

THE CORNACEAE, SENSU STRICTO, OF THE
NETHERLANDS INDIES

by

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After Mr. S. BLOEMBERGEN had planned a revision of the *Cornaceae*, *sensu amplissimo*, of the Netherlands Indies (inclusive those of the Malay Peninsula and the non-Dutch parts of Borneo and New Guinea) and had received, for that purpose, herbarium materials from different institutes, it appeared desirable to him to confine his revision to the *Alangiaceae*. I therefore took the *Cornaceae*, *sensu stricto*, for my account. It was very convenient to me that Mr. BLOEMBERGEN had already composed a nearly complete list of literature wanted.

The herbaria of which materials have been worked up in this revision, are the following.

- B = Herbarium of the Botanic Garden, Buitenzorg, Java.
- Be = Herbarium of the Botanic Garden, Berlin—Dahlem.
- L = State Herbarium, Leiden.
- S = Herbarium of the Botanic Gardens, Singapore.
- U = Herbarium of the University, Utrecht.

I feel very thankful to the Directions of these herbaria for their kindness of sending me the materials on loan.

As a result of this revision I will mention in the following only 11 species as indigenous to the area accepted. This is due to the fact, that I thought it necessary to unite the many species mentioned for the area to a smaller number of polymorphic ones. No new species have been described, though several new varieties of *Mastixia tetrandra* had to be distinguished.

Moreover I am in doubt, whether the genus *Mastixiodendron* really belongs to this family.

Key to the genera.

Ovary inferior, one-celled. Calyx-lobes not deciduous.

Stipules none *Mastixia*, p. 47.

Ovary semi-inferior, two-celled. Calyx lobes deciduous.

Stipules large, interpetiolar, contort, deciduous... *Mastixiodendron*, p. 69.

MASTIXIA.

BLUME, Bijdr. Fl. Ned. Ind., 13, p. 654 (1825); D. C., Prodr., 4, p. 275 (1830); G. DON, Gen. Hist. Diehl. Pl., 3, p. 401 (1834); MEISN., Gen. pl., p. 153 (1838); ENDL., Gen. pl., p. 799 (1839); BLUME, Mus. Bot. Lugd. Bat., 1, p. 256 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 771 (1856); BAILLON, Adansonia, 5, p. 184 (1864—65); BENTH. & HOOK.F., Gen. pl., 1, p. 950 (1867); BAILLON, Hist. d. pl., 7, p. 255 (1879); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 745 (1879); BOERL., Handl. Fl. Ned. Ind., I, 2, p. 654 (1890); TRIMEN, Handb. Fl. Ceyl., 2, p. 286 (1894); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. Booms. Java, 5, p. 86 (1900); SMITH, Bull. Inst. Bot. Buitenz., 11, p. 10 (1901); KING, Journ. As. Soc. Beng., 71, 2, p. 72 (1902); BRANDIS, Ind. trees, p. 356 (1906); WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 19 (1910); KOORDERS, Exkursionsfl. Java, 2, p. 730 (1912); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1916); RIDLEY, Fl. Mal. Pen., 1, p. 889 (1922); KOORD., Fl. Tjib., 2, p. 237 (1923); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1194 (1923); MELCHIOR, in ENGL., Jahrb., 60, p. 167, 171 (1925); *Mastixia* SPACH, Hist. Vég. Phan., 8, p. 88 (1839); *Bursinopetalum* WIGHT, Ic. pl., III, 3, p. 4 (1847).

The *Mastixiae* are trees of normal habit, with an erect, cylindrical bole, that occupies about 0.6 of the total height of 10 to 35 m. The twigs and leaves are of medium or small, rarely rather large, dimensions. The flowers are disposed in triads (simple cymes) that are again united into more or less many-flowered corymbs. Dimensions and structure of the flowers show little variation. In the characters of the calyx tube, the corolla, the stamens, the style and the fruit I could not find differences for specific distinction. The differences that proved most valuable for that purpose are the following.

1. *The shape of the calyx teeth*, especially the relation between length and width. A part of the species have calyx teeth less than half as long as broad. There is some difference in this respect between the species of this group, but if in acuminate calyx teeth the acumen is excepted, and very young flower buds are left out of consideration, it is never doubtful whether a species is short- or long-toothed. The other species have calyx teeth, the length of which is at least $\frac{3}{4}$ of the breadth, usually, however, about as long as broad.

2. *The phyllotaxis*. There are species with the leaves spread and others with the leaves opposite. Though a sharp distinction of species,

by means of this character only, is not possible, it is a valuable distinction for determination. Species with opposite leaves often have, here and there, the leaves of one pair more or less remote from each other, and in very young specimens of *Mastixia trichotoma*, a species with normally opposite leaves, the leaves are entirely spread. Also it deserves mentioning, that I could not separate, as a species, *M. Margarethae*, with spread leaves, from *M. rostrata*, with opposite leaves. The difference in phyllotaxis causes moreover a difference in appearance of the young twigs and of the inflorescence, as opposite leaves cause strongly flattened internodes and pseudotrichotomous inflorescences, whereas in species with the leaves spread the twigs and inflorescences have not these characteristics.

3. *The 4- or 5-merous flowers.* It rarely occurs (as I sometimes saw in *M. philippinensis*), that in one inflorescence 4-merous and 5-merous flowers occur intermingled. Most species have the flowers either all of them 4-merous or all 5-merous. Yet the 4-merous species and the 5-merous species, each as a group, show no closer relation at all, and it is, therefore, quite incomprehensible, how WANGERIN could base subgenera on this difference. Between the 5-merous *M. korthalsiana* and the 4-merous *M. trichotoma*, there are no further differences at all, and the number of flower parts only I could not judge sufficient for specific distinction.

4. *The dimensions of twigs and leaves.* It is possible to distinguish certain species with very slender twigs and small leaves from others with coarse twigs and medium-sized or large leaves. *M. rostrata* and *M. bracteata* are, for instance, always typically slender and small-leaved, though in all other important characters they are different. Only in *M. trichotoma* I united the small-leaved slender *M. acuminatissima* and *M. clarkeana* with other, coarser and larger-leaved forms, as there undoubtedly exists a series of intermediate forms.

Key to the species.

1a	Length of the calyx teeth at most one-half of their width... ..	2
b	Length of the calyx teeth at least three-quarters of their width, usually the teeth as long as broad	6
2a	Flowers 5-merous... ..	3
b	Flowers 4-merous... ..	5
3a	Leaves spread; also the primary branches of the inflorescences spread	4
b	Leaves opposite or nearly so; inflorescence several times trichotomous	3. <i>M. kaniensis</i> , p. 51.

- 4a Normal leaves not more than 6 cm long and 3.5 cm broad. Twigs slender. Lower branches of the inflorescences nearly 9-flowered 5. *M. bracteata*, p. 54.
- b Normal leaves 8—18 cm long, 3—9 cm broad. Twigs robust. Lower branches of the inflorescences nearly 27-flowered 1. *M. pentandra*, p. 49.
- c Cfr. also 6. *M. cuspidata*, p. 55.
- 5a Leaves opposite or spread, long-cuspidate, the cuspid 6—20 mm long, 1—1.5 mm broad, usually somewhat spatulate. Twigs slender 4. *M. rostrata*, p. 52.
- b Leaves spread, at most shortly acuminate. Twigs rather robust 2. *M. parvifolia*, p. 51.
- 6a Leaves spread. Primary branches of the inflorescences also spread 7
- b Leaves opposite or nearly so. Inflorescences several times trichotomous 9. *M. trichotoma*, p. 57.
- 7a Flowers 5-merous 7. *M. Scortechinii*, p. 56.
- b Flowers 4-merous 8. *M. totrandra*, p. 56.

1. *Mastixia pentandra* — A tree 12—34 m high, its bole 18—75 cm in diameter at a height of 1.5 m, 13—50 cm in diameter below the crown (according to herbarium labels). Twigs bearing adult leaves 2—6 mm thick. Leaves spread; petiole 10—45 mm long; lamina elliptic to oblong or more obovate, (5)8—18 cm long, (2)3—9 cm broad, contracted into the petiole below the rounded base or quite cuneate, with an obtuse cuspid up to 20 mm long 2—4 mm broad, thin-coriaceous, the secondary lateral nerves nearly transverse. Corymb with spread primary branches, usually three times branched below the triads; bracts of the lower branches usually linear, 5—15 mm long, obtuse, falling off during the development of the flowers, the upper ones shorter and narrower, remaining longer. Calyx limb nearly 1 mm long, cut halfway down into 5 very short and broad obtusely acuminate teeth. Style 0.5—1.5 mm long. Fruit ellipsoidal, often more or less ovate or obovate, 18—37 mm long, 15—17 mm in diameter, with differently developed disc. Indumentum silky in the young parts, none on the adult leaves and twigs, more densely and appressedly silky on the inflorescences towards the extremities and on the flowers, usually disappearing before the ripening of the fruit.

