



Studies in South American Malpighiaceae, Lauraceae and Hernandiaceae, especially of Surinam

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STUDIES IN SOUTH AMERICAN MALPIGHIACEAE,
LAURACEAE AND HERNANDIACEAE,
ESPECIALLY OF SURINAM.

A. J. G. H. KOSTERMANS

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RIJKSUNIVERSITEIT
GROENINGE

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LAURACEAE AND HERNANDIACEAE,
ESPECIALLY OF SURINAM.

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PROEFSCHRIFT

TER VERKRIJGING VAN DEN GRAAD VAN
DOCTOR IN DE WIS- EN NATUURKUNDE
AAN DE RIJKS-UNIVERSITEIT TE UTRECHT
OP GEZAG VAN DEN RECTOR MAGNIFICUS
Dr. C. W. VOLLGRAFF, HOOGLEERAAR IN
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OP MAANDAG 20 JANUARI 1936
DES NAMIDDAGS TE VIER UUR DOOR

ANDRÉ JOSEPH GUILLAUME HENRI KOSTERMANS
GEBOREN TE POERWOREDJO (NED. OOST-INDIË)



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**STUDIES IN SOUTH AMERICAN
MALPIGHIACEAE, LAURACEAE AND
HERNANDIACEAE, ESPECIALLY OF
SURINAM**

BY

A. J. G. H. KOSTERMANS (Utrecht).

INTRODUCTION.

Acknowledgments.

The present investigation has been carried out in the "Botanisch Museum en Herbarium" of the University of Utrecht. I wish to render to Dr. A. Pulle, the Director of the Institute, my most sincere thanks for the facilities afforded to me and for the interest in the progress of this work.

I am also greatly indebted to the Directors of the Berlin-Dahlem, Brussels, Göttingen, Leiden and Paris Herbaria and to the members of their staff for the opportunity of studying in these Institutes the collections entrusted to their care and for their helpful advice. Special words of thanks are due to Dr. O. C. Schmidt (Berlin-Dahlem), Dr. R. Benoist (Paris) and Dr. Exell (South Kensington). To Mr. Wilmott (South Kensington) I am obliged for the information he gave me with regard to the genus *Persea*, and to Dr. Hochreutiner (Geneva) for the loan of the type specimen of *Ocotea vernicosa*. To the Brussels, Berlin-Dahlem, Göttingen, Kew, Leiden and Paris Herbaria I am indebted for the loan of specimens which I needed for the solution of various special problems.

Scope of work.

It are in the first place Surinam species to which in this paper attention has been paid. In various instances however it was found advisable to revise a part of a genus, and then of course species not occurring in Surinam had also to be taken into consideration.

Material studied.

I have done my best to make the enumeration of the specimens collected in Surinam as complete and reliable as possible. For this purpose I have verified all the older determinations. The Surinam collections preserved in the Herbaria of Berlin-Dahlem, Brussels, Göttingen and Leiden are entirely included. It is doubtless true that other herbaria too possess specimens of Surinam plants, but as the greater part of these are merely duplicates of sheets belonging to the herbaria mentioned above, these collections are not of great importance. Those of Daniel Rolander, presumably in the Copenhagen Herbarium, could not be found: this is a great pity, because the study of these plants is absolutely necessary for the solution of several problems of identity. The Surinam material preserved in Utrecht consists for the greater part of collections made by the „Boschwezen" (Forestry Bureau); it was collected mainly in the localities indicated on the map at the end of this paper. In 1924 the numbering of the trees in the forest, a method which up to that date had been applied by the Forestry Bureau with such a great succes, was unfortunately stopped. Especially in a family like the Lauraceae this method is of the utmost importance, as it is practically the only way for establishing the specific identity or non-identity of the various fruiting and flowering branches, which in their vegetative characters are often very similar. A survey of these collections has been given by Pulle in his „Enumeration of the Vascular Plants known from Surinam (1906)" and in a paper published in the „Rec.

d. Trav. Bot. Néerl. 22 (1925), p. 324". The Utrecht Herbarium possesses also a number of jars containing flowers and fruits preserved in alcohol. As they belong to the herbarium specimens collected by the Forestry Bureau they are not mentioned separately. Information with regard to habit and to colour and fragrance of flowers and fruits were taken from the labels supplied by the collectors and from the card catalogue made by the Forestry Bureau. All other particulars were studied on herbarium material.

ABBREVIATIONS.

Herbaria:

B	Brussels
D	Berlin-Dahlem
G	Göttingen
L	Leiden
K	Kew
P	Paris
U	Utrecht

Vernacular names:

Ar.	Arowaccan (Indian)
Car.	Caribbean, Caraibic, Galibi (Indian)
N.E.	Negro English
Sar.	Saramaccan (Negro)
S.D.	Surinam Dutch

CHAPTER I.

NEW AND CRITICAL SPECIES.

MALPIGHIACEAE.

Niedenzu in his monograph of the Malpighiaceae includes the diagnostic characters of the varieties in his description of the species. In this paper however the description of the species is based exclusively on the var. *typica*. The presence or absence of glands on the sepals has been used by Niedenzu as a varietal diagnostic and before him even new species had been based on this character. In the course of this study it appeared however that glandular and eglandular sepals may be found even in the flowers of the same tree (see: *Byrsonima coriacea*). Consequently no great taxonomic value can be attached to the presence or absence of these glands and in the enumeration of the specimens I have indicated the two forms therefore merely as: glandless and gland bearing.

Mascagnia anisopetala (Juss.) Griseb. in Fl. Bras. XII, 1(1858), p. 95.

In my opinion *M. macrodisca* (Tr. et Pl.) Niedenzu is a variety only of *M. anisopetala*. The sole difference lies in the tomentum, which is sericeous in *M. macrodisca* and tomentose in *M. anisopetala*. The difference in the form of the leaf, to which Niedenzu draws the attention, viz. leaves usually cuspidate-acuminate in *M. macrodisca*, acuminate or obtuse-apiculate in *M. anisopetala* are of fluctuating nature. Of still

less importance is the diameter of the wings and I have not been able to confirm his statement that the glands of the sepals of *M. macrodisca* are less free than those of *M. anisopetala*. Niedenzu did not see flowers of *M. macrodisca*. A specimen with flower buds from Bolivia (Buchtien n. 1799) shows that the flowers too are exactly the same as those of *M. anisopetala*.

Mascagnia anisopetala (Juss.) Griseb., var. **macrodisca** (Tr. et Pl.) Kosterm. nov. var.

Frutex scandens. Pubes sericea appressa. Folia ovata apice plerumque cuspidato-acuminata. Samarae ala 6—8 cm diametro.

Mascagnia multiglandulosa Niedenzu, var. **surinamensis** Kosterm. nov. var.

Ramuli feretes, dense lanuginosi. Folia oblonga vel elliptica basi rotunda vel subcordata margine subrevoluta apice breviter acuminata vel apiculata supra glabrescentia nervis majoribus exceptis subtus dense persistenter lanuginosa. Inflorescentiae floresque ferruginco-lanuginosi.

Surinamo, Brownsberg (v. Emden s. n., fl. m. Sept.; typus in Herb. Utrecht).

Tetrapteris mucronata Cav., Diss. IX (1790), p. 434, emend. Kosterm.

I have united the two species *T. mucronata* Cav. and *T. crebriflora* Juss., because they merge into each other. The var. *subia* Griseb. of *T. crebriflora* can hardly be distinguished from *T. mucronata*. To get a better survey of the different varieties I have divided the species into two subspecies: *eumucronata*, covering *T. mucronata* s.s. and *crebriflora*, consisting of *T. crebriflora*.

Tetrapteris discolor (G. F. W. Meyer) Niedenzu, var. **brownsbergensis** Kosterm. nov. var.

Folia glabra obovato-oblonga vel oblonga basi acuta apice breviter acuminata obtusa petiolis usque ad 15 mm longis. Inflorescentiae (fructiferae) usque ad 20 cm longae.

Surinamo, Brownsberg (B.W. n. 658, fr. m. Sept.; v. Emden s. n., fr. m. Sept.; typus in Herb. Utrecht).

This variety links *T. diicolor* with *T. ovalifolia* Griseb. from which it differs by the thinner and smaller leaves.

Tetrapteris puberula Miq. in Tijdschr. Nat. Gesch. X (1843), p. 84; id. in Linnaea 18 (1844), p. 56.

The type specimen of this species: Focke n. 330, lower Suriname R., is identical with *T. diicolor* (G. F. W. Meyer) Niedenzu. The error may be explained by the fact that this specimen consists of an inflorescence only, the inflorescence leaves always being smaller and somewhat different in shape from the normal ones.

Heteropteris nervosa Juss. in St. Hil., Fl. Bras. mer. III (1852), p. 26.

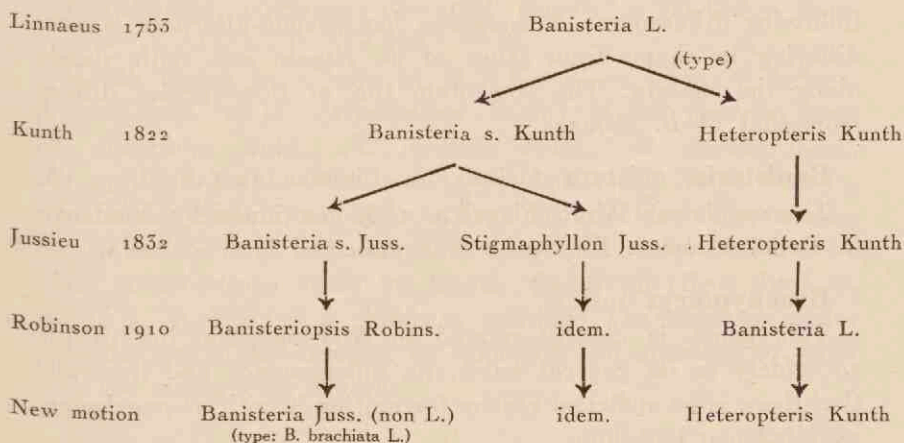
According to Macbride in Field. Mus. Nat. Hist. VIII, 2 (1930), p. 120, this name must supplant: *H. suberosa* (Willd.) Griseb, the name of Willdenow being a nomen nudum. I have combined this species with *H. anoptera* Juss. Neither the length of the inflorescence, nor the thickness of pedicels and peduncles, nor the shape of the top of the styles of *H. anoptera* are sufficiently distinct from those of *H. nervosa*. In the shape and the length of the wings of the samaras there is no difference at all.

Heteropteris multiflora (D.C.) Hochreutiner in Bull. N.-York Bot. Gard. VI, (1910), p. 277.

This species has first been described by Poiret as *Malpighia reticulata* (1816). In Flora Bras. XII, I (1858), p. 71 Grisebach described another species as *Heteropteris reticulata* Griseb. Niedenzu altered the name illegally into *H. Grisebachiana*. The name *H. reticulata* has to be kept for the species described by Grisebach and *M. reticulata* Poir. should be altered into *H. multiflora*, the name of D.C. being the oldest synonym.

Banisteria Juss. (non Linn.).

De Jussieu (St. Hil., Fl. Bras. merid. III, 1832, p. 27) and after him several other authors, including Niedenzu, have employed the name *Banisteria* in another sense than Linnaeus did. As the name: *Heteropteris* Kunth, based on the type specimen of Linnaeus' genus *Banisteria*, belongs to the nomina conservanda and *Banisteria* Linn. has been rejected (Intern. rules, ed. 3, 1935, p. 135), it appears advisable to make *Banisteria* Juss. (non Linn.) a nomen conservandum and *Banisteriopsis* Robinson ex Small (N. Amer. Fl. XXV, 2, 1910, p. 131) a nomen rejiciendum. In this way the renaming of the numerous species mentioned by Niedenzu in his monograph under the name: *Banisteria* sensu Juss. will be avoided. See for the discussion of the generic names: *Heteropteris* Kunth and *Banisteria* L.: Niedenzu in Engl., Pfl. reich IV (1928) p., 386; Fawcett and Rendle, Fl. Jam. IV (1920), p. 232, and the following scheme:



Banisteria calocarpa Miq. in Linnaea 18 (1844), p. 53.

Niedenzu's monograph merely refers to the diagnosis given by Miquel. Miquel did not describe the flowers. He stated that this species is nearly related to *B. lucida* Rich., but that

it differs from the latter in the shape of the leaves, in the inflorescence and in the flowers. Of this species I have only seen the specimen: Focke n. 329, which bears the determination of Miquel. The same specimen was labeled: *B. lucida* by Niedenzu. It is very incomplete, having samaras only, the latter are not different from those of *B. lucida*, and a few leaves, one of the leaves has a slightly cordate base, the others do not differ in the least from those of *B. lucida*.

Banisteria leptocarpa Benth. in Lond. Journ. Bot. VII (1848), p. 13.

B. elegans Tr. et Pl. is a very polymorphous species. By some of its forms it is connected with *B. leptocarpa*. I have removed the var. *ciliata* Ndz. of *B. elegans* to *B. leptocarpa*. But it is better perhaps to unite the two species. In both the underside of the leaf is provided with glands on either side of the midrib and in both calyx glands occur. Niedenzu points rightly to the following differences: *B. leptocarpa* has pseudo-alternate leaves, differing in shape from those of *B. elegans* and with glands along the margin. The tomentum too of this species differs from that of *B. elegans*.

Banisteria cristata Griseb. in Linnaea 22 (1849), p. 16.

The specimen: Wullschlägel n. 183, mentioned by Niedenzu in Pulle, Enumer. Pl. Surin. was collected in Venezuela.

Brachypterys Juss.

This genus is closely related to *Stigmaphyllon*, but differs so widely in its general habit, its inflorescence and its fruit, that there is no sufficient reason for uniting it with *Stigmaphyllon*, as Niedenzu has done.

Byrsonima crassifolia (L.) Rich. ex A. L. de Jussieu in Ann. Mus. Paris XVIII (1811), p. 481.

A. L. de Jussieu in Ann. Mus. Paris XVIII (1811), p. 481 says: „D'autres... (Malpighiacées), telles que les *M. spicata*,

lucida, *crassifolia*, *verbascifolia*, etc., formeroient un second genre que Mr. Richard nomme *Byrsonima*," As the name *Byrsonima* of Richard is accepted, there is no reason why the names of the species, above mentioned, should not be accepted as valid combinations, though Jussieu himself was not convinced, that they belonged to the genus *Byrsonima*. The combinations of Richard should therefore have the priority above those of Kunth.

Small includes *B. cotinifolia* Kunth also in this species. This may be advocated on the ground of the polymorphy of this species, but the shape of the leaves and their tomentum make it preferable to keep them separated. The forms: *Kunthiana* Niedenzu, *ferruginea* (Kunth) Griseb., and more or less *cubensis* (Juss.) Niedenzu are merging into each other. The differences in the pilosity of ovaries, anthers and leaves are of little value, as this character often changes in the process of maturing.

Byrsonima coriacea (Swartz) Kunth in H.B.K., Nov. gen. V (1821), p. 113 (col. ed.).

Kunth states in a note in H.B.K., Nov. Gen. V (1821), p. 113 (col. ed.): „(Byrsonima Rich.) Hujus generis sunt: *M. crassifolia* Aubl., *M. moureila* Aubl., *M. spicata* Cav., *M. altissima* Aubl., *M. verbascifolia* Aubl., *M. lucida* Swartz, *M. coriacea* Swartz, et *M. rufa* Poir". I consider these names, for so far as they had not yet been published by Richard, as valid combinations made by Kunth. Sandwith (Kew Bull. 5, 1935, p. 312) is of a different opinion. The case is rather dubious, but in my opinion no difficulty can arise as to what was the meaning of Kunth.

Byrsonima Aerugo Sagot in Ann. sc. nat. 6e sér. XII (1881), p. 178.

According to Sandwith (Kew Bull. 5, 1935) this species is identical with *B. altissima* Auct. (not of Aubl.). The name *Malpighia altissima* Aubl. Guia. I (1775), p. 455 is of younger

date than *Malpighia altissima* Jacquin, *Observ. Bot.* I (1764), p. 40 and must therefore be rejected. I propose for *Malpighia altissima* Aubl. the name **Byrsonima Aubletii** Kosterm. nom. nov.

Byrsonima densa (Poir.) D.C., *Prodr.* I (1824), p. 580.

I have united this species with *B. amazonica* Griseb. The differences according to Niedenzu are: Leaves glabrous (or puberulous at the margin) and shining beneath; *B. amazonica*: leaves glabrous, dull beneath but in the latter species the var. *lucidula* (Huber) Niedenzu has a shining lower surface. Poirlet (*Enc., Suppl.* IV, 1797, p. 7) states that the leaves of *B. amazonica* are shining on both surfaces, but less so beneath. The shape of the leaves is in both practically the same. I could not confirm Grisebach's statement, that the lower leaf surface is sparsely covered with black dots: in Grisebach's material the leaves may have been infected by fungi. It is possible, that *B. punctulata* Juss. also should be included in the above mentioned species: the description of Jussieu accords very well with this supposition, there is only a slight difference in the shape of the leaves. Unfortunately I could not find this specimen in the Paris herbarium.

Byrsonima densa var. **emarginata** Kosterm. nov. var.

Folia oblanceolata apice emarginata, apice ramuli brevissime congesta. Internodia 1—5 mm longa.

Surinamo, Dalgerberg (Pulle n. 395, fr. m. Sept.; typus in Herb. Utrecht).

Alcoceratothrix Niedenzu.

In *Arb. Inst. Lyc. Braunsb.* I (1901), p. 45 Niedenzu founded a new genus: *Alcoceratobrix* on the 2 species: *Byrsonima rugosa* Benth. and *B. stipulacea* Juss. The name of the genus is derived from the antler shaped hairs (the author introduces here the name Elk-horn shaped hairs, probably under the influence of the Elk reserve in the vicinity of his residence;

I did not use this name, as it may give a false impression of the shape of these hairs: the branches of the latter namely are not flattened like those of the antlers of the Elk; usually they are more or less stellate or antler-shaped). Antler shaped hairs however also occur in *Byrsonima Poeppigiana* Juss., *B. nitidissima* Kth. and *B. laurifolia* Kth., where they can even be 6-branched. Other species of *Byrsonima* moreover show hairs differing from the ordinary compassneedle type, e.g. *B. verbasifolia* (L.) Rich. where they appear to be simple, one of the branches being reduced. Therefore not too much significance should be attributed to this character. On the other hand the large deciduous stipules, the sepals already recurved in bud and the rectangular nervation of the leaves also serve to distinguish *Alcoceratobrix* from *Byrsonima*. In the opinion of Sandwith and myself, however, these characters are not so important as to necessitate the separation of the two genera, especially because the general appearance of the various species is very similar. (see also Gleason and Smith in Bull. Tor. Bot. Cl. 60, p. 361 and Sandwith in Kew Bull. 1935, p. 311). Other differences, mentioned by Niedenzu are still more dubious, e.g. the bullate leaves of *Alcoceratobrix* and its climbing habit. More or less bullate leaves also occur in other species of *Byrsonima* and *Alcoceratobrix stipulacea* Juss. is, according to v. Emden (on label), a tree.

I have combined *Byrsonima rugosa* and *B. stipulacea* Juss. The principal difference, according to Niedenzu and already mentioned by Bentham in Lond. Journ. Bot. VII (1848), p. 118, is the presence of glands in *B. rugosa*. As previously remarked, this character has no specific value. Neither could I confirm the presence of a difference in the shape of the hairs, as indicated by Niedenzu, viz. the presence of trimorphous hairs in *B. stipulacea* and of hairs of one kind only in *B. rugosa*, nor that the tertiary nerves are parallel in *B. rugosa* only. The sole difference I could find lies in the stipules, which

in *B. rugosa* are longer and provided with longer hairs; the poor state of the specimens of *B. stipulacea* makes it however very doubtful, whether this difference is of any value.

LAURACEAE.

Persea Mill.

Mr. A. J. Wilmott from the British Museum of Natural History has been very kind in giving me the necessary information with regard to the publication of this genus in Miller's Gardener's Dictionary. The 8th edition of this work follows the Linnean nomenclature, the other editions do not and consequently they figure on the list of works to be rejected according to the proposal of Mr. Wilmott (Kew Bull. 1935). As Mr. Wilmott pointed out to me the genus *Persea* was properly described and the name is therefore valid in the usual sense. It therefore seems necessary to Mr. Wilmott and me to change the name *Persea* Gaertn. to *Persea* Mill. in the list of nomina conservanda. Otherwise we should have the curious fact that the species name: *Persea americana* Mill. is of older date than the genus name: *Persea* Gaertn.

