

A JOURNAL ON TAXONOMIC BOTANY,
PLANT -SOCIOLOGY AND ECOLOGY

REINWARDTIA

Editors

MIEN A. HUBER
KIJS WAT A KARTAWINATA
N. WULIJARNI-SOETJIPTO

¹ Published by

HERBARIUM BOGORIENSE
LEMBAGA BIOLOGI NASIONAL — LIPI
BO.SOR, INDONESIA

Einwardtia Vol. 9, Part 1, 1 —182 31 December 1974

10- ISSN 0(f34-365X

A REVISION OF MALESIAN CAESALPINIA,
INCLUDING MEZONEURON
(LEGUMINOSAE-CAESALPINIACEAE)

T. A. HATTINK

B. A. Krukoff *botanik of Mdeiaian botany, Rijksherbarium,
Leiden, Netherlands*

SUMMARY

This is the first taxonomic revision of this pantropical genus of prickly climbers for the area, the Solomons inclusive. It deals with 21 species, of which 19 are native (dealt with over the whole of their area), and 2 are widely naturalized, viz *C. pulckerrima* and *C. sappan*. Also mentioned are 3 occasional introductions. Full descriptions are given, keys to the native and to the cultivated species, the complete synonymy and typification with all important later references. Many new deductions have been made, some from adjacent regions.

New species are *C. opprimitifolia*, from Borneo, with truly opposite leaves and *C. Bolomonensis* from the Solomons; new combinations are *C. melowensis* based on *Mezoneuron melowensis* Prain, *C. furfuracea* based on *M. furfuraceum* Prain, *C. hymenocarpa* based on *M. hymenocarpum* Prain, *C. latilobum* based on *M. latilobum* (Cavron.) Merr., *C. mindorevigit* based on *M. mindorevigitse* Merr., *C. pubescens* based on *M. pubescens* Desf., *C. scortechinii* based on *M. scortechinii* F.v.M. from Queensland and now on record from New Guinea, the last one closely resembling *C. brachycarpa*, another new combination based on *M. brachycarpum* Benth. from New South Wales.

No subdivisions of the genus are adopted or proposed. The long-standing nomenclatural confusion between *C. bonduc*, *C. bonducella*, *C. cristata*, and *C. major* has been visualized in a diagram. Specimens of importance for the knowledge of the area have been cited. Extreme and intergrading specimens are discussed. Reference is made to the main taxonomic literature.

Indexes to all names and all specimens are given.

ABSTRAK

Di Maleia dan kepulauan Solomon marga *Caesalpinia* diwakili oleh 21 jenis, 19 jenis di antaranya asli dan dua jenis lagi (*C. puUherrima* dan *C. eappati*) merupakan basil naturalisasi; tiga jenis yang kadang-kadang didatangkan disinggung juga. Dua jenis baru dan delapan kombinasi baru diusulkan untuk pertama kali, dan beberapa jenis lagi diperlakukan sebagai sinonim jenis lainnya. Pertelaan lengkap, gambar-gambar, daftar sinonim, acuan tentang nilai ekonomi masing-masing jenis serta kunci detenninaai jenis-jenis asli serta jenis-jenis yang dibudidayakan disajikan pula.

INTRODUCTION

This revision was made as a contribution to the Flora Malesiana, but as the family for that work is not expected to be completed before a few years hence, the descriptive parts are already published here.

Since it is also a precursory study to that Flora, the regions adjacent to Malesia have also been taken into account, and several names from S.E. Asia have here been evaluated as well. As for the non native species, a clear difference can be made between the common ones *C. pulcherrima* and *C. swppan*, which were evidently introduced long ago, on the one hand, and a few occasional introductions on the other. All have been incorporated in the 'Key to the cultivated species' before the treatment of the species. The common species have been dealt with in the same style as the indigenous ones; the others have been mentioned in the key only.

An effort has been made to evaluate all names ever used for *Caesalpinia* in the present circumscription in Malesia*). However, it would not be expedient to cite and correct the many misapplications of names. The Index to Specimens at the end will provide a detailed clue to most of the works in which material was cited. The most complicated case of nomenclatural confusion has been elucidated in figure 1.

Type specimens have been cited with the names based on them and not again among the 'Specimens Examined' under the species. In the latter category altitudes have been given if this seemed informative, and fertility only if the date of collection was known.

CHARACTERS AND THEIR TAXONOMIC SIGNIFICANCE

Most species of *Caesalpinia* are climbers or straggling shrubs, only a few species attain the *It a b it* of a small tree. One species, *C. parviflora*, usually is a climber, but a few old collections from Malaya were reported to be from small trees.

A species can be recognized by its flowers as well as by its fruits, but leaflets are usually necessary too.

The hairs in *Caesalpinia* are simple and usually appressed. In *C. bonduc* and *C. major* occur on the pedicels and calyx sometimes also glandular hairs.

The *branchlets*, as far as they have been collected, mostly are armed with recurved spines. In some species these are also inserted at the leaf base beside the stipules (see below). In *C. bonduc* and *C. major* also straight prickles occur; sometimes these prickles are very densely placed on the branches and the leaf rachises. The prickles on the old stems may occur on top of corky knobs. Since those stems, or the older branches, are rarely collected, and the field notes about this are scarce, it is uncertain whether this occurs in all species. A few collections only consisting of stems with those knobs and no leaves present, could not be identified by me.

The presence and the shape of the *stipule s* have some taxonomic importance, but they are not always available. Two species, *C. sappan* and *C. latisiliqua*, have on either side of the leaf base a raised line, which may be the scar of a stipule. In spite of the abundant material I could not find any field note about stipules on the living plant. In one Malesian species, *C. oppositifolia*, the stipules are interpetiolar. In the latter species the leaves are opposite, while they are alternate in all other Malesian species. The leaves are double-pinnate, a terminal pinna is present only in the introduced *C. coriaria*.

In most species the rachises are armed underneath; usually the prickles are recurved and inserted in pairs below the base of the pinnae and often also scattered ones occur. The length of the petiole varies, and no taxonomic value could be found. The pinnae are opposite, rarely the lowest two are subopposite. The distances between the pinnae decrease towards the top. Usually also the pinnae decrease in length towards the top, but in some species the pinnae in the middle are the longest.

For the *leaflets* the presence of a stalk, the arrangement and the shape of the leaflets are characteristic, though not always specific. In some species the leaflets always are opposite, in a few species always alternate, but in most species both may occur, often even on one specimen. The size of the leaflets usually is variable, often so with the number: the more leaflets, the smaller they are and conversely. Only in a few species is the number of leaflets per pinna of taxonomic importance. Often the terminal leaflets deviate in shape and size. In some species the leaflets are linear, usually the shape is rectangular or elliptic.

The *inflorescences* are racemose, axillary and terminal, often branched. In many species the upper leaves fall off, giving the inflorescence the appearance of a panicle, but then scars of the leaves are perceptible. In some *C. latisiliqua* and *C. sumatrana* specimens the

*Of the indigenous Malesian species 49 types, from inside and outside Malesia, could be examined; 11 types were lost or inaccessible. The total number of names of sections, species, and infraspecific taxa evaluated in this study, amounts to 123. The total number of examined specimens is about 1640, the duplicates not reckoned.

inflorescences are conspicuously thickened from the beginning. The bracts are usually early caducous, in some species they are wanting.

Pedicels and flowers are of taxonomic importance, that is whether or not 1) the pedicels are jointed above the base, 2) the pedicels and flower buds are hairy, 3) the standard is bilobed or entire, and smaller or longer than the other petals, 4) the flowers are unisexual or bisexual, 5) the ovary is hairy and also 6) the number of ovules.

The flowers usually are bisexual. Two species have unisexual flowers: the female ones do have stamens, but the anthers contain no pollen; the male flowers have a rudimentary ovary. The racemes only have flowers of one sex, whether the whole plant is unisexual is uncertain. The colour of the flowers usually is yellow, in some species also combined with red. Sometimes the calyx is yellow too. In *C. parviflora* the flowers are sometimes whitish or greenish. The stamens are useless for identification, except in *C. pulcherrima* where the filaments are conspicuously long, and in *C. bondua* and *C. -major*, where in female flowers the anthers contain no pollen. The filaments usually are hairy, except in *C. swinratrana* where they often are glabrous. The anthers are glabrous, except in *C. seorteckinii* where they are villose. The width of the stigma ranges from as narrow as the style to much wider, the top of the style then being funnel-shaped. The stigma is never peltate, as it is in the allied genus *Peltophorum*.

The fruit is a good means to distinguish the species, but not always diagnostic. For *C. furfuracea* this is difficult, as most fruiting specimens are leafless, and the pods are very similar to those of *C. andamanica*. From two species, *C. parviflora* and *C. oppositifolia* I saw ripe pods detached only; the pods and their seeds are similar and may have been mixed up. In winged fruits the wing usually runs along the whole length, but sometimes begins up to 1 cm above the base. The top also is often variable; the wing may end up to γ° cm below the top or the top may be hooked. In the latter case the wing goes further than the top and is curved to the seed bearing part. For possibilities within one species, see fig. 6.

TAXONOMY

In the genus *Caesalpinia* occur many different types of pods. The first one to remark this was De Candolle, he also was the first to divide *Caesalpinia* into sections on account of the fruits. Two of his four sections contain Malesian species: sect. *Nugaria* (with our *C. arista*) and sect. *Sappania* (with *C. sappan* and *C. digyna*). Bentham & Hooker

(1865) divided *Caesalpinia* into 10 sections; in Malesia occur only species of the sections *Nugaria* DC., *Gulandina* (L., genus), *Sappania* DC., *Caesalpinaria* B. & H. (with the introduced *C. pulcherrima* only) and *Cinclidocarpus* (Zollinger, genus). In the latter section they also placed *C. digyna*, which De Candolle had in sect. *Sappania*. Bentham's sections were adopted by Taubert (1894). Baker (1878) divided *Caesalpinia* into 3 subgenera: *Gulandina*, *Eucaesalpinia*, and *Cinclidocarpus*.

The genus *Mezoneuron* was divided by Miquel (1855) into a subgenus *Tubicalyx*, and another one, left unnamed. Baker divided the genus in * *Eumezoneuron* and *[†] *Tubicalyx*; Taubert established these as sections.

As in this paper only the Malesian species are revised, representing only a part of the whole diversity of the genus, I refrained from subdividing *Caesalpinia*.

The genus *Mezoneuron* was only differentiated from *Caesalpinia* on the pods, which in the former were taken to be winged along the dorsal suture, and in the latter were wingless. However, *C. decapetala* often bears a narrow dorsal wing on the pod. The pods of the Linnaean genus *Gulandina* (where our *C. bondua* was placed) are spiny; in those of *C. digyna* the sutures are thickened, and there is a great variety in pod dehiscence, yet these are all reckoned to *Caesalpinia*. In the latter as well as in *Mezoneuron* the fruits display quite a variety of shape, and the number of seeds ranges from 1 to about 12 in both. In both *Caesalpinia* and '*Mezoneuron*' also trees occur, e.g. *C. sappan* and *C. kavaensis* Mann (in Proc. Am. Ac. Arts Sc: 164. 1866, and was referred to *Mezoneuron* by Hillebrand in 1888).

Mezoneuron sinense Hemsl.*) in J- Linn. Soc. 23: 204. 1887, from China, is in foliage, flowers, and pods very near *C. nuga* (our *C. crista*) but the pods of the former are narrowly winged on the dorsal suture. Prain (in J. As. Soc. Beng. ii 66: 470. 1897) tentatively suggested to move *C. nucja* out of *Caesalpinia* and to put it together with *Mezoneuron sinense* in a new genus, '*Nugaria*'.

Mezoneuron seorteckinii resembles a *Caesalpinia*, notably *C. crista*, as for the flowers, and *M. brachyarpum* Eenth., Fl. Austr. 2: 278. 1864, as for the leaves and fruits. Both species are also intermediate between the two genera in having the pod being comparatively much broader and the valves of the pod much thicker than in other species attributed to *Mezoneuron*. Remarkable is that the pods of *M. scortechinn* are dehiscent, and in the herbarium have lost their wing: dehiscence

*) Of *C. chmensh* Roxb. [Hort. Bcng.: S2. 1814, nomen] Fl. Ind. ed. Carey 3: 381. 1832, from China, I have not seen the type, but it cannot be the same species.

only occurs in some *Caesalpinia* species. With the resemblance of the fruits of *M. scortechinii* to those of *C. stenoptera* Merr. in J. AMI. Arb. 19- 35, 1938, from Tonkin, the presumed generic distinction crumbles down further. Brennan in Kew Bull. 17: 203, 1963, already doubted the distinction because of the great variation in pods between the species of both.

When I visited the Kew Herbarium, Mr. Brennan suggested that also *pUrolobium* might be incorporated in *Caemlpinia*. However: 1) there are no species with transitional fruits between *PUrolobium* and either *Caesalpinia*, or *Mezoneuron*, 2) the fruits of all *Pterolobium* species are very uniform, 3) contrary to *Caesalpinia* and *Mezoneuron* the genus *Pterolobium* may be recognized in flower on account of the shape of the ovary. In my opinion *Pterolobium* is a distinct genus.

The monotypic genus *Wagatea*, to which *C. pteata* was transferred, was distinguished on account of the conspicuous long calyx tube and the absence of pedicels (actually they do occur). The same sort of calyx, However, occurs in *C. sumatma*, for some time reckoned to *Mezoneuron*. *Wagatea* is therefore reckoned to *Caesalpinia*.

DISTRIBUTION

A regularity in the distribution patterns of the indigenous species is shown by the coastal *G. bondiic* and *C. arista*, and also by a few species which seem consistently to avoid evevvet conditions, namely *C. digyna*, *enneaphylla*, *furfuracea*, *kymenacarpa*, and to a lesser degree *C. pwbwceps*. In the same category seems to come *C. andamanica* save for a collection from true rain forest area in S. Sumatra. Local endemics are *C. mmdorensis*, *ovositifolia*, and *solomonensis*.

Caemlpinia cucullata, *latisiliqua*, *parviflora*, *swm.tro.wx*, and *tortuosa* occur rather scattered in parts of Malesia. Most remarkable is the distribution pattern of *C. decapetaU* which is the only species that occurs mostly on mountains, up to ca 1700 m; at lower altitudes it might have been planted for use in hedges.

Of three species the distribution in Borneo seems to be confined to a very small area around Sandakar.; *C. oppositifolia* is there endemic, *C. varviflora* is also found at Palawan and in western Malaya, *C. » trana* occurs also in Sumatra, Malaya, Java, New Guinea, and the Solomon Islands.

Although frequency is hard to judge from the available material as far as not belonging to the common coastal species, and the armature may have deterred collectors, most species seem to be generally rare.

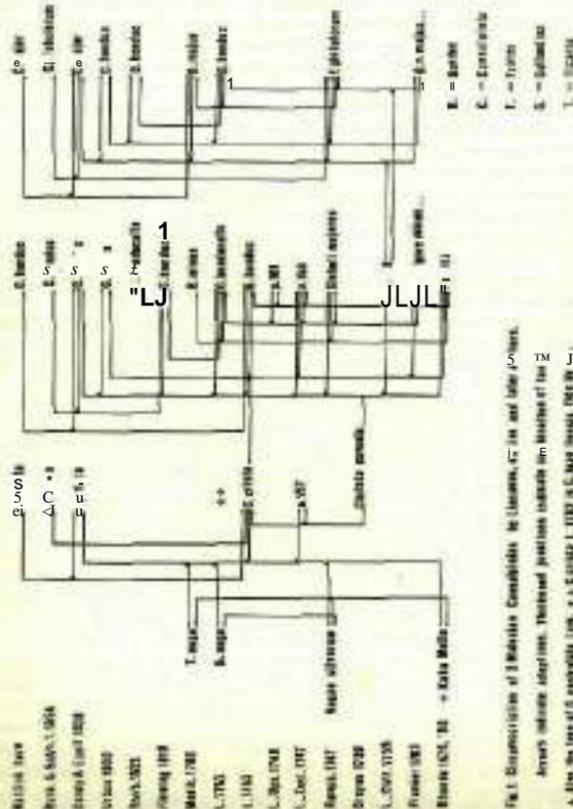


Fig. 1. Re-arrangement of 3 Maleian Caesalpiniae by Linnaeus, 1759, in the 1st and 2nd editions. Accuracy indicates agreement. The shaded quadrates indicate the Malayan of the 1st edition. The shaded squares indicate the Malayan of the 2nd edition. The shaded circles indicate the Malayan of the 3rd edition. The shaded triangles indicate the Malayan of the 4th edition. The shaded diamonds indicate the Malayan of the 5th edition.



Fig. 1. Distribution of the species *Caesalpinia* in Malacca and the Malay Peninsula, with their collection in B.F. Java and Sumatra (with further specimens). Above the symbols: number of collection in each year; below the symbols: number of specimens.

VERNACULAR NAMES

As many species bear similar sounding vernacular names, these apparently have little distinctive value. Vernacular names may be found in Back., Schooffl.: 396-401. 1911; Burk., Diet. 2nd ed.: 389-394, 1488, 1966; Heyne, Nutt. Pl. 3rd ed. 1: 750-753. 1950; Men-, in Philip. J. Sc. 4: Bot. 26S. 1909; ibid. 5: Eot. 56-57. 1910; Enum. Philip. 2: 266-269, 1923; Koord., Exk. Fl. Java 2: 371. 1912.

USES

Uses mentioned on the labels are not included in the text, because much about it is uncertain. The cultivated species are almost all introduced because of their dye (*C. sappan*) or tanning material (*C. coriaria*), or as ornamental (*C. pulcherrima*, *spicata*, *spinosa*). For further information see: Burk., Diet.: 386-393, 1463. 1935; 2nd ed.: 389-397, 1488, 1966; Heyne, Nutt. Pl. 3rd ed. 1: 750-755. 1950; Watt, Diet. Ec. Prod. Ind. 2: 3-12. 1889; Comm. Prod. Ind.: 190-196. 1908.

ACKNOWLEDGEMENTS

I express my sincere thanks to the Directors of the Herbaria listed in the Index to examined Specimens, for the loan of their material and/or the hospitality given for my stay at their institutions, particularly to Professor C. G. J. van Steenis and to his successor Professor C. Kalkman for receiving me at the Rijks herbarium and for allowing me the use of the facilities and for the services of the staff, of whom especially the draftsmen Miss Ruth van Crevel and Mr. C. L. Marks, and the typist Miss Emmy van Nieuwkoop are here remembered for the expert jobs they did.

Thanks are also due to Mr. J. P. M. Brenan and Mr. R. M. Polhill at Kew, and Dr. J. E. Vidal at Paris, here remembered for the personal interest they expressed in the work and for the stimulating help they gave me.

Last but not least, I should like to thank my supervisor at the Rijksherbarium, Dr. Marius Jacobs, for whose patience, interest, guidance and help I feel very much indebted.

CAESALPINIA L.

Caesalpinia L., Sp. Pl.: 380. 1755; Gen. Pl. 5th ed.: 178. 1754 ('*Caexalpinia*'); Cavan., Deser. Pl.: 467. 1802; DC, Prod. 2: 480. 1825 (including the sections *Ningaria* and *Sappania*); Mem. Leg.: 458. 1837; W. & A. Prod.: 280. 1834; Miq., Pl. Ind. Bat. 1, 1: 107. 1855; B. & H., Gen. Pl. 1: 565. 1865 (including the sections *Nagano*, *ChHaydina*, *Sappania*, *Caesalpinia* and *Cinclidocarpus*); Baker in Hook, f.

Fl. Br. Ind. 2: 254. 1878 (including the subgenera *Guilandina*, *Eueaenlpinia* and *CincKdacarpus*); Taubert in E. & P., Nat. Pil. Fam. iii 3: 173. 1834 (including the sections taken from B. & H.); Prain in J. Aa. Soc. Beng. ii 66: 225. 1857; Gagn. TO Fl. Gen. I.-C. 2: 173. 1913; Back. & Bakh. f. Fl. Java 1: 5U. 1964; Hutch., Gen. Fl. Pl. I: 260. 1964.

Guilaudina L., Sp. PL: 381. 1753; Gen. PL 5th ed.: 179. 1754; DC., Prod. 2: 480. 1825; W. & A., Prod.: 280. 1834; Miq., Fl. Ind. Bat. 1, 1: 113. 1855.

Poinciana L., Sp. PL: 380. 1753.

Bovdur, P. Miller, Card. Diet. Abr. cd. (no pas.) 1754; Medik., Theod. Sp.: 40. 1786.

Campecia Adans., Fam. PL 2: 318. 1763.

Ticanto Adans., Para. PL 2: 319. 1763.

CincHdocarpus Zoll. in Nat. Geneeak. Arch. N.I. 3: 81. 1816.

Biancaea Todarc., Nuov. Gen. Sp. PL: 21. 1858.

*Mezaneuron**) *Vest*, in Mem. Mus. Hiat. Nat. Paris i: 245. 1818; DC., Prod. 2: 484. 1825; W. & A., Prod.: 282. 1834; Miq., Fl. Ind. Bet. 1, 1: 103. 1855; *ibid.*: 1081. 1858 (including the subgenus *Tubicalyx*); E. & H., Gen. Pl. I: 565. 1865; Baker *ia* Hook. f., Pl. Br. Ind. 2: 257. 1878 (including **Eumetonuron* and **Tubicalyx*); Boerl., Handl. 1: 392. 1890; Taubert in E. ii P., Nat. Pil. Fara. iii 3: 176. 1391 (including the sections *Eumenneuron* and *Tubicalyx*); Prain in J. Aa. Soc. Eng. ii 66: 130. 1897; Gagn. in PL Gen. I.-C. 2: 193. 1913; Back. & Bañeh. f. Fl. Java 1: 546. 1964.

Wagatea Dalz. [in Hook., J. Bot. Kew Misc. 3: 89. 1851, nonincl. Bomb. FL.: 80. 1861.

Climbers or shrubs or small trees, usually armed with recurved prickles, rarely together with straight ones, the former on old stems often on a tubercular base, rarely unarmed; often hairy when young, the hairs simple, appressed, rarely also glandular hairs.**) *Stipules* present or absent or wanting, sometimes reduced to scales, or on either side of the leaf base a crescent-shaped ridge which might be the scar of a stipule, in one Malesian species the stipules interpetiolar. *Leaves* alternate, in one Malesian species opposite, double pinnate; petiole 14-21/s times as long as the distance between the first two pairs of pinnae, distances between the other pinnae decreasing towards the top; rachis beneath often with recurved prickles with rarely straight ones amongst them; pinnae opposite, rarely the lowest ones subopposite, a terminal pinna present only in one introduced species, jointed at the base, often armed with recurved prickles at the base of the leaflets, sometimes scattered ones amongst them, stipels only present in one introduced species. *Leaflets* opposite or alternate, sessile or short-stalked, jointed at the base, usually membranous, sometimes coriaceous, entire, the base usually

oblique, the acroscopic side wider, sometimes subequal to equal, surfaces often hairy when young. *Racemes* axillary and then often serial, or terminal or both, often branched, the bracts early caducous except in one Malesian species, often short-hairy or short-pubescent; bracts mostly early caducous; bracteoles absent; pedicels jointed at the base and often also near the top or rarely in the middle. *Flowers* usually bisexual, rarely unisexual, often all parts punctate (secretory cavities), in bud globose or ovoid, the lowest sepal often covering the bud like a hood; receptacle short, usually obliquely funnel-shaped or cupular; sepals 5, imposed upon the receptacle, usually conjoining at the base only, rarely connate into a campanulate calyx tube with 5 segments, sometimes all sepals subequal, mostly the lowest one cucullate, longer than the other 4, the latter rounded at the top, often reflexed during anthesis, often ciliate. *Petals* 5, inserted on the receptacle, sessile or with a short claw, limb orbicular or oblong, standard mostly in shape and size deviating from the other petals, in that case often hairy on the transition between the claw and the limb or the claw protracted into a ligule. *Stamens* 10, inserted on the receptacle, free, in 2 whorls which alternate with the petals, in open flower usually incurved, equal in shape and size or alternately smaller and larger or the median ones smaller; filaments laterally compressed, hairy at the base or rarely glabrous; anther dorsiflexed and versatile, glabrous, rarely villose, opening with 2 longitudinal lateral slits. *Pistil* sessile or short-stalked, ovary oblique at the base, ovules 1-10 (-13), flat; style slender, more or less curved upwards, often funnel-shaped at the top, stigma terminal, oblique, usually orbicular and hollow in the centre or sometimes slightly bilobed, ciliate or glabrous. *Pod* dehiscent or indehiscent, 1-5 times as long as wide, winged along the dorsal suture or wingless, in the former case membranous, rarely coriaceous, unarmed, in the latter case either coriaceous to subliguous and then usually unarmed, rarely spiny, or fleshy, sometimes twisted, the margins thickened, pericarp usually swollen on each seed. *Seeds* 1-10 (-13), either orbicular to ellipsoid to reniform, flat or globose, ovoid to ellipsoid to almost rectangular in outline and also in section, only in *C. solomonensis* finely sculptured; albumen usually absent, rarely present.

DISTRIBUTION: Pantropical genus estimated at ca 100 species; all over Malasia where 19 species are indigenous, 2 (*C. pulemma* and *C. sappan*) probably introduced and now wide-spread; 3 were introduced and occasionally cultivated. See fig. 2.

ECOLOGY: Mostly in (secondary) scrub-vegetation, sometimes coastal, rarely in primary forest, often in seasonally dry country, but sometimes also under everwet conditions, on various types of soil from sea level to ca 1700 (- 2000) m altitude. Not seldom species seem to have a considerable ecological range.

