. 1927, 401.

Leaves and petioles glabrous.

Type specimen: *NIFS bb 8864* in BO.

Vernacular name: balam bunga.

Distribution: Sumatra.

Bengkulu, Redjang near Sukamarindu, alt. 600 m: *NIFS bb 8864* (not seen), tree 30 m, fl. yellowish green, March.

78. *P. koratense* Fletcher, Kew Bull. 1937, 374.

Trees, c. 20 m tall. Branchlets irregularly terete, 2—5 mm in diam., ferruginously sericeous, glabrescent; terminal cone up to 5 mm long, sericeous; stipules lanceolate, c. 1 by 0.5 mm large, acute, ferruginously sericeous

on outside, glabrous on inside, soon caducous. *Leaves* conferted at apex of branchlets, oblanceolate or oblong-oblanceolate, 10—20.5 by 3—6 cm, indistinct obtusely acuminate at apex, narrowly cuneate at base, decurrent along upper side of petiole; subcoriaceous, glabrous on either side; midrib grooved above and minutely crested as well, prominent and rounded below, secondary nerves 12—18 pairs, ascending at an angle of 60°—65°, straight but curved at their tips, diminishing until inconspicuous near margin, prominulous above and grooved as well, prominent below, tertiary nerves transverse, slender, prominulous on either side but more distinct below. Petioles 1—2.2 cm long, grooved above in the apical half, rounded or angular below, finely ferruginously puberulous. *Flowers* 1 or 2 in the axils of apical leaves or their scars, pedicels angular, 1.2—2 cm long, ferruginously puberulous. *Sepals* 6 or 7, ovate-triangular, 3.5—4 by 3.5—4 mm, subacute at apex, slightly crested and ferruginously tomentose on outside, glabrous on inside, inner sepals slightly larger and more rounded than outer ones, with membranous and glabrous margins, all sepals plumulose at apex. *Corolla* 11—12 mm long, entirely glabrous, lobes 7.5—8 by 3.5—4 mm, rounded to truncate at apex, reflexed in anthesis. *Stamens* 12—14, 7—8.5 mm long, filaments filiform, 3—4 mm long, glabrous, anthers narrowly oblong-ovoid, c. 4 mm long, connective prolonged, truncate or acute, dehiscing extrorsely, with scattered ferruginous hairs on outside. *Ovary* conoid, c. 2 by 2 mm, 6-celled, 12-lobed, finely ferruginously puberulous, style stout, 12-ribbed with 6 large and 6 small wings, glabrous. *Fruits* unknown.

Type specimen: *Kerr 9966* in K.

Vernacular name: chik nom.

Ecology: In rainforests at low altitudes.

Distribution: Siam.

SIAM. Korat, Lao Lem, alt. 900 m, evergreen forest: *Kerr 9966* (K), fl. Jan.; Loie, Phu Krading, Dawn Phra Kaew, alt. 1300 m, evergreen jungle: *Smitinand 1959* (L), tree 10 m, fl. Sept.; Trang, Kantang: *Na Nakawn 1572* (L), tree, fl. Jan.

79. *P. elongatum* Merrill, Phil. Journ. Sc. 3, 1908, 257; Dubard, Bull. Mus. hist. nat. 15, 1909, 383; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 279; Lam, l. c. 1925, 61; Lam, l. c. 1927, 400.

Trees, c. 20 m high. Branchlets stout, up to 14 mm in diam., cinnamomously tomentose, glabrescent; terminal cone up to 15 mm long; stipules boat-shaped lanceolate, up to 7 by 3 mm, acute at apex, dorsally crested, ferruginously sericeous on outside, glabrous on inside, caducous. *Leaves* subconferted at apex of branchlets, narrowly spatulate or oblanceolate, or narrowly oblong-lanceolate, 18—25 by 4—8 cm, rounded and short obtusely acuminate at apex, narrowly cuneate at base, shortly decurrent along upper surface of petiole; glabrous above, ferruginously sericeous below, coriaceous; midrib grooved above and minutely crested as well, rounded and prominent below, secondary nerves 14—16 pairs, ascending at an angle of c. 40°, straight but curved at their tips, diminishing until inconspicuous near margin, grooved above, prominent below, tertiary nerves transverse, slender, prominulous or prominent above, prominulous below. Petioles 2—3.5 cm long, narrowly grooved above, rounded below, ferruginous-brownish

tomentose. *Flowers* solitary, pedicel angular, 3.5—5 cm long, ferruginously tomentose. Outer sepals ovate, up to 6 by 5 mm, acute, yellowish brown tomentose on outside, glabrous on inside, inner sepals smaller than outer ones. *Corolla* seen in bud only, c. 5 mm long, lobes ovate, up to 5 by 4 mm, subacute, ferruginously sericeous on outside except along margins, glabrous on inside. *Stamens* 18, in bud 3.5—4 mm long, filaments subulate, c. 1 mm long, glabrous, anthers narrowly lanceolate, c. 3.5 mm long, irregularly bifid at apex, ferruginously tomentose, dehiscing extrorsely. *Ovary* ovoid-disciform, c. 1 by 3 mm, 6-lobed, ferruginously tomentose, style stout, 3 mm long, glabrous, but ferruginously tomentose at base. *Fruits* unknown.

Type specimen: *Reyes 6620* in PNH.

Neotype specimen: *Alvarez 22370* in K.

Vernacular names: Luzon: palak-palák, tañgileng-pulá (Tagalog language).

Ecology: In primary forests at low altitudes.

Distribution: Luzon.

Luzon. Nueva Ecija prov.: *Alvarez 22370* (K), fl. buds, Febr. — Tayabas prov.: *Reyes 6620*, ex litt.

Remark. Since the type specimen has been destroyed a new one has to be chosen.

#### 80. *P. vitilevuense* Gilly, n. sp. — See p. 606.

Trees, up to 6 m. Branchlets stout, terete, c. 6 mm in diam., ferruginously woolly, glabrescent; terminal cone up to 7 mm long, ferruginously woolly; stipules lanceolate, c. 3 by 1 mm, acute at apex, woolly on outside, glabrous on inside, caducous. *Leaves* conferted at apex of branchlets, elliptic-oblong, 10—20 by 3.5—4.5 cm, apex rounded or obtuse, base rounded; subbullate, glabrous on either side except ferruginously or whitish woolly at base of midrib, sometimes only so below, chartaceous, midrib slightly grooved above, prominent and rounded below, secondary nerves slender, 17—25 pairs, ascending at an angle of 65°—90°, slightly curved, diminishing until inconspicuous near margin, sometimes indistinctly archingly joined, prominulous above, prominent below, tertiary nerves very slender, transverse, inconspicuous on either side. Petioles 1.5—2 cm, ferruginously woolly, crested above. *Flowers* 1 or 2 in each axil, pedicels angular, 15—18 mm long, ferruginously woolly. *Sepals* broadly ovate, 5—6 by 4.5—5.5 mm, apex obtuse or obtusely acuminate, ferruginously woolly on outside, with a bundle of darker and longer hairs at apex, glabrous on inside, inner sepals crested at base and with longer hairs. *Corolla* seen in bud only, c. 3 mm long, margins ferruginously fimbriate, lobes suborbicular, c. 2.5 by 2.5 mm, obtuse. *Stamens* 12, c. 2 mm long, filaments subulate, c. 0.5 mm, glabrous, anthers oblong-ovoid, 1.5—2.5 mm long, 2-lobed at apex, ferruginously tomentose on either side, dehiscing extrorsely. *Ovary* disciform, c. 1 by 2 mm, 6-celled, ferruginously pubescent. Style stout, subulate, c. 2.5 mm long, glabrous. *Fruits* unknown.

Type specimen: *Greenwood 914* in NY.

Ecology: In forests along creeks at c. 550 m altitude.

Distribution: Fiji (Viti Levu).

VITI LEVU. Lautoka, mountains near Lautoka, alt. c. 550 m, at edge of creek among hills: *Greenwood 914* (K, NY), tree 6 m, fl. pale yellowish green, May.

81. *P. gutta* (Hooker f.) Baillon, Tr. Bot. Med. Phan., 1884, 1500, Add., f. 3290; Pierre, Bull. Mens. Soc. Linn. Paris 1, no 63, 1885; Merrill, Enum. Born. Pl., 1921, 480; Lam, l. c. 1927, 387, f. 1; Lam in Backer, Noodfl. Java 7, 1948, Fam. 166, p. 10; Corner, Wayside Trees, ed. 2, 1, 1952, 600; Wyatt-Smith, Research Pamphlet 4, 1954, 32, fig. — *P. gutta* f. *borneense* H. J. Lam, l. c. 1927, 389, f. *genuinum* H. J. Lam, l. c. 1927, 390, f. *vrieseanum* H. J. Lam, l. c. 1927, 391 — *Isonandra gutta* Hooker f., London Journ. of Bot. 6, 1847, 463, t. 16; Teysmann, Nat. Tijdschr. Ned.-Ind. 1, 1850, 435; de Vriese, Tuinb. Fl. 3, 1856, 223; de Vriese, Pl. Ind. Bat. Or., 1856, 59; Miquel, Fl. Ind. Bat. 2, 1859, 1038 t. 36; Bentley & Trimen, Medical Pl., 1880, t. 167; Beauvisage, Contr. Etud. Gutt.-Percha, 1881, 15, 28; Burek, Med. Lands Pl. Tuin 1, 1884, 3, 17 — *I. gutta* Hooker f., var. *oblongifolia* de Vriese, Tuinb. Fl., 1856, 225, fig.; de Vriese, Pl. Ind. Bat. Or., 1856, 60 — *I. gutta* Hooker f., var. *sumatrana* Miquel, Fl. Ind. Bat. 2, 1859, 1038; Miquel, Fl. Ind. Bat., Suppl. (1860) 581 — *Palaquium gutta* Burek, Ann. Jard. Bot. Bzg 5, 1886, 24, t. 1; Dubard, Bull. Soc. Bot. Fr. 56, 1909, Mém. 16, p. 14; Lam, l. c. 1925, 27, f. 3 & 4; Heyne, Nutt. Pl. Ned.-Ind., ed. 3, 1, 1950, 1234 — *P. gutta* Burek, f. *borneense* (Burek) H. J. Lam, f. *genuinum* H. J. Lam, with the subformae *gutta* H. J. Lam and *oblongifolium* (Burek) H. J. Lam, f. *selendit* (Burek) H. J. Lam, and f. *vrieseanum* (Burek) H. J. Lam, l. c. 1925, 28—31, 253 — *P. gutta* Burek, var. *curtisii* Ridley, Fl. Mal. Pen. 2, 1923, 275 — *P. gutta* Burek, var. *oblongifolium* King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr 17, 1905, 192, 402 — *P. gutta* Burek, var. *sessiliflora* Boerlage, Bull. Inst. Bot. Btzg 5, 1900, 21; Merrill, Enum. Born. Pl., 1921, 480 — *P. acuminatum* Burek, Ann. Jard. Bot. Btzg 5, 1886, 40; Heyne, Nutt. Pl. Ned.-Ind., ed. 3, 1, 1950, 1232 — *P. borneense* Burek, Ann. Jard. Bot. Btzg 5, 1886, 25, t. 6; Dubard, Bull. Soc. Bot. Fr. 56, 1909, Mém. 16, p. 12; Heyne, Nutt. Pl. Ned.-Ind., ed. 1, 4, 1917, 16 — *P. borneense* Pierre, *P. formosum* Pierre, *P. malaccense* Pierre and *P. princeps* Pierre, Bull. Soc. Linn. Paris 1, 1883, 496 — *P. ellipsoideum* Beccari, For. Born., ed. 1, 1902, 560 — *P. fulvosericeum* Engler, Bot. Jahrb. 12, 1890, 511; Dubard, Bull. Soc. Bot. Fr. 56, 1909, Mém. 16, p. 9; H. J. Lam, l. c. 1925, 48, *Bornean specimens only* — *P. gloegloerense* Burek, Ann. Jard. Bot. Btzg 5, 1886, 40 — *P. leiocarpum* Boerlage, var. *longe-acuminatum* Boerlage, Bull. Inst. Bot. Btzg 5, 1900, 25 — *P. oblongifolium* (Burek) Burek, Ann. Jard. Bot. Btzg 5, 1886, 25, t. 5; Burek, Med. Lands Pl. Tuin 3, 1886, 40; Dubard, Bull. Soc. Bot. Fr. 56, 1909, Mém. 16, p. 15; Heyne, Nutt. Pl. Ned.-Ind., ed. 1, 4, 1917, 20; Koorders, Atlas Baumart. Java 4, 1918, t. 614 — *Dichopsis oblongifolia* Burek, Med. Lands Pl. Tuin 1, 1884, 21 — *Palaquium obscurum* Burek, Med. Lands Pl. Tuin 3, 1886, 40 — *P. optimum* Beccari, For. Born., ed. 1, 1902, 152, 558, f. 30, 31; Beccari, l. c., ed. 2, 1921, 110, f. 30; Lam, l. c. 1925, 35; Lam, l. c. 1927, 391 — *P. selendit* Burek, Med. Lands Pl. Tuin 3, 1886, 41; Heyne, Nutt. Pl. Ned.-Ind., ed. 3, 1, 1950, 1240 — *P. tammedak* Beccari, For. Born., ed. 1, 1902, 559; Lam, l. c. 1925, 106 — *P. treubii* Burek, Med. Lands Pl. Tuin 3, 1886, 28, incl. var. *parvifolium* Burek — *P. vrieseanum* Burek, Ann. Jard. Bot. Btzg 5, 1886, 28 — *P. vrieseana* Pierre in Beccari, For. Born., ed. 1, 1902, 558.

Trees, up to 45 m. Branchlets subterete or angular, 2—6 mm in diam.,

purplish or reddish brown, golden-coloured, or greyish tomentose or sericeous, glabrescent; terminal cone up to 10 mm long, brownish or reddish brown, gold-coloured or greish tomentose or sericeous; stipules lanceolate, 1—2 mm long, apex acute, purplish or reddish brown, golden-coloured, ferruginously, or light or dark greyish tomentose or sericeous on outside, glabrous on inside, caducous. *Leaves* very variable in shape and size, sometimes even along the same branchlet, conferted or subconferted along tip of branchlets or scattered, obovate, spathulate, ovate, ovate-oblong, elliptic or obovate- or elliptic-oblong, (8—)12—17(—50) by (2.5—)4.5—6.5(—12) cm, apex rounded, obtuse or obtusely or acutely acuminate, acumen up to 3.5 cm long, base broadly or narrowly cuneate, decurrent along adaxial side of petiole; sparsely whitish puberulous above but soon glabrous, densely brownish, light or dark greyish, golden-coloured, ferruginous, reddish or purplish tomentose or sericeous below, sometimes ultimately glabrous, coriaceous; midrib grooved above, prominent and rounded below with a few grooves, secondary nerves (9—)16—20(—33) pairs, ascending at an angle of 45°—50°(—90°), straight and curved at their tips only, archingly joined very close to the margin of the leaf or diminishing until inconspicuous, prominulous above, prominent below, tertiary nerves slender or stout, transverse or subparallel, or parallel to the secondary nerves, sometimes reticulate, prominent or inconspicuous on either side but usually slightly more distinct below. Petioles (0.7—)3—4.5(—6.5) cm long, broadly or narrowly grooved above but the groove diminishing in size down to the basal fourth, rounded and with a few grooves below, brownish, golden-coloured, cinnamomous, or ferruginously tomentose, or sericeous below. *Flowers* in (2—)4—7(—10)-flowered, axillary clusters, pedicels angular, (1.5—)5—9(—12) mm long, with the same type of indumentum as the leaves. Outer *sepals* ovate, 3—4 by 2—3.5 mm, apex obtusely acuminate, tomentose or sericeous on outside in the same colours as the leaf, glabrous on inside, inner sepals ovate-oblong, 2.5—4 by 1—2.5 mm, apex obtuse, margin membranous and fimbriate, tomentose on outside, glabrous on inside. *Corolla* up to 9 mm long, glabrous, lobes elliptic-ovate, up to c. 6 by 2 mm, apex obtuse, ciliate at apex, reflexed in anthesis. *Stamens* 12, 4.5—7 mm long, filaments lanceolate, 3.5—4 mm long, glabrous, anthers sagittate, 2—2.5 mm long, apex aristulate, glabrous, sometimes with a few hairs, dehiscing extrorsely. *Ovary* ovoid, c. 1 by 2 mm, 6-celled, brownish tomentose. Style filiform, 6—9 mm long, pubescent at base, apex with 6 small, lighter coloured streaks. *Fruits* globose, ellipsoid, or ovoid, 2—3.5 by 1—3 cm, rounded, obtuse or acuminate at apex, rounded or attenuate at base, 1- or 2-seeded, pericarp thin or fleshy, minute and densely ferruginously tomentose, sometimes glabrescent. Seeds ovoid or ellipsoid, 1.2—3 by 1—1.7 by 0.6—1 cm, obtuse at both ends, olivaceous brown, brown or dark brown, testa thin, embryo exalbuminous, cotyledons thick, radicle not or slightly exsert.

Type specimen: *Lobb 290* in K.

Vernacular names: Perak: taban putih, t. sutrah; Penang: ekor, daun durian, gëtah taban, taban merah; Selangor: taban merah, t. putih; Johore: sontai manyang; Riouw: gëtah putih, taban pertjah; Bangka: dadau; Sumatra: balam abang, b. pipiet, b. putih, b. saso, b. tebaga, b. tembaga, b. timah, durian taban, genëng, guttah pertjah, majang batuh, m. bolon,

m. buluk, m. durian, m. gerindjing, m. kapur, m. merah, m. pertjah, m. rapuk, njato balam susun, m. selendit, m. surian, seluwai; Java: suntek; Borneo: djankang, djunkang, gëtah durian sambung, g. keras, g. kribang, g. merah, g. merah nomor satu, g. puah, g. sambung, g. semalan, ketapedian, ligayan, natu rupui, njato barak, n. durian, n. rian, n. tamiang, padang njato djangkar, rapok palung, samban tewadah, s. weja, asmban, sambung.

**Use:** This species yields a rubber which can be used for the manufacture of chewing-gum. It is the best gëtah-producing tree. But its most important use is for the manufacturing of sheets used for covering cables to be laid in seawater. The seeds are said to produce a very good wax for the manufacture of soaps and candles. Often the fat is used in the preparation of food. According to extensive studies of the yield of gutta-perchah those trees belonging to the former forms borneense and gutta seem to produce a gutta of higher quality than those of the form selendit (see Heyne, Nutt. Pl. Ned.-Ind., ed. 3, 1950, 1235). It is on account of the producing of an inferior gëtah that Heyne keeps *P. acuminatum*, *P. selendit* and *P. treubii* apart from *P. gutta*, but a distinction on chemical substances alone seems not to justify the separation of species with so many systematical features in common. It only proves that within one single species a large range of possibilities can be enclosed.

**Ecology:** This species seems to be restricted to lowland forests but is found up to 1600 m. In Penang (Malaya) it is flowering from January to April, but in the centre and middle of the Malay Peninsula it flowers from July to September. In the other regions of its area no definite time of flowering seems to be present.

**Distribution:** Though this species is often cultivated, originally it has been found on the Malay Peninsula, Sumatra, Borneo and some surrounding islands only. It seems to be introduced on Java where the government has been trying to cultivate it at Tjipetir on Western Java already for a long time with varying results.

**MALAYA.** Penang, Telok Bahang: *Mahamad 9567* (SING), fl. April; Pulau Penang, Waterfall Valley: *Curtis 3535* (CAL, SING), fl. Jan.; ibidem, Highland Hill, alt. 300 m: *Curtis 3532, 3633 & 3636* (SING), tree, fl. Nov.; Government Hill, alt. 400 m: *Curtis 780* (SING), April; Batu Terenggy; *Curtis s.n.* (SING), fr. June; ibidem, alt. 250 m: *Curtis 3634* (SING), tree, fl. March; Botanical Garden: *Henderson 110* (SING), fl. Jan.; ibidem: *Nur 3666* (SING), juv. fr. — Perak, Taiping: *Stephens s.n.* (SING), fr. Aug.; ibidem: *Curtis 3637* (SING), Oct.; Plus river: *Wray 522* (CAL, SING), fr.; Keledang: *Hill s.n.* (SING); Larut, Waterfall: *Curtis 3725* (CAL, SING), Dec.; ibidem: *King's Coll. 6475* (CAL), fl. Aug.; Dindings: *Bryant s.n.* (SING), March — Pahang, Kuala Lipis: *Burn-Murdoch s.n.* (SING), Sept.; Permatang (Temerloh): *Idris CF 6314* (SING), fl. Sept. — Selangor, Semangka Pass, alt. 800 m: *Hill s.n.* (SING), Aug.; Rantau Panjang: *Strugnell 14507* (SING), fr. Dec.; Kanching Res.: *Ahmad CF 5706* (SING), fr. Nov. — Negri Sembilan, Senawang Res.: *CF 530* (SING), fr. Febr.; Mt Angzi For. Res.: *Sow 23766* (SING), fr. Dec.; Serembang: *Hudson s.n.* (SING), July; Bukit Tangga: *CF 532* (SING), fr. March — Malacca, Kuala Lumpur, Bot. Gardens: *Hamid CF 4916* (SING), fr. Sept.; Weld Hill Res.: *Hamid CF 4967* (SING), fr. Nov.; ibidem: *CF 3397* (SING), fl. July — Johore, Johore Baru: *Nong Chie s.n.* (SING), fr. March; Muar river, Biaivak: *Curtis 3632* (SING); Pontian Besar: *Kassim bin Andeng 52408* (KEP), Nov. — Singapore, Pulau Damar: *Aman s.n.* (SING), Sept.; Bot. Garden: *Nur s.n.* (SING), tree 5 m; ibidem: *Ridley 9519* (CAL, SING), fl. Sept.; Bukit Timah: *Sinclair s.n.* (L, SING), fr. Jan.; ibidem: *Nur s.n.* (SING), Oct.; ibidem: *Fox 11306* (SING), Aug.; without known loc.: *Lobb 290* (K, GL, SING), fl.; ibidem: *White s.n.*



(NY) — without known state: Sungei Ujong: Batu Kupayang: *Malvius* 2199 (SING), Nov.; *Maingay* 983 (K, L).

ROUW. without known loc.: *Wahlbeem* s.n. (L).

SUMATRA. Padang Sidimpuan, Padang Lawas: *Rahmat Si Torus* 5634 (A), Sept.; ibidem, Pulo Liman: *Rahmat Si Torus* 5261 (A) & 5265 (A, L), Aug.; Padang, Ayer Mantjur: *Beccari* s.n. (FI), Aug.; Mt Sago near Pajakumbuh: *Maradjo* 205 (L), tree 5 m, July; Pematang Siantar, alt. 700 m: *NIFS* bb 20394 (BO), tree 31 m, March; Huta Padang Estate, near Kisaren: *Krukoff* 229 (BO, NY), tree, Dec.; ibidem: *Krukoff* 211 & 217 (BO, NY, SING), Dec.; Indragirian Uplands, Keritang: *NIFS* bb 28666 (BO, L), July; ibidem: Muras Serangge, alt. 75 m: *NIFS* bb 30024 (BO, L), Sept.; without known loc.: *Curtis* 3630 (SING), Jan.

JAVA. Banjumas, Upper Baturaden, alt. 800—1000 m: *Drescher* s.n. (BO, L), April.

BORNEO. Sandakan, Mt. Kinabalu, Penibukan, 1300—1600 m alt.: *Clemens* & *Clemens* 21232 (A, BM), tree 43 m, fr. green, Febr.; ibidem, alt. 1600 m: *Clemens* & *Clemens* 40571 (CAL, G, K, L), tree 20 m, fl. buds, Oct.; ibidem: *Clemens* & *Clemens* 50331 (G, K, L, CAL), tree 30 m, Nov.; Gurulau Spur, alt. 1700 m: *Clemens* & *Clemens* 50695 (CAL, E, G, K, L), tree 20 m, fl. Dec.; Tenompeh, alt. 1600 m: *Clemens* & *Clemens* 30066 (BO), tree 13 m, June; Penampang-Sensaron Track, hill, alt. 1200—1600 m: *Keith* 5929 (K, L, SAN, SING), tree 20 m, June; ibidem, alt. 1300 m: *Leano-Castro* 5987 (K, L), tree 20 m, July; Sambas: *Dunnan* s.n. (SING), March; Sipitang, Ulu Mendalong, alt. 800 m: *Wood SAN A 16316* (L, SAN), fl. Oct., tree 27 m; ibidem, alt. 550 m: *Wood SAN A 16784* (L, SAN), tree 45 m, fr. Sept.; Kimanis For. Res.: *Kwan Ting A 354* (KEP), fl. yellow, May — Sarawak, Kuching: *Beccari* s.n. (FI); ibidem: *Beccari* 88 (FI); without known loc.: *Beccari* 2097 (FI), fl.; ibidem: *Beccari* 2269 (FI, S), fl., type specimen of *P. sambasense* Pierre; Sungei Paoh, Sarikei: *Danyut* 1116, *A 1274* (SAR), fl. buds, March; Setapak For. Res.: *Egon* 612 (SAR), fl. April; Limpang Tiga, hilly ground: *Egon* 349, 353 (SAR), tree 20, fr. Nov.; Kuching: *Beccari* s.n. (FI); Jesselton distr., Beaufort: *Cuadra A 1347* (SING), April; Bongawen: *Rahman* 55176 (SING), Nov.; Kabili For. Res.: *Puasa* 10230 (K, L), Dec.; Kuching: *Beccari* 88 (FI), type specimen of *ellipsoideum* Beccari; ibidem: *Beccari* s.n. (FI), type specimen of *P. magnolifolium* Beccari; ibidem: *Beccari* 2097 (FI), type specimen of *P. tammedalk* Beccari — Indonesian Borneo, Pontianak: *Teysmann* s.n. (BO, L), fl.; Sambag: *Teysmann* s.n. (BO, P), fl. & fr.; Muara Teweh, Lemau Malaju, alt. 15 m: *NIFS* bb 28038, 28039, 28749, 28750 (A, BO, L, SING), June/July; ibidem: *NIFS* bb 29211, 29760, 29676 (BO, L, SING), fl. Sept., fr. Oct.; ibidem: *NIFS* bb 29694 (BO, L), fr. Nov.; Muarah Teweh, Hadak, alt. 25 m: *NIFS* bb 21260 (BO), July; Danau Rawah, Lower Dajak river: *NIFS* bb 13479 (BO), 23465 (BO, L), Nov.; Tidang Uplands, alt. 15 m: *NIFS* bb 18253 (BO), tree 38 m, Nov.; Kubu distr., Pulu Limbu, alt. 5 m: *NIFS* bb 12644 (BO), tree 21 m, June; Puruk Tjahu, Takundjan, alt. 75 m: *NIFS* bb 20443, 21198 (BO, L), March/July; ibidem, alt. 175 m: *NIFS* bb 21211 (A, BO, L, SING), June; ibidem, alt. 350 m: *NIFS* bb 20444 (BO, L), March; Sanggau-Sekadan, Meliau, alt. 50 m: *NIFS* bb 23599 (A, BO, L), Dec.