Persea Benthamiana Meissn. in D.C., Prodr. XV, 1 (1864), p. 44.

The leaves of this species are densely sericeous beneath; the adult leaves of *Persea nivea* Mez are nearly glabrous and pruinose beneath, but the young leaves have the same sericeous tomentum as those of *P. Benthamiana*. In my opinion the two species are identical.

Persea coriacea Kosterm. nov. spec.

Arbor 15 m. Ramuli sulcati sparse pilosi glabrescentes. Rami cylindrici laeves glabri. Petioli tenues glabri supra distincte canaliculati usque ad 2 cm longi. Folia alterna coriacea elliptica vel lanceolata basi breviter acuta apice breviter

acuminata vel acuta veteriora rotundata vel emarginata margine recurva (5—)10—12(—13) cm longa, ($1\frac{1}{2}$ —) $3\frac{1}{2}$ — $4\frac{1}{2}$ (—5) cm lata supra glabra nitida dense tenuiter punctiformi-areolata nervo mediano impresso costis vix prominulis infra glabrescentia brunneo-lutescentia sub lente granulata nervo mediano prominente costis utrinque 7—10 patentibus curvatis subprominentibus venis prominulis dense areolatis. Inflorescentiae in axilli foliorum superiorum floribus paucioribus late pyramidales usque ad 10 cm longae pedunculo graciliore sulcato glabro usque ad 6 cm longo incluso ramulis alternis usque ad $1\frac{1}{2}$ cm longis. Floris tubus subnullus attenuatus in pedicellum sulcatum extus dense breviter cinereo-pilosus intus glaber. Perianthii lobi sub-aequales ovato-orbiculares $1\frac{3}{4}$ mm longi concavi carnosi extus dense cinereo-puberuli exteriores intus eodem indumento vestiti interiores intus cinereo-sericei. Stamina exteriora 2 mm longa filamentis extus dense sericeis antheras sub-aequantibus sub-gracilioribus applanatis antheris ellipticis apice rotundatis margine plerumque constrictis cellulis introrsis, seriei tertiae $1\frac{3}{4}$ —2 mm longa filamentis 1— $1\frac{3}{4}$ mm longis extus cinereo-tomentosis intus glabris tertia parte a basi glandulis parvis sessilibus ellipsoideis compressis praeditis antheris ellipticis glabris cellulis extrorsis. Staminodia 1 mm longa extus fere usque ad apicem dense cinereo-sericeo-tomentosa intus glabra apice sagittata incrassata atra. Seriei quintae staminodium singulum saepe adest. Ovarium glabrum cylindricum $1\frac{1}{4}$ mm longum stylo crasso $\frac{3}{4}$ mm longo. Bacca globosa laevis 1 cm diametro cupula subplana parva margine integra 4 mm diametro 2 mm alta. Pedicellus fructifer crassus obconicus 1 cm longus apice 3 mm latus.

Surinamo, Emma Range, Hendrik top; 1080 m. (B.W. n. 5748, fl. m. Mart.; typus in Herb. Utrecht).

Species *Persea lanceolata* (Meissn.) Mez simillima sed magnitudine et forma loborum perianthii ovario glabro aliisque notis differt.

Ocotea Aubl.

O. rubra Mez, *O. Rodiaei* (Rob. Schomb.) Mez and *O. barcellensis* (Meissn.) Mez differ from the other *Ocotea* species in the shape of the outer stamens. But for the position of the anther cells the latter show a striking resemblance with those of many *Nectandra* species. I agree with Mez, that for the separation of the genera *Ocotea* and *Nectandra*, the position of the cells is of primary importance and the shape of the anthers secondary. The cells in the species mentioned above are inserted in two vertical rows and these species are therefore to be reckoned to the genus *Ocotea*.

Ocotea rubra Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 258.

My description of the flowers based on Surinam material shows important deviations from that given by Mez. There can be no doubt however, that the type specimen (Mélinon s. n. in the Paris Herb.) and the specimens from Surinam are conspecific. The flowers of the type specimen are badly preserved and moreover rather young.

Ocotea Rodiaei (Rob. Schomb.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 236.

Bentley and Trimen (Med. pl. III, 1880, p. 219) give a very good drawing of this species. It has repeatedly been mixed up with other species, but can easily be recognised by the elongated-triangular form of the outer stamens with their basal cells. The specimen Schomburgk n. 1004 in the Kew Herb. is the same as Schomburgk n. 1703 in the Brussels and Dahlem Herb., the former bearing in addition the number 1703. It is curious that most flowers of this species are abnormal in possessing an increased number of stamens.

Ocotea barcellensis (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 237.

This species was erroneously described by Ducke (Arch.

Rio de Janeiro V, 1930, p. 113) as a *Nectandra*. He was led astray by taking the shape of the outer stamens, instead of the position of the anther cells as a generic criterium. The type specimen of *O. barcellensis* (Spruce n. 1925) has immature fruits, still included in the cupule. But the cupule shows already the same double margin as that of the two specimens of *Nectandra elaiophora* Barb. Rodr.: Ducke n. 23963 [D.] and n. 19936 [U.], which I had an opportunity for studying. The flowers of the latter specimen are abnormally enlarged.

Ocotea glomerata (Nees) Benth. et Hook.f., Gen. III (1880), p. 158.

According to the description of *Gymnobalanus Fendleri* Meissn. from Venezuela, which is given by Mez as a synonym, the berries of this species are 2 cm long and the fruiting pedicel is sub-cylindrical and up to 7½ mm long, and 5¾ mm diam. This species can not belong therefore to *O. glomerata*.

Ocotea guianensis Aubl., Pl. Guia. II (1775), p. 781.

Aublet (Guia. II, 1775, p. 781, III t. 310) gives a description and a drawing of a fruit, which do not belong to this species. He mistook the valves of the anther cells for the anthers themselves and described the filaments as bearing four anthers, each of the latter with a cavity underneath. A specimen in the Sprengel Herb. in Berlin, determined as *Laurus surinamensis* Swartz is *Ocotea floribunda* Mez p. p., the rest is not a Lauracea.

Ocotea guianensis Aubl., var. **subsericea** Kosterm. nov. var.

Differt a specie foliis subtus indumento indistinctiore subsericeo vestitis.

Fluv. Surinamo super. prope Goddo (Wilhelmina Exped. n. 105, fl. m. Jan.; spec. femin.; typus in Herb. Utrecht).

Ocotea Wachenheimii R. Benoist in Bull. Mus. Hist. nat. Paris 30 (1924), p. 510.

The rudimentary ovary in the male flower is sometimes

minute, stipitiform and provided with an inconspicuous stigma, but shows all gradations to a quite distinct ovary, provided with a conspicuous style and stigma. The shape of the rudimentary ovary consequently is of no importance as a species character.

Ocotea caudata (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 378.

This species shows a great variation in the shape of the leaves, which are sometimes obovate-cuspidate and sometimes oblong-cuspidate. Both forms of leaf occurred on the same plant. *O. urophylla* (Meissn.) Mez is perhaps also a mere variety of this species.

Ocotea Neesiana (Miq.) Kosterm. nov. comb.

This species was first validly published by Miquel as *Nectandra Neesiana* in Linnaea 18 (1844), p. 745; afterwards Miquel himself altered this name into *Oreodaphne fallax* (Stirp. surin. 1850, p. 202), the name adopted by Mez. *O. florulenta* (Meissn.) Mez, of which I could study the type specimen (Spruce n. 812, *Ocotea* n. 1 in the Dahlem Herb.) does not differ from *O. Neesiana*. Mez however confused his *O. florulenta* with other species. *Oreodaphne dispersa* Nees (Syst., 1836, p. 427; Linnaea 21, 1848, p. 520, quoad cit. spec. Sello n. 1361) is *O. Hilariana* Mez. *Oreodaphne confusa* Meissn. in D.C., Prodr. XV, 1 (1864), p. 126 and in Fl. Bras. V, 2 (1866), p. 221, quoad cit. spec. Sello n. 1381, is *O. Hilariana*. It remains doubtful, whether *Gymnobalanus Sprucei* Meissn. belongs to *O. Neesiana* or to *O. Hilariana*. With the aid of the leaves alone they can not be distinguished and I had no opportunity for studying fruiting specimens of *O. Hilariana*. The latter can easily be recognised by the larger flowers which seem to be hermaphrodite and not dioecious, as they are described by Mez: in the so called male flower a well developed ovary, provided with style and stigma is present.

Ocotea puberula Nees, Syst. (1836), p. 472.

This widely distributed species has been described under several names. *O. Martiniana* (Nees) Mez differs from *O. puberula* according to Mez by the filaments. The latter are said to be united with the perianth segments. Pilger (Engl. Jahrb. 30, 1902, p. 153) could not confirm this statement, nor could I.

Ocotea vernicosa Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 331.

Mez mixed a flowering specimen (Mélinon n. 555 in the Paris Herb.) of *O. globifera* Mez with the fruiting specimens of *O. vernicosa* (Mélinon s. n.). The label of the specimen in the Geneva Herb. bears the words nov. spec. and I therefore consider this specimen as the type of *O. vernicosa*. Neither the cupule, nor the leaves resemble those of an *Ocotea* species. In my opinion it is more probable that this species belongs to the genus *Acrodiclidium*.

Ocotea subglabra R. Benoist in Arch. Bot. T. 3 (Jan. 1929), p. 10 and in Bull. Soc. Bot. France 75 (1928), p. 979, is identical with *Ocotea oblonga* (Meissn.) Mez.

Ocotea Tessmannii O. C. Schmidt in Notizbltt. Berl.-Dahlem X, 93 (1928), p. 233 is identical with *Ocotea cuneifolia* (R. et P.) Mez. I do not agree with Macbride (Field Mus. XI, 1, 1931, p. 18) that the names of the species published in Ruiz et Pavon, Fl. Peruv. IV are invalid. The drawings are very good and they are provided with flower details. Nothing in the rules compels us to consider these species as invalidly published.

Nectandra grandis (Mez) Kosterm. nov. comb., non Nees mscr. ex Klotsch et Karst in syn. in Linnæa 21 (1848), p. 505; — *Endlicheria grandis* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 124; — *Nectandra praeclara* Sandwith in Kew Bull. 1932, p. 224; — *Nectandra dioica* Mez in Fedde, Rep. 16 (1920), p. 308.

The fruiting type of this species in the Paris and Dahlem Herb. from French Guiana is identical with the flowering type of *N. praeclara* Sandwith. Flowers, collected at various times from the same Surinam tree show a good deal of variability; the tube, at first infundibuliform, increases at the end of the flowering period rapidly in bulk and becomes subglobose with a distinct contraction at the top; in the specimen: B.W. n. 5546 the tube is extremely, in my opinion more or less abnormally, enlarged; the perianth segments vary but little in shape and tomentum. The 6 outer stamens vary between ovate or ovate-rectangular and transversally elliptic, the top of the anthers is as a rule truncate or emarginate and incurved, but an obtuse top is not rare. In young flowers the anthers of the third row of stamens are as broad as the filaments, after the flowering period they give the impression of being narrower.

Nectandra dioica Mez is, according to Sandwith, a distinct species, the principal differences with *Nectandra grandis* being the indumentum of the branches, in *N. dioica* tomentose and not appressed as in *N. grandis*. However Surinam specimens of *N. grandis* show a tendency to become tomentose. The tomentum of the adult leaves shows no difference and the specimens of *N. dioica* have no young leaves. The top of the adult leaves of *N. dioica* varies between mucronate and cuspidate, consequently in this respect there is no difference with *N. grandis*. The flowers of both species are identical; it is sure that the glands of *N. dioica* are as a rule somewhat smaller than those of *N. grandis*, but small glands occur also in the latter species. The ovary rudiment is not pilose, as stated by Mez, but in both species glabrous. The only difference lies in the length of the pedicel, which is very short in *N. dioica*, but it has not been proved, that this character is constant.

Nectandra Laurel Klotsch et Karst ex Nees in *Linnaea* 21 (1848), p. 505 and *N. rigida* Nees can easily be distinguished

from *N. reticulata* (R. et P.) Mez by the glabrous inside of the flower tube; in *N. reticulata* the tube is densely sericeous-hirsute inside, a character not mentioned by Mez in his monograph. As the three species are otherwise very much alike, it is comprehensible, that Mez mistook several specimens of *N. reticulata* for specimens of the other two species and vice versa. *N. Laurel* and *N. rigida* are closely allied and it is often difficult to decide to which of these two species a specimen belongs. In both species the shape of the leaf is very variable and the young leaves are moreover different from the adult ones. The following differences could be found: in *N. Laurel* the leaves are as a rule alternate, but now and then, especially at the top of the branches they may become opposite or sub-opposite; in *N. rigida* the leaves are usually opposite, but this holds true only for the upper ones, the lower ones being often sub-opposite. *N. Laurel* has elliptical or ovate leaves with obtuse base; the latter showing the typical „auricle”, i.e. the margins are reflexed; *N. rigida* has lanceolate leaves with acute base, but the older leaves of *N. rigida* are rigidly coriaceous, those of *N. Laurel* coriaceous with distinctly impressed nerves on the upper surface. In the flowers no difference could be found; in both species the size of the flowers and the length of the pedicels vary strongly. The presence of a difference in the length of the style, as mentioned by Mez, I could not confirm.

Nectandra Kunthiana (Nees) Kosterm. nov. comb.

Mez saw a male specimen only of this species. The female ones from Surinam show that this species does not belong to *Ocotea* but to *Nectandra* and that it is closely related to *Nectandra grandis* (Mez) Kosterm.

Nectandra Pisi Miq., Stirp. Surin. (1850), p. 199.

This species was identified by Mez in his monograph as *N. globosa*. Aublet, Guia. I (1775), p. 364, gave no description

of his *Laurus globosa*, but referred to Plumier, Gen. 4. According to Urban (Fedde, Repert., Beih. V, 1920, p. 49), Plumier's plant, figured in Descr. pl. Amer. ed. Burm. (1775), p. 50, t. 60, is identical with *Nectandra antillana* Meissn., a species closely related to *N. Pisi*, but known from the West Indian islands only, not from Surinam. The name: *Nectandra globosa* (Aubl.) Mez must be reserved therefore for *N. antillana* Meissn. *Laurus globosa* Lamarck, Dict. III, p. 451, based on a specimen collected by Martin in S. Domingo, may be identical with this species. *Ocotea lineata* H.B.K., Nov. Gen. II (1817), p. 131 is treated by Mez as identical with *N. Pisi*. I could not study the type specimen; the description however does not correspond with that of *N. Pisi*.

The conclusion is that the Surinam species should bear the name: *N. Pisi* Miq. But there remains another unsolved difficulty: *N. sanguinea* Rol. ex Rottb. in Act. Hafn. (1778), p. 279, is based on a specimen of Rolander, collected in Surinam. The type specimen could not be found in the Copenhagen Herb., and Mez apparently did not see it. The locality makes it possible that Rolander's plant may be identical, either with *N. Pisi* Miq. or with *N. guianensis* Meissn. If the first supposition should prove to be true the name *N. sanguinea* Rol. should supplant the name *N. Pisi*. The species, interpreted by Mez as *N. sanguinea*, has not been found in Guiana.

In Stirp. Surin. (1850) Miquel gave a description of *N. leucantha* Nees based, as he remarks, on the description given by Nees, but he recognised already that there were differences between the various specimens described under this name by Nees himself. However he did not draw the conclusion that it was desirable to split the species up, though he mentioned *N. Rodiaei* Schomb. as a possible constituent, but not as a distinct species. According to Miquel the specimens Hostmann n. 235 and Kegel n. 193 (both *N. Pisi* Miq.) connect *N. Rodiaei* with *N. leucantha*. Miquel gave a good drawing of

the specimen Hostmann n. 235 and he stated also that there exists a difference between this specimen and the specimen Schomburgk n. 29 (*N. ambigua* Meissn.); of the latter he gave a short differential diagnosis.

The specimen: Kappler n. 1827 in the Leiden Herb. has much longer, lanceolate leaves with acute base, of the same shape therefore as those of *N. ambigua*. The leaves however are alternate and not opposite as in *N. ambigua*. The type specimen of *N. Pisi*: Focke n. 1305 bears abnormal, gall-like berries; the cupule is badly developed, flattish, irregular instead of hemispheric.

Nectandra ambigua Meissn. in D.C., Prodr. XV, 1 (1864), p. 158.

The specimens: Schomburgk n. 29 in the Leiden en Dahlem Herb. agree with the description given by Mez. Schomburgk n. 29 in the Brussels Herb. is different and belongs to *N. Pisi*.

Nectandra cuspidata Nees, Syst. (1836), p. 330.

The type specimen of *N. Pichurim* (H.B.K.) Mez in the Kunth Herb. in Dahlem is identical with *N. amazonum* Nees. The leaves possess a sericeous tomentum beneath, while those of *N. cuspidata* are puberulous. The many primary nerves and the hemispheric cupule exclude the possibility that *Ocotea Pichurim* H.B.K. should be identical with *N. cuspidata* Nees. *N. amazonum* Nees is only a synonym of *Ocotea Pichurim* = *Nectandra Pichurim* (H.B.K.) Mez (excl. descript.). The young leaves of *N. Pichurim* and the adult ones are very different. A beautiful specimen: Krukoff n. 2077 and also the type specimen of *N. amazonum* of Martius show the young, narrowly lanceolate cuspidate leaves, densely sericeous beneath and puberulous above, whereas the adult leaves are ovate or ovate-lanceolate, shining, and glabrous on both sides. *N. urophylla* Meissn. does not show the slightest difference from this species and must therefore be considered as a synonym. The type

specimen has the young lanceolate leaves only, but it shows the same kind of panicle as *N. Picburim*.

The leaves and cupules of *N. pallida* Nees of which I could study two fruiting specimens are in my opinion identical with those of *N. urophylla*, except that in *N. pallida* the older, coriaceous leaves remain sericeous beneath and have the same shape as the young leaves of *N. Picburim* usually have. The type specimen of *N. Picburim* however has the same kind of leaves. It is questionable whether *N. ambigua* Meissn. should be considered as a distinct species or merely as a variety of *N. Picburim*. The base of the adult leaves is different, usually acute, but there occur also leaves with rounded bases resembling those of *N. Picburim*. The cupule and flowers of both species are, the tomentum excepted, nearly the same. The leaves of *N. ambigua* are usually opposite, those of *N. Picburim* alternate but the latter has sometimes sub-opposite leaves.

Nectandra guianensis Meissn. in D.C., Prodr. XV, 1 (1864), p. 160.

Mez cites as a synonym: *N. Neesiana* Miq. in Linnaea 18, p. 745, teste Nees. This species is based on Hostm. et Kappl. n. 1433, which is *Ocotea Neesiana* (Miq.) Kosterm.

The description of *Nectandra sanguinea* Rol. ex Rottb. shows many controversies, as already pointed out by Nees. The shape of the leaf: oblong and the description of the nerves make it possible that this species is identical with *N. guianensis*. See also under *N. Pisi* Miq.

Nectandra kaburiensis Kosterm. nov. spec.; — *Nectandra surinamensis* Mez in Urban, Symb. II (1900), p. 252, nec alibi; — *Aniba sulcata* R. Benoist, nomen, in Bull. Soc. Bot. France 75 (1928), p. 976.