NOTES: The part on which in most species the sepals are inserted is called 'calyx tube' by many authors, e.g. Bentham & Hooker and Hutchinson. Also 'disc' is sometimes used. Here receptacle is preferred,

*) The original spelling is *Mezoneuron*, which may be changed in *Mezoneuron* (Act. 73 of the Code). De Candolle was the first to use *Mestunwinin*. Later authors used either spelling, but gave no reason for their choice. Throughout the present paper the spelling *Mezoneuron* is adopted, irrespective of a former author's choice.

-) This description applies to the Malesian species.

like Taubert did already. A real calyx tube is only present in *C. spicata* and *C. sumatrana*, where the connate part of the calyx is much thinner than the receptacle, which is fleshy in all species.

Aa type species of *Mezoneuron*, Hutchinson (1964) appointed *M. glabrvmi* Desf. from "Burma, Malaya". The material which Desfontaines described was from Timor and belongs to our *Caesalpinia* (formerly *Mezoneuron*) *pubescens* (see there for an explanation of the confusing interpretations), which does not occur in Burma nor in Malaya.

KEY TO THE SPECIES WILD AND NATURALISED*)

1. Leaves alternate. Stipules (if present) not inter petiolar. Branches of the racemes alternate, rarely also serial.
2. Leaflets more than 1/2 mm stalked. Pod winged or wingless, in the latter case neither swollen on each seed, nor the sutures thickened.
8. Pedicels 3⁺ cm or shorter. Filaments 3 cm or shorter. Leaflets without 3-veined.
4. Pods unarmed. Flowers bisexual: anthers with pollen, pistil 5 mm or longer.
5. Ovules 4 or more, rarely 1-2 but then either 10 or more pairs of pinnae and more than 10 leaflets per pinna or a calyx-tube present. Pod more than 2 times longer than wide, more than 6 cm long. Seeds more than 2, if 1-2 then the pericarp thin.
6. Flowering material.
 7. Calyx tube absent, sepals as long as or longer than the receptacle.
 8. Standard rounded at the top.
 - f. Ovary glabrous.
 10. Flower buds glabrous.
 11. Leaflets opposite, 7-12 pairs per pinna.
 12. Pedicels 1-2 cm long. Claw of the standard protracted in a ligule. Filament ca 10 mm long. 7. *C. enneaphylla*
 12. Pedicels 2-2.8 cm long. Standard either somewhat smaller than the other petals and glabrous, or as large as the other petals and on the transition of the claw and the limb hairy; claw not protracted in a ligule. Filament ca 15-20 mm long. 8. *C. furfuracea*
 11. Leaflets alternate, 6-10 in all per pinna. 1. *C. andamanica*
 10. Flower buds hairy.
 13. Pedicels 8-15 mm long. Claw of the standard protracted in a ligule. Ovules 1-6.
 14. Ovnles 4-6. Leaflets 10-18 in all per pinna, index 1/2-2. 3. *C. hypoleuca*
 14. Ovnles 1-2. Leaflets 16-24 in all per pinna, index 2-3. 12. *C. mindortensis*
 13. Pedicels 15-30 mm long. Claw of the standard not protracted. Ovules 8-10. 5. *C. decapetala*

9. Ovary hairy.
 15. Claw of the standard protracted in a ligule. Ovules 4-7. 15. *C. vubescens*
 35. Claw of the standard not protracted. Ovules 8-10. 5. *C. decapetala*
8. Standard bilobed.
 16. Standard 2-5 times as long as the other petals, these at the top acuminate or with 3 teeth. Leaflets usually alternate, at least the lowest ones of a pinna, top rounded to retuse. Ovules 6-13. 10. *C. latialiqua*
 16. Standard about as large as the other petals. Leaflets opposite, acuminate or acute. Ovules 1-2. 4. *C. cueultata*
7. Calyx-tube campanulate, 0-16 mm long, longer than the segments or than the receptacle. 20. *C. sumatrana*
6. Fruiting material.
 17. Pod with a wing of 5 mm or wider. Seeds 1-8 (-13).
 18. Seeds placed separate from each other, to be counted from without, if 1-seeded, then the pod shining, glabrous.
 19. Pedicels jointed near the top or without a distal joint, in the latter case the leaflets opposite and the dorsal and ventral sides of the receptacle recurved (see fig. 5, number 1,8).
 20. Pedicels glabrous or with a few hairs. Receptacle glabrous, rarely shed. Leaflets opposite or alternate.
 21. Leaflets opposite.
 22. Pod shining. Leaflets 9-18 by 5-7 mm. Pedicel 15-20 mm long. Median ends of the receptacle (if persistent) not recurved. 7. *C. eaneaphylla*
 22. Pod dull. Leaflets 18-25 by 7-13 mm. Pedicel 20-35 mm long. Median ends of the receptacle recurved. 8. *C. furfuracea*
 21. Leaflets alternate, 6-10 in all per pinna. Median ends of the receptacle recurved. 3. *C. andamanica*
20. Infructescences and pedicels and receptacle hairy (hand lens!), the latter usually shed.
 23. Pods 1-seeded. Pinnae 10-13 pairs. Leaflets 16-24 in all per pinna; index 2-3. 12. *C. mindorensis*
 23. Pods (1-) 3-6-seeded, each seed in an orbicular swelling of 10-15 mm O. Pinnae 6-10 pairs. Leaflets 10-18 in all per pinna; index Hi-2. 9. *C. hymenocarya*
19. Pedicels above the base not jointed or jointed at ca y, from the top to ca halfway (see also note 5 under *C. latisulcata*), leaflets alternate or opposite. Receptacle persistent, not recurved or only the ventral side.
 24. Receptacle usually wider than long, often grading into the pedicel (see fig. 4, number 10), the widest part at the dorsal (winged) side of the pod.
 25. Receptacle glabrous or hairy. At least the lowest leaflets of a pinna alternate, top rounded to retuse. Pod 6-9 (-13)-seeded. 10. *C. latialiqua*

*) For pods, see fig. 5. Key to the cultivated species on page 15.

**) Of 19. *C. polioflora* the flowers are not known.

25. Receptacle glabrous. Leaflets opposite, top acuminate. Pod 1 (-2)-seeded 4. *C. cucullata*
24. Receptacle usually about as wide as long, glabrous, often narrowed into the pedicel (see fig. 4, number 20), symmetrical or the widest part at the ventral side of the pod 20. *C. smalrana*
18. Seeds 4—7, placed close together in the middle of the pod, not to be counted from without. Pedicel, receptacle and pod hairy. Pod dull 15. *C. pnbescons*
17. Pod wingless, or the wing less than 2 mm wide.
23. Pod 6^11 by 2^3—3 cm. Leaflets opposite, uji to 22 mm long, usually hairy. 5. *C. decapctola*
26. Pod 10-12 by 714—8 cm. Leaflets alternate, 75—85 mm long, glabrous 19. *C. colomonensia*
5. Ovules 1-2 (—31. Pinnae 2-8 pairs. Leaflets 16 or less per pinna. Pod 1—2 times as long as wide, 3—7 cm long, coriaceous.
27. Pinnae 5-8 pairs. Leaflets alternate, 10-16 in all per pinna. Pod winged 18. *C. ecorectekini*
27. Pinnae 2—5 pairs. Leaflets opposite, 2—4 pairs per pinna. Pod wingless 3. *C. crisis*
4. Pod armed with rigid spines. Flowers unisexual, in } flowers the pistil ca 7—8 mm long, the anthers without pollen; in } flowers the pistil ca 1 mm long.
28. Stipules pinnate, consisting of 3—5 leaflets, each ca %—5 cm long. Leaflets (12-) 16-24 in all per pinna, the base unequal. When flowering the pedicels 2—6 mm. Ovules 2. Seeds grey. 2. *C. bonduc*
28. Stipules subulate or absent, sometimes split, up to 2 mm long. Leaflets 6—14 in all per pinna, the base (approximately) equal. When flowering the pedicels 6—12 mm long. Ovules 4. Seeds yellow 11. *C. major*
3. Pedicels 3% cm or longer. Filaments 3 cm or longer. Leaflets with stipels. Cultivated small tree or shrub, often unarmed 16. *C. pulcherrima*
2. Leaflets sessile or subsessile, less than 11 mm stalked. Pod wingless.
29. Pedicels not jointed near the top. Flower buds eventually globose. Ovary usually glabrous. Pod swollen on each seed, indehiscent, fleshy, margins thickened.
30. Leaf rh.ichis 17-23 cm. Pinnae ca 5 cm long. Leaflets hairy, above dull. 6. *C. diffyna*
30. Leaf rhachis 30 cm or longer. Pinnae 5—30 cm long. Leaflets glabrous or very short-hairy (hand lens!), above shining 21. *C. tortuosa*
29. Pedicels jointed near the top, there often nodding. Flower buds eventually ovoid, cucullate. Ovary hairy. Pod with dorsal suture ending in a sharp beak. The seeds cannot be counted from without.
31. Stipules present. Pedicels 4-11 mm. Bracts 1^6 by <A-2 mm. Claw of the standard 1—2 mm long. Ovules 3, Seeds flat, orbicular 14. *C. p&rviflora*
31. Stipules wanting, beside the leaf base a raised line. Pedicels 15-20 mm. Bracts 5-12 by 3—5 mm. Claw of the standard ca 5 by 2 mm. Ovules 8—6. Seeds ellipsoid in outline and also in section 17. *C. sapan*
1. Leaves opposite. Stipules interpetiolar. Branches of the racemes in opposite, serial clusters 13. *C. oppositifolia*

KEY TO THE CULTIVATED SPECIES

- Both pedicels and stamens less than 3 cm long. Leaflets without stipels.
- Racemes more than 10 cm long. Leaves even pinnate. Leaflets more than 3 mm wide.
- Pedicels more than 2 mm long. Calyx tube absent.
- Pinnae 9—14 pairs. Leaflets opposite, 10—12 pairs per pinna. Lowest sepal with entire margin. Pod with the upper margin ending in a sharp beak 17. *C. support*
- Pinnae 2—7 pairs. Leaflets opposite or some of them alternate, fewer than 15 in all per pinna. Lowest sepal serrate. Pod leathery, with thickened margins. The seeds can be counted from the outside. From South America. (For nomenclature see Sprague, Bull. Misc. Inf. Kew: 91-96. 1931) *C. spiwocia* (Molina) O. KÙe.
- Pedicel 3 up to 2 mm. Calyx eampanulate, tube ca 1—2 mm long. From Northwest India (*Wagatea spscata* (Dalz.) Dalz.) *C. spicata* Dalz.
- Racemes up to 6 m long. Leaves often odd-pinnate. Leaflet⁶ up to 214 mm wide, 1E—28 pairs per pinna. Pod flexuous, twisted. From South America (*PoinArata coriaria* Jacq.) *C. coriaria* (Jacq.) Willd.
- Pedicels and stamens more than 3 cm long. Leaflets with stipels, short-stalked. From South America 16. *C. putcherrima*

1. *Caesalpinia andamanica* (Prain) Hattink, *nov. comb.*

— Fig. 4/1.

Mezoneuroti andawanicanum Prain in J. As. Soc. Beng. ii 61: 131. 18B2; *ibid.* ii 66: 234. 1897. — Type: *Prain* s.n. (CAL, holo; K!), from S. Andaman, Rangaehang, y.fr. 16, XI. 188B.

Mszmeuron kunstleri Prain in J. As. Soc. Beng. ii 66: 233. 1897; Ridl., PL. Mai. Pen. 1: 647. 1922. — Type: *King's mil.* [*Kunsiler*] SSS (CAL, holo; K!), from Malaya, Perak, Sunga Ryah (= Sg. Raya), fl. X. 1880.

Climber up to 20 m, in all vegetative parts glabrous. *Branchlets* glossy; prickles recurved, 2—6 mm long. *Stipules* caducous, scale-like, \sqrt{v} mm long, 2 mm wide, acute, appressed. *Leaves*: rhachis 15—50 cm long; prickles in pairs at the base of the pinnae and scattered ones in between, 1—3 mm long; pinnae 2—6 pairs, 7—16 cm long, often with a spine at the base of the leaflets, ending in a ca 1 mm long tip. *Leaflets* alternate, sometimes subsopposite at the top of a pinna, 6—10 in all per pinna, 2—5 mm stalked; blade membranous, widest at the middle, the highest tme(s) above the middle, subsymmetrical, index, \sqrt{v} —Z, 2—6 by 1—3 cm, base cuneate, top obtuse to rounded, sometimes somewhat retuse, surfaces when dried dull. *Racemes* axillary and then often serial, as well as terminal, combined into a panicle of 25—50 cm long in all (—75 cm according to Prain); axes puberulous to glabrous; bracts wanting, caducous; pedicels 6—10 mm, after anthesis 15—25 mm, glabrous, sometimes somewhat hairy or hairy on the joint only, jointed 1—2 (after anthesis —7) mm below the top. *Flower buds* glabrous; receptacle symmetrical, cupular, 1—2 mm long by 4 (—6) mm wide; lowest

sepal deeply cucullate, ca 12 by 6 mm, the others ca 4 by 6 mm, reflexed during anthesis, ciliate. *Petals* spreading; standard ca 10 by 7 mm, obovate, at the base 2 mm wide, at the inner side at about half the length a transverse furrow, which is densely hairy inside; the other 4 petals ca 9 by 5 mm, short-clawed, limb elliptic, glabrous. *Stamens* exserted; filament 12—14 mm, woolly over V_1 .—*Vt* of the length; anther 3 by 1 mm. *Pistil* glabrous; ovary ca 4 by 1 mm, 1 mm stalked, ovules 4; style ca 12 mm, stigma somewhat bilobed, 1 mm wide, ciliate. In *fruit* the pedicel ca 15 mm (—25 mm in the Andamans), jointed 3—5 mm (—7 in the Andamans) below the top; receptacle persistent, laterally flattened, 2—3 mm long, 7—9 mm wide, the median ends often somewhat recurved, abruptly narrowed into the pedicel; pod indehiscent, 3—4 times as long as wide, 10—15 by $2\frac{1}{2}$ —4 cm, including the 9—12 mm wide wing, base cuneate, top acute, carpels dull, often strongly reticulate. *Seeds* 3—4, spaced, ovate in outline, flat, ca 11 by 6 by 1 mm, brown, smooth; albumen none.

DISTRIBUTION: Burma (Tenasserim, S. Andaman), Indo-China (Cochin-China), Thailand (Peninsula); in Malesia: Sumatra (Lampung), Malaya (Perlis, Perak).

Identity uncertain: INDIA. *Bej* Chittagong, Oarjania Range. *Cowan* 553 = *Imp. For. hist.* 21,391, fl.

BURMA. *Tenasserim*: *Puckertin s.n.*, fr. 1844, Pierre, fr. *Andaman* 5: *South A. King's coll.*, fr. 2. XII. 1893, *King's coll.*, fl. 13. X. 1894.

INDO-CHINA. *Cochin-China*: prov. Bienhoa, km 73 route no. 20, *Poitane* 19765, fl. 17. X. 1931.

THAILAND. *Peninsula*: Sichong, 50 m, *Kerr*, 15689, fr. 12. V. 1928. *Kaw Chang*, *Kerr* 1655S, fr. 17.1.1929. *Pang-nga*, *Kerr* 1751S, fr. 5. III. 1929. *Surat*, *Yanyan*, *Kerr* 18191, fr. 21.11.1930.

SUMATRA. *Lampung*: NW. of Kota Agung, T23'S 104°35'E, 350-450 m, *Jacobs* 8170, fl. 17. V. 1968.

MALAYA. *Perils*: Bukit Ketri, *SF* S2954 *Henderson*, fr. 19.XI.1929. *Perak*: Reservoir Padang Rengas, *SF* 14975 *Haniff*, *IT*. 18.1. 1925. *Salak*, *SF* 69*1 *Haniff* & *Nur*, fr. 11. XII. 1920. *I poll*, Kinta Hill F. R., 450 m, *KEP* 9975V *Ramni Zainuddin*, fl. 12. X. 1966.

ECOLOGY: In scrub, evergreen primary forest, along rivers and roads, up to 500 m. Fl. May, Oct., fr. Oct. to March.

NOTES: 1. Compilation of field data: flowers scented, calyx green, petals yellow, filaments pale green, anthers brown; young fruits green.

2. Prain contrasted in his key *Mezoneuron andamanicum* with *M. kunstleri* on account of the longer distance between the joint in the pedicel and the calyx, the glabrous pedicels, and the obtuse leaflets in the former. The shape of the leaflets and the distance between the joint and the calyx, however, vary in Malaya, and the pedicels in the isotype of *M. kunstleri* are glabrous.

3. The pods resemble those of *C. sumatrana* and *C. furfuracea*. The former has no joint in the pedicel, and a different calyx-tube; the latter differs by its opposite leaflets.

4. Of the specimen from India, Chitlagong, the identity is not quite certain.

2. CAESALPINIA BONDUC (L.) Roxb. *emend.* Dandy & Exell

Caesalpinia bonduc (L.) Roxb., *Fl. Ind.* (ed. Carey) 2: 362. 1832, *emend.* Dandy & Exell *TM J. Bot.* 76: 179. 1338; *Back. & Bakh. f. Fl. Java* 1: 545. 1964. - *Gulandina bonduc* L., *Sp. Pl.*: 381. 1753, not of *later* ed.; *Skeela in Science* n.s. 37: 922. 1913. - *G. bonducella* L., *Sp. Pl.* 2nd ed.: 545. 1762, *nom. illeg.* - *C. bonducella* (L.) Fleming in *A3. Res.* 11: 159. 1810, *nom. illeg.* - *Q. bonduc* B minus DC, *Prod.* 2: 480. 1828. - *Bondw minus* Medik., *Theod. Spec.* 41, t. 2. 1886, *nom. illeg.* - *C. jayabo* *ft cytauperma* Maa in *An. Soe. Esp. Hist. Nat. IS*: 234. 1850, *nom. illeg.* - *Lectotype* (Dandy & Exell's choice); hb. *Hermann vol.* 3: fol. 35 (BMI), from Ceylon, fl.

Gulandina gemina Lour., *Fl. Cochinch.*: 265. 1790. - Type: *Loureyro* (?) s.n. (BM!), from Cochinchina, fl. fr. 1774, 1780.

Cactalpinia banducella (L.) Fleming var. *aequiacantha* O. Ktze., *Rev. Gun.* Pl. 1: 186. 1896. - Type: not seen.

Caesalpinia bonducella (D) Fleming var. *etevans* O' Ktze., *lc.* Type: O. Kuntze *iSSI* (NY!), from Java, Batavia, V. 1875, fl.

Caesalpinia bonducella, (L.) Fleming var. *inaequiauleata* O. Ktze., *lc.* - *Lectotype*: O. Kuntze s.n. (NY!), from Java, fl. 1875.

Caesalpinia sogerensis Baker f. in *J. Bot.* 61: Suppl. 12. 1923. - Type: *Forbes* 112 (BM! L! P!), from New Guinea, Sogeri Region, 9°21'45"S, 147°31'37"E, fr. 1885-86.

Mezoneuron oxyphyllum Gagn., leaves only: see under *Doubtful Species*.

Climber up to 15 m. *Branchlets* dull, hairy to almost glabrous; prickles densely placed to wanting, straight or somewhat recurved, 1—10 mm long (11 a small suborbicular base. *Stipules* subsistent, pinnate or bipinnate, consisting of 3—5 leaflets, these ovate, ca $\frac{1}{2}$ —2 em long, often mucronate. *Leaves*: rhachis 15—80 cm, armed with recurved prickles at the base of the pinnae and often scattered ones in between, in the basal part often also straight prickles to 10 mm long; pinnae 6—11 pairs, 8—20 cm, rhachia sometimes protracted to 3 mm. *Leaflets* opposite to subopposite, (12—) 16—24 in all per pinna, ca 1 mm stalked; blade membranous, widest at the middle, asymmetrical, index 2—2.4 (—3)/£, 1—6"/ by V_2 —3 cm, base rounded, top rounded to acute, rarely acuminate, mucronate, margins curved, nerves prominent, surfaces dull; hairy, rarely glabrous. *Racemes* supra-axillary and inserted up to 2 cm above the leaf axil and often serial, as well as terminal, often branched, up to 30—60 cm in all, in the lower part often set with short, straight prickles, all parts densely hairy; bracts caducous, exceeding the topmost flowers when they are in bud for 1—5 mm, lanceolate, 8—15 by ca 1 mm, bristle pointed; pedicels 2—6 mm, jointed $\frac{1}{2}$ —1 mm below the top. *Flowers* in 3 or 5 racemes (the 1 flowers seemingly bisexual but

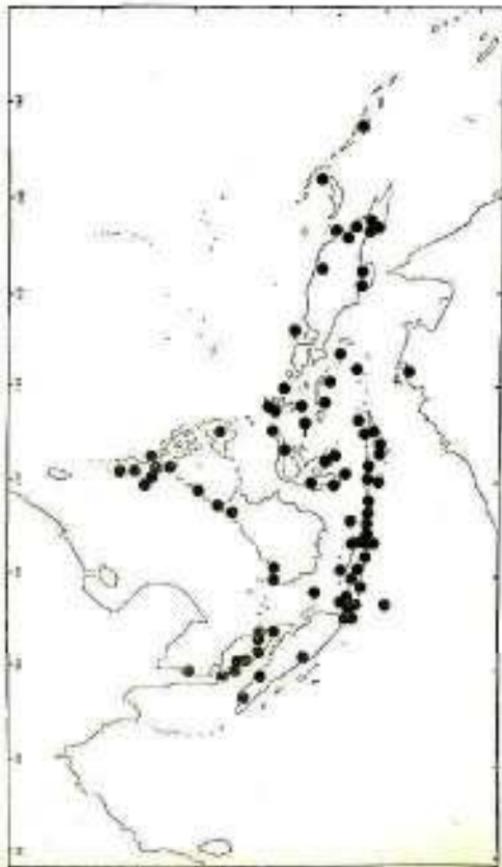


Fig. 3. *Caesalpinia bonduella*: distribution in Malesia.

anthers functionless), buds ovoid, pubescent; receptacle ca 1 ram long, 3 mm wide; *sepals* almost equal, reflexed during anthesis, 7—10 by 1—6 mm, on their margins often glandular hairs, the lowest one somewhat boatshaped. *Petals* not or slightly exceeding the sepals; standard: claw ca 3 by 1 mm, densely hairy on both sides, limb 4—7 lf 3 mm, reflexed, glabrous or with a few hairs; the other 4 petals ca 7 by 2 mm, spatulate, in the basal part and on the outer side hairy, sometimes ciliate. *Stamens*: filament nearly straight, hairy in the basal part, in S Sowers the filament ca 6—10 mm, anther ca 1% by ^ mm; in e flowers the filament ca 5 mm, anther ca 1 by % mm, without pollen. *PMil* in a flowers ca 7_s by 2 mm, hairy; ovary ca 3 by 2 mm, 1 mm stalked, densely set with ca $\sqrt{2}$ mm long spines, ovules 2; style ca 3 mm, hairy, stigma ciliate; pistil in *i* flowers rudimentary, ca 1 mm long, hairy. In *fruit* the pedicel ca $y^* - IVz$ cm, in section round, at the base 2—4 mm 0 towards the top the thickest and there ca 4—7 mm 0, more or less ligneous; pod ca y_2 cm stalked above the receptacle, at maturity in the dried state swollen, dehiscent, ca $iy_2 - 2$ times as long as wide, $6^{\wedge} - 9$ by $rf/g - 4y_3$ cm, base acute, top rounded, style-remnant to 8 mm long, surfi aces more or less densely set with 5—10 mm long spines, surfaces and bristles hairy. *Seeds* 1-2, ovoid to globular, 15-20 mm long, smooth grey (greenish-grey when unripe) with parallel lines concentric with the hilum which is brown and often has a minute rejecting point of the funicle; albumen

""""DISTRIBUTION: Pantropic. In Malesia in all parts, but distinctly scarce in the rain forest areas in Sumatra, Borneo, the Philippines and western New Guinea. — Fig. 3.

ECOLOGY: The ecological amplitude of this species seems not quite even over its whole area. While it is often coastal, it may also occur inland, in secondary forests, and in eastern parts of Malesia it may ascend to about 850 m. There seems to be a preference for a seasonal climate. A periodicity was not found, often flowers and fruits occur together. A record of *B.L. Turner s.n.* (BM!) from 9000 - 10200 ft on Mt Obree in Papua anno 1918 seems apocryphous.

USES: Burkill (1966) says (under *C. jayabo* and *C. crista*) that the seeds are used for stomach troubles etc. and the leaves for tapeworms. See also Watt, *Diet. Ec. Prod. Ind.* 2: 3. 1889; *Comm. Prod. Ind.*; 190. 1908 (both under *C. bonducella*), and Heyne, *Nutt. Pi.* 3rd ed. I: 751. 1950 (under *C. crista* and *C. jayabo*).

NOTES: 1. Compilation of field data: calyx green, petals yellow, standard tinged with red or orange, filaments and style pale green, anthers brown, stigma pale yellow; fruits green.

2. The long-standing confusion between the species here called *Caesalpinia bonduella* and *C. major* (explained in fig. 1) goes back to an unfortunate segregation by Linnaeus of his pre-1753 materials. The

illegitimate name *C. bmiducella* has by subsequent authors rather consistently been applied to the former. The name *C. bondue*, however, got misapplied in different ways. The nomenclature has been commented on by Urban (Symh. Antili. 2: 269. 1900) who interpreted this species as *C. ciista* L. 1753. Dandy & Exell had another opinion, which we follow here.

Differences between *C. bondue* and *C. bonducella* (our *C. "major* and *C. bondue*) on account of their seeds are given by Petch in Ann. R. Bot. Gard. Perad. 9: 299-305. 1924.