Mastixia pentandra BLUME, Bijdr., 13, p. 654 (1825); D. C., Prodr., 4, p. 275 (1830); G. DON, Gen. Hist. Dichl. Pl., 3, p. 401 (1834); HASSK., Cat. Pl. Hort. Bot. Bog., II, p. 168 (1844); BLUME, Mus. Bot. Lugd. Bat., 1, p. 256 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 771 (1856), p. 1095 (1858); suppl. Sum., p. 135 (1860); BAILLON, Adansonia, 3,

p. 83, nota (1862); TEYSM. & BINN., Cat. Pl. Hort. Bot. Bog., p. 169 (1866); ? CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 746 (1879) excl. synonym.; HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. Kenn. Booms. Java, 5, p. 88 (1900); ? GAMBLE, Man. Ind. Timb., ed. 2, p. 391 (1902); BRANDIS, Ind. trees, p. 356 (1906); MERRILL, Ann. Jard. Bot. Buitenz., suppl. 3, 1, p. 283 (1910) p. p.; WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 20, 26 (1910) excl. var. *cuspidata*; KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 104 (1912) p. p.; KOORDERS, Exkursionsfl. Java, 2, p. 732, 734 (1912) p. p.; *Mastixia megacarpa* RIDL., Fl. Mal. Pen., 1, p. 891 (1922); *Mastixia Ledermannii* MELCHIOR, in ENGL., Jahrb., 60, p. 172, 173 (1926).

I have united *M. Ledermannii* and *M. megacarpa* with *M. pentandra*, as I could not discover sufficient differences. Perhaps *M. arborea* (WIGHT) CLARKE, and *M. philippinensis* WANGERIN, are only geographical variations of the same species. Sterile materials of *M. pentandra* I cannot distinguish from *M. tetrandra*, but as *M. tetrandra* is rare in the area dealt with, I reckoned such materials provisionally to *M. pentandra*.

MALAY PENINSULA. Penang: (locality illegible) HANIFF 3759 (S); Pulu Butong Reserve, 300 m, CURTIS 919 (S), type of *M. megacarpa* RIDL.; Pahang: Fraser Hill, 1200 m, NUR 11291 (S, B); Fraser Hill, southern slope, 1200—1350 m, BURKILL & HOLTTUM 7840 (S).

SUMATRA. Palembang: Banjoe-Asin- & Koeboe-streken, 20 m, GRASHOFF 895 (B) v.n. *kajoe reboeng*; 15 m, Boschpr. bb. 158 E. 1 P. 850 (B, L) partly, cfr. *M. tetrandra*.

BORNEO. Eastern Part, near Long Petah, 450 m, ENDERT 3310 (B).

JAVA. "Harriang", VAN HASSELT (L) v.n. *tenjau*; without exact locality, for the greater part authentic specimens of *M. pentandra* BLUME, partly cultivated in the Buitenzorg Botanic Gardens, probably partly from the original locality, i. e. "Salak, Burangrang" (ex BL., l. c.); G. Boerangrang (B); G. Tangkoebanprahoe, KORTHALS (L); Paseroean, Toerèn, Zuidergebergte near Soembertangkil, 400—500 m, KOORDERS 23785 β , forest number 305* (B, L); KOORDERS 23801 β , forest number 1547* (B, L).

NEW GUINEA. North-eastern Part, Etappenberg, 850 m, LEDERMANN 9575 (Be), type of *M. Ledermannii* MELCHIOR.

Sterile materials, perhaps partly *M. tetrandra*:

SUMATRA. Westkust: Oud-Agam, Bantjok Dalam, 900 m, boschproefstation bb. 7415 (B) v.n. *djao*; Bengkoeloe: Redjang, Kep. Tjoeroep, northern slope of Bt. Kaba, 1100 m, boschpr. bb. E. 1053 (B, L); Palembang: Moesi Ilir, Ipil, 9 m, boschpr. bb. TB. 1085 (B) v.n. *boeng*.

BANGKA. Rindik, 10 m, boscpr. bb 11581 (B) v.n. *mengkapas*.

BORNEO. South-eastern Part, Poeroek Tjahoe, Kp. Mocara Laoeng, 80 m, boscpr. bb 10028 (B) v.n. *pangoan poetih*; Boeloengan, near Salimbatoe, S. Pingping, 150 m, boscpr. bb. 11177 (B) v.n. *baer toas*, and S. Roemah, 150 m, boscpr. bb. 11180 (B).

2. *Mastixia parvifolia* — Twigs bearing full-grown leaves 1—2.5 mm thick. Leaves spread; petiole 5—13 mm long; lamina obovate or oblong-obovate, 2.5—5.5 cm long, 1.2—2.5 cm broad, cuneate at the base, shortly obtuse-acuminate at the apex, rather thickly coriaceous, with secondary lateral nerves not transverse and not distinguishable from the veins. Corymbs with spread primary branches, usually two or three times branched below the triads; lower branches in the axils of normal leaves, bracts unknown (fallen off in the materials available). Calyx limb with 4 very short teeth. Fruit (unripe) ovate-oblong, up to 20 mm long, 10 mm in diameter. Indumentum none (or already fallen off).

Mastixia parvifolia HALLIER, Bcih. Bot. Centralbl., 34, 2, p. 41 (1916); MELCHIOR, in ENGL., Jahrb., 60, p. 172 (1925).

M. parvifolia is, with certainty, only known from the type materials, that are in fruit. Therefore we can say little about its affinities. The twigs and leaves resemble those of a small-leaved *M. pentandra*, as do the small calyx teeth, but the flowers are 4-merous. The small, hard leaves make it probable, that the type might be a mountain form of a more polymorphic species. Yet the further materials enumerated below are doubtful, especially those from Selebes. The specimen from Mt. Kinabalu is only a small fruit-bearing twig terminated by a short raceme of triads, but the leaves are up to 16 cm long, 7 cm broad.

BORNEO. G. Damoes, near the Nijoet, HALLIER B. 569 (B, L), type. Doubtful:

BORNEO. Mt. Kinabalu, Marai Parai, 1500 m, CLEMENS s. n. (B).

SELEBES. Southeastern Peninsula, Bt. Watoewila, 1500 m, KJELLBERG 1085 (B), "small tree".

3. *Mastixia kaniensis* — Internodes bearing full-grown leaves nearly 2.5 m thick in the lower part, up to 1.5 times as broad towards the top. Leaves opposite; petiole 7—13 mm long; lamina elliptic-oblong or somewhat obovate, 5—11 cm long, 1.5—4 cm broad, cuneate at the base, protracted in a 5—10 mm long, 1.5—3 mm broad cuspis, thin-coriaceous, with secondary lateral nerves distinct, transverse, somewhat arcuate. Corymbs 3—4 times trichotomous below the triads, the lower branches in the axils of normal leaves, the further bracts short, triangular, falling off after anthesis. Calyx limb nearly 0.75 mm long,

with 5 teeth that are short and broad, rounded with a very short acumen. Style nearly 0.75 mm long. Fruit unknown. Indumentum thin and silky on the young parts, soon falling off or remaining on the extremities of the inflorescences and on the flower buds.

Mastixia kaniensis MELCHIOR, in ENGL., Jahrb., 60, p. 172 (1925).

This species comes near to *M. pentandra* by its 5-merous flowers with short calyx teeth, but is different by the opposite leaves and consequently trichotomous inflorescences. The latter character is very striking and causes a resemblance with *M. trichotoma*, but I suppose that it is not of a great systematic value, and if this might be right the difference with *M. philippinensis* and *M. pentandra* would be unimportant.

NEW GUINEA. North-eastern part, Kani Mountains, 1000 m, SCHLECHTER 17061 (Be, type, L, cotype of *Mastixia kaniensis* MELCH.); *ibidem*, SCHLECHTER 17703 (L).

PHILIPPINE ISLANDS. Mindanao, Bukidnon, Mt. Candoon, B. Sc. 38841 (Be, L).

4. *Mastixia rostrata* — Tree, usually 10–28 m high, with a bole 20–50 cm in diameter at a height of 1.5 m (according to herbarium labels). Young internodes 1–2 mm thick at the base, up to 1.5 time as broad at the top. Leaves either opposite few of them spread, or all of them spread; petiole 8–12 mm long; lamina elliptic to oblong or somewhat obovate, 4–10 cm long, 1–4 cm broad, contracted below the rounded base or cuneate at the base, more or less abruptly cuspidate at the apex, with a cuspis 6–20 mm long, 1–1.5 mm broad, very obtuse, distinctly spatulate, thin-coriaceous, with secondary lateral nerves difficultly to be distinguished from the veins, not transverse nor arcuate. Corymbs rather small, 3–4 times trichotomous below the triads or the primary branches spread; all bracts small and acute. Calyx teeth 4, very short, rounded or very shortly acuminate. Style 1–2 mm long, rarely shorter. Fruit 15–20 mm long, 9–10 mm thick, ovate. Indumentum thinly to rather thickly silky, permanent on the extremities of the inflorescences, on the nodes, and on the underside of the petiole and the midrib.