Arbor usque ad 30 m alta. Ramuli crassissimi angulati sulcati dense fulvo tomentosi vel sericei. Rami cylindrici leaves grisei. Gemmae dense sericeae. Folia alterna rigide coriacea

late elliptica vel oblonga raro oblongo-lanceolata (9—)13—19 (—21) cm longa, (4—)5—6(—8) cm lata basi acuta vel cuneata margine vix recurva apice acuminata acumine usque ad 1 cm longo acuto, juniora interdum lanceolata puberula, adulta supra glabra nitida nervo mediano costis nervisque secundariis impressis infra sparse hirsuta vel puberula nervo mediano valde prominente costis utrinque 10—15 prominentibus rectis adscendentibus margine arcuato-connectis inferioribus exceptis nervis secundariis parallelibus subhorizontalibus 4—5 mm distantibus subprominentibus venis fere inconspicuis, petiolis crassis latis glabrescentibus supra planis 10—15 mm longis. Paniculae multiflorae axillares in ramulis pyramidales dense fulvo-tomentellae usque ad 18 cm longae pedunculis crassis compressis usque ad 7 cm longis ramulis strictodivaricatis crassis compressis usque ad $7\frac{1}{2}$ cm longis cymis pluribus floribus pseudo-umbellatis. Bractee lanceolatae acutae 1— $1\frac{1}{2}$ mm longae extus tomentellae intus glabrae deciduae. Pedicelli graciles tomentelli $2\frac{1}{2}$ mm longi. Flores fragrantis albi vel flavescentes rotati 5—6 mm diametro tubo $\frac{1}{2}$ mm longo apice paullo constricto extus tomentello vel subglabro intus glabro. Perianthii segmentis ovatis vel oblongis $1\frac{1}{2}$ — $2\frac{1}{2}$ mm longis extus glabrescentibus intus dense lanuginoso-papillosis. Stamina seriei exterioris 1 mm longa filamentis brevibus latis tomentellis antheris transverse ellipticis vel suborbicularibus truncatis incurvis interdum submarginatis $\frac{1}{2}$ mm longis extus dense papillosis loculis serie paullo curvata dispositis magnis introrsis exterioribus saepe sublateralibus, stamina seriei tertiae paullo longiora antheris cuneatis apice truncatis gradatim in filamenta lata brevia transeuntibus intus canaliculatis loculis inferioribus extrorsis superioribus lateralibus glandulis basalibus maximis depressis globoso-polygonis magis minus filamenta amplectentibus. Staminodia seriei quartae $\frac{1}{2}$ mm longa subclavata pilosa vel glabra. Ovarium glabrum globosum 1 mm diametro stylo brevi vel vix $\frac{1}{2}$ mm longo stigmate discoideo parvo. Bacca globosa

12 mm diametro sublibera. Cupula plana parva 6 mm diametro pedicello crasso obconico 12 mm longo apice 5 mm diametro insidens.

Surinamo, Kaboeri, arbor n. 649 (B.W. n. 4888, ster. m. Oct.; n. 5901, fl. m. July, typus in Herb. Utrecht).

Mez reckoned (Urb. Symb. l. c.) material of this species from Trinidad to *N. surinamensis*, but it can easily be distinguished from the latter species by the broadly elliptic, rigidly coriaceous leaves with their thick, broad petioles.

Aniba sulcata R. Benoist was published as a nomen nudum; there can be no doubt that the type specimen in the Paris Herb. is identical with *N. kaburiensis*.

N. kaburiensis is closely related to *N. myriantha* Mez, from which it differs in the distinctly impressed nerves and the secondary nerves which are prominulous on the lower side. A specimen from Peru (Weberbauer n. 5027) determined by Mez as *N. cissiflora* Nees, is in my opinion *N. myriantha*; the inflorescences however are tomentose.

N. Kuntzeana Mez in O. Ktze. Rev. II, 2 (1898), p. 277 is identical with *N. myriantha*. Not the least difference could be discovered in leaves and flowers.

Aniba Koumaroucapa Kosterm. nov. spec.; — *Aniba salicifolia* (Nees) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 71, p. p., quoad cit. spec. Mélinonis in Herb. Paris; — *Laurus koumaroucapa* L. C. Richard, mscr. in Herb. Paris.

Arbor. Ramulis rectis gracilibus cylindricis subnitidis glabris rubro-brunneis vel cinereis plerumque lenticellis pluribus magnis internodiis usque ad 10 cm longis ramis cinereis gemmis subglabris. Folia sub-verticillata obovato-lanceolata, (6—)10—14 (—20) cm longa, (2—)3½—5 cm lata, basi subcordata vel rotundata apice breviter acuminata vel acuta saepe obtusa margine vix recurvulo supra glabra satis opaca nervo mediano et costis prominulis vel planis venis inconspicuis areolatis

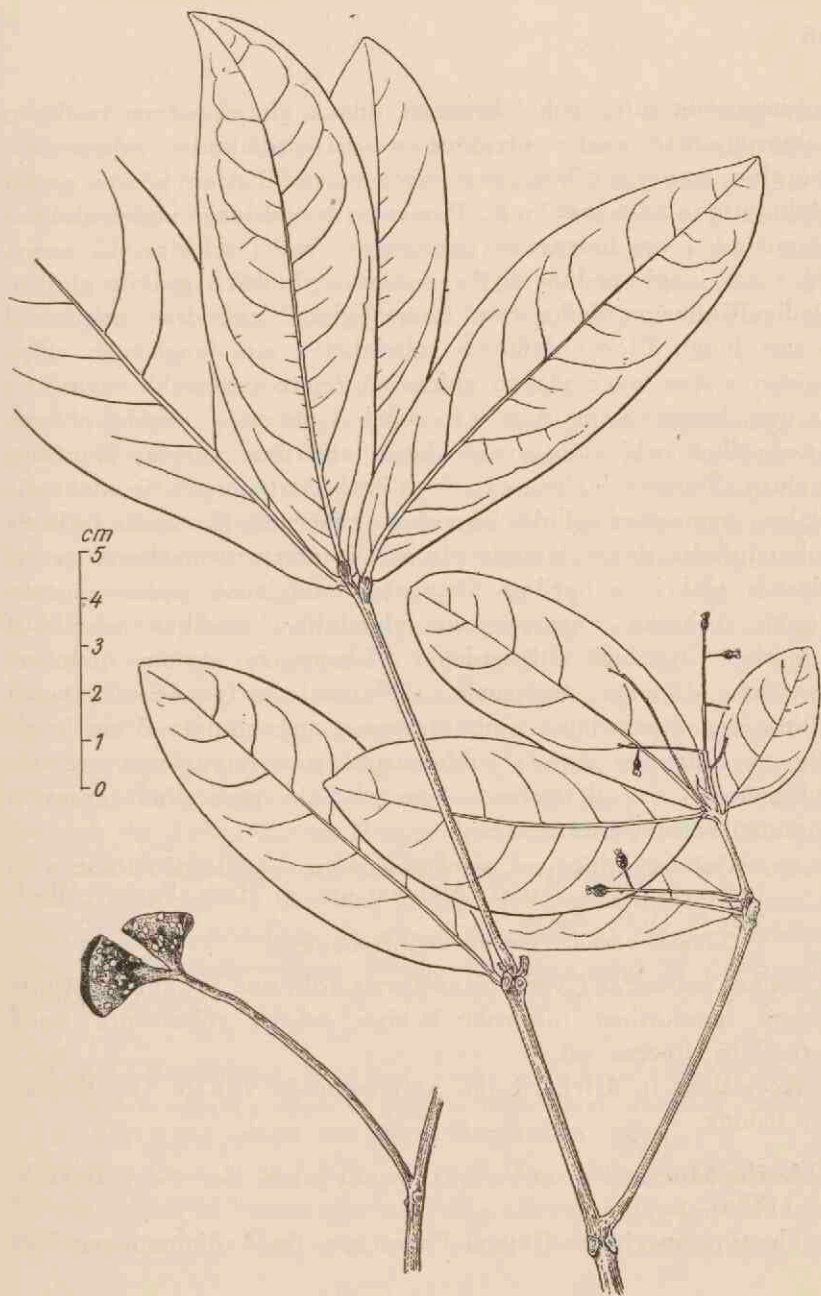


FIG. 1. *Aniba Koumaroucapa* Kosterm.

subimpressis infra rubro-brunnea opaca glabra nervo mediano subprominente costis utrinque 7—10 prominulis subcurvatis margine evanescentibus venis inconspicuis. Petioli breves crassi glabri usque ad 6 mm longi. Paniculae pseudo-terminales glabrae usque ad 4 cm longae vix ramosae ramulis inferioribus usque ad 1 cm longis pedunculo brevissimo cylindrico gracile glabro. Pedicelli florum defloratum tenues glabri cylindrici usque ad 4 mm longi. Flores deflorati subglabri 1 mm longi tubo ellipsoideo 2 mm longo glabro apice constricto perianthii segmentis 1 mm longis aequalibus exterioribus anguste ovatis obtusis interioribus orbiculato-ovatis duplo latioribus margine fimbriato incluso. Stamina inclusa exteriora antheris triangularibus obtusis glabris connectivo cellulas brevissime superante filamentis antheris subaequilatis dense lanuginosis seriei interioris antheris ovatis obtusis glabris minoribus filamentis lanuginosis apice excepto quam antherae angustioribus glandulis basalibus sessilibus minutis. Ovarium ellipsoideum glabrum in stylum inclusum conicum stigmate majusculo sublaterale attenuatum. Bacca ellipsoidea laevis lutea apice depressa mucronulata 3 cm longa 1½ cm diametro cupula subhemisphaerica ferrugineoverrucosa subtenuae ½ cm diametro 1 cm alta in pedicellum crassum conicum sensim transeunte.

Guiana gallica ad amnem Kourou, leg. L. C. Rich. s. n. (typus in Herb. Paris); Mélinon s. n. in Herb. Paris; collect. ign. in Herb. Paris.

Nomen vernac. caribaeum: Ayououy.

Aniba bracteatae (Nees) Mez forma foliorum proxima petiolis autem tenuioribus foliorum lamina subtus rubescente haud reticulata diversa est.

According to Richard the natives make use of the berries for fishing.

Aniba Muca (Ruiz et Pavon) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 57.

The type specimen: Ruiz et Pavon s. n. (in Andinum nemoribus

ad Pozuzo, Cuchero) in the Dahlem Herb. is a fruiting one. The shape of the leaves induced Mez to place it in the same group as *A. firmula* (Nees et Mart.) Mez. Weberbauer collected a flowering specimen (n. 1919, La Mezzed in Chamayo vale, Dep. Junin) of which the leaves agree very well with those of Ruiz' specimen. The flowers however are quite different from the *A. firmula* type. Here follows the description:

Narrow, small panicles, densely rusty-tomentellous, few-flowered, up to 4 cm long, clustered at the top of the branchlets; peduncle compressed, up to $2\frac{1}{2}$ cm long, branchlets up to 1 cm long. Flower tube nearly cylindrical, 1 mm long, constricted at the top, tomentulous inside. Perianth segments ovate-triangular, slightly acute or obtuse, concave, tomentulous, inner row broader, orbicular-ovate, obtuse, $\frac{1}{2}$ mm long. Outer 6 stamens $\frac{1}{2}$ mm long, filaments hirsute, broader than the anthers; anthers transversally oblong, $3 \times$ broader than long. Inner stamens $\frac{3}{4}$ mm long, filaments narrower than those of the outer ones, slightly narrower than the anthers, canaliculate, glabrous inside, twice as long as the glabrous, small, depressed-oblong anthers, densely pilose outside; connectives not protruding beyond the cells; glands large, touching each other. Ovary ellipsoid, nearly glabrous, 1 mm long, merging into the slender, conical, glabrous, 1 mm long style, stigma minute. This species differs from *A. firmula* in its minute flowers with their cylindrical tube, in the indumentum of the filaments and in its nearly glabrous ovary.

Aniba Burchellii Kosterm. nov. spec.; — *Aniba firmula* (Nees et Mart.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 58, p. p., quoad cit. spec. Burchell n. 9620.

Arbor. Ramuli angulati, striati, dense ferrugineo-puberuli; ramuli cylindrici laeves cinerei. Folia alterna chartacea oblonga vel elliptica, 13—17(—20) cm longa, 4— $5\frac{1}{2}$ (— $6\frac{1}{2}$) cm lata

basi breviter acuta apice acuminata margine recurvulo supra viridia nitida laevia nervo mediano costis et venis reticulatis plerumque planis, subtus glabra nervo mediano puberulo flavida sub lente papillosa nervo mediano prominente costis prominentibus utrinque 10—14 arcuatis patentioribus margine haud connectis venis prominulis dense reticulatis. Petioli crassi striati 1—1½ cm longi ferrugineo-puberuli. Paniculae axillares et pseudo-terminales pyramidales laxae dense ferrugineo-puberulae usque ad 14 cm longae, pedunculo compresso striato breve, ramulis paucioribus patentibus usque ad 5 cm longis. Flores 2½ mm longi puberuli pedicellis crassis 1 mm longis tubo subcylindrico breve 1 mm longo apice paullo constricto perianthii segmentis aequalibus concavis obovatis apice subtriangularibus margine pilosis extus puberulis 1 mm longis interioribus angustioribus ovato-oblongis subacutis puberulis. Stamina exteriora sex 1 mm longa filamentis gracilioribus ¾ mm longis incurvatis dense hirsuto-lanuginosis antheris parvis subglabris cellulis parvis introrso-apicalibus connectivis cellulas distincte superantibus. Stamina interiora paullo breviora antheris minoribus filamentis latioribus dense lanuginosis cellulis extrorsis connectivis cellulas haud superantibus glandulis basalibus magnis filamentis sub-aequantibus globosis sessilibus. Ovarium ellipsoideum puberulum glabrescens 1 mm longum in stylum gracilem 1 mm longum vix puberulum stigmate minimo transeuns.

Brasilia, Para (Burchell n. 9620, typus in herb. Leiden); in planitie alta inter flum. Livramento et flum. Ipixuna (Krukoff n. 7050, fl. m. Nov.).

Anibae firmulae (Nees) Mez affinis sed staminum 6 exteriorum forma differt.

Aniba firmula (Nees et Mart.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 58.

The differences between *A. Panurensis* Mez, *A. firmula* and *A. laevigata* Mez given by Mez in his Monograph are the following:

<i>A. Panurensis</i>	<i>A. firmula</i>	<i>A. laevigata</i>
Petioles up to 15 mm long;	Up to 8 mm long;	Up to 10 mm long;
leaves subcoriaceous; elliptical- or broadly sublanceolate-oblong; top acuminate;	chartaceous-coriaceous; elliptical- or obovate-lanceolate; top shortly acuminate;	chartaceous; elliptical- or oblong-lanceolate; top very shortly and obtusely acuminate;
16—18 cm long; 4—5½ cm wide;	13—17 cm long; 3½—5 cm wide;	10—18 cm long; 2,8—4½ cm wide;
beneath distinctly prominent-reticulate;	minutely, obscurely reticulate;	nearly smooth;
pedicels 3—8 mm long	2—4 mm long	1—2 mm long
Flowers 2—3 mm long;	2½ mm long;	1½ mm long;
glands very large.	small.	very large.
Ovary densely strigose;	sparingly strigose-pilose;	densely strigose;
style rather thick	slender	conical

These characters are hardly sufficient to distinguish the 3 species. Of *A. Panurensis* I could study: Spruce n. 2603 (type), Glaziou n. 7809; of *A. firmula*: Sellow n. 369 (type), Glaziou n. 17193, Moura n. 1001; of *A. laevigata*: Glaziou n. 8104, Pohl s. n., Schwacke n. 6608, III 434. The length of the petioles of *A. firmula* (Sellow n. 369) is up to 12 mm, of *A. laevigata* (Glaziou n. 8104) up to 15 mm. Not the least difference could be found in the thickness of the leaves. The shape and the length of the leaves is so variable that this character has no value at all. The specimen Sellow 369 shows in contradiction with Mez' statement the reticulation of the lower leaf surface better than the type specimen of *A. Panurensis*. The length of the pedicel depends on the stage of development of the flower: in the same specimen lengths varying between 1 and 7 mm may be found. The same holds true for the length of the flower. Flowers with small and with large glands occur in Surinam specimens on the same tree. The ovaries are densely tomentellous in youth, but in the end they become glabrous. *A. Gardneri* Mez is also a synonym only of this species, though the distinct reticulation of the lower leaf surface seems a rather characteristic feature, but it also occurs in *A. firmula*

(Glaziou n. 1793). I have studied the specimens Glaziou n. 12118, Schwacke n. 6654, Gardner n. 5156 (type), Mexia n. 5163, Jelski n. 203, 192; Raimond n. 3764, 4055. According to Mez the difference lies in the length of the leaves, the latter being shorter and more distinctly elliptic than those of *A. firmula*; however the specimen Jelski n. 203 shows among short leaves also some reaching up to 18 cm long and 6 cm wide. Another difference should lie in the broader filaments, but I could not confirm this, as among very broad filaments there are also narrow ones, even in the same flower. *A. fragrans* Ducke (specimens studied: Ducke n. 18349 and 19978) differs from *A. firmula* in the denser tomentum of branchlets, lower leaf surface and flowers. A specimen of *A. laevigata* (Pohl s. n.) has the same tomentum, whereas the specimen Glaziou n. 12118 (*A. Gardneri*) is intermediate between the more glabrous and the tomentose type. The type specimen of *A. firmula* (Sellow n. 369) too has a denser tomentum. The shape of the leaves and of the flowers is the same as in *A. firmula*.

Aniba Canelilla (H.B.K.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 53.

The stamens of the third row are fertile and not sterile as stated by Mez. The shape of the flower changes very markedly when the fruit begins to develop: the tube becomes constricted at the top, the ovary, at first ellipsoid, pilose and gradually merging into the style becomes globose-ellipsoid, glabrous and distinct from the style. *A. elliptica* A. C. Smith differs only in the shape of the leaves, the latter are more distinctly elliptical.

Aniba mas Kosterm. nov. spec.

Arbor. Ramuli paulo angulati ferrugineo-tomentelli. Rami cylindrici brunnei glabri. Gemmae ferrugineo-tomentosae. Folia alterna tenuiter chartacea obovato-elliptica vel elliptica, (11—)14—18(—22) cm longa, (4—)5—6(—8½) cm lata, basi cuneata vel acuta apice acuminata acumine lato obtuso usque

ad $1\frac{1}{2}$ cm longo supra glabra subnitida nervo mediano subprominulo vel plano costis vix prominulis venis oblitteratis, subtus flavido-viridia glabrescentia nervo mediano valde prominente tenuiter tomentello costis utrinque 10—13 prominentibus patentibus quodam spatio a margine curvatis connectis venis reticulatis prominulis vel indistinctis. Petioli supra valde canaliculati dense ferrugineo-tomentelli glabrescentes, $1-1\frac{1}{2}$ cm longi. Paniculae permultiflorae, ferrugineo- vel cinereo-tomentellae apice ramulorum congestae pyramidales usque ad 9 cm longae pedunculo subcompresso sulcato gracile usque ad 3 cm longo ramulis patentioribus compressis usque ad 3 cm longis bracteis ovatis carinatis usque ad 3 mm longis, deciduis. Pedicelli $1-3$ mm longi sulcati dense cinereo-tomentelli. Flores cinereo- vel ferrugineo-tomentelli, $1\frac{1}{2}-2$ mm longi; perianthii segmentis ovatis vel ovato-orbicularibus, 1 mm longis margine paullo ciliatis apice obtusis. Stamina inclusa, 6 exteriora antheris glabris ovatis vel depresso-ovatis filamentis villosis quorum tria seriei primae filamentis dilatatis tria seriei secundae filamentis antheris aequilatis praedita sunt. Stamina seriei tertiae antheris aequilatis basi tantum hirsutis. Ovarium ellipsoideum praeter basin tomentellum in stylum conicum praeter apicem tomentellum stigmatem minimo transeuns. Fructus ignotus.

Surinamo, Brownsberg, arbor n. 1024 (B.W. n. 6337, fl. m. Nov., typus in herb. Utrecht).

Anibae firmulae (Nees) Mez valde affinis sed foliorum magnitudine crassitudine et forma filamentis angustioribus diversa.

Aniba Gonggrijpii Kosterm. nov. spec.

Arbor. Ramuli angulati crassi dense ferrugineo-tomentosi. Rami cylindrici laeves cinerei. Folia alterna chartaceo-coriacea elliptica vel magis minus obovato-elliptica, (7—12(—15) cm longa, 3—5(—7) cm lata basi breviter acuta apice breviter acuminata margine recurvulo supra glabra laevia venis vix conspicuis subtus flavida sub lente papillosa glabra praeter

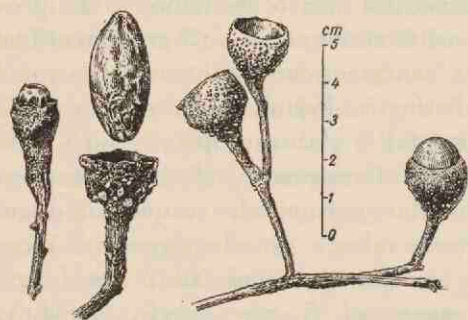


FIG. 2. Left: Young and mature fruit of *Aniba rosaeodora* Ducke; right: young fruit and cupules of *Aniba Gonggrijpii* Kosterm.

irregularibus verrucosis, hemispherica, 15 mm alta, 17 mm diametro margine integro sub-tenuo in pedicellum fructiferum crassissimum obconicum verrucosum sensim transeans.