3. The above description rests on Malesian material only and comprises but part of the whole diversity. For descriptions covering other parts of the world, see for South America: Fawcett & Rendle, Fl. Jam. 4: 93, fig. 1920 (under *C. bonducella*), Britton & Wilson, Sc. Siirv. Porto Rico Virg. Isl. 5: 378. 1924 (under *Guilandma crista*), Pulle, Fl. Suriname 2, 2: 86. 1939, Gooding, Loveless & Proctor, Fl. Barbados: 175. 1965; for Africa: Wilczek in Fi. Cong. Belg. Ruanda Urundl 3: 250. 1052, Erenan in Fl. Trop. E. Afr. Leg. 2 Caes.: 37. 1967, Aubreville, Fl. Cameroun 9: 310. 1970.

4. In specimens from the rain forests in New Guinea (e.g. *Forbes 112*, type of *G. sogerensis*, *Heyligers 1357*, *Pullen 6611*, *Tippett U.P.N.G. 361*) the branchlets and leaf rachises are often pubescent and densely set with 5—10 mm long straight pubescent spines. Plants were found which integrate with the scarcely spiny ones from the beach habitats (e.g. *LAE 51582* and *Brass 22052*, both from the rain forests, the branches of the latter being unarmed (LAS!) to slightly armed (L! A!) but less as the branches of *NGF 38078*, from the beach).

5. Many collections consist of racemes with male flowers and detached fruits. Whether these are taken from one plant or from two different ones, is uncertain; see Petch, *l.c.*: 304.

6. One specimen (*NGF i5527*) is inscribed: myremecophilous at nodes.

7. One collection, *SF 2i962* from Malaya, Johore, Pulau Plandok, VI. 1931, has seeds which are black, without concentric lines and somewhat intruded like those of *C. xolomonensis*.

3. CAESALPINIA CRISTA L. — Fig. 4/8.

Caesalpinia crista L., Sp. Pl.: 380. 1753; Skeels in Science n.s. 37: 922. ISIS; Dandy & Exell in J. Bot. 76: 179. 1938; Bock & Bakh. f. Fl. Java 1: 545. ISBA. — Lectotype (Dandy & Exell's choice): hb. Hermann "vol. 1: fol. 68 (BM!)", from Ceylon.

GuUandina naga L., Sp. Pl. 2nd. ed.: 546. 1762; Lam., Eneycl. Méth. I: 434. 1785; Willd., Sp. Pl. 2: 635. 1799. — *Ticantia nuga* (L.) Medik., Theod. Spec: 52. 1786. — *C. wusa* (L.) Ait., Hort. Kew. 2nd ed. 3: 32. 1811; Benth., Fl. Hongk.: 97. 1861; Kura, For. Fl. Burma 1: 405. 1877; Baker in Hook, f. Fl. Br. Ind. 2: 255. 18781 Trim., Fl. Ceyl. 2: 99. 1894; Prain in J. As. Son Beng. ii 66: 287. 470. 1897; Merr. in Philip. J. Sc. 5: Bot. Si. 1810; Back, Schooff.: 401. 1911; Koord., Exk. Fl. Java 2: 371. 1912; Gagn. m Fl. Gtin. 1.-C. 2: 181. 1913; Merc., Int. Rumph.: 261. 1917; Sp. Blanc: 176. 1918; Gamble, Pl. Pres. Madras 1: 394. 1919; Ridl., Fl. Mai. Pen. 1: 650. 1922; Merr., Comm. Lour.: 190. 1935; Bor & Kaizada in J. Bomb. Nat. Hist. Soc. 46: 1, fig. 5. 1946. — Type: Niŋ'oe *silvaram* Rumph., Herb. Arab. 5: t. 50. 1747, from Ambon, fl. fr.

Genista icandew Lour., Fl. Codiinch.: 428. 1790. — *Bv.Ua laureirii* Spreng., Syet. Veg. 3: 186. 1826; according to Merr., Comm. Lour.: 191. 1935. — Type: (n.v.) from Cochmchina.

Guilandma paniculate Lam., Eneycl. Meth. 1: 434. 1785; Willd., Sp. Pl. 2: 535. 1799. — *C. paniculata*, (Lam.) RoxK, Hort. Eeng.: 32. 1814; DC, Prod. 2: 481. 1825; Rosb., Fl. Ind. (ed. Carey) 2: 364. 1832; W. & A., Prod.: 281. 1834; Wight, Ic. 1: t. 36. 1840. — Type: *Kaka MvUu*, vid *Kaka Moulou* (in caption *Kaka mullu*) Kheede, Hort. Mai. 6: t. 19. 168ff, Irom India, Malabar, fl. fr.

Caesalpinia laevigata Perr. in Mem. Soc. Linn. Paria 3: 104. 1824. — Type: *PerrotU* (n.T.) from the Philippines.

Caesalpinia ecandens Heyne ex Both, Nov. Pl. Sp.: 209. 1821; DC, Prod. 2: 464. 1825. — Type: *Heyne s.n.* (BM! holotype; K!), from Ind. Or., fl. fr.

Liana up to 15 m, in all vegetative parts glabrous. *Branchlets* glossy, black, more or less armed with recurved prickles. *Stipules* wanting. *Leaves*: rachis 10—30 cm; prickles sometimes absent, recurved, at the base of the pinnae and scattered ones in between; pinnae 2—4 (—5) pairs, 2[∞]—8 (—12) cm, often armed. *Leaflets* opposite, 2—3 (—5) pairs, 2—4 mm stalked; blade coriaceous, widest at the middle, index 2—21/2, 2—10 by 1—5 cm, base acute, subequal, top acute to obtuse, sometimes acuminate or rounded, margins curved, nerves prominent, surfaces above shining, below dull. Racemes axillary and terminal, combined into a 20—40 cm long panicle, short-hairy when young; bracts very early caducous, ca 1 mm long; pedicels 7—15 mm, jointed ca 1 mm below the top. *Flower* buds glabrous; receptacle oblique, ca 2 mm long, 5 mm wide; *sepals*: the lowest one cucullate, ca 8 by 4 mm, glabrous, the others 6—8 by 2—3 mm, reflexed during anthesis, ciliate. *Petals* spreading; standard: claw ca 5 by 2 mm, hairy, limb siihorhicular, ca 5 mm 0, reflexed, glabrous, margins incurved; the other 4 petals: claw ca 1 by 1/2 mm, limb widest below the middle, 7—9 by 4 mm. *Stamens*: filament ca 10 mm, woolly to over the middle; anther ca 1% by 1 mm. *Pistil* ca 12 mm long, hairy to glabrous; ovary ca 1 mm stalked, ca 2—3 by 2 mm, ovules 1—2 (—3); style ca 10 mm, stigma somewhat wider as the style, ciliate. In *fittii* the pedicel as long as in the flower, receptacle shed, the remnant ca 3 mm wide; pod 2—6 mm stalked above the receptacle, when ripe somewhat swollen, indehiscent, ca 1—2 times as long as wide, 4—7 by 2[∞]—4—BY's em, base cuneate, top obtuse to acute, beaked at the upper angle or at the top.

INDO-CHINA. Tonkin: *d'Alleivyte*, ir. VII. 1908. Ti Vu, *Balaaa S150*. Annam: prov. Quang Tii, Lang-hon-sao, *Pailane 12613*, fr. 1S.III.1527; prov. Haut-Donai, col de Braian, Djiring, 900 in, *Poilane S4761*, fr. 4, III. 1935.

THAILAND, North: near Lampang, $\pm 18^{\circ}16'N$ $99^{\circ}30'E$, *Kerr S115*, fl. 14.1.1914. Southeast: Ampo Makam, $\pm 13^{\circ}N$ $102^{\circ}10'E$, *Kerr S553*, fl. 10. XII. 1924.

SUMATRA. Atjeh: Mt Bur ni Geredong, 1500 m, *van Steenis 6487*, st. 5. IX. 1934. East Coast: Padang Bulan, *Jockeins S125*, st. 0. IV. 1923. West Coast: Fort de Koek [= Padang Tinggi], *Jacobson 3089*, fl. VIII. 1822.

Identity doubtful: MALAYA. Kedah: Langkawi, Bukit Pateh, *Comer s.s.*, Bt 20. XI. 1841.

JAVA. West to East, to 1500 m: 18 coll. Nusa Barung: *Jacobs 4711*, st. 13. V. 1957.

LESSEE SONDA ISLANDS. Bali: G. Pala, 475 m, *Maier & Sarip 21B*, fl. 13. IX. 1918.

BORNEO. Kalimantan: Banjrsmasin, *Motley SS6, 11*. 1857-58.

PHILIPPINES (Merrill's records; not seen). Luzon: Laguna, *Elmer*. Mindanao: Lake Lanao, *Mrs. Clemens 9H2*, II. 1907.

ECOLOGY: In forests, forest fringes and scrub, up to 1500 m. Fl. (in Maleaia) April-Oct.

NOTES: 1. Compilation of field data: calyx and sepals yellow, fruits red.

2. The (holo) type material of *M. eueulloium* which may be in CAL, I have not seen. In BM there is a flowering specimen, inscribed W. Carey; in SING there is a specimen inscribed in what seems Roxburgh's hand: "No. 272 *Caesalpinia cucuUata* R.H.B. Febr. 22.1815". On the detached inflorescence a few old flowers are left. Fruits, also described, were not seen.

3. The difference between the var. *macrophyllum* and the typical variety is only in size of the vegetative parts. No sharp limits between those two varieties could be found by me.

For interpretations of *Caesalpinia (Guilandina) o,xillar* see under Doubtful Species.

4. A sterile specimen, *Comer s.n.* (SING!) from Malaya, Langkawi, Bukit Puteh, 20. XI. 1941, has the leaflets aubsessile, oblique at the base, ca 3 times as long as wide. The prickles on the stem-piece are inserted on tubercular knobs, the young branches are when dried not black as usual in *C. cucuUata*.

5. CAESALPINIA DECAPETALA (Roth) Alston

Caesalpinia dempetala (Roth) Alston, Fl. Ceyl. (Suppl.): S9. 1031; Back. & Bakh. f. Fl. Java 1: 545. 1964. — *Eeickardia ? decaepetala* Roth, Nov. Pl. Sp.: 212. 1821; DC, Prod. 2: 4B4. 1826; G. Don, Gen. Syst.: 433. 1832. — Type: *Heyne a holo*; K, iso), from India, fl.

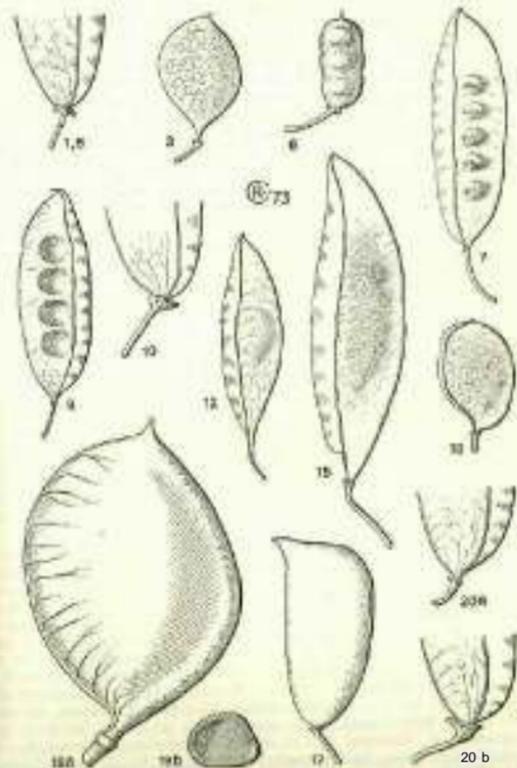


Fig 4. Pods of *d e p m* ^ species; seed of *C. sutoyensis*. The number are the » Uw. rf the >pecta in the test, 1 and S b dng similar, 20 being var. abl

Caesalpinia sepiaria Roxb. [Hoit. Beng.: 32. 1814. women], Fl. lid. (ed. Carey) 2: 360. 1832; W. & A., Prod.: 282. 1834; Wight, Ic. 1: t. 37. 1840; Miq., F. Ind. Bat 1: 109. 1855; Kun, For. Fl. Burma 1: 406. 1877; Baker in Hook, f. Fl. Br. Ind. 2: 256. 1878; Trim., Fl. Ceyl. 2: 100. 1894; Prain in J. As. Soc. Beng. ii 66: 329. 1897; Brandis, Ind. Tr.: 246, fig. 1906; Talbot, For. Fl. Bomb. Pves. Sind 1: 440. 1909; Mcrr. in Philip. J. Sc. 5: Bot. SS. 1910; Back., Sehoofl.: 309. 1911; Koord, Exk. Fl. Java 2: 371. 1912; Gagn. in Fl. Gen. I.-C. 2: 180. 1913; Gamble, Fl. Pres. Madras 1: 3/4. 1919; Rock, Leg. Pl. Hawaii: 102, figtogr., 105. 1920; Eidl., Fl. Mai. Pen. 1: 650. 1932; Bor & Raiiada in I. Bomb. Nat. Hist. Soc. 46: 9, t. 1, 2, fig. 5. 1946. — *Biancaea zcandens* Todaro, Nuev. Gen. Sp. Pi.: 32. 1858. — *Biancaea sepiaria* Todaro, Hort. Bot. Panorm.: 3. 1876-78. - Type: *Roxburgh* (? holo; BM!; K! iso in *hb. Wallich* 583&A), from India, fl. fr.

Caesalpinia japonica Sieb. & Zucc. TM Abh. K. Ak. Wiss. Munchen IV 2: 117. 1845. — *Csepiaria* Roxb. var. *japonica* (Sieb. & Zaic.) Gagn. in Fl. Gen. I.-C. 2: 180. 1913. — Type: *Siebold & Zuccanini* (LE), from Japan.

Caesalpinia benguelensis Elmer n Leaf. Fl. Philip. Bot. 1: 226. 1307. — *Meloneuron benguelense* (Elmer) Elmer in Leaf. Fl. Philip. Bot. 1: 362. 1907. — Type: *Elmer 8750* (BOI K! L! PNHF), from the Philippines, Luzon, Benguet prov., Baguio, fl. fr. III. 1907.

Caesalpinia ferox Hiem. Ind. Sem. Hort. Amst. 1841 (not seen, ~~1841~~). Cat. Hort. Bog.: 235. 1844, descr.; Pl. Jav. Ear.: 40C. 1848. - Type: not Keen, probably a living plant in Hort. Bog.

Climber or shrub, up to 25 m, young parts densely brown hairy. *Branckles* dull, glabrescent, more or less set with recurved prickles to 5 mm long. *Stipules* subsistent, obliquely ovate-semi cordate, 8—15 by 4—7 mm, acuminate, hairy. *Leaves:* rachis 7—38 cm, hairy; prickles sometimes absent, mostly in pairs at the base of the pinnae, often scattered ones in between; pinnae 3—10 pairs, 2[^]—7 cm, hairy, often armed. *Leaflets* opposite, 5—12 pairs per pinna, y%—1 m stalked, membranous, widest at the middle, the highest pair above the middle, more or less asymmetrical, index 2—3, 12—22 by 4—11 mm, base rounded, top truncate to retuse, surfaces when dried dull, appressed short-hairy, rarely glabrous. *Racemes* axillary and then serial, as well as terminal, 15—32 cm long, hairy, often bearing 1 or 2 leaves; bracts caducous, ovate-lanceolate, acuminate, 4—8 by 2—2y; mm, pubescent; pedicels 15—30 (—S5) mm, pubescent, joint (sometimes invisible) 1—3 mm below the top. *Flower* buds first almost globose, eventually ovoid, hairy, all parts punctate (secretory cavities); receptacle oblique, 2 mm long, 5—10 mm wide; lowest *sepal* slightly cucullate, 8—10 by 3—4 mm, the others 6—8 by 3—4 mm, reflexed during subsynthesis. *Petals* spreading, standard; claw 4—6 by 1—2 mm, hairy, limb suborbicular, 5—7 mm \emptyset , reflexed, the other 4 petals ca y» mm clawed, limb orbicircular, ca 6—10 by 4—8 mm. *Stamens* exerted; filament 10—15 mm, woolly to over the middle, the upper median one less hairy; anther 1[^]—2 by %,—1 mm, glabrous. *Pistil* ca 17 mm; ovary 4—5 by 1—1² mm, hairy or glabrous, ovules 8—10; style 8—9 mm, glabrous, stigma ca % \emptyset . In *fruit* the pedicel as long as in the flower, ligneous; receptacle-remnant 4—6 mm wide; pod subsessile, dehiscent, ligneous, 3—4 times as long as wide, 6[^]—11

by 214—3 cm, sometimes on the dorsal side up to 3 mm wide longitudinally winged, base rounded, top rounded, the upper suture prolonged in a sharp beak, style-remnant up to 15 mm, margins parallel, surfaces often prominently nerved, exocarp and endocarp easily to be separated. Seeds 4—9, ellipsoid in outline and also in section, 8—12 by 6—8 by 3—4 mm, black, dull; albumen none.

DISTRIBUTION: India (Himalaya, Deccan), Ceylon, Japan (Honshu, Shikoku, Kyushu), China (Anhui, Hong Kong), Upper Burma, Pacific (Tahiti, wild?, Oahu, wild?), also cultivated in other tropical countries and then run wild; in Malasia: Sumatra (northern half), Malaya (Penang), Java, Lesser Sunda Islands (Lombok, Flores, Timor), Philippines (Luzon), SW-Celebes. Unconfirmed: Indo-Chinese peninsula.

INDIA, *hb. Wallich* S»&D, E, F, all fl., /, fl. fr., *Wight* SS8, fl. Deccan : Bombay area: Gorakhpur, *Panigrahi* 10615, fl. 25.11.1866. NilgM Mts, *Hohenacher* USB. Bot. Garden, *hb. Wallich* SSS4B, fl. 20.1.1815. Nff. Himalaya: Dausan, YSU, m, *Watt* STS1. Kumaon, 2100 m, *BSI* S5555 N.C. *Nat-r*, fl. 23.IV.1965. Near Dehra Dun, *Zuteki* e.n. = *PR!* HS7HO, fl. 2.IV.1828. Nepal: 1000—2100 m, 6 coll. Bengal: reg. trop. *Hooker f. & Thomson* LDH 977. Assam: Manipur, 900 m. *Bullock* 959, fl. 2S. II. 1846. Sylhet distr., *hb. Wallich* S8S&C, fr. XII. 1823.

CEYLON. *Thwaites* 2781, fl.

JAPAN. Hondo: Minomo in Settsu, *M. Togasi* NSM its (distr. by TNS), fl. I.VIII.1952, also Shikoku and Kyushu.

CHINA. Anhwei prov.: Tien Chu Shan, Chien Shan Hsien, ca 32°N 117-E, *C.S. Fan & U* 57, fr. 12.VI.1936. Hong Kong: 1200 m, *Tsui* S7S, fr. 24, 26.IV.1932. Hainan: Yaichow, 240 m, *F.C. How* 708A0, fl. 1933.

BURMA. Upper B.: *Abdul Hvk s.n.*, fl. 7.X.1890.

SUMATHA. North: about 900-1350 m, 12 coll. West Coast: *Korthale*, fl. *Pajakumbuh*, 500 ra, *W. Meyer*, fl. 14.VIII.1957.

MALAYA. Penang: Govt. Hill, 75 m, *Curta* SB5, one sheet fl. VIII. 1885, one sheet fl., detached fr. X. 1880.

JAVA. West to East: from sea level at Tandjung Friok, *Blume*, st. IV, to \pm 1700 m on Mt Sindoro, *horsing* 2ZI, fr. 2. II. 1812, 28 coll. in all, mostly montane.

LESSER SUNDA ISLANDS. Lombok: 1200 m, *Rensch* H7, fl. 30. III. 1927. Flores: per. Ruteng, 1000-1200 m. *Verheijen* +s, fl., tel/2, fr. 2S. V. 1863. Timor: South central part, 1100 m, *Walsh* 806, fl. 2I.V.192B; &10 ra, *Walsh*, ilk, fl. fr. 2. V. 1829.

PHILIPPINES. Luzon: Benguet prov.: 5 coll. (\pm 1300 m). Cagayan prov., 8S 17531 *Clemens*, fl. IV. 1627. Manila, *Vidal* y S. & S%, fr.

CELEBES. Southwest pen.: Ranto Leruo, 1400 m, *Kjellberg* 4082, fr. 2. IV. 1829. Loka Bonthain, *Teijsmann* 13753 *HB*, st.

PACIFIC. Tahiti: *M. Vesco* s.n. hi), *Hasskarl*, fl. 1847. Oahu: *Kailua*, *Fosberg & Oliveira* 10760, fl. 12. XII. 1935.

ECOLOGY: Open grasslands, scrub, forest fringes and edges of belukar on mountains between 1000 and 1700 m {-2000 ni in Nepal), at lower altitude in China, Indo-China and Japan, in Malasia also cultivated at low altitude and there run wild. Seems to prefer a dry soil.

USES: Used for the impenetrable hedges it forma.

NOTES: 1. Compilation of field data: flowers yellow, sometimes dark red, standard with red veins or dots, anthers violet or red.

2. The foliage resembles that of *C. pubescens*, the latter having short stipules and often alternate leaflets.

3. The wing on the pod is the widest in specimens from China. A glabrous ovary only occurs in Indio-China, China and Japan.

6. CAESALPINIA DIGYNA Rottl. — Fig. 4/6.

Caesalpinia digyna Rottl. in Ges. Naturf. Fr. Berl. Neue Sehr. 4: 200, t. 3. 1803; DC, Prod. 2: 482. 182E; G. Don, Gen. Syst. 2: 431. 1832; W. & A., Prod.: 281. 1834; Kurz, For. Fl. Burma 1: 407. 1877; Baker in Hook, f. Pl. Br. Jnd. 2: 256. 1878; Trim., Fl. Ceyl. 2: 100, 1884; Prain in J. As. Soc. Beng. ii 66: 231. 1897; Gagn. in Fi. Gen. I. - C. 2: 182. 1913; Gamble, Fl. Prea. Madras 1: 394. IBID; Ridl., Fl. Mai. Pen. 1: 651. 1322; Craib, Fl. Siam. Mimim. 1: 501. 1928; Kanj. f. Das, Fl. Assam 1: 121. 1938; Bor & Raizada w J. Bomb. Nat. Hist. Soc. 46: 10, fig. G. 194G; Back. & Bakh. f. Fl. Java 1: 546. 1964. - Type: *Rattler s.n.* (Bt K!), from [S. India] Mannelon, fl. fr. 9. X. 1799.

Caesalpinia oleosperma Eoxb. [Hort. Bong.: 32. 1814, HMM], Fl. Ind. (ed. Carey) %: 357. 1832. - Type: *Roxburgh* (u.w.), from India.

Citesalphina gracilie Miq., Fl. Ind. Bat. 1, 1: 110. 1855; Back., Schoolfl.: 401. 1911. - Type: *Horsfield ISS* (BM!; K! holo), from Java, ft. fr.

Climber or scandent shrub or small tree, up to 10 m, young parts densely rusty-brown hairy. *Branchlets* mostly glossy, occasionally lenticellate, when dried dark purplish, slightly pilose or glabrous; prickles recurved, 4–5 mm long. *Stipules* caducous, subulate, to 3 mm long, slightly lairy. *Leaves*: rhachis 17–23 cm; prickles in pairs at the base of the pinnae, recurved, 1–3 mm long, with occasionally smaller ones in between; pinnae 8–13 pairs, 4–5 cm, unarmed. *Leaflets* opposite, 9–12 pairs per pinna, subsessile, membranous, closely placed, often overlapping, index 2/3 > 2V5, 5–11 by 2*4–4VE mm, base oblique-truncate, top truncate or notched, margins parallel, lateral nerves obscure, surfaces when dried above dull dark greenish, below dull greivish and in some specimens densely pitted, on both sides appressed short-hairy. *Racemes* axillary and terminal, combined into a panicle of 30–40 cm long in all, the single racemes 18–30 cm, sometimes with a single branch, glabrous or hairy like the branchlets, with a few prickles in the basal part; bracts caducous, somewhat boat-shaped, 4 by 0.4 mm, hairy; pedicels spreading, slender, 1'A–2% cm, glabrous or with a few hairs, above the base not jointed. *Flowers* in all parts punctate (secretory cavities), buds glabrous; receptacle oblique, shallowly cup-shaped, 1–2 mm long, 6–7 mm wide; the lowest sepal 6–8 by 4–5 ram, the others 3–5 by 2–3 mm. *Petals* spreading, standard (including the claw) ca 5 by 3 mm, boat-shaped, claw 2 by 1 mm with hairy margins, limb suborbicular, with a group of woolly hairs in the transitional zone between the claw and the limb, otherwise glabrous, the other 4 petals with a very short claw, which is

in the upper pair often along the margins hairy, limb orbicular, 6–8 mm 0, glabrous, sometimes sparsely ciliate. *Stamens* slightly esserted, filament ca 12 mm, woolly over more than half the length, the 2 median ones less hairy; anther IV2 by 0.7 mm, glabrous or with a few hairs. *Pistil* glabrous or silky-hairy along the ovarian sutures; ovary 3–4 by 1 mm, ovules 2–4; style 6–8 mm, glabrous, stigma 0.3 mm wide, short-hairy along the margin. In *fruit* the pedicel as long as in the flower, receptacle persistent, ca 1–2 mm long, ca 7 mm wide; pod indehiscent, 1^ 2V2 times as long as wide, 3–5 by 1'a–2 cm, glabrous, base rounded, top obtuse, short-beaked, both sutures thickened, often constricted between the seeds, exocarp strongly adnate. *Seeds* 1–3 (–4), subglobose, ca 10–12 mm 0, dark brown, testa very hard; albumen none.