Mastixia rostrata BLUME, Mus. Bot. Lugd. Bat., 1, p. 258 (1850); MIQ. Fl. Ind. Bat., I, 1, p. 773 (1856) & 1095 (1858); TEYSM. & BINN., Cat. Pl. Hort. Bot. Bog., p. 169 (1866); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. Booms. Java, 5, p. 92 (1900); WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 20, 22 (1910); KOORD.-SCHUM., Syst. Verz., I, 1, fam. 229, p. 104 (1912);

KOORD., Exkursionsfl. Java, 2, p. 732, 734 (1912); KOORD. & VAL., Atlas, 1, tab. 191 (1913); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); MOLL & JANSSON., Mikrographie, 3, p. 729 (1918); RIDL., Fl. Mal. Pen., 1, p. 890 (1922) p.p. ?; *Mastixia Junghuhniana* MIQ., Pl. Jungh., p. 426 (1855); Fl. Ind. Bat., I, 1, p. 772 (1856); ? HARMS, in ENGL., Nat. Pflanzenfam., III, 8, p. 262 (1898); *Mastixia Margarethae* WANGERIN, in FEDDE, Repert., 4, p. 335 (1907); in ENGL., Pflanzenr., IV, 229, p. 20, 21 (1910); *Mastixia cuspidata* var. *Margarethae* HALLIER, Beih. Bot. Centralbl., 34, 2, p. 41 (1917); *Mastixia caudatifolia* MERRILL, Univ. Calif. Publ. Bot., 15, p. 233 (1909).

There are, indeed, small differences between the Java and Flores specimens with usually opposite leaves, described as *M. rostrata* and as *M. Junghuhniana*, and those from Sumatra and Borneo with spread leaves, and there are other small differences between the Sumatra specimens, described as *M. Margarethae* and the Borneo ones described as *M. caudatifolia*, but these differences appeared insufficient for specific distinction.

In ascribing a "drupa globosa" to *M. Junghuhniana*, MIQUEL was certainly in error; he might have described fruit-galls, as globose fruit-galls indeed occur in several *Mastixia* species.

CLARKE's *M. Junghuhniana* is *M. trichotoma*. RIDLEY's *M. rostrata* is certainly *M. trichotoma* for the greater part; perhaps MAINGAY's specimen cited by RIDLEY is right.

It is not clear how HALLIER, in his excellent publication on *Mastixia*, could take the 4-merous *M. Margarethae* as a variety of the 5-merous, insufficiently known *M. cuspidata*.

MALAY PENINSULA. Malacca, MAINGAY 709 (according to WANGERIN).

SUMATRA. Oostkust: near Badjalinggi, south of Tebingtinggi, 100 m, LÖRZING & JOCHEMS 7504 (= Deli-Proefstation 1380) (B); Westkust: on the Soengai Boeloc, 0 m, BECCARI P. S. 956 (L, type of *M. Margarethae* WANG.); Soeliki, near Moedik Liki, 900 m, boscpr. bb. 3988 (B), v.n. *tapih* (?).

BORNEO. North Borneo: Mt. Kinabalu, Penibukan, 1200 m, CLEMENS 32101 (B); Elphinstone Prov., Tawao, ELMER 21584 (B, Be, S, U, cotypes of *M. caudatifolia* MERR.) & ELMER 21870 (B, Be, S, U) second number cited by MERRILL; West Borneo: Long Hoet, 130 m, ENDERT 2577 (B); near the Kong Kemoel, 1600 m, ENDERT 4317 (B).

JAVA. Without exact locality: BLUME (U); "Progan" BLUME (L); JUNGHUHN (L, U, the former original of *M. Junghuhniana* MIQ.), v.n. *tjangkar*; Nirmala, native collector 193 (B) v.n. *daon kitadjas*; Nirmala,

Oetan Nangkok Botol, native coll. 41 (B) v.n. *daon kajoe tendjo*; G. Salak, 1000 m, KOORDERS 33268 β (B); near Kp. Bodjong, KOORDERS 24218 β , forest number 932* (B, L) v.n. *kitindjo, kitendjo*; G. Gedé, REINWARDT ?, houtsoort 645 (L) v.n. *kiboeray lalakina*; Takokak, forest G. Aseupan, KOORDERS 32860 β , forest number 1558* (B) v.n. *kitendjo*; Takokak, KOORDERS 9885 β , forest number 2090a (B) v.n. *kitendjo*; Takokak, 1050 m, KOORDERS 915 β (B, L) 11915 β (B, L), 11916 β (B, L), 25556 β (B, L), 32681 β (B), 37260 β (B), all with the forest number 2138a; KOORDERS 11917 β (B, Be, L, S, U) & 25634 β (B, Be, L) v.n. *kitendjo*, & 25735 β (B, Be, L) forest number 2309a; 25755 β (B, Be, L) v.n. *kilejas*; Pasir Padakati, 1035 m, KOORDERS 9901 β (B, L); Tjigenteng, KOORDERS 30123 β (B); Pasir Djamboc, 1400—1700 m, KOORDERS 26319 β , forest number 323* (B, L, S, U); Pengalengan, 1300 m, JUNGHUHN 168 (L, U, originals of *M. Junghuhniana* MIQ.); Pengentjongan near Garoet, 1400 m, KOORDERS 14081 β (B); Banjoemas, Pringombo, forest Grendeng, 800 m, KOORDERS 38076 β , forest number 157* (B, L); Pringamba, top G. Boetok, 1000 m, KOORDERS 39016 β , forest number 24* (B, L).

FLORES. Ende, Kp. Walo Lele, 1000 m, boschpr. bb. 12609 (B), v.n. *tapaaèkè*; Kp. Boa Feo, 900 m, boschpr. bb. 8922 (B, L) v.n. *raoe*, & bb. 8925 (B, L) v.n. *sje*.

5. *Mastixia bracteata* — Tree 12—16(—30?) m high, with a bole 15—20(—40?) cm in diameter (according to herbarium labels). Young internodes bearing full-grown leaves 1—1.5 mm thick at their base. Leaves spread; petiole 5—10 mm long; lamina elliptic to obovate or more oblong, 3—6 cm long, 2—3.5 cm broad, with cuneate base or contracted into the petiole below the rounded base, more or less abruptly acuminate, the acumen 5—10 mm long, 1.5—2 mm broad, obtuse, often more or less spathulate, thin-coriaceous, the secondary lateral nerves difficultly to be distinguished from the veins, indistinctly or rather distinctly transverse. Corymbs once or twice branched below the triads with spread branches; lower bracts leafy, either common small leaves, or lanceolate obtuse, gradually or more abruptly diminishing into the upper small triangular or more filiformous bracts. Calyx limb cupuliformous, with 5 short, broad teeth. Fruit not known. Indumentum rather densely silky in the young parts, appressed, less dense later, the leaves soon quite glabrous.

Mastixia bracteata CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 746 (1879); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KING, Journ. As. Soc. Beng., 71, 2, p. 73 (1902); WANGERIN, in ENGL.,

Pflanzenr., IV, 229, p. 20, 26, ic. 1, G—K, N—O (1910); RIDLEY, Fl. Mal. Pen., 1, p. 891 (1922).

Resembles *M. pentandra* by the short calyx teeth, is, however, quite different in general appearance, by the slender twigs and small leaves, which it has in common with *M. rostrata* and *M. trichotoma* var. *clarkeana*. I have not seen the type number MAINGAY 710, but I have seen the number KING's coll. 6830, cited by CLARKE.

MALAY PENINSULA. Perak: Larut, within 30 m, KING's coll. 6830 (B, Be, L); Malacca: Selandau, 0 m, HOLMBERG 840 (S), v.n. *dadaru*.

SUMATRA. Palembang: Banjoe-Asin- & Koeboe-streken, 5—20 m, boschpr. 68 T. 1 P. 124 (B, L), v.n. *k. koendoer* and *beboeng*.

BORNEO. Sarawak: BECCARI P. B. 1559 (B); Mt. Dulit, Ulu Tinjar, near Long Kapa, 700—900 m, RICHARDS 1966 (K) v.n. *biansu gunong*.

Without flowers, therefore uncertain:

BANGKA. Perlang, 5 m, boschpr. bb. 11638 (B), v.n. *mengkopas*.

BORNEO. Southern & Eastern Part: P. Tjahoc, Kp. Kalapeh, 200 m, boschpr. bb. 11064 (B) v.n. *mahawai aoe*; East Koctai, Sangkoelirang, Kp. Palawan, 50 m, boschpr. bb. 11963 (B).

6. *Mastixia cuspidata* — Young internodes bearing full-grown leaves 2—3.5 mm thick at their base. Leaves spread; petiole 6—9 mm long; lamina obovate-oblong, 7—12.5 cm long, 2.5—4.5 cm broad, cuneate at the base, abruptly acuminate at the apex, the acumen 6—18 mm long, 1.5—2.5 mm broad, sometimes slightly spatulate, thin-coriaceous, almost chartaceous, the secondary lateral nerves more or less distinctly arcuate. Corymbs 2 to 3 times branched below the triads, with spread branches. Bracts unknown. Calyx teeth 5, very short and broad. Fruit oblong, 22—23 mm long, 8—9 mm in diameter.