Surinamo, fluv. Suriname sup., Parwa-Kreek, prope Wane-Kreek (B.W. n. 369, fr. m. Oct.; typus in herb. Utrecht).

Aniba rosaeodora Ducke affinis sed foliis et cupulis tenuioribus diversa.

Aniba opaca A. C. Smith (type: Krukoff n. 1730) is identical with *A. affinis* (Meissn.) Mez (type: Spruce n. 3769). Both specimens show a remarkable resemblance to *A. Trinitatis* Mez (type: Crueger n. 69). In the shape and nervature of the leaves no difference could be found. The same may be said of the flowers, except that the ovary is densely tomentellous in *A. opaca*, tomentellous in *A. affinis* and nearly glabrous in *A. Trinitatis*. This may be due however to the circumstance that the latter are older. *A. Trinitatis* has very slender panicles, but its peduncles and branchlets have the same tomentum and

nervum medianum prominentem, costis utrinque 6—10 prominentibus patentioribus superioribus arcuato-connectis quodam spatio a margine distantibus venis vix prominulis dense reticulatis. Petioli dense ferrugineo-puberuli supra distincte canaliculati, 1—1½ cm longi. Flores ignoti. Paniculae fructiferae axillares usque ad 10 cm longae. Bacca ellipsoideo-ovoidea flava laevis mucronulata usque ad 2 cm longa 1½ cm diametro. Cupula crassa ferrugineo-verrucosa maculis albidis

the same compressed form as those of *A. opaca* and *A. affinis*. As the type specimen of *A. Trinitatis* gives the impression of being very poorly developed, I doubt whether these differences are of any value. The three species may easily be recognised from other *Aniba* species by the very thick and large, truncate anthers of the stamens of the third row, with minute cells and by the strongly protruding connectives in the large anthers of the outer six stamens with their distinct, narrow filaments. The label of the type specimen of *A. affinis* (Spruce n. 3769) in the Brussels Herb. bears the name: *Goeppertia Sprucei* Meissn.; this is an error: the description of *Goeppertia Sprucei* refers to Spruce n. 2769. It is strange however that Meissner in Fl. Bras. V, 2, p. 182 cites the number of Spruce n. 3769 as p. p.; probably a mistake has been made in the numbering of Spruce's specimens.

Aiouea densiflora Nees in Linnaea 21 (1848), p. 268 and 513.

The cells of the outer anthers are introrse and not extrorse as Mez erroneously states. This can best be seen before the cells open: after dehiscence the thick cells give the impression of being more or less lateral. But for the climbing habit, *A. scandens* Ducke looks almost exactly like *A. densiflora*. The petioles of *A. scandens* are somewhat longer, the staminodes of the fourth row are longer, but not broader than those of *A. densiflora*: the anthers and the staminodes of the third row are of identical form.

Aiouea guianensis Aubl., Pl. Guia. I (1775), p. 311.

The cells of the outer anthers are extrorse and not introrse as Mez erroneously states. This applies also to the type specimen of Aublet in the Paris Herb.; the description of Aublet is right therefore. But for the size of all its parts *A. rubra* A. C. Smith (Phytologia I, 3, 1935, p. 115) does not differ from *A. guianensis*. The filaments are not glabrous, but sparingly puberulous. As it is very difficult to distinguish the closely allied *Aiouea*

Schomburgkii Meissn., *A. brasiliensis* Meissn., *A. guianensis* Aubl., and *A. densiflora* Nees, I will give here a key.

- | | | | |
|----|----|--|---|
| 1. | a. | Anther cells introrse | 2 |
| | b. | Anther cells extrorse | 3 |
| 2. | a. | Staminodes of the 4th row triangular, sessile, not divided at the top. Filaments long. Staminodes of the 3rd row long, but not so long as the style, truncate at the top A. brasiliensis Meissn. | |
| | b. | Staminodes of the 4th row ovate, sub-stipitate; top incised. Filaments of the fertile stamens very short. Staminodes of the 3rd row long and as long as the style; top clavate... A. densiflora Nees. | |
| 3. | a. | Filaments of the fertile stamens short (in youth). Staminodes of the 3rd row 2 × as long as the glands, somewhat clavate at the top | |
| | | A. Schomburgkii Meissn. | |
| | b. | Filaments of the fertile stamens long. Staminodes of the 3rd row very short, hardly longer than the glands | |
| | | A. guianensis Nees. | |

Acrodiclidium Canella (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 90.

Mez stated erroneously in his monograph that the fertile anthers had extrorse cells; in the abundant material I could study the cells however were introrse. The cupules of the fruiting specimen from Surinam (B.W. n. 4961) agree with those of the fruiting specimen of *Aniba megacarpa* Hemsl. (Bot. Gard. Herb. Trinid. n. 6786). The cupules of the Surinam specimen are somewhat smaller, probably owing to their youth. A fruiting specimen from Brit. Guiana (Forest Dep. n. 2299) has as large cupules as Hemsley's specimen. Leaves and flowers of *A. megacarpa* are identical with those of *A. Canella*, the small size of the outer staminodes made it difficult for Hemsley to decide whether they were sterile or not.

Acrodiclidium Aubletii Kosterm. nov. spec.; — *Licaria guianensis* Aubl. Guia. I (1775), p. 313, III, t. 121;

Lamarck, Enc. 3 (1789), p. 470; Nees, Syst. (1836), p. 344 et 658; Meissn. in D.C., Prodr. XV, 1 (1864), p. 259; id. in Fl. Bras. V, 2 (1866), p. 281 in adn.; Baillon, Hist. II (1870), p. 466; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 220 et 378; Hallier in Meded. Herb. Leiden 35 (1918), p. 20; Gonggrijp in de Indische Mercur 23 Apr. 1920; Benoist in Bull. Soc. Bot. France 75 (1928), p. 979; Ducke in Arch. Jard. Rio de Janeiro V (1930), p. 108.

Arbor. Ramuli graciles, subcylindrici, dense ferrugineo-tomentelli. Rami glabri cinerei. Petioli graciles ferrugineo-tomentelli glabrescentes supra canaliculati 1 cm longi. Folia alterna chartacea elliptica vel lanceolata breviter acuta apice caudato-acuminata acumine usque ad $1\frac{1}{2}$ cm longo basi 5 mm lato margine recurvula, (5—)7—9(—13) cm longa, (2—) $2\frac{1}{2}$ —3(—4) cm lata, juvenilia supra dense areolata infra sericea adulta supra glabra nitida medio canaliculata nervo mediano prominulo costis impressis nervis secundariis subimpressis infra brunescencia sericeo-tomentella glabrescentia nervo mediano prominente costis utrinque 3—4 prominentibus arcuatis adscendentibus distincte connectis quodam spatio a margine separatis nervis secundariis prominulis laxe reticulatis venis inconspicuis. Paniculae pyramidales in axillis foliorum vel bractearum usque ad 8 cm longae dense ferrugineo- vel rubro-tomentellae pedunculis gracilibus cylindricis usque ad 3 cm longis ramis sparsis patentibus usque ad $1\frac{1}{2}$ cm longis. Pedicelli graciles tomentelli 3 mm longi. Flores 2 mm longi tubo conico apice constricto tomentello $1—1\frac{1}{2}$ mm longo perianthii segmentis extus tomentellis intus glabris crassis concavis depresso-obovatis apice acutis. Staminibus serierum 2 exteriorum sterilibus glabris perianthio brevioribus foliaceis ovatis acutis seriei secundae basi paulo constrictis perianthio brevioribus seriei tertiae fertilibus vix $\frac{1}{2}$ mm longis antheris obtusis cellulis terminalibus filamentis pilosis antheras sub-aequantibus et iis subaequantibus glandulis basalibus parvis foliaceis seriei quartae nullis. Ovarium pilosum

ellipsoideum vix $\frac{1}{2}$ mm longum in stylum angustum dimidio breviorum attenuatum stigmatum indistincto. Bacca ellipsoidea laevis 15 mm longa 9 mm diametro apice depressa tertia partem a cupula hemisphaerica subcylindrica tenue sparse ferrugineo-verrucosa margine integra tecta. Pedicellus fructifer obconicus apice 2 mm crassus.

Surinamo: Zandery I, arbor n. 156 (B.W. n. 4365, fl. m. July, typus in Herb. Utrecht; n. 1524, ster. m. Dec.); Zandery I (B.W. n. 6424, fr.; Samuels n. 536, fl. m. July [L.]); Watramiri, arbor n. 1653 (B.W. n. 1923 fl. m. Juny; n. 4706, fl. m. July).

Guiana gallica: Aubl. s. n. (in Herb. Juss. Paris).

A *Acrodictidio guianense* Nees cui valde affinis foliorum forma et nervatura floribus minoribus differt.

The identity of *Licaria guianensis* Aubl. was difficult to establish. Nees (1836) reckoned it to *Dicypellium caryophyllatum* Nees, but mentioned it also under his species incertae sedis (Syst., p. 658). In the latter publication he suggested that it might belong to *Mespidodaphne*. Meissner (1848) does not accept *L. guianensis* as a synonym of *Dicypellium caryophyllatum* and puts it under the dubious species. Gonggrijp (De Indische Mercur l. c.), who studied the rose wood species from a technical point of view, comes as a result of an anatomical investigation to the conclusion that the real rose wood belongs to the genus *Aniba* and that *Licaria*, which according to Aublet is also called rose wood, is not the real one. It is strange that he says that the leaves of *Licaria* are glabrous beneath; he must have based this opinion on a description because I do not believe that he saw the type specimen of Aublet. Mez in his monograph concludes, after studying the Aublet specimen in Paris, that *Licaria* is identical with *Ocotea caudata*. Hallier in Meded. Rijks Herb. Leiden 31, 1918, p. 20 reviews all the different opinions with regard to the identity of *Licaria guianensis*. R. Benoist (Bull. Soc. Bot. France l. c.) states rightly that the tomentum of Aublet's specimen differs from that of *Ocotea caudata* and remarks that *Licaria* belongs to a

hitherto undescribed species. The abundant Surinam material of *A. Aubletii* of which the leaves look exactly like those of Aublet's type in the Jussieu Herb. in Paris proves that it is this *Acrodiclidium* species which is identical with *Licaria guianensis*.

In comparing the drawing of the leaves one may see that there exists a certain resemblance between the *Licaria* leaves

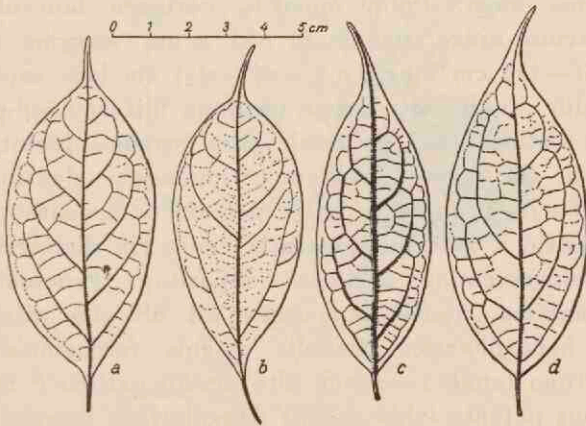


FIG. 3. *a.* Leaf of *Licaria guianensis* Aubl. (type specimen); *b.* leaf of *Ocotea caudata* Mez; *c.*, and *d.* respect, older and young leaf of *Acrodiclidium Aubletii* Kosterm. The lower surface of the leaves is drawn.

and those of *Ocotea caudata*: the base of the leaves however is different. The leaves of *Licaria* and of *A. Aubletii* are sparingly puberulous beneath, while those of *Ocotea caudata* are glabrous.

As the genus name *Licaria* has not been used for 150 years and the renaming of the about 30 species of *Acrodiclidium* would cause much confusion, I propose that the name *Licaria* Aublet, as this genus is moreover based on sterile material only, should be rejected and the name *Acrodiclidium* Nees should be retained.

Acrodiclidium rigidum Kosterm. nov. spec.; — *Acrodiclidium guianense* Auct., non Nees, Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 97, p. p., quoad cit. spec. Mélinonis n. 601 in Herb. Paris.

Arbor, 60 cm diametro (teste Gonggrijp). Ramuli graciles subangulares dense cinereo- vel ferrugineo-tomentelli. Rami cylindrici glabri cinerei. Gemmae dense cinereo-sericeae. Petioli tenues tenuiter pubescentes glabrescentes supra canaliculata 6(—11) mm longi. Folia opposita coriacea lanceolata basi breviter acuta apice acuminata vel acuta margine recurvula (5—)6—8(—11) cm longa, $1\frac{1}{2}$ —2(— $2\frac{1}{2}$) cm lata supra glabra nitida medio canaliculata nervo mediano filiforme subprominulo costis vix distinctis vel impressis infra brunnea tenuiter sparse pubescentia (in nervo mediano prominente densius) costis utrinque 5—10 prominulis satis patentibus arcuato- connectis quodam spatio a margine separatis venis vix distinctis. Flores ignoti. Inflorescentiae axillares oppositae. Fructus ignotae. Cupula maxima crassissima usque ad 28 mm alta 35 mm diametro hemisphaerica maculis magnis ferrugineis margine triplice intimo tenue 1—2 mm alto erecto extimo 8 mm crasso magis minus patente lobis magnis irregularibus biseriatis verosimiliter e perianthii segmentis valde auctis ortis.

Surinamo, Sectie O, arbor n. 852 (B.W. n. 4682, fr. m. Maio, typus in Herb. Utrecht; n. 4259, ster. m. Febr.; n. 4249, ster. m. Febr.). Guiana gallica: Mélinon n. 601 in Herb. Paris.

Foliis oppositis ad *Acrodiclidium Meissneri* Mez et *A. debile* Mez accedens sed ab utraque specie foliorum forma et crassitudine diversa. Habitu *A. sericei* Griseb. quae species cupula simplicimarginata et foliis sparsis a nostra differt.

Mezilaurus O. Ktze. ex Taubert.

The name *Silvia* was first published by Vellozo, Fl. fl. (1825), p. 55, t. 149 (1827). The only species *S. curialis* Vell. is universally reduced to a species of *Escobedia* Ruiz et Pav. (*Scrophulariaceae*). *Silvia* Benth. in D.C., Prodr. XV, 1 (1846),

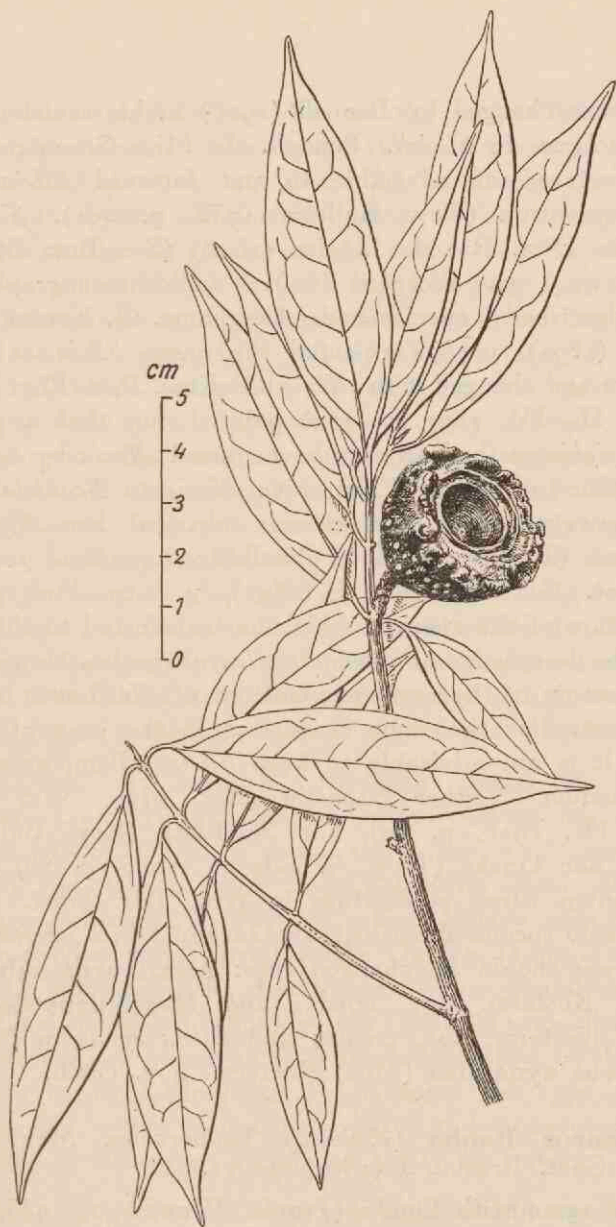


FIG. 4. *Acrodiclidium rigidum* Kosterm.

p. 513 was changed by Pennell (1928) in his revision of the *Scrophulariaceae* to *Silviella* Pennell. As Miss Green points out it is therefore not advisable to put forward *Silvia* Benth. for conservation (Kew Bulletin 1935, p. 492). *Silvia* Fr. Allem. in Diss. Rio de Janeiro (1848) (See Bot. Ztg. XII, 1854, p. 454) was accepted by Mez in his monograph (1889) and he described 6 species under this name. O. Kuntze in Rev. Gen. I (1891), p. 573 rejected the name *Silvia* as a later homonym and changed it to *Mezia* O. Ktze. Pax (Engl.-Prantl., Nachtr. II—IV, 1897, p. 174) pointed out, that a genus of the *Malpighiaceae* had already been named *Mezia* by Schwacke and he therefore changed the name *Mezia* to *Neosilvia*. Meanwhile however Mez had already changed his *Mezia* into *Mezilaurus* (Taubert in Bot. Cntrlbltt. 50, 1892, p. 21). In Arb. Bot. Gart. Breslau I (1892), p. 112 Mez gave an enumeration of the species, which he transferred to this genus, adding the description of a new *Mezilaurus* species. He renounced his authorship of the new combinations of *Mezilaurus* in favour of Taubert. For the same reason as in the case of *Silviella* Pennell it is not advisable to keep *Silvia* Allem. as a nomen conservandum. Neither Sampaio (Bol. Mus. Nac. Rio de Janeiro IV, 1928, p. 39), nor Sandwith (Kew Bull. 1933, p. 338), nor Ducke (Trop. Woods 42, 1935, p. 18) seem to have known Mez' publication in Arb. Bot. Gart. Breslau. The 2 new species described by Ducke: *Silvia subcordata* and *S. decurrens* should be changed into: **Mezilaurus subcordata** (Ducke) Kosterm. nov. comb., and **Mezilaurus decurrens** (Ducke) Kosterm. nov. comb.; and *Silvia synandra* Mez into **Mezilaurus synandra** (Mez) Kosterm. nov. comb.

Mezilaurus Itauba (Meissn.) Taubert ex Mez in Arb. Bot. Gart. Breslau I (1892), p. 12.

I fully agree with Ducke (Tropic. Woods 42, 1935, p. 18), that *Silvia polyantha* Mez can not be treated as a distinct

species; the only difference lies in the larger inflorescences and pedicels. I had no opportunity to study the type specimen of *Silvia Rondonii* Mez, but according to Ducke this species too is identical with *Mezilaurus Itauba*.

Concerning the dehiscence of the anther cells in the genus *Mezilaurus* I should like to add the following remarks: The normal Lauraceous type of dehiscence, viz. from base to top is found in *M. oppositifolia* (Nees) Taubert and *M. Sprucei* (Meissn.) Taubert. However the cells are in these species not oblong, but more ovate, moreover they are not parallel, but convergent: the cells are not vertical, but more or less horizontal. In *M. crassiramea* (Meissn.) Taubert and *M. synandra* (Mez) Kosterm. the cells are minute and nearly orbicular: the valves dehiscing horizontally in the direction of the centre; if we might consider the cells as horizontal, there would be no difference with the normal type of dehiscence. In *M. Itauba* the dehiscence begins in the upper and outer corners and proceeds from there towards a point somewhat below the centre, which gives the impression of a dehiscence from top to base.