Remarks. In studying the abundance of material before us it seems hardly justified to accept the four forms described by Lam in 1925 and 1927, viz f. *gutta* (Lam's forma *genuinum*), f. *vrieseanum*, f. *borneense*, and f. *selendit*. When using the term "forma" one has in mind that there are more or less sharply defined unities in the species, though the differences between these forms are of a definitely lower level than the differences between species or varieties. This, however, is impossible to carry out in *P. gutta* as so many specimens show in-between characteristics. Moreover, it appeared that, when including new material in each of the four forms, their delimitations had to be expanded, thus obscuring the distinct lines between them. E. g. in forma *gutta*, Lam mentions the number of secondary nerves to be 20—30 pairs, but new material brings this number to 14—30. In forma *borneense* the pedicels are said to reach 0.7 cm sometimes, but now

pedicels of 1.1 cm are found. In forma *selendit* the number of secondary nerves is found to be 9—16 pairs, instead 14—16. Discarding thus the four forms as taxa it is worthwhile to mention the two trends discernable in this species.

With the material before us it is clear that one group of specimens usually has narrowly elliptic or lanceolate leaves and the other group usually more obovate leaves. In the first group the apex is often longly acuminate but rounded leaves are found as well. In the second group usually rounded leaves are found, but acuminate leaves are reported too. Interpreting these two groups in Lam's terms the first group comprises f. *gutta* and f. *vrieseanum* and the second group includes f. *borneense* and f. *selendit*.

The forms *vrieseanum* and *selendit* might respectively be regarded as small-leaved forms of f. *gutta* and f. *borneense*.

What is said about the shape and size of the leaf applies also to the tertiary nerves, the length of the petioles and that of the pedicels.

In the f. *gutta* transverse tertiary nerves are found but also nerves parallel to the secondary nerves, sometimes both types being represented side by side along the same branchlet. In this forma obovate leaves with the two different types of tertiary nervation are found but the same can be stated from the lanceolate leaves, sometimes even to such a degree that transverse and parallel tertiary nerves are found in one and the same leaf.

The small-leaved f. *vrieseanum* has in general a parallel tertiary nervation but the same number of secondary ones as f. *gutta*. The difference in size and the transverse nervation, however, can not be regarded as characters sufficient to separate f. *vrieseanum* from f. *gutta*.

In f. *borneense*, distinguished by usually obovate leaves, the same is found, though not to such an extent as in f. *gutta*, in the transverse and parallel tertiary nervation. Usually the tertiary nervation is transverse to the secondary nerves but nerves parallel to the latter are found in other specimens as well. The small-leaved f. *selendit* with a long petiole has transverse tertiary nerves and less secondary nerves but actually no sudden change in sizes, type of tertiary nervation and number of secondary nerves between this form *selendit* and f. *borneense* can be admitted.

What is said above induces rather the uniting of the forms distinguished by earlier authors than the separating of them.

**82. P. tjipetirens** H. J. Lam, l. c. 1925, 48, f. 7; Lam, l. c. 1927, 398; Lam, in Backer, Noodfl. Java, 7, 1948, Fam. 166, p. 10.

Trees, up to 25 m high. Branchlets irregularly angular, 3—5 mm in diam., ferruginously sericeous, glabrescent; terminal cone up to 10 mm long, sericeous; stipules lanceolate-linear, up to 2 by 0.5 mm, acute or acuminate at apex, sericeous on outside, glabrous within, caducous. *Leaves* subconferted towards tip of branchlets, obovate, elliptic or oblong, 10—19(—30) by 3.5—8(—11) cm, usually rounded at apex, sometimes short obtusely or acutely acuminate, acumen up to 7 mm long, base cuneate, decurrent along upper side of petiole; glabrous above except along midrib ferruginously tomentose, cinnamomous or brown appressedly tomentose below, subcoriaceous; midrib grooved above, rounded below, secondary nerves 13—17 pairs, ascending at an angle of 50°—60°, slightly curved, diminishing until in-

conspicuous near margin, minutely grooved above or prominulous, prominent below, tertiary nervation slender, transverse, prominulous on either side but sometimes inconspicuous above. Petioles 2—3.5 cm long, grooved above, rounded below, cinnamomous, brown or ferruginously appressedly tomentose. *Flowers* in (3—)6—10-flowered, axillary clusters, pedicels angular, 5—10 mm long, in fruit up to 18 mm long, ferruginously appressedly tomentose. *Sepals* lanceolate or ovate-oblong, 3.5—4.5 by 2.5—3 mm, subacute at apex, ferruginously tomentose on outside, glabrous on inside, inner 3 sepals usually smaller and more obtuse than the outer ones, with membranous, glabrous and fimbriate margins, recurved in fruit. *Corolla* 10—12 mm long, on outside ferruginously sericeous on the tube and base of lobes, otherwise glabrous, lobes ovate-oblong, 7—8 by 2—3 mm, acute at apex. *Stamens* 12, 7—10 mm long, filaments filiform, 6—8 mm long, glabrous, anthers ovoid, c. 3 mm long, acuminate at apex, ferruginously sericeous on either side, dehiscing extrorsely. *Ovary* ovoid-conoid, c. 1 by 1.5 mm, 6-celled, 6-lobed, ferruginously sericeous. Style filiform, 6-ribbed, 12—15 mm long, glabrous. *Fruits* obovoid or obpyriform, 3—3.5 by 1.6—2.3 cm, 1- or 2-seeded, pericarp fleshy, glabrous. Seeds fusiform or ellipsoid, 2.5—2.8 by 1.2—1.8 cm, obtuse at apex, acute at base, testa thin, cartilaginous, dark brown, nitidous, scar covering half the surface of the seed, greyish, dull, embryo exalbuminous, radicle not or hardly exsert.

Type specimen: *Bakhuizen v. d. Brink 2660* in BO.

Ecology: Only found in cultivation and by Heyne supposed to be of hybrid origin.

Distribution: Java, cultivated.

JAVA. West Java, Preanger distr., Tjipetir, Tjibadak, alt. 600 m: *Bakhuizen v. d. Brink 2666* (BO, L), tree 10—25 m, fl. brown; *Hortus Bogoriensis*, Tjikeumeuh section *HB 56* (BO, L), fl.

83. *P. calophyllum* (Teysmann & Binnendijk) Pierre in Burck, Ann. Jard. bot. Btzig 5, 1886, 28; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 8; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 279; Lam, l.c. 1925, 52, incl. var. *typica* and var. *philippinense* H. J. Lam; Lam, l. c. 1927, 398 — *Isandra calophylla* Teysmann & Binnendijk, Nat. Tijdschr. Ned.-Ind. 27, 1864, 35 — *Dichopsys calophylla* (T. & B.) Bentham & Hooker f., Gen. Pl. 2, 2, 1876, 658 — Fig. 20.

Trees, up to 15 m. Branchlets terete to angular and costate, 2—5 mm in diam., golden-coloured, ferruginously or greyish tomentose, glabrescent; terminal cone up to 7 mm long; stipules lanceolate-linear, up to 4 by 2 mm, acute, ferruginously or greyish tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, obovate, rarely elliptic, (7—)11—19 by (3.5—)4.5—9 cm, apex obtuse, or obtusely or acutely acuminate, acumens up to 16 mm long, base cuneate, decurrent along adaxial side of petiole; glabrous above, golden-coloured, ferruginously, or greyish tomentose or sericeous below,

Fig. 20. *P. calophyllum*, a. branchlet with leaves and immature fruits; b. branchlet with mature fruits; c. tertiary nervation of leaf; d. flower; e. outer sepal, inside; f. part of corolla, outside, showing the sparse pubescence; g. seed; h. embryo (cot. cotyledon, rad. radicle) (*Kostermans 6668*, except g. and h. *Kostermans 6883*, in d. only part of the stamens drawn).



chartaceous or coriaceous; midrib grooved above, prominent and rounded below, secondary nerves 10—12 pairs (in *Beccari* 2278 6 only), ascending at an angle of 40°—50°, straight, curved at their tips, diminishing until inconspicuous near the margin, tertiary nerves transverse, inconspicuous above, prominent below. Petioles 8—33 mm long, narrowly grooved above, greyish, ferruginously or golden-coloured tomentose, often thickened in the basal part. *Flowers* in 2—11-flowered, axillary clusters, pedicels angular, 1—2.5 cm long, ferruginously or golden-coloured tomentose, in fruit up to 3 cm long. *Sepals* triangular-ovate, 3—3.5 by 2.5—3 mm, indistinctly obtusely acuminate, densely ferruginously or golden-coloured tomentose on outside, sparsely so on inside mainly in the apical half. *Corolla* c. 6 mm long, on outside with a few ferruginous hairs in the middle-line of the lobes, extending downwards over the tube, lobes lanceolate, 2—4 by 1.5—2 mm, obtuse at apex, reflexed in anthesis. *Stamens* 12, 2.5—4.5 mm long, filaments subulate, 1.5—3 mm long, angular, glabrous, anthers sagittate-ovoid, 1.5—2 mm long, acute, sometimes bifid, dehiscing laterally, connective sparsely ferruginously tomentose on outside. *Ovary* conoid, c. 2 by 2 mm, gradually tapering into the style, ferruginously sericeous, 6-celled, irregularly 6-lobed. Style filiform, 7—10 mm long, ferruginously tomentose at base only, but scattered so up to the middle. *Fruits* depressedly globose, up to 2 by 2.5 cm, 1- or 2-seeded, pericarp woody, densely ferruginously tomentose. Seeds subglobose, laterally slightly compressed, 11—14 by 10—12 by 8—10 mm, obtuse at either end, testa blackish brown, thin, scar covering about a third of the surface of seed, greyish, embryo exalbuminous, radicle inferior, not exerted.

Type specimen: *Teysmann s.n.* in BO.

Vernacular names: Singapore: gutta salualam; Borneo: guttah samalam, malaupedara, njato, n. djangkar, n. merah.

Ecology: Common tree of lowlands along rivers, up to 200 m altitude.

Distribution: Malaya, Borneo, Mindoro; doubtful from Celebes, Ternate, Batjan, and New Guinea.

MALAYA. Singapore, Botanical Garden: *Nur s.n.* (SING), fr. May; ibidem: *Desmukh s.n.* (SING), small tree, fl. May.

BORNEO. Sarawak, Mattang: *Beccari* 2614 (FI), fl. Sept.; ibidem: *Beccari* 2226 (FI, G, NY, S), fl. July; ibidem: *Beccari* 2278 (FI, G), fl. July; Lumdu, Mt Gadin: *Clemens & Clemens* 22200 (BO), Oct.; ibidem: *Egon* 239 (SAR), fl. Sept.; ibidem: *David & Tachun* 36097 (KEP, SING), tree 5 m, fl. Sept.; Pangkalan Ampat: *Beccari* 2752 (FI), fr. Nov.; Mt Selang For. Res.: *Egon* 489 (SAR), fl. Sept.; Mt Semengoh For. Res.: *Egon* 239 (SAR), fl. March — Sandakan, Beaufort distr., Beaufort Hill, alt. 100 m: *Wood SAN* 16985 (A, BO, BRI, K, L, SAN), tree 12 m, fr. June; Sipitang, Ulu Mamdalong, alt. 600 m: *Wood SAN* 16778 (A, BO, BRI, K, L, SING), tree 17 m, fr. Sept. — Indonesian Borneo, Loa Haur, W. of Samarinda, low ridge, alt. 40 m: *Kostermans* 6883 (BO, L), tree 15 m, fr. brown, May; Loa Djanan, W. of Samarinda, sandy loam ridge, alt. 30 m: *Kostermans* 6668 (BO, L), tree 15 m, fl. June, fr. April; Hayup: *Winkler* 2441 (L), fr. June; E. Kutai, Rantau Bahan, alt. 18 m: *NIFS* bb 15242 (BO, L), fl. April; Muarah Teweh, Pepas, alt. 30 m: *NIFS* bb 28098 (BO, L, SING), May; ibidem: *NIFS* bb 28086 & 29680 (BO, L, SING), fl. May & Oct.; ibidem: *NIFS* bb 29707 (BO, L, SING), fl. & fr. Nov.; ibidem: *NIFS* bb 28090 (BO, L), May; Sangkulirang, alt. 17 m: *NIFS* bb 15191 (BO, L), April; Bangaya: *Wade s.n.* (SING), Tandjong Bangko region near mouth of Mahakam river, alt. 20 m, sandy soil, low ridge: *Kostermans* 7030 (BO, L), tree 15 m,

fl. & fr. May, common; Berau, Inaran: *NIFS bb 12154* (BO), tree 18 m, Oct.; Tandjung Rodeb, Labanan: *NIFS bb 11547* (BO, L), tree 24 m, June; without known locality: *Teysmann 14606* (BO), fl.

MINDANAO. f. Merrill, l.c. 1923. Also: Surigao: *Leuterio & Mallong 27109* (†), tree 15 m, fl., type specimen of var. *philippinense* H. J. Lam.

TERNATE. f. Lam, l.c. 1925, 52.

CELEBES. f. Lam, l.c. 1927, 398.

BATJAN. f. Lam, l.c. 1925, 52.

NEW GUINEA. f. Lam, l.c. 1925, 52. Most of the specimens mentioned by Lam represent *P. supfianum* Schlechter.

**Remarks.** In *Daud & Tachun 36097* the angle between secondary nerves and midrib is c.  $35^\circ$  but the number of secondary nerves is the same as in the other specimens. In *Beccari 2278* this angle is also c.  $35^\circ$  but there are only 6–10 pairs of secondary nerves.

**84. *P. ferrugineum* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 11; Lam, l.c. 1925, 71; Lam, l.c. 1927, 402 — Fig. 21.**

Large trees. Branchlets angular, 1.5–4.5 mm in diam., cinnamomous-brown tomentose when young, glabrescent; terminal cone up to 10 mm long, cinnamomous-brown tomentose; stipules lanceolate, up to 4 by 2 mm, apex acute, cinnamomous-brown on outside, glabrous on inside, caducous. *Leaves* scattered, elliptic, 6–10 by 2–4.5 cm, apex obtusely acuminate, acumen up to 8 mm long, base narrowly cuneate, decurrent along adaxial side of petiole; very sparsely cinnamomous-brown tomentose above, densely so below, coriaceous; midrib grooved above, prominent and rounded below, secondary nerves 11–14 pairs, ascending at an angle of  $35^\circ$ – $45^\circ$ , slender, straight, but curved at their tips, diminishing until inconspicuous, near margin, grooved above and sometimes rather inconspicuous, prominent below, tertiary nerves transverse, inconspicuous on either side. Petioles (1–)2–3 cm long, very narrowly grooved above, brownish tomentose. *Flowers* in 2–6-flowered, axillary clusters on prominent warts, pedicels angular, 2–6 mm long, cinnamomous-brown tomentose. Outer *sepals* ovate, c. 2 by 1.5 mm, apex subacute, brownish tomentose on outside, glabrous on inside, fimbriate, inner sepals elliptic-ovate, slightly smaller than the outer ones, indumentum the same as that of the outer sepals, margins membranous. *Corolla* c. 6 mm long, glabrous on either side, except for a few hairs at the base of the alternipetalous stamens, lobes elliptic-lanceolate, c. 5 by 1.5 mm, apex obtuse or obtusely acuminate, glabrous, reflexed in anthesis. *Stamens* 12, the alternipetalous ones usually slightly shorter than the epipetalous, 3.5–4 mm, filaments filiform, 2.5–3.5 mm long, glabrous except for a few hairs at the base of the alternipetalous ones, anthers oblong-ovoid, 1.5–2 mm long, apex mucronate, sparsely ferruginously hairy, dehiscing laterally to subextrorsely. *Ovary* disciform, c. 1 by 1.5 mm, 6-celled, ferruginously tomentose. Style subulate, 6–7 mm long, glabrous, at apex with 6 lighter coloured stigmas. *Fruits* unknown.

**Type specimen:** *Beccari 2283* in P.

**Ecology:** In lowland rainforests.

**Distribution:** Borneo.

BORNEO. Sarawak, near Mattang: *Beccari 2283* (FI, G, P, S), fl. July, large tree with very abundant latex.

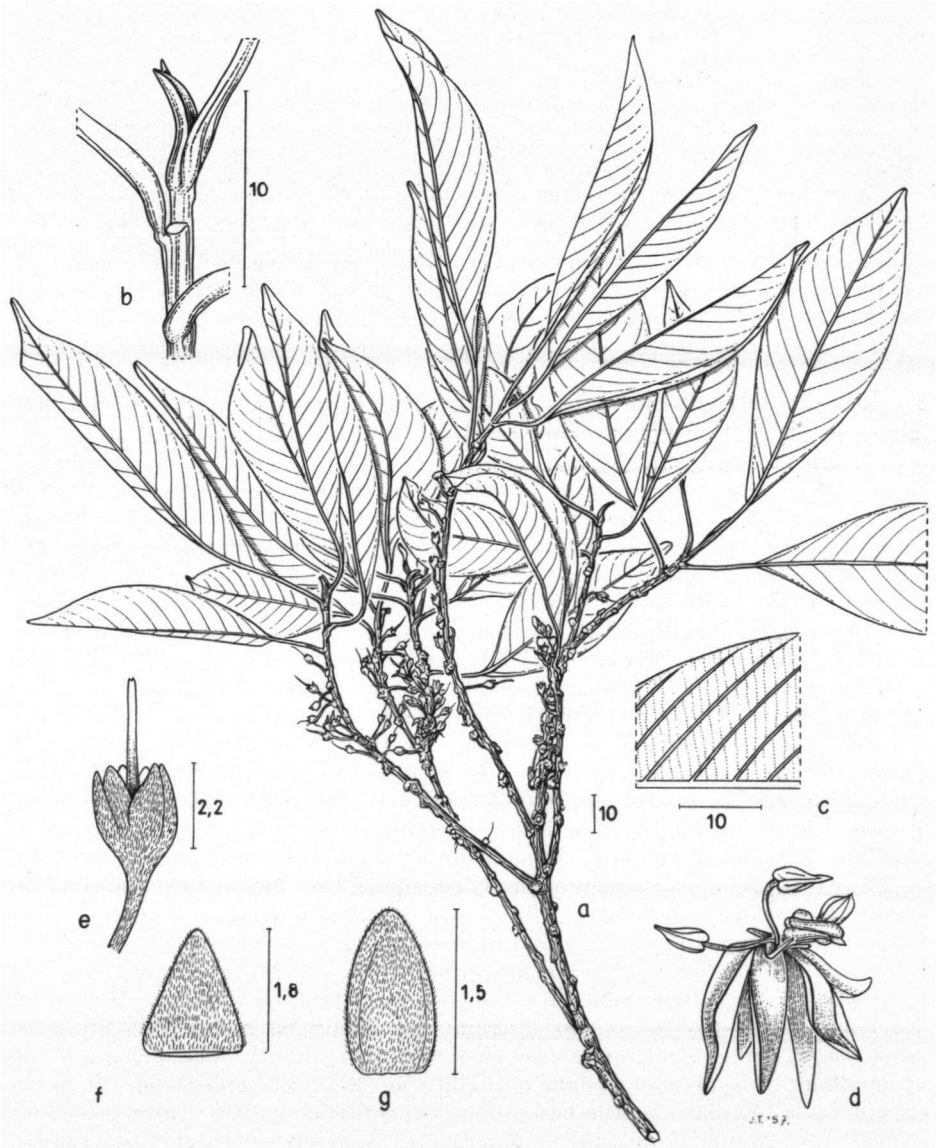


Fig. 21. *P. ferrugineum*, a. branchlet with leaves and flowers; b. top of branchlet; c. tertiary pervation of leaf; d. corolla with some stamens; e. calyx and gynaecium; f. outer sepal, outside; g. inner sepal, outside (Beccari 2285).

85. *P. quercifolium* (de Vriese) Burck, Ann. Jard. bot. Btzg 5, 1886, 41; Lam, l. c. 1925, 53; Lam, l. c. 1927, 399 — *Isonandra quercifolia* de Vriese, Nat. Tijdschr. Ned-Indië 21, 1860, 311 — *I. argentata* Teysmann & Binnendijk, Nat. Tijdschr. Ned-Indië 25, 1863, 415 — *Dichopsis argentata*

(T. & B.) Bentham & Hooker f., Gen. Pl. 2, 2, 1876, 658 — *Palaquium argentatum* Pierre in Burck, l. c., 1886, 30, t. 10 f. 1 & 2; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 4 — *P. macrophyllum* (de Vriese) Pierre ex Dubard, l. c. 9; Lam, l. c. 1925, 106; Lam, l. c. 1927, 413 — *Isonandra macrophylla* de Vriese, l. c., 309 — *Sideroxylon ? macrophyllum* Burek, Ann. Jard. Bot. Btzg 5, 1886, 20.

Trees, up to 40 m. Branchlets slender to stout, terete, 3—10 mm in diam., ferruginously tomentose, glabrescent; terminal cone 2—10 mm long, ferruginously tomentose; stipules lanceolate-linear, up to 11 mm long, acute, greyish or ferruginously sericeous on outside, glabrous on inside, caducous. *Leaves* scattered, obovate-oblong or narrowly elliptic, (8—)12—32 by (3.5—)5—10 cm, apex short acutely acuminate, very rarely rounded, base cuneate, slightly constricted before tapering along adaxial side of petiole, glabrous above, greyish, yellowish, brownish or reddish cinnamomous sericeous or puberulous below, thin-coriaceous; midrib grooved above, prominent and rounded below, secondary nerves 12—16(—19) pairs, ascending at an angle of 35°—45°(—60°), straight and curved at their tips, diminishing until inconspicuous near margins, sometimes archingly joined in the upper most nerves, prominulous and grooved above, prominent below, tertiary nerves transverse, slender, but less so below, prominulous on either side. Petioles (1.5—)3—7 cm, grooved above except in the basal third but thickened there, ferruginously tomentose, but ultimately glabrous. *Flowers* in 4—8-flowered, axillary clusters, pedicels 8—14 mm long, in fruit 1.5—2.4 cm long, ferruginously tomentose. *Sepals* lanceolate, 5—6 by 2—2.5 mm, acute, densely ferruginously tomentose on outside, sparsely so on inside. *Corolla* 12—16 mm long, outside ferruginously tomentose on the tube and less in the centre of the lobes, the latter ovate-lanceolate, 9—12 by 1.5—3.5 mm, apex subacute or obtuse and fimbriate, in fruit reflexed. *Stamens* 12, 10—12.5 mm long, filaments 7—9 mm long, glabrous, anthers ovoid-sagittate, 2.5—3.5 mm, acuminate at apex, glabrous. *Ovary* obconoid to discoid, c. 0.7—1.5 mm, 5- or 6-lobed, 5- or 6-celled, ferruginously tomentose at apex only. Style filiform, 15—22 mm long, glabrous. *Fruits* globose, c. 2 cm in diam., glabrous (?), one-seeded, pericarp thin, woody. Seeds ellipsoid, c. 1.4 by 1.2 cm, yellowish brown, nitidous, testa thin, scar broadly elliptic or ovate, c. 1.2 by 1 cm large, grey, dull, cotyledons thick, exalbuminous, radicle punctiform, not exsert.

Type specimen: *Motley VII (1367)* in BO.

Vernacular names: Sumatra: balam sago; Borneo: kerekit, ma-lau, m. palung, nato palong, nyato, njatuh tinggang.

Distribution: Sumatra, Borneo, Celebes, Batjan, Amboina.

SUMATRA. Central Sumatra, Indragiri, Taluk region, Dipterocarpaceae forest: *Meyer 4130* (L), Jan., doubtful specimen.

RIOUW. Lingga, Bukit Tandjung Sembilang, alt. 7 m: *NIFS bb 31654* (BO, L), Dec.

BORNEO. Brunei, Labi Rd, 17.5 mile, primary forest: *Ashton BRUN 34* (L), fl. buds May, tree 33 m — Sandakan, Kinabatangan distr., on hill at Kuala Daramakud: *Kadir bin Abdul SAN 16873* (L, SAN), tree c. 23 m, fl. May — Indonesian Borneo, Bandjermasin: *Motley VII (1367)* (BO, L); Pleihari, Kintap, alt. 150 m: *NIFS bb 13467* (BO, L), fl. Nov.; West Kutai, Sei Long Paka, alt. 50 m: *NIFS bb 24018* (A, BO, L), fl. March; ibidem: *NIFS bb 24019* (BO, L), March; Kendisi, alt. 90 m: *NIFS bb 16682* (BO, L), May; Mendom (Sei Klindjau), alt. 50 m: *NIFS bb 29239* (A, BO, L), Aug.; Kelumpang, alt. 30 m: *NIFS bb 16958*



(BO, L), May; Muara Teweh, Sei Ajoeh, Pepas, alt. 50 m: *NIFS* bb 29198 (BO, L); ibidem, alt. 25 m: *NIFS* bb 21213 (BO, L), June; Tanah Bumbu: *NIFS* bb 13081 (BO), tree 34 m, fr. Dec.; Tandjung Pangelak: *NIFS* bb 15964 (BO), tree 33 m, fr. Dec.; Balikpapan, Sungei Wain, alt. 80 m, primary forest: *NIFS* bb 34320 (BO, L), tree 24 m; E. Kutai, Sg Kerajaan (Sangkulirang), alt. 30 m, old primary forest: *NIFS* bb 34788 (BO, L), tree 23 m, July; Banjarmasin: *de Vriese* 1252 (L), type specimen of *Isonandra macrophylla* de Vriese.