Mastixia cuspidata BLUME, Mus. Bot. Lugd. Bat., 1, p. 256 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 772 (1856), p. 1095 (1858); TEYSM. & BINN., Cat. Pl. Hort. Bot. Bog., p. 169 (1866); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40, 41 (1917) excl. var. *Margarethae*; ? DAKKUS, Bull. Jard. Bot. Buitenz., ser. 3, suppl. 1, p. 191 (1930); *M. pentandra* var. *cuspidata* WANG., in ENGL., Pflanzenr., IV, 229, p. 26 (1910).

Very incompletely known, the type specimens consisting of few leafy twigs with flowerless and fruitless inflorescences, and few detached, probably not yet ripe, fruit. By the 5 short calyx teeth, and the appearance of twigs and leaves it resembles *M. bracteata* more than any other species, but it is coarser in all parts and the leaves are more acuminate, whereas the bracts cannot be compared with those of that species. There is also a great resemblance with certain forms of *M. philippinensis*. The second

specimen, mentioned by HALLIER, is quite sterile, and may be as well *M. rostrata* as *M. cuspidata*.

SUMATRA. Probably Westkust: KORTHALS (L, U), originals of the species.

HALLIER reckons to this species also the following sterile specimen: BORNEO. Boekit Kasian, AMDJAH (Exp. NIEUWENHUIS) 55 (B, L).

DAKKUS *l. c.* mentions *M. cuspidata* as cultivated in the Buitenzorg Botanic Gardens sub III. G. 56 (not 56a), but I did not see any materials of this tree.

7. ***Mastixia Scortechinii*** — A small tree (ex KING). Young twigs 2—3 mm thick between the full-grown leaves. Leaves spread; petiole 8—15 mm long; lamina obovate to obovate-oblong, 4—9 cm long, 1.5—4 cm broad, acute at the base, acuminate at the apex, the acumens 5—12 mm long, obtuse but not spatulate, the secondary lateral nerves indistinctly transverse, not arcuate. Corymbs 3 to 4 times branched below the triads, with spread branches; bracts all triangular, small, acute. Calyx teeth 5, triangular, nearly as long as broad, acute or slightly acuminate. Fruit unknown. Indumentum on all young parts (probably) rather thinly but densely woolly-tomentose, later remaining only on the buds and nodes, partly also on the inflorescences, falling off from the twigs and leaves.

M. Scortechinii KING, Journ. As. Soc. Beng., 71, 2, p. 73 (1902); WANG., in ENGL., Pflanzenr., IV, 229, p. 21, 27 (1910); RIDLEY, Fl. Mal. Pen., 1, p. 891 (1922).

Of *M. Scortechinii* I only saw one twig in the Leiden and Berlin herbarium each, insufficient to make out whether this species, besides by the 5-merous flowers, is sufficiently different from *M. tetrandra* to be kept apart as a species.

MALAY PENINSULA. Perak: SCORTECHINI 1971 (Be, L, cotypes).

8. ***Mastixia tetrandra*** — Tree nearly 30 m high, with a bole 36—65 cm in diameter (according to herbarium labels). Young twigs bearing full-grown leaves 2—4 mm thick. Leaves spread; petiole 10—20 mm long; lamina obovate to obovate-lanceolate, 6—8 cm long, 2—4 cm broad, usually acute at the base, shortly and obtusely acuminate at the apex, rather thickly coriaceous, with secondary lateral nerves transverse, not arcuate. Corymbs nearly 4 times branched below the triads, with the primary branches spread; lower branches often in the axils of normal leaves, the further bracts small, acute, triangular. Calyx teeth 4, nearly as long as broad, subobtuse or somewhat acuminate. Fruit not known.

Indumentum almost none, or appressed grayish on the leaf- and flower-buds.

Mastixia lanceolata BAILLON, *Andansonia*, 3, p. 83, nota (1862) nom. nud.; *Bursinopetalum tetrandrum* TEYSM. & BINN., *Cat. Pl. Hort. Bot. Bog.*, p. 169 (1866) nom. nud.; *Mastixia tetrandra* CLARKE, in HOOK.F., *Fl. Br. Ind.*, 2, p. 745 (1879) excl. var.; TRIMEN, *Handb. Fl. Ceyl.*, 2, p. 287, t. 47 (1894) excl. var.; HARMS, in ENGL. & PR., *Nat. Pflanzenfam.*, III, 8, p. 262 (1898); KOORD. & VAL., *Bijdr. Booms. Java*, 5, p. 88 (1900); WANG., in ENGL., *Pflanzenr.*, IV, 229, p. 20, 21 (1910) excl. var.

This species is not distinguishable from *M. pentandra* in the sterile state, but is readily to be distinguished from it by the 4-merous flowers and long calyx teeth. Among the sterile specimens enumerated under *M. pentandra* there might be some of this species. The materials above mentioned quite agree with the type number THWAITES 2441, from Ceylon, in the Leiden Herbarium.

SUMATRA. Tapiannoeli: Angkola & Sipirok, near Kp. Sitoemba, 1440 m, boscpr. bb. 5229 (B, L) v.n. *modang ambogol*; Palembang: Banjoe-Asin- & Koeboe-streken, near Bajoeng Lintjir, 15 m, boscpr. bb. 158. E. 1 P. 850 as far as collected by ENDERT in April 1920, the further materials under the same number being *M. pentandra*; n.v. *reboeng*.

Cultivated in the Buitenzorg Botanic Gardens under III. G. 56a, non 56. Perhaps this is the specimen TEYSMANN & BINNENDIJK mentioned in their catalogue of 1866 as *Bursinopetalum tetrandrum*?

9. *Mastixia trichotoma* — Tree 12—40 m high, the bole 10—150 cm in diameter at a height of 1.5 m (according to herbarium labels). Internodes bearing full-grown leaves 1—10 mm thick in the lower part, up to 1.5 times as broad towards the apex. Leaves opposite or subopposite; petiole usually 10—30 mm long; lamina elliptic to lanceolate or ovate to ovate-lanceolate, usually 5—25 cm long, 2—11 cm broad, cuneate to rounded at the base and contracted into the petiole, acuminate, but not abruptly, the acumen 10—20 mm long obtuse or acute, thin-coriaceous or thick-chartaceous, the secondary lateral nerves distinctly transverse and somewhat arcuate. Corymbs usually 3 to 8 times trichotomous below the triads; lower bracts often more or less foliaceous or even common leaves, most or all of them, however, small, triangular, acute. Calyx lobes 4 or 5, triangular to ovate, often slightly acuminate. Style 0.5—1 mm long. Fruit ovate to oblong, 18—35 mm long, 7—15 mm thick. Indumentum either appressed and grayish, confined to the inflorescences and the young parts, or brownish and woolly, usually soon falling off,

more rarely persistent on the adult internodes and the undersides of the leaves.

Mastixia trichotoma BLUME, Bijdr. Fl. Ned. Ind., 13, p. 655 (1825); D. C., Prodr., 4, p. 275 (1830); G. DON, Gen. Hist. Diehl. Pl., 3, p. 401 (1834); HASSK., Cat. Pl. Hort. Bot. Bogor., II, p. 169 (1844); BLUME, Mus. Bot. Lugd. Bat., 1, p. 257, ic. 58 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 772 (1856) & p. 1095 (1858) cum var. *laxa*; BAILLON, Adansonia, 3, p. 83, in nota (1862); TEYSM. & BINN., Cat. Pl. Hort. Bot. Bogor., p. 169 (1866); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. Booms. Java, 5, p. 90 (1900); WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 20, 24, ic. 1A—E (1910); KOORD.-SCHUM., Syst. Verz., I, 1, fam. 229, p. 105 (1912); KOORD., Exkursionsfl. Java, 2, p. 732, 734 (1912); KOORD. & VAL., Atlas, 1, tab. 190 (1913); KOORD., in ENGL., Jahrb., 50, suppl. p. 291, 293, 302 (1914); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); MOLL & JANSS., Mikrogr., 3, p. 722 (1918); KOORD., Fl. Tjibod., 2, p. 238 (1923); BRUGGEM., Bull. Jard. Bot. Buitenz., ser. 3, 9, p. 199, 200 (1927); *Mastixia laxa* BLUME, Mus. Bot. Lugd. Bat., 1, p. 257 (1850) cum var. *angustifolia*; WANGER., in ENGL., Pflanzenr., IV, 229, p. 20, 24 (1910) cum var. *angustifolia*; KOORD., Exkursionsfl., 2, p. 734 (1912); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); *Mastixia acuminatissima* BLUME, Mus. Bot. Lugd. Bat., 1, p. 258 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 772 (1856) & 1095 (1858); suppl. Sum., p. 135 (1860); HARMS, in ENGL., Nat. Pflanzenfam., III, 8, p. 262 (1898); WANGER., in ENGL., Pflanzenr., IV, 229, p. 20, 22, ic. 1F (1910); *Mastixia kimanilla* BLUME, Mus. Bot. Lugd. Bat., 1, p. 258 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 772 (1856) & p. 1095 (1858) cum var. *caesia*; TEYSM. & BINN., Cat. Pl. Hort. Bot. Bogor., p. 169 (1866); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. Booms. Java, 5, p. 94 (1900); WANGER., in ENGL., Pflanzenr., IV, 229, p. 20, 25 (1910); KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 104 (1912); KOORD., Exkursionsfl. Java, 2, p. 734 (1912); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); *Mastixia caesia* BLUME, Mus. Bot. Lugd. Bat., 1, p. 258 (1850); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); *Mastixia Maingayi* CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 746 (1879); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KING, Journ. As. Soc. Beng., 71, 2, p. 74 (1902) cum var. *sub-tomentosa*; WANGER., in ENGL., Pflanzenr., IV, 229, p. 20, 22 (1910); RIDLEY, Fl. Mal. Pen., 1, p. 890 (1922); *Mastixia Junghuhniana* CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 746 (1879) non MIQ.; *Mastixia Clarkeana* KING, Journ. As. Soc. Beng., 71, 2, p. 75 (1902) cum var. *macrophylla*; WANGER., in