Silvia Duckei A. Sampaio (*Misanteca Duckei* A. Sampaio in Comm. Linh. Electr. Matto Grosso Amaz. 56, Ann. 5, 1917, p. 15) of which I could study the specimens Ducke n. 17593 and Ule n. 7578 does not differ from *Mezilaurus Lindaviana* Schwacke et Mez of which I have seen the type specimen (Schwacke n. 19798) in the Dahlem Herb. Apparently Ducke did not know the description of this Brazilian species in Bot. Gart. Breslau I (1892), p. 112. There is some discrepancy in the description with regard to the indumentum of the ovary. According to Mez the latter is glabrous: the type specimen however has very young buds only and consequently the pubescence of the ovary could not safely be judged.

Endlicheria Nees has been published in *Linnæa* 8 (1833), p. 37 with 2 species *E. hirsuta* Nees and *E. sericea* Nees.

Nees himself altered this name into *Goepertia* (Syst. 1836, p. 365), when he discovered the publication of Presl in Symb. Bot. I (1832), p. 73, where the latter described a Rubiaceous genus *Endlichera* Presl. The name *Goepertia* however had already been published as a genus (genus spurium) of the Scitamineae by Nees in Linnaea 6 (1831), p. 337 (see also Nees, Syst., p. 365 in adn.). In: Lindley, Introd. Nat. Syst., 2nd ed. (1836), p. 202 in adn., Nees suggested that, if *Endlichera* Presl. (Rubiaceae) was to be retained, the name of the Lauraceous genus should be altered into: *Schauera* Nees. Supposing that this conditionally given name should be valid, *Schauera* Nees should be kept for the Lauraceous genus. The consequence will be, that the name *Schaueria* Nees (*Acanthaceae*) in Linnaea 13 (1839), Lit. Ber., p. 119, must be rejected.

Endlichera Presl (Rubiaceae) has an older synonym: *Emeorbiza* Pohl in Flora 8 (1835), though a nomen nudum (Mez in his monograph erroneously quotes the name *Endlichera* Presl as a nomen nudum). *Endlichera* Presl (Rubiaceae) has one species only, whereas *Endlicheria* Nees (Lauraceae) is a large genus and includes already about 30 species. Therefore it seems advisable to keep the name *Endlicheria* Nees (Lauraceae) with *E. hirsuta* Nees as type specimen and to reject: *Schauera* Nees (Lauraceae); consequently *Emeorbiza* Pohl (Rubiaceae) should be kept (type specimen: *E. brasiliensis* (Presl) Walp.) and *Endlichera* Presl (Rubiaceae) rejected. A motion in this sense has been put forward at the VIth Bot. Congress (Prelim. opinions etc., p. 25).

Endlicheria pyriformis (Nees) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 116.

The specimen: Triana n. 1059 from Colombia differs in its cupule and in the nervation of the leaves from *E. pyriformis* and does not belong to this species.

Endlicheria multiflora (Miq.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 130.

The type specimen (Hostmann n. 1163) is a male one. The female plant is rather different from the male one in the form of its panicles. The latter are more or less spicate and rather short. The type specimen of *Endlicheria villosa* Mez should be in the Göttingen Herbarium, but I could not find it there; a few leaves and flowers however were available from the Mez Herb. in Dahlem. This specimen shows that the only difference lies in the narrowly lanceolate leaves, but a Surinam specimen of *E. multiflora* (Voltz s. n.) and specimens from French Guiana have the same narrow leaves. The locality of *E. villosa* is doubtful. The species has hitherto never again been found in Jamaica, the locality indicated on the label; I suppose that the specimen was a Guiana one, but as the collector of this specimen: March has never collected on the continent, it must erroneously have been inserted by Grisebach among specimens of March.

Endlicheria endlicheriopsis (Mez) Kosterm. nov. comb.;
— *Ocotea endlicheriopsis* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 300; Benoist in Arch. Bot. V (1931), p. 73.

The female type specimen: Mélinon n. 605 in the Paris Herb. is rather defective and consists of a few flowers and some leaves only. The abundant material of male specimens does not leave the slightest doubt that Mélinon's plant is an *Endlicheria*. The rudimentary, sterile state of the anthers in the female flowers made it difficult for Mez to decide to which genus it ought to be reckoned.

Cassytha filiformis L. (non Thunberg), Spec. pl. I (1753), p. 35; — *Volutella aphylla* Forsk., Fl. Aeg. Arab. (1775), p. 84; — *Cassytha zeylanica* Gaertn. Fruct. I (1788), p. 134; — *Calodium cochinchinense* Lour. in Fl. Cochinch. I (1790), p. 247; — *Cassytha aphylla* Raeusch., Nomencl. ed. 3 (1797), p. 116; — *Cassytha paniculata* R. Br., Prodr. (1810), p. 404; — *Cassytha guineensis* Schum. et Thonn., Beskr. Gui. Pl. (1827), n. 1, p. 219; — *Cassytha americana*

Nees, Syst. (1836), p. 644; — *Cassytha brasiliensis* Mart. ex Nees, Syst. l. c., p. 648; — *Spironema aphylla* Raf., Fl. Tell. IV (1836), p. 92; — *Cassytha remotiflora* F. Muell. ex Meissn. in D.C., Prodr. XV, 1 (1864), p. 256; — *Cassytha capillaris* F. Vill. (non Meissn.), Nov. App. (1880), p. 182 ex Merr., Enum. 2 (1923), p. 204; — *Cassytha timoriensis* Gandoger in Bull. Soc. Bot. France 40 (1913), p. 419.

Cassytha pondoensis Engl. in Engl. Jahrb. 26 (1899), p. 392 is identical with *C. rubiginosa* E. Mey. in Drège, Zwei Pfl. Doc., p. 171 and with *C. pubescens* E. Mey. (non R. Br., non Schlechtend). This species differs only from *C. filiformis* by the rusty tomentum of the peduncles, the outer perianth segments and the base of the inner ones; I consider it therefore as a variety only of *C. filiformis*: var. **pondoensis** (Engl.) Kosterm. nov. comb. *Cassytha capillaris* Meissn. in D.C. l. c., p. 252 differs from *C. filiformis* by its very thin stems and capitate flowers. A specimen of *C. filiformis* from Flores shows the same slender stems, but the spikes are the same as those of *C. filiformis*. *Cassytha capillaris* also may prove after all to be a mere variety. *Cassytha paniculata* R. Br. l. c. differs from *C. filiformis* by the clustered spikes, but these occur now and then also in *C. filiformis*; Bentham in Fl. Austr. V (1870), p. 311 already pointed out that the two species are probably identical.

HERNANDIACEAE.

Sparattanthelium wonotoboensis Kosterm. nov. spec.

Liana. Ramuli crassi striati cylindrici sparse puberuli. Rami glabri laeves striati. Folia alterna subtripplinervia chartacea ovata, (4—)5—6(—8) cm longa, (2—)2½—3(—4) cm lata basi subcordata vel rotunda margine recurvulo apice breviter acuminata supra glabra nervis primariis et secundariis tomentellis planiusculis subtus sparse tomentosus nervo mediano subprominente nervis primariis binis lateralibus ad dimidium vel

duas partes folii adscendentibus costis utrinque 3—4 subprominentibus superioribus arcuato-connectis nervis secundariis prominulis laxe reticulatis. Petioli graciles glabrescentes usque ad $1\frac{1}{2}$ cm longi. Paniculae densae permultiflorae corymbiformes axillares usque ad 10 cm longae pedunculo cylindrico usque ad 4 cm longo ramulis usque ad 4 cm longis cinereo-tomentosis. Pedicelli graciles cinereo-tomentosi usque ad 1 cm longi. Flores rubescentes 4 mm longi tubo cylindrico-ovoideo puberulo $1\frac{1}{2}$ mm longo perianthii segmentis 4 oblongo-linearibus obtusis extus tomentellis intus glabris. Stamina 4 filamentis $\frac{1}{2}$ mm longis glabris filiformibus contortis antheris oblongo-linearibus 1 mm longis glabris connectivis cellulas paullo superantibus. Stylus crassiusculus puberulus stigmatibus capitellato. Paniculae fructiferae divaricato-dichotomae albae ramulis gracilibus nodis incrassatis. Pedicellus fructiferus usque ad 6 cm longus gracilis. Fructus ovoideo-ellipsoideus acutus 15 mm longus 7 mm diametro dehiscens.

Surinamo, fluv. Corantijne in saxis prope catar. Wonotobo (B.W. n. 3120, fl., fr., m. Oct.; typus in herb. Utrecht).

S. Botocudorum Mart. valde affinis sed foliorum forma tomento nervatura et pedicellis fructiferis longis gracilibus diversa.

Hernandia sonora L.

I will give here a survey of the literature:

Hernandia sonora L., Spec. pl. II (1753), p. 981; — *Hernandia, foliis peltatis* Hort. Cliff. (1737), p. 485, t. 33; — *Hernandia amplo hederæ folio umbilicato* Plum. Gen. 6 (1737), p. 374, t. 40; — *Nux vesicaria oleosa, foliis umbilicatis ex insula barbadensi* Pluk. Almag. (1696), p. 266, t. 208 f. 1; — *Nux zeylanica umbilicatis foliis* Kigg., Hort. Beaumont. (1690), p. 31; Burm., Thes. Zeyl. (1737), p. 171; Linn. Fl. zeyl. (1748), p. 199; — *Arbuscula exotica foliis umbilicatis* etc. Breyn. Prodr. 2 (1689), p. 20?; — *Hernandia arborea foliis cordato-peltatis* etc. Browne, Jam. p. 373; — *Hernandia sonora* L., Jacq. Stirp. Amer. (1763), p. 245 et Pict. (1780), p. 120; Buchoz Hist. Regn. Veg. IX, Dec. X (1775),

t. 9; Aubl. Guia. II (1775), p. 852; Gaertn. Fruct. I (1788), p. 194; Lam. Dict. 3 (1789), p. 123, excl. syn. Arbor regis Rumph.; Willd., Spec. IV, 1 (1805), p. 327; Descourt., Fl. Pitt. et Med. Ant. 2 (1822), p. 143; Blume, Bydr. 2 (1825), p. 551; Blanco, Fl. Filip. ed. 1 (1837), p. 689; ed. 2 (1845), p. 478; Twaith, Enum. Zeyl., p. 258; Hassk., Pl. Jav. rar. (1848), p. 217; Wight, Ic. V (1852), t. 1855; Miq., Fl. Ind. bat. I (1855), p. 887, excl. Arbor regis Rumph.; Meissn. in D.C., Prodr. XV, 1 (1864), p. 263; id. in Fl. Bras. V, 2 (1866), p. 300; Baillon, Hist. II (1870), p. 449, 450; — *Hernandia ovigera* L., Stickman in Am. Acad. IV (1759), p. 125; Arbor ovigera Rumph. Amb. III (1743), p. 193, t. 123; Lam., Dict. 3 (1789), p. 123; Willd., Spec. IV, 1 (1805), p. 327; Poir., Enc. Suppl. 3 (1813), p. 45, Pl. t. 755 f. 2; Roxburgh, Fl. Ind. III (1832), p. 577; Schnizlein, Ic. I (1850—1856), t. 109; Meissn. in D.C. l. c., p. 262; id. in Fl. Bras. l. c., p. 299; Baker, Fl. Maurit. (1877), p. 293; Greshoff, Nutt. pl. (1896), t. 21; Koorders en Valet., Booms. VII (1900), p. 110; id. Atl. IV (1913), t. 185; Koorders, Exkurs. Fl. 2 (1912), p. 281; Merrill, Enum. Phil. pl. 2 (1923), p. 206, id. in Phil. Journ. Sc. (1926), p. 370; Heyne, Nutt. pl. I (1927), p. 674; Alston in Trim., Fl. Ceyl. VI (1931), p. 248; — *Hernandia guianensis* Aubl. Guia. II (1775), p. 849, III t. 329; Willd., Spec. l. c., p. 328; Poir., Enc. Suppl. l. c., p. 46; Pl. IV, t. 755 f. 1; Meissn. in D.C. l. c., p. 262; id. in Fl. Bras. l. c., p. 299; Pulle, Enum. pl. surin. (1906), p. 187; Benoist in Arch. Bot. V (1931), p. 76; Standley in U. S. A. Herb. 23, 2 (1922), p. 298; id. in Field. Mus. X (1931), p. 202; — *Hernandia peltata* Meissn. in D.C., Prodr. l. c., p. 263; Kurz, For. Fl. Br. Burma II, p. 309; Beddome, Fl. sylv. (1873), t. 300; Benth., Fl. Austr. V (1870), p. 314; Seem., Fl. Vit. (1865—73), p. 205, t. 52; Baker, Fl. Maurit. l. c., p. 293; Vidal, Infr. Fl. Filip. (1883), Atl. t. 78 f. G.; Hook., Fl. Brit. Ind. V (1890), p. 188; Schimper, Bot. Mitt. III (1891), t. 7; Greshoff, l. c., t. 21; Reinecke in Engl. Jahrb. 25 (1898), p. 366; Engl., Pf. Ost-Afr. C, p. 183; Koorders et Valet. l. c., p. 106; id. Exkurs. Fl. l. c., p. 281; id. Atl., t. 184; v. Eeden, Houts. Ned. O. Ind. (1905), p. 43; Bailey, Compr. Cat. Queensl. pl. (1909), p. 439, t. 13; Sprague in Fl. Trop.

Afr. IV, 1 (1913), p. 191; Lecomte, Fl. Indo-Chine V, 2 (1914), p. 159, f. 14; Hattori in Journ. Coll. Sc. Tokyo 23, X, p. 13; Gamble, Journ. As. Soc. Beng. 75, 1, p. 204; Ridley, Fl. Malay Pen. III (1924), p. 138; Heyne l. c., p. 675; — *Hernandia peltata* Sessé et Moc., Fl. Mex. 2na ed. (1894), p. 213; — *Hernandia peltata*, var. *subcordata* Hochr. in Candollea II (1925), p. 365; — *Hernandid catalpisfolia* Britton et Harris in Torreyia II (1911), p. 174; Fawcett and Rendle, Fl. Jam. III, 1 (1914), p. 221 f. 90.

Linnaeus enumerated under this name specimens from Asia and from America. The type specimen being the American plant the name *H. sonora* was exclusively used for this species.

Stickman in Am. Ac. l. c. described the closely related Asian *H. ovigera*, whereas Meissner distinguished a *H. peltata*. Merrill, Enum. l. c. discovered in studying numerous plants that the supposed differences between *H. ovigera* and *H. peltata* break down absolutely.

H. guianensis, belonging to the same group as *H. peltata* is fully identical with it: Surinam and Brazilian specimens show that peltate and not peltate leaves occur on the same plant.

H. sonora differs according to Meissner by the male flowers being 3-4-merous and having one gland only at the base of each filament. In studying the abundant material from America and Asia I came to the conclusion that neither of these differences holds true. The specimens of Meissner which I could study had 3-merous male flowers. The number of the glands is a character of no value. On the same (American) plant I have found flowers in which the filaments bore 3 glands and flowers in which one of the filaments bore two basal glands. In the Asian specimens I have found flowers with up to 9 glands. The glands are often only partially divided and the conclusion may be drawn that the variability in the number of the glands is due to union and to division of the normal 6 ones. The shape of the flowers and other characters too of the American plants are the same as those of the Asiatic ones.

H. sonora, as already suggested by Hooker, is a pantropical species. The species has not been found hitherto on the West coast of Africa; the species found there: *H. beninensis* Welw. however is, according to Sprague, l. c., very closely allied to *H. sonora* and may prove one day identical with this species.

Hernandia Kunstleri King ex Heyne, Nuttige Ind. Pl. I (1927), p. 674 is no *Hernandia*. Judging from the vernacular name the plant might be a *Podocarpus*.

CHAPTER II.

GEOBOTANICAL REMARKS.

MALPIGHIACEAE.

The geographic distribution of the Malpighiaceae shows but few interesting points. By means of their flying apparatus they are easily transported by the wind and consequently the species cover as a rule very large areas. Of the 42 species occurring in Surinam one only: *Dolichopterys surinamensis* Kosterm. is endemic; 4 species: *Hiraea affinis* Miq., *Tetrapteris fimbripetala* Juss., *Diptopterys rosea* (Miq.) Ndz. and *Byrsonima Aerugo* Sagot occur in the Guianas only.

Malpighia coccigera L. is endemic in the Antilles; the Surinam specimen is most probably a cultivated one. Outside Surinam *Mascagnia multiglandulosa* Ndz. has been found hitherto in Paraguay only but there is every reason to suppose that this species will be found one day in the Amazonian district too. The remaining 35 species, that is 83 %, occupy extensive areas, often reaching from Central America to Argentine.

Heteropteris africana Juss. is the only species of this genus occurring in Western Africa. The explanation given by Niedenzu, namely that its samaras must have been transported either by wind or sea to Africa, after the latter's separation from America, though a simple one, is not convincing: it is, for instance, curious that a species like *Brachypterys ovata* (Cav.) Small, a plant living on the coast, should not have wandered to Africa in the same way. The supposition that the migration

of this species to Africa will have taken place in the Eocene period, when there existed according to Wegener (Die Entstehung der Kontinente und Ozeane) a narrow connection between Guiana and Guinea, is more satisfactory.

LAURACEAE AND HERNANDIACEAE.

The representatives of the Lauraceae are usually very large trees with minute flowers and they are therefore difficult to collect. As this family therefore is rather badly known and as I will restrict myself to a small area: Surinam, the following remarks should be regarded as preliminary. The distribution of the species was, with the exception of a few ones, verified by myself.

Of the 57 species of these two families we need not discuss the cultivated ones: *Persea americana* Mill., *Cinnamomum zeylanicum* Breyn. and *Laurus nobilis* L. Only the first one is a real American plant, *Cinnamomum* has its representatives mostly in Asia, though it has been recorded as growing wild in the Amazone area; *Laurus nobilis* has its native country in Minor Asia and the Mediterranean. Of the remaining species, two are pantropic: *Hernandia sonora* L. and *Cassytha filiformis* L. It is remarkable that both species seem to have been distributed from about the same centre, viz. Australia and Polynesia, as both genera have the greatest number of representatives in those regions. *Cassytha filiformis* is in Guiana a typical savanna plant, climbing on and over minor shrubs and herbs. *Hernandia sonora* is a coast plant, though it has often been found farther inland. Its wide distribution may be due to the circumstance that the seed is protected against the influence of sea-water by several layers; moreover the cupule will give it some buoyancy. That the wood is used for ship-building purposes may also be one of the reasons of its wide distribution. The remaining 52 species are divided into 10 genera as follows:

Persea 2	Aiouca 2
Ocotea 14	Acrodiclidium 7
Nectandra 9	Mezilaurus 1
Aniba 10	Endlicheria 4
Systemonodaphne 1	Sparattanthelium 2

One may see that the genera are all, more or less in accordance of their size, well represented in Surinam.

Of the other genera, occurring in South America, it is curious that not a single species of *Phoebe* has been found hitherto in Surinam. This genus has its largest distribution in Central America; its area extends eastwards over the West Indian islands as far as Trinidad, where a few species have been found; southwards it reaches over the Andes region to Southern Brazil; the Hylaea and the Guianas however are avoided. The area of the genus *Persea* reaches its limit in the Guianas, the greater part of the species occur in the Andes region, Mexico and the Campos of Southern Brazil; its distribution, though somewhat more extensive, is consequently more or less the same as that of the closely related genus *Phoebe*. *Cryptocarya* has been found in French Guiana only (two species) but in view of the similarity of the flora of this country with that of Surinam, we may expect it in Dutch Guiana too. The genus *Hufelandia* reaches its limit in British Guiana, where one species is found; its area covers Central America and the West Indies. The genus *Litsea* does not occur in the Guianas; a few species are known from Central and Southern Brazil, the others occurring chiefly in Mexico; the centre of this genus is found in tropical Asia. The distribution in America is similar to that of *Phoebe*, though not so evident.

Of the 52 Surinam species of the Lauraceae and the Hernandiaceae, 6 are endemic:

- Aniba Kappleri Mez
- Aniba Hostmanniana (Nees) Mez

SPECIES.