CELEBES. Makassar: *Teysmann* s.n. (BO, L), fl. & fr.

BATJAN. without loc.: *Herb. Bog.* s.n. (NY).

AMBOINA. f. Lam, l. c. 1927, 53.

Dubious specimen:

Sandakan, Beaufort Hill, NE of Beaufort Township, alt. 110 m: *Wood* SAN 16917 (L, SAN), tree 20 m, fr. June.

This specimen is placed here but it differs from all other specimens in the glabrous underside of the leaves.

Remark. Contrary to earlier descriptions the inside of the calyx is pubescent and not glabrous.

86. *P. rigidum* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 18; Lam, l. c. 1925, 27; Lam, l. c. 1927, 387.

Trees? Branchlets terete, c. 6 mm in diam., brownish tomentose, glabrescent; terminal cone 2—4 mm long, greyish or brownish tomentose; stipules ovate, up to 2 by 2 mm, subacute or acute, greyish or brownish tomentose on outside, ferruginously tomentose on inside, caducous. *Leaves* subconfered at apex of branchlets, obovate, 14—22 by 6—8 cm, obtusely acuminate, acumen 2—4 mm long, base narrowly cuneate, decurrent; glabrous on either side, chartaceous; midrib impressed above, prominent and rounded below, secondary nerves 13—16 pairs, ascending at an angle of 60°—70°, slightly curved, diminishing until inconspicuous near margin, distinct on either side, tertiary nerves transverse but almost parallel to secondary nerves, few, with a distinct reticulate nervation in between, distinct on either side. Petioles (2—)2.5—4 cm long, flat above and slightly grooved in the apical part, greyish or ferruginously tomentose in the basal part. *Flowers* in 2—4-flowered, axillary clusters, pedicels angular, 12—17 mm long, ferruginously tomentose. *Sepals* ovate-lanceolate, 5—6.5 by 3.5—4.5 mm, apex obtuse, ferruginously tomentose on outside, glabrous on inside, ferruginously woolly fimbriate, inner sepals thinner than outer ones and with membranous margins. *Corolla* 8—10.5 mm long, glabrous on either side, lobes elliptic-oblong, 5.5—6.5 by 3.5—4.5 mm, apex obtuse. *Stamens* 12, in 2 whorls, (5.5—)7.5—8.5 mm long, filaments filiform, 2.5—4 mm long, glabrous, anthers oblong-lanceolate, 3—4 mm long, apiculate, glabrous, dehiscing extrorsely. *Ovary* disciform, c. 1 by 1.5 mm, 6-celled, 6-grooved, ferruginously tomentose, provided with a thin disk. Style filiform, 10—12 mm long, terete, infundibuliform at apex. *Fruits* unknown.

Type specimen: *Beccari* 2284 in FI.

Distribution: Borneo.

BORNEO. Sarawak, Mattang: *Beccari* 2284 (FI, G, L), fl. July.

87. *P. rubiginosum* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 9; Lam, l. c. 1925, 107; Lam, l. c. 1927, 414 — *Isonandra rubiginosa* Thwaites, Enum., 1864, 177 — *Dichopsis rubiginosa* (Thwaites) Bentham, Gen. Pl. 2, 1876, 658; Clarke

in Hooker f., Fl. Br. Ind. 3, 1882, 541 — *Bassia rubiginosa* (Thwaites) Beddome, Fl. Sylv. 2, 1869—1873, t. 254; Beddome, For. Man., 1871, 141.

Trees. Branchlets stout, terete, 6—11 mm in diam., reddish villose but soon glabrous; terminal cone broadly conoid, up to 3 mm long, villose; stipules lanceolate, up to 5 by 2 mm, obtuse at apex, puberulous on either side, caducous. *Leaves* conferted or subconferted near tips of branchlets, obovate-oblong, or spatulate, (5.5—)9—16 by (2.5—)3.5—6.5 cm, rounded, obtuse or indistinct obtusely acuminate at apex, narrowly cuneate at base, shortly decurrent; glabrous above, greyish, brownish or rusty tomentose below, coriaceous; midrib impressed and minutely grooved above, prominent and rounded below, secondary nerves 8—13 pairs, ascending at an angle of 40°—50°, straight, archingly joined near margin, prominent on either side, tertiary nerves few, reticulate, sometimes one nerve more distinctly developed and parallel to the secondary nerves, inconspicuous to distinct on either side. Petioles 8—17 mm long, prominulous, flat or slightly grooved above, often rugulose in the basal 2/3, with the same type of pubescence as the leaf. *Flowers* in 6—10-flowered, axillary clusters near apex of branchlets, pedicels angular, 1.5—3.5 cm long, in fruit up to 4.5 cm long, thickened at apex, brownish or greyish appressedly tomentose. *Sepals* lanceolate or ovate-lanceolate, 8—11 by 3—4 mm, acute at apex, ferruginously tomentose on either side, except for a narrow part in the middle-line on inside, inner sepals with glabrous, membranous margins, edge fimbriate. *Corolla* 8—10 mm long, glabrous on either side, but fimbriate at tip of lobes, lobes obovate-oblong, 6—7 by 3—3.5 mm, obtuse. *Stamens* 12, 5.5—6.5 mm long, filaments filiform, 3—4 mm long, in bud curved outwards and downwards but later stretching itself, glabrous, anthers sagittate-ovoid, c. 4 mm long, acutely cuspidate, glabrous, dehiscing laterally. *Ovary* ovoid-globose, c. 1.5 by 2 mm, 6-celled, glabrous. Style filiform, 9—11 mm long, glabrous. *Fruits* obovoid-ellipsoid, 2.7—3.5 by c. 2 cm, rounded, 1-seeded, pericarp crustaceous-fleshy, glabrous. Seeds subellipsoid, c. 2.3 by 1.3 cm, testa crustaceous, scar ovate, not reaching the tip of the seed, c. 4 mm broad, embryo exalbuminous.

Type specimen: *Thwaites 394* in K.

Ecology: In forests at low altitudes.

Distribution: Ceylon.

CEYLON. Saffragam distr. and Hinidoon Corle: *Thwaites 394* (BO, CAL, G, K, L, NY, US), fl. & fr.; ibidem: *Thwaites 3447* (CAL), fl.

88. *P. polyanthum* (Wallich) Baillon, Tr. Bot. Méd. Phan., 1884, 1500, Add.; Lam, l. c. 1927, 414 — *P. polyanthum* (Wallich) Engler, Bot. Jahrb. 12, 1890, 511; Lam, l. c. 1925, 107, 258; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 18 — *Bassia polyantha* Wallich, Cat., 1828, 4156; A. DC, Prodr. 8, 1844, 198 — *Isonandra polyantha* Kurz, For. Fl. Br. Burma 2, 1877, 119; Kurz, Journ. As. Soc. 1877, pt. 2, 230 — *Dichopsis polyantha* (Wallich) Bentham, Gen. Pl. 2, 1876, 658; Clarke in Hooker f., Fl. Br. Ind. 3, 1882, 542 — *Sideroxylon regium* Wallich, Cat., 1828, 4156, p.p.

Trees, up to 15 m. Branchlets terete, 3—6 mm in diam., sparsely greyish puberulous, glabrescent; terminal cone up to 6 mm long, puberulous; stipules lanceolate, up to 7 by 2 mm, acute to aristulate, puberulous on

outside, glabrous on inside, caducous. *Leaves* scattered, sometimes clustered at apex of branchlets, oblanceolate, obovate or obovate-oblong, 12.5—20 (—35) by 4—8 (—12) cm, subobtuse or short obtusely acuminate at apex, acumen up to 4 mm long, cuneate or cuneate-rotundate at base, shortly decurrent; glabrous above, greyish yellow silky-tomentose below, but later sometimes subglabrous, coriaceous; midrib grooved above and minutely crested, prominent and rounded or angular below, secondary nerves 16—23 pairs, ascending at an angle of 80°—90°, slightly curved, archingly joined near margin, prominent on either side, sometimes grooved above, tertiary nerves laxly reticulate, sometimes a small number transverse, prominent on either side. Petioles 1—3.5 cm long, flat above, rounded below, thickened and rugulose in basal half or two-third, sparsely tomentose. *Flowers* in 7—10-flowered, axillary clusters towards the end of branchlets, pedicels terete or angular, 1.5—3 cm long, cinnamomously or greyish tomentose. *Sepals* elliptic-ovate, 5—6.5 by 4—5 mm, obtuse at apex, ferruginously, cinnamomously or greyish appressedly tomentose on outside, sparser so on inside, inner sepals usually broader and with membranous, fimbriate margins. *Corolla* 7—12 mm long, glabrous except for the ferruginously pilose throat, lobes elliptic, 3.5—6 by 1.5—2.5 mm, apex obtuse. *Stamens* 12 (—15), 5—6.5 mm long, filaments filiform, 3.5—4.5 mm long, with long brown hairs mainly in the basal part, anthers compressedly oblong, 2—2.5 mm long, rounded and mucronate at apex, glabrous, dehiscing laterally. *Ovary* broadly ovoid, c. 1 by 2.5 mm, 6-celled, 6-lobed, whitish pilose. Style filiform, 6—9 mm long, glabrous. *Fruits* not seen but according to Clarke: "a berry, 1.5 inch, obovoid, scaly brown, 1-seeded". Pedicel at apex thickened in fruit, up to 6 mm long.

Type specimen: *Wallich 4166* in K.

Use: Yields a good gutta-percha in large quantity.

Vernacular names: kurta, kherual, bonthai pionbuphang, kerbal, dieng-horua, salua (Assam).

Ecology: In forests at low altitudes.

Distribution: East Pakistan, India and Burma.

EAST PAKISTAN. Silhet: *Wallich 4166* (CAL, G, K), fl.; ibidem: *Hooker & Thomson s.n.* (CAL, K, L), sterile; Chittagong, Demagiri East: *Lister 221* (CAL, K), fl. March; Kisalong East: *Lister s.n.* (CAL, K), fl.; Luckipoor, alt. 100 m: *Clarke 42399* (C, CAL, K), tree 13 m, fr. Dec.; Cachar, Jelinga Tulak jungle: *Keenan s.n.* (K), fl. & fr., Sept.

INDIA. Assam, Silcari: *Mann s.n.* (CAL), fl. July.

BURMA. Pegu: *Wallich 4156* (K); Thauingzin div., Sw Ka Li Chg: *Maug Ba Pe 12903* (K), tree 15 m, fr. deep yellow, Dec.

Dubious specimens. *Gamble 6769 A* (CAL), from Pharoka, Chittagong, sterile, Febr.; *Kurz s.s.* (CAL, L), from Arracan, Boronga Island, on Mingoo Hill, 240—300 m, sterile, Oct.

89. *P. pauciflorum* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511; Trimen, Fl. Ceylon 3, 1895, 85; Lam, l.c. 1925, 107, 258; Lam, l.c. 1927, 414; King & Alston, Ann. Roy. Bot. Gard. Peradeniya 9, 3, 1930, 296 — *Isonandra pauciflora* Thwaites, Enum., 1864, 177 — *Bassia pauciflora* (Thwaites) Beddome, For. Man., 1870, 141 — *Dichopsis pauciflora* (Thwaites) Clarke in Hook. f., Fl. Brit. Ind. 3, 1882, 541 — Fig. 22.

Medium-sized trees. Branchlets terete, c. 3 mm in diam., brownish

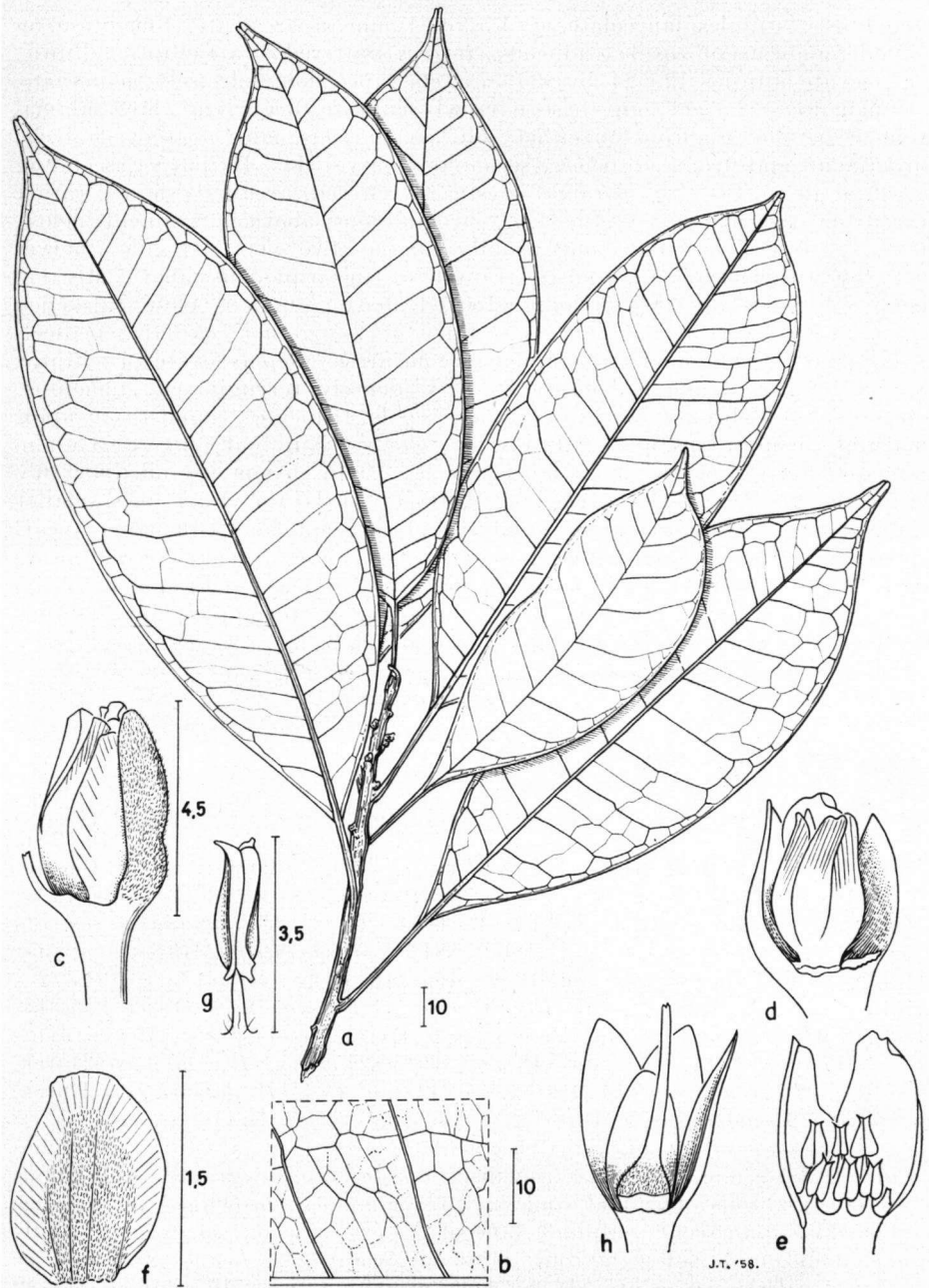


Fig. 22. *P. pauciflorum*, a. branchlet with leaves; b. tertiary nervation of leaf; c. flowerbud, part of calyx removed; d. flowerbud, part of calyx removed, showing the corolla; f. inner sepal, outside; g. stamen; h. part of corolla, with gynaecium (Thwaites 2630).

tomentose; stipules lanceolate, c. 1.5 by 1 mm, apex acute, tomentose on outside, glabrous on inside, caducous. *Leaves* scattered, ovate-elliptic, elliptic, or obovate-elliptic, 12—24 by 3.5—7.5 cm, apex long obtusely acuminate, acumen up to 2.5 cm long, base narrowly cuneate, decurrent along adaxial side of petiole; glabrous on either side, chartaceous, midrib grooved above, prominent and rounded below, secondary nerves 11—16 pairs, ascending at an angle of 75°—80°, straight or slightly curved, archingly joined rather far from the margin of the leaf, prominulous above, prominent below, tertiary nerves reticulate but usually one or two very irregular nerves between two nerves apparently transverse, inconspicuous above, distinct below. Petioles 10—26 mm long, grooved above, rounded below, thickened in basal part, glabrous. *Flowers* solitary or 2 together, axillary, pedicels angular, 1—2 mm long, ferruginously tomentose. *Sepals* ovate or elliptic, 3.5—4 by 2.5—3 mm, subobtusate at apex, densely ferruginously tomentose on outside, glabrous on inside, inner sepals truncate, rounded at apex, margins membranous and glabrous. *Corolla* seen in bud only, c. 3.5 mm long, entirely glabrous, lobes lanceolate, c. 2.5 by 1 mm, rounded or subtruncate at apex. *Stamens* 12, in 2 distinct whorls, the inner ones smaller than outer ones, almost entirely glabrous, 1—1.5 mm long, filaments linear-subulate, c. 0.5 mm long, with a few hairs at the base, anthers ovoid-ellipsoid or ovoid, 1—1.5 mm long, apex rounded with 2 mucros, dehiscing laterally. *Ovary* ovoid, c. 1 by 1 mm, 6-celled, ferruginously tomentose, but glabrous in the basal part. Style filiform, c. 3.5 mm long, glabrous. *Fruits* not seen but according to Clarke a berry and oblong.

Type specimen: *Thwaites 2680* in K.

Distribution: Ceylon.

CEYLON, near Ratnapura: *Thwaites 2680* (CAL, G, K), fl.

90. *P. rostratum* (Miquel) Burck, Ann. Jard. bot. Btzg 5, 1886, 39; Heyne, Nutt. Pl. Ned. Ind., ed. 1, 4, 1917, 24; Lam, l. c. 1925, 40, 254; Heyne, l. c., ed. 2, 2, 1927, 1239; Lam, l. c. 1927, 396; Lam, in Backer, Noodfl. Java 7, 1948, Fam. 166, p. 10; Heyne, l. c., ed. 3, 1, 1950, 1239; Wyatt-Smith, Research Pamphlet 4, 1954, 41 — ? *Isonandra rostrata* Miquel, Fl. Ind. Bat., Suppl., 1860, 581 — *P. verstegei* Burck, l. c. 35; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 18; Heyne, l. c. 1917, 25; Hallier, Rec. Trav. bot. néerl. 15, 1918, 71 — *P. bancanum* Burck, l. c. 43; King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr. 17, 1905, 195; Heyne, l. c. 1917, 17; Ridley, Fl. Mal. Pen. 2, 1923, 275 — ? *P. linggense* Burck, l. c. 42 — *P. membranaceum* Burck, l. c. 42, non 43 — *P. parviflorum* Burck, l. c. 37 — *P. parvifolium* Burck, l. c. 36 — *P. laeve* Ridley in msc.

Trees, up to 60 m high. Branchlets terete but at apex sometimes angular, 2—8 mm in diam., brownish, ferruginous or greyish puberulous but soon glabrous; terminal cone up to 5 mm long, brownish, ferruginous or blackish pubescent; stipules lanceolate, c. 1 by 0.5 mm, apex acute, puberulous on outside, glabrous on inside, caducous. *Leaves* scattered or subconferted at apex of branchlets, obovate, spatulate or elliptic, (5—)7—22 by 2.5—7(—9) cm, apex retuse, rounded, obtuse, short obtusely acuminate or obtusely cuspidate, acumen up to 15 mm long, base narrowly cuneate, decurrent; glabrous on either side, subcoriaceous or chartaceous, sometimes

membranous; midrib flat or slightly grooved above and sometimes minutely crested, prominent and angular below, secondary nerves 15—28 pairs, ascending at an angle of 70°—90°, but c. 40° at apex, straight, but curved at their tips, irregularly archingly joined near margins, prominent on either side and sometimes hardly separable from the tertiary nervation, the latter reticulate-parallel to secondary nerves but sometimes a few nerves transverse though almost parallel to the secondary nerves as well, prominent on either side. Petioles 10—32 mm long, flat above and crested, angular below, glabrous. *Flowers* solitary or in 2—5-flowered, axillary clusters, almost sessile, pedicels angular, 0.5—3 (—12) mm long, in fruit thickened, ferruginously tomentose. *Sepals* ovate, 1.5—3 by 1—2 mm, apex obtuse, ferruginously tomentose on outside, glabrous on inside, the inner ones with membranous and fimbriate margin, in fruit slightly reflexed. *Corolla* 2.5—3.5 mm long, reflexed in anthesis, sparsely ferruginously sericeous on outside in the basal parts of the lobes, but soon becoming glabrous, and ferruginously woolly in the throat, lobes oblong-ovate, 2—2.5 by 1—1.5 mm, apex obtuse, margin membranous. *Stamens* 12, 1.5—2.5 mm long, the oppositipetalous ones longer than the alternipetalous, filaments subulate, 0.5—0.7 mm long, ferruginously woolly, but sometimes soon glabrous, anthers ovoid, flattened, 0.7—1 mm long, apex mucronate, glabrous. *Ovary* disciform, c. 0.5 by 1.5 mm, 6-celled, 12-lobed, ferruginously hirsute, style conoid, 1.5—3.5 mm long, glabrous. *Fruits* ovoid-ellipsoid or ellipsoid, (1.5—)2—3.5 by (0.8—)1.2—1.6 cm, 1-seeded, apex rounded, often with a short remnant of the style, pericarp fleshy, glabrous, seeds obovoid, 1—2.3 by 0.6—0.9 cm, apex obtuse, base obtusely acuminate, testa thin, brown, glossy, scar covering about half of the seed, greyish, dull, albumen none, radicle small, exsert.

Type specimen: *Teysmann s.n.* in BO.

Vernacular names: Siam: pikul pah; Johore: nyatoh semaram; Malacca: nyatoh bunga tanjing; Perak: nyatoh bunga, n. sidang; Selangor: malang, nyatoh; Singapore: nyatoh bukit; Billiton: njatuh merah, n. pisang, n. terung; Banka: njatoah darat, n. pisang, n. terun; Sumatra: balam bakal, b. dulang, n. katijau, b. perak, b. pulan, b. putat, b. putjung, b. sudu, b. temigih, b. terung, meranti busuk, njatoh bungo tandjong, n. terung, pulau pipit, wajang raja; Java: ki bangkong, nagasari; Borneo: njatoh baian, n. baitis, n. bawin gunung, n. geronong, n. kalalang, n. klëwër; Amboina: siekie.

Use: The fruits are edible and from the seeds an edible fat is extracted in Bangka and Billiton. In some parts of Borneo (Sandakan) the wood is used for building purposes.

Ecology: This tree usually grows in swampy primary forests at low altitudes.

Distribution: Siam, Malaya, Sumatra, Lingga, Riouw, Banka, Billiton, Siberut, Borneo, Java, Celebes, Amboina.

SIAM. Kopah Ban Kiap: *Haniff & Nur 2726* (SING), tree c. 20 m, fl. Dec.  
MALAYA. Kedah, Perangin For. Res.: *Awang 47832* (KEP), tree, Aug. — Penang, Government Hill, alt. 600 m: *Curtis s.n.* (SING), fl. Oct. — Trengganu, Dungun distr., Br. Bank For. Res., alt. 50 m: *Ahmad bin Ibrahim 53357* (KEP), tree 60 m, Sept. — Perak, Kroh For. Res.: *Synington 31048* (KEP), tree 16 m, June; Pulau Tanjung For. Res.: *KEP 63468 & 65562* (KEP), tree 18 m, Aug. — Pahang,

Kuantan, Bukit Goh Res.: *Sohor 8144* (SING), fl., imm. fr., Nov.; Balok For. Res.: *Arip 17201* (KEP), tree 20 m, fr. Jan.; ibidem: *Debah 17218* (KEP), tree 16 m, juv. fr., July; ibidem: *KEP 17209* (KEP), tree 16 m, juv. fr., July; ibidem: *Arip 6847, 6848 & 6849* (KEP), tree 20 m, fr. Jan.; Sungei Parang: *Symington 56272* (KEP), large buttressed tree, April; ibidem: *KEP 27195* (KEP), tree 20 m, Aug.; Mangtigi For. Res., Cameron Highland: *KEP 34118* (KEP), tree 22 m, Sept.; ibidem: *KEP 34131* (KEP), tree 35 m, Sept. — Selangor, state land near Telok Res., Klang: *Walton 27068* (KEP), tree, Oct.; Port Dickson, Sg Mengala For. Res.: *Wyatt-Smith 66589* (KEP), seedling, Oct. — Negri Sembilan, Senaling Inas: *Symington 43542* (KEP), tree, fl. March; Pasir Pandjang For. Res.: *Foston 18376* (KEP), tree 45 m, Nov. — Malacca, Merlimau For. Res.: *Ahmad 25342* (KEP), tree 35 m, fl. Dec.; ibidem: *Merlimau 50151 & 50152* (KEP), tree 52 m, fl. Febr.; Kepong: *Abdula Hamid 37579* (KEP), tree 5 m, Oct.; Jasin distr., Sedanan For. Res.: *Johan 62907* (KEP), tree 32 m, fl. March; Alor Gajah: *KEP 43864* (KEP), tree, fr. Aug. — Johore, Malan Res.: *KEP 69966* (KEP), tree 30 m, Jan.; Mersing, Mt Arong For. Res.: *KEP 70234* (KEP), tree 45 m, Aug. — Singapore, Bukit Timah: *Alvius 11307* (SING); ibidem: *Ngadiman 34538* (A, BO, SING), fr. Nov.; ibidem: *native collector 6134* (SING), fl.; Mandai Rd, in swampy forest: *Corner 37117* (BO, KEP, SING), tree, fl. fr. July; Kranji: *native collector 5689* (SING), tree; Botanic Gardens, near Store: *Nur s.n.* (A, BO, SING), tree 18 m, fr. Aug.; ibidem: *Ridley 6507* (SING), fr.; ibidem: *Ridley 1660* (SING), tree 26 m, fr. June, lvs with scent of mice; rockery in garden: *Ridley 6019* (SING), fl. Oct.; ibidem: *Furtado s.n.* (SING), tree 20 m, fl. Sept.