ENGL., Pflanzenr., IV, 229, p. 20, 24 (1910) cum var. *macrophylla*; KOORD., Exkursionsfl. Java, 2, p. 734 (1912); RIDLEY, Fl. Mal. Pen., 1, p. 890 (1922) cum var. *macrophylla*; HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917) cum var. *macrophylla*; *Mastixia Korthalsiana* WANGER., in FEDDE, Repert., 4, p. 335 (1907); in ENGL., Pflanzenr., IV, 229, p. 20, 25 (1910); HALLIER, Beih. Bot. Centralbl., 34, 2, p. 40 (1917); *Mastixia propinqua* RIDL., Journ. Fed. Mal. States Mus., 4, p. 25 (1909); Fl. Mal. Pen., 1, p. 890 (1922); *Elataeriospermum Tokbray* KOORD., Junghuhn-Gedenkb., p. 173 (1910), non *Elateriospermum Tokbrai* BLUME; *Mastixia pentandra* KOORD.-SCHUM., Syst. Verz., I, 1, fam. 229, p. 104 (1912) p.p., non BLUME; *Vitex premnoides* ELMER, Leafl. Phil. Bot., 8, p. 2874 (1915); *Mastixia premnoides* HALLIER, Beih. Bot. Centralbl., 34, 2, p. 41 (1916); MERR., Phil. Journ. Sc., bot., 13, p. 43 (1918); Enum. Phil. Fl. Pl., 3, p. 242 (1923); MELCHIOR, in ENGL., Jahrb., 60, p. 172 (1925); *Mastixia rostrata* RIDL., Fl. Mal. Pen., 1, p. 890 (1922) non BLUME.

As is evident from the above list of synonyms, I take together, under the collective name of *M. trichotoma*, several forms, that by other authors are distinguished as different species. These forms, however, either show differences too slight for specific distinction, or are connected by intermediate forms.

Among the species distinguished by different authors, *M. trichotoma* BLUME (1825) is characterized by its middle-sized, elliptic to oblong leaves, the yellowish or ochraceous colour of its twigs and undersides of its leaves, the woolly indumentum covering all young parts, permanent on the inflorescences, the nodes and the undersides of the leaves.

BLUME himself split off from this species *M. laxa* (1850), somewhat different by less branched inflorescences, larger flowers, and leaves that are only hairy on the underside of the nerves; moreover the leaves are a trifle smaller, more ovate, less acuminate, the inflorescences more densely woolly or nearly floccose.

Of this species BLUME distinguished a variety *angustifolia*, with leaves much smaller and less hairy, and inflorescences still less branched.

M. kimanilla BLUME (1850) has somewhat more ovate, quite glabrous leaves; the indumentum on the other parts is restricted to the young parts and the extremities of the inflorescences, and is more grayish and appressed, not brownish and woolly. Also the colour of different parts is more grayish.

M. caesia BLUME (1850) has blackish twigs and leaves that look somewhat pruinose, but this might be caused by the mode of drying.

For the remainder there is little difference with *M. kimanilla*, of which it can be hardly distinguished as a variety.

M. acuminatissima BLUME (1850) differs much more, and its specific distinction appears quite justified at first sight. Its twigs are more slender, its leaves smaller, more oblong, and long- and acute-acuminate; its colour is grayish, the indumentum grayish, appressed, and nearly restricted to the inflorescences, though also the buds and nodes are slightly hairy. This form, however, cannot be distinguished from *M. clarkeana* and is, together with this form, connected with *M. trichotoma* by intermediate forms.

M. Maingayi CLARKE (1879) is as well distinguished, at first sight, as *M. acuminatissima*, by copious ochraceous or even ferruginous indumentum, that is permanent and dense on the inflorescences, twigs, petioles and undersides of the leaves; moreover are the leaves more coriaceous, more strongly nerved, and the midrib and primary and secondary lateral nerves are impressed above. The lower bracts of the inflorescences are common leaves or at least somewhat foliaceous, and gradually diminish into the upper small bracts. This remarkable form, however, is connected with *M. trichotoma* by intermediates, one of which was already described by KING as var. *subtomentosa*.

M. clarkeana KING (1902) is little different from BLUME'S *M. acuminatissima*, but is quite conspicuous among the forms of the Malay Peninsula. If one would, in spite of the transition forms towards *M. trichotoma*, keep this form upright as a species, it would be impossible to keep it separated from *M. acuminatissima*. It has somewhat ovate, rather small, thin-coriaceous, quite glabrous leaves, somewhat larger and less acuminate than those of *M. acuminatissima*. The indumentum of the inflorescences is grayish and appressed.

M. korthalsiana WANGERIN (1907) is strikingly different by 5-merous flowers, hardly different, however, for the rest from forms such as *M. trichotoma* and *M. laxa* BLUME. It is remarkable that the materials of these form, distinguished by means of the 5-merous flowers only, and from distant localities, are so uniform as to the characters of twigs and leaves, but so different as to the dimensions of the fruit.

M. korthalsiana var. *macrophylla* WANGERIN (1907) is, as HALLIER already remarked, not 5-merous but 4-merous, and nothing but a large leaved form of *M. clarkeana*, so connecting this with larger-leaved forms of *M. trichotoma*.

M. propinqua RIDLEY (1909) is intermediate between *M. clarkeana*

and *M. trichotoma*; it has the general appearance of the latter but the appressed grayish indumentum of the former.

M. premnoides (1915) is an analogous form, but somewhat more yellowish-coloured and with a more loose indumentum.

Among the materials at my disposition I moreover found forms, that as well as several of the above-mentioned ones, deserve distinction as varieties. I am quite well aware, that it is rather arbitrary how many varieties may be named as such, but as on one hand I thought it undesirable to let forms as *M. Maingayi*, *M. acuminatissima* and my new variety *simalurana*, unnamed, and on the other hand the distinction of varieties is a means by which the polymorphy of a species may be more distinctly expressed, I have described, in the following, as many as 9 varieties. Besides these, there remain several, more or less intermediate, forms unnamed.

Of the varieties described, the var. *laxa* may be considered as the central type, from which the other varieties diverge in different directions. It is connected by the var. *benculuana* with the extreme var. *simalurana*; in this direction the variability is characterized by the increasing dimensions of all vegetative parts, and of the indumentum, which, however, is shorter and more papillose than that of the var. *Maingayi*. The var. *laxa* is connected with the extreme var. *Maingayi* by such forms as indicated in the distribution list as *sub-Maingayi*, and among which is *M. Maingayi* var. *sub-tomentosa* KING. The var. *Maingayi* is characterized by more copious velvety indumentum and thicker leaves with stronger nerves impressed on the upper surface. To the connecting forms the var. *benculuana* is rather similar. By forms indicated by the name *sub-clarkeana* and *clarkeana* the central type *laxa* is connected with the extreme var.s *acuminatissima* and *tenuis*. In this series of varieties the dimension of vegetative parts are decreasing, the twigs become very slender, the leaves thin and small, the indumentum gray and appressed. The var.s *korthalsiana* and *rhyngocarpa* are no extreme forms; from the var. *laxa* they are distinguished each by one striking character, the former by 5-merous flowers, the latter by peculiarly rostrate fruit.

The varieties distinguished here are the following:

1. Var. *tenuis* nova var.; arbor ad 25 m alta, altitudine 1.5 m 40 cm diametro; internodia foliifera parte inferiore 1—3 mm crassa; petiolus 5—16 mm longus; lamina 4—9 cm longa, 2—4 cm lata, ovata vel elliptica vel nonnihil oblongior, acumine distincto vel conspicuo, 5—12 mm longo, 3—4 mm lato, obtuso, non spathulato, tenuiter coriacea vel chartacea. Corymbi minores vel parvi, sub triadibus ter vel quater

trichotomi; bracteae inferiores nonnunquam foliaceae, plerumque petiolaceae acutae ad 4 mm longae, superiores minores triangulares acutae, tempore fructificationis maxima parte deciduae; flores 4-merae; fructus (maximi noti) 14—15 mm longi, 6—7 mm diametro, ovati, calycem versus paulum acutae; indumentum canum adpressum, ad inflorescentias ramulos petiolos nervosque crassiores juveniles restrictum, denique in omnibus partibus deciduum.