(X denotes, that the species occurs in the region).

	West Indian Islands.	Central America.	Eastern Venezuela, Colombia, Peru.	Brit. Guiana.	French Guiana.	Hylaea.	Trinidad.	Andes.	Southern & Eastern Brazil.	Paraguay, Argentina.
1. Persea Benthamiana Meissn.	—	—	—	×	×	×	—	—	—	—
2. Ocotea rubra Mez.	—	—	—	×	×	×	×	—	—	—
3. Ocotea Rodiaei (Rob. Schomb.) Mez.	—	—	—	×	×	—	—	—	—	—
4. Ocotea barcellensis (Meissn.) Mez.	—	—	—	—	—	×	—	—	—	—
5. Ocotea canaliculata (Rich.) Mez.	—	—	—	×	×	—	×	—	×	—
6. Ocotea glomerata (Nees) Benth. et Hook. f.	—	—	×	×	—	—	×	—	×	—
7. Ocotea guianensis Aubl.	—	—	×	×	×	×	—	—	—	—
8. Ocotea Wachenheimii R. Ben.	—	—	—	—	×	—	×	—	—	—
9. Ocotea globifera Mez.	—	—	—	—	×	—	—	—	—	—
10. Ocotea splendens (Meissn.) Mez.	—	—	—	—	×	—	—	—	—	—
11. Ocotea caudata (Meissn.) Mez.	—	×	×	×	×	×	—	—	—	—
12. Ocotea Neesiana (Miq.) Kosterm.	—	—	—	—	×	×	—	—	×	—
13. Ocotea puberula Nees	—	×	×	×	×	×	—	—	×	×
14. Ocotea Schomburgkiana (Nees) Benth. et Hook. f.	—	—	—	×	—	—	—	—	—	—
15. Ocotea Petalanthra (Meissn.) Mez.	—	—	×	—	—	—	—	—	—	—
16. Ocotea oblonga (Meissn.) Mez.	—	—	—	×	×	—	—	—	—	—
17. Ocotea punctulata Mez.	—	—	—	×	×	—	—	—	—	—
18. Nectandra grandis (Mez.) Kosterm.	—	—	—	×	×	—	—	—	—	—
19. Nectandra Kunthiana (Nees) Kosterm.	—	—	—	×	×	—	—	—	—	—
20. Nectandra Laurel Kl. et Karst.	—	×	×	—	—	—	—	×	—	—
21. Nectandra Pisi Miq.	—	—	—	×	×	×	—	—	—	—
22. Nectandra ambigua Meissn.	—	—	—	×	—	—	—	—	—	—
23. Nectandra cuspidata Nees.	—	×	×	×	—	×	—	—	×	×
24. Nectandra guianensis Meissn.	—	—	—	×	—	—	—	—	—	—
25. Nectandra surinamensis Mez.	—	—	—	×	×	—	—	—	—	—
26. Nectandra kaburiensis Kosterm.	—	—	—	—	—	—	×	—	—	—
27. Aniba rosaeodora Ducke	—	—	—	—	×	×	—	—	—	—
28. Aniba firmula (Nees et Mart.) Mez.	—	—	—	×	×	×	—	—	×	—
29. Aniba Canelilla (H.B.K.) Mez.	—	—	×	×	—	×	—	—	—	—
30. Aniba Taubertiana Mez.	—	—	—	—	×	—	—	—	—	—
31. Aniba riparia (Nees) Mez.	—	—	—	×	×	×	—	—	—	—
32. Aniba Jenmani Mez.	—	—	—	×	—	—	—	—	—	—
33. Systemonodaphne geminiflora Mez.	—	—	—	—	×	—	—	—	—	—
34. Aiouea densiflora Nees	—	—	—	×	×	×	×	—	—	—
35. Aiouea guianensis Aubl.	—	—	×	×	×	×	—	—	—	—
36. Acrodiclidium cayennense (Meissn.) Mez.	—	—	—	×	×	×	—	—	—	—
37. Acrodiclidium Canella (Meissn.) Mez.	—	—	—	×	×	×	×	—	—	—
38. Acrodiclidium debile Mez.	—	—	—	×	×	—	—	—	—	—
39. Acrodiclidium Martinianum Mez.	—	—	—	×	×	×	—	—	—	—
40. Acrodiclidium guianense Nees.	—	—	—	×	×	×	—	—	—	—
41. Acrodiclidium Aubletii Kosterm.	—	—	—	×	—	—	—	—	—	—
42. Acrodiclidium rigidum Kosterm.	—	—	—	—	×	—	—	—	—	—
43. Mezilaurus Itauba (Meissn.) Taubert.	—	—	—	×	×	×	—	—	—	—
44. Endlicheria pyriformis (Nees) Mez.	—	—	—	—	×	—	—	—	—	—
45. Endlicheria sericca Nees	×	—	×	×	×	—	×	—	—	—
46. Endlicheria multiflora (Miq.) Mez.	—	—	—	×	—	—	—	—	—	—
47. Endlicheria endlicheriopsis (Mez) Kosterm.	—	—	—	—	×	—	—	—	—	—
48. Sparattanthelium Botocodorum Mart.	—	—	—	×	×	×	—	—	—	—

Aniba mas Kosterm.
 Aniba Gonggrijpii Kosterm.
 Persea coriacea Kosterm.
 Sparattanthelium wonotoboensis Kosterm.

The remarkable fact, that most of them belong to the genus *Aniba*, may be explained by assuming, that this genus has its centre of distribution here; it is unfortunately one of the worst known genera.

The distribution of the other species is given in the table page 52. As *Ocotea punctulata* Mez and *Ocotea oblonga* (Meissn.) Mez occur both in French and in British Guiana, these species may be expected in Surinam too: for this reason they are inserted in the table.

The number and percentage of the species occurring in the different regions runs as follows.

Region	Number	%
West Indies	1	2
Central America	3	6
Eastern Venezuela, Colombia, Peru	10	21
British Guiana	31	65
French Guiana	34	71
Hylaea	19	40
Trinidad	8	17
Andes	1(?)	2(?)
Southern & Eastern Brazil	6	13
Paraguay, Argentina	2	4

Surinam has of course most species in common with French and British Guiana, but there exists also a relation between Dutch Guiana and the Amazonian district. It is a curious fact, that only one Surinam species occurs also on the West Indian Islands; according to Mez' monograph there were several other species in common with West India, but they

all proved to be different though closely related species. With the Andes region Surinam shows but little similarity. It is rather dubious whether the specimen of *Nectandra Laurel* Kl. et Karst. really belongs to this species. With Trinidad, as was to be expected Surinam has several species in common.

Ocotea.

It is curious that among the 14 Surinam species of this genus three belong to the group, which by the shape of the outer 6 stamens, link the genera *Nectandra* and *Ocotea*. Mez described 6 species only of this group, of which 3 occur in Central America and one on the West Indian Islands; the 3 Surinam species have their area restricted to Guiana or to Guiana and the Amazone district. In view of this distribution and with regard to the different character of the anthers it is probably advisable to separate this group from both *Nectandra* and *Ocotea*. Of the Surinam *Ocotea* species: *O. puberula* Nees has the widest distribution: its area extending from Mexico to Argentina. In view of the localities where it has been found, we must assume that it prefers the drier and higher regions. A few species of *Ocotea* occur in Eastern and Southern Asia and on the Mascarenes, they differ from the American species by the large staminodes.

Nectandra.

Nectandra Pisi Miq., described by Mez as *N. globosa* Aubl., is not so widely distributed as Mez supposed. The species has hitherto been found only in the Guianas and in the Amazone district. Other specimens from Southern and Central America described by Mez belong probably to the closely related: *N. lucida* Nees; in the West Indies it is supplanted by: *N. antillana* Meissn. (= *N. globosa* Aubl.).

Nectandra ambigua Meissn. This species has been found in British Guiana only and its area seems to reach its limit in Western Surinam, the plant has not been found eastward of

the Nickerie river; in the Amazone district it is replaced by the closely related *N. Pichurim* (H.B.K.) Mez.

Nectandra cuspidata Nees has a very extensive area, reaching from Mexico to Argentina.

Aniba.

The centre of the area of this genus seems to lie in the Guianas and the Hylaea. Of the about 40 species, 17 occur in the Guianas and about 10 in the Amazone district.

Acrodiclidium.

The same may be said of this genus. Of the about 30 species: 11 are Guianean, 5 Amazonian.

Mezilaurus.

This genus has its centre of distribution in the Amazone district. A few species extend however as far as Eastern Venezuela and Guiana and southward a few are found in Central and Eastern Brazil. *Mezilaurus Itauba* (Meissn.) Taubert has a large area, it seems to prefer dry, rising ground and does not grow in marshes.

CHAPTER III.

USEFUL PLANTS.

On the following pages is given a brief survey of the useful plants. As the literature on this subject is very scattered, the list does not claim to be in any way complete. Everybody is warned against applying any of the medicaments mentioned here without medical advice.

A list of the principal works from where the data have been taken, is given at the end of this chapter; all authors moreover are mentioned between brackets.

MALPIGHIACEAE.

Malpighia puniceifolia L.

In the West Indies the fruit is much eaten, either raw or it is used for jellies and tarts; it has a sour flavour. The bark is reported to yield a red dye (Standley). The fruit is used against obstipation and inflammatory and adynamic diseases; the sap is purgative and diluted in water it is used in case of scorbut as a refreshment (Descourtilz).

Bunchosia glandulifera (Jacq.) Kunth.

An incision of the bark furnishes an in water soluble gum, named: „Ciruela gum” in Caracas, it is employed against diseases of the respiratory organs and against catarrh of the bladder (Hartwich).

Byrsonima crassifolia (L.) Rich.

The fruit is eaten mostly by children and birds although occasionally in Central America it is offered for sale in the markets. It is used for preparing a kind of lemonade; in some localities it has been fermented to produce an alcoholic drink (Standley). The bark is used for tanning leather and for painting paddles, arrowpoints, etc. (Bentham). It is said to yield a strong fibre (Guzman). The plant is astringent and various parts have been used in domestic medicine for fevers, colds, diarrhoea and snake-bites (Standley, Poirer, Schomburgk). The wood is rather heavy and dense and has a dark red-brown colour (Wiessner); it is used for charcoal and burning purposes, now and then for building.

Byrsonima coriacea (Sw.) Kunth.

The wood is said to be used for tanning leather (Poirer).

Byrsonima verbascifolia (L.) Rich.

A decoction of wood and roots is used as vulneral, detersive and astringent. It gives a red dye (Poirer). The trunk furnishes timber (Niedenzu).

Byrsonima densa (Poir.) D.C.; *B. stipulacea* Juss.

These large trees furnish timber for building purposes.

LAURACEAE.

Laurus nobilis L.

Leaves and berries possess aromatic and stimulant properties and have been reported narcotic. The leaves are also said to be diaphoretic and in larger doses emetic. Both leaves and fruits were employed formerly in flatulent colic, hysteria, amenorrhoea and other affections but they are rarely or never used internally at the present time either in Europe or elsewhere. The berries, commonly called Bay-berries, yield a green or yellow-green oil, extracted by boiling, though in minute quan-

tities. Externally this commercial oil of bays is sometimes employed as an external stimulant and application in sprains, bruises, etc., sometimes against hemorrhoids or against vermin. But its principal use is in the veterinary medicine. Now and then it has been used for making soap. The leaves are frequently used by the cook and the confectioner as a flavouring agent. The volatile oil is also sometimes employed in perfumery. The plant itself is cultivated for ornamental purposes.

Persea americana Mill.

Two principal horticultural forms of *Persea americana* are recognised: the West Indian type with smooth fruit and leathery skin and the Guatemalan type also called the Mexican or highland avocado (*P. americana*, var. *drymifolia*) with rough and warty fruit and membranous skin, the leaves when crushed dissipating an anise-like odour. There is great variation in size and shape of the fruit (Standley, Popenoe). In Surinam two forms are cultivated: one with pink and one with whitish pulp, the skin of the fruit being reddish or green (Sack). It is commonly used as a table fruit and eaten raw; it is so rich and mild that most people make use of some spice or pungent substance to give it a poignancy and for this purpose some make use of wine, of sugar or of lime-juice, but most people add pepper and salt and the berry is eaten as a salad (Browne); in the Dutch East Indies usually brandy or coffee is added; it is used further in soups or spread on bread. The seed is used for marking linen: one method being to hold the cloth over the fresh stone and pricking through into the seed with a needle, the milky juice becomes dark-red and is practically indelible. A large number of therapeutic uses are reported. The pulp is credited with hastening the suppuration of wounds and is reputed to have aphrodisiac and emmenagogue properties (Duss, Standley). The seed contains an astringent milky juice reputed against diarrhoea and dysentery (Bocq.-Limousin).

Ground and mixed with cheese, meal, etc. the seeds are used to poison rats and mice (Standley). An ointment of the pulverized seeds is sometimes employed as a rubefacient and a decoction of them or a piece of the seed, put in the cavity of a tooth is believed to cure tooth-ache (Standley). According to Sahagun the powdered seeds are employed as a remedy for dandruff; they should have a soothing influence in case of intercostal neuralgia (Hartwich). The seeds are also used for manufacturing various trinkets (Standley). The rind is used to expel intestinal parasites (Standley, Peckholt). Hernandez states that by pressure oil was obtained from the seeds and used in curing eruptions of the skin. According to Britton the valuable oil contained in the seeds is used for burning and for making soap. The leaves and bark are employed in domestic medicine because of the pectoral, stomachic; emmenagogue, resolutive, antiperiodic, antihysterical, antidysenteric, anthelmintic properties ascribed to them. These properties are probably due to the presence of a large quantity of tannin (Duss, Standley). On the West Indian Islands the leaves are used as pectoral, balsamic and carminative (Bocq.-Limousin). According to Bisschop Grevelink the buds are employed in the Dutch East Indies against contusions and against syphilis. A decoction of flower and leaf buds is used as aperitive. An infusion of leaves and seeds is administered for diarrhoea and chronic catarrh. For building purposes the wood has little or no value.

Cinnamomum zeylanicum Breyn.

Cinnamon bark has generally the properties of the spices, being aromatic, carminative and stimulant. It is also somewhat astringent. It is rarely prescribed alone but chiefly as an addition to other medicines to improve their flavour or to check their griping qualities. As a cordial, stimulant and tonic it is indicated in all cases characterised by feebleness and atony. As astringent it is employed in diarrhoea, usually in combination

with chalk, the vegetable infusions or opium. As a cordial and stimulant it is exhibited in the latter stages of low fever. In flatulent colic, flatulence, in spasmodic affections of the bowels and gastric irritation it often proves a very efficient carminative and antispasmodic. It checks nausea and vomiting. It has also been used in uterine haemorrhage as a stimulant of the uterine muscular fibre and in tedious labour depending upon insufficiency of uterine contractions. The oil of cinnamon possesses the cordial and carminative properties of the bark without its astringency and is a good deal used as an adjunct to other medicines and also as a powerful local stimulant in paralysis of the tongue, cramp of the stomach, to relieve headache etc. An oil of clove-like odour and taste is also distilled from the leaves of the plant in Ceylon and occasionally exported as „clove oil”; it resembles in medicinal properties and uses closely the oil of cloves. A substance called cinnamon suet is also expressed in Ceylon from the ripe fruit (Lindley). From the root is extracted a yellow oil which has a strongly camphoraceous flavour (Watt).

Ocotea rubra Mez.

Furnishes one of the best and mostly widely distributed timber woods of Guiana. The wood is rather light, rather soft, coarse and somewhat splintery but does not burst as a rule, yellowish-brown, useful for indoor constructions, furniture and light cabinet work. It is said not to be attacked by worm (Pfeiffer, Sack, Stone and Freeman). This species furnishes the so called: „suikerkisten-hout” (sugarbox wood) according to v. d. Speck Obreen.

Ocotea Rodiaei (Rob. Schomb.) Mez.

Dr. Rodie prepared from the Bibiru (Bebeeru) bark a solution of the sulphate of its alkali, which he has administered with success in intermittent fevers. Maclagan succeeded in procuring two vegetable alkaline bodies: bibirine and sipirine (according

to other investigators identical with the already known buxine; see Wiessner, Rohst. p. 38). Bebeeru, though not so effective as quinine, is used as a substantive for it as antiperiodical, but it never causes nausea, head-ache or other unpleasant effects, which so frequently follow the use of quinine (Bentl. and Trimén). According to Merrill it is used in various uterine diseases as dysmenorrhoea, menorrhagia, leucorrhoea, also useful in affections of the kidneys and bladder and in blenorrhoeal discharges (Bentl. and Trimén). Bocquillon states that it may be used in case of periodical neuralgia. Externally it is employed against inflammation of the eyes (Dragendorff). There is 54 % starch in the fruit and the aborigines use it in times of scarcity as a substitute for bread. The seeds are grated for that purpose and immersed in water, when a white starch precipitates itself which is repeatedly washed to deprive it of its bitterness. It is afterwards mixed with decayed wood, chiefly that of *Eperua falcata* Aubl. and baked into cakes. The Indians are sometimes obliged to live on it for months (Schomburgk, Martius). The hard, heavy, coarse-grained wood of a more or less pronounced green or greenish-brown colour with prominent light-green pores (Stone and Freeman) is much esteemed for luxurious furniture, constructions of ships and docks, especially for keelsons, beams, engine bearers, planking, dock and lock gates, piers and piling (Record), but in Europe only it proved to be resistant against the attack of marine borers; for Central and South America this reputation is wholly lost: constructions for which it has been used in Panama, San Francisco and Surinam were destructed within a year by a species of *Teredo* (Pfeiffer). The wood tends to check and splitter in drying and requires great care in seasoning and in working (Record). An excellent charcoal is made of it (Wiessner).

Ocotea barcellensis (Meissn.) Mez.

The wood is used for building purposes and for corjales.

When the tree is cut down or when an incision is made in the stem, several litres of a terpentine-like fluid run out of the wound; it is used by the Alukuja Indians for burning (Snijders).

Ocotea guianensis Aubl.

The leaves are used as a cataplasm in order to obtain the suppuration of tumours and bubos (Aublet). The plant furnishes a resin (Dragendorff).

Ocotea canaliculata (Rich.) Mez.

Furnishes a timber for indoor work (Freeman and Williams).

Ocotea puberula Nees.

The yellow, peppery wood is common in carpenter shops and used for tables, shelving and all kinds of joinery (Record).

Ocotea Schomburgkiana (Nees) Mez.

The branchlets are used for basket work, the wood as timber.

Nectandra Pisi Miq.

The yellowish-brown, hard wood, easily to work on, is employed for indoor work and furnishes a durable timber for ship-building and constructions in water (Stone). It needs brass nails, as iron is rapidly attacked (Lauessan).

Nectandra cuspidata Nees.

Furnishes a very light and durable timber used for building purposes (Miquel, Krukoff).

Aniba rosaeodora Ducke.

In 1875 the Frenchman Samain succeeded in distilling out of the wood an oil: „Huile de linalois ou huile d'aloès”, afterwards called: „Essence de bois de rose”. A narrowly related product: „Linaloë mexique” is provided by: *Bursera Delphechiana* Poiss. and *B. Aloëxylon* Engl. The oil contains 90 % of linalol. The wood was shipped chiefly to France for the extraction of the oil, but owing to the loss of essence in transportation, it

was found best to manufacture it in Cayenne itself. The oil is used in the perfumery industry. At the beginning of 1918 this *Aniba* species, named in French Guiana: „Bois de rose femelle” was found by Snijders on the Gonini river. (See: Pulle in Rec. Tr. Bot. Néerl. 22, 1915). Afterwards it has been found elsewhere too, though it seems to be very rare in Surinam. Another species, so closely related, that the collectors could only distinguish it by the terpentine smell of the wood, is called: “Bois de rose male”.

Aniba riparia (Nees) Mez.

Furnishes timber wood (Peckholt).

Aniba Canelilla (H.B.K.) Mez.

The bark, with the taste and smell of cinnamon, though fainter is sold on the smaller markets in the Amazonian inland; it is used in the shape of powder for perfuming linen and sometimes for making a stimulating tea (Ducke).

Acrodiclidium Canella (Meissn.) Mez.