ROUW. Kwantan distr., Muara Pantei, alt. 100 m: *NIFS bb 23351* (A, BO, L, SING), Febr.; Kuala Sungei, Sembilang, alt. 15 m: *NIFS bb 31656* (BO, L, SING), Dec.

SUMATRA. Palembang, Lematang Ilir, Semangoes, alt. 100 m: *NIFS bb 32227* (BO, L), July; Musi Ilir, Mangsang: *NIFS bb 18656* (BO), tree 26 m, Aug.; without loc.: *Burck s.n.* (BO, L) *type specimen of Palaquium membrunaceum* Burck; ibidem, Diepenhorst s.n. (BO, L), *type specimen of P. parviflorum* Burck; Djambi, Muara Pidjuan: *NIFS bb 13172* (BO), tree 27 m, Dec.

LINGGA. f. Lam, l. c. 1925; without loc.: *Teysmann s.n.* (BO, L), *type of Palaquium linggense* Burck.

BANKA. Lobok Besar, sandy soil, alt. 200 m: *Anta 1104* (A, BO, K, L, SING), tree 25 m, fl. brown, Oct., buds brown-green; ibidem, alt. 10 m: *Anta 390* (BO, L, SING), tree 40 m, fl. dirty yellow, Sept.; ibidem: *Koetermans 219* (BO, L, SING), tree 15 m, fl. brown, Oct.; Mt Mangkol, alt. c. 50 m, primary forest on granite: *Anta 638* (BO, L, SING), tree 30 m, fl. brown, Sept.; ibidem, alt. 5 m: *NIFS bb 33935* (BO, L, SING), tree 28 m, fl. white, very sweet scented, Sept.; ibidem, alt. 100 m: *Koetermans 103 A* (BO, L), tree 32 m, fl. buds, Sept.; without loc.: *Teysmann s.n.* (BO, L), *type specimen of Palaquium verstegei* Burck; ibidem: *Teysmann s.n.* (BO, L), *type specimen of Palaquium parvifolium* Burck; ibidem: *Teysmann s.n.* (BO, L), *type specimen of Palaquium bancanum* Burck; near Djebus: *Teysmann s.n.* (BO, L), *type specimen of Isonandra rostrata* Miquel.

BILITON. Sloping country, forest on sandy soil, alt. 25 m: *NIFS bb 33713* (BO, L), tree; Tandjung Pandang: *NIFS bb 14730* (BO), tree 40 m, Oct.; ibidem: *NIFS bb 14734* (BO), tree 27 m, Oct.

SIBERUT. Kotorai: *NIFS bb 17446* (BO), tree 17 m, Sept.

BORNEO. Sarawak, Mattang: *Beccari 3013* (FI), tree, Dec.; ibidem: *Egon 533* (SAR), tree, fr., Febr.; Loba Katang South P. F., swamp forest: *Anderson 50536* (FHO), tree; ibidem, in mixed swamp forest: *Anderson 50527* (FHO), tree, Febr.; Kuching: *Browne 1150* (SAR), fr. Oct.; ibidem: *Tinggi 1182* (SAR), Febr.; ibidem: *Haviland 3034* (BM, K, SING), fl. May; ibidem: *Haviland 3036* (BM, K), fl. May; Brunai, Labuan: *Symington 35433* (KEP), tree, fr. July; ibidem: *Cuadra A 3068* (SING), tree, March; Sandakan, Pababak Island, Forest Reserve near Serporna: *Cuadra A 2457* (SING), tree 16 m, Oct.; Kuala Penyua, Mempakul, alt. 3 m: *Tandon 4205* (K, L), tree 13 m, fl. white, Nov.; Marotai, alt. 3 m: *Maidin 3658* (K, L), tree 30 m, fl. olive green, Sept.; Jesselton Interior distr., Kiamnis: *Cuadra A 1375* (KEP, SING), tree 16 m, April; Lumanggas Island, Lahud Datu: *Harvey A 114* (SING), tree, fr. May; Sepilok For. Res.: *Wood SAN A 3867* (A, BRI, K, KEP, L, SING), Febr.; Beaufort Hill, alt. 100 m: *Wood & Sisiron SAN A 16335* (A, K, L, SING),

tree 17 m, fr. Aug.; Sipitang, Ulu Mendalong, alt. 80 m: *SAN 16786* (A, K, L, SAN), tree 50 m, fr. Sept. — Indonesian Borneo, Sg Bambangan, SE of Samarinda: *Kostermans 6098* (BO, L), tree 35 m, fl. & fr. Aug.; *ibidem*: *Kostermans 6107* (BO, L), tree 20 m, fr. green, Aug.; Nunukan Island, near seacoast: *Kostermans 9236* (BO, L), tree 30 m, Jan.; Loa Djanan, W of Samarinda, low sandy loamsoil, alt. 30 m: *Kostermans 6427, 6429* (BO, L), tree 40 m, imm. fr. green; *ibidem*, alt. 30 m: *Kostermans 6436* (BO, L), tree 35 m, buttresses 1 m high, fl. dirty yellowish, April; E. Kutai, Sei Bai: *NIFS bb 14880* (BO), tree, fr. Dec.; *ibidem*, Pengnaan: *NIFS bb 14849* (BO), tree 30 m, Dec.; *ibidem*, Tapian Leban: *NIFS bb 14645* (BO), tree 32 m; W. Kutai, Kembang: *NIFS bb 15619* (BO, L, SING), tree, juv. fr., Sept.; *ibidem*: *NIFS bb 15640* (BO, L), tree, fr. Sept.; Puruk Tjahu Tahundjan, alt. 75 m: *NIFS bb 21188* (A, BO, L, SING), tree, July; Tandjong Bangko region near mouth of Mahakam river, alt. 20 m, sandy soil on low ridge: *Kostermans 7021* (BO, L), tree 25 m, fr. green, May; *ibidem*: *Kostermans 7151* (BO, L), tree 20 m, fr. June; Tidung Lands, Sibenggaris: *NIFS bb 20020* (A, BO, L, SING), tree, fr. July; *ibidem*, Bahnon, alt. 7 m: *NIFS bb 17785* (BO, L), tree, July; Tandjung Merah: *NIFS bb 18359* (BO), tree 28 m, Nov.

JAVA. Western Java, Bogor, Dungus Iwul, Tjigelung: *NIFS Ja 4536* (BO), tree 35 m, April. See also Lam, l. c. 1925.

CELEBES. Manado, Anurang Lobak Kolai, alt. 270 m: *NIFS bb 17130* (BO, L), Sept.; Boné, alt. 25 m: *NIFS bb 21710* (BO, L), Dec.

AMBOINA. Waai, primary forest, alt. c. 30 m: *Buwalda 6158* (BO), fl. buds yellow, Sept.

91. *P. canaliculatum* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 18; Lam, l. c. 1927, 107, 258; Lam, l. c. 1927, 414 — *Isonandra canaliculata* Thwaites, Enum., 1864, 177 — *Dichopsis canaliculata* (Thwaites) Clarke in Hooker f., Fl. Br. India 3, 1882, 541; Bentham & Hooker f., Gen. Pl. 2, 2, 1876, 658 — *Bassia canaliculata* (Thwaites) Beddome, For. Man., 1870, 141.

Medium-sized trees. Branchlets terete or angular, 2—4 mm in diam., ferruginously puberulous, glabrescent; terminal cone up to 5 mm long, puberulous; stipules lanceolate, c. 1.5 by 1 mm, acute, puberulous on outside, glabrous on inside, caducous. Leaves scattered, elliptic-oblong, or elliptic, 9—13 by 2.5—5.5 cm, apex rounded and shortly obtusely acuminate, acumen up to 3 mm long, cuneate at base or rounded, decurrent along adaxial side of petiole; entirely glabrous but sometimes midrib slightly pubescent below, subcoriaceous; midrib narrowly grooved above, rounded and prominent below, secondary nerves 13—17 pairs, ascending at an angle of c. 70°, slightly curved or straight and curved at their tips only, irregularly archingly joined rather far from the margin, with a thin intramarginal nerve, prominulous above, prominent below, tertiary nerves reticulate, with one or a few irregular transverse nerves, inconspicuous above, prominent below. Petioles 1.5—2.4 cm, narrowly grooved above, rounded below, thickened and coarse in the basal part, glabrous. Flowers solitary, or in 2—6-flowered, axillary clusters, pedicel angular, 1.2—2.6 cm long, thickened near apex, cinnamomously puberulous. Sepals ovate, 6—8 by 4—6 mm, subacute at apex, cinnamomously puberulous on outside, glabrous on inside, inner sepals with glabrous, membranous and fimbriate margin. Corolla and stamens unknown. Ovary disciform, c. 1 by 2.5 mm, 6-lobed, ferruginously puberulous, at base surrounded by an annular ferruginously puberulous disk. Style filiform, 9—12 mm long, glabrous. Fruits obovoid, c. 1.8 by 1.6 by 1 cm, 1-seeded, pericarp thin, glabrous except for a few ferruginous hairs at base of fruit. Seeds same shape as fruit, laterally compressed,



13 by 7 by 3 mm, obtuse at apex, subobtuse at base, testa light brown, scar covering half of the seed, greyish, exalbuminous, radicle inconspicuous.

Lectotype specimen: *Thwaites 3473* in K.

Distribution: Ceylon.

CEYLON. Cultura: *Thwaites 3473* (CAL, G, K), fl. & fr.; without loc.: *Thwaites 3456* (K); ibidem: *Walker 115* (K), fl.

92. *P. bourdillonii* Brandis, Indian Trees, 1906, 424; Gamble, Fl. Madras 4, 1921, 765; Lam, l. c. 1925, 258 — Fig. 23.

Small trees. Branchlets terete, 2—3 mm in diam., ferruginously tomentose at apex only; terminal cone c. 2 mm long, ferruginously tomentose; stipules lanceolate, c. 1 by 0.5 mm, acute, tomentose on outside, glabrous on inside, soon caducous. *Leaves* conferted at apex of branchlets, subopposite or in indistinct whorls, obovate-elliptic or elliptic, 11—17.5 by 3.5—6 cm, apex obtusely acuminate to subcuspidate, acumen up to 15 mm long, base narrowly cuneate; glabrous above but finely scattered puberulous along the midrib, sparsely puberulous below, membranous; midrib flat and prominulous above, rounded and prominent below, secondary nerves 10—12 pairs, ascending at an angle of c. 50°, curved, archingly joined or connected by some thickened tertiary nerves, prominulous above but distinct, prominent below, tertiary nerves widely reticulate, distinct on either side but more prominent below than above. Petioles 5—15 mm long, flat above, angular below, thickened in the basal part, ferruginously tomentose. *Flowers* solitary or in 2-flowered, axillary clusters, pedicels terete, c. 10 mm long, ferruginously woolly, in fruit up to 22 mm long. *Sepals* ovate, 5—7 by 3—4 mm, apex subacute, ferruginously woolly-tomentose on outside, ferruginously on inside in the apical part only, glabrous in the basal part, inner sepals with membranous and fimbriate margin. *Corolla* 5.5—6 mm long, seen in bud only, glabrous on either side, lobes spathulate-oblong, 3.5—4 by c. 1.5 mm, obtuse or subtruncate at apex. *Stamens* 12, 2.5—3 mm long, filaments c. 1.5 mm long, densely pale yellowish hairy on inside, anthers compressedly ovoid, 2—2.5 mm long, apex bifid, dehiscing laterally, glabrous. *Ovary* ovoid, c. 1.5 by 1.5 mm, 6-celled, 6-lobed, brownish hirsute. Style filiform, c. 5 mm long, glabrous. *Fruits* ovoid, c. 3 by 1.3 cm, subacute at apex, glabrous, 1-seeded; complete seeds unknown.

Type specimen: *Bourdillon 609* in CAL.

Ecology: In evergreen forests up to 1300 m altitude.

Distribution: India.

INDIA. Madras, Strathmore Patenas, alt. c. 1300 m: *Bourdillon 609* & *610* (CAL, K), fl. buds, April; Travancore, Tinnavalley ghats: *Beddome 4868* (SING), fr.

Remark. The fruits have have been described after *Beddome 4868*.

93. *P. hinmolpedda* van Royen, nom. nov. — *Dichopsis grandis* (Thwaites) Clarke, var. *parvifolia* Clarke in Hooker f., Fl. Br. Ind. 3, 1882, 540 — *P. grande* (Thwaites) Engler, var. *parvifolium* (Clarke) King & Alston, Ann. Roy. Bot. Garden, Peradeniya 11, 3, 1930, 294, pl. 40 f. 2, 3.

Trees. Branchlets terete, 2—3.5 mm in diam., pale ferruginously tomentose, glabrescent; terminal cone narrowly conoid, up to 4 by 2 mm, tomentose; stipules lanceolate, up to 2 by 1 mm, acute, tomentose on out-

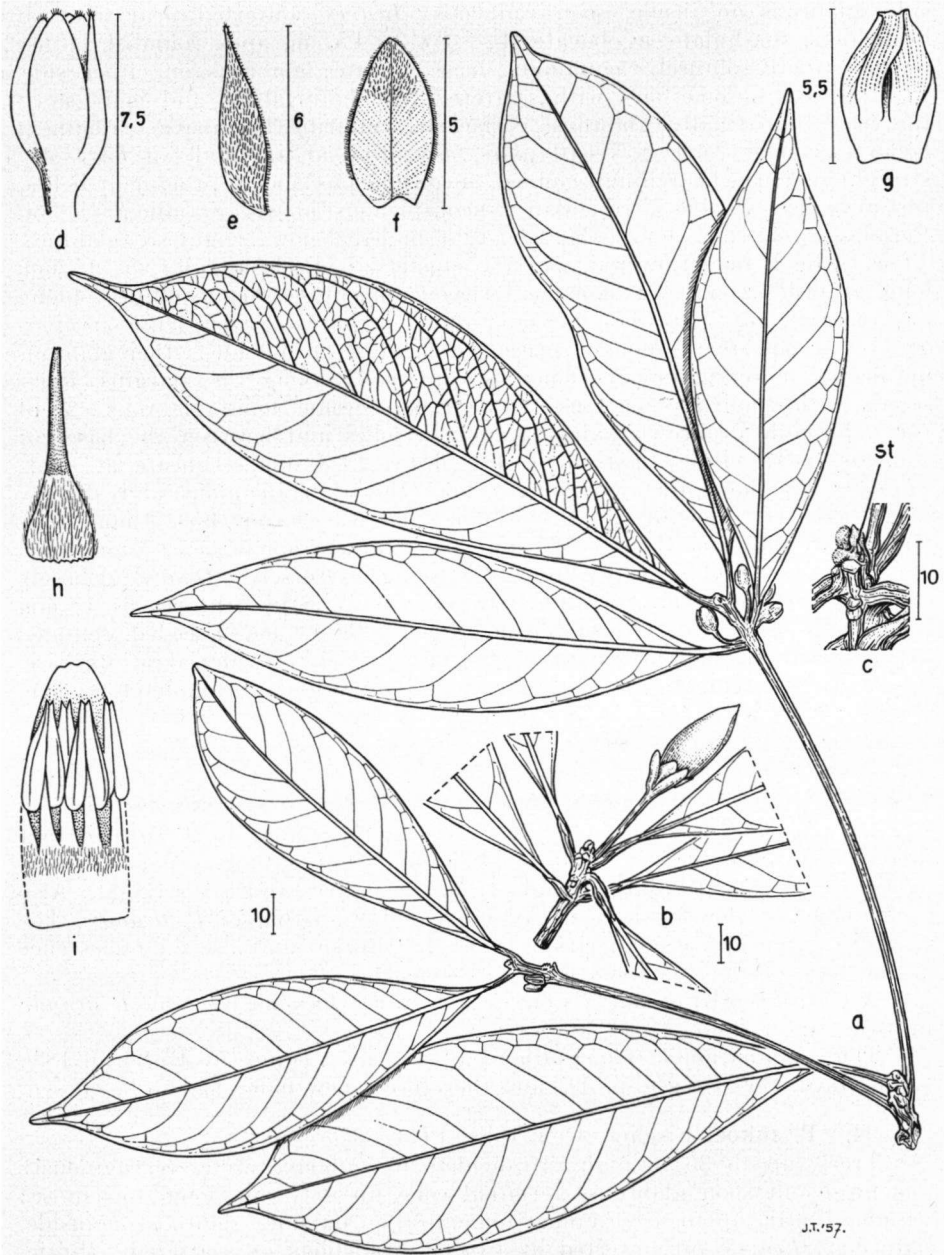


Fig. 23. *P. bourdillonii*, a. branchlet with leaves and flowerbuds; b. fruit; c. apex of branchlets showing stipules (st); d. flowerbud; e. inner sepal, from aside; f. inner sepal, inside; g. corolla, in bud; h. gynaecium; i. part of corolla and androecium (*Bourdillon 609*).

side, glabrous on inside, soon caducous. *Leaves* conferted near apex of branchlets, spathulate or obovate, 4—8 by 3—4.5 cm, apex rounded, obtuse or indistinctly obtusely acuminate, base cuneate; glabrous on either side, juvenile leaves sometimes with scattered pale hairs above and more so at the base, but finally glabrous, coriaceous; midrib flat above, prominent below, secondary nerves 7—10 pairs, ascending at an angle of 65°—80°, straight or curved, archingly joined, inconspicuous above, prominent below, tertiary nerves widely reticulate, inconspicuous above, prominent below. Petioles 8—11 mm long, flat above, rounded below, rugulose, glabrous. *Flowers* in 2- or 3-flowered, axillary clusters, pedicels angular, 8—15 mm long, greyish or pale cinnamomous sericeous-tomentose. *Sepals* elliptic-oblong or lanceolate, 5—7 by 3.5—4.5 mm, rounded, obtuse or subacute at apex, greyish or pale ferruginously sericeous-tomentose on outside, either glabrous on inside or ferruginously tomentose or woolly along the margins, inner sepals with fimbriate margins. *Corolla* 6.5—8 mm long, glabrous except for a plumule of brown hairs at apex of lobes and between the bases of stamens, lobes elliptic-spathulate, 4.5—6 by 2—3 mm, truncate at apex. *Stamens* 12, the epipetalous longer than the alternipetalous and slightly lower inserted, the former 4—4.5 mm long, the latter 4.5—5 mm long, filaments either 2.5—3 or 3—3.5 mm long, anthers oblong, c. 2.5 mm long, apex acute or subbifid, glabrous, dehiscent extrorsely. *Ovary* globose disciform, c. 2 by 3 mm, ferruginously puberulous. Style filiform, 6—15 mm long, glabrous. *Fruits* ellipsoid-ovoid, up to 3 by 1.8 cm, 1-seeded, rounded at apex, with a short remnant of the style which is widened at its base, base of fruit attenuate, glabrous, pericarp fleshy. Seeds incompletely known.

Type specimen: *Thwaites 2402* in K.

Vernacular name: hin-molpedda.

Distribution: Ceylon.

CEYLON. without known loc.: *Thwaites 3402* (K, L), fl. & incomplete fruits.

Remarks. This species is very closely related to *P. grande* but differs in the smaller leaves, the smaller number of secondary nerves which, moreover, ascend at a larger angle from the midrib and are straight. Also the number of flowers in each axil is smaller than that of *P. grande*. The sizes of the flower are smaller than those of *P. grande* and also the pubescence at the base of the filaments is more extensive.

According to King and Alston, l. c., the wood does not resemble *P. grande* in any respect.

The combination *P. parvifolium* has been used before by Burck in 1886 (Ann. Jard. Bot. Btzig 5, p. 39) and therefore a new name had to be chosen.

94. *P. sukoei* Fischer, Kew Bull. 1933, 365.

Trees, up to 35 m high. Branchlets irregularly terete, ferruginously tomentose but soon glabrous; terminal cone up to 7 mm long, tomentose; stipules linear, up to 8 by 1 mm, tomentose on outside, glabrous on inside, caducous. *Leaves* subconferted at tips of branchlets or scattered, elliptic, elliptic-obovate or obovate, 7—14 by 3.5—7 cm, rounded or obtuse, sometimes slightly obtusely acuminate at apex, narrowly to broadly cuneate at base, sometimes rounded, shortly decurrent along sides of petioles; glabrous on either side, sometimes ferruginously sericeous above at base of midrib,

subcoriaceous; midrib flat above, sometimes slightly grooved, prominent and rounded or angular below, secondary nerves 7—11 pairs, ascending at an angle of 55°—75°, at base up to 90°, curved, sometimes straight and curved, distinctly archingly joined rather far from the margin, prominulous but distinct above, prominent below, tertiary nerves few, coarse, widely reticulate, reticulation outside the arches of the nerves also distinct. Petioles 10—17 mm long, flat above, rounded below, whitish almost over its whole length, glabrous. *Flowers* solitary, or 2 or 3 together in the axils of the higher leaves or their scars, pedicels angular, 12—22 mm long, pale orange-brown tomentose. *Sepals* ovate-lanceolate, 6.5—7.5 by 3—4 mm, subobtusate at apex, densely pale orange-brown tomentose on outside, sparsely sericeous on inside except for the basal part, inner sepals broader, more rounded at apex, margins membranous and glabrous, descendingly woolly fimbriate along edges. *Corolla* 9.5—12 mm, glabrous on either side, lobes ovate-lanceolate, 6.5—8 by 2.5—3 mm, rounded and scarious at apex. *Stamens* 12, 4.5—6 mm long, filaments 3—4 mm long, ferruginously woolly in the basal half, anthers ovoid-oblong, 2.5—3 mm long, connective prolonged and bifid at apex, glabrous, dehiscing extrorsely. *Ovary* conoid, c. 1 by 2 mm, 6-celled, densely ferruginously hirsute. Style filiform, 10—13 mm long, 12-ribbed, glabrous. *Fruits* ellipsoid-ovoid or ellipsoid, 1.6—4.5 by 0.9—2.2 cm, 1-seeded, obtuse and with a short remnant of the style, which is star-shaped widened at base, pericarp thin-woody, densely covered with a whitish layer of lepidote-like flakes which are not easy to remove. Seeds fusiform, laterally compressed up to 2.5 by 1 by 0.7 cm, acute at either end, testa rather thick, yellow, scar elliptic, as long as seed, up to 3 mm wide, greyish, dull, embryo exalbuminous.

Type specimen: *Sukoe 11091* in K.

Vernacular names: mayang, nyatoh daun jangus (Malaya), pinelebyin (Burma).

Ecology: In forests at low altitudes.

Distribution: Burma and Malaya.

BURMA. Tenasserim, Tharapou, alt. 260 m: *Sukoe 11091* (K), fl. May; ibidem: *Sukoe 10896* (K), fr. Febr.

MALAYA. Perak, Bubu For. Res.: *Symington 28591* (KEP), fl. March; ibidem: *Symington 30409* (KEP, SING), fl. April; Parit For. Res.: *Symington 39560* (KEP), fr. April; ibidem: *Bakar 65853* (KEP), tree 30 m, fr. Sept.; ibidem: *Lazim 34304* (SING), tree 35 m, April; ibidem: *Symington 39475* (KEP), tree, fl. April; Chikus For. Res.: *KEP 65056* (KEP), tree 33 m, Nov.; Larut, Padang Gajah: *Hodgson 5693* (KEP), tree, Nov.; Dindings, Lumut For. Res., alt. 280 m: *KEP 76724* (KEP), tree 30 m, July; Johore, Sungei Kayu area, Mawai-Jemaluan Rd, in dry Dryobalanops forest: *Corner 29379* (BO, SING), fr. May; ibidem: *Kiah SF 31995* (SING), tree 10 m, fr. Oct.; ibidem: *Corner 32990* (SING), tree 30 m, fl. June; ibidem: *Corner 29320* (SING), fl. May.

95. *P. thwaitesii* Trimen, Handb. Fl. Ceylon 3, 1895, 84; Lam, l. c. 1925, 258; Lam, l. c. 1927, 414; King & Alston, Ann. Roy. Bot. Garden, Peradeniya 11, 3, 1930, 295 — *Isonandra lanceolata* Thwaites, Enum., 1864, 442 — *Palaquium engleri* H. J. Lam, l. c. 1925, 107 — *Dichopsis lanceolata* (Thwaites) Clarke in Hooker f., Fl. Br. India 3, 1882, 541 — *Dichopsis lanceolata* Trimen, Syst. Cat., 1885, 51 — *Palaquium lanceolatum* (Thwaites) Engler, Bot. Jahrb. 12, 1890, 511 — *Bassia lanceolata* (Thwaites) Beddome, For. Man., 1870, 141.