Distribution: Sumatra, Borneo.

2. Var. *acuminatissima* nov. var.; arbor magnitudine ignota; internodia foliifera parte inferiore 1.5—2 mm crassa; petiolus 10—15 mm longus; lamina 7—12 cm longa, 2—3.5 cm lata, lanceolata vel ovato-lanceolata, tenuiter coriacea vel chartacea acumine 12—20 mm longo apicem versus sensim attenuato acuto vel acutiusculo; corymbi sub triadibus ter trichotomi; bracteae non foliaceae, omnes parvae triangulares acutae, mox deciduae; flos statu alabastri adulti 3—3.5 mm longus, 4-merae; fructus ignotus; indumentum adpressum canum, in inflorescentiis floribus petiolis internodiisque juvenilibus, iam tempore florendi parte deciduum.

Mastixia acuminatissima BLUME, Mus. Bot. Lugd. Bat., 1, p. 258 (1850).

Distribution: Sumatra.

3. Var. *clarkeana* nov. var.; arbor (ex singula schedula) ad 37 m alta, trunco altitudine pectoris ad 76 cm diametro; internodia foliifera parte inferiore 1—3 mm crassa; petiolus 6—20 mm longus; lamina 7—17 cm longa, 1.5—8 cm lata, ovato-oblonga ad lanceolata, chartacea vel tenuiter coriacea, acumine distincto apicem versus sensim attenuato, 5—15 mm longo 2—4 mm lato, plerumque obtuso raro subspathulato; corymbi sub triadibus quater vel quinques trichotomi; bracteae inferiores magis vel minus foliaceae saepe folia normalia parva, abrupte in superiores parvas acute triangulas plerumque iam tempore florendi deciduas transientes; flos statu alabastri adulti 2—3 mm longus, 4-merae; fructus quoad notus (ex speciminibus non typicis) ovato-oblongus vel angustior, ad 30 mm longus 10 mm diametro; indumentum canum adpressum in inflorescentiis, floribus, petiolis, foliorumque nervis crassioribus, mox deciduum, iam tempore florendi in extremitatibus inflorescentiarum tantum permanens.

Mastixia clarkeana KING, Journ. As. Soc. Beng., 71, 2, p. 75 (1902) an cum var. *macrophylla*?

Distribution: northern parts of the area of the species, Sumatra, Bangka, Malay Peninsula, North Borneo.

Specimens indicated by me in the distribution lists as *sub-clarkeana* are those forms, that belong to *clarkeana* as to the indumentum, but that have coarser twigs and larger leaves, or that verge towards the var. *laxa* by looser indumentum on the nodes and more brownish hue of the twigs and undersides of the leaves; among these is the form described by RIDLEY as *M. propinqua*.

4. Var. *laxa* MIQUEL; arbor ad 28—30 m alta, trunco pectoris altitudine 40 cm diametro; internodia foliifera parte inferiore 2—7 mm crassa; petiolus 8—24 mm longus; lamina 4—20 cm longa, 2—8 cm lata, tenuiter coriacea, elliptica vel ovata ad oblonga vel ovato-oblonga, acumine valde variabili, brevi vel longo, obtuso vel acuto, nunquam tamen spathulato; corymbi sub triadibus quater vel quinquies trichotomi; bractee non foliaceae, omnes parvae acutae triangulares, inferiores iam ante tempus florendi deciduae; flos statu alabastri adulti 3—3.5 mm longus, 4-meres; fructus 20—30 mm longus, 9—13 mm diametro, ovatus; indumentum fuscum vel ochraceum, saepe floccosum in omnibus partibus iuvenilibus, tempore florendi in floribus et extremitatibus inflorescentiarum, in petiolis et in facie inferiore nervorum crassiorum, raro etiam pareum in laminae facie inferiore.

Mastixia trichotoma BLUME, Bijdr., 13, p. 655 (1825); *M. trichotoma* & *M. laxa* cum var. *angustifolia* BLUME, Mus. Bot. Lugd. Bat., 1, p. 257, ic. 58 (1850); *M. trichotoma* MIQ., Fl. Ind. Bat., I, 1, p. 772 (1856) & p. 1095 (1858) cum var. *laxa*.

Distribution: Java.

5. Var. *korthalsiana* nov. var.; arbor 12—25 m alta, trunco altitudine pectoris 10—60 cm diametro; internodia foliifera parte inferiore 1—5 mm crassa; petiolus 10—17 mm longus; lamina 5—16 cm longa, 2—5.5 cm lata, chartacea vel tenuiter coriacea, elliptica ad oblongo-lanceolata, raro paulum ovata, acumine valde protracto 5—20 mm longo 2.5—5 mm lato obtuso sed nunquam spathulato; corymbi statu fructifero tantum noti, sub triadibus quater vel quinquies trichotomi, bracteis ignotis tempore fructificationis iam deciduis; flos 5-meres; fructus oblongo-ovatus, 20—32 mm longus 8—14 mm diametro; indumentum fuscum floccosum in omnibus partibus iuvenilibus, postea in nodis ramulorum et inflorescentiarum tantum permanens.

M. Korthalsiana var. *typica* WANGERIN, in FEDDE, Repert., 4, p. 335 (1907).

Distribution: South-Sumatra, South-Borneo.

6. Var. *Maingayi* nov. var.; arbor 20—40 m alta, trunco altitudine pectoris c. 40 cm diametro; internodia foliifera 2—5 mm crassa; petiolus

10—20 mm longus; lamina crassiuscule coriacea, nervis lateralibus primariis et secundariis facie superiore impressis, 10—20 cm longa, 4—9 cm lata, ovata ad ovato-oblonga, rarius elliptica ad lanceolata vel angustior, acumine plerumque ad 10 rarius ad 20 mm longo obtuso, nunquam tamen spatulato; corymbi sub triadibus quinquies vel sexies trichotomi; bracteae inferiores plerumque foliis normalibus similes vel magis minusve foliaceae, superiores vario modo diminutae, ad tempus fructificationis permanentes; flos 4-meres, statu alabastri adulti 2.5—3.5 mm longus; fructus ovatus, 18—20 mm longus, 10—13 mm diametro; indumentum dense velutinum in omnibus partibus iuvenilibus, in inflorescentiis adultis ramulis petiolis faciebusque inferioribus foliorum tantum permanens.

Mastixia Maingayi CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 746 (1879).

Distribution: around the Malacca and Karimata Straits, i.e. southern and western coast of the Malay Peninsula, eastern coast of Sumatra, Bangka, western coast of Borneo.

7. Var. **benculuana** nov. var.; arbor 21—28 m alta, trunco ad 45 cm diametro; internodia foliifera parte inferiore 3—5 mm crassa; petiolus 17—35 mm longus; lamina 10—20 cm longa 4—8 cm lata, crassiuscule coriacea, nervis lateralibus primariis tantum impressis, ovato-oblonga, rarius elliptica vel oblonga, acumine 7—12 mm longo obtusiusculo vel acutiusculo; corymbi sub triadibus quater vel quinquies trichotomi, bracteis omnibus parvis, inferioribus iam ante anthesin deciduis; flos 4-meres, statu adulto ignotus; fructus 25—30 mm longus, 14—16 mm diametro; indumentum papillosum vel nonnihil velutinum, fuscum, diu permanens etiam in ramulis, in petiolis nervis crassioribus et inter nervos facie inferiore, denique iam parcissimum iam densiusculum.

Distribution: Korinchi Peak and Bencoolen.

8. Var. **rhynchocarpa** nov. var.; arbor 20—25 m alta, trunco 25—40 cm diametro; internodia foliifera parte inferiore 2—4 mm crassa; petiolus 10—18 mm longus; lamina tenuiter coriacea, 9—16 cm longa, 3—7 cm lata, elliptica ad oblonga vel nonnihil ovata, acumine protracto 8—16 mm longo acuto vel obtuso, non spatulato; corymbi sub triadibus e. quater trichotomi; bracteae omnes parvae acutae, inferiores 2—5 mm longae superiores gradatim decrescentes; flos 4-meres, statu adulto ignotus; fructus immaturus tantum notus, disco inflato 4-tuberculato et stylo in rostrum 2—3 mm longum aucto coronatus; indumentum fuscum papillosum vel saltem breve, in omnibus partibus iuvenilibus densum, mox tenuescens, in foliorum facie inferiore denique deciduum.

If the beak on the fruit might prove to be a deformity, this variety would hardly differ from the var. *benculuana*.

Distribution: Central Borneo.

9. Var. *simalurana* nov. var.; arbor 18—21 m alta, trunco c. 16 m alto, pectoris altitudine 50—150 cm diametro (sic!); internodia foliifera parte inferiore 4—10 mm crassa; petiolus ad 32 mm longus; lamina 7—25 cm longa, 3—12 cm lata, crassiuscule coriacea, ovato-oblonga, acumine 5—20 mm longo obtusiusculo; corymbi in paniculas uniti, sub triadibus sexies vel pluries trichotomi; bracteae omnes parvae triangulae acutae vel inferiores folia normalia; flos 4-merus, adultus 2.5—3 mm longus; fructus 20—35 mm longus, 10—15 mm diametro; indumentum fuscum breve adpressum vel papillosum, in omnibus partibus iuvenilibus densum, mox tenuescens, in ramulis diu permanens, in petiolis et in foliorum nervis crassioribus et etiam inter nervos facie inferiore breve sed subdensum.