Furnishes a very hard, heavy, dark-brown wood with a faint cinnamon smell. It is durable, but very brittle and difficult to work (Pfeiffer). A decoction of the wood is said to be anti-rheumatic (Corrêa).

Acrodiclidium guianense Nees.

Furnishes useful timber wood (Peckholt).

Acrodiclidium Aubletii Kosterm.

According to Aublet this plant should furnish the: „Bois de rose de Cayenne”. It has been proved now that the real rose wood is furnished by *Aniba rosaeodora*. Several *Acrodiclidium* species have a more or less pungent rose smell. As producers of rose wood plants belonging to various families are mentioned e.g. *Protium altissimum* March, *Amyris* and *Fagara* species, etc.

Mezilaurus Itauba (Meissn.) Taubert.

Furnishes one of the most useful and durable timbers of Brazil and Guiana; the wood is yellowish-green, very sound and strong and especially suited for ship-building (Ducke). The fruit is edible, but it has a strong resinous flavour; from the pulp a wine is made (Spruce). The bark is astringent (Dragendorff).

Cassytha filiformis L.

The aborigines use the stems rubbed with chalk to pitch their vessels (Rumphius). The crushed stems are employed to expel intestinal parasites (Hasskarl) and a watery decoction is said to be a remedy against the coming out of hair (Greshoff). Pulverized and mixed with nutmeg it is said to cure diseases of the abdomen and stomach; the powder mixed with ginger and butter is used as an ointment on tumours. In Southern India the Brahmans use the plant for giving skimmed milk a more agreeable flavour (Greshoff). The powder or viscous juice of the stems is used against vermin (Dragendorff), mixed with sesam oil it preserves the hair, mixed with sugar it is a remedy against sore eyes and head-ache (Rheede). In China it is used as depurative and antivenereal (Baillon, Bot. méd.).

HERNANDIACEAE.

Hernandia sonora L.

The wood is used for canoe-building and indoor work; it is very light and porous, and when dried it can be used as tinder (Lamarck). In the Dutch East Indies swimmers for fishing nets are made of it (Greshoff). The bark should cure inflamed wounds (Dragendorff). An alcoholic extract of the pink sap wood is employed as aphrodisiac; a decoction of the bark should cure wounds, caused by poisoned arrow points (Hartwich). The fruit yields an oil for burning in lamps; in the Dutch East Indies the aborigines make a sort of candle

sticks of it. The oil, extracted out of the stamped and boiled seeds should be narcotic (Hasskarl). On the isle of Réunion a liqueur is made of the fragrant cupule of the fruit (Greshoff); on the Antilles it is used as a drastic. The belief that the plant should have depilating properties is due to the fact that Rumphius' *Arbor regis* was for a long time taken for *Hernandia*, it is however a plant belonging to the *Euphorbiaceae*. The boiled fruit is used against chronic diarrhoea; it is a strong purgative. An ointment made of the fruits is employed against scrofulous affections (Descourtilz).

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SUPPLEMENT.

DESCRIPTIONS OF THE MALPIGHIACEAE, LAURACEAE
AND HERNANDIACEAE KNOWN FROM SURINAM.

(REPRINTED FROM A. PULLE, FLORA OF SURINAM VOL. II).

MALPIGHIACEAE

BY

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Lianes, shrubs or trees. Young parts covered with 1-celled, mostly brachiate, bifurcate, or compass-needle-shaped hairs. Leaves opposite, (rarely alternate) mostly entire, usually petioled, often with glands on margin and beneath, usually pinnately nerved. Petioles often with glands. Stipules usually small or wanting, rarely large, either interpetiolar, attached to the petiole or to the branch, or intrapetiolar, mostly free. Inflorescences racemose, terminal or axillary, simple or compound, consisting of racemes, corymbs or umbels, rarely reduced to a single flower. Pedicels articulate, provided with 2 bracteoles, at the base with 1 bract or rarely a leaflet. Flowers hermaphrodite, rarely diclinous (not in Surinam species), zygomorphous, heterochlamydeous, rarely apetalous (not in Surinam species). Receptacle convex, flat or depressed. Sepals 5, free or rarely united at the base, with quincuncial aestivation, rarely valvate, beset with usually 5—10 glands, or glandless (in nearly all species there are glandless and glandbearing varieties). Petals 5, alternating with the sepals, with cochlear aestivation, mostly manifestly clawed, usually unequal, often concave, rarely entire, margin often glandular. Androecium obdiplostemonous, (the 5 stamens opposite the petals often shorter than the alternating ones) either actinomorphic or zygomorphous, often some stamens sterile or abortive. Filaments usually united at the base or higher up, rarely distinct. Anthers narrow or broad, the connectives often large. Carpels 3,

rarely 2 or 4, partly or entirely united, epigynous, each with 1 pendulous, campylotropous or hemi-anatropous ovule. Styles 3, mostly free, rarely united, bearing at the top the acute, obtuse, capitellate or dilated stigma. Fruit a schizocarp, the mericarps with wings or hairs (not in Surinam species), ventrally or dorsally dehiscent capsules, 1—3-pyrenous drupes, or 1-seeded nuts. Seeds without endosperm. Embryo notorrhizal, rarely straight, with mostly curved, circinnate, involute or convolute cotyledons. Plumula small.

Distribution: Nearly 800 species, 56 genera, mostly in the tropics of the New and Old World.

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The key to the genera is only based on the Surinam species.

1. *a.* Fruit winged (samara) attached to a high pyramidal, usually 3-sided receptacle 2

- b.* Fruit a drupe, capsule, or nutlike, attached to a flat or depressed receptacle 9
2. *a.* Samaras with a small, dorsal ridge, keel or winglet and large distinct or united lateral wings. 3
- b.* The largest wing of the samaras is the dorsal one. 6
3. *a.* Aestivation of the sepals quincuncial; sepals, bracts and bracteoles ovate, elliptical or lanceolate. Styles nearly straight (except: *Hiraea*). Lateral wing large, the medio-dorsal one developed, intermedial emergences wanting, or consisting only of wrinkles, crests, or small winglets. 4
- b.* Aestivation of sepals valvate; sepals and large bracts and bracteoles oblanceolate or spatulate. Styles \pm sigmoid. Intermedial emergences very large, therefore fruit with 5 parallel, subequal wings. Inflorescences consisting of 4-flowered pseudo-umbels, in axillar panicles or corymbs. Leaves beneath grey-velutinous, with 2 glands at the base. Calyx pink, with 8 pairwise united glands. Ovary densely hirsute with 3 styles... 3. **Diplopterys.**
4. *a.* Lateral wing entire (1 wing) or at top and base incised (2 wings) 5
- b.* Lateral wing X-shaped, consisting of 4 parts .. 4. **Tetrapteris.**
- c.* Lateral wing V-shaped, consisting of 2 parts... 5. **Dolichopterys.**
5. *a.* Stipules small, at the base of the petiole. Inflorescences consisting of racemes (rarely umbels) forming panicles. Pedicels with small bracteoles above or at the middle. Seeds with nearly equal cotyledons 1. **Mascagnia.**
- b.* Stipules large, attached either to the base or to the top of the petiole. Inflorescences consisting of axillary or terminal umbels, either solitary or in corymbs, shorter than the leaves. Pedicels bibracteolate at the base. Seeds with unequal cotyledons, the larger one plicate around the strongly reduced interior one .. 2. **Hiraea.**
6. *a.* Flowers zygomorphous or actinomorphic. All 10 stamens fertile. Style-tops obtuse or uncinat.

- Wing thickened at the upper or lower margin, rarely entirely 7
- b.* Flowers zygomorphous. Stamens opposite the 4 lateral sepals sterile, the others fertile or all more or less fertile. Style-tops leaf- and clawlike, with stigma at the inner angle. Wing with thick upper, thin lower margin 8
7. *a.* Flowers small, sub-actinomorphic. Top of the style compressed, often ending in a short claw. Stigmas clavate or truncate, at the inner angle of the top of the style. Dorsal wing of the samara with thin upper (ventral) and thick lower (dorsal) margin. (Wings of *Heteropteris reticulata* entirely thickened) 6. **Heteropteris.**
- b.* Flowers zygomorphous. Top of the styles truncate and mostly with orbicular, capitellate stigmas. Dorsal wing with thick upper and thin lower margin. 7. **Banisteria.**
8. *a.* Leaves pinnately nerved. All stamens more or less fertile. Dorsal wing very short, crest-like. 9. **Brachypterys.**
- b.* Leaves palmately nerved. The 4 lateral stamens sterile. Dorsal wing large. 8. **Stigmaphyllon.**
9. *a.* Axillary or terminal racemes, bearing 2-flowered branchlets. Bracts and bracteoles with glands. Flowers pink. Filaments glabrous, at the base united into a hirsute ring; anthers glabrous. Ovary glabrous, 2-locular with 2 styles. Fruit separating into 2 smooth cocci. 10. **Spachea.**
- b.* Axillary racemes or many-to 1-flowered corymbs. Bracts and bracteoles glandless (except *Bunchosia*). Ovary 2—3-locular, with 2 or 3 styles. Fruit a 3—1-pyrenous drupe, or 3—1nuts 10
10. *a.* Styles obtuse. Drupe with 2 or 3 pyrenes. Cotyledons nearly straight or shortly uncinat. 11
- b.* Styles subulate, nearly straight. Drupe with 1, 3-locular, 3-seeded pyrene, exocarp thin, fleshy, endocarp bony or woody. Cotyledons sub-equal, spirally involute or one enveloping the other with the margins 13. **Byrsonima.**

11. *a.* ∞ - to 1-flowered, axillary and terminal corymbs. Bracteoles glandless. Calyx with 6—10 glands, the 6 posterior longer than the others. Ovary glabrous; styles free, with obtuse or slightly dilated top with the stigma at the inner angle. Drupe with 3 pyrenes, longitudinally 3—5-crested, and transversally ribbed. 11. **Malpighia.**
- b.* ∞ -flowered, elongated, axillary racemes, larger than the leaves. Bracteoles with large glands. Ovary glabrous or sericeous. Styles free or united, with oblique capitellate stigmas. Drupe with 2 smooth pyrenes 12. **Bunchosia.**

1. MASCAGNIA Bert. emend. Griseb. et Ndz.

Climbing or partially erect shrubs. Leaves opposite, reticulate, petiolate, membranous or coriaceous, varying from glabrous to copiously pubescent. Stipules scanty, attached to the sides of the base of the petiole, deciduous. Axillary or terminal, simple or paniced racemes, sometimes umbels (not in Surinam species). Pedicels rather long. Bracts and bracteoles ovate, lanceolate or elliptical. Sepals broad, ovate, lanceolate or elliptical, persistent; aestivation quincuncial, outside puberulous, inside glabrous, provided with 8, rarely 10 glands. Petals unguiculate, varying in colour, membranous, mostly glabrous, ovate or obovate, with usually cordate base, often undulate; the margin crenulate, erose or toothed, rarely one of them fringed, the 5th petal rarely glandular. Stamens 10, all fertile; androecium either actinomorphic, and then the stamens opposite the petals shorter, or zygomorphic, and then the 2 stamens opposite the posterior-lateral petals, resp. opposite the posterior styles, longer than the 8 others. Filaments subulate or lanceolate, with short anthers. Ovary 3-lobed, 3-locular. Styles 3, short, mostly straight, obtuse, glabrous. The 1—3 samaras attached to a pyramidal, trigonous torus, at last becoming more or less free, with large, lateral, entire, or at the top incised wing, or divided into 2 lateral wings; dorsal

crest or winglet often, and intermedial appendages or winglets now and then present. Cotyledons mostly more or less equal, notorrhizal, leaflike.

Distribution: Species about 40, in tropical America, including the West Indies.

1. a. Petals in adult flowers glabrous (see also *M. leucanthele*); margin toothed or wavy. Samara-wing slightly incised. 2
- b. Petals in adult flowers sericeous outside; margin glandular-toothed or lacerate-ciliate. Samara-wing incised as far as the nut 3
2. a. The epipetalous stamens equal, slightly smaller than the alternating ones. Styles short, nearly straight, equal; top of the styles compressed, acute. Corymbs small, axillary. 1. *M. sepium* (Juss.) Griseb.
- b. Of the epipetalous stamens those opposite the posterior styles larger and thicker than the others. The 2 posterior styles thickest, curved at right angles at base; the anterior style shorter, nearly straight. Tops of the styles compressed, distinctly uncinat. Panicles large, decompound, leaf-bearing, consisting of many-flowered racemes. 2. *M. ovatifolia* (Kunth) Griseb.
3. a. Petals in adult flowers at last glabrous. Top of the styles triangular, truncate, stigma covering the whole top. Corymbs few-flowered, forming terminal or sub-terminal ample, 3 × compound panicles. 5. *M. leucanthele* Griseb.
- b. Petals densely sericeous outside. Top of the styles compressed; stigma at the inner angle. Simple or paniced racemes 4
4. a. Bracteoles glandless or at the base of the lower surface with 1—4 abortive glands along the margin. Sepals with revolute, glandless tops. Petals with lacerate-ciliate, involute margins. The epipetalous stamens slightly longer than the alternating ones. Styles equal, nearly straight 3. *M. anisopetala* (Juss.) Griseb.

- b. Margin of the bracteoles with 7—15 long-stipitate, capitellate-clavate glands. Sepals erect, upper part of the margin with 5—9 stipitate glands. Petals flat with sub-glandular teeth. The 3 stamens opposite the styles with curved filaments and with much thicker anthers than the others. Styles curved, the 2 posterior ones thicker and more curved than the anterior one
- 4. **M. multiglandulosa** Niedenzu.

1. **Mascagnia sepium** (Juss.) Griseb. in Fl. Bras. XII, 1 (1858), p. 96; id. in Vid. Medd. Kjöb. (1875), p. 147; Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 6; id. in Engl., Pfl. reich. IV, 141 (1928), p. 94; — *Hiraea sepium* Juss. in St. Hil., Fl. Bras. mer. III (1852), p. 16, t. 165; id. in Arch. Mus. Par. III (1843), p. 552; Griseb. in Linnaea XIII (1839), p. 243.

Liane or shrub, dependent on the surrounding vegetation. Young parts covered with rufous, yellowish or whitish, sericeous or velutinous hairs; compass-needle-shaped with straight branches, or forked with erect branches; feet always very short (in Surinam specimen forked hairs with conspicuous feet). Branchlets compressed, slender, velutinous; branches cylindrical, mostly glabrous, brownish or greyish, 3—5 mm in diam, beset with many small lenticels; internodes $\frac{1}{2}$ —6(—20) cm long. Leaves opposite (sometimes pseudo-alternate) membranous, chartaceous or coriaceous, ovate or ovate-oblong, with rounded or subcordate base, revolute margin and acuminate top, very varying in size. Young leaves sericeous or velutinous; adult ones either glabrescent or with persistent hairs; above smooth, beneath often with several impressed glands; midrib strongly prominent (in subspec. *bierosa*), primary nerves (4—6 on each side) prominent, arcuate, not attaining the margin, the secondary ones laxly reticulate. Petioles mostly sericeous, 4—25 mm long, canaliculate. Stipules small, deciduous. Small, manyflowered, axillary corymbs, at the top of a velutinous peduncle. Pedicels very slender, ascending, velutinous, up to 20 mm long, bracteate

at the base, jointed below the middle and somewhat below the articulation bibracteolate. Bracts and bracteoles mostly subulate or lanceolate (rarely ovate), hirsute, 2—3, resp. $\frac{1}{2}$ — $1\frac{1}{2}$ mm long, one of the bracteoles often with a small gland. Flowers 1— $1\frac{1}{2}$ cm in diameter. Sepals ovate, erect, outside sericeous, inside glabrous, 3—4 mm long, beset with 8 large, ellipsoid or obovoid, 2—3 mm long, contiguous glands, with mostly free and recurved tops. Petals subequal, membranous, glabrous, patent. Limb elliptical or obovate, hollow, 3—5 mm long, base subcordate or hastate, margin toothed, top galeate, dorsally carinate; claws straight, 1—2 mm long. Stamens exerted, the episepalous ones somewhat longer; the 2 stamens opposite the posterior styles exceeding the others; filaments glabrous. Anthers elliptical, cells straight, parallel with a thick connective. Ovary 3-lobed, villose, dorsally crested; styles 3, attached to the ventral side of the carpids, glabrous, straight or slightly diverging, 2 mm long, top compressed or obtuse, stigma at the inner angle. Samaras puberulous; nut sub-globose, hardly $\frac{1}{2}$ cm high, top acuminate; lateral wing orbicular or ovate, yellow-green, at the top slightly protruding beyond the nut and slightly sinuate-emarginate, 2— $3\frac{1}{2}$ cm in diam., very thin; margin undulate; dorsal crest semi-lanceolate, -ovate, or -cordate, 8—15 mm long, 1—2 mm high, not attaining the apical sinus. Ventral areole ovate-acute, 2—3 mm long, embryo with short radicle and fleshy cotyledons.

Distribution: From Argentina and Paraguay to Tobago and Honduras.

Sub-species *acuminata* Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908); id. in Engl., Pfl. reich. IV (1928), p. 95.

Leaves rather long-acuminate, acumen up to $\frac{1}{10}$ of the length of the leaf; mostly with long petiole (not in var. *Salzmanniana*).

var. **Salzmanniana** Ndz. l. c. [merging into var. *bierosa* (Moric.) Griseb.].

Branchlets and branches soon glabrescent. Leaves large, soon glabrous, chartaceous, ovate; base oblique-cordate, often with 2 glands; margin strongly revolute; top short-acuminate. Lower surface with strongly prominent midrib, few, arcuate primary nerves, and laxly reticulate, hardly prominent other veins; the veins at the base of the leaf slightly puberulous. Petioles puberulous, 1 cm long. Stipules subulate, hardly 2 mm long.

Distribution: Brazil.

Tapanahoni R. (Versteeg n. 681, fr. July); Locality unknown: Menge, ex reliq. Wullschlägel s. n. [B.].

var. **velutina** Griseb. in Vid. Medd. (1875), p. 147; Ndz. l. c.

Branchlets and leaves with persistent velutinous hairs. Leaves small, 3—9 cm long, membranous. Petioles long, sericeous or velutinous. Stipules very small, setaceous, caducous. Bracts and bracteoles lanceolate or setaceous. Flowers 1 cm in diam.; anthers globose.

Distribution: As in the species.

Brownsberg (B.W. n. 3180, fl. Sept.).

Subspecies **bierosa** (Moric.) Griseb. in Fl. Bras. XII, 1 (1858), p. 96; Ndz. in Engl., Pfl. reich IV (1928), p. 96; — *Hiraea bierosa* Moric. ex Juss. in Ann. sc. nat. Bot. XIII (1840), p. 260.

Leaves chartaceous or coriaceous, ovate; base cordate; top obtuse or emarginate, or shortly and broadly acute or acuminate.

var. **aequatorialis** Ndz. in Arb. Bot. Inst. l. c., p. 7; id. in Engl., l. c., p. 96.

Leaves chartaceous-coriaceous; above glabrous, beneath hispid, up to 13 cm long, and 7½ cm wide.

Distribution: Para, Guiana, Tobago, Trinidad.

Marowijne R. near Albina (Wullschlägel n. 1391, fr. Oct. [B.]).

2. **Mascagnia ovatifolia** (Kunth) Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 13; id. in Engl., Pfl. reich IV (1928), p. 101, f. 15A; Small in N.-Amer. Fl. XXV, 2 (1910), p. 120; — *Hiraea ovatifolia* Kunth in Nov. gen. et spec. V (1821), p. 131; Juss. in Arch. Mus. Par. III (1843), p. 552; — *Hiraea divaricata* Kunth l. c., p. 131; Juss. l. c., p. 551; — *Hiraea oblongifolia* D.C., Prodr. I (1824), p. 585; Juss. l. c., p. 550; — *Hiraea elegans* Juss. l. c., p. 549; — *Hiraea Jussieuana* Miq. in Linnaea XIX (1847), p. 142; — *Mascagnia elegans* Griseb. in Fl. Bras. XII, 1 (1858), p. 15, t. 19; Pulle, Enum. Pl. Surin. (1906), p. 466.