Medium-sized trees. Branchlets terete, grooved, slender, 1.5—2.5 mm in diam., reddish ferruginously puberulous but soon glabrous; terminal cone up to 2 mm long, puberulous; stipules ovate-lanceolate, up to 2 by 1 mm, acute at apex, reddish ferruginously puberulous on outside, glabrous on inside, soon caducous. *Leaves* scattered, narrowly elliptic, lanceolate, or ovate-elliptic, 8.5—13 by 2.3—3.1 cm, apex obtusely acuminate, acumen up to 1 cm long, base cuneate, decurrent along adaxial side of petiole; subcoriaceous, juvenile leaves scattered ferruginously tomentose above and densely puberulous below, mature ones glabrous above and scattered puberulous or glabrous below; midrib grooved above, prominent and rounded below, secondary nerves 9—11 pairs, ascending at an angle of 50°—55°, straight, curved at the tips and archingly joined, inconspicuous above, slightly more distinct below, tertiary nerves widely reticulate, few, hardly visible on either side. Petioles 1—2.2 cm long, narrowly grooved above, finely whitish puberulous or glabrous, thickened and rugose at base. *Flowers* axillary, solitary or in clusters of 2, pedicels subangular, c. 1 cm long, ferruginously sericeous. *Sepals* lanceolate-ovate, 6.5—7.5 by 3.5—4 mm, subobtusate at apex, ferruginously puberulous on outside, glabrous on inside, inner sepals with membranous, glabrous and fimbriate margin. *Corolla* and *stamens* unknown. *Ovary* subglobose, c. 2 by 3 mm, 6-celled, ferruginously puberulous. Style filiform, up to 1.5 cm long, glabrous. *Fruits* unknown.

Lectotype specimen: *Thwaites 3679* in K.

Distribution: Ceylon.

CEYLON. Caltura: *Thwaites 3679* (CAL, K), tree, fl. without corolla and stamens.

Remark. On account of the already existing combination *Palaquium lanceolatum* Blanco, Trimen has been forced to give a new specific epithet when inserting *Isonandra lanceolata* Thwaites in Palaquium.

96. *P. xanthochymum* (de Vriese) Pierre in Burek, Ann. Jard. bot. Btzg 5, 1886, 30; King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr 17, 1905, 194; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 11; Ridley, Fl. Mal. Pen. 2, 1923, 275; Lam, l. c. 1925, 73, f. 19; Heyne, Nutt. Pl. Ned.-Indië, ed. 2, 2, 1927, 1242; Lam, l. c. 1927, 405; Heyne, l. c., ed. 3, 1, 1950, 1242; Wyatt-Smith, Research Pamphlet, 1954, 45, 1 fig. — *Isonandra xanthochyma* de Vriese, Nat. Tijdschr. Ned.-Indië 21, 1860, 311 — ? *Dichopsis rubens* Clarke in Hook. f., Fl. Br. Ind. 3, 1882, 543 — *Palaquium rubens* (Clarke) Engler, Bot. Jahrb. 12, 1890, 511 — *Palaquium lanceolatum* Burek, l. c. 1886, 43.

Trees, up to 40 m high. Branchlets irregularly angular by the numerous leaf-scars, 3—10 mm in diam., greyish or ferruginously puberulous near apex only; terminal cone up to 5 mm long, greyish or ferruginously puberulous; stipules ovate, up to 3 by 1.5 mm, acute at apex, greyish or ferruginously puberulous on outside, glabrous on inside, usually soon caducous (in var. *puberulum* long persistent). *Leaves* scattered but sometimes subconferted near apex of branchlets, obovate, elliptic, lanceolate or spatulate, 6—20 by 2.2—6 cm, retuse, rounded, obtuse or obtusely acuminate at apex, acumen up to 5 mm long, base narrowly cuneate to subrotundate, decurrent along adaxial side of petiole; usually coppery reddish when dry, either glabrous on either side or puberulous below, sometimes along midrib

only, chartaceous or coriaceous; midrib grooved above and minutely crested, rounded or angular below, secondary nerves 12—16(—20) pairs, ascending at an angle of 55°—65°, usually slightly curved and stronger so near their tips, sometimes straight and curved at tips only, irregularly archingly joined, prominulous above and sometimes grooved, prominent below, tertiary nerves few, transverse but sometimes very irregular and giving the impression of a reticulate nervation, usually prominulous above, sometimes inconspicuous, prominulous below but sometimes inconspicuous also. Petioles 7—11(—32) mm long, grooved above, either rounded or angular below, glabrous or ferruginously or greyish puberulous. *Flowers* in (2—)3—7-flowered, axillary clusters, pedicels terete or angular, (1.5—)3—12 mm long, in fruit up to 22 mm, greyish or ferruginously puberulous. *Sepals* ovate-triangular, 2.5—3 by 1.5—2.2 mm, apex obtuse, ferruginously puberulous on outside, glabrous on inside, fimbriate, inner sepals with membranous margins. *Corolla* 6.5—11 mm, entirely glabrous, lobes lanceolate, 4.5—7 by 1.5—2.5 mm, apex obtuse. *Stamens* 12, some or all cohering at their base, 3—4 mm long, filaments subulate, 1.5—2.5 mm long, glabrous; anthers oblong, 2—3 mm long, apex acute or bifid, glabrous, dehiscing extrorsely. *Ovary* ovoid, c. 1 by 1 mm large, 6-celled, glabrous, subabruptly passing into the filiform, 9—14 mm long, glabrous style. *Fruits* obliquely fusiform, 3—5 by 1—1.7 cm, 1- or 2-seeded, acuminate at either end, at apex often with a short remnant of the style, pericarp thin, fleshy, glabrous. Seeds fusiform, 2—4 by 0.6—0.8 cm, obtuse at apex, subacute at base, testa very thin, blackish brown, scar covering about half of the seed, greyish, dull, albumen none, radicle acute, almost not exerted.

Type specimen: *Motley VI 1366* in BO.

Use: The timber is used for boards and boats, in Sandakan it is used for making furniture shelves.

Ecology: *P. xanthochymum* is a species of swampy forests, but also of dry ground in lowland forest and on low hills, one variety is found growing at higher altitudes.

Distribution: Malaya, Sumatra, Riouw, Lingga, Banka, Java, Borneo.

Var. *xanthochymum* — *P. xanthochymum* (de Vriese) Pierre in Burck, var. *glabrum* H. J. Lam, l. c. 1925, 73, f. 19, c, e—h; Lam, l. c. 1927, 406. Stipules soon caducous. Pedicels 3—9 mm long. *Leaves* membranous to subcoriaceous, flaccid.

Type specimen: *Motley VI 1366* in BO.

Vernacular names: Perak: nyatoh babi, n. jangkang, n. kabu, n. paya; Johore: ketiau; Lingga: njato; Banka: njato rengang, n. riengoeng; Borneo: natu ringkau, njantu, njato bawoei, n. djangkar.

Distribution: Malaya, Sumatra, Riouw, Lingga, Bangka, Java, Borneo, Philippines.

MALAYA, Selangor, Kuang Res.: *Walton 21050* (SING), Sept. — Johore, Sungai Sedili, by riverside: *Corner 29265* (A, BO, SING), fl. April; ibidem: *Corner 25990* (BO, NY, SING), tree 30 m, fl. Aug.; ibidem: *Corner 25391* (NY, SING), tree, fl. buds July; Mawai: *Ngadiman SF 34758* (SING), tree 15 m, fr. Jan.; ibidem: *Ngadiman 36796* (BO, SING), tree 26 m, imm. fr. July; Sungei Langar: *Yeob 5338* (SING), fr. Dec.; Sungei Tementang, Mawai: *Ngadiman 34718* (BO), tree, fr. Jan. — Singapore, Bukit Mandai: *Ridley 3637a* (BM, SING), fl.; ibidem: *Kiah 37122*

(BO, SING), tree 25 m, fr. July; Changi: *Ridley 3639a* (SING), fl.; ibidem: *Cantley 63* (SING), tree, fl. white; without loc.: *Maingay 995* (BO, K, L), type specimen of *Dichopsis rubens* Clarke.

LINGGA. f. Lam, l. c. 1925.

RIOUW. Indragiri Highlands, alt. 6 m: *NIFS bb 28507* (A, BO, L), July.

SUMATRA, f. Lam, l. c. 1925, also: Djambi, Simpang: *NIFS bb 12881* (BO), tree 25 m, Nov.

BORNEO. Indonesian Borneo, Bandjermasin: *Motley VI 1366* (BM, BO, L), fl. fr.; Muara Teweh, alt. 25 m: *NIFS bb 28084 & 28085* (BO, L, SING), fl. May; Sungai Terentang: *NIFS bb 12611* (BO), tree 30 m, June.

JAVA. Djasinga, Dungus Iwul, alt. 175 m: *van Steenis 11215* (BO, L, SING), tree, fr. Dec.; ibidem: *van Steenis 11216* (BO, L, SING), tree, Dec.

LUZON. prov. Camarines Sur, Mt Potianay, alt. 1300 m: *Edaño 75985* (NY), tree 4 m, fl. buds Nov.

Var. *puberulum* H. J. Lam, l. c. 1925, 74, f. 19a, b, d; Lam, l. c. 1927, 406.

Stipules long persistent. Pedicels 1.5—3 mm long. Leaves chartaceous or subcoriaceous, flaccid.

Type specimen: *Beguín 577* in BO.

Vernacular name: suwakat.

Distribution: Sumatra.

SUMATRA. Bengkalis, Panglang, Sungai Missigit, alt. c. 6 m: *Beguín 577* (BO, L), tree 31 m, fl. Jan.

Remark. It must be pointed out that some of the leaves are glabrous below as well as some being pubescent, so watering down the limits of this variety against var. *xanthochymum*.

Var. *montanum* H. J. Lam, l. c. 1927, 406.

Stipules soon caducous. Pedicels 3—12 mm long. Leaves stiff, coriaceous.

Lectotype specimen: *NIFS bb 2755* in L.

Vernacular names: majang bunga, majang kapu, majang tajung.

Distribution: Sumatra.

SUMATRA. East Coast, Sibutan reserve, alt. c. 1400 m: *NIFS bb 2755* (BO, L), tree 30 m, Jan.; Karo countries, near Lautkawat, alt. c. 1600 m: *NIFS bb 8640* (BO), tree 26 m, fl. July; ibidem, near Lau Buluh: *NIFS bb 11983* (BO), tree 46 m, Sept. — Tapanuli, Angkola & Sipirok, near Situmba, alt. c. 1300 m: *NIFS bb 6153* (BO), tree 27 m.

Remarks. This variety is provisionally kept in *P. xanthochymum* though the stiffness of the leaves and the quite different habitat and altitude on which this variety is growing, rather point to a separate species. However, the material is so scanty that a decision about its real status has to be postponed. It must be pointed out that the leaves are puberulous below and the tertiary nerves are distinct below, contrary to Lam's description.

97. *P. microphyllum* King & Gamble, J. As. Soc. Beng. 74, 2, Extra Nr 17, 1905, 196; *Ridley*, Fl. Mal. Pen. 2, 1923, 276; Lam, l. c. 1925, 36, f. 5; Lam, l. c. 1927, 395; Heyne, Nutt. Pl. Indonesia, ed. 3, 1, 1238; Wyatt-Smith, Research Pamphlet 4, 1954, 37—38.

Trees, up to 35 m. Branchlets terete, 2.5—5 mm in diam., reddish ferruginously tomentose or woolly, glabrescent; terminal cone 2—8 mm long, reddish ferruginously woolly; stipules absent. Leaves scattered or subconferted at apex of branchlets, spatulate, 2.5—8.5 by 1.5—4 cm, short

obtusely acuminate, rarely rounded, acumen up to 3 mm long, tapering towards the narrowly cuneate base; glabrous above except sometimes whitish or ferruginously tomentose in the basal part, scattered whitish or ferruginously tomentose below but sometimes on the midrib and/or of basal part of leaf only, sometimes mature leaves completely glabrous, thinly coriaceous; midrib provided with one or two crests above, prominent and angular below, secondary nerves (8—)10—14(—20) pairs, ascending at an angle of 70°—80°, slender, sometimes hardly separable from the tertiary nerves, straight but sometimes slightly curved, archingly joined near margin of leaf, conspicuous on either side but sometimes hardly visible above, tertiary nerves reticulate, parallel to secondary nerves, slender. Petioles (5—)7—12(—17) mm long, flat or shallowly grooved and usually crested above, reddish ferruginously or greyish woolly or tomentose. *Flowers* solitary or in 2—5-flowered, axillary clusters, pedicels 2—5 mm, ferruginously pubescent. *Sepals* broadly ovate, 2.5—3 by 2.5—3 mm, apex obtuse or indistinctly acuminate, ferruginously tomentose on outside, glabrous on inside, margins woolly fimbriate, inner sepals narrowly ovate, 2—2.5 by 1.5—2 mm, apex obtuse, for the rest similar to the outer sepals but margins smooth. *Corolla* 4—5 mm long, ferruginously tomentose on outside in the middle-line, at apex of the lobes and the whole tube, lobes elliptic, 3—3.5 by 2—2.5 mm, apex obtuse. *Stamens* 12, inserted at base of lobes, 3—3.5 mm long, filaments filiform, 2—2.5 mm long, anthers ovoid, 1.5—2 mm long, glabrous, apex mucronulate, dehiscing lateral-introrsely. *Ovary* conoid, c. 1.5 by 1.5 mm, 6-celled, indistinctly 6-lobed, ferruginously tomentose. *Style* filiform, up to 8 mm long, 6-ribbed, glabrous. *Fruits* obovoid to globose, 12—22 by 8—22 mm, apex rounded or subacute, often crowned by the remnants of the style, sometimes attenuate at base, 1-seeded, pericarp fleshy, thick, glabrous. Seeds ovoid-ellipsoid, up to 20 by 12 mm large, testa crustaceous, glossy, pale brown-yellow, scar covering half the surface of the seed, embryo exalbuminous, radicle small, punctiform.

Type specimen: *Ridley 10840* in SING.

Vernacular names: Johore: nyatoh chiku; Perak: nyatoh, n. balam; Malaya: djelutung batu, nyatoh pipit, taban simpur; Borneo: nyatoh merah.

Ecology: Uncommon species of lowland and swamp forest.

Distribution: Malaya, Sumatra, Lingga, Riouw, Banka, Borneo.

MALAYA. Singapore, Bukit Timah: *Ridley 10840* (SING), fl.; ibidem: *Liew 36481* (BO, KEP, SING), fl. June; Botanical Garden: *Nur s.n.* (NY, SING), fr. Sept.; Bukit Timah: *Corner 33587* (SING), tree, July; ibidem: *Liew 36454* (SING), fl. June; ibidem: *Corner 34516 & 34671* (BO, SING), tree, Febr./Nov.; ibidem: *Simclair 38245* (E, SING), fl. Sept. — PERAK, Kledang Siaong Res.: *Puteh 39194* (KEP), Nov.; Ulu Langat, Bukit Tunggul For. Res.: *Salleh bin Ka 63604* (KEP), Sept., tree 28 m — SELANGOR, Kanching: *Symington 29848* (KEP), Dec.; Serendah For. Res., Ulu Selangor: *KEP 66656* (KEP, L), fl. March, tree 30 m — Negri Sembilan, Senaling Inas For. Res.: *Ibrahim 42822* (KEP), tree 45 m, Nov. — JOHORE, J. East, Mt Arong For. Res.: *Sulaiman bin Manja 70230* (KEP), July, tree 37 m; ibidem: *FMS 35959 & 35960* (KEP), tree, Nov.; ibidem: *Sulaiman bin Manja 74153* (KEP), Dec.

RIUW. Karimoen, Moro, P. Soegi Bawah, alt. 140 m: *NIFS bb 20383 & 20384* (BO, L, NY, SING), fr. Dec.

LINGGA, f. Lam, l.c. 1927, 36; Bakong: *NIFS RI/I-39* (BO), tree, Febr.

BANGKA, f. Lam, l.c. 1927, 36.



SUMATRA, f. Lam, l. c. 1927, 36—37, also; S. W. C., Padang, Sungei Laras, Kotah Tengah, alt. 895 m: *NIFS* bb 20312 (BO, L), Febr.

BORNEO. Sarawak, Elopura For. Distr., Kabili-Sepilok For. Res., alt. 45 m: *Puasa & Enggoh 10676* (KEP, L), tree 30 m, fl. Oct. — Brunei, Seria, mixed peat swamp on edge of *Shorea albida* forest: *Smythies, Wood & Ashton 5886* (L), tree 35 m, fl. April — Indonesian Borneo, Western Div., Melawi, S. Kelawai deras: *NIFS* bb 22102 (BO, L, SING), May; ibidem, Smitan, B. Saguk: *NIFS* bb 32288 (BO, L), May; SE division, Tidung Lands, Tanah Merah: *NIFS* bb 12278 (BO), Dec.; ibidem, Bulungan, Salimbatu, alt. 150 m: *NIFS* bb 11189 (BO), tree 33 m, Aug.

98. *P. rufolanigerum* van Royen, n. sp. — Fig. 24.

Arbor magna. Ramuli irregulariter teretes, ferrugineo-lanati, glabrescentes; stipulae ignotae. Folia spatulata, 6.8—9.4 × 2.4—3.2 cm, apice rotundata, supra glabra, sed in costae basali parte cinereo-lanata, subtus glabra sed ad costam obscure rubro-brunneo-lanata. Nervi secundarii utroque latere 7—11, arcuato-connati, tertiarii reticulati. Petiolus 0.2—0.7 cm longus, lanatus. Pedicellus 0.8—1.2 cm longus, ferrugineo-lanatus. Sepala 6, extus ferrugineo-lanata, intus glabra. Corolla extus ad tubum et in parte centrali loborum ferrugineo-sericea, intus fauce ferrugineo-sericeo excepta glabra.

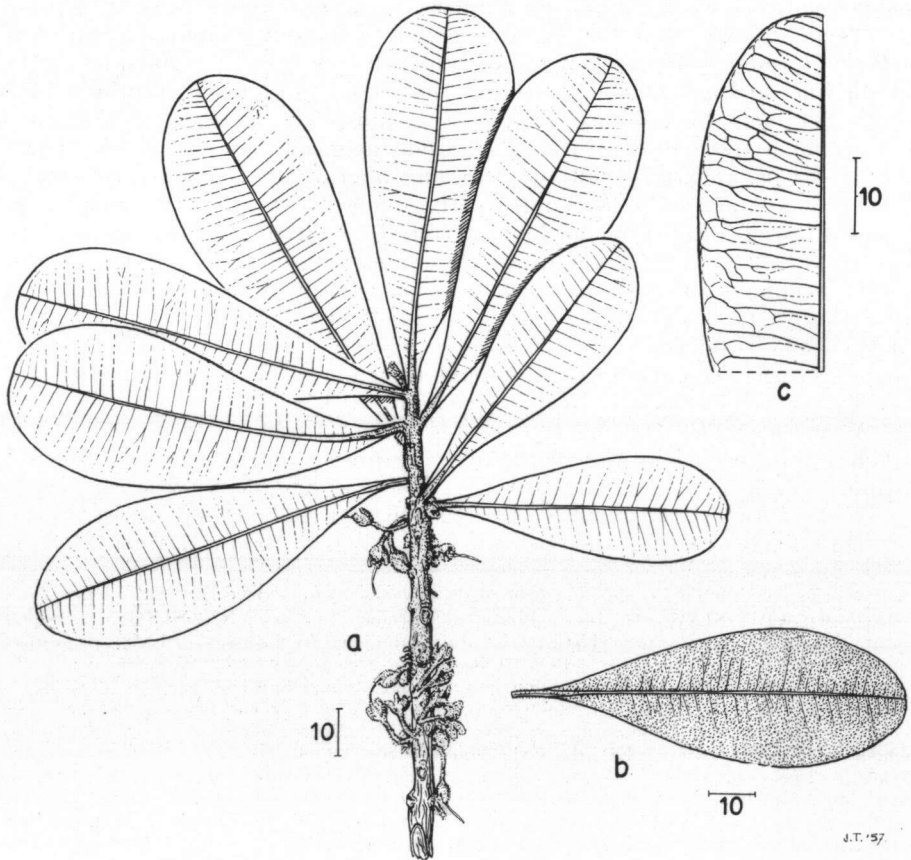


Fig. 24. *P. rufolanigerum*, a. branchlet with leaves and flowers; b. leaf; c. tertiary nervation of leaf (Rambli 1753).

Stamina 12, glabra. Ovarium 6-loculare, ferrugineo-hirsutum; stylus basi excepta glaber. Fructus ignotus. Typus: *Rambli 1753* in SAR.

Trees, up to 20 m. Branchlets irregularly terete, c. 4 mm in diam., dark ferruginously woolly, but soon glabrous; terminal cone up to 4 mm long, woolly; stipules? *Leaves* subconferted at tip of branchlets, spatulate, 6.8—9.4 by 2.4—3.2 cm, rounded at apex, narrowly cuneate at base, decurrent along sides of petioles; glabrous above except greyish brown woolly in basal part of midrib, glabrous below but dark reddish brown woolly on midrib, coriaceous; midrib crested above, prominent and angular below, secondary nerves 7—11 pairs, ascending at an angle of 85°—90°, straight, archingly joined closed to margin, prominulous on either side, not easily discernable from tertiary nervation, the latter reticulate, lax, prominulous on either side. Petioles 2—7 mm long, woolly on either side, crested above, angular below. *Flowers* 2 or 3 in the axils below the leaves, pedicels angular, 8—12 mm long, dark ferruginously woolly. *Sepals* ovate-triangular, c. 4 by 4 mm, obtuse or subacute, dark ferruginously woolly on outside, glabrous on inside, inner sepals more ovate with membranous, glabrous margins, and smaller. *Corolla* 5.5—7 mm long, ferruginously sericeous on outside on tube and in a central spot at base of lobes up to the middle of the latter, glabrous on inside, except for a ferruginous sericeous pubescence in throat, lobes lanceolate, 4—5 by 1.5—2 mm, rounded or subtruncate at apex. *Stamens* 12, 4.5—5.5 mm long, entirely glabrous, filaments filiform, 3—3.5 mm long, anthers lanceolate, 2—2.5 mm long, connective slightly prolonged, bifid, dehiscing extrorsely. *Ovary* globose-ovoid, c. 2.5 by 2.5 mm, 6-celled, dark ferruginously hirsute. Style filiform, up to 10 mm long, glabrous except for the hirsute base. *Fruits* unknown.

Type specimen: *Rambli 1754* (= *S 48*) in SAR.

Distribution: Borneo.

BORNEO. Sarawak, Kuching, Semengho For. Res., alt. 300 m: *Rambli 1753* (SAR), tree 20 m, fl. Sept.

Remarks. An easily distinguishable species by the spatulate leaves which are dark ferruginously woolly on underside of the angular midrib, and by the woolly pubescent petioles, pedicels and outside of sepals. It is closely related to *P. pseudorostratum* and *P. microphyllum*. From both it differs in the woolly pubescence mentioned above. From the former, moreover, it can be separated by the pubescence on the outside of the corolla and from the latter by the pubescence on the inside of the corolla.

99. *P. semaram* H. J. Lam, l. c. 1925, 43, 255, f. 6; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1240; Lam, l. c. 1927, 397; Heyne, l. c., ed. 3, 1, 1950, 1240; Wyatt-Smith, Research Pamphlet 4, 1954, 42.

Trees, 30—50 m. Branchlets angular or terete, irregular by the numerous scars, 2—10 mm in diam., ferruginously, greyish-brown or greyish woolly as are the lower and basal part of upper side of petioles, pedicels and the sepals; branchlets glabrescent; terminal cone up to 10 mm long, with the same indumentum as the juvenile branchlets, apex abruptly rounded or truncate; stipules absent. *Leaves* conferted at apex of branchlets, spatulate, obovate-oblong or rarely linear-lanceolate, 9—13.5(—19) by 3—6(—8) cm, apex rounded or obtusely acuminate,

acumen up to 3 mm, in sucker-leaves up to 12 mm long, base narrowly cuneate, decurrent along sides of petioles; glabrous on either side but dark reddish woolly along midrib underneath and its basal part above, coriaceous; midrib grooved above and minutely crested mainly in the basal part, prominent below, secondary nerves 18—25 pairs, ascending at an angle of (70°—)80°—90°, straight, irregularly archingly joined, slender, prominent on either side, at base and apex of leaf hardly separable from the tertiary nerves, the latter reticulate, parallel to secondary nerves, slender, prominent on either side. Petioles (0.8—)1.5—2.5 cm long, woolly, ultimately subglabrous, sometimes transversely verrucose below in the basal part. *Flowers* in 2—6-flowered, axillary clusters, pedicels angular, 8—15 mm long, in fruit 13—22 mm long, woolly. *Sepals* ovate, 3.5 by 2.5—3.5 mm, apex shortly obtusely acuminate, sometimes crested, woolly on outside, glabrous on inside, inner sepals elliptic, 3.5—4.5 by 2.5—3 mm, apex rounded, margins membranous and fimbriate, woolly on outside, glabrous on inside. *Corolla* 6—9 mm long, glabrous, when young with a few golden hairs in epipetalous lines on the tube, lobes ovate-elliptic, 5—7.5 by 2.5—3.5 mm, apex obtuse, fimbriate. *Stamens* 12, 6—8.5 mm long, filaments filiform, angular, 3.5—5 mm long, glabrous, anthers sagittate, 4—5 mm long, apex aristulate, truncate, emarginate or acute, glabrous, dehiscing extrorsely. *Ovary* ovoid, c. 1.5 by 1.5 mm, 6-celled, ferruginously tomentose. Style filiform, 10—15 mm long, glabrous. *Fruits* ellipsoid, sometimes slightly oblique or obovoid, 2.5—3.5 by 0.8—1.5 by 0.6—1.5 cm, sometimes 6-lobed, 1-seeded, apex obtuse, usually with a short remnant of the style, glabrous except for a ring of ferruginous hairs at the base and at the base of the style, pericarp fleshy. Seeds ovoid, 12—18 by 6—8 mm, obtuse at apex, acute at base, testa thin, scar covering about half the surface of the seed, embryo without albumen, cotyledons thick, radicle small, almost not exsert.