DISTRIBUTION: India (Nepal, Bengal, Madras), Ceylon, Burma, Indo-China (Laos, Annam, Cochín-China), Thailand (N., E.); in Malasia: Sumatra (Palembang), NW. Malaya, Java (Central, East; also Madura and Kangean Is.), Lesser Sunda Islands (Bali).

INDIA. Not further located: 9 coll.- Nepal: Dhnran, 26°0'N 87°SO'E, Williams & Stainton 855S, fl. 22. IX. 1067. Bengal: Chittagong hill tracts, King's coll eO7. Djanipur distr., hb. WaUhh SSoB, fl. fr. 6. III. 1800.

CEYLON. *Beddome 9.1.90, Thwaitea 1527.*

BURMA. Upper B., Abdul Hub *s., fl. 7. X. 1890. Teiasserer : Moulmein, *Falconer 56S.*

INDO-CHINA. Laos: SaYOnnaket, *Poilane ssOAL*, fl. 13. X. 16B8. Luang-prabang, *Poikne 2021I*, fr. 28.11.1932. Annam: prov. Nhatrang, *Poilany BJ&I*, fr. 22.1.192B; *Evvard '67*. Cochín-China: *Thorval sr.2*; near Saigon, *Pierre 21S*.

THAILAND. North : Chiang Mai area, ca 15°N 89°E, 300 m, *Kerr SOU*, fl. fr. 12. IX. 1909; 200 m, *Kerr isee*, fr. 28. XI. 1920. East : Nakawn Rachasima, ca 200 ra, ca 15°N 102°E, *HKF 23769* = *Smitinand isCI*, fl. E.IX.1958. South of this line: 13 coll.

SUMATRA. Palembang : de Voogd ZS2, fl. 1. XII. 1928.

MALAYA. KedBh find. Penang and Langkawi la.): 12 coll. Perlis : Mata Ayer, low alt., *SF 2805S Henderson*, fl. 22. XI. 1929. Pernk : Eg. Kencing, *SF 2888S Henderson*, fl. IB. VI. 1B30.

JAVA. East of 110°E, up to 250 m: 16 coll. KanR'ean Is.: 1 coll. Madura : 25-150 m alt., 5 coll.

LESSER SUNDA ISLANDS. Bali : 4 coll.

ECOLOGY: Dry plains or hills, savannahs, scrub, forest fringes, up to 250 m. In general a drought-loving species, which in Thailand occurs together with *C. furfuracea* (see there). A periodicity was not found.

USES: The pods are used for tanning, see Burk., Diet. 2nd ed.: 391. 1966; Watt, Comm. Prod. Ind.: 192. 1908; Diet. Ec. Prod. Ind. 2: 9. 1889.

NOTES:1. Compilation of field data: petals yellow, all or only the standard with a red dot at the base or red veins.

7. CAESALPINIA ENNEAPHYLLA *Rash.* — Fig. 4/7.

Caesalpinia enneaphytta *Rash.* [Hort. Beng.: 32. 18J4, nomen], Fl. Ind. (ed. Carey) 2: 363. 1832. — *Mezoneuron enneaphyllum* (Roxb.) W. & A. es Benth. in *Miq.*, PL Jungh.: 258. 1852; *Miq.*, Fl. Ind. Bat. 1, 1: 104. 1855; Baker in Hook. f. PL Br. Ind. 2: 258. 1878; Prain in J. As. Soc. Beng. ii 66: 472. 1877; Back., Schoof!]. 397. 1911; Kootd., Exk. PL Java 2: 372. 1912; Ctaib, Fl. Siara. Enum. 1: 498. 1928; Kanj. & Das, Fl. Assam 2: 124. 1938; Back. & Bakh. f. FL Java 1: 547. 1964. — Type: Roxburgh's drawing n. 1426 (K!), fl. fr.

Shrub or climber, up to 15 m. *Branchlets* glossy, when young finely pubescent, sparsely beset with recurved prickles, these 1—3 mm long. *Stipules* scale-like, ca 14 mm long, 1 mm wide, appressed, often seemingly absent. *Leaves*: rhachis 20—40 cm, short-hairy to glabrous, at the insertion of the pinnae and in between set with recurved prickles; pinnae 8—12 pairs, 3—8 cm, short-hairy to glabrous, unarmed or with a few short prickles. *Leaflets* opposite, 8—12 pairs per pinna, $\frac{y}{6}$ —1 mm stalked; blade membranous, widest about the middle, index 2—3, subequal, 9—18 by 5—7 mm, base and top rounded, margins parallel, surfaces when dried dull, glabrous. *Racemes* axillary and terminal, 25—40 cm, often branched, hairy to glabrous, unarmed; bracts caducous, lanceolate, 1—2 by 14 mm; pedicels 10—20 mm, glabrous or sparsely hairy, jointed 1—3 mm below the top. *Flower* buds glabrescent or glabrous, almost globose; receptacle oblique, cupular, ca 2 mm long, 4—6 mm wide; lowest *sepal* deeply cucullate, glabrous, ca 5—6 by 2—4 mm, the other 4 sepals ca 4—6 by 3—4 mm, reflexed during anthesis, ciliate. *Petals* spreading, glabrous, sometimes the standard ciliate; standard ca 8 by 4 mm, claw 3 by 1 mm, leathery, prolonged into a ligule which is ca 1 mm long with a bilobed top, limb reflexed, suborbicular, 4—5 mm 0; the other 4 petals: claw 1 by 1 mm, ciliate, limb suborbicular, ca 5 mm 0. *Stamens* exserted; filament ca 10 mm, the topmost one glabrous, the other 9 hairy to about the middle; anther 11/4—2 by 1/2—1 mm, glabrous. *Pistil* subsessile, glabrous; ovary 4—5 by $V/5$ mm, ovules 4—6; style ca 6 by y -i mm, top funnel-shaped, stigma ca 1 mm 0, short-ciliate. In *fruit* the pedicel 15—20 mm, jointed ca 3—4 mm below the top and there nodding; receptacle first ca 6 mm wide, later often shed and remnant then 2—3 mm wide; pod indehiscent, very thin, $2V_2$ — $3i/2$ times as long as wide, 8—12 by 2l—C 4 cm, including the 7—10 mm wide longitudinal wing, base cuneate, top acute, surfaces shining, the swelling on each seed ellipsoid to linear, the long sides contrary to the length direction. *Seeds* 4—6, ellipsoid in outline, flat, ca 7 by 5 by 2 mm, brown, smooth; albumen none.

DISTRIBUTION: India (Assam), China, Burma, Indo-China (Tonkin, Annam, Cochinchina), SW. Thailand; in Malesia: West and Central Java, SW. Celebes.

INDIA: Assam: Cachar, *Booker f.* & *Thomson*, fl. fr.

CHINA: *Morse SIS*, fr. 1801.

BURMA. Upper E.: Wuntho, *Halves* 5805, fr. 24. XII. 1914. Tankhayongim[†] 61 miles from Rangoon, *Parkvixnn* 14611, fr. 30. VI. 1932.

INDO-CHINA. Tonkin: Long Tdieou, Simon *SOI*. Annam: prov. Haut Donal, Col de Braian, Djirins, 11°35'N 108°05'E, *Poillane* 2104i, fr. 1. II. 1935. Cochinchina: Dongnai, *Pierre*, fr. 1.1866.

THAILAND. Southwest: Kanburi, 14°2'N 98°33'E, BO ni, *Kerr* 10100, fr. 30.XII.1926. Chumpawn, 10°50'N 99°20'E, 150 jn, *Kerr* 11124, fl. fr. 14.1.1927.

JAVA. Culta: *Junghuhn* 722. West: Priangan, Sumedang, *Hoarders* 40i7S, SE 28.II.1915. Central: Rembang, Blora, *Beumee* 871, fl. VI.1917. SW. of Semarang, Bodja, Djatikalangan, ± 300 in, *Wailz* 875, lib. *Junghuhn* is, yfr.

CELEBES. Southwest: Pangkadjene, *Teijsmann* uses *HB*, *ims* *HB*, fr.

ECOLOGY: Forest fringes, ca 300 m alt.

NOTES: 1. Compilation of field data: flowers yellow; fruits brown.

2. For differences with *C. furfuracea* see there.

8. *Caesalpinia furfuracea* (Prain) Hattink, *nov. comb.*

— Fig. 4/8, Fig. 5.

[*Caesalpinia furfuracea* Wall., Cat. JI. 5835. 1831-32, *mov*[†]]. - *Mitzoneuron furfuraceum* Prain in J. As. Soc. Beng. ii 66: 471. 1897. - Type: *hb. WaBich* n. 5555 (BM!; K! holo), from [Burma] Tenasserim, Attaran River, Pabang Hill, fr.

Climber or straggling shrub. *Branchlets* glossy, slightly pubescent or glabrous; prickles recurved, up to 5 mm long. *Stipules* persistent, scale-like, ca 1 mm long, 1% mm wide, the axil hairy. *Leaves*: rhachis 25—30 cm, short-hairy on the upper side, a prickle below the insertion of each pinna and scattered ones in between; pinnae 7—8 pairs, opposite or sometimes one pinna inserted to 1 cm higher as the other, 6—10 cm, hairy. *Leaflets* opposite, 7—10 pairs per pinna, 1 mm stalked; blade membranous, equal or subequal, widest at the middle, the topmost pair above the middle, index 2—2Va. 18—25 by 7—13 mm, base rounded, in the topmost pair cuneate, top rounded or retuse, margins parallel, surfaces glabrous or the costa below puberulous. *Racemes* axillary and terminal, often branched, up to ca 40 cm long in all, brown-hairy when young, unarmed; bracts caducous, 8—12 by ca *4 mm, hairy; pedicels spreading, 2—2l/2 cm long, hairy or glabrous; usually jointed ca $y/2$ — $l/2$ mm below the top. *Flower* buds glabrous; receptacle oblique, cupular, 2 mm long, 7—8 mm wide; lowest *sepal* deeply cucullate, glabrous, ca 15 mm long and 4 mm deep, the other 4 sepals ca 8 by 6 mm, reflexed during anthesis, mostly ciliate. *Petals* spreading; standard: in Malesia i —9 mm long, claw 2—4 by ca 2 mm, glabrous, grading into the limb which is reflexed, vaulted, ca 3—4 mm long and near the top 5—6 mm wide, glabrous, the margin at the top waved; standard in continental Asia ca 13 mm long, including the claw which is ca 6 by 3l/2 mm with hairy margins, limb more or less reniform, reflexed, ca 7 by 8 mm, woolly hairy on the transition with the claw; the other 4 petals: claw 2—4 by 3 mm, limb suborbicular, ca 15—20 mm 0. *Stamens* exserted; filament ca 15—20 mm, hairy to about the middle; anther 4 by 1 mm, glabrous. *Pistil*

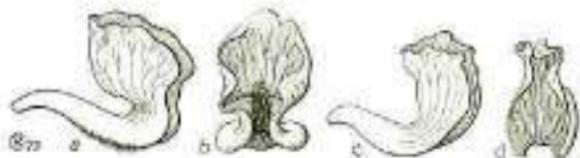


Fig. 5. *Caesalpinia furfuracea*, showing the differences between specimen from Thailand (a-b) and the Lesser Simda Islands (c-d), 5 x. — From AV 1000 (a-b) and Forées J79* (c-d).

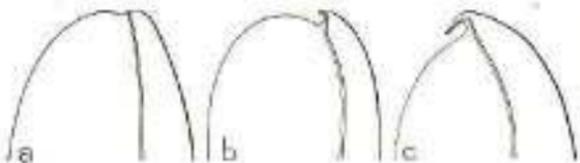


Fig. 6. *Caesalpinia latitiliqua*: top of poda, showing the variability, 1 x. — a From Cosro E Melegrito 1BS7, b from P.V.J. -27SH, c from BS 4le'S.



Fig. 7. *Caesalpinia nalomoRe*, all from the same pod, 1 s. — From f/s/f t/OBS.

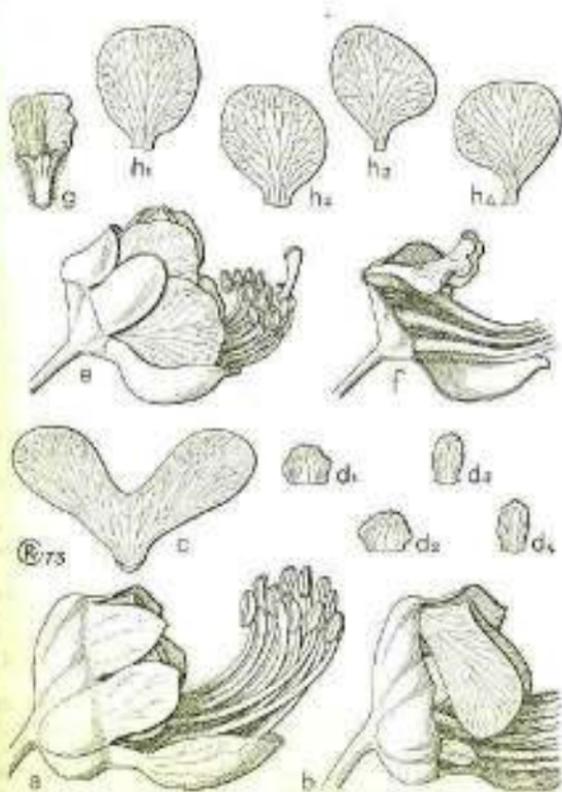


Fig. 8. Flowers of *Caesalpinia latitiliqua* (a-d) and *C. mndomwih* (e-h): a, open flower, b, the same, two sepals removed, c, standard, d, 1-4, petals, e, open flower, f, the same, two sepals and four petals removed, g, standard, h, 1-4, petals, 3 x. — From PNH 17SSO (a-d) and BS 18G75 (e-h).

ca 1 mm stalked, glabrous; ovary 8 by 2 mm, ovules 4—5; style ca 20 mm, the top funnel-shaped, stigma 11.4 mm 0, short-ciliate. In fruit the pedicel 2—3/4 cm, above the base not jointed or ca 4 mm from the top, receptacle persistent, ca 2—3 mm long by 8—9 mm, the median ends often recurved, abruptly narrowed into the pedicel, pod indehiscent, comparatively thin, $21/\wedge$ —31/J times as long as wide, 7—20 by 2/i—6 cm, including the 10—17 mm wide wing, base cuneate, top acute, often hooked, surfaces dull, covered with wax. Seeds 3—4, spaced, ellipsoid in outline and also in section, ca 11 by 6 by 4 mm, brown, smooth, dull; albumen?

DISTRIBUTION: Burma (Toungoo, Tenasserim), Thailand; in Malesia: Lesser Sunda Islands (Timor, Alor).

BURMA. Toungoo distr.: *Lace SOU*, fl. 10.XII.1909.

THAILAND. North: Lainpang, 18°47'N 99°30'E, 250 m, *Kerr 4806*, fr. 7. II. 1921; Ban Ta Dua, 17°50'N 98°38'E, 200 m, *Kerr 4G65*, fl. 28. XI. 1920. Southwest: Wangka, 15°06'N 88°28'E, 150 m, *Kostermans*, fr. IV. 1946 (leaves of *C. diffyna*).

LESSER SUNDA ISLANDS. Timor: *Forbes 8703*, fl., *Teijsmann 10699*, fr. Oéolo-Eban, 1000 m, *Schmutz 2311*, fr. only 3. VII. 1968. Alor: *Jaag 609*, fl. 7. V. 1938.

ECOLOGY: In Thailand in the same habitats as *C. digyna*. Seems to prefer a strong seasonal drought.

NOTES: 1. Compilation of field data: flowers yellow; fruits with blue wax.

2. The flowers resemble those of *C. andamanica*, *C. digyna*, and *C. enneapylla*. The first two have different leaflets. The last one has a glabrous standard.

3. The fruits resemble those of *C. andamanica*, *C. enneapylla*, *C. sumatrana*, and *C. latistiliqiw.* The first one differs in leaflets; the second in the shorter pedicels and the shape of the calyx tube; the last two differ in the calyx tube, the absence of a joint in the pedicel, and the often larger leaflets which usually are alternate.

4. *Kostermans OS* from Thailand, near Neechey, 15°06'N 98°28'E, 25—28. IV. 1946, is a mixture, the fruits belonging to this species, the leaves to *C. digyna*. Possibly the fruiting plant was leafless. As all fruiting collections from the Lesser Sunda Islands are collected without leaves, the species may be deciduous.

5. *Kerr 4665* (*C. furfuracea*) and *Kerr 4666* (*C. digyna*) are both from Thailand, Ban Ta Dua; as, moreover, *Kostermans 98* is a mixture of these two species, they obviously grow together in Thailand.

9. *Caesalpinia hymenocarpa* (Prain) Hattink, *nov. comb.*

— Fig. 4/9.

[*Caesalpinia kyme-nocarpa* Wall., Cat. n. 5832. 1831-32, nomen; W. & A., Prod.: 283. 1834, nomen, tentatively under *Meioneuron*. — *Mezoneuron kymenocarpum* Jacks, in Ind. Kew. 2: 223. 1885, nomen]. — *M. hymenocarpum* Prain in J. As. Soc. Beng. ii 66: 233 descr., 472. 1897; Back., Sohooff.: 397. 1911; Koord., Exk. Fl. Java 2: 872. 1912; Gagn. ill Fl. Gen. I. -C. 2: 154. 1913; Craib, Fl. Slam. Emim. 1: E00. 1928. — Type: *kb. Walkck 583S* (BM!; K! holo), from [Burma] Taong Doling, fr. *Mezoneuron laotimim* Gags, in Not. Syst. 2: 208. 1911; in Fl. Gen. I. -C. 2: 19E. JH13. - Lectotype: *TKorel z.n.* (P!), from LBOS, Me Kong, Stung Streng (= Stung Treng), fl. 18C6-6S.

Climber or shrub. *BranchUts* glossy to dull, slightly pubescent or glabrous; prickles recurved. *Stipules* scale-like, ca Vg mm long, Va—1 mm wide, appressed. *Leaves*: rhachis 20—40 cm, short-hairy, ending between the last pair of pinnae in a ca 3 mm long tip, which is inserted contrary to the length direction; prickles at the insertion of each pinna and often scattered ones in between; pinnae 6—10 pairs, sometimes one pinna inserted up to 1 cm higher as the other, 4—10 cm long, hairy, unarmed, contrary to the top a 1—3 mm long appendage. *Leaflets* opposite or alternate, 10—18 in all per pinna, ca 1 mm stalked; blade membranous, widest about the middle, the topmost pair above the middle, index l/a—2, 11—28 by 5—16 mm, base subequal to unequal, cuneate in the topmost pair, top rounded to retuse, margins parallel or curved, surfaces when dried dull, pubescent to glabrous. *Racemes* axillary and then often serial, as well as terminal, 20—40 cm long, combined into a panicle of 30—50 cm long in all, pubescent; bracts wanting, caducous; pedicels 8—15 mm, pubescent, jointed 1—4 mm below the top. *Flower* buds pubescent; receptacle oblique, cupular, ca 1 mm long, 6 mm wide; lowest *sepal* deeply cucullate, in open flower 9—10 by 5 mm, the other 4 sepals ca 6—7 by Zy₂—4 mm, reflexed during anthesis, ciliate. *Petals* spreading; standard: 7—8 by 6 mm, the claw 3—4 by 11.4—2 mm, leathery, margins hairy, the claw prolonged in a ligule which is ca 1 mm long with a bilobed to dentate top, limb reniformi to orbicular, ca 3—4 by 4—6 mm, reflexed, the other 4 petals: claw ca 3/2 by 1 mm, hairy or glabrous, limb suborbicular to reniform, ca 7—10 by 10—11 mm. *Stamens* exerted; filament ca 7—17 mm; the upper median one glabrous and slender, the lowest 3 hairy at the base only, the other 6 hairy to about the middle; anther 2% by 1 mm, glabrous. *Pistil* glabrous; ovary 5 by 1 mm, ovules 4—6; style ca 12 mm, top funnel-shaped, stigma 1 mm 0, short-ciliate. In fruit the pedicel as long as in the flower, jointed 1—4 mm below the top and there often bend, receptacle shed, the remnant then 2—3 mm wide, sometimes persistent and then ca 6 mm wide, laterally compressed; pod thin, indehiscent, 0—V2 ctn stalked, 2Y₂—5 times as long as wide, 6—15 by 2—3 (—4) cm, including the 6—8 mm wide longitudinal wing, base cimate, top sometimes rounded, normally hooked; the wing ca 1—6 mm longer than and curved to the seed bearing part, dull to shining, weakly

reticulate, each seed in a swollen seed chamber which is orbicular, ca 10—15 mm 0. *Seeds* (1—) 3—6, ellipsoid in outline, flat, ca 5—10 by 3—5 by 1 mm, dull; albumen none.

DISTRIBUTION: Ceylon, China (Yunnan), Burma (also Andaman Is.), Indo-China (Laos, Cochinchina), Thailand (N., S.E.); in Malesia: Java (Djakarta, once found), Lesser Sunda Islands (Sumbawa, Flores, Alor, Timor, Tanimbar *la.*).

CEYLON, *Thwaites 8801*, fl. fr. 1868. Near Ginigathene: *N.D. Simpson 8548*, fl. CHINA. Yunnan: *Bans d'Anty, IT.*

BURMA. Gambia, *Skaik Mokim B1&*, fr. XI. 1903. Teiuiserim: Tavoy. 14°02'N 98°12'E. *hb. Wallich S<<H*, fl. 7. XII. 1827; loc. unknown, fl. *Wallich 555/G*, fl. 28. IX. 1820. Andamans: 8 coll.

INDO-CHINA. Laos: *Spire 708*, fr., 811, fr. Me Khong, *Hamnard 52*, fr. Bassin Se Moun, *Harmand 151*, fr. XI. 1875. Cochinchina: Thorel, yfr. 1862—66. Bienhoa, *Pierre, IT. IV. 1893*. Cap St. Jacques, *Poiaine 605*, fl. 18.X.1819.

THAILAND. North: Chiang Rai, 19°56'N 99°51'E, *Bunchai & Nimang H59*, fl. 10. VIII. 1967. Chiang Mai, 18°18'N 98°59'E, *Kerr 1529*, fl. 20. VIII. 1910. 1339a, fl. 10.11.1911. Southeast: Chantabun, *Kerr 0589*, fr. 10. XII. 1824. Sriracha, *Mrs D.J. Collins 1552, IT. 4. XII. 1927*. East: Pak Thong Chai, 200—300 m, *van Beusekom & Geeink 3378*, fr. 26. X. 1971.

JAVA. West: Batavia, now Jatinegara, *Backer U656, Si65T*, fr. X. 1904.

LESSEE SUNDA ISLANDS. W. Sumbawa: *Kuswata 156*, fr. 3. V. 1961. Flores: Wae Wolang, Rehas, 300 m, *Schmutz 183a*, fr. 26. V. 1966. Alor: beach, *Jaag iSX*, fr. 4.V.1935; 850 m, *Jaag 13G7*, fr. 18.V.1938. Timor: *Guichenot s.n.* fr. Tanimbar Is.: Jamdena, central part, *van Borssum Waalkes SK7*, fl. 4.IV.1956 (fr. of *C. crista*), *van Boream Waalkes 5320*, fl. 7.IV.1955.

ECOLOGY: Hill jungle, monsoon forest, river banks, up to 850 m alt. Seems to prefer a strong seasonal drought.

NOTES: 1. Compilation of field data: fruits green, tinged with red.

2. Specimens from the Lesser Sunda Islands (e.g. *Jaag 422* from Alor) and the Tanimbar Islands (*van Borssum Waalkes 8320* from Jamdena) have the same shape of leaflets as specimens from Thailand (*Kerr 9589*). Specimens from the Andamans often have leaflets which are larger and resemble those of *C. andamanica*; the latter differs by the glabrous leaflets, pedicels and calyx, and different pod.

This species resembles *C. pubescetis* in shape and arrangement of leaflets, but differs in the shorter pedicels, the glabrous ovary and the arrangement of the seeds in the pods.

Gagnepain's *Mezoneuron laoticum* was described as having flowers jointed 1 mm from the top and pods of 9 cm long, which are not hooked at the top. In his key (1913) these characters are used to distinguish his species from *M. hymenoearpum* ("fruits 10—15 cm"). As in the cited syntypes of *M. laoticum* the fruits are often longer than 9 cm and also

sometimes are hooked at the top, and the distance between the joint in the pedicel and the calyx is variable in specimens from other regions too. I included *M. laoticum* in this species. The figure in the Fl. Gen. I. - C. is wrong: the two teeth on the standard claw are in fact a ligule.

3. For *Guichenot s.n.* (P1), from Timor, that was named *Mezoneuron glabrum*, see under 15. *Caesalpinia pubescens*.

4. Specimens from Ceylon (*Thwaites 3601*, p.p.), have pods without swollen seed chambers; the pods also are wider than those from other localities. Flowers (*Thwaites 3601*, p.p.; A'. *Douglas Simpson 8548*), however, are the same.

10. *Caesalpinia latisiliqua* (Cavan.) Hattink, *nov. comb.*

~ Fig. 6a-d, 4/10.

Bauhinia ? *latisiliqua* Cavan., Ic. 5: 5, (V-8. 1799. — *Mezoneuron luUsiliquum* (Cavan.) Merr. in Philip. J. Sc. 4: Bot. 268. 1809; *ibid.* 5: Bot. 57. 1910. Sp. Blanc: 176. ISIS. — Type: Cayanille's plate end. leaves, which are bauhinoid, from the Philippines, Luioa, fr.