Distribution: Island Simeuloeë (Simaloer).

In the following distribution list of the species I have indicated the varieties by bold-faced capitals, being the initial ones of the variety names. So **A** = var. *acuminatissima*, **B** = var. *benculuana*, **C** = var. *clarkeana*, **K** = var. *korthalsiana*, **L** = var. *laxa*, **M** = var. *Maingayi*, **R** = var. *rhynchocarpa*, **S** = var. *simalurana*, **T** = var. *tenuis*.

MALAY PENINSULA. Without exact locality: MAINGAY, Kew distribution 711 (Be, L) **M**; Penang: Government Hill, 360 m, CURTIS 1564 (S) **M**; Perak: SCORTECHINI 98 (Be) **C**; 625b (B, S) **C**; 869 (L) **C**; the Cottage, CURTIS 3575 leg. Fox (S), v.n. *kayu neiri* **L**; Pahang: Telom, RIDLEY 13899 (S), type *M. propinqua* RIDL. sub-**C**; Selangor: Sungai Lalang Kajang, SYMINGTON 22615 (S) **C**; Malacca: Sungei Udang, 0 m, DERRY 584 (S) v.n. *kayu mawa* & 1036 (S) v.n. *kayu bengkal bukit*, sub-**M**; Singapore: CANTLEY's collector s.n. (S) **M** & ?.

SIMEULOEË. ACHMAD 109 (B, L), v.n. *ahelat*, 500 (B, L, U) v.n. *awa simangoerah*, 510 (B, L, U) *awa ahelat oeding*, 588 (B, L, U) v.n. *awa enti*, 696 (B, L) v.n. *ahelat oeding*, 1183 (B, L) v.n. *toetoen simangoerah pajo*, all **S**.

SUMATRA. Without exact locality: PRAETORIUS (L, U), authentic specimens of *M. acuminatissima* BLUME, **A**; Oostkust: Karolanden near Kp. Tongka, 1456 m, boschpr. bb. 6234 (B), v.n. *damar* ?; Westkust: G. Singgalang, BECCARI P.S. 46 (L) var. ?; Pajakoemboeh, Kp. Oeloe Air, 1240 m, boschpr. bb. 6710 (B), v.n. *kiauw*, **T**; Oud-Agam, Kp. Paoeh, 1300 m, boschpr. bb. 2932 (B, L) v.n. *madang toendjoek*, **C**; Oud-Agam, S. Dareh near Kp. Batas Tjoeli, 1200 m, boschpr. S.W.K. II. 27 (B), v.n. *madang toendjoek*, var. ?; Oud-Agam, Kp. Mabalak, 1000 m, boschpr. bb. 6666 (B), v.n. *djao* **M**-?; Solok, near Kp. Loeboekselasih, 1000 m, boschpr. 5499 (B, L) v.n. *koendoer (djanten)*, var. ?; G. Kerintji, 2000 m,

BÜNNEMEYER 9572 (B, S), **B**; Bengkoeloe: Redjang, Bt. Kaba, boschpr. bb. 2254 (B, L), v.n. *boeng*, **B**, & bb. 2255 (B, L) v.n. *tanah*, **B**; Redjang, Rimba Air Tidatar, boschpr. bb. 2446 (B, L) v.n. *medang tima*, **B**; Redjang, Taba Penandjoeng, boschpr. bb. 2286 (B, L) v.n. *medang djentik*, var. ?; Kroë, Kota Banglai, 900 m, boschpr. bb. 10297 (B) v.n. *kembang tjangké*, var. ?; Palembang: Kp. Ning, R. Bliti, 150 m, H. O. FORBES 2744 (Be, L, S) **K**; Lematang Oeloe, 150 m, LAMBACH 1261 (B, L) v.n. *medang kladi*, **K**; Pasemah-landen, Pg. Tjawang Tjempedak, marga Lb. Boentak, 1200 m, boschpr. T. B. 208 (B) v.n. *kemoeran*, **T**; Lematang Ilir, 75 m, boschpr. 98 T. 3 P. 261 (B, L), v.n. *kapoer*, **M**.

BANGKA. Pangkal Pinang, TEYSMANN (B), **C**; Muntok, Air Limau, boschpr. bb. 7826 (B) v.n. *mentepong*, **M**; Rindik, 10 m, boschpr. bb. 11578 (B) v.n. *menamer*, **M**.

BELITOENG. Tandjoeng Pandan, near Kp. Bantan, 30 m, boschpr. bb. 9171 & 10237 (B), v.n. *mendamaran*, var. ?.

BORNEO. Sarawak: native collector 1856 (L) **C**; Kuching, GARAI (HAVILAND) 957 (S, Sa) **C**; Kuching, HAVILAND & HOSE 3625 E (L) **C**; West Borneo: Kapoeas, TEYSMANN 8379 H. B. (B) v.n. *imoer-imoer*, **M**; G. Kenepai, HALLIER B 1836 (B, L), **T**; East Borneo: Boeloengan, Selimbatoe, near Kp. Roehmah, 100 m, boschpr. bb. 11287 (B), v.n. *oeras-oeras goenoeng*, var. ?; near Long Petah, 450 m, ENDERT 3429 & 3465 (B), **K**; near Long Hoet, 150 m, ENDERT 4769 & 2572 (B) **R**; South Borneo: without exact locality, KORTHALS (B, L), in (L) authentic specimens of *M. korthalsiana* var. *typica* WANG., **K**. & of var. *macrophylla* WANG., sub-**C**; G. Sakoembang & G. Balaran, KORTHALS (L), authentic specimens of *M. Korthalsiana* var. *typica* WANG., **K**; lower Dajak-River, Kp. Teroesan, 1 m, boschpr. bb. 9888 (B), v.n. *kamoeran*, var. ?.

JAVA. Without exact locality: REINWARDT (B, L, U), authentic specimens of *M. kimanilla* BLUME, v.n. *kimanilla*, **C—L**; REINWARDT, houtsoort no. 125 (L) v.n. *plaglar minjak*, var. ?; BLUME (Be, L, U), authentic specimens of *M. trichotoma* BLUME, **L**; BLUME (B, Be, L), authentic specimens of *M. laxa* BL., **L**; BLUME, "*Mastixia trichotoma, stirps junior*" (L), var. ?; "Harriang", VAN HASSELT (L, U), v.n. *tenggau*, var. ?; Banten: VAN HASSELT (L), authentic of *M. caesia* BLUME, **C—L**; G. Poeloesari (near Pandeglang) (B, L), authentic of *M. laxa* var. *angustifolia* BL., **L**; G. Poeloesari, above Doekoeh Tjihoedjan, KOORDERS 913 β , forest number *9 (B), var. ?; G. Poeloesari, 1050 m (?) (KOORDERS 914 β , forest number *8 (B, Be, L, U), **L**; Dépok, 95 m, BURCK & DE MONCHY (B), var. ?; Tjiampèa near Buitenzorg, 200—300 m, KOORDERS 30598 β , forest number 486* (B, L), var. ?; KOORDERS 30597 β , forest number 1548*

(B), L; G. Salak, BLUME (L), authentic of *M. laxa* and of *M. trichotoma* BL., v.n. *kibunting*, L; G. Salak, near Kp. Bodjong, 600—1000 m, KOORDERS 24478 β , forest number 930* (B), v.n. *kendoe*, L; near Kp. Bobodjong, 800 m, KOORDERS 24459 β , forest number 158* (B, L), L; G. Gedé, 600—1200 m, JUNGHUHN (L), var. ?; G. Gedé, REINWARDT?, houtsoort no. 47, v.n. *kidedak*, var. ?, 227, v.n. *kibenteli*, var. ?; 652, v.n. *kilangseb lalakina*, var. ?; Tjibodas, tree no. 3100a, KOORDERS 32188 β (B), 41829 β (B), 13231 β (B, L), v.n. *kibonteng*, var. ?; tree 3168a, KOORDERS 25909 β (B, L), 2200 β (B), 12487 β (B, L), 41874 β (B), 25860 β (B, L), 2191 β (B, L), v.n. *mehmal*, *memah*, *hoeroe mehmah*, L; SAPIIN 2599 (B) L; Takokak, G. Aseupan, KOORDERS 25680 β (B), v.n. *kimenjan*, var. ?; Takokak, KOORDERS 15227 β , forest number 2412a (B, Be, L) v.n. *kitendjo*, var. ?; Tjidatoe near Soekaboemi, 900 m, KALSHOVEN VII (B, L), v.n. *djerèt*, L; Bodjong Genteng, near Tjisolak, 500 m, KOORDERS 39459 β , forest number 45* (B, L), sub-C; G. Bèsèr, south of Tjibeber, 1000 m, WINCKEL 264 β (B, L), v.n. *hoeroe hiris*, L, 289 β (B, L, S, U) v.n. *hoeroe minjak*, L; G. Boerangrang, BLUME (B), authentic of *M. laxa* BL., L; G. Papandajan, KORTHALS (L), L; Pasir Djamboe, Tjigenteng, 1400—1700 m, KOORDERS 26248 β , forest number 321* (B, Be, L), v.n. *kiloengloem*, L; G. Tjigoelocdoeg, near Bandoeng, 1050 m, boschpr. Ja. 1368 (B), v.n. *kiloemloem*, var. ?; Pengalengan, 1200 m, JUNGHUHN (L), var. ?; Noesagedé, in the Pendjaloe Lake, 720 m, KOORDERS 47885 β , forest number 341 (B), youth form with partly spread leaves, var. ?; 47886 β , forest number 530 (B), very young form with spread, dentate leaves, var. ?; G. Slamet, KOORDERS 9980 β , forest number 23 (B), var. ?; G. Slamet, DEN BERGER 122 (B, L), v.n. *woeroe*, sub-C; forest Mantrem near Ngasinan (Magelang), KOORDERS 27699 β , forest number 879* (B, L), v.n. *woeroe sonten*, L; G. Oengaran, Medini, 900—1200 m, JUNGHUHN (L), v.n. *lawean*, "Plantae Junghuhnianae ineditae" 86, *Elateriospermum Tokbraj* KOORD., non BL., var. ?; Pasoeroean, G. Kidoel, forest Soembertangkil, 400—500 m, KOORDERS 23754 β , forest number 1252* (B, L), var. ?; Ragadjampi (Besoeeki), KOORDERS 28894 β , forest number 1356* (B, Be, L), L.