**Lectotype specimen:** *Beguín 392* in L.

**Vernacular names:** Malaya: nyatoh semaram (Malacca, Pahang, Kelantan), nyatoh (Pahang); Lingga: lakis bukit daun lebar; Sumatra: balam hitam, balam seminaí, balam serindit, nyatoh semaram, pulau pipit.

**Ecology:** Frequent tree of lowland and low-lying forest in the coastal belt.

**Distribution:** Malaya, Sumatra, Lingga.

**MALAYA.** Johore, Sungai Kayu, Mawai-Temalurang Road, swampy forest: *Corner s.n.* (SING), tree 50 m, fr. Febr., green; Kulai Young Estate: *Corner 36298* (BO, SING), fl. June; *Corner Rhu Reba*, Jason Bay: *Corner 28516* (BO, SING), fl. June, top storey tree; Mawai: *Ngadinan 36793* (SING), tree 25 m, fl. pale yellow, July; *ibidem*: *Wyatt-Smith 71887* (KEP, L), tree 30 m, fr. green, Jan. — Pahang, Sungai Tahan, on ridge: *Kiah 31797* (SING), tree 25—30 m, fr. July; Roempin Pahang: *Mohammed 14957* (SING), fl. May; *ibidem*: *Maw 29451* (KEP), May; Ulu Anak Endau Sh.: *KEP 17257* (KEP), tree 25 m, fr. March; Kuantan: *Lambak CF 3556* (BO), tree, fl. July — Malacca, Mersing, Mt Arsong For. Res., alt. 16 m: *Awang bin Deli 70108* (KEP), tree 40 m, Jan.; *ibidem*: *Dimal 70078* (KEP), tree 40 m, fr. Jan. — Trengganu, Dungun, Besuk State Cons. Lic.: *KEP 66955* (KEP), tree 33 m, fr. Jan., green — Kelantan, Selih Sungei, Pergan: *Wallon 33258* (KEP), large tree, March — Kuantan, Juru Lalang S. L.: *Ali 29996* (KEP), large tree, March.

**SUMATRA.** Indragiri Low Lands, Simpang, alt. 5 m: *NIFS bb 22278* (BO, L, SING);

Gelang Isl.: *NIFS* bb 29147 (BO, L), Sept.; Belimbing: *Buwalda* 286 (BO, L), tree 26 m, July; Keritang, alt. 5 m: *NIFS* bb 28680 (BO, L), Aug.; Padang upper Lands, Minangkabau, Painan Doekoe, alt. 150 m: *NIFS* bb 3110 (BO, L), Febr. — B e n g k a l i s, Sebaoek, alt. 2 m: *Beguín* 392 (BO, L), fl. Oct.; ibidem, Tamansari: *Beguín* 241 (BO, L), fr. Aug.; Selat Pandjang: *NIFS* bb 13835 (BO), tree 23 m, Oct.; Tj. Sei Lakar: *NIFS* bb 12844 (BO), tree 25 m, fl. Oct.

LINGGA. Singkep, Mt Gambang, alt. 100 m: *NIFS* bb 4042 (BO, L), Sept.

**Remark.** Contrary to Lam's description I have been unable to trace any sign of stipules.

100. *P. glabrifolium* Merrill, Phil. Journ. Sc. 14, 1919, 416; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l.c. 1925, 46; Lam, l.c. 1927, 398.

Small trees, up to 8 m. Branchlets angular, 2—4 mm in diam., greyish ferruginously puberulous, glabrescent; terminal cone up to 3 mm long, puberulous; stipules lanceolate, c. 2 by 1 mm, acute, puberulous on outside, glabrous on inside, caducous. *Leaves* scattered or subconferted at apex of branchlets, oblong-obovate, 9—14 by 2.5—5 cm, short obtusely acuminate at apex, acumen up to 5 mm long, narrowly cuneate at base; glabrous on either side, thin-coriaceous; midrib grooved above and very minutely crested as well, rounded or angular below, secondary nerves (11—)14—20 pairs, ascending at an angle of 70°—80°, straight, irregularly archingly joined at their tips, very slender, prominulous on either side but more distinct below, tertiary nervation parallel to secondary nerves and widely reticulate, very slender, prominulous on either side but more distinct below. Petioles 1—2.5 cm long, flat above, rounded below, glabrous. *Flowers* solitary or in fascicles of 2—4, axillary, pedicels angular, 1—1.5 cm long, entirely glabrous. *Sepals* broadly ovate, c. 3 by 3.5 mm, obtusely acuminate, glabrous on either side, inner sepals slightly smaller, obtuse or rounded, membranous along margins, ferruginously tomentose on outside except along the marginal part. *Stamens* and *corolla* not seen. *Ovary* ovoid-conoid, c. 2 by 2 mm, 6-lobed, ferruginously puberulous; style c. 9 mm long, 6-ribbed, glabrous. *Fruits* globose, c. 2—4 cm in diam., seeds unknown (f. Lam 1925).

Type specimen: *Ramos & Edaño 30820* in PNH.

Lectotype specimen: *Ramos & Edaño 30820* in K.

Distribution: Panay.

PANAY. Capiz prov., Mt Macosolon: *Ramos & Edaño 30820* (K), fl. Aril/May.

**Remark.** Since the type specimen has become lost, the only specimen traced has been chosen to represent the type specimen.

101. *P. dubardii* Elmer, Leaf. Phil. Bot. 3, 1910, 868; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 279; Lam, l.c. 1925, 38; Lam, l.c. 1927, 395.

Trees, c. 10 m. Branchlets angular, 3—7 mm in diam., ferruginously tomentose, glabrescent; terminal cone up to 5 mm long, ferruginously tomentose; stipules subulate, c. 1 mm long, ferruginously tomentose, caducous. *Leaves* conferted at apex of branchlets, elliptic-obovate, (6—)8—12 by (3—)3.5—4.5 cm, short indistinctly obtusely acuminate, sometimes emarginate, subabruptly narrowed at base, decurrent along adaxial side of petiole; glabrous on either side, except for a few hairs in basal part underneath,

coriaceous; midrib impressed above and minutely crested, prominent and rounded below, secondary nerves 7—14 pairs, ascending at an angle of c. 50°, straight but at their tips slightly curving backwards and forked, archingly joined rather far from the margin but the arches very irregularly sinuous, grooved above and sometimes rather inconspicuous, prominent below, tertiary nerves reticulate, parallel to the secondary nerves, inconspicuous on either side but sometimes more distinct below. Petioles (10—)13—20 mm, flat above and crested, rounded below, greyish or ferruginously tomentose. *Flowers* solitary or in 2- or 3-flowered, axillary clusters, pedicels 6—8 mm long, but up to 12 mm long in fruit, greyish or ferruginously tomentose. Outer *sepals* narrowly ovate, 3—3.5 by 1.5—2 mm, apex usually obtuse, occasionally acute, ferruginously puberulous on outside, glabrous on inside, inner sepals orbicular, c. 3 mm in diam., rounded at apex, ferruginously puberulous on outside, glabrous on inside, margins membranous and finely hairy. *Corolla* c. 6 mm long, glabrous on either side, lobes elliptic-ovate, c. 4 by 2.5 mm, apex acute. *Stamens* 12, 3—3.5 mm long, filaments angular-subulate, c. 1 mm long, anthers sagittate, c. 2 mm long, apex acute, sparsely brownish hairy, dehiscent extrorse-laterally. *Ovary* ovoid, c. 1.5 by 1 mm, 6-celled, 6-lobed, ferruginously puberulous. Style subulate, c. 4 mm long in flower, in fruit up to 8 mm, glabrous. *Fruits* not seen but according to Elmer: globose ellipsoid, 12.5 mm long, 2- or 3-seeded, hard, green, smooth.

Type specimen: *Elmer 12553* in PNH.

Lectotype specimen: *Elmer 12553* in L.

Vernacular name: molito (Panáy Bisáyan).

Ecology: In primary forests at 200—600 m alt. on red soil with gravelly subsoil on wooded banks.

Distribution: Sibuyan, Panay, Luzon, Palawan, Samal.

SIBUYAN. Capiz prov., Magallanes, Paula river, alt. 250 m: *Elmer 12553* (E, FI, G, L, NY), fl. & fr. May; Mt Giting-giting: *Elmer 12126* (E, FI, G, L, NY), fl. March.

PANAY. f. Merrill, l.c. 279.

LUZON. Zambales prov.: *Vidal 1557* (FI, K, L), fl. buds Nov.

PALAWAN. Palawan prov., Mt Pulgar: *Elmer 12313* (E, FI, G, L, NY), fl. March.

SAMAL. without known loc.: *Angeles 27732* (SING), May.

Remarks. As the type specimen has been destroyed in Manila lectotype specimen is chosen from the original material.

102. *P. calophylloides* Ridley, J. As. Soc. Straits 79, Sept. 1918, 93 and Fl. Mal. Pen. 2, 1923, 276; Lam, l.c. 1925, 105; Lam, l.c. 1927, 413.

Trees, up to 20 m. Branchlets angular, 2—4 mm in diam., greyish puberulous, glabrescent; terminal cone up to 3 mm long, puberulous; stipules lanceolate, up to 3 by 1 mm, acute, ferruginously puberulous on outside, glabrous on inside, caducous. *Leaves* subconferted at apex of branchlets, obovate, 8—12.5 by 4.5—6 cm, short obtusely acuminate at apex, cuneate at base, constricted near petiole; glabrous on either side, when young finely brown puberulous below, coriaceous; midrib crested above, prominent and angular below, secondary nerves slender, 10—16 pairs, ascending at an angle of 65°—75°, slightly curved, diminishing until in-

conspicuous near margin or irregularly archingly joined, prominulous above but often grooved, prominent below, tertiary nervation reticulate-parallel to secondary nerves, inconspicuous or absent above, prominent below. Petioles 1.8—2.4 cm long, crested above, angular below, thickened and rugose at base, glabrous. *Flowers* in 3- or 4-flowered, axillary clusters, pedicels angular, 5—8 mm long, sparsely ferruginously sericeous. Outer sepals ovate, 3.5—4 by c. 2.5 mm, subobtusely, ferruginously tomentose on outside, glabrous on inside, inner sepals narrowly ovate, c. 3.5 by 1.5—2 mm, subacute, margins membranous and glabrous, fimbriate, otherwise similar to the outer sepals. *Corolla* 4—4.5 mm long, on outside ferruginously sericeous in middle-line of lobes and on tube, densely woolly tomentose in throat, lobes ovate-elliptic, c. 3.4—4 by 1.5—2 mm, rounded or obtuse at apex. *Stamens* 12, in 2 whorls, the epipetalous whorl longer than the alternipetalous, 2—2.5 mm long, filaments subulate, 1.5—2 mm long, glabrous, anthers c. 1.5 mm long, short obtusely acuminate, dehiscing extrorsely, glabrous. *Ovary* conoid, c. 1 by 1.5 mm, 6-celled, 12-lobed, cinnamomously tomentose. Style stout, 5—7 mm long, glabrous. *Fruits* unknown.

Type specimen: *Bell & Haniff s.n.* in K.

Distribution: Malaya (Kedah).

Kedah. Kedah Peak, c. 300 m alt.: *Bell & Haniff s.n.* (K), large tree, fl. March.

103. *P. cuneifolium* Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 279 — *P. cuneatum* (Blume) Vidal, Sinopsis Atlas, 1883, 31, t. 62, f. A, p.p.; Merrill, Phil. Bureau For. Bull. 1, 1903, 47; Merrill, Bur. Govt Lab. Publ. 6, 1904, 14; Dubard, Bull. Mus. hist. nat. Paris 15, 1909, 382; Lam, l. c. 1925, 35, 254; Lam, l. c. 1927, 391 — *Dichopsis cuneata* (Blume) F.-Vill., Nov. App., 1880, 124, p.p. — *P. heterosepalum* Merrill, Phil. J. Sc. 10, 1915, 61; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 280; Lam, l. c. 1925, 38; Lam, l. c. 1927, 395.

Trees, c. 15 m high. Branchlets slender, 2—5 mm in diam., terete, ferruginously tomentose in the most apical part, otherwise glabrous and striate when dry; terminal cone 1—2.5(—5) mm long; stipules lanceolate, c. 1 mm long, apex acute, brownish tomentose on outside, glabrous on inside, caducous. *Leaves* conferted or subconferted at apex of branchlets, obovate-spathulate or obovate-orbicular, (3—)5—8(—12) by (1.5—)2—3.5(—5) cm, apex rounded or short obtusely and broadly acuminate, or cordate, base narrowly cuneate and tapering into, or sometimes abruptly narrowed into petiole, shortly decurrent; juvenile leaves glabrous above, scattered ferruginously tomentose below but denser so on the midrib, mature leaves glabrous on either side, coriaceous; midrib impressed above and distinctly crested usually in the basal part only, prominent below, secondary nerves (7—)8—11(—15) pairs, ascending at an angle of c. 80°, straight, archingly joined near the margins of the leaf, inconspicuous above, prominent below, tertiary nervation widely reticulate, parallel to the secondary nerves, sometimes one nerve more distinctly developed and also parallel to the secondary nerves, almost invisible above, distinct below. Petioles (6—)8—11(—13) mm, flat above, rugose in the basal part, glabrous. *Flowers* axillary, solitary or in clusters of 2—4, pedicels (6—)9—12 mm, angular, ferruginously tomentose, in fruit up to 15 mm long and stouter. *Sepals* 4 or 6, ovate, 2.5—3 by

c. 3 mm, ferruginously tomentose on outside, glabrous on inside, apex of outer sepals subacute, margins ciliate, apex of inner sepals obtuse and margins membranous and scarious, dorsally crested. *Corolla* 7—9 mm long, entirely glabrous or with a few hairs in the middle-line of each lobe, lobes ovate-elliptic, 5—6.5 by 2—2.5 mm, obtuse. *Stamens* 12, inserted at base of lobes, 4—5.5 mm long, filaments filiform, 2—3 mm long, angular, glabrous, anthers ovoid, 2.5—3 mm long, apex mucronate, dehiscing extrorsely, glabrous, in bud with few ferruginous hairs. *Ovary* ovoid, c. 2 by 2 mm, 6-celled, 6-lobed, ferruginously tomentose, borne by a thick disk. Style flagellate, 7—11 mm long, with 6 ribs, glabrous. *Fruits* globose, 2—3 cm in diam., when young ellipsoid and usually bearing a short remnant of the style, 1-seeded, pericarp fleshy, glabrous, with 3 broad white streaks (always?). Seeds unknown.

Lectotype specimen: Vidal 440 in L.

Vernacular names: Philippines: arosap, anosep, malikinik, tañgiling-kompól (Tagalog), lako-lako (Pánay Bisáya); Borneo: ketiau.

Ecology: In primary and secondary forests at low and medium altitudes, or in swamps.

Distribution: Luzon, Mindoro, Guimares, Cebu, and perhaps in Borneo.

LUZON. Bulacan prov.: Ramos 1998 (G, L, NY, SING), fr. Dec. — Rizal prov.: Reillo 19160 (NY), fl. Dec., type specimen of *P. heterosepalum* Merrill; ibidem: Loher 13875 (BO), tree, fl. Jan.; Montalban: Loher 6555 (K), fl. — Zamboales prov.: Curran & Merritt 8245 (NY), fl. Nov./Dec.; Botolan: Merrill 2993 (BM), fr. June; Tanauan: Vidal 440 (FI, K, L), fl. April; ibidem: Vidal 1561 (FI), fl. April; ibidem: Vidal 1561 (FI), fl. April.

GUIMARES. without known loc.: Gammill 238 (NY), fl. Jan.

PANAY. Ilo-Ilo prov., Mt Pulacan, Miagas: Vidal 3184 (K), fl. & fr. March.

MINDORO. Paluan: Ramos 39811 (L), fr. April; ibidem: Ramos 39790 (L), fr. April.

CEBU. f. Merrill 1923, 279.

Without known loc.: Loher 6553, f. Lam, d. c. 1925, 38, 254.

BORNEO. Sarawak, Sibuan: SAE 82692 (SAR), tree 26 m, May, dubious specimen; ibidem: SAE 8714 (SAR), tree 29 m, May, dubious specimen.

Remarks. As no type specimen ever has been indicated neither by Villar, Vidal or Merrill, Vidal 440 is chosen, as probably it was this specimen that Villar had in hands when ascribing it to *Dichopsis cuneata*.

The specific epithet *cuneata* used by Villar is derived from *Bassia cuneata* Blume. But as this represents a *Madhuca* and Villar misapplied that name to a species of *Dichopsis*, which subsequently was transferred by Vidal to *Palaquium*, Merrill was fully justified in replacing the specific epithet *cuneata* by *cuneifolium*, since *Palaquium cuneatum* (Bl.) Vidal is based on a synonym now referred to the genus *Madhuca*, viz *M. cuneata* (Bl.) McBride.

104. *P. pseudorostratum* H. J. Lam, l. c. 1927, 393, f. 3.

Trees, up to 45 m tall. Branchlets stout, terete or angular, 3—7 mm in diam., glabrous; terminal cone, if present, up to 5 mm long, ferruginously sericeous; stipules minute, very soon caducous. Leaves scattered, obovate, obovate-spathulate or spathulate, (3—)7—15 by 1.7—4 cm, apex rounded or obtuse, very rarely obtusely acuminate with the acumen up to 3 mm long, base narrowly cuneate, tapering along upper side of petioles;

glabrous on either side, thinly coriaceous; midrib grooved above and sometimes minutely crested as well, prominent and angular below, secondary nerves 13—20 pairs, but some of the tertiary nerves stronger developed and parallel to the secondary nerves and increasing the number of the latter up to 30, ascending at an angle of 75°—85°, slender and prominulous on either side, sometimes very inconspicuous above, straight but curved at the very tips only, archingly joined very close to the margin or reaching to the edge and forming an indistinct almost straight intramarginal nerve, tertiary nerves parallel to the secondary nerves, inconspicuous, but sometimes as strongly developed as the latter, widely reticulatè. Petioles 0.8—4 cm long, flat or crested above, angular below, initially ferruginously appressedly tomentose, ultimately glabrous. *Flowers* in 2—4-flowered clusters in the axils of the uppermost leaves and/or in the lower leaf scars, pedicels angular, 1.5(—7) mm long, ferruginously sericeous. *Sepals* ovate, 2—3.5 by 2—3 mm, obtuse or subacuminate, crested at the back, ferruginously appressedly tomentose or outside, glabrous within except along the apical margin, fimbriate, inner sepals slightly smaller than the outer ones, with membranous and glabrous, fimbriate margins. *Corolla* 5—7 mm long, glabrous except for a ring of ferruginous hairs at base of stamens, reflexed in anthesis, lobes elliptic-oblong, 3.5—5.5 by 1.5—2 mm, obtuse or truncate, and penicillate at apex. *Stamens* 12, in 2 whorls, the alternipetalous shorter than the epipetalous, 3—5 mm long, filaments filiform, 2—4 mm long, glabrous, anthers ovoid-lanceolate, 1.5—2 mm long, connective prolonged and obtuse or rounded, glabrous. *Ovary* ovoid, c. 1 by 1.5 mm, 6-celled, 12-lobed, glabrous in the basal part, ferruginously sericeous for the rest. *Style* filiform, 6—10 mm long, 6-grooved, glabrous. *Fruits* globose, ellipsoid, disciform or depressedly globose, 0.8—1.5 by 1.2—1.6 cm, 1—5-seeded, obtuse or rounded at apex, often with a short remnant of the style, which is circularly expanded at base, (2—)6- or 12-grooved, pericarp woody, glabrous. Seeds ellipsoid, up to 11 by 6 by 5 mm, testa black, nitidous, scar covering half of the seed, greyish, dull, embryo exalbuminous, radicle small, shortly exsert.

Type specimen: *NIFS bb 9449* in BO.

Vernacular names: bintagor batu, kandjak laki, nyatoh, njatoh batu, njato puntik.

Ecology: Growing in freshwater swamp forests, or on limit between Agathis forests and swampy forests, at low altitudes.

Distribution: Borneo and Philippines.

BORNEO. Sandakan, Kimanis For. Res., Sabak: *Ahho A 488* (KEP, L, SAN, SING), fr. April; Sipitang, W. ridge of Mt Lumaku, alt. 1500 m: *Wood SAN 16731* (A, BRI, K, KEP, L, SAN, SING), tree 33 m, fr. Sept.; Padas Swamp: *Melegrito 2795* (K, L, SAN), tree 20 m, fr. Febr. — Sarawak, Sungei Retus, Batang Igan: *Anderson 53* (KEP), fl. July; ibidem: *Anderson 60* (SIBU), fl. July; Kuching: *SAR A 371* (KEP), fr. Oct.; ibidem: *Hewitt S. 1, 3 & 5* (BM), fl. May; ibidem: *Haviland 2319* (SING), fl. Febr.; Lowa Kabang South P. F.: *Anderson 482, 572, 2678, 2797* (SAN), Febr.-May; ibidem: *Anderson S 497* (SAR), Nov.; ibidem: *Wan S 2759* (SAN), June; ibidem: *S 896* (SAN), Febr.; Baram: *Anderson S 3279* (SING), tree, Oct.; Triso Peninsula: *Anderson S 3165* (SING), tree, fr. Nov.; Dano For. Res.: *Anderson 108* (SIBU), tree, Nov.; ibidem: *Eageti S 402* (KEP, SAN), Dec.; Sibü: *Anderson 1526* (SAN), Febr.; Kerangas along Limbang Rd: *SAN S 1283* (SAN, SING), Febr.; Bintulu: *Drahman S 906* (SAR), tree 20 m, Sept.; Selapok: *Budin A 1286* (KEP),



Febr.; Kalabakan, WNW of Tawau, alt. 200 m: *Wood SAN A 15249* (A, BO, K, KEP, L, SAN, SING), tree 45 m, juv. fr. June — without known loc.: *Haviland & Hose 3485 F* (BM, K, L), fr. Nov. — Indonesian Borneo, Sampit: *NIFS bb 33045* (BO, L, SING), tree 33 m, fr. Sept.; ibidem: *Buwalda 7812, 7860* (BO, L, PNH), tree, fl. yellowish green, Sept.; ibidem: *NIFS bb 32424* (BO, L), tree 29 m, fl. Oct.; ibidem: *NIFS bb 32381* (= *Buwalda 4*) (BO, L), tree 30 m, fl. Sept.; ibidem: *Buwalda 47* (BO, L), tree 29 m, fl. yellow, fr. green, Oct.; Lower Dajak, Tuwanan: *NIFS bb 9449* (BO, L), fl. & fr., Oct.; E. Kutai, Sg Susuk Region, alt. 50 m, loam soil with coral limestone: *Kostermans 5685* (BO, L), tree 30 m, fl. white, July. PHILIPPINES. without known loc.: *Lay s.n.* (BM), fr.

105. *P. pseudocuneatum* H. J. Lam, l. c. 1927, 391, f. 2.

Trees, up to 34 m high. Branchlets slender, terete or angular, 2—3 mm in diam., sparsely ferruginously sericeous at the ultimate tip of branchlets only, soon glabrous; terminal cone up to 3 mm long, tomentose; stipules minute, very soon caducous. *Leaves* scattered or subconferted at tips of branchlets, spatulate or obovate, 4—11 by 1.5—4.5 cm, retuse, rounded or short obtusely acuminate at apex, narrowly cuneate at base, decurrent along sides of petioles; glabrous on either side, subcoriaceous; midrib with one or two narrow grooves above, prominent and angular below, secondary nerves, slender, 10—12 pairs, but by stronger developed tertiary nerves parallel to the secondary ones, seemingly up to 50, ascending at an angle of 60°—80°, at the base c. 90°, straight or slightly curved, archingly joined close to the margin and forming an almost straight intramarginal nerve, prominulous above, less stronger so below, tertiary nerves reticulate-parallel to the secondary nerves and often as strongly developed as the latter. Petioles 6—12 mm long, grooved above, and sometimes minutely crested as well, prominent and angular below, glabrous. *Flowers* in 2—4-flowered, axillary clusters, pedicels angular, 5—12 mm long, ferruginously tomentose. *Sepals* ovate, 3—4 by 2—3 mm, acute at apex, ferruginously sericeous on outside, glabrous on inside except along the margin and sometimes along the middle-line, inner sepals smaller than outer ones, all sepals reflexed in fruit. *Corolla* 3—4 mm long, on outside ferruginously pubescent on the tube and base of lobes, on inside ferruginously woolly between the stamens, lobes elliptic-oblong, 2—3 by 1—1.5 mm, truncate or rounded at apex, reflexed in anthesis. *Stamens* 12(—8), inserted at different levels, 2.5—3 mm long, filaments filiform, 1.5—2.5 mm long, scattered ferruginously woolly, anthers ovoid, 1—1.5 mm long, bifid at apex, glabrous, dehiscent extrorsely. *Ovary* ovoid, c. 1.5 by 1.5 mm, 6-celled, 6—12-lobed, ferruginously hirsute. Style cylindrical-filiform, 2—4 mm long, 6-grooved, glabrous except for the base. *Fruits* globose but constricted at base, or ellipsoid, 1.5—1.9 cm in diam., or c. 1.9 by 1.4 cm, 1-seeded, pericarp fleshy, glabrous. Seeds obovoid, c. 12 by 6 by 5 mm, rounded at apex, subobtusate at base, testa thin, scar covering half the seed, embryo exalbuminous, radicle small, not exsert.

Type specimen: *Egon 340* (non 306) in BO.

Vernacular name: nyatoh kelalang, salanglang.

Ecology: Hilly land forests at low altitudes or in swamps.

Distribution: Borneo.