Caesalpinia torquata Blanco, Fl. Filip.: 336. 1837. — Type: lost.

Mezon-euron procumbent Blanco, Fl. Filip. 2nd ed.: 235. 1845. — Type: lost. *Mezon-<ron glabrum* (non Desf.) F.-Vill., Nov. App.: 70. 1880.

Meioneuron rubrum Merr. in Publ. Gov. Lab. Philip. 6: 7. 1904. — Type: *Merrill 805* (K! PNH US!), from the Philippines, Paragua (= Palawan), Point Separation, fr. 20. II. 1903.

Mezoneuron platymrum Merr. in Philip. J. Sc. 11: Bot. 85. 1916. — Type: *Hose 70* (BM! K! L! PNH! dupl.), from Borneo, Sarawak, Baram District, Miri River, fl. yfr. 1.1895.

Mezoneuron cabadbarese Elmer, Leaf! Philip. Bot. 10: 3757. 1939. — Type: *Elmer 13886* (BM! BO! GH! K! L! P! PNH! NY! U!), from the Philippines, Mindanao, Cabadbaran, fl. VII. 1912.

Mezoneuron bala-asae Pram [in J. As. Soc. Beng. ii 66: 472. 1897. *nomen*] *ex Gaga*, in Pl. Gen. I. - C. 2: 198. 1913. — Lectotype: *Bala.7isa 1298* (K! L! P! holo), from Indo-China, Tonkin, pres de Luang Yen, fl. fr. VIII. 1885.

Mezoneuron keo Gagn. in Bull. Mus. Hist. Nat. Paris ii 24: 318. 1952. — Type: *Poilsans U52* (K! LI P! holo), from Indo-China, Annam, Tourane, fl. 1. VI. 1920.

Mezoneuron oxyphyllum Gagn., fruits only, see under *Doublif Species 3*.

Climber or small tree, up to 20 m. *Branchlets* glossy to dull, pubescent to glabrous, unarmed or with a few prickles, these scattered, recurved, on older stems on a corky knob. At the leaf-base on either side a crescent-shaped ridge, 2—4 mm long, which might be the scar of a *stipule* often also a prickle beside it. *Leaves:* rachis 20—40 cm; prickles in pairs at the base of the pinnae and often paired or scattered ones in between; pinnae 4—8 pairs, 7—13 cm, sometimes armed, hairy to glabrous. *Leaflets* alternate to subopposite, sometimes some of them opposite, the topmost 2 of a pinna in a pair, 6—16 in all per pinna, 1—3 (—4) mm stalked, blade membranous to coriaceous, index 1*4—2V₂,

$l'/\wedge-7$ by %—5 cm, base unequal to subequal, truncate to obtuse, in the highest pair of a pinna often euneate, top rounded to truncate to retuse, margins parallel or eurved, nerves below often prominent, surfaces when dried above dull to shining, below dull, glabrous or appressed short-hairy to pubescent. *Racemes* axillary and terminal, combined into a 30—100 cm long panicle; rhachis often thick, up to 1 cm 0, pubescent to glabrous, unarmed; bracts wanting, caducous (linear to lanceolate according to Elmer); pedicels 10—20 mm, pubescent to glabrous, above the base not jointed (in Malesia). *Flowers* in all parts punctate (secretory cavities), in bud ovoid, pubescent to glabrous; receptacle oblique, 3—5 mm long, 7—12 mm wide; *sepals*: the lowest one cucullate in bud, in open flower twice as long as the others, 7—15 by 6—8 mm, the other 4 sepals ciliate, top rounded, the lowest two 4—7 by 3—5 mm, the highest two semi-orbicular, 4—7 mm 0. *Petals* very unequal, standard vaulted, bilobed, 8—12 (—19) by 6—10 (—14) mm, at the base 1—2 mm wide, sinus for ca V_5 —% of the length and sometimes with a short stipitate process, the other 4 petals: length $1/5$ to $1/2$ of the standard, 2—6 by $1/2$ —3 mm, short-clawed or sessile, widest above the middle, top acuminate to tridentate, in the latter case the central dent acuminate, the lateral ones rounded; often ciliate. *Stamens* far exserted; filament ca 14 (—22) mm, more or less hairy to about the middle; anther 1—2 by V_4 mm. Pistil pubescent or glabrous, 0—1; mm stalked, ovary ca 5 by 1 mm, flat, ovules 6—13; style ca 8 mm, stigma oblique, hairy along the margin. *In fruit* the pedicel 15—32 mm; receptacle 4—7 mm long, 7—18 mm on median, section, the widest part at the winged side of the pod; pod 2—3 $\frac{1}{2}$ times as long as wide, 10—16 by 3—5 cm, including the 10—15 mm wide wing at the dorsal side, base euneate, hidden in the calyx-tube, top variable (see fig. 6), surfaces sometimes reticulate-nerved. *Seeds* 6—9 (—13), placed separate from each other, ellipsoid in outline, flat, ca 9—12 by 6—7 by 1 mm, brown, dull; albumen none.

DISTRIBUTION: Indo-China (Tonkin, Annam); in Malesia: Borneo (not from the S.W. part, also Labuan, Banguey), Philippines, Celebes, E. New Guinea (Morobe Distr., once found).

INDO-CHINA. Tonkin: *Balansa* 2149, fl. fr. IV. 1887, Bon 2B95, fr. 17. VI. 1884. Ho Yung Shon and vis., Tien-yen, *Tmng* 30749, fl. Kren Khe, in morit. Bong Ham, *Bon* 2132, fl. 14. V. 1883. Annam: Tourane, *Clemens* 3167, fl. fr. V. 1927.

BORNEO. Sarawak: 3rd div. Kapit, *Clemens* 5125S. Brunei: *BEVN* 989 Ashlon, fr. III. 1958. Sabah: to 1500 in, 19 coll. Kaliraintan: N.E. part, southwards to 0°36'S, 6 coll. Labuan: *Unlrrt* 547. Banguey: *Castro* & *Melegria* 1557.

PHILIPPINES. All parts, up to 1300 m, 39 coll.

CELEBES. North: 0°57'N 124°10'E, 600 m, *Kavdern* S64, fl. fr. VII. 1917. Central: Manado. *Koorder** 17700, fr. 28.0.1895. Malili. *Kjelberg* 2005, fl. 20.VIII. 1929. Southeast: LBSBO, 100 m, *Jkellberg* 1170, fr. 2. IV. 1929.

NEW GUINEA. Territory: Biao river, Morobe distr., 6°30'S 147°10'E, *NGF* 25252 *Gillison*, fl. fr. 21. V. 1965.

ECOLOGY: Rocks on sunny hot dry slopes, river banks and road sides, primary forests and forest fringes.

NOTES: 1. Compilation of field data: panicle-branches red, pedicels green, corolla green, yellow, yellowish white or pink; fruit red.

2. The species is very variable. Elmer distinguished *Mezoneuron cabadarensense* from *M. latisiliquum* by "a number of important characters". As Elmer neither mentioned those, nor described the flowers, which are present in the type specimen and, like the vegetative parts, do not differ from those of *M. latisiliquum*, I see no reason to keep his species distinct.

3. The pod resembles that of *Caesalpinia sumatrana*, see there.

4. The specimens of the Philippines differ from those of Borneo by the leaf index: 2—21.4 in the Philippines against $V/n-2$ in Borneo; often also by the standard; the sinus reaches in the Philippines often further than halfway, in Borneo less than halfway. The ovary is never glabrous in Borneo. Intermediates in foliage occur; compare e.g. *SAN* 1077, from Sandakan with *PNH* 2781 (A! PNH1) from Luzon: both specimens are in fruit, the foliage is almost identical.

5. Specimens of Annam (named *Mezoneuron keo*) differ sometimes by a joint in the pedicel. They possess a standard like many Bornean specimens, but the foliage and the glabrous ovary are like many Philippine specimens, e.g. *Elmer* 17988 from Luzon. Specimens of Tonkin (named *Mezonemioi balanme*) resemble the Bornean ones, e.g. *Clemens* 21293 from Sarawak.

11. CAESALPINIA MAJOR (Medik.) Dandy & Exell

Caesalpinia, major (Medik.) Dandy & Exell in 3. Bot. 76: 180. 1838; Sykes, Contr. Fl. Niue: 54. 1970; Fosberg in Taxon 22: 162. 1973. — *Bondul majus* Medik., Theod. Spec-43, t. 9 upper part. 17B6. excl. syn. *Galandina bonduc* L. — *Guibntina bojdice* L., Sp. Pl. 2nd ed.: 545, 1762, num. illeg.: non L. 1753. — *G. bmdud L. a majus* DC, Prod. 2: 480. 1825. — *G. major* (DC.) Small, Fl. SE. U.S. 2nd ed.: 591. 1903; Skeds in Scence n.a. 37: 922. 1913. — *C. jayabao Maza* in An. Soo. EBB. Hist. Nat. 19: 234. 1890, n'an. illeg. — *C. glcblorumm* Bakh. f. & Tan Eoyen in Blumea 12: 62. 1963; Bask. & Bakh. f., Fl. Java 1: 545. 1964. — Type: *Frutex globulomm* Rumph., Herb. Atmb. 5: t. 48. 1747, from Malesin, Ambon and the other Moluccan Islands, fl. fr. See Note 2.

Caemlinia glabra (P. Mill.) Merr. in Philip. J. Sc. 5: Bot. 54. 1910, exd. type; see note 6.

Climber up to 15 m. *Branchlets* glossy to dull, hairy to glabrous; prickles straight or somewhat recurved, V_2-3 mm long; on a small suborbicular base, sometimes also recurved prickles on an ellipsoid base. *Stipules* caducous, subulate, often split into 2 or 3 superposed parts, 1—3 ram long. *Leaves*: rhachis up to 75 cm, armed with recurved

prickles at the base of the pinnae and scattered ones in between, often also in the lower part short straight prickles; pinnae 3—8 pairs, 7—35 cm, hairy to glabrous. *Leaflets* opposite or alternate, 6—14 in all per pinna, ca 1 mm stalked; blade membranous to subcoriaceous, widest at the middle, subsymmetrical, index $l/w \approx 2.5/1.5$, 3—9 by $l/2=5$ cm, the basal one or two often much smaller than the others, the topmost ones often the largest, base acute to rounded, top acute to acuminate (rarely rounded), margins curved, costa mucronate, nerves prominent, surfaces dull or the upper side shining, hairy to glabrous. *Racemes* supra-axillary and then inserted up to 3 cm. above the leaf-axil and often serial, as well as terminal, often branched, 10—50 cm in all, in the lower part sometimes with short, straight prickles, all parts densely hairy, glabrescent; bracts caducous, not exceeding the topmost flower buds, lanceolate, ca 5 by $y/2=1$ mm, bristle pointed; pedicels 6—12 mm, jointed $>1=1$ mm below the top. *Flovers* in *s* or $\$$ racemes; rarely 1 or more branches of a *S* raceme *g* (the *s* flowers seemingly bisexual but anthers without pollen), in bud ovoid, pubescent; receptacle ca 1 mm long, 3 mm wide; *sepals* ca 7 by 2 mm, almost equal, the lowest one somewhat boat-shaped, all reflexed during anthesis. *Petals* not exceeding the sepals; standard: claw ca 3 by 1 mm, on both sides densely hairy, limb ca 4 by 3 mm, reflexed, glabrous or with a few hairs; the other 4 petals ca 7 by 2 mm, widest above the middle, on the basal part and the outer side hairy, sometimes ciliate. *Stamens*: filament nearly straight, hairy in the basal part, in *s* flowera filament ca 6—7 mm, anther ca l/v_1 by $y/2$ mm; in *S* flowers filament ca 5 mm, anther 1 by $y/8$ mm, without pollen. *Pistil* in 9 flowers ca 7 by $2/2$ mm; ovary ca 4—5 by $2/1_2$ mm, hairy, densely set with ca $1/4$ a m^{TM} long spines, ovules 4; style ca 3 mm, hairy, stigma ciliate; pistil in *s* flowers rudimentary, ca 1 mm long, hairy. In *fruit* the pedicel 1—3 cm, on section round, 3—6 mm 0, towards the top the thickest; receptacle 5—7 mm wide; pod 5—10 mm stalked above the receptacle, swollen, dehiscent, ca 2 times as long as wide, 8—13 by 4—6 cm, base acute, top rounded, style-remnant up to ca 11 mm long, surfaces more or less densely set with 5—10 mm long bristles; surfaces and spines often hairy. *Seeds* 2—4, (sub)globular, 15—25 mm 0, smooth, yellow to brownish (grey-green when unripe) with parallel lines concentric with the hilum, which is brown and often has a minute rejecting point of the funicle; albumen none.

DISTRIBUTION: America (S.E. United States, Caribbean Is., Guyana), Madagascar, SE. Asia from India to the Ryukyu Is., Pacific Is. (Micronesia, Sandwich Is., Tonga); in Malesia: all parts, except the major rain forest areas of Sumatra, Borneo, the Philippines, Celebes and New Guinea.

ECOLOGY: A species with a wide ecological amplitude; beaches, sandy areas, thickets, primary forests and forest fringes, dense jungles, up to 1000 m alt., even to 1400 m in New Guinea. A periodicity was not found.

USES: . The same as those of *C. bonduc*, see there.

NOTES; 1. Compilation of field data: calyx green or light red, petals yellow, anthers brown; fruits green.

2. Of Eakhuizen & Van Royen's paragraph the last line should read "Theod. Specios. (1786) 43, quoad descr., excl. syn. L.". Their omission of the L. at the end does not affect the clear intention of the authors to declare *Bonduc majus* Medik. an illegitimate name, since for the pre-Linnaean generic name *Bonduc* Plum., which Medikus wanted to reinstate, Linnaeus had already established *Guilandina*. In spite of this the name *Caesalpinia major* (Medik.) Dandy & Exell, which these authors announced as a new combination based on *Bonduc majus* Medik., can not be considered illegitimate, see Code art. 72, note, so Bakhuizen & Van Royen's name must be rejected. See also fig. 1.

As neither Bakhuizen & Van Royen nor Dandy & Exell (nor earlier authors) typified the names proposed by them, and as no specimens were found by me in herbaria consulted by Linnaeus, Rumphius's plate *Is* here suggested as such. The stipules have not been drawn, these are small and caducous. As the spiny fruits occur only in two Malesian species, and as the other one (with larger stipules) has also correctly been figured by Rumphius, there is no doubt as to the Identity.

3. The above description rests on Malesian material only, comprising but part of the whole diversity of the species. For description of other parts of the world see Fawcett & Rendle, Fl. Jam. 4: 92. 1920 (under *Caesalpinia bonduc*) and Britton & Wilson, Sc. Surv. Porto Rico Virg. Isl. 5: 379. 1924 (under *Guilandina bonduc*).

4. One of the few New Guinea specimens, viz *NGF 32592 Coode* (! LAE!) differs by being pubescent in all parts except the upper side of the leaflets, many glandular hairs on the pedicels and calyx and more spines on the racemes. A parallel with *Caesalpinia bondiitc*, where in New Guinea also specimens occur which are very pubescent and more spiny (named *C. sogerensis* Baker).

5. Many collections consist of racemes with male flowers and detached fruits. Whether these are of one plant or not is uncertain.

6. *Guilandina glabra* P. Mill., Gard. Diet. 8th ed. (no pagination). 1768, probably belongs to the genus *Gymnocladus* (*Leguminosae-Caesalpiniaceae*) according to Dandy & Exell (1938).

12. *Caesalpinia mindorensis* (Merr.) Hattink, *nov. comb.*

— Fig. 4/12, 8e-h.

Meioneuron mindorcvs Merr. in Philip. J. Sc. S: Bat. 232. 190S. - Type: *FB 5S8S* (PNH+, see note), from the Philippines, Mindoro, Pinamalayan, fr. X. 1906.

Mezoneuron mindrense Merr. var. *inermis* Merr., *l.c.* — Type: BS 15U (BOI GH! K! PNH NY! US!), from the Philippines, Mindoro, Bulalacao, fr. VIII-IX. 1906.

Climber. Branchlets glossy, glabrous, more or less armed with short, recurved prickles, sometimes unarmed. Stipules sessile-like, ca 1/2 mm long, 1-2 mm wide, appressed. Leaves: rachis 20-35 cm, glabrous, unarmed or prickles in 2's or 3's at the insertion of the pinnae, sometimes scattered ones in between; pinnae 10-13 pairs, rarely the lowest two alternate, 5-8 cm, short-hairy, unarmed, at the top a ca 1 mm long appendage. Leaflets opposite or alternate, 16-24 in all per pinna, i/i_1 -1 mm stalked, closely placed, overlapping; blade membranous, widest at the middle, the topmost pair above the middle, index 2-3, 8-22 by 4-8 mm, base subequal to unequal, rounded to cordate, top retuse, margins parallel, surfaces when dried dull, glabrous or beneath near the stalk hairy. Racemes supra-axillary and then sometimes serial, as well as terminal, the single racemes 10-30 cm long, often branched, combined into a panicle of 20-50 cm long in all, pubescent; bracts caducous, boat-shaped, 4-5 by 1 mm including the 2-3 mm long bristle point, hairy; pedicels 8-15 mm, pubescent, jointed 1-2 mm below the top. Flowers in all parts punctate (secretory cavities), pubescent; receptacle oblique, cupular, 2 mm long, 6 mm wide; sepals ciliate, the lowest one deeply cucullate, 7-8 by 5 mm, the other 4 sepals 6-7 by 3-4 mm, reflexed during anthesis. Petals spreading; standard: 7-8 by 4 mm, the claw 4 by 2 mm, leathery, hairy along the margins, in the middle prolonged into a ligule which is ca VB $\frac{1}{2}$ mm long, retuse top, limb reflexed, ovate to suborbicular, 3-4 by 4-6 mm, the other 4 petals: claw Y2 by 1 mm > hairy or glabrous, limb suborbicular, ca 7-10 mm 0. Stamens exserted; filament 1.1-1.3 mm, woolly in the basal half or up to the top; anther 1 1/2 by 1 mm, glabrous. Pod ca 10-18 mm, 1/2 mm stalked, glabrous; every 3-4 by 1 mm, valve 1-2; style ca 6-12 mm, at the top funnel-shaped, stigma 1 mm < short-ciliate. In fruit the pedicel 8-15 mm, jointed 1-2 mm below the top and there often bent; receptacle about the remnant 2-3 mm wide; pod very thin, indehiscent, ca 3 times as long as wide, 6-9 by 2-8 cm including the 5-8 mm wide longitudinal wing at the dorsal side, base attenuate, top rounded, often hooked, surfaces shining, swollen on the seed, weakly reticulate. Seeds 1, in the middle of the pod, flat, circular in outline, 7 mm 0, dull; albumen none.

DISTRIBUTION: Malesia: Philippines (Mindoro, Biliran, Mindanao). — PHILIPPINES. Mindoro: FB 179 Merritt, fr. 20. X. 1906, PNH 17753, *l.c.* 19. VI. 1953, PNH 15728, fl. 16. VIII. 1963. Biliran: BS 15572 E.G. McGregor, fl. VI. 1914. Mindanao: Davao prov., Mati, BS (SSSO, fl. 27.IV.1927.

ECOLOGY: Secondary forests, edge of swamps, thickets, at low altitude.

NOTES: 1. Compilation of field data: flowers yellow, pollen black, fruits green (greenish yellow when young).

2. The specimen FB ^79 Merritt (L!), 20. X. 1906, Pinamalanay, Mindoro, agrees very well with Merrill's description (e.g. prickles sometimes in threes), while also the locality is the same. It might have exactly resembled the lost type.

3. In spite of Merrill's statement that the leaves of the var. *inermis* are unarmed, there are some spines on the US duplicate. As the number of spines is very variable in other specimens too, I see no reason to keep the variety distinct.

13. *Caesalpinia oppositifolia* Hattink, *rtov. spec.*

— Fig. 9.

TYPUS: SAN 24026 legit J. Singh (K! L! holo, SAN!), e Malesia, North Borneo, Ranau distr., Hot Spring track, 2000 feet, fl. 15. II. 1961, "climber, forest, hill side".

DESCRIPTIO TYPI: Liana. Stipulae interpetiolares ad 3/4 cm longae 4/2 cm latae. Folia opposita vel subopposita; rachis 25-50 cm longa aculeis recurvatis armata; pinnae 4-6 paribus, 10-21 cm longae; foliola opposita vel subopposita, 5-8 paribus ca 1 mm petiolata, lamina 4-10 cm longa 1 1/2-4 1/2 cm lata glabra. Racemi axillares terminalesve, ramulis oppositis serialibus bractea subtentis, pedicellis sparsis 5-10 mm longia bractea subtentis. Florium receptaculum ca 2 mm longum 3 mm latum sepalis ca 3 mm longis 1 1/2 mm latis; petala ca 4 mm longa 2 mm lata, vexilli unguis interne pubescens; pistillum ca 4 mm longum pubescens ovulus 2. (Fructus deest.)

Climber. Branchlets dull, co yate, 1 entice Hate, unarmed or the prickles in pairs beside the leaf-base. Stipules interpetiolar, persistent, up to 3/4 by 4/2 cm, base amplexicaul, top rounded or bilobed, tops then acute to rounded, the sinus variable, sometimes up to the base. Leaves opposite; rachis 25-50 cm, short-pubescent to glabrous, prickles in pairs at the insertion of the pinnae and scattered ones in between; pinnae opposite or the lower ones subopposite, 4-6 pairs, 10-21 cm long, short-pubescent to glabrous, unarmed or with scattered recurved prickles. Leaflets opposite or subopposite, 6-8 pairs per pinna, ca 1 mm stalked; blade membranous, index 2-2 1/2, 4-10 by 1 1/2-4 1/2 cm, base unequal, top acute to obtuse, emarginate, margins parallel or curved, surfaces above shining to dull, below dull, both sides glabrous. Racemes axillary and terminal, up to 40 cm long in all; pubescent when young, branches opposite, serial, the subtending bracts (leaves?) not seen, their stipules interpetiolarly connate, up to 1 1/2 cm long; pedicellar bracts caducous, ca 3 by 1 mm, boat-shaped, top acute, hairy; pedicels 5-10 mm long, Pubescent, jointed ca V< mm from the base. Flower buds eventually ovoid, pubescent; receptacle ca 2 mm long, 3 mm wide; sepals ca 3 by 1 1/2 mm, the lowest one concave. Petals: standard ca 4-5 by 2 mm, claw hairy on the inner side, tapering into the reflexed limb, the other 4 petals ca 5 by 2 mm, spatulate, hairy at the base. Stamens: filament ca 5 mm,



Fig 9 *Caenalmia opotisitfolia*: a, habit, b, a node with stipules, c, inflorescence with buds, M, x — a Mainly after SAN 2567&, b-c from SAN HOB5.

hairy in the lower part, the upper median one at the basal part for ca 1 mm glabrous; anther ca $\frac{1}{6}$, by $\frac{1}{2}$ mm, glabrous. Pistil ca 4 mm long, pubescent; ovary ca 2 by $V\%$ mm, ovules 2; style ca 1–2 mm, the upper half glabrous, stigma ciliate. In fruit the pedicel unknown; pod (detached) dehiscent, ca 2 VS times as long as wide, ca 9 by 4 cm, the widest towards the top, base rounded, top truncate, beaked at the upper angle, dull. Seeds 2, ovoid in outline, flat, ca 27 by 22 by 3 mm, black.

DISTRIBUTION: Malesia: N. Borneo (near Sandakan).

NORTH BORNEO. Sandakan area: Mangkuo R., Tungku. *NBFD 88?1* H. G. Keith, fl. 30. IV. 1938. Lungmanis, mile $<W_2$, Br. Borneo Timber Co. Concession, 25 miles S.W. of Sandakan, SAN A 2557, fl. yfr. 4.III.1956. Beluran, Kuala Sinaputa, Labuk, SAN BSU9, fl. fr. 14. V. 1961. Sandakan, mile 18, « mile to Peng Kcong's area, SAN 2557S, [1. 25.1.1961.

ECOLOGY: River banks and open spaces in primary forests, up to 600 m.

USES: The Kedayans use the stems for making fish-traps.

NOTES: 1. Compilation of field data: flowers greenish white.

2. The detached pods of SAW 25149, from Sandakan, Labuk, Kuala Sinaputa, Beluran, are similar to those of the type specimen of *C. minitiflora*; see under *C. parviflora*, note 6.

14. CAESALPINIA PARVIFLORA Prain

Caesalpinia parviflora Prain vsr. *typica* Prain in J. As. Soc. Beng. ii 66: 330 descr., 470. 1897; Ridl., Fl. Mai. Pen. 1: 650. 1922. - Lectotype: *Wray 1809* (CAL, holo; K! SING!), from MalayE, Perak, Relau Tugor, fl. V. 1888.

Caesalpinia parviflora Prain var. *stipularia* Prain, L.e. 230 descr., 470. — *C. stipularia* (Prain) Hid], (not the South American sp. of Bentham), Fl. Mai. Fen. 1: 651. 1922.

Caesalpinia miniflora Elmer in Leaf]. Philip. Bot. 5: 1803. 1913. - Type; *Elmer 125B9* (BM! K! L! P! PNH! dupl.; U!), from the Philippines, Palawan, Puerto Princesa, Mt Pulgar, fl. +, fr. IV. 1911.

Caesalpinia borneensis Merr., Pl. Elm. Born.: 104. 1929. — Type: *Elmer 21UB* (A! BM! BO! K! L! NY! P! U! UC! hole; SING!), from Borneo, Elphinstone Prov., Tawao, f]. X. 1922—III. 1923.