SELEBES. Menado, near Kp. Klabat, 340 m, boschpr. bb. 14153 (B), sub-C; foot of G. Klabat, 600 m, KOORDERS 16977 β , forest number 717 (B), v.n. *makolimboen*, var. ?; near Loeboe, KOORDERS 17519 β , forest number 2226 (B), v.n. *aloechéra*, & 17518 β , forest number 2257 (B), v.n. *kajoe tondongan*, var. ?; forest Loelomboelan near Pakoe-oeré, 700 m, KOORDERS 17474 β , forest number 3308 (B), v.n. *sansalan*, var. ?; Kp. Klabat, 340 m, boschpr. 14155 (B), var. ?.

AMBON. Doesoen Poeta, Kp. Hatoe, 300 m, boschpr. bb. 14267 (B), v.n. *mameleng hoetan*, sub-C.

PHILIPPINE ISLANDS. Mindanao: Davao, Todaya, ELMER 11644 (B), cotype of *Vitex prennoides* ELM., sub-C; Lake Lanao, Camp Keithley, CLEMENS s.n. (Be), var. ?.

Species dubia.

Mastixia gracilis KING, Journ. As. Soc. Beng., 71, 2, p. 73, 74 (1902); WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 21, 28 (1910); RIDLEY, Fl. Mal. Pen., 1, p. 891 (1922).

“A small tree; young branches slender, angled, smooth, yellowish. *Leaves* thinly coriaceous, lanceolate, tapering much to the base and still more to the much acuminate apex; both surfaces pale olivaceous-green when dry, glabrous; the upper shining, the lower somewhat dull; main-nerves 8 to 14 pairs, ascending, very little curved, faint on both surfaces; length 2.25 to 4.5 in.; breadth .8 to 1.5 in.; petioles varying from .2 to .25 in. *Cymes* in threes, terminal, about a third or a fourth the length of the leaves, on short angled peduncles, the branches short and crowded at their apices, many flowered, with a whorl of minute broad bracts at the base of flower pedicels. *Flowers* about .1 in. long, their pedicels about as long, ovoid. *Calyx* campanulate; the tube puberulous, slightly furrowed; the mouth wavy, indistinctly 5-toothed. *Petals* 5, oblong-ovate, adherent by their edges, concave, leathery. *Stamens* 5 *anthers* oblong, bifid: filaments short. *Disc* small. *Style* short, conical: stigma concave. *Fruit* unknown.”

“PERAK: at an elevation of about 5,000 feet; Wray 1528.”

It seems to be unknown where the type specimen of this plant actually is. Neither WANGERIN nor RIDLEY did see it. The description does not convince me, that it really is a *Mastixia*.

Species reiciendae.

Mastixia ? cuneata BLUME, Mus. bot. lugd. bat., 1, p. 257 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 773 (1856) & 1905 (1858); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KOORD. & VAL., Bijdr. booms. Java, 5, p. 87 (1900); WANGERIN, in ENGL., Pflanzenr., IV, 229, p. 29 (1910).

According to KOORDERS & VALETON, *l.c.*, this is no *Mastixia* and probably no *Cornacca*. According to WANGERIN *l.c.* it is a species excludenda, “ex anatomia foliorum *Embelia* spec.” According to HALLIER, in Beih. Bot. Centralbl., 34, 2, p. 42 (1916) it is *Notaphoebe umbelliflora* BLUME.

Mastixia? heterophylla BLUME, Mus. bot. lugd. bat., 1, p. 257 (1850); MIQ., Fl. Ind. Bat., I, 1, p. 773 (1856); suppl. Sum., p. 136 (1860); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); WANGERIN, in ENGL., Pflanzenr., IV., 229, p. 28 (1910); HALLIER, Meded. Rijks Herb. Leiden, 36, p. 5 (1918).

According to WANGERIN *l.c.* this is a "species valde dubia". According to HALLIER *l.c.* it is *Gomphandra capitulata* BECC.

MASTIXIODENDRON.

MELCHIOR, in ENGL., Jahrb., 60, p. 167 (1925).

Only species

Mastixiodendron pachyclados (K. SCHUM.) MELCH.; *Fagraea pachyclados* K. SCHUM., in SCHUM. & LAUTERB., Nachtr. Fl. deutsch. Schutzgeb. Südsee, p. 349 (1905); *Mastixiodendron pachyclados* MELCHIOR, in ENGL., Jahrb., 60, p. 168, t. 1 (1925); LAUTERB., in ENGL., Jahrb., 63, p. 467 (1930); C. T. WHITE, Journ. Arnold Arbor., 10, p. 257 (1929).

As to the treatment of this genus by MELCHIOR *l.c.* I can add hardly anything of importance, I will confine myself to some remarks, the more as I am in doubt, whether *Mastixiodendron* really has to be placed among the *Cornaceae*. More probable seems to me, that it might be a *Rubiaceous* genus, and this because of the following considerations.

The supposition that *Mastixiodendron* might be a *Rubiacea*, was awakened in me by the general appearance of the plant, and in the first place by the occurrence of large interpetiolar stipules. When we ask ourselves, why MELCHIOR does not place *Mastixiodendron* among the *Rubiaceae*, we must come to the conclusion, that this is only because of the choripetalous corolla. Therefore I have tried to settle, whether the corolla of *Mastixiodendron* really is choripetalous, but I found, that of all materials in the Berlin Herbarium the corollas were too little developed, to establish this with certainty. From the drawings given by MELCHIOR, appears, that nor the author of the genus himself saw better-developed corollas.

When we try to determine the plant with THONNER's determination key and with ENGLER & PRANTL's Pflanzenfamilien, supposing that the corolla is sympetalous, we do not only come to the *Rubiaceae*, but even without difficulty to the genus *Plectronia*, of which there occur many species in New Guinea. In the treatment of the New Guinea species of this genus by VALETON in ENGLER's Jahrbücher (61, p. 53), I did not succeed, however, in finding a species strongly resembling *Mastixiodendron*.

Anyhow, it seems to me that more attention has to be paid to the peculiar characters of the stipules of this genus. MELCHIOR mentions them, but does not describe them as interpetiolar, nor does he mention the remarkable scars they leave on the twigs nor their contort aestivation. Besidēs in some genera of *Rubiaceae* (e.g. *Sarcocephalus*, *Anthocephalus*), the latter characteristic occurs in few *Rhizophoraceae* (e.g. *Carallia*, *Rhizophora*, *Bruguiera*, *Gynotroches*), but the structure of the flower of *Mastixiodendron* makes it impossible that this genus might belong to the latter family.

Index of collectors numbers of *Mastixia*.

indicating the species by means of their number (1 = *M. pentandra*, 2 = *M. parvifolia*, 3 = *M. kaniensis*, 4 = *M. rostrata*, 5 = *M. bracteata*, 6 = *M. cuspidata*, 7 = *M. Scortechinii*, 8 = *M. tetrandra*, 9 = *M. trichotoma*).

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AMDJAH 55 : 6.

BECCARI P. B. 1559 : 5; P. S. 46 : 9; P. S. 956 : 4.

BLUME s. n.: 1, 4 & 9.

BOSCHPROEFSTATION.

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BURCK & DE MONCHY s. n.: 9.

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CURTIS 919 : 1; 1564 : 9; 3575 : 9.

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- HALLIER B. 569 : 2; B. 1836 : 9.
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WRAY 1528: *M. gracilis*.

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 kajoe tendjo *cfr.* daon kajoe tendjo 4.
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