BORNEO. Sarawak, 6th Mile For. Res.: *Egon 340* (non 306, f. Lam) (BO, SAR), tree c. 20 m, fl. & fr. Sept.; ibidem: *Egon 978* (SAR), fl. Aug.; Daro 3rd Div.,

swamps: *Anderson S 2627* (SAR), tree 15 m, April; Sibuluan, swamps: *Anderson S 1768* (SAR), tree 22 m, May; Pulau Bruit: *Morshidi S 2680* (SAR), May; Loba Kabang South P. F.: *Anderson S 2685* (SAR), tree, May; Betong Saribas For. Res.: *Anderson 8542* (L, SAR), tree 20 m, fl. Aug.; Binatang distr., Pulau Bruit: *Anderson 9058* (L, SAR), tree 16 m, fl. Sept.; ibidem: *Sanusi bin Tahir 9246* (L, SAR), tree 34 m, diseased fl. Oct.; ibidem: *Sanusi bin Tahir 9256* (L, SAR), tree 32 m, fr. immature, Oct. — Brunei, Badas swamps: *Anderson S 2834* (SAR), small tree, June — Indonesian Borneo, Mempawah subdistr., Andjongan, alt. 10 m: *NIFS bb 12246* (BO), tree 19 m, May; Meliau subdistr., Dawak, alt. 50 m: *NIFS bb 12400* (BO), tree 30 m, fr. April.

106. *P. amboinense* Burck, Ann. Jard. bot. Btzg 5, 1886, 37; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 17; Lam, l. c. 1925, 38; Heyne, Nutt. Pl. Ned.-Ind., ed. 2, 2, 1927, 1232; Lam, l. c. 1927, 395; Heyne, l. c., ed. 3, 1, 1950, 1232 — *P. javense* Burck, l. c. 36, t. 10, f. 3, 4; Koorders & Valetton, Bijdr. Booms. Java 1, 1894, 143; Dubard, l. c. 1909, 18; Hallier, Rec. Trav. bot. Néerl. 15, 1918, 70; Koorders & Valetton, Atl. Baumart. 4, 1918, t. 610; Lam, l. c. 1925, 45; Lam, l. c. 1927, 397; Lam, in Backer, Noodfl. Java 7, 1958, Fam. 166; Heyne, l. c., ed. 2, 2, 1236; idem, ed. 3, 1, 1236 — *P. njatoh* Burck, l. c., 41 — *P. jambos* Pierre ex Dubard, l. c. 1909, 17 — *P. timorensis* Baillon, in msc. — *Sicchius mas* Rumphius, Herb. Amb., ed. 2, 3, 1750, 40, t. 21.

Trees, up to 40 m. Branchlets terete, 2—5 mm in diam., ferruginously or golden-ferruginously tomentose when young, glabrous when mature; terminal cone up to 7 mm long, ferruginously tomentose; stipules acicular, 1—2.5 by c. 1 mm long, ferruginously tomentose, caducous. *Leaves* scattered, subconferted or conferted at apex of branchlets, elliptic to subelliptic, obovate, or obovate-oblong, (5—)7—16 by 2.8—5.5 cm, apex acute, rounded or obtusely acuminate, acumen up to 5 mm long, base narrowly or broadly cuneate, shortly decurrent; glabrous on either side, subcoriaceous or coriaceous; midrib crested above, prominent and angular below, secondary nerves 8—16(—25) pairs, straight, ascending at an angle of c. 70°, forked at their tips and irregularly archingly joined, often grooved above, prominent below, tertiary nerves transverse but almost parallel to the secondary nerves and in the basal and apical part of the leaf reticulate-parallel to secondary nerves and often one of the nerves stronger developed, thus apparently increasing the number of secondary nerves up to 25 pairs, inconspicuous above, prominent below. Petioles 6—14 mm long, flat above and crested in the most apical part only, very minutely golden-ferruginously tomentose. *Flowers* solitary or in 2—6-flowered, axillary clusters, pedicels angular, 4—8 mm long, ferruginously tomentose. *Sepals* triangular or ovate, 2—3.5 by 2—2.5 mm, apex obtuse or subacute, sparsely minutely ferruginously tomentose on outside, glabrous on inside, inner sepals slightly smaller and thinner than the outer ones and with membranous margins. *Corolla* seen in bud only, c. 2.8 mm long, lobes elliptic-ovate, c. 2.5 by 2 mm, yellowish brownish woolly at the obtuse apex. *Stamens* 12, inserted at base of tube, c. 2 mm long, filaments subulate, 1—2.5 mm long, glabrous, anthers sagittate, 1.8—2.5 mm long, apex irregularly obtuse or acute, dehiscent laterally, ferruginously sericeous (according to Burck glabrous but this might apply to mature anthers). *Ovary* narrowly conoid, c. 1 by 1 mm, 6-celled, deeply 6-lobed, ferruginously tomentose. Style claviform, c. 2.5 mm

long, glabrous. *Fruits* oblong or ovoid-oblong, sometimes oblique, 3.6—5 by 1—1.8 cm, 1-seeded, pointed at both ends, apex with a rudiment of the style, glabrous (?). Seeds with a large broad scar, pointed at both ends, albumen none, radicle not exsert, punctiform.

Type specimen: *Teysmann s.n.* in BO.

Vernacular names: Java: *bedu*, *djenipino*, *gentiri*, *genitri*, *grawang*, *kawang*, *kedu*, *kemedu*, *klawang*, *santen*, *sepat*; Kangean: *katingan*, *klèsi*, *tatingan*; Sumbawa: *kantusu*; Sula: *tapirie*; Morotai: *tiwiring*; Misool: *nat*; Amboina: *siki ajër*, *siki batu*, *siki mérah*, *siki laki laki*, *siki perampuan*; New Guinea: *kema* (Kokas), *nu*, *segu* (Karoon), *kemanak* (Mooi), *sowgwa* (Manikiong), *senariga* (Oransbari), *hamom* (Sentani), *lou* (Skou), *bori*, *hoo*, *joo*, *jook*, *naneu*, *tiejiek* (Tami).

Ecology: In lowland forests.

Distribution: Java, Bali, Kangean, Sula, Celebes, Sumba, Sumbawa, Timor, Weda, Morotai, Amboina, Misool, Kai, New Guinea, New Britain, Solomons.

JAVA. Bandjuwangi: *Teysmann s.n.* (BO, L), type specimen of *P. javense* Burck; ibidem: *Teysmann s.n.* (BO, L), type specimen of *P. njatoh* Burck; Penatukan, Wonoreddji: *NIFS Ja 2261* (BO), tree 15 m, March; ibidem, Kesambi-Kerep, alt. 20 m: *NIFS Ja 2294* (BO), tree 12 m, March; Blora, Sambong, alt. 150 m: *NIFS Ja 1818* (BO), tree 23 m, Dec.

BALI. Pulkan, alt. 300 m: *van Steenis 7718* (BO), fl. April; Buleleng, Sendang, alt. 100 m: *NIFS bb 21406* (BO, L), fl.

KANGEAN. f. Lam, l.c. 1925, 45.

SULA. Mangoli, along Wai Tamila, alt. 100 m: *NIFS bb 29914* (BO, L, SING); ibidem: *NIFS bb 29754* (BO, L, SING) — Sanana, Tobukoh, alt. 20 m: *NIFS bb 28788* (BO, L, SING), fl. Aug. — Sulabësi, without known loc.: *Hulstijn 409* (L).

CELEBES. Menado, Banggai, Balaang, alt. 5 m: *NIFS bb 31862* (BO, SING), March; ibidem, Poso, Pusungi, alt. 25 m: *NIFS bb 31583* (BO, SING), March; Palopo, alt. 100 m: *NIFS bb 33079* (BO, L), tree 35 m, Sept.

SUMBA. Djuli, alt. 250 m: *NIFS bb 15134* (BO, L), Febr.

SUMBAWA. Bisna, Adu, alt. 600 m: *NIFS bb 6930* (BO), tree 40 m, Oct.

TIMOR. Tafinisi, alt. 900 m: *NIFS bb 17588* (BO, L, SING), fl. July; without known loc.: *Biedel s.n.* (L, P), fr.

WEDA. Tiloppo, alt. 25 m: *NIFS bb 24834* (BO, L, SING), April; ibidem: *NIFS bb 24881* (BO, L, SING).

AMBOINA. Waai, alt. 30 m: *NIFS bb 26005* (BO, L, SING), fl. Sept.; without known loc.: *Teysmann s.n.* (BO, SING), type specimen of *P. amboinense* Burck.

KAI. without known loc.: *Jaheri 1452144* (BO, L).

MOROTAI. Tobelo, alt. 80 m: *NIFS bb 33843* (BO, L), tree 38 m, fl. May; Daigila Pemins.: *NIFS 33732* (BO, L), tree 22 m, fl. yellow, April.

MISOOL. Salafen: *NIFS bb 14383* (BO), tree 15 m, June.

NEW GUINEA. Western New Guinea, Geelvink Bay distr., Andai: *Sugiyama s.n.* (BO), fl. buds; Amban-Kol: *NGBW 2239* (HOLL, L), tree 35 m, fl. buds, Oct.; Sausapor, primary forest on clayey soil: *NGBW 3946* (HOLL, L), tree 30 m, Nov.; ibidem: *NGBW 4649* (HOLL, L), tree, 30 m; Rendani: *NGBW 2231* (HOLL, L), tree 41 m, fl. buds green; Meos Waar Island: *NGBW 1221*, *1213*, *1294* (HOLL, L), trees 17—25 m, fl. buds June, fr. June; Windos Waar Island: *NGBW 3337* (HOLL, L), tree 25 m, June; Numfur: *NGBW 594* (HOLL, L), tree 50 m, March; distr. Hollandia, Tami, E. of Hollandia: *NGBW 2797* (HOLL, L), tree 34 m, fl. buds May; Tami river mouth: *NGBW 2698* (HOLL, L), tree 38 m, fl. March; ibidem: *NGBW 2706* (HOLL, L), tree 32 m, fl. March; ibidem: *NGBW 2711* (HOLL, L), tree 42 m, fl. & juv. fr. March; ibidem: *NGBW 2720* (HOLL, L), tree, March; ibidem: *NGBW 2723* (HOLL, L), tree 36 m, March; ibidem: *NGBW 2805* (HOLL, L), tree 30 m, fl. buds June; ibidem: *NGBW 2807* (HOLL, L), tree 32 m, fl. buds June; Hottekang: *NGBW 815* (HOLL, L), tree 30 m, Jan.;

ibidem: *NGBW 1543* (HOLL, L), tree 32 m, Oct.; ibidem: *NGBW 1546* (HOLL, L), tree 43 m, Oct.; ibidem: *NGBW 1548* (HOLL, L), tree 35 m, Oct.; ibidem: *NGBW 1572* (HOLL, L), tree 20 m, Oct.; Babrongko, Lake Sentani: *NGBW 5287* (HOLL, L), tree 37 m, fl. buds green, April; Kokas, Ugar: *NGBW 3136* (HOLL, L), tree, June — Papua, Misima Island: *NGF 2774* (CAN, L, LAE), fl. buds June.

NEW BRITAIN. Jacquinot Bay: *Mair 142* (LAE), tree, Jan.; ibidem: *NGF 164* (L, LAE), Jan.; Keravat, alt. 130 m: *Womersley 7936* (L, LAE), tree 16 m, fl. buds, March; Open Bay, Nantambu: *Mair 1875* (LAE), tree 30 m, fl. May.

SOLOMONS. Bougainville, Torokina: *NGF 533* (L, LAE), March.

107. *P. galactoxylum* (F. Mueller) H. J. Lam, l. c. 1925, 107; Lam, l. c. 1927, 414 — *Bassia galactoxyla* F. Mueller, *Fragm. Phyt.* 6, 42, 1867, 27 and vol. 8, 55, 1870, 115 — *Galactoxylon pierrei* Baillon, *Hist. Pl.* 11, 1891, 300, *descr. fl. excl.* — *Sersalisia ? galactoxylon* F. Mueller ex Baillon, l. c., *descr. fl. excl.* — *Sersalisia galactoxylon* (F. Mueller) F. Muell. in Bentham, *Fl. Austr.* 4, 1869, 279 — *Lucuma galactoxyla* (F. Mueller) Bailey, *Qld. Flora* 3, 1900, 955.

Trees, up to 47 m. Branchlets slender, 3—6 mm in diam., with numerous scars of pedicels, ferruginously tomentose, glabrescent; terminal cone up to 9 mm long, ferruginously tomentose; stipules lanceolate-linear, up to 6 by 1 mm, acute at apex, tomentose on outside, glabrous on inside, caducous, sometimes long persistent. *Leaves* conferred at apex of branchlets, oblong-obovate or spatulate, 7—13.5 by 2.5—5 cm, apex rounded, emarginate, obtuse or rarely obtusely acuminate, acumen up to 5 mm long, base narrowly cuneate, decurrent along petioles; glabrous on either side, coriaceous; midrib grooved and minutely crested above, prominent and rounded, sometimes angular below, secondary nerves slender, 8—12(—16) pairs, ascending at an angle of c. 70°, curved, archingly joined, arches 2—3 mm from margin, prominulous on either side, sometimes grooved above, tertiary nerves few, slender, transverse, inconspicuous on either side or sometimes more distinct below, but often almost parallel to the secondary nerves. Petioles 3—15(—25) mm, grooved above, rugose and thickened in the basal part, ferruginously tomentose, but soon glabrous. *Flowers* in 2—4-flowered, axillary clusters along up to 3 mm long brachyblasts, pedicels angular, 6—7 mm long, ferruginously tomentose. *Sepals* ovate, 1.5—2.5 by 1.5—2.5 mm, apex obtuse, ferruginously tomentose on outside, glabrous on inside, inner sepals more rotundate than the outer ones, with membranous, glabrous, fimbriate margins. *Corolla* 6-lobed, c. 2.5 mm long, entirely glabrous, lobes ovate-oblong, c. 2 by 1 mm, rounded or obtuse at apex and fimbriate. *Stamens* 12, c. 1.5 mm long, filaments subulate, c. 0.5 mm long, glabrous, anthers sagittate, c. 1.5 mm long, acuminate, and fimbriate at tip, ferruginously hirsute on either side, dehiscing laterally. *Ovary* ovoid, c. 0.5 by 0.5 mm, 6-lobed, ferruginously hirsute. Style stout, subclaviform, c. 1.5 mm long, when mature c. 10 mm long, glabrous. *Fruits* obliquely ellipsoid, attenuate at either end, 2—3.5 by 1.5—2.5 cm, 1- or 2-seeded, apex subacute, base of style slightly widened, pericarp thin, fleshy, glabrous. Seeds ellipsoid, laterally compressed, c. 2 by 1.5 by 1 cm, rounded at either end, testa cartilaginous, thin, brownish yellow, glossy, scar covering slightly more than  $\frac{1}{3}$  of the surface, brownish, dull, embryo exalbuminous, radicle short.

Type specimen: *Dallachy s.n.* in MEL.

**Distribution:** Australia, Solomons, New Britain, New Guinea.

**Remarks.** The addition by Pierre and Baillon of the details of the androecium seem to be derived from flowers not belonging to the genus *Palauquium* at all and it must be seriously doubted whether Pierre and Baillon matched the right flowers against the fruiting material. This doubt is increased by the fact that von Mueller did not describe the corolla and androecium and Bailey much later also did not give details. From all the material available at present it is clear that the flowers are entirely different from those described by Pierre and Baillon. The description here is therefore derived from the material quoted below, more in particular from the New Guinean material.

**Var. galactoxylum**

Petioles 3—8 mm long.

Type specimen: *Dallachy s.n.* in MEL.

Vernacular names: pencil cedar, moorooke (Queensland).

Ecology: In rainforests at low altitudes.

Distribution: Australia (Queensland).

Queensland, Rockingham Bay: *Dallachy s.n.* (BO, K, L, MEL, P), fr.; Cairns: *Mocatta s.n.* (BRI), Jan.; Mt Gribble: *Bailey s.n.* (BRI), fr. Nov.; North Kennedy distr., Jarra Creek, c. 13 miles NW of Tully, rainforest, alt. c. 50 m: *L. S. Smith & L. J. Webb 4905* (BRI), Nov.; Johnstone river: *Ladbrook s.n.* (BRI, NSW), Nov.

**Var. salomonense** (White) van Royen, nov. comb. — *P. salomonense* White, Journ. Arn. Arb. 31, 1950, 107.

Petioles 8—25 mm long.

Type specimen: *Walker & White BSIP 180* in BRI.

Vernacular names: New Guinea: taubabu (Koiari), joedag, djoerag (Asmat), tau-wa-salaina (Normanby).

Use: On Normanby Island used as posts in native houses.

Ecology: In periodically flooded lowland forests, in swampforests, or sometimes in dry rainforests.

Distribution: New Guinea, New Britain, Solomons.

NEW GUINEA. Western New Guinea, Asmat region, Erma, level land inundated in the wet season, primary forest: *Nautje 6538* (L), tree 20 m, June; ibidem: *Nautje 6533* (L), tree 28 m, immature fr., June; ibidem: *Nautje 6556* (L), tree 25 m, July; ibidem: *NGBW 6516* (L), tree 14 m, June -- Northeastern New Guinea, Bumbu area near Lae: *Vickery 1402* (BRI, L, LAE), tree 45 m, fl. buds July; Lae: *Vickery 939* (L, LAE), tree, fr. Oct.; ibidem: *White, Dadswell & L. S. Smith 1739* (LAE), tree 40 m, fl. & juv. fr. green, Aug.; Yalu area, alt. 100 m: *Vickery 1424* (BRI, L, LAE), tree 47 m, fr. Nov.; Busu river near bridge: *NGF 5515* (CAN, L, LAE), tall tree, Febr.; Botanical Gardens, Lae: *Womersley s.n.* (CAN, L, LAE), fl. May; Wau Rd, west from Lae: *Womersley 4306* (BO, BRI, L, LAE, SING), tree 26 m, juv. fr. July — Southeastern New Guinea, Veiya, riverside swampforest: *Carr 11599* (BM, K, L, SING), tree 16 m, fl. buds March; Kokoda, alt. 400 m: *Carr 16496* (BM, CAN, K, L, SING), tree 30 m, fl. green, May; near Brown river bridge: *Jackson & McDonald 4571* (CAN, L, LAE), tree 26 m, Nov.; Normanby Island, Waikaiuna Plantation: *Jackson 4112* (BO, CAN, L, LAE, SING), tree, Jan.

NEW BRITAIN. Jacquinot Bay: *Haas 164* (BRI), tree 30 m, fl. buds Febr.

SOLOMONS. New Georgia: *Walker & White BSIP 180* (A, BO, BRI), tree 35 m, fl. Oct.

**Remark.** Though the difference between the two varieties seems

to be very slight, on account of its consistency, and on the distinct geographical separation, they are kept apart.

108. *P. brassii* H. J. Lam, n. sp. — Fig. 25.

Arbor magna. Ramuli teretes, brunneo-tomentosi, glabrescentes; stipulae lanceolatae, acutae, longe persistentes, sed ultimo caducae. Folia obovata, 4.7—8.3 × 2.2—3.7 cm, apice obtusa vel obtuse-acuminata, supra glabra, subtus costa ferruginineo-tomentosa excepta glabra. Nervii secundarii utroque latere 9—12, irregulariter arcuato-connecti, tertiarum reticulati, nervis secundariis paralleli. Petiolus 0.6—1.1 cm longus, ferrugineo-tomentosus. Pedicellus ferrugineo-tomentosus. Sepala 6, extus ferrugineo-tomentosa, intus glabra. Corolla glabra. Stamina 12; filamenta glabra; antherae sparse ferrugineo-puberulae. Ovarium 6-loculare, in parte apicali ferrugineo-puberulum ceterum glabrum; stylus glaber. Typus: *Brass 7024* in L.

Trees up to 30 m. Branchlets terete, 3—5 mm in diam., brownish tomentose, glabrescent; terminal cone up to 5 mm long, ferruginously tomentose; stipules lanceolate, 2—3.5 by 1—1.5 mm, apex acute, ferruginously tomentose on outside, glabrous on inside, rather long persistent but finally caducous. *Leaves* subconferted at apex of branchlets, obovate, 4.7—8.3 by 2.2—3.7 cm, apex obtuse or obtusely acuminate, base cuneate, shortly decurrent along adaxial side of petiole; glabrous above, glabrous below except ferruginously tomentose along midrib, subcoriaceous; midrib grooved above, prominent and rounded below, secondary nerves 9—12 pairs, ascending at angle of 70°—80°, straight, forked at apex and irregularly archingly joined rather far from the margins of leaf, slender, prominent on either side, tertiary nerves reticulate-parallel to secondary nerves, slender, prominulous on either side. Petioles 6—11 mm long, grooved above, ferruginously tomentose. *Flowers* solitary or in 2—5-flowered, axillary clusters, pedicels angular, 3—5 mm long, ferruginously tomentose. Outer *sepals* triangular, c. 2 by 2 mm, apex subacute, ferruginously tomentose on outside, glabrous on inside, inner sepals ovate, c. 1.5 by 1.5 mm, apex subacute, margins membranous and fimbriate, ferruginously tomentose without, glabrous within. *Corolla* 4.5—7 mm long, glabrous on either side, reflexed in anthesis, lobes ovate-oblong, 3—4.5 by 1.5—2 mm, apex obtuse. *Stamens* 12, 2.5—3.5 mm long, filaments filiform, angular, c. 1.5 mm long, glabrous, anthers sagittate, 1.2—1.5 mm long, apex acute, dehiscent introrsely, sparsely ferruginously hairy. *Ovary* disciform, c. 1 by 1 mm, 6-celled, 12-lobed, ferruginously puberulous in the upper third only. Style linear, 7—12 mm long, sulcate and twisted, glabrous. *Fruits* unknown.

Type specimen: *Brass 7024* in L.

Ecology: Common large canopy tree on lower ridges.

Distribution: New Guinea.

NEW GUINEA. Southeast New Guinea, Western Distr., Palmer river, 2 miles below junction Black river, alt. 100 m: *Brass 7024* (A, L), fl. June, large canopy tree to 30 m, trunk spurred at base.

Remarks. Apart from the flowers this species, which is named in honour of Mr L. J. Brass, well-known collector of New Guinean plants, resembles *P. fidjiense* but distinctly differs from that species by the longitudinal not transverse tertiary nerves. Its relation is undoubtedly with *P. cuneifolium* from the Philippines, from which it differs by the much smaller and more gracile flowers, the different shape of the ovary, the

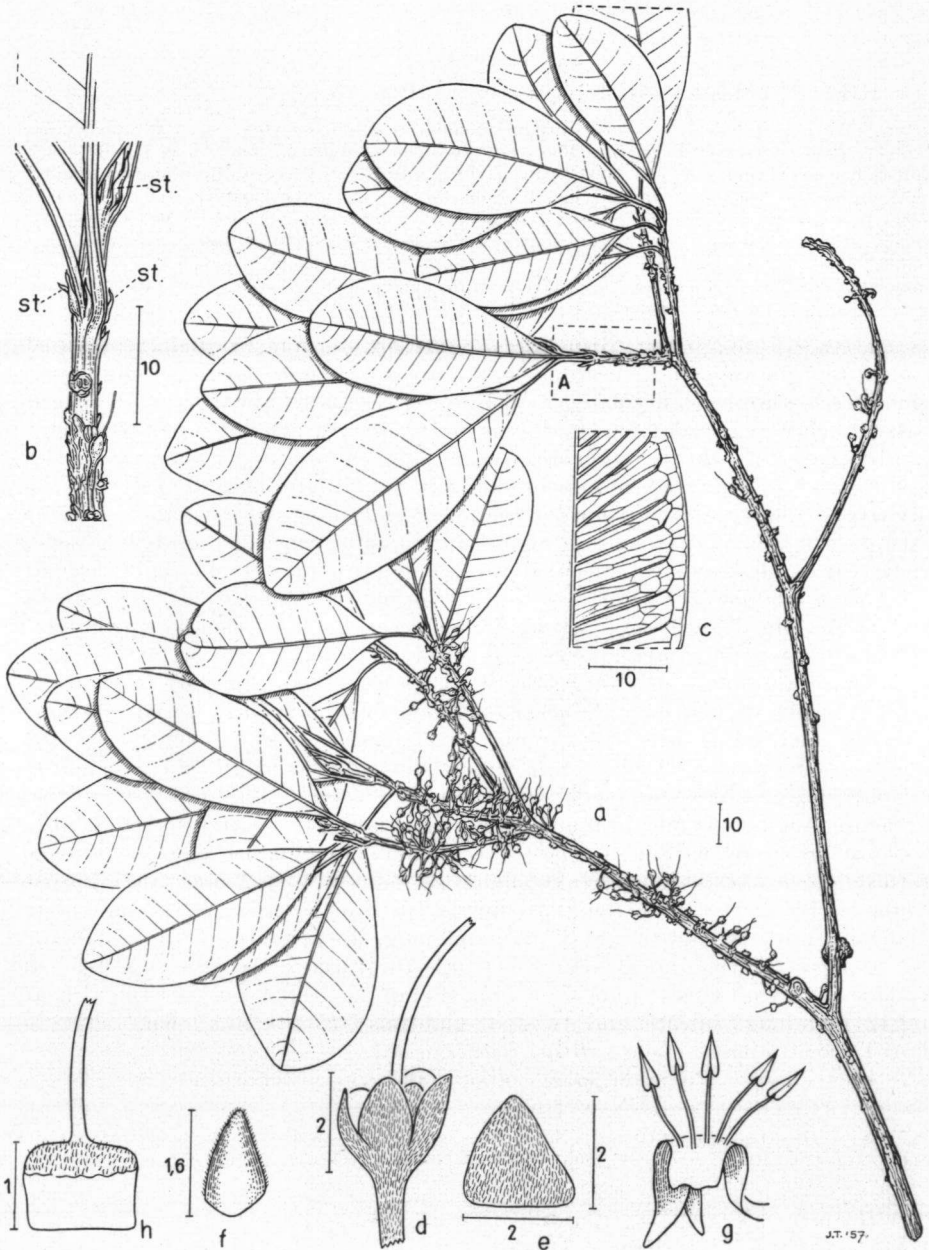


Fig. 25. *P. brassii*, a. branchlet with leaves and flowers (part A enlarged in b); b. branchlet with stipules (st); c. tertiary nervation of leaf; d. calyx and gynaecium; e. outer sepal, outside; f. inner sepal, outside; g. part of corolla, inside; h. gynaecium (*Brass* 7024, pubescence of the flowers in a. left out).

straight pedicels and style (both curved in *P. cuneifolium*) and the less rigid leaves.