Climber or small tree, young parts hairy. Branchlets hairy, with recurved prickles in pairs below the leaf-base. Stipules subsistent, lanceolate to broadly ovate-oblong, 8–20 by 3–11 mm, sessile; base amplexicaul, ca % of the width, top acute to acuminate. Leaves: rhachis 14–35 cm, hairy, unarmed or with a few prickles, these scattered or in pairs at the base of the pinnae; pinnae 8–19 pairs, 5–12 cm long, unarmed or sometimes with a few small prickles. Leaflets 13–18 pairs per pinna, opposite or subopposite, sessile, membranous, closely placed, index 21A–3, 7–26 by $2\frac{1}{2}$ –9 mm, base obliquely truncate, top retuse, sometimes truncate, margins parallel, both surfaces when dried dull dark

greenish or below dull greyish, sometimes above dull blackish, somewhat short-hairy or glabrous, ciliate or not. *Racemes* supra-axillary and then often serial, as well as terminal, combined into a panicle which is up to 1 m long in all, the single racemes often branched, all parts densely short-hairy; bracts caducous, linear to lanceolate to broadly ovate, either 5-6 by 14-1 mm or 114-2 by 1 mm, top acuminate to caudate, pedicels 4-11 mm, jointed ca $\frac{y}{2}$ mm below the top. *Flowers* often punctate (secretory cavities), buds ovoid, hairy to glabrous; receptacle ca 1-2 mm long, 3-5 mm wide, *sepals* hairy to almost glabrous, ciliate, lowest one ca 3-7 by 1-3 mm, somewhat boat-shaped, the other 4 sepals 2-6 by 1-2 mm. *Petal?*: claw 1-2 by $\frac{1}{2}$ -1 mm, limb 4-6 by 1/4-4 mm, widest about the middle; standard vaulted, claw on both, sides and along the margins hairy, limb glabrous, the other 4 petals: claw along the margins hairy, limb sometimes ciliate. *Stamens* exserted; filament 5-10 mm, woolly over more than half the length; anther ca 1/2 by 1/3 mm, glabrous. *Pistil* aubseasile; ovary 2-4 by 1-1/2 mm, hairy, ovules 2; style 3-6 mm, glabrous, except the basal part, stigma as wide as the style. In *fruit* the pedicel ca 1/3 cm; pod (detached) dehiscent, up to 10 by 3/4 cm, widened to the top, base rounded, top obtuse, upper margin ending in a sharp beak. *Seeds* 2, orbicular, flat, up to 2 cm \emptyset , smooth. DISTRIBUTION: Malesia: Malaya, N. Borneo, Philippines (Palawan).

MALAYA. Perak: Teluk Anson, Selangor: Kepong plantation, *Sow & Tagor* 1881, fl. fr. 1949. Negeri Sembilan: *Alvins* 1637.

NORTH BORNEO. *Raxwahan* 1881: *Marche*.

PHILIPPINES. Palawan (probably): *Marche* 78, fl. IV. 1884.

ECOLOGY: Primary forests and clearings at low altitude.

NOTES: 1. Compilation of field data; flowers greenish, light yellow, yellow ochre or white, sometimes with red inside.

2. Prain distinguished two varieties of *Caesalpinia parviflora*, viz var. *typica* and var. *stipularis*, later by Ridley elevated to specific rank. As the foliage of the duplicate of *Knisler St. 99* (L!), named var. *typica*, is similar to that of *Wray S991* (SING!), named var. *stipularis*, the size of the leaflets cannot stand as a distinguishing factor. The size of the stipules is very variable: the bigger the leaflets are, the bigger the stipules, so I think that no separation between the two varieties is possible.

Elmer described of his *C. minutiflora* both fruits (seen) and flowers (not seen; probably lost in Manila). Of *Marche* 78 (P!) from Palawan the flowers agree very well with Elmer's description of *C. minutiflora*. The foliage of both collections is similar to that of *Wray S953*, *3991* and *i251*, all from Malaya, their flowers only differing in size. The same may hold for the pod: those from Malaya are, according to the description, smaller.

The flowers of the Eornean specimens agree with those of *Marche* 78, but the leaflets are smaller and agree with the Malayan material. The only difference lies in the bracts, which in the Bornean material are much shorter.

3. This species is closely related to *C. sappan*, and *C. macra* Craib from Thailand, but differs from the former in the presence of stipules, the shape of the leaflets which often are also ciliate, the often much smaller flowers and the fewer ovules; the latter species has very short stipules (ca $< \frac{1}{2}$ mm long), fewer pinnae, and leaflets which are fewer per pinna and relatively shorter. The pods of *C. macra* may be similar to those of *C. parviflora*.

4. This species may have the habit of climber or small tree. Ridley contrasted in his key *C. stipularis* as a climber and *C. parviflora* as a tree, but under the description of the latter he noted: "a large climber according to Kunster".

5. *Holmberg 87J*, (SING!) from Malacca, Batu Ti# a, recorded by Ridley under *C. stipularis*, appeared to be *Pterolobium densiflorum* Prain.

6. I have not seen ripe fruits from Borneo and Malaya. According to Prain's description the fruit of his var. *typica* is "21/a by 1% cm, with a recurved beak at the upper angle of the obtuse apex, seeds (young) oval, 4, 6 mm long". The number of seeds does not agree with the number of ovules, which is always two; the size of the pod may be that of a young one. In Elmer's type of *C. minutiflora* the fruits are 10 by 3 1/2 cm, 2-seeded and their shape agrees with the description of *C. parviflora*. The detached fruits with his type specimen are similar with the also detached ones with a specimen of *C. oppositifolia*; the latter differs in its opposite leaves, with interpetiolar stipules, and the serial clusters of the branches of the racemes being opposite too. As very young fruits of Bornean and Malayan specimens are exactly the same, I see no reason to keep them distinct.

15. *Caesalpinia pubescens* (Desf.) Hattink, *nov. comb.*

— *Fig. 4/15.*

Mezmeuron pubescens Deaf, in Mem. Mus. Hist. Nat. Paris 4: 247, (t. 11. 1818; DC, Prod. 2: 484. 1825; Miq., Fl. Ind. Bat. 1, 1: 104. 1815; Merr. in Philip. J. So. 5: Bot. 56. 1910; Back., Schoof]; 397. 1911; Merr., Fl. Manila: 230. fol2; Koord., Exk. Fl. Java 2: 372. 1912; Gagn., m Fl. Gen. I.-C. 2: 193. 1913; Merr., Sp. Blanc: 176. 1918; Back. & Bakh. f. Pl. Java 1: E47. 1964. - Type: *Lezchenawlt s.n.* (P!), *Herb. Java, fr.*

Mezmeuron glabrum Deaf, in Mem. Mus. Hist. Nat. Paris 4: 246, t. 10. 1818; DC, Prod. 2: 484. 1825; Miq., Pl. Ind. Bat. 1, 1: 103. 1865. - Type: *Legckenawlt s.n.* (K!) P! holo), from Timor, fl. (P!) fr. (K!).

6. *Frazer 133* (BM!), from "W. Australia", consisting only of pods, is not considered in the distribution because of the doubtful origin and the wanting leaves.

16. CAESALPINIA PULCHEEIMA (L.) Swartz

Cacatipiitia pulckerrima (L.) Swartz, *Observ. Bot.*: 166. 1791; Willd., *Ep. Pl.* 2: 581. 1799; Mia., *Pl. Ind. Bat.* 1, 1: 111. 1E55; Kurz, *For. Fl. Burma* 1: 407. 1877; Baker in *Hook. f. Fl. Br. Ind.* 2: 265. 1E75; Men. in *Philip. I. Sc.* 5: Bot. 54. 1910; Back., *Schoefl.*: 3SS. 1911; Koord., *Exli. Fl. Java* 2: 371. 1912; Gogn. in *Fl. Gen. I.-C.* 2: 183. 1913; Merr., *Int. Euph.*: 2C0. 1917; Sp. Blanc: 175. 1918; Rock, *Leg. PL Hawaii*: 104 photo gr., 105. 1930; Merr., *Comm. Lour.*: 191. 1935; Bor & Raizada in *J. Bomb. Nat. Hist. Soc.* 16: 4< 1940; Back. & Bakh. t. *Fl. Java* 1: 544. 1964. — *Poiwaana pulckerrima* L., *Sp. Pl.*: 380. 1753; Lour., *Fl. Cochinch.*: 261. 1790; Ait., *Hort. Kew. Hnd. ej.* 3: 30. 1811; G. Don, *Gen. Syst.*: 432. 1832; W. & A. Prod.: 282. 183*. — Type: *Linnaeus 52911* (LINN!), from *Indin caliciorie*, fl. fr.

Shrub or small tree, up to 5 m, in all parts glabrous. *Brancklets* glossy, unarmed or with a few straight prickles. *Stipules* caducous, subulate, ca 2 mm long. *Leaves*: rachis 20–40 cm, constricted at the base, unarmed or with a few prickles, these in pairs at the base of the pinnae, straight or slightly curved to the top; pinnae 5–9 pairs, both pinnae of a pair inserted close to each other at the upper side of the rachis and often a small subulate stipel between them, 4–12 cm long, the intermediate ones the longest; each pair of leaflets with a triplet of stipels, these subulate, ca fo mm long. *Leaflets* opposite, 6–12 pairs per pinna, 1–2 mm stalked, blade rectangular, widest at the middle, the topmost pair above the middle, index 2–2*4, 9–30(–35) by 5–15(–23) mm, the lowest ones often the smallest, base unequal, rounded, top rounded to retuse, margins parallel, costa mucronate, surfaces dull. *Racemes* axillary and terminal, 20–50 cm long, sometimes branched, all parts glabrous, rarely with a few straight prickles; bracts caducous, ca 5 by 14 mm; pedicels (35–)50–100 mm long, above the base not jointed, ca 3 mm below the top thickened. *Flowers* bisexual (sometimes s ?), punctate (secretory cavities); receptacle ca 2 mm long, 4 mm wide, grading into the pedicel; lowest *sepal* deeply cucullate, ca 15 by 5 mm, the other 4 sepals 10–13 by 6–7 mm, ciliate. *Petals* spreading; standard: claw

20–25 by 3 mm, the margin incurved, limb suborbicular, ca 4–6 mm (1 margin wavy); the other 4 petals 20–25 by 12–18 mm, spatulate. *Stamens* very tar exerted: filament 55–7b mm, in the oasai pan hairy; anther ca li/s₂ 2Va by 1 mm, glabrous. *Pistil* about as long as the stamens; ovary 15–20 by 2 mm, ovules ca 10; style 50–G5 mm, stigma ciliate. *In fruit* the pedicel as long as in the flower, ca 5 mm below the top swollen; receptacle ca 5–4 mm wide; pod ca 8 mm stalked above the receptacle, septals, dorsalmost, more or less woody, ca 5 times as long as wide, 6–9(–11) by 1½–2 mm; often at the top the widest, here grading into the stalk, top rounded, upper suture ending in a sharp beak,

margins somewhat divergent, surfaces dull. *Seeds* 8–10, somewhat rectangular in outline and also on section, ca 8–10 by 6–8 by 2–3 mm, black, dull; albuminous.

DISTRIBUTION: Origin South America, widely cultivated throughout the tropics.

USES: Cultivated as an ornamental throughout Malesia and often run wild. The pod seems to be edible.

NOTES: 1. Compilation of field data: calyx yellow, petals yellow or red or red with a yellow border.

17. CAESALPINIA SAFFAN L. — Fig. 4/17.

Caesalpinia sappan L., *Sp. Pl.*: 381. :1753; *Sp. Pl.* 2nd ed.: 545. 1762; Lour., *Fl. Cochinch.*: 262. 1790; Swartz, *Observ. Bot.*: 1GS. 1791; Willd., *Sp. Pl.* 2: 58K. 1793; Ait, *Hort. Kew.* 2nd ed. 3: 31. 1811; Blaneo, *Fl. Filip.*: 335. 1837; Miq., *Fl. Ind. Bat.* 1, 1: 108. 1855; Kurz, *For. Fl. Burma* 1: 405. 1877; Baker in *Hook. J., Fl. Br. Ind.* 2: 255. 1878; Prain in *J. A3. Soe. Beng.* ii 465: 228. 1897; Brandia, *Ind. Tr.*: 246. 1906; Merr. in *Philip. J. Sc.* 5: Bot. SS. 1910; Back., *Scliofil.*: 400. 1911; Koord., *Exl. Fl. Java* 2: 371. 1912; Gagn. in *Fl. G4n. I.-C.* 2: 179. 1913; Gamble, *Fl. Pres. Madras* 1: 394. 1919; Rock, *Leg. PL Hawaii*: 36 *pkotogr.*, 101. 1920; Ridl., *Fl. Mal. Pen.* 1: 649. 1822; Merr., *Comm. Lour.*: 131. 1935; Bor & Raizada in *J. Bomb. Nat. Hist. Soc.* 46: 6. 1946; Back. f. Bakh. f, *Fl. Java* 1: 546. 1964. — *C. anguifolia* Salisb., *Prod.*: 326. 1795, *von. illeg.* - *Biancaea aappan* Todaro, *Hort. Bot. Panorm.*: 8. 1E76-7S. — Type: hb. Hermann, vol. 4. *fra. 31* (BM!), from Ceylon.

Small tree or shrub, up to 10 m. *Bra-ncMets* dull, lenticellate, usually set with recurved prickles, these scattered and in pairs below the insertions of the leaves, on old branches placed on large knobs, rarely unarmed. At the leaf-base on either side a crescent-shaped ridge, 2–4 mm long, which might be the scar of a stipule. *Leaves*: rachis 25–40 cm, short-hairy to glabrous; prickles none or in pairs at the base of the pinnae and scattered ones in the lower part; pinnae 9–14 pairs, 9–15 cm, short-hairy, unarmed. *Leaflets* 10–20 pairs per pinna, opposite, subsessile, membranous, closely placed, index 2–3, 4, 10–25 by 3–11 mm, base obliquely truncate, top retuse to rounded, margins parallel, costa at the base very excentric, from there running obliquely to the middle of the top, surfaces when dried above shining or both sides dull, glabrous or sparsely short-hairy (hand-lens). *Racemes* supra-axillary and terminal, combined into a panicle, 10–40 cm long in all; bracts caducous, 5–12 by 2–5 mm, hairy; pedicels 15–20 mm, jointed ca 1–2 mm below the top and there nodding. *Flower* buds glabrous, often punctate (secretory cavities); receptacle oblique, cupular, ca 2 mm long, 6–8 mm wide; *sepals* ciliate, lowest one eucullate, ca 10 by 4 mm, the other 4 sepals ca 7 by 4 mm, reflexed during-anthesis. *Petals* spreading; standard: claw ca 5 by 2 mm, leathery, hairy, limb orbicular, ca 4–6 mm 0, reflexed; the other 4 petals: claw ca 1 by V^ mm, hairy or glabrous, limb suborbicular,

ca 10 mm 0. *Stamens* exerted, filament ca 15 mm, woolly to over the middle; anther ca $V/6$ by 1 mm, glabrous. *Pistil* ca 18 mm long, pubescent; ovary ca 4 by $V/2$ mm, ovules 3—6; style ca 14 mm, stigma ca ig mm 0, ciliate. In *fruit* the pedicel as long as in the flower, nodding at the joint; receptacle shed; pod dehiscent, ca $2y/3$ times as long as wide, 8—10 by 3—4 cm, widest towards the top, base rounded, top truncate, upper margin ending in a sharp beak, surfaces when dried black. *Seeds* 3—4, ellipsoid in outline and also in section, ca 15—18 by 8—11 by 5—7 mm, black, dull; albumen none.

DISTRIBUTION: Origin unknown. Cultivated in S. and S.E. Asia; throughout Malasia, in New Guinea once found (BW 9790, from Manokwari).

USES: From the wood a red dye can be obtained. See W.H. Brown, Min. Prod. Philip. For. 2: 389. 1921; Burk., Diet. 2nd ed.: 394. 1966; Heyne, Nutt. Pl. 3rd ed. 1: 753. 1950; Watt, Comm. Prod. Ind.: 194. 1908; Diet. Ec. Prod. Ind. 2: 10. 1889.

NOTES: 1. Compilation of field data: flowers yellow; fruit green.

2. For differences with *C. purviflora*, see under that species.

18. *Caesalpinia scortechinii* (F.v.M.) Hattinli, *nov. comb.*

— Fig. 4/18.

Mezaneuron eaoHeckimi P.V.M. in Wing, South. Sc. Eec: 73. ISE2; Bailey, Queensl. Fl. 2: 4S1, t. 15, fig. 5-7. 1900. — Type: *Bidwill s.n.* (E!), from Australia, Queensland, Wide Bay, fr.

Liana or shrub. *Branchlets* glossy to dull, short-pubescent to glabrous, with a few small, recurved prickles. *Stipules* caducous, ca 1 mm long, 2 mm wide, appressed, top acute. *Leaves:* rhachis 13—25 cm; prickles in pairs under each pair of pinnae and often scattered ones in between; pinnae 5—8 pairs, 5—11 cm, unarmed. *Leaflets* alternate, 10—16 in all per pinna, ca 1 mm stalked; blade membranous, widest about the middle, index 2, 15—30 by 7—16 mm, base oblique, top rounded, surfaces when dried dull, above glabrous or short-hairy, below glabrous to hairy. *Racemes* supra-axillary and then often serial, as well as terminal, combined into a panicle of ca 30 cm long in all, puberulous to glabrous; bracts caducous, subulate, ca 3 mm long, hairy; pedicels 3—5 mm, jointed ca $i/1$ mm below the top. *Flowers* bisexual, rarely also some S ones in a raceme, buds ovoid, hairy; receptacle ca 1 mm long, 4 mm wide, short-hairy to glabrous; *sepals* often punctate (secretory cavities), almost glabrous, ciliate, the lowest one ca 6 by 2 mm, boat-shaped, the other 4 sepals 5—6 by 2 mm, reflexed during anthesis. *Petals* as long as the calyx; standard: claw 1—2 by 1 mm, on the inner side hairy, limb oblong, 3— i by 2—3 mm, incurved; the other 4 petals: claw ca Vi "n, on the inner side hairy, limb oblong, ca 4—5 by 2—3 mm. *Stamens:* filament

ca 7 mm, hairy to over the middle; anther ca $V/6$ by 1 mm, villose. *Pistil* pubescent in Malasia, glabrous in Australia, in s flowers rudimentary; ovary ca 2 by $1/5$ mm, ovules 1—2; style ca 6 mm, in the lower part hairy, stigma not much wider than the style, ciliate. In *fruit* the pedicel ca 7 mm; pod ca 1 mm stalked above the receptacle, flat, indehiscent, obliquely rhomboid-orbicular, 1— $li/2$ times as long as wide, 3— $iy/2$ by 2—3 cm including the 1—6 mm wide wing at the dorsal side, base rounded to cuneate, top rounded, the wing there often hooked, surfaces dull, black, prominently nerved. Seed 1, almost reniform in outline, flat, ca 18 by 15 mm; albumen none.

DISTRIBUTION: Australia (Queensland, northern part of New South Wales); in Malasia: New Guinea (Papua).

NEW GUINEA. Papua: Central Distr., Kairuku, *van Duuren IS*, fl. fr. III. 1963. S. Highland distr. c. 810 m, *Schodde 22ie*, fl. 25.IX.1961. Lake Daviumbu, *M7i9S*, fl. fr. VIII.193G.

AUSTRALIA. Queensland: Moreton distr., Mt. Glorious, *JHf. Clemens a.*, fr. 1.1945. Dalrymple heights and vic., *M.S. Clement s.n.*, fl. VIII-IX.1947. Bundang, Mary Valley, *White 9811*, fl. 10. XL 1933. Fraser I, \pm 25° S 16E110E, *Ward 4581*, fl. 17/18. X. 1930. New South Wales: Murwillumbah, 28°22'S 153°24'E, 45 m, *Thurtell & Coveny 3880*, fr. 10.XII.1971.

ECOLOGY: Rain forests, secondary forests, river banks and along roads.

NOTES: 1. Compilation of field data: petals yellow, pods brown.

2. This species resembles *Caesalpinia braehycarpa* (Benth.) Hattink, *comb. nov.* (Baskmym: *Mezaneuron braehycarpum* Benth., Fl. Austr. 2: 278. 1864; lectotype *C. Moore s.n.* (K!) from Australia, New South Wales, Richmond River, flowering branches only). The Bidwill specimen on the same sheet in K is the type of *C. scortechinii*. *C. braehycarpa* differs of the latter by the flanges of cork along the stems, the (sub) opposite leaves and inflorescence branches, and the pods having thinner walls and a less suborbicular shape. Also to *C. braehycarpa* belongs NSW 12011S (L! SYD) from New South Wales, near Nimbin, old fr. 19-II-1971, but *Brass 19746* (A, L!) from Queensland, Cape York Pen., though also with opposite leaves and inflorescence branches, might belong to a different taxon for its different leaflets and (detached) pods.

3. The pod of this species is nearly identical to that of *C. stenoptera* Merr.; mentioned in the introduction. Of the latter species I saw the type: *Pitelot 1757* (K! P!) from Tonkin, prov. Cao Bang, Ban Gio, fr. VI-1933. The leaves are ca 8—12 cm long, pinnae 2—3 pairs, leaflets 2—3 pairs, these ca 2 mm stalked, largest in or below the middle, 4—7Va by 2—3 cm, base rounded, top acuminate. It resembles *C. erista* in num-

ber and size of the leaflets but the latter are distinctly acuminate. From Tonkin I also saw *Balansa 21US* (P!), which I dare not identify (but certainly not *Mezoneuron cucullatum* as the label is inscribed). The leaflets integrate between those of *Petelot U757* and of *C. crista*, but there are 5 pairs of pinnae and 4 pairs of leaflets, the flowers are identical to those of *C. crista*.

19. *Caesalpinia solomonensis* Haitink, *nov. spec.* — Fig. 4/19, 7.

TYPUS: BSIP 6068 legit L. Maenu'u (HON, K! L! holo; LAE! SIN&I US!), e Malesia, Solomon Is., Viru River, SE. New Georgia, fr. 24.VI.1965, "flat plain, 15' above sea level, well-drained secondary forest; climber reaching 40' above ground; fruits green, 4" x 3", flat".

DESCRIPTIO TYPI: Liana. Foliorum rhachis 70–80 cm longa aculeis recurvatis armata; pinnae 6 paribus oppositis 15–21 cm longae; foliola oppoaita vel subopposita ca 10 in aequae pinna; pinnae ca 1–2 mm petiolatae lamina ca $iy \pm 81/j$ cm longa 3–3½% em lata basi acuta apice acuminata mucronata. Racemi supra-axillares seriales, fructificantes lignosi ramis 5–9 mm diametro. (Flores desunt.) Fructus supra receptaculum 7–10 mm petiolatus, 10–12 cm longa V%—8 cm lata basi oblique acutus apice rotundatus dorso ca 5 mm rostratus faciebus laevibus obscure venatis marginibus iticrassatus rarissime ventro aculeatus. Semina 2, quasi semi-orbiculaura, plus minusve complanata indententata, ca 25–30 mm longa facie porcellata ordinatione partim pauce partim valde irregulare.

Climber, in all parts glabrous. *Brancklets* glossy. *Stipules* wanting. *Leaves* glabrous; rhachis 70–80 cm long, armed with recurved prickles at the base of the pinnae and scattered and paired ones in between; Dinnae 6 pairs, 15–21 cm long. *Leaflets* opposite or subopposite, ca 10 in all per pinna, 1–2 mm stalked; blade membranous, widest at the middle, index 2–2½, subsymmetrical, 7/8–8/10 by 3–3½ cm, base acute, top acuminate, margins curved, costa mucronate, nerves prominent, surfaces dull to shining. *Racemes* supra-axillary, serial, in fruit woody, 15–18 cm long, 5–9 mm Ø, glabrescent. (*Flowers* unknown.) *Fruit*: pedicel 6–10 mm by 5–7 mm, ligneous; receptacle-remnant ca 3–4 mm long by 7–8 mm, suborbicular; pod 7–10 mm stalked above the receptacle, ca 1½ times as long as wide, 10–12 by 7½–8 cm, base acute, oblique, top rounded, at the dorsal side a ca 5 mm long point, unarmed, or with an occasional spine at the ventral suture. *Seeds* 2, almost semi-orbicular with rounded corners, flat, surfaces and sides intruded, 25–30 mm Ø, testa covered with a partly regular pattern of fine slightly and strongly curved ridges, hilum brown.

DISTRIBUTION: Malesia: Solomon Islands (New Georgia, once found).

ECOLOGY: Well-drained secondary forest at low altitude.

NOTES: 1. Compilation of field data: fruits green.

2. The seeds may be abnormal: the seeds of *BSIP 10013* (*C. major*) and *SF S1956* (*C. bondiut*) are also somewhat intruded, while they usually are globular to ovoid, but without curved ridges. The species is vegetatively similar to *C. major* (cf. *BSIP 10013*), but the fruits are remarkably different; unarmed (but in one pod in L, I found a single spine, which unfortunately broke off), and much larger with thicker carpels.

The species undoubtedly belonged in the Linnaean genus *Gulimindina*, together with *C. bonduc* and *C. major*. The last two have spiny pods, *C. solomonensis* being transitional to smooth-fruited *Caesalpinias*.

20. *CAESALPINIA KUMATRANA* Rob. — Fig. 4/20.