109. *P. sumatranum* Burck, Ann. Jard. bot. Btzig 5, 1886, 34, t. 10 f. 9, 10; Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 1; Lam, l. c. 1925, 39, 254; Heyne, Nutt. Pl. Ned. Ind., ed. 2, 2, 1927, 1240; Lam, l. c. 1927, 396; Heyne, l. c., ed. 3, 1, 1950, 1240 — *P. teysmannianum* Burck, l. c., 38; Dubard, l. c. 1909, 17 — *P. beauvisagei* Burck, l. c., 38, t. 10 f. 7—8.

Trees, up to 45 m. Branchlets slender, 4—7 mm in diam., greyish or pale ferruginously puberulous, soon glabrous; terminal cone up to 13 mm long, puberulous; stipules lanceolate, 5—6 by c. 2 mm large, apex acute, puberulous on outside, glabrous on inside, caducous. *Leaves* scattered, elliptic- or obovate-oblong, (8—)14—22 by (2.5—)5—8 cm, apex rounded and usually obtusely acuminate, acumen up to 5 mm long, base narrowly cuneate, decurrent along lateral sides of petioles; glabrous, coriaceous; midrib grooved above, prominent and often angular below, secondary nerves 20—26 pairs, ascending at an angle of 60°—90°, straight, irregularly archingly joined close to the margin or diminishing until inconspicuous, prominulous above, prominent below, tertiary nerves reticulate, parallel to secondary nerves, sometimes a few nerves transverse, prominulous on either side. Petioles 1.6—3.5 cm long, grooved above or flat, slightly thickened in the basal half, dark reddish ferruginously or whitish puberulous, glabrescent. *Flowers* in 2—5-flowered, axillary clusters, pedicels angular, 5—10 mm long, in fruit 7—22 mm long, pale ferruginously or greyish puberulous, in fruit glabrous. *Sepals* ovate, 5—7.5 by 4.5—5.5 mm, apex subobtuse or acute, finely pale ferruginously or greyish puberulous on outside, glabrous on inside, inner sepals with membranous and ciliate margins. *Corolla* 6.5—8 mm long, glabrous except for the ferruginous pubescence of the central parts of the lobes, this pubescence soon disappearing, lobes elliptic or broadly ovate, 5—6 by 2.5—3.5 mm, apex rounded or subtruncate. *Stamens* 12, 5—6 mm long, entirely glabrous, filaments linear, 2.5—3.5 mm long, anthers oblong-ovoid, 2.5—3 mm long, apex acuminate, dehiscent extrorsely. *Ovary* disciform, c. 1 by 2 mm, pale ferruginously puberulous, 6-celled. Style subulate, 8—14 mm long, with 6 distinct stigmas at apex, glabrous. *Fruits* ovoid, ellipsoid or obovoid, 2.2—5 by 1.5—3 cm, apex rounded or acute, 1-seeded, pericarp fleshy, glabrous; seeds slightly smaller than fruit, rounded at apex, acute at base, black, nitidous, scar broadly elliptic, covering about  $\frac{1}{4}$  of the surface of seed, grey, dull, embryo exalbuminous, radicle inferior, slightly exsert.

Type specimen: *Teymann s.n.* in BO.

Vernacular names: Siam: pikul pah; Sumatra: madang sudu sudu, njato durian, meang na bontar, meang-rata, balam durian, balam sudu sudu, njato sudu, gëtah, balam pipit; Borneo: njato gummy, njato katienu.

Ecology: In primary forests up to 1200 m alt.

Distribution: Siam, Sumatra, Riouw, Borneo, Billiton, Java.

SIAM. Trang, Ka-cha-wang, alt. 100 m: *Boonkird* 70 (L), tree, fl. greenish white, April.



SUMATRA. Indragiri Highlands, Danau Mangkuang, alt. 60 m: *NIFS* bb 27535 (BO, L), April; Pagarumbei, Tjenako river: *NIFS* bb 25795 (BO, L), Oct.; Taram, E of Pajakumbuh, on sandstone along river: *Meyer* 6721 (L), tree c. 20 m, Aug.; Palembang, Lematang Ilir, Semangus, alt. 100 m: *NIFS* bb 31748 (BO, L), June; ibidem, alt. 75 m: *NIFS* bb 32128 (BO, L), May; without loc.: *Teysmann* s.n. (BO, L, SING), fl., type specimen of *P. teysmannianum* Burek.

RIOUW. Lingga, Bukit Sei Sembilang, alt. 20 m: *NIFS* bb 32300 (BO, L, SING), fr. July.

JAVA. Cultivated in Hort. Bog.: *Kostermans* 9982 (BO, L), tree 45 m, fl. white, June, said to be a native of Java; ibidem: *Teysmann* s.n. (BO), found in Sumatra, type specimen of *P. beauvisagei* Burek.

BORNEO. Sandakan, Mt Kinabalu: *J. & M. S. Clemens* 40574 (G, K, L), tree 45 m, fl. brownish, white, Oct. — E. Borneo, Sambas: *Beccari* s.n. (FI), fl. — S. E. Borneo, Kutai: *NIFS* bb 14878 (BO, L), Dec.; ibidem, Pengatan: *NIFS* bb 14845 (BO), tree 28 m, Dec.; Tidung Lands, Nunukan: *NIFS* bb 19788 (BO, L), fr. May.

BILLITON. Mt Banten: *van Alphen de Veer* s.n. (BO), May.

Remarks. Though Diepenhorst was the first who collected material of this species it is certain that the type specimen is derived from a tree cultivated in the Bogor Botanical Garden from seeds brought there by Diepenhorst and that Teysmann was the collector of the type specimen and not Diepenhorst as has been stated by Lam, l.c. 1925, 39.

In Lam's publications of 1925 and 1927, *P. beauvisagei* Burek is included in *P. javense* Burek, but a closer study reveals, however, that this is a later synonym of *P. sumatranum* rather than of *P. javense*.

The main difference between *P. javense* and *P. beauvisagei* is the smaller number of secondary nerves, (8—16(—25) against 20—26), the shorter petioles (6—14 against 16—35 mm), and the pubescent anthers in the former species. *P. javense*, finally, appeared to be identical with *P. amboinense* and so the two species are united.

The inclusion of *P. beauvisagei* in *P. sumatranum* geographically clarifies the situation as now *P. sumatranum* is found on Sumatra, Riouw, Borneo, and Billiton and *P. amboinense* from Eastern Java towards and including New Guinea.

### Doubtful species

#### 1. *P. ? annamense* Lecomte, Fl. Gén. Indo-Chine 3, 1930, 900.

Trees, up to 18 m. Branchlets terete, 3—5 mm in diam., glabrous; terminal cone and stipules unknown. Leaves conferted at apex of branchlets, spatulate or subobovoid, 8—10.5 by 3—3.5 cm, apex retuse, rounded or short obtusely acuminate, acumen up to 3 mm long, base narrowly cuneate, decurrent along sides of petioles; glabrous on either side; coriaceous; midrib grooved above, rounded below, secondary nerves 11—13 pairs, ascending at an angle of c. 60°, straight or slightly curved, stronger so at their tips, irregularly archingly joined, slightly grooved above, prominent below, tertiary nerves widely reticulate, inconspicuous and minutely grooved above, prominent below. Petioles 1—2 cm long, flat above, rounded below, thickened and rugose in the basal part, glabrous. Flowers unknown, pedicels in fruit stout, 2—2.5 cm long, glabrous, calyx in fruit 6-lobed, sepals triangular, 5—6 by 5—7 mm, apex obtuse, glabrous on either side. Fruits ovoid, 3—3.5 by 2—2.5 cm, 5—6-celled, 1-seeded, obtuse, pericarp

fleshy, with numerous papillae, glabrous. Seeds ellipsoid, 1.5—2.5 by 0.8—1.2 by 0.3—0.6 cm, testa thin, black, dull, scar as long as the seed, c. 2 mm wide, albumen none, radicle punctiform, not exsert.

Type specimen: *Poilane 1524* in P.

Distribution: Indo-China.

Remarks. The material of this species is rather poor and the insertion in this genus is rather uncertain.

2. *P. ? densivenium* Krause, Bot. Jahrb. 58, 1923, 469; Lam, Nova Guinea 14, 4, 1932, 552, t. 96.

No material of this species could be traced and provisionally the original description by Krause must serve as such:

Arbor alta erecta ramis crassis validis summo apice sparse puberulis cortice brunneo obtectis. Folia ad ramorum apices conferta; petiolus crassus semiteres supra applanatus, late canaliculatus, 1.8—2.8 cm longus, puberulus; lamina rigida supra glabra subtus dense ferrugineo-sericeo-pilosa, obovato-oblonga vel obovato-spathulata, apice breviter indistincte acuminata vel obtusata, basin versus longe sensimque angustata, 2.5—3.5 dm longa, tertio vel quarto superiore usque ad 1.5 dm lata, nervis lateralibus primariis c. 20 a costa valida subtus valde prominente patentibus prope marginem arcuatim adscendentibus supra impressis subtus prominentibus inter se venis transversis numerosis conjunctis percursa. Flores fasciculati; pedicelli breves 1—2 cm longi, sericeo-pilosi; calycis laciniae ovatae stamina nondum nota; ovarium subhemisphaericum, 3 mm altum, stylis glaber 2 cm vel ultra longus.

"Type specimens". *Schlechter 16200, Schultze 43* in B?

Distribution: New Guinea.

Northeastern New Guinea, Kelel, forests, alt. 200 m: *Schlechter 16200*, sterile; Kohari Mts, c. 800 m alt.: *Schultze 43*, fl. Aug.

Remarks. According to Lam, 1932, *Schlechter 16200* has leaves similar to *Planchonella kaernbachiana*, but judging from Krause's description he still regards this species as belonging to *Palaquium*.

3. *P. ? payeni(-ae)folium* Pierre in Beccari, Nelle For. di Borneo, ed. 1, 1902, 602; Lam, l. c. 1925, 106.

No type specimen nor description is indicated and no material which might be regarded as a type specimen turned up during the study of the genus.

4. *P. ? retusum* Beccari, Nelle For. di Borneo, ed. 1, 1902, 560.

Though a small description in Italian is given by Beccari no specimen is indicated that can serve as a base of this species. A search for specimens in the Florence material also proved to be negative. If, however, material turns up of this species the name will be valid since *P. retusum* is used by Merrill in 1909, and that species is renamed into *P. globosum* H. J. Lam.

5. *P. ? tenuifolium* Krause, Bot. Jahrb. 58, 1923, 472; Lam, Nova Guinea 14, 4, 1932, 553, t. 98.

No fertile material has been traced of this species and the original description by Krause must serve as such:

Arbor erecta ramis teretibus modice validis glabris vel summo apice sparse tomentosulis cortice obscure brunneo obtectis. Foliorum petiolus supra applanatus atque canaliculatus, 1.2—1.8 cm longus; lamina tenuiter chartacea utrinque glabra oblonga vel elliptica rarius obovato-oblonga, apice acumine abrupto oblongo obtuso 1—1.4 cm metiente praedita, basi subacuta, 1.6—2 dm longa, 7—9.5 cm lata, nervis lateralibus primariis 7—9 supra prominulis subtus distincte prominentibus angulo fere recto a costa patentibus marginem versus arcuatis percursa. Flores ignoti.

"Type specimens": *Schlechter 12745* and *Stephan 6*.

Distribution: New Britain, New Ireland, Kai Islands ?

NEW BRITAIN. near Massawa: *Schlechter 12745* in BO.

NEW IRELAND. near Muliama: *Stephan 6* in B ?

KAI ISLANDS. cult. in Hort. Bog. (BO), sterile.

6. *P. ? vidalii* Pierre ex Dubard, Bull. Mus. hist. nat. 15, 1909, 381; Merrill, Enum. Phil. Fl. Pl. 3, 3, 1923, 283; Lam, l. c. 1925, 106; Lam, l. c. 1927, 413.

As no material of this species could be found the original description is given here:

Folia elliptica, oblonga, 16 cent. longa, 6 cent. 5 lata, supra glabra, infra puberula, coriacea, 25—30 costulis, nervis transversaliter dispositis. Sepala 6, biseriata, 3 millim. 5—4 millim. alta, deltoidea, acuta, intus glabra, dorso squamuloso-puberula. Corolla adulta, extus sericeo-pilosa, intus glabra, tubo 4 millim. alto, lobis 8 millim. longis, reflexis, staminibus subaequilongis, crassis. Stamina 12, biseriata, exteriora paululo longiora epipetala, filamentis 5 millim. longis, interiora episepala filamentis 4 millim. longis. Antherae 4 millim. 5 altae, extrorsae, profunde cordatae, oblongae, lanceolatae, connectivo brevi denticulato vel apice biscurio, utrinque pilosae. Ovarium 6 loculare pyramidale, 2 millim. altum, basi disco pulvinato suffultum, cum stylo exserto, glabro, subulato, 18 millim. longo.

Type specimen: *Vidal 9* in P ?

Distribution: Philippines.

#### Excluded species

1. *P. angustifolium* Merrill, Bur. Gvt Lab. Bull. 17, 1904, 45 = *Planchonella firma* (Miq.) Dubard, Lam l. c. 1925, 202.

2. *P. beccarii* Pierre ex Dubard, Bull. Soc. bot. Fr. 56, 1909, Mém. 16, p. 20; Lam, l. c. 1925, 47; Lam, l. c. 1927, 398 = *Aulandra beccarii* (Pierre) van Royen, Blumea, Suppl. IV, 1958, 263, f. 1.

3. *P. boninense* Nakai, Rigakkwai 26, 1928, 11 = *Planchonella ? boninensis* (Nakai) Masamuna & Yanagihara, Transac. Nat. Hist. Soc. Formosa 31, 1941, 322.

4. *P. nadeaudi* Drake, Fl. Polyn. Franc., 1891, 120 = *Nesoluma nadeaudi* (Drake) Pierre ex H. J. Lam, Occ. Papers Bishop Mus. Honolulu 14, 1938, 154.

5. *P. neocaledonicum* Moore, J. Linn. Soc. 45, 1920, 353 = *Pycnandra neocaledonica* (Moore) Vink, Nova Guinea N. S. 8, 1, 1957, 116.

6. *P. sussu* Engler, Notizbl. Berl. 1, 1895, 101 = *Planchonella sussu* (Engler) H. J. Lam, Nova Guinea 14, 4, 1932, 564, t. 119.

7. *P. ? species*, Lam, l.c. 1925, 107 — *Bassia elongata* Miquel, Fl. Ind. Bat. Suppl., 1860, 582; Burek, Ann. Jard. bot. Btzg 5, 1886, 46; Ridley, Fl. Mal. Pen. 2, 1923, 272 — *Illipe elongata* (Miquel) Engler, Bot. Jahrb. 12, 1890, 509 = *Trigonostemon* sp. (Euphorbiaceae).

### Index of collectors' numbers

The numbers between brackets indicate the number of the species in the text. Those with the prefix D. or E. indicate the number of the doubtful or excluded species. S.n. means specimen without number.

**Abdula Hamid** 37579 (90) — **Abu** 11002 (66) — **Achmad** 1216 (45) — **Aet** 7 (70) — **Aet & Idjan** 872 (48), 910 (48) — **Agama** A 1809 (8), SAN 17670 (8) — **Arguilar** 11186 (12) — **Ahern** 42 (67), 608 (60), 837 (58), 841 (60) — **Ahern's Coll.** 1109 (12), 1853 (12), 1968 (60), 3250 (12), 3350 (12) — **Ahmad** 4759 (25), CF 5706 (81), 5709 (25), 25342 (90), 53357 (90) — **Ali** 29996 (99) — **Aliho** A 488 (104) — **Alphen de Veer** s.n. (86) — **Alvarez** 22370 (79) — **Alvius** 11307 (90) — **Amam** s.n. (81) — **Ammandale** s.n. (1) — **Anderson** 28 (45), 40 (52), 53 (104), 55 (52), 56 (48), 482 (104), 572 (104), 1953 (74), 2053 (74), 2089 (74), 2619 (48), 2678 (104), 2797 (104), 2827 (48), 5647 (74), 7921 (48), 8040 (48), 8642 (105), 9013 (48), 9058 (105), 50527 (90), 50585 (90), S 64 (74), S 441 (48), S 472 (48), S 497 (104), S 653 (74), S 657 (74), S 680 (48), S 872 (48), S 874 (48), S 896 (104), S 1768 (104), S 2196 (48), S 2345 (48), S 2627 (105), S 2685 (105), S 2834 (105), S 2867 (74), S 3165 (104), S 3279 (104), S 4156 (74), S 4192 (74) — **Angeles** 27732 (101) — **Anta** 390 (90), 688 (90), 1104 (90) — **Arip** 6847 (90), 6848 (90), 6849 (90), 17201 (90), 17232 (90) — **Arnot** 14185 (66) — **Asdat** 86 (53) — **Ashton** BRUN 34 (85), BRUN 149 (52), BRUN 416 (48) — **Atasrip** 7, 8, 23, 33, 70, 223 (23), 48 (71) — **Awang bin Deli** 70108 (99), 47832 (90) — **Aziz Budin** 363 (33).

**Bailey** s.n. (107) — **Bakar** 10973 (25), 25321 (33), 65853 (94) — **Baker** 2216 (12), 2872 (9) — **Bakhuizen v. d. Brink** 2666 (82) — **Barber** 3894 (49), 8464 (49) — **Barnes** 62 (27), 131 (12), 154 (62), 155 (60), 156 (61), 162 (60), 168 (5), 169 (61), 179 (60), 486 (60), 496 (61) — **Bawan** 25356 (20) — **Beccari** s.n. (81, 86), 34 (8), 88 (81), 361 (43), 557 (37), 783 (8), 1362 (52), 1439 (36), 1549 (32), 2097 (81), 2099 (35), 2226 (83), 2269 (81), 2278 (83), 2283 (84), 2284 (86), 2490 (36), 2614 (83), 2752 (83), 3013 (90), 3286 (40), 4069 (8) — **Beguain** 241 (99), 246 (48), 392 (99), 423 (54), 486 (54), 577 (96), 2087 (79) — **Bell & Haniff** s.n. (102) — **Boonkird** 70 (86) — **Borden** 698 (72), 1247 (62), 1918 (72), 2325 (72) — **Bourdillon** s.n. (92), 186 (49) — **Brass** 6589 (48), 7023 (23), 7024 (108), 25386 (23) — **Brass & Versteegh** 13543 (56) — **Brooke** 10596 (74) — **Browne** 1150 (90), 14363 (7) — **Bryant** s.n. (81) — **Budin** A 1286 (104) — **Burek** s.n. (90) — **Burkill** 3153 (25), 6333 (25), 13350 (1) — **Burn-Murdoch** s.n. (50, 82), 10821 (6) — **Buwalda** 4 (104), 47 (104), 286 (99), 4963 (70), 5119 (70), 6158 (90), 6610 (48), 7757 (48), 7810 (74), 7812 (104), 7860 (104).

**Cantley** 63 (96) — **Carr** 11599 (107), 16496 (107) — **Carroll** 205 (46), 1166 (46), 7172 (37) — **Castillo & Valderama** 18 (45) — **Castro** PNH 6517 (34) — **Catalan** 26388 (67) — **CF** 530 (81), 532 (81), 2009 (7), 3897 (81), 4940 (50), 7045 (25) — **Christophersen** 29 (4), 2884 (4), 3255 (3) — **Clarke** 42399 (88) — **Clemens** 1033 (60), 8293 (57) — **Clemens & Clemens** 1154 (28), 1155a (28), 21114 (10), 21532 (19), 21534 (10), 21824 (19), 22200 (83), 27635 (19), 29022 (68), 29208 (68), 30066 (81), 31232 (81), 32080 (68), 40446 (68), 40571 (81), 40574 (86), 40605 (68), 40646 A (68), 50331 (81), 50445 (68), 50695 (81) — **Clemente** 6218 (68) — **Collins** s.n. (50) — **Corner** s.n. (1, 99), 21324 (1), 25891 (96), 25990 (96), 28516 (99), 28639 (1), 29265 (96), 29320 (94), 29379 (94), 30789 (77), 32990 (94), 33587 (97), 34516 (97), 34671 (97), 35553 (6), 36298 (99), 37078 (45), 37117 (90), 37720 (45) — **Craddock** s.n. (50) — **Cuadra** A 1347 (80), A 1375 (90), A 2457 (90), A 3068 (90), SF 30592 (7) — **Cubitts** CF 854 (1) — **Cullen** s.n. (49) — **Curran** 5274 (60), 5842 (60), 10613 (12), 10917 (21) — **Curran & Merritt** 8245 (103) — **Curtis** s.n. (1, 7, 81, 90), 780 (81), 3481 (1), 3482 (1), 3535 (81), 3582 (81), 3630 (81), 3631 (50), 3632 (81), 3633

(81), 3634 (81), 3636 (81), 3637 (81), 3638 (50), 3734 (50), 3725 (81), 3763 (50), 3764 (50).

**Dallachy** s.n. (107) — **Dalzell** s.n. (49) — **Dangut** 1116 (81), A 1274 (81) — **Daud** 11335 (37) — **Daud & Tachun** 35705 (10), 36097 (83) — **Debah** 17218 (90) — **van Delden** s.n. (7) — **Derry** 59 (1), 88 (1) — **Desmukh** s.n. (83) — **Diepenhorst** s.n. (90) — **Dimal** s.n. (90) — **Din** 42142 (1), 73615 (1) — **Dinthawng** 1573 (1) — **Drahman** S 906 (104) — **Drescher** s.n. (81) — **Drew** s.n. (49) — **Dunnam** s.n. (81).

**Edaño** 11909 (12), 41724 (13), 45990 (12), 75985 (96), 76043 (62), 76237 (12) — **Egerton** s.n. (1) — **Egon** 239 (83), 340 (105), 349 (81), 358 (81), 373 (48), 489 (83), 509 (83), 583 (90), 612 (81), 978 (105), A 925 (52), A 926 (52), F 335 (48) — **Elmer** 8523 (21), 9129 (21), 11816 (12), 12126 (101), 12515 (1), 12553 (10), 12813 (101), 13660 (28), 13896 (30), 15370 (67), 15775 (12), 16029 (67), 16303 (62), 17196 (72), 17819 (9), 21170 (42), 21620 (42) — **Endert** 3021 (18), 3550 (68), 3620 (68), 3642 (68), P 423 (45) — **Eseritor** 11852 (48).

**Falconer** 34 (1) — **Fenix** 3668 (61), 4101 (16), 29837 (21), 29934 (21) — **FMS** 35959 (97), 35960 (97) — **Foenander** 23041 (6) — **Foston** 18881 (66), 18876 (90) — **Fox** PNH 9017 (67), 11306 (81) — **Foxworthy** 499 (7) — **Foxworthy & Ramos** 13112 (63) — **F. R.** 66453 (1), 71160 (1) — **de Fretes** 5616 (38) — **F. S. S.** 1 (121) — **Furtado** s.n. (1, 90).

**Gamble** 6769 A (88) — **Gammill** 222 (60), 238 (103) — **Garrett** 113 (73) — **Garrill** 22 (45) — **Ghani** 2095 (25) — **Goodenough** 1543 (1) — **Grashoff** 246 (77), 1010 (66) — **Greenwood** 842 (15), 914 (80) — **Griffith** 3606 (1), 3609 (45).

**Haas** NGF 142 (106) — **Haenke** 357 (16) — **Hamid** CF 877 (25), 4885 (25), CF 4967 (81), 10353 (6), 10367 (66), 10582 (6), 11032 (38), 33415 (6), 38511 (45), 39889 (45) — **Haniff** 3836 (50) — **Haniff & Nur** 2726 (90) — **Harvey** A 114 (90) — **Haviland** 508 (42), 898/801 (11), 1875 (37), 1890 (36), 1893 (104), 2030 (10), 3034 (90), 3036 (90) — **Haviland & Howe** 624 (10), 3485 F (104) — **HB** s.n. (85), 56 (82), IV. B. 12 (38) — **Hebblethwaite** 548 (57) — **Henderson** s.n. (1), 110 (81) — **Henry** 341 (16), 434 (16) — **Hervey** s.n. (33) — **Hewitt** S. I. 3 (104), S. I. 5 (104) — **Heyne** 891 (7) — **Hill** s.n. (81) — **Hodgson** 5693 (94), CF 9570 (50) — **Holtum** 9806 (25), 15153 (1) — **Hoogland** 3981 (71), 4521 (29) — **Hooker & Thompson** s.n. (49, 88) — **Hooper & Rawaswami** 39432 (49) — **Horne** 717 (74), 1117 (15) — **v. d. Horst** s.n. (47) — **Hudson** s.n. (81) — **Hutchinson** 7579 (60).

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### Addendum

P. 552, to 80. *P. vitilevuense* Gilly.

Remark. The description of this species apparently has never been published by Gilly, though from the annotations on the material in New York and Kew it was intended. To validate it a short latin diagnosis is given below.

Arbor. Folia elliptico-oblonga, 10—20 × 3.5—4.5 cm, apice rotundata vel obtusa, glabra sed costa subtus excepta. Nervii secundarii utroque latere 17—25, sursum evanescenti, tertiarii transversi. Petiolus 1.5—2 cm longus, ferrugineo-lanatus. Sepala late ovata, extus ferrugineo-lanata, intus glabra. Corolla glabra. Stamina 12, filamenta glabra; antherae utroque latere ferrugineo-tomentosa. Ovario 6-loculare, ferrugineo-pubescentis; stylus glaber. Fructus ignotus. Typus: *Greenwood 914* in NY.