¹ *Caesalpinia sumatrana* Roxb. [Hort. Beng.: 32, 1814, *nomen*]. FL Ind. (ed. Carey 2: 366, 1832; W. & A., Prod.: 2B3, 1834, tentatively under *Mezoneuron*. — *Mezoneuron sumatranum* <Roxb.) W. & A. ex Miq., Pl. Ind. Bat. 1, 1: 105, 1855; *ibid.*:

floIBI. 1858; Baker in Hook, f., Fl. Br. Ind. 2: 259, 1878; Prain in I. As. Soc. Beng. ii 66: 235, 1897; Eidl., Fl. Mai. Pen. 1: 647, 1922; Back. & Bakh., f. Fl. Java 1: 66, 1964. — Type: *C. Campbell* (n.v.), from Sumatra (see note).

Mezoneuron swfireum Miq., Fl. Ind. Bat. 1, 1: "106, 1855; Back., Schoeffl.: 17, 19U. — Type: "Zollinger s.n. [1002 in P] (BM) KI P! U! holo), from Java, Tjsoekja, fl.

Meianeuron sumatranum (Roxb.) W. & A. ex Miq. var *g* Miq., Fl. Ind. Bat. 1, 1: 1081, 1858. — Type: *Teysmann* am. (K! L! U! holo), from Sumatra, Siboga, fl. *Mezoneuron koordersii* Back., Schoeffl.: 356, 1911. — Type: *Koorders siUS* (BO! holo; L.), from Java, Preanger, Wijnkoopabaai, Palaboean, fr. fl. IV, 1899.

Climber up to 20 m, in all parts glabrous (sometimes the leaflets hairy). *Brancklets* glossy, unarmed or sparsely set with up to 5 mm long prickles. *Stipules* none or only a raised line which might be a scar. *Leaves*: rhachis 30–50 cm, unarmed or prickles in pairs at the insertion of the pinnae and often scattered ones in between; pinnae 4–8 pairs, 8–15 cm, unarmed or sparsely set with recurved prickles. *Leaflets* alternate, at the top often an opposite pair, 7–9 in all per pinna, 2–3 mm stalked, subsymmetrical, widest at the middle, the highest leaflet(s) above the middle, index 1¼–2 (–2¼, 2½–7 by 1½–5½ cm, base cuneate

to truncate, top reflex to rounded, rarely obtuse, surfaces usually glabrous, lower side sometimes hairy. *Racemes* supra-axillary and terminal, 10–80 (–100) cm, often branched, rhachis often thick, up to 1 cm Ø;

iracex caducous, ca 10 y₀ mm, noar-shapea, lop acutie to acuminate; <diels 5–20 mm, often somewhat S-shaped, above the base not jointed. *Flowers* in bud oblong, glabrous; receptacle oblique, 3–7 mm long, 4–8 mm wide; calyx-tube 6–15 mm long, 4–8 mm wide, after anthesis circumsciss 3–7 mm above the receptacle and falling off with the corolla and the stamens; calyx segments half-orbicular, the lowest one 4–10 mm, cucullate, the other 4 ca half as long as the lowest one, 2–7 mm long.

often ciliate. *Petals* inserted on the receptacle, almost equal, spatulate, 12–30 mm long, basal part 2–2 mm wide, limb 8–12 mm wide, standard vaulted, the margins sometimes ciliate or fimbriate half-way; the other 4 petals plane. *Stamens* not or slightly exceeding the petals; filament 15–29 mm, laterally compressed, in the lower part $\frac{1}{2}$ –2W_i mm wide, alternately a narrow and wide one, glabrous or near the base short-hairy; anther ca $l^{\frac{1}{2}}$ –3 by 1 mm, glabrous. *Pistil* 12–30 mm, glabrous; ovary 6–15 by 1–2 mm, ovules 2, 4 or 8 (rarely in between); style 6–15 mm, stigma as wide as the style, ciliate. In *fruit* the pedicel 10–25 mm, receptacle 4–7 mm long, 7–12 mm wide, the widest part at the seed-bearing side of the pod; pod subsessile, ca 3 times as long as wide, 10–17 by 3–6 cm including the longitudinal, dorsal wing which is ca $\frac{1}{2}$ of the width, base ciliate, hidden in the calyx-tube, top rounded or hooked, surfaces smooth or slightly reticulate-nerved. *Seeds* 1–8, spaced, ellipsoid in outline, flat, ca 11 by 7 by 1 mm, brown, dull; albumen none.

DISTRIBUTION: India? (see note); in Malesia: Sumatra (West Coast, Engkulung), Malaya, W. & E. Java, Borneo (near Sandakan), New Guinea, Solomons (Guadalcanal).

Origin doubtful; India, Silhet, *Wallich 5828 C*, mixture with leaves of *C. cucullata*. SUMATRA. West Coast: Mt Sago near Pajakumbuh, 900–1200 m. W. Meyer 8157. Kerintji valley, Siulak Daras, H.C. Robinson & C.B. Kloss 3008, fl. 21.11.1914. Bengkulu: Bmtuhan, coastal road, van der Fiji SIS, fl. i. VI. 1931. MALAYA. Most provinces (not from Perlis or Kedah), 29 coll.

JAVA. West: low to 1000 in, 10 coll. East: S. of Surabaya, Sumber-tingkal, Hoarders 25585, St. 27. VI. 1886.

BORNEO. Sabah: Sandakan and vic, sea level, *Villamil IM*, fr. 30. III. 1916, *Japp 821*, fl. 13.11.1920.

NEW GUINEA. West: Mamberamo R., *Doctere van Leeuwen 9685*, fl. fr. VII.1926. Hollandia distr., 50–70 m, *BW 5981> Versteegk*, fr. 19.IX.1956, van *Boyen & Sleumer 5637*, fl. fr. 29. V. 1961. East: Daunde R. near Vanim, 2°40'S 141°20'E, *NGF 25HI*, yfr. 20. IX. 1066. Central distr., Karera, *Schodde 5604*, fr. 19. VII. 1962. Morobe distr., 7°15'S 146°40'E, 750 m, *NGF 30898*, fl. fr. 28. IX. 1967. Sudest I., *Bass 57TS1*, fl. 19.VIII.1956.

SOLOMONS. Guadalcanal: *Whitmore 6003*, fl. 3.VII.19CB.

ECOLOGY: Forest fringes, along roads, in secondary vegetation, usually at low altitude, but in New Guinea up to 1000 m.

NOTES: 1. Compilation of field data: calyx red, segments (yellow-) green, petals red; fruits red.

2. In K is *Wallich 5851A*, which is inscribed: "herb. Roxburgh, (...) returned". This specimen bears only one (destroyed) flower and may be the type. Roxburgh's drawing n. 1423 (K!), inscribed *C. sumatrana* Roxb., also represents our species.

3. The fruits resemble those of *C. anda-inaniaa*, *C. furfuracea* and *C. lamSiUqva*. The first has jointed pedicels and a shorter receptaclej

which is often recurved. The second has opposite leaflets. The third has an often more oblique receptacle with the widest part at the winged side of the pod.

21. CAESALPINIA TOSTUOSA Roxb.

Caesalphia, tortuosa Roxb. [Hort. Beng.: 32. 181-1, iioaraen], FL Ind. (ed. Carey) 2: 3HS. IS32; Miq., Fl. Ind. Bat. 1, 1: ICS. 1S65; Kurz, For. Fl. Burma I: 407. 1877; Baker U Hook, f, Fl. Br. Ind. 2: 267. 1678; Prain in J. As. Soc. Beng. ii G6: 231, 471. 1E97; Brandis, Ind. Tr.: 247. 1906; Kridl, Pl. Mai. Pen. I: (531. 1922. — Type: *Roxburgh s.n.* (K!). "Hort. Cale. e. Sumatra", fl.

Caesalpinia microphylla [Ham. ex Wall., Cat. n. 6826. 1831-32, *itomenj ex Prain* (not of G. Don) m J. As. Soc. Beng. ii 66: 471. 1897; Brandis, Ind. TT.: 247. 1906; Kanj. & Das, Fl. Assam 2: 122. 1938, [— *C. parvifolia* Steud., Nom. Bot. 2nd ed.: Zil. 1840, *womenj*] — Type: *Wallich 5820* (K!), from Goyalpara, fl. fr. 6. VIII. 1908. *Cinalidocarjruie nitidae* Zoll. in Nat. Geesek. Arch. N.I. 3: £2. 1846. — *Caesalpinia einclideewpa* Miq., PL Ind. Bat. 1, 1: 110. 18EB; Baker in Hook, f, Fl. Br. Ind. 2: 256. 1878; Back., Schoofl.: 400. 1911; Koord., Exk. Fl. Java 2: S71. 1312; Back. & Bakh. fl., Fl. Java 1: E46. 1964. — Type: *Zollinger 8462* (A! BM! L! hoio; P!), from Java, fl.

Caesalpinia acanthobotrya Miq., Sumatra: 293. 1861; Prain in J. Aa. Soc. Beng. ii 66: 232. 1887. — Type: *iHepetiKont 221.0 HB* (BO! U! liolo), from Sumatra, Prainian, fl. 1865-60.

Caesalpinia tortuosa Roxb. var. *grandifolia* Fedde in Exp. Sp. Nov. 12: 39a. 1913. — Type: *Meebold 17908* (K!>, from Burma, Kowpok, fr. 1.1912.

Climber or shrub or small tree, up to 10 m. *Branemets* glabrous, leiticellate; prickles?recurved, up to 8 mm. *Stipules* wanting. *Leaves:* rhachis 30–45 (—70) cm, hairy; prickles recurved in pairs at the base of the pinnae, often also scattered ones in between; pinnae 7–20 pairs, 5–16 cm, the proximal and distal ones often shorter than those in between, hairy, unarmed. *Leaflets* opposite, 12–30 pairs per pinna, sessile, membranous, linear, index 3–6, 9–22 by 2–6 mm, base oblique, truncate, top obtuse or rounded, margins parallel, costa parallel to the margins, lateral nerves perceptible, surfaces when dried above shining below dull, glabrous or sparsely short-hairy (hand lens). *Racemes* (supra) axillary, and then sometimes serial, as well as terminal, 20–60 cm in all, often branched, pubescent, in the lower part or up to the top armed with many recurved prickles, sometimes unarmed; bracts caducous, ca 2 by 1 mm, hairy; pedicels 8–15 mm, hairy, above the base not jointed. *Flowers* often punctate (secretory cavities), bud glabrous or hairy in the basal part; receptacle 2 mm long, 8 mm wide; lowest *Re/pal* deeply cucullate, ca 8–10 by 7 mm, the other 4 ca 3 by 6 mm, usually ciliate. *Petals:* standard 10–13 by 6–8 mm, claw 6–8 by 2 mm, hairy, the basal part glabrous in the centre, limb reflexed, vaulted, reniform, 4–5 by 6–8 mm; the other 4 petals: claw 1–3 by 1 mm, hairy or glabrous, limb elliptic to orbicular to reniform, 7–10 by 6–12 mm. *Stamens* slightly exerted;

filaments 10—14 mm, woolly over ca half their length, the upper median one often slender and less hairy; anthers $2\frac{1}{2}$ — $3\frac{1}{2}$ by 1 mm, glabrous. Pistil 10—16 mm, subsessile; ovary 3—4 by 1Vi mm, hairy or glabrous or along the upper margin hairy only, ovules 4—5(—7); style often grading in the ovary, 8—12 mm long, glabrous or in the basal part hairy, stigma ca 1 mm p. In fruit the pedicel ca 15 mm; receptacle persistent, salver-shaped, ca 2 mm long, 7 mm wide; pod indehiscent, often twisted, $3\frac{1}{2}$ —9 by 2—Wi cm, base rounded, top obtuse, short-beaked, both sutures thickened, often constricted between the seeds, glabrous, when dried black, exocarp and endocarp strongly adnat*, swollen on the seeds, when ripe transversely cancellated cleft. Seeds 1—5(—7), subglobose, ca 10 mm O; albumen none.

DISTRIBUTION: India (Assam), China (Hongkong), Burma; in Malasia: Sumatra (W. & E.), Malaya (Johore, Penang, Singapore), Java (W. & E-), Borneo (W. & E. near the equator).

INDIA. (Several Wallich coll. Bot. not further located). Assam:

CHINA. Hong Kong: Sot. For. Dept. 54St.

SUMATRA. East Coast: Aaahan, Batu, Yates 1858. West Coast: Priaman, Diepenhorst 1577 HB.

MALAYA. Johore: S. Segun, Rowai, Corner s.n., ss. 12.V.1B35. Penang Curtis War, fl. fr. X. 1887. Singapore: Ridley ZQ91.

JAVA. 109° E on the S. coast, Backer 311, 57, fl. 10. V. 1921, and further West East: Djember area, Koorderie 20S15, tsmst, both fr. 17. X. 1895.

BORNEO. Kalimantan: West part, Sg. Landak (?), Tvljamann s.n East Dart, Bungalun, Ratten 738, fl. fr. 23.SI.1912.

ECOLOGY: Primary and secondary forests, forest fringes, along rivers; in Java often on limestone, further data are wanting.

NOTES: 1. Compilation of field data: flowers scented, petals yellow, stamens green, anthers violet, pollen yellow.

2. The differences, given in the literature, between *Caesalpinia tortuosa* and *C. cinclidocarpa* are the numbers of pinnae and leaflets, the inflorescence branches and ralyx hairy or not. In all parts of the area the numbers of pinnae and leaflets vary: large leaflets are concomitant with a lower number of leaflets and pinnae (like also in *C. latisiliqua*). The branching or the inflorescence is variable too and when the upper leaves have fallen off, the single racemes look like a compound panicle. The calyx should be glabrous in *C. tortuosa* and hairy in *C. cinclidocarpa*; however Ridley 1094 was cited by Eidle under *C. tortuosa*: this specimen has leaflets like the other Malayan specimens (e.g. Curtis 1027), but the calyx and ovary are hairy, like in specimens of Java (Zollinger 953). An ovary, which is hairy on the upper suture only, occurs in a specimen from Hort. Bot. Bogor., coll. unknown (L! BO!), fl. IV.1911.

3. The type of *C. acanthobotrya* is similar to specimens of Malaya (e.g. Curtis 1027) and Assam (e.g. Col, Jenkins s.n.).

4. *Caesalpinia dnclicdoearpa* var. *grandiflora*, *C. dnclicdoearpa* var. *grandifolia* and *C. nitida* (Zoll.) Back., non Hassk. are mere names on herbarium sheets in L, all from Java.

5. Roxburgh's drawing no 1426 (K!) fl. fr. also represents this species.

DOUBTFUL SPECIES

Caesalpinia axillaris (Lam.) DC, Prod. 2: 481. 1825; W. & A., Prod.: 280. 1834. — *Guilandina axillaris* Lam., Encycl. Meth. 1: 435. 1785, based on the 'Bankaretti' in Rheede, Hort. Mai. 6: 35, t. 20. 1686, which was referred to *Caesalpinia axiUaris* by DC, Prod. 2: 451. 1825, was suggested to belong to this species by W. & A., Prod.: 280. 1834, and by Baker in Hook, f, Fl. Br. Ind. 2: 258. 1878. The figure of Rheede is very bad: singly pinnate leaves and axillary flowers. The leaflets resemble those of *C. eucullata* and the fruits may belong to *C. cristata*.

Caesalpinia nitida Hassk., Cat. Hort. Bog.: 285. 1844; Miq., Fl. Ind. Bat. 1, 1: 113. 1855. — Type: not seen, the description is probably made after a living plant.

Miguel doubted already about this species. According to the description of the leaflets, the species may be *C. major*.

'*C. nitida* (Zoll.) Back.' is a herbarium name given to specimens belonging to *C. tortuosa*.

Mezoneuron oxyphyUwm Gagn. in, Bull. Mus. Hist. Nat. Paris ii, 24: 319. 1952. — Type: F. Fleury, Kb. Chevalier 32512 (P!) from Indo-China, N. Annam, prov. Nghe-An (Vinh): Reserve foreatiere de Co-Ba (Kehne), fr. 14. V. 1914.

The twig and leaves belong to *Caesalpinia bondue*, the inf rutescence to *C. latisiliqua*; one of the fruits is narrow, like in Gagnepain's *Mezoneuron kea*, in the other fruit the top is much wider, and may be a monstrosity.

EXCLUDED SPECIES

Caesalpinia arborea Zoll. in Nat. Geneesk. Arch. N.I. 3: 65. 1846, was reduced by Bentham, Fl. Austr. 2: 279. 1864, as a synonym of *Peltophorum ferragineum* (= *P. pterocarpa* (DC.) Back.; *Leguminosae*).

Caesalpinia dasyrachis Miq., Sumatra: 292, 1861, was referred to *PeUophorum* by Kurz ex Baker in Hook, f, Fl. Br. Ind. 2: 257. 1878 ('*dasyrachis*'; *Leguminosae*).

Caesalpinia ferruginea Decne in Nouv. Ann. Mus. Hist. Nat. Paris 3: 462. 1834, was referred to *Peltophorum ferrugineum* (= *P. pterocarpa* (DC.) Back.; *Leguminosae*).

Caesalpinia inermis, a nomen nudum of Roxburgh, Hort. Eeng.: 90. 1832, was reduced by Bentham, Fl. Austr. 2: 279. 1864, to *Peltophorum ferrugineum* (= *P. pterocarpa* (DC.) Back.; *Leguminosae*).

Guilandina microphylla DC, Cat. Pl. Monsp.: 114. 1813, typified by *Nugae sylvarum minimae*-Rumph., Herb. Amb. 5: t. 49 f. 2. 1747, was erroneously used as a synonym of *Caesalpinia bonduc* (our *C. major*) by Grisebach, Fl. Br. W. Ind. Isl.: 204. 1860, but by Merrill, Int. Eumph.: 251. 1917, reduced to *Acacia rugata* (Lam.) Ham. ex Merrill (*Leguminosae*).

Guilandina moringo, L., Sp. Pl.: 381. 1753, was placed as a synonym tinder *Moringa oleifera* Lam. by C.G.G.J. van Steenis, Fl. Males. I, 4: 45. 1949 (*Moringaceae*).

Mezoneuron grande Miq., Sumatra: 291. 1861, was by Heyne, Nutt. Pl. 2: 251. 1936, placed as a synonym of *Acrocarpus fraxinifolia* Wight (*Leguminosae*).

INVALID NAMES

(not attributed to one of the species treated in the present revision)

Caesalpinia ? *Mlaroe* is a herbarium name of Spanoghe, uaed as a synonym of *C. ferruginea* Decne, at present *Peltophorum pterocarpa* (DC.) Back. (*Leguminosae*).

Caesalpinia ? *maeklotii* is a herbarium name of Miquel, used in the synonymy of both his *Mezoneuron sulfureum* and *Caesalpinia, arborea* (see under excluded species). It belongs according to the Index Kewensis to *Peltophorum, ferrugineum* (= *P. pterocarpa* (DC.) Back.; *Leguminosae*).

Caesalpinia, micrantha is a herbarium name of Merrill, given to specimens belonging to *Pteralobium microphyllum* Miq. (*Leguminosae*).

INDEX TO NAMES

An effort has been made to evaluate oil the names given to *Caesalpinia* species, and all the epithets under thi genus *Caesalpinia*. The names are referred to the species where they belong or to the chapters Doubtful, Excluded and Invalid, if they belong under one of the, e. A key to the 3-letter abbreviations of accepted *Caesalpinia* species is given at the end. *Caesalpinia spicata* is abbreviated spc, *C. spinoea* is abbreviated spn. Accepted names are in normal print, *synonyms in italics*, new names in bold type.

*Btiakinia Ititisiliqui** Cavan. = lat

Biancaca Trdaro ^ Cncsalpinia

sappan Todaro = sap

scandeni Todaro = dec

sepiaria-Todaro = dec

Bondue P. Miller = *Caesalpinia*

majns Medik. = maj

minus Medik. = bon

Butea loureirii Spreng. = cri

Caesalpinin L.

sect. *Caesalpinia* B. & II. = Cacaal-

pinia

sect. *Cifclidocarpus* E. & H. = Cae-

salpinia

sect. *Guilandina* E. & H. = *Caesalpinia*

sect. *Nugaria* DC. = *Caesalpinia*

sect. *Sappemia* DC. = *Caesalpinia*

subgen. *Cinlidocarpus* Baker = Cae-

salpima

s"bgen. *Eueaesatpinia* Baker = Cae-

Salpinia

subgen. *Gmlaiuhna* Bu!er = *Caesal-*

pinie

acanthobotrya Miq. ^ tor

andamanica (Prain) Hfhtink — ana

aiijustifelia Saliab. = sap

arborea Zoil. — Excluded

axillaris DC. — Doubtful

benguiitensh Elmer = dec

bonduc (L.) Roxb. — bon

bonducella (L.) Fleming = bon

var. *aeguiaculeata* O. Ktze = bon

var. *elegant* O. Ktze = bon

var. *inaeq-uiancleata* O. Ktze = bon

bomcensis Merr. = pal'

liraohycarpa (Benth.) Hattink — see

sco Note 2

cifclidocarpa Miq. = [or

var. *grandiflora* — invalid name;

var. *rypm* Prain = par

pubescens (Desf.) Hattink — pnb

pubescens Wall. — invalid name;

see pub

cariaria (Jaeg.) Willd. — cor

crista L. — cri

cucuHata Hoxb. — cue

disyrhachis Miq. — Excluded

decapetala (Eoth) Alston — dec

digyna Rottl. — dig

enneaphylla Roxb. — enn

ferox Hassk. = dec

ferruginea Decne. — Excluded

furfuracea (Prain) Hallink — fur

glahra (S. Mill.) Mecr = maj

globubirum Bakli. t. & van Eoyen =

maj

gradlis Miq. = dig

grandis Heyne ex Wall. — invalid

name; see cue

hymenocarpa (Prain) Hattink — hym

ignuta Blanco = pub

inermis Koxh. — Excluded

jupovica Sieb. & Zucc. — dec

jayabo Maa = maj

H cyanOsjeTvta Maza ^ Don

kilaroe Spanoghe — Invalid

laevigata Perr. = cri

latiailiqua (Cavan.) Hattink — lat

maeklotii Miq. — Invalid

macro, eraib — see par Note 3

major (Medik.) Dandy & Exell — maj

micrantha Merr. — Invalid

microphylla Ham. ex Prain non. G.

Don = tor

mindorensis (Merf) Hattink — min

miiaitiflora. Elmer = par

nitida Hassk. — Doubtful

nitida (Zoll.) Back. — invalid name;

see 347

nuga (L.) Willd. = cri

uleosperma Roxb. = dig

oppositifolia Hattink — opp

panieulata (Lam.) Roxb. = cri

parviiora rrain → par

var. *etipilarh* Prain = par

var. *rypm* Prain = par

pubescens (Desf.) Hattink — pnb

pubescens Wall. → invalid name;

see pub

pulcherrima (L.) Swartz — pul

stiptwq Noronha ^ sap

sappan lj. — sap

scayflwns HQtyle e^ Jtoth ^ cri

INDEX TO EXAMINED SPECIMENS

This list is an index to all the collections of *Caesalpinia* examined by the author. Specimens collected in an institutional series have been listed under that series only. For an explanation of the abbreviations see Fl. Males, Bvill. 22: 1571-1578, 1908. Specimens without a collector's number have been indicated, where possible, with the month and year of collecting. Type specimens have been marked with (T). Specimens marked with * are mentioned in the text. The specimens are referred to an abbreviation of their name, explained at the end.

The materials were supplied by the following herbaria:

A	Arnold Arboretum at Cambridge, Mass.
BM ²)	British Museum (Natural History) at London
BO	Herbarium Bogoriense at Bogor
Gil	Gray Herbarium at Cambridge, Mass.
K ¹)	Royal Botanic Gardens at Kew
KEP	Forest Research Institute at Kepong, Malaya
L+)	Rijksherbarium at Leiden
LINN ¹)	Linnaean Herbarium at London
NY	New York Botanical Garden
P ¹)	Laboratoire lie PhanSrogamie at Paris
PNH	Philippine National Herbarium at Manila
SING	Herbarium of the Botanic Gardens at Singapore
U ¹)	Botanic Museum & Herbarium at Utrecht
UC	Herbarium of the University of California at Berkeley
US	Smithsonian Institution at Washington, D.C.

A *scries* JWS, 1903, *EOIS*, *SSIO*; lat. 2<J10< cri, 2037: opp; *Abubakar* 41 OH: iri; *Aer* 229: cri. *Aet* & *Idjan* 24f: cri; *Akern* 252: cri; *5E1*: pul, 771: sap; *d'Alleizette* XI-1906: pul, XI-1906: bon, VII-1908: cue; *Seel*: cri; *Attamm* 121: pub; *Alvins* 371: maj, 751: sum, 1657: par, *ssi3*: sap; *Amami* 416: dec; *Andjah* 45, 764: cri; *Anang* (exp. de Haan) 377: cri; *Anderson* 1004: pul, 2010: bon, 8706: pul, 5767: maj; *Annandala* 24-1-1916: cri; *Apostal* IS: cor; *Arora* 26-VIII-1966: bon; *Atjeh* (exp. van Huls- (jijn) 27: bon, 75: cri, *S17*: pul.

Backer 15-VI-1856: bon, IX-1803: sap, 11-1904: cri, IV-1904: bon, VIII-1904: sap, 1452, *ISM*: bon, 17-14: sum, 2550:

pub, 2545: bon, *Lei*%; pub, 2739: sap, 2815, *OSSA*: maj, 3511: cue, 5824: n.aj, 5957: sum, 5001: tor, 567i: dig, 6641: pub, 65G2, 7065: cor, 71*5, 7761: bon, *SiSl*: cue, 1175B: maj, 121S6: tor, 1395S: bon, 1304i: pub, 180611 dig, *ISSO9*: cri, 16126: dig, 1646i: pub, 17096- 17X87: maj, 17S1&1: sum, *HUB*: bon, 18880: cue, *UUN*, 19268: bon, 1925i: dig, 1942S, 19698: bon, 19911: dig, 200S1: sap, 200IS: pub, 20062: dig, 5007S: sap, 20502: pub, 2055S: bon, 20S&3: pub, 20757: sap, 20741: pub, 20902: dig, *glIE4:han*. 21247: dig, 21256: pub, 25523: maj, 26a0^, dee, *SiSS*: pub, 242S2: !pub, 34188: bon, >4199: pub, 21,515, 24688: dig, 34724: bon, 21,742: pub, *SSIII*: dee, 23522: sum.

) Herbaria visited by the author

scortechinii (Fv.M.) Hattink— sco
aeiparia Eoxb. = dec
var. japonica, (Zieb. & Zucc.) Gagn.
:= dec

Bolomonensis Hattink — sol
Bpicatea Dalz. — spe
spinosa (Molina) O. Ktze — spn
stenoptera Merr. — see sco Note 3
etipularis (Pra'n) Eidl, non Vogel =
par

sumatrana Roxb. — sam
nitritum RlnnrO_* lat
tortuosa Roxb. — tor
var. grandifolia Fedde = tor
Campeda Adans. = *Caesalpinia*
CipCiliocarpius Zoll. = *Caesalpinia*
nitidul Zoll. = lor
Genista scandens Lour. — en
A. r jima, T — 1^p-i-nTi^inia

axillivris — Doubtful
bonduc L. (r7S3) = bon
6odus L. (1T62) = maj
majus DC. = maj
mihiw DC. = bon
bovdaella L. = bon
gemina Loar. = bon
gUbra P. Mill. — Excluded; see maj
major (DC.) Small = maj
microphylla DC. — Excluded
merigata L. — Excluded
wuga L. = cri

Kaka Moullov. Rheede = cri
Kaha Mdhi Rheede = cri
MczonevOH Desf. = *Caesalpinia*

sect. *Eumezoncuron* Taubert = *Caesalpinia*
sect. *Tubicalyr* Taubert = *Caesalpinia*
subgen. *Tybieabx* Miq. = *Caesalpinia*
**Eumeionemim* Baker r^ *Caesalpinia*
Tubicalyx Baker = *Caesalpinia*

60lansw Prain = lat
benguetense (Elmer) Elmer = dec
braehycarpum Benth. — see sco Note

cabadbrnrvse Elmer = lat
cueullatum (Roxb.) W. & A. = cue
var. ffrndis Heyne es Baker = cue
var. *robustum* Craib = cue
enncaphyllum (Rusb.) W. & A. ex
Bentb. = enn

glahrum Desf. = pub
ffrande Miq. — Excluded
Zia/menoeorpum Pcin = b5TM
miermedim Zipp. — invalid name;

Ice¹ Gagn. = lat
knstlri Praia = and
taolicum Gagn. = hyra
latisiliqum (Cavan.) Murr. = lat
mae^pfc^il^m Bl. ex Miq. = cue
mindorensis Merr. = min
var. *inevme* Merr. = TMn
Doubtful
p^ftiycn^ M^rr. = lat
Gagn. - invalid naros; see p^b
Blanco = lat
puoacens Desf. = F^A

var. *loKsfps* Craib = pub
j!to^m Merr. = lat.
scand'ns Spanoghe — invalid name;
see pub
var. *inermis* Spsnoslic — invalid name; see pub

scoriehiitti F.v.M. = sco
8K^Hreum Miq. = sum
«wst^M»i» (Roxb.) W. & A. Miq. =

var. 3 Miq. = sum
Poinciana L. = *Caesalpinia*
coriarit Jacq. = COI
p^ckerrima, L. = pal
Keiabardia deapetala Roth = dec
Ticr.no Adans. = *Caesalpinia*
vaja (L.) MedA. = cri
Wagatae Dalz. = *Caesalpinia*
epiatea (Dab.) Dalz. = ape

26604: cor, 26774: dig, 26822: bon, 26997: pub, 27000: dig, 27037: pul, 27350, 27565: bon, 27571: eri, 28092: bon, ƎƎƎƎ; cri, 2S1SS: bon, 28525: pub, 28SS4: bon, 28805: pub, 2917, BfllW: bon, Si 110: dig, SWfii: pub, 28474⁺ bon, 28BS9: pub Ǝ7⁺: cri, 29701, 29822: bon, 29S9f: cri, 30378: dig, 50&28: maj, J10SS: bon, J1157: tor, 25SC7: maj, 5SS32, 35S13, tŕSm; 538/5: eri, S1S11, 34512, 34518, S1S11, 34515, 34516, 31617: bon, 34518: tor, 34519, 54530: pul, SiSaJ. <522>: sap, 34666 = 54657. 54657: hym, 34658, 54659: pub; C.F. Baker IS-X-1917: cri; *Bakhsert van den Brink Sr 475*: maj, 2847: bon, 251B: maj, 5015-, cue, 4089: pul, 5135: sap; *BaUjadia 3742*: cri; *Botonea Jaw.* - maj, 1298: lat (T), S.J.: < cri, Ǝ119: lat, S150: cue, 2US: cri; ff.N. & CM. *Bangham*, 623: cri, fiŕfŕS; bon, 755: dec, *Barclay 3554, 3591*; cri, *Bartlett 15139*; pub; *bb series 11143*: pul, 14090: sap; *Beccari P.B.* 849: maj, P.B. 2455, P.B. 3116; cri, P.B. 3527: bon; *Beimome* 3430: dig; *Beguin 759*: sap, Ji <: bon, 1435: cri, JF31: bon, 1764: cri; *BeJXII-1902*: bon; *der Berger U.S.* cue; *Beumte 196*: ?pub, S7J: enn, 91J, 980: pub, JOM; bon, J417: sap, 8457: pub, WOO: dig, 4962: sap, 5152: cue, 52 <; pub; *van Beusekom & Geeaink 3-178*: hym; Biff series 21789: dig; *Bloembergen 5090, 3220*: bon, S522: pul, S51S: pub, S55S: pul, 3662: pub, J&JƎ, 444⁺: pul, 4545: bon; Sŕfime 715: maj, 73100: cue (T); *BWB series*; numbers without A A been cited under the collector, for the others, see under A: *Boerlage 16-XI-1888*: sap, 13-II-1859: sap, 258: pul, 2'7: dec; *dv. Bois 81*: sap, *Bolster 866*: lat; *Boa 2182, 2695*: lat, 4670: sap; *van. Barssum Waalka* 61S: cti, 727, 1689: bon, 1990: cri, 8267: hym, 8281: maj, S320, hym*, JS50: bon; *BotchTan SO, 105, 194*: bon; Bot. & For. D.-pt. *Hong Kong 8421*: tor; *Branderhorst*

150: bon; *Brass 742*: bon, 1852: cri, ISSO: bon, 1659: cri, 2S06- maj, S m, S559: cri, 9*8f: bon, 7ASS: sco, 14063, 2178s: eri, <e05S: bon¹, 27751: sum; *Byneinefomij V-1917*: pub, IG-II-1818: bon; *Brinkman 21*: sap; *BriKon Si*: pub, 224: pul; Sj-oo&e SS^ - cri, 10578: mixed: fr. bon, fl. maj; *R. Brown IV-1803*: pub; *BRUN series 989*: lat; *BS series MS*: raaj, 610: cri, 1477: pub, 1515: rain (T), 4969: bon, OCBS: lat, 7418: cri; ?W7: lat, 7948: pul, 3501, 1*8 m: pub, 17531: dee, JSODO; lat, 18672: min, JSJSJ; pub, 2787S, 29100: lat, *S51J: aap, 57949, 39650: lat, WS9S: bon, 46256, 4667S, 47106: lat, 49280, min, ?ŕf1P: let; BS/Ǝ series 4809: maj, SOSS: sol (T), 778S-, eri, J00i<; maj*, JSJO, 11668, 12422: cri, 2S?>fl: bon; *Bidlack 959*: dec; *CwHoAau SO*: sap; *Bimafcwai & Wimana-B 1489*: hym; *Bit*Kemeijer 6075*: sap, 8001: pul; *Burger 2001*: pub, TAO: bon; JJJ, J2711 V-1915: bon, 47: dec, *9fl; sum, SJT5S: cri; H.W. *Burkitt & Shah 268*; maj; *Baitnirfa iS9S/ sap*, 449%3: bon, SS74: cri, 7482: dig; B sei-WB 3#SJ; sum, 45i8, 5465: cri, S750: sap.

Culei-j/ VIII-1935: bon; *Criir 11224, 11516*: cri, J1BS2, J1SSS, 16189; bon; 6aYtef & Enocft 271: bon; *Cusfiiio 601*: cri; *CastM 440**: par; *Castro & Metegrio 1358*; sap, 1537: lat, 3549: pul, 1700: bon; Cf series 676: sap, JiE3: bon, IW-- eri, 1823; sum; *CToid SOs*, 55S2: cue; *Cheaug s.n.* 29-IX-1860: dig; Si. *Cfevalier 32512*: leaves: bon, fr.: Tlat (T); *Carfa(optfe, sen 3017*; maj; *Cta-fe* 5a51<; cri *GLG8OH & vaill Sloten 54*: dig; *Clemons 1-1945*: eco, VIII-IX-1947: sea, 262: lat, 922: cue; sap, 3052: pub, Jiffi, IS053: lat, S1292: pul, SJS9S: lat¹, 27625, 28297-29438, S1246: lat, 41734: bon; *Coeri JSfl, 705*: cri, 1092, 1134: bon; *Coifs 2*15*: bon; *D.J. Collins 156, 600*, 1459: dig, JS5S: hym, 1853: dig; *Conraioi-AS5*: pul; *Cope*

land 108: cri, 345: bon, [70: lat; *Corner 12-V-1935*: tor, 14-IX-1936: sum, 4-V-1910: ?sum, 20-XI-1841; cue?; *Cowan 633*; &and?; *Cauting 1138*; eri, 1195: lat; *Curtis 99*: bon, 385: dec, 448: dig, 1027: tor*, 1502; bon, 2618: cri, 2SB2; dig, 2567: cri, S<e> sum; 4.H. *Curtias 203, 472*: bon; *Cuzner 8*: pul.

van Daalen 479: pul; *Derbyshire 640*: pul; *Dz&f&f&f&f 7601*: pul; *Degeer 31117*: bon; *Dickson 6904*: cri; **DiepenWst HB 1877: tor, HB 1230- tor** (T); *Dillewijn & Demandt X-1929*: cri, 1611 (X-1929); dig; *Docters van Leeuwen 1543*; bon, 1591: cri, 1812: bon, 9689: sum, 11371: cri; *Doeters van Leeuwen-Reynvaan* 1-1909: sap, 3-11-1910: dig, 22-V-1910: bon, 17-IV-1911: cri, 4-X-1911: dec, S63: dec, S74: dig, 1005: dec, 3739, 5188, 6127: bon; *Dommera 49*: bon, 215: dig, S1J: pul, S* <; sap, 555: pul, SŕfO: bon; *Dorgelo 1767*: cri, 191S; bon, *van Duuren IS*: sco.

Eioio 168: bon; *Eoai0 & Conklin 1452*: let; *Eberhardt 1522*: pub; *Eddin VII-1R03*: bon; *fesecis 5*4*: bon; *Elbert 403, 692, 799*; pub, 3052: pul, 2490: pub, 2628, 29,16: cri, *ŕfM; sap, 597; bon; *Elmer 5715*: pul, 5723: bon, S5S<; dec, 7002: bon, 7009: eri, m<, 8466: lat, S720: dec (T), 10306: sap, 17W7: maj, 13157: lat, 12969: par (T), 13>SU; lat (T), 17983: lat*, 20M4: lat, 21449: par (T); *E-nehai 10393*: cri; *JJnderS aOSJ*: lat; *Evrard 467*: dig, 167fl; pub.

Fuhoner 568: dig; C.S. *o a & Li 67: dec < FB series 93' saD 47fl * min* 1952 2272, 1482; cri, JS5f- sap, JS70: pub, 3569: pn, 4879-18261: cri, 1*405, IS407: pill, SO<e> sap, a*7SO: cri; *Fenir 11*: bon; *Feuillelau de Bruyn 442*: bon; *FMS series 1129, 4053, 5082, 651S, 9848, 6544, 10837, 10338, 11287, 11743, 12596, 13298*; sap, 20417: maj, 20556: sap, 28906: sum, 38880: eri, JS5J7- aap, 59012 (=Pu<u> a

1039J): cri, 51S02, fi4^3u; ape; *Forbes 112*: bun" <T, 1*J0o, 1785; maj, 1E0S; cri, S1SSa; sap, S79S; fur, 4022: pul; *Formau 494*: lat; *Forrest 8519, 11812*: cue; *Fosberg 24978*; maj, 20SSS: pul, S1sai; maj, S3Si>: pul, 36507: inaj, S7MI: cri; *Fosberg & Oliveira 10760*: dec; *Foxworthy 1119*; cci; *Frofee WS*: cri; *FBI Series 2089*; maj, 8013, 7669: bon, WfE, li'f'fi>; sum, 5JS02: spe, 55708: sap, 50973: dig, CSe39: spe; *Fn'edi-ere SIS*: pul.

Gamble 4043: lion; Gi(6 JS^ - cri; *Gjellerup 289a*: cri; CŕfRKn S89f: sap; *Grathoff 560*: aap; *Grutternick 3226*: pub; *GuevierJ 775*: maj; *Guichenot 324*: pub; *Gasdoi-/ fi*, 170, S7i: sap.

<e *Uaan*, see *Artfwj* and also *Nedi*; *Haines 24-XII-1914*: enn; *Hallier 13-V-1864, 12-XI-1894*: cri, 11-VI-1896: sum, 15-VI-1896 (or 15-11?) : bon, 68: sap, 488, 18Se: lat *J<*>: cri, 4i88: lat; *Harmand 22, 162*; hym, Ǝ0E: maj; *Hartley 9732*: cri; *Hatauima 24066*: maj; *Haviland 1522*; maj; *ŕfeiaic J15H-* hym; *ŕfleiW47*: bon; *Helwig 674*; cri; *ŕffhderson 19-VIIM929*: cri, 1256: aap; 1/cn% 2&- IIM9fi); bon; hb. *Hermann vol. 1 M. B8*: eri (Tl, vol. 3 fol. 86; bon (T), vol. 4 fol. 31: sap (T); *HtyKgen 1367*: bon"; *B. Ho* 1883: par; *Hochrutiner 2088*: cri, &57S<; sap, Ǝ590: pul; *den Hoed 48, 3062*; bon; *Hohenacker 102a*: cri; *Holaiwoogd ISO*: bon; *Hoogerwerf 12-XI-1941*: cri, 2S, 27: bon, 369: pul; *Hoogland 4274, 8R56*: bon; *Haesfeldt 183*: bon, US; pub, JS7: dec, US; dig (T), 139: dec, 1*0, cue, 141; pub, lia- pul; *Hort*, Bot. Bog. I.D.10: cor, Li, 22, Li, 43, Li, 24, Li, 65, Li, 83; pul, I.K.I. eoc, X.II.A.81, X.II.A. 83: bon, X.II.A.88, X.II.A.103, X.II.A.105, X.II.A.106a: maj, X.II.A.107a: bon, X.II.A.111a: cri, X.II.A.112: sap, X.II.A.114a, X.II.A.IBS, X.II.A.158a: dec, X.II.A.1f2: cri, X.II.A.IB3: dig, X.II.A.166: spe, X.II.A.173: cri, X.II.A.173, X.II.A.174: tor,

& Steamer B6S7: sum, 56S0; pul, 6681: cri; R-atten 11,0; pul, 72S: tor, 2089: IIBJ.
S aeries 17916: bon, 299S0: cri; *Sorian* (exp. van Hultijin) 8: pul; *SAN aeries* 25474-lat*, 19209: lat, 19S57: par, 23678: opp, 24025: opp (T), 5S14S: opp*, 26010: lat, 28659: par, 5S5W-lat, 59M2: maj, W.Ue.-eri, 41S05; bon, 5ifiSj.-eri; *Sangkkackand* 185: dig; J.V. *Santos* 5S10: lat, 5S4fi, (KO)!: bon; *Sarip* 17S: bon; *Satindem* 14S: pul; *Schilling* 309: dec; *Schmidt* 12, 118a; maj, 2cSo: hym. 837: cri, i180: sap, 2S19: fur, 2SSS: pul; *Skodde* 221,6: seo, SSSD: sum; *Scortechim* 108S: maj; A. *Scott, Bkaral Project* no 70: dec; SF² sei-ia Ig?fi: cri, 1286: sap, SS9S: bon, 2S12: hym, «S4f: and, W6: spc, 7488: bon, 10JSS: sap, loSSi: sum, 3407S: and, 15278: sum, 15177: dig, 157#«, 25SJO, 15««S: maj, 10211: sap, 18611: sum, 187B0: sap, JWiB: maj, iWSil: lat, iSSOS: dig, £2«S4: and, S29S9,* maj, 2SiW, #SSeS; dig, 24963: bon*, SSnfi; cri, 291U: bon, S977S: maj, JS27B: eri, Si87H pul, S««Sil* bon, S90S1; dig; SAaifc Mo'rim VIII-1903: tor, 27, 128: tor, «J8: hym; *Seidenfaden* 2SiI: eri; *Sieburg* XII-1928: sap; *Simon* SOf: enn; N.D. *Simpson* 5S18: hym*; J. *Sinclair* 2S-VIII-1951: sum, 9286: lat; *Sintenie* BIDS: bon; i-an S'ootTM, & *Backer* SSOIS: bon; A.C. *Smith* 7911: bon; Smitinodr i861; dig; Sneuwla 3-S5: dec; *Sorgdrager* IS: pul; SDIO & *Tagoa* 1G8S1: pat; *Specht* 16: bon; SpVe 7D3, «IJ; liym; *Sptigerber* 798: bon; StoW 202: bon; *Stainton, Sykea & William** 169, 2567: dec; TM« *Steenia* 58S: bon, JSSS: maj, SBil: dig, SiW: dec, C*??: cue, 7508: dig, JOSSO: cri, 11136: dec, JfJSO: cri, J1W6: cue; *Stone* UOO: maj; Sfonc & J. *Sinclair* 6251: cri; *Suringar* I-II-1885: cor, B-II-188B: cor, IG-IV-1B85: bon, 24-IV-1B85: bon, 25-I-1885: cor; *Suzuki* 29-XII-1922: cri.

Takamitsu 12iS, 1287: cri, 1551: maj; *Talbot* 1256; eri; *Teyimunn* HB 58S, HB 1i5: cri, HB 2761: dig, HB 3206: 1 sheet no Caeca, 1 sheet pub (fr.), HB 7831: bon, HB 10699: fur, HB leei: pub, HB uses: enn. HB 18906: fur, HB 122J2; bon, HB 15758: dec, HB 13873: fur; *Thomsen* 711, 81,9: eri; TM« s.«: 1866-1868: hym <T>, 3B2: dig, *Thurtell & Coveny* 3880: seo; TM«i«feg 1537: dig, 27Si: dec, Sew: hym*; *Tippett* UPNG SCI: bon*; TM«f 50719: lat; *tsianfen* Fins S7J7; sap; *Tjm* 278: dec; *Tulteken* 557: bon.

miec J «: raaj.

ValetoH 2-III-1905: bon; *Vanoverhergh* 3760: sap; *Verheyen* iei: dec, 7W; maj, 10&2i3: bon, S*SA: pul; *Verhoef* 2S: dec; TM«w es*«: bon; *Verteeg* 1131, 1800: cri; *Vidal* v. S. Q8: dec, BS9: pul, 278: pub, 7W; eri, 7i5: sap, 1067, 1265: eti, K*4: pub, 2667: lat; *Fii!oma* JPO; SOS: lat; *Villar* 2607: lat; «Foojfd dig, 812, SIS: pub, 2^0-- bon; *Vor-art* 32, 49: sap, 57: pub, Sff; pul; TM«e 20: cri; *Waa Vuurren*, see JJaCjml.

ai*1 S75: enn; Wa(Jer 66«, r1SBa: TM« IvaKca 87g: cue*, 580SA, 5808B, 580SC, 5803D, 5803E: bon, 5803A: cue, TM«; 1 sheet maj, 1 sheet bon, 5S13A, C,D,E,F,G: pul, 5825: dig, 5826: tor (T), 5827A,B,C,D: tor, 5S2SA,B: cri, 5828C: leaves: cue, fl.: sum, 5828D,E: cue, 5#3#A,C,D, sKpp(: cri, 5830A: cue <T>, 58S0C,D,E: cue, S&«JA: sum¹, 58S1B,C: cri, 5SS2: hym (T), 5S1.S^,B: TM«, 5821A: bon (T), 5822: dec*, S«SiC, D,E,F: Aee, 58S4G: hym, BSSiH: hym inn, 58S1J: dec, 5834 *euppl*: dec p.p., 68S5: fur (T), 5837: spc, 583SA,B,C,D: TM« i, 5S3!A, B, 6S41F, G: dig, SSiH: dig, BM also fr.: hym, 584U: dig; *Wahk* TM«: pub, 201: bon, «2S: pub, 306, 37f: dec, 404: pul; *Waterhouse* iOl-B maj;

I^alt S7J7: dec; CM. *Waite* U6S: bon; G. *Weber* 14-XI-18S8: pul; *Week* i: pul; *Welnlaiui* 291: eri; «« Heiaen iS: sap; TM««« 1067: pul, IMS, JC75: cri; *White* 9811: aco; *Whitford* 1264: eri; TM«ifimre f100J: sum; *Wight* 837: bon, &7S; dec, 839: sap, S4/- pul, S*g: eti, 81,4: spc; A.G. *de Wilde* 2754,* pul; * *Wijjes-HiBink* 13: iri, Wi^imms J32: bon, 701: lat, JSOfi: dec, 2728: pul; TM«ifimms & *StaintOH* S5S1: dig; TM«iwiurd 97S: sum, 1810: dec, 1S«: maj; TM«s* 7: sap.

iOS: pub; *WomersZelf & Simmonds* 50S1: cri; *Wood* 753; lat, m*:- sap; TM«ra* 1909: par (T), fMS; maj, 3983: par*, JSW- par*, 4SW; par*, 5554: sap.

Yates 932: bon, 1570: dec, ISSfi: tor, JS7S- cri, *Yuncker* 15195, 1S868: maj.

Zimmermann 157, 147: pul; *ZolHtgen* 610, 648: sap, S5S: tor*, 1002: sum (T), iJ3S; pub, 1193: pul, JS2j: maj, 2S37: sap, 2122: cri, W.2: tor (T); *van Zon* 1: dec, *Zwhki* 2-IV-19S&: dec; *Zwiekey* 285:

KEY TO THE ABBREVIATIONS OF NAMES

and	=	<i>C. oitdamvnic/</i> (Prain) Hattink
bon	=	<i>C. bonduc</i> (L.) Dandy & Exell
cor	=	<i>C. coharia</i> (<Laco>) Willd.
eri	=	<i>C. arista</i> L.
cue	=	<i>C. cucullata</i> Roxb.
dec	=	<i>C. decapetala</i> (Roth) Alston
dig	=	<i>C. digyna</i> Kottl.
enn	=	<i>C. enneaphylla</i> Eoxb.
fur	=	<i>V. furfutracea</i> (Frain) Hattink
hym	=	<i>C. hymenocarpa</i> (Prain) Httntink
lat	=	<i>C. latisiliqua</i> (<Cavan.) Hattink
maj	=	<i>C. major</i> (Medik) Dandy & Esell
min	=	<i>C. mindarensia</i> (Merr.) Hattink
opp	=	<i>C. oppositifolia</i> Hattink
par	=	<i>C. parviflora</i> Prflin
pub	=	<i>C. pvbeecene</i> (Desf.) Hattink
pal	=	<i>C. pmlcherrima</i> (L.) Swarts
sap	=	<i>C. sappa</i> -n.L.
sco	=	<i>C. ecorechhini</i> (F.v.M.) Hattink
soj	=	<i>C. aolowanennyi</i> Hattink
Sdt	=	<i>C. ajficata</i> Dalz.
spc	=	<i>V. spinosa</i> (Molinal) O. Ktze.
sum	=	<i>C. sumatrana</i> Roxb.
tor	=	<i>C. toriussa</i> Eoxb.

	Page
HATTINK, T. A. A revision of Malesian <i>Caesalpinia</i> , including <i>Mezoneuroji</i> (Legummosae-Caesalpiniaaceae)	1
JONES, H. G. Orchidaceae navae vel minus coglitae	71
KENG, H. Rediscovery of <i>Cheilothea malayana</i> and the identity of <i>Cheilothea</i> , <i>Audresia</i> and <i>Mo-notropastmm</i> (Ericaceae- Monotropoideae)	77
KOSTERMANS, A. J. G. H. A monograph of the genus- <i>Neoanna-</i> <i>momum</i> Liou Ho	85
————Materials for a revision of Lauraceae IV	97
r? ———A new Bornean species of <i>Mammea</i>	117
———— <i>Triadodapkne</i> , a. new Jauraceous genua from Borneo	119
————A monograph of <i>Caryodaphnopsis</i> A. Shaw	123
LARSEN, K. & LAKSEN, S. K. A new <i>Amorphophallus</i> from Thailand	139
NAYAK, M. P. A revision of <i>Phtkiandra</i> (Melastomataceae)	143
RAO, A. N. & LEONG, F. L. Pollen morphology of certain tropical plants	153
SKVORTZOV, B. V. On some colourless flagellates from Java and Brasil	177

Distributor

BIBLIOTHECA BOGORIENSIS,
JALAN RAYA JUANDA 20,
BOGOK, INDONESIA