Shrub or liane dependent on the surrounding vegetation. Young branchlets grey-velutinous, thin, cylindrical; branches glabrous, brownish, striate, up to $\frac{1}{2}$ cm in diam.; internodes up to $12\frac{1}{2}$ cm long. Leaves opposite, membranous-chartaceous, ovate, ovate-lanceolate or lanceolate, up to $12\frac{1}{2}$ cm long, $7\frac{1}{2}$ cm wide, with obtuse or acuminate base, and rather long and abruptly acuminate top, mostly glandless; margin flat. Young leaves sericeous, glabrescent, except the veins beneath; beneath midrib and primary nerves (4—5 on each side) prominent, the secondary nerves reticulate. Petioles slender, cylindrical, often curved, beneath canaliculate, sericeous, velutinous or glabrescent, up to 2 cm long, mostly glandless. Stipules minute ($\frac{1}{2}$ — $\frac{3}{4}$ mm), triangular or subulate, puberulous. Leaves of the inflorescence gradually diminishing to $1\frac{1}{2}$ cm long (petioles included) bracts. Grey-pubescent, up to 40-flowered racemes, up to 10 cm long (peduncle included), in lax, ample, terminal, leafy, decompound panicles. Pedicels grey-pubescent, 1— $1\frac{1}{2}$ cm long, cylindrical, nearly erect, 2—3 mm above the base articulated, and bibracteolate somewhat below the joint. Bracts and bracteoles triangular-subulate or linear, small (1— $1\frac{1}{2}$, resp. $\frac{1}{2}$ —1 mm long), glandless, top acute. Flowers $1\frac{1}{4}$ cm in diam. Sepals elliptical or oblong, 2—3 mm long, outside sericeous, with 8, thick, oblong 2— $2\frac{1}{2}$ mm long glands,

with recurved and often free tops. Petals pink or lilac, patent, glabrous, semi-orbicular or broadly ovate; margin toothed or wavy; base cuneate or cordate; 3—5 mm long; claw straight, 3 mm long. Stamens long-exserted, glabrous, the stamens opposite the posterior styles slightly thicker and longer than the others; anthers elliptical, $\frac{1}{2}$ —1 mm long; cells pilose, recurved at the base. Ovary subglobose-ovoid, white-hirsute, each carpel with 3 dorsal crests; styles 3, glabrous, trigonous, 2 mm long, the posterior thicker, at the base curved at right angles, the anterior style nearly straight, slightly shorter; top of the styles acute or slightly uncinat, with stigma at the inner angle. Samaras pink, with few long hairs; nut reticulately veined, up to 5 mm high; ventral areole obpiriform, 3—4 mm long; wing sub-orbicular, symmetrical, entire or undulate, glabrous, membranous, with strong radial veins, $1\frac{1}{2}$ —3 cm in diam., at the top 3 mm incised; dorsal crest keel-like, 4—6 mm long, 2—4 mm wide, reaching as far as the apical wing-sinus.

Distribution: From Argentina and Paraguay to Colombia and Trinidad.

Paramaribo (Hering 32 [L.], type of *Hiraea Jussieuana* Miq.; Wulfschlägel n. 920 [G.]; Went n. 225, fl. Aug.; Splitgerber n. 768 [L.]; v. Hall s. n.; Weigelt s. n. [D.]); Way to Charlesburg (B.W. n. 504, fl. and fr. Apr.); Tourtonne-laan (Kegel n. 829, fl. March [G.]); locality unknown: Focke n. 317, n. 1103, and s. n.

var. **oblongifolia** (Bertero) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 13; id. in Engl., Pfl. reich IV (1928), p. 102; — *Mascagnia oblongifolia* Bertero ex D.C., Prodr. I (1825), p. 585; Juss. in Arch. Mus. Par. III (1843), p. 550.

Leaves lanceolate-ovate, up to 12 cm long, 5 cm wide; top of the style acute or shortly uncinat; wing ovate, up to 2 cm long, 1.6 cm wide.

Distribution: Colombia, Guiana.

Locality and collect. unknown: Herb. Reichenbach s. n., named *Hiraea floribunda* [D.].

3. **Mascagnia anisopetala** (Juss.) Griseb. in Fl. Bras. XII, 1 (1858), p. 95; Pulle, Enum. Pl. Surin. (1906), p. 466; Ndz. in Engl., Pfl. reich IV, 141 (1928), p. 106; t. 15N, O; Kostermans l. c. p. 4; — *Hiraea anisopetala* Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 13; id. in Arch. Mus. Par. III (1843), p. 554; Miq. in Linnaea XVIII (1844), p. 57; — *Mascagnia macrodisca* (Tr. et Planch.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. (1908), p. 16; id. in Engl., Pfl. reich IV (1928), p. 105; — *Hiraea macrodisca* Tr. et Planch. in Ann. sc. nat. 4e sér. Bot. XVIII (1862), p. 326.

Shrubby liane, grey-tomentose; arms of the hairs curved, 1 mm long, feet 0,2 mm long. Branches cylindrical, 4–5 mm in diam.; branchlets compressed; internodes $1\frac{1}{2}$ –5(–17) cm long. Leaves opposite, membranous-chartaceous, ovate, obovate, elliptical or oblong, 5–10(–17) cm long, 2–5(–9) cm wide; base acute or obtuse; top acuminate, mucronate or obtuse; margin flattish. Adult leaves above glabrous, smooth, shining, beneath densely sericeous-tomentose (rarely nearly glabrous) with prominent midrib and primary nerves (5–6 on each side); the secondary ones reticulate, slightly prominent; base along the margin often with 2–5 glands. Petioles thick, canaliculate, $\frac{1}{2}$ –2 cm long, usually with disappearing glands. Stipules very small or wanting. Densely sericeous, simple, 5–20-flowered racemes, or axillary and terminal, up to 10 cm long, raceme-bearing panicles. Pedicels 3–7 mm long, densely sericeous, bracteolate slightly above the middle, bracteate at the base. Bracts and bracteoles ovate or lanceolate, outside sericeous, top often slightly revolute; bracteoles along the basal margin with 0–4 glands. Flowers 1–1,2 cm in diam. Sepals lanceolate with revolute top, outside densely sericeous, inside glabrous, shining, 4–7 mm long, with 8 oblong-elliptical, 2–3 mm long glands, halfway free and recurved. Petals membranous, pale-reddish, strongly unequal, patent, except the petal opposite the glandless sepal (Chodat, in Bull. Soc. Bot. Genève 9 (1917), p. 58), outside densely sericeous,

obovate-oblong, 2—3 mm long, the 5th one 5—6 mm long, with involute lacerate-ciliate margin, and thin (5th one dilated), 1½—3 mm long claws. Stamens included, glabrous, those opposite the sepals slightly longer than the others; filaments subulate, short; anthers linear-oblong, with cordate or hastate base. Ovary densely hirsute, 3-crested; styles equal, nearly straight, glabrous, top compressed, stigmas at the inner angle. Samaras sericeous-tomentose; nut subglobose, 5—6 mm in diam.; ventral areole broadly ovate or orbicular, 4 mm in diam.; wing sub-orbicular, 3—5(—8) cm in diam., with deep-sinuate margin, at the top incised as far as the nut; dorsal crest oblique-elliptical or ovate, sinuate, ½—2 cm high, 6—10 mm wide.

Distribution: Tropical South America.

var. **macrodisca** (Tr. et Pl.) Kosterm. l. c., p. 5; — *Mascagnia macrodisca* (Tr. et Pl.) Ndz. in Engl., Pfl. reich l. c., p. 105.

Leaves slightly sericeous beneath.

Distribution: Colombia, Bolivia.

Paramaribo (Splitg. n. 768 [L.], named *Hiraea rosea* Splitg.); upper Saramacca R. near Jacob-Kondre (Pulle n. 111, fl. Dec.); upper Suriname R. near Goddo (Stahel n. 35, fl., fr., Jan.).

4. **Mascagnia multiglandulosa** Ndz. in Bull. Herb. Boiss. 2 sér. VII (1907), p. 284; id. in Arb. Bot. Inst. Lyc. Braunsb. III (1908), p. 17; id. in Engl., Pfl. reich IV (1928), p. 107, f. 15P.

Olive-green, velutinous liane. Branches cylindrical, glabrescent, brownish, slightly striate, up to 4 mm in diam.; branchlets compressed, velutinous; internodes 2—12 cm long. Leaves opposite, chartaceous, ovate; base cordate; margin flattish; top caudate-acuminate; up to 10 cm long, and 5 cm wide. Young leaves densely velutinous; adult on both sides velutinous, beneath midrib and primary nerves (6—9 on each side)

prominent, the few secondary ones reticulate and slightly prominent. Petioles thick, cylindrical, velutinous, 3—11 mm long. Stipules very small. Leaves of the inflorescences gradually diminishing to small bracts. Racemes 6—12-flowered, 2—3 cm long, axillary and terminal, usually in panicles. Pedicels straight, thickish, velutinous, 6—11 mm long, bibracteolate slightly above the middle, bracteate at the base. Bracts ovate or lanceolate, acute, outside velutinous, inside glabrous, 4—7 mm long. Bracteoles ovate-lanceolate, acute, outside velutinous, inside glabrous; margin with 7—15 long-stipitate (up to 1 mm) capitellate-clavate glands. Flowers $1\frac{1}{2}$ cm in diam. Sepals erect, ovate-lanceolate, acute, outside velutinous, inside glabrous, 4—6 mm long, margin with 5—9, long-stipitate (up to 1 mm), capitellate-clavate glands, at the base with 8 ellipsoid or obovoid, $1\frac{1}{2}$ —2 mm long glands. Petals yellow, membranous, outside sericeous; limb flat, ovate-orbicular or obovate; base cordate; margin sub-glandular-toothed; 2—4 mm long; claw thick, straight, 2 mm long. Stamens glabrous, the 2 stamens opposite the posterior styles incurved, much longer and thicker than the others, 4 mm long; the stamen opposite the anterior style as long, but thinner; the stamen opposite the 5th petal 2 mm long, sigmoid between the posterior styles. Anthers glabrous, cells slightly protruding beyond the base of the flat, thick, glandular connective; filaments glabrous, united at the base. Ovary long-hirsute, 3-lobed, 3-locular; styles 3, glabrous, compressed; the posterior ones curved, the anterior one nearly straight, 3—4 mm long, top compressed, with acute or slightly uncinat dorsal side; stigmas at the inner angle. Samaras unknown.

Distribution: Paraguay.

var. **surinamensis** Kosterm. l. c., p. 5.

Branchlets cylindrical, covered with dense lanuginose hairs. Leaves oblong or elliptical, with rounded or subcordate

base and slightly revolute margin; top shortly acuminate or apiculate; above at last glabrous, except the larger veins, beneath with persistent dense lanuginose hairs. Inflorescences and flowers with rusty lanuginose hairs.

Brownsberg (v. Emden s. n., fl. Sept.).

5. **Mascagnia leucanthele** Griseb. in Fl. Bras. XII, 1 (1858), p. 96; Ndz. in Engl.-Prantl., Nat. Pfl. fam. III, 4 (1890), p. 55; id. in Engl., Pfl. reich IV (1928), p. 108; Pulle, in Rec. Tr. Bot. Néerl. IX (1912), p. 143; — *Tetrapteris leucanthele* Griseb. in Schomb., Fauna u. Fl. Guia. (1847), p. 1003; — *Tetrapteris calophylla* Griseb. in Linnaea XXII (1849), p. 23; — *Mascagnia bracteosa* Griseb. p. p. in Fl. Bras. l. c., p. 97.

Liane with silvery or somewhat yellow, velutinous tomentum. Branches cylindrical, glabrescent, brown or dark-violet, beset with lenticels, up to 5 mm in diam.; branchlets compressed; internodes $\frac{1}{2}$ —12 cm long. Leaves opposite, chartaceous, obovate; base rounded; margin strongly revolute; top shortly acuminate or apiculate. Young leaves densely velutinous, the adult ones subglabrescent, smooth, shining above; beneath densely velutinous, with prominent midrib and primary nerves (4—5 on each side), secondary nerves hardly prominent. Petioles velutinous, above canaliculate, up to $1\frac{1}{2}$ cm long. Stipules setaceous, nearly invisible. Leaves of the inflorescences gradually diminishing to hardly (included the 2—3 mm long petiole) 6 mm long bracts. Corymbs 4—6-flowered, forming terminal or subterminal, ample, compound, lax panicles. Pedicels ascendent, slender, 6 mm long, jointed below the middle. Bracts obovate, obtuse, concave, outside densely sericeous, 3 mm long, petioles 1—3 mm long; bracteoles same shape, $1-1\frac{1}{2}$ mm long, petioles 1 mm long. Flowers 1 cm in diam. Sepals lanceolate, outside sericeous, with strongly revolute top, 4—5 mm long, with 10 obovoid, striate, $1\frac{1}{2}$ —2 mm long glands, with free and recurved tops. Petals reddish, erect,

with revolute top, obovate, in bud puberulous at base, glabrescent; 3—4 mm long, the 5th one larger; margin slightly toothed; claw broad, erect, 1—2 mm long. Stamens nearly equal, included; anthers resupinate, cordate-ovoid, 1—1.3 mm long; filaments short, glabrous, united at the base. Ovary sericeous; styles 3, straight, trigonous, glabrous; stigmas truncate, covering the whole top of the style. Samaras reddish, the young ones sericeous, at last puberulous, attached to the pyramidal torus, at last becoming free; nut subglobose, 6 mm in diam.; ventral areole suborbicular, 4 mm in diam.; wing suborbicular, entire, except for the angle of 45° — 120° at the top, up to $3\frac{1}{2}$ cm wide, nearly 3 cm high; margin sinuate, incised as far as the nut; dorsal crest semi-cordate, with sinuate margin, up to $1\frac{1}{4}$ cm high, and $\frac{1}{2}$ cm wide.

Distribution: Guiana, Amazone-district.

Daalbergweg (B.W. n. 5453, fr. Nov.); Para district near Republiek (Kuyper n. 46, fl. Oct.); forest of Zanderij I (Samuels n. 254 [L.]); Patrick-savanna (Gonggryp s. n., fr.); Brownsberg (B.W. n. 6692, fl. Nov.); locality unknown: Weigelt s. n., named *Banisteria nitida* Weigelt [D.].

2. HIRAEA Jacq.

Trees or lianes. Leaves opposite, entire, petiolate, mostly coriaceous, usually somewhat pubescent, often copiously so, glandless; not only the primary nerves, but also the secondary ones parallel to each other. Petiole biglandular, rather short. Stipules mostly large, mostly subulate, persistent, attached to the base or to the top of the petiole, sometimes wanting. Usually 4-flowered umbels, axillary or at the top of short branchlets, or often 3- ∞ forming an axillary corymb. Pedicels bibracteolate at the base; bracts and bracteoles ovate, lanceolate or elliptical. Flower buds globose. Sepals 5, with quincuncial aestivation, persistent, ovate, lanceolate or elliptical, mostly with 8, rarely with 9—10 glands; in the same species often glandless. Petals 5, unguiculate; limb membranous or

fleshy, ovate to sub-orbicular, yellow or white; margin nearly entire, toothed or shortly fimbriate, of the 5th one long and glandular-fimbriate. Stamens 10, all fertile; filaments subulate or filiform, united at the base; anthers sub-globose, oblong or ovoid. Androecium and gynaecium either actinomorphic (not in Surinam species), or zygomorphic, with curved stamens and styles. Ovary 3-lobed, 3-locular, dorsally crested; styles distinctly sigmoid, uncinata. The 3—1 samaras with large, entire, or variously divided wing, dorsal winglet and inter-medial crests, or the latter wanting; torus pyramidal; samaras becoming free. Cotyledons strongly unequal, the exterior enveloping the reduced interior one.

Distribution: Species about 26, in tropical America, including the W. Indies.

1. *a.* Leaves beneath golden-yellow haired. Filaments opposite the posterior styles much longer and thicker than the others, strongly curved with decurrent anthers; the filament opposite the 5th petal much smaller than the others. Styles sericeous at the base, the 2 posterior ones semi-circular, sigmoid, longer and thinner than the slightly incurved anterior one. Wings thickish-coriaceous, divided into 3 lobes; dorsal crest ± entire 4. **H. chrysophylla** Juss.
- b.* Leaves beneath glabrous or nearly so. Stamens diminishing from the fore-part to the back-part of the flower. Styles sericeous or glabrous at the base, nearly equal in length, the posterior ones sigmoid. Wings membranous; dorsal crest toothed, or only the midrib prominent 2
2. *a.* Leaves acuminate, with obtuse acumen, glandless. Petals membranous, yellow. Anthers sub-globose with short, thick, glanduliform, sub-globose connectives. Dorsal crest of samara small, only the midrib 0,3 mm prominent 1. **H. affinis** Miq.
- b.* Leaves acuminate, glandless or glandular-toothed. Petals fleshy, yellow or white. Anthers large

- (1½—2 mm), ellipsoid or obovoid. Samara with a distinct dorsal crest 3
3. *a.* Leaves coriaceous or coriaceous-chartaceous, glabrous, acuminate, base slightly cordate or cuneate, margin revolute, glandular-toothed. Stipules attached at ⅓ from the base of the petiole. Pedicels thick, 1 mm in diam. Stamens hardly diminishing from the for-part to the back-part of the flower. Dorsal crest of the samara ½ cm high, or only the midrib prominent. . . . 2. **H. Gaudichaudiana** Juss.
- b.* Leaves chartaceous, glabrous, except the midrib beneath; obtusely acuminate, base usually obtuse or rounded; margin flattish, glandless; midrib and primary nerves beneath strongly prominent, reddish. Stipules at, or nearly at the top of the petiole. Petioles more slender, ½—1 mm in diam. Androecium strongly zygomorphous. Dorsal crest of the samara oblique-quadrangular, 2 mm long, 1—1½ mm high 3. **H. fagifolia** (D.C.) Juss.

1. **Hiraea affinis** Miq. in *Linnaea* XIX (1847), p. 133; *Ndz. in Verz. Vorl. Lyc. Hos.* (1906), p. 8; *id. in Engl., Pfl. reich IV* (1928), p. 135, t. 18J; *Pulle, Enum. Pl. Surin.* (1906), p. 467.

Liane. Branchlets compressed, striate, at first sericeous, soon glabrescent; branches cylindrical, grey or brownish, with many, very small lenticels, up to 7 mm in diam.; internodes 2—10 cm long. Leaves coriaceous-chartaceous, obovate or oblong-obovate or oblong, up to 23 cm long, and 11 cm wide; base cordate; top obtusely acuminate, margin flat, glandless. Young leaves sericeous; adult ones soon glabrescent, above nearly smooth, shining, with impressed midrib and primary nerves, beneath strongly prominent, the secondary ones nearly parallel, ½—3 mm from each other, slightly prominent; veins reticulate. Petioles thick, sericeous, 5—11 mm long, with subulate, hardly 1 mm long stipules at ⅓ from the base, top with 2 inconspicuous, gland-like, disappearing dots. Umbels mostly 4-flowered, forming axillary, ± contracted and corym-

biform panicles. Umbel-bearing peduncles 4—8 mm long, sericeous, thick, bibracteate 0—2 mm above their base. Lower bracts subtriangular, acute, 2—2½ mm long, upper ones ovate, 1½ mm long. Bracteoles semi-orbicular, ½ mm long, sericeous outside. Pedicels sericeous, 1—2 mm long, bibracteolate at the base. Flowers 1,7 cm in diam.; buds globose. Sepals lanceolate or lanceolate-ovate, 3½—5 mm long, top reflexed, outside sericeous, with 8—9 oblong, longitudinally canaliculate, 2—3 mm long glands. Petals membranous, yellow, concave, suborbicular, 5—6 mm long, base sub-hastate, decurrent into the claw; margin, especially of the 5th one, toothed or fringed; claw rather slender, slightly reflexed, 3 mm long. The 3 anterior stamens slightly curved, separated from the others, the 7 others inclined to the for-part of the flower; filaments of the epipetalous stamens shorter than the others, the filament opposite the 5th petal smallest. Filaments glabrous, united at the base. Anthers sub-globose, with thick glanduliform sub-globose connectives. Ovary ovoid, 1 mm long, densely hirsute, each carpel with 2 dorsal appendages; styles 3, rather slender, long-exserted, 3 mm long, the posterior ones sigmoid, as long as the slightly curved anterior one; tops long-uncinate, stigmas at the inner angle. Nut of samara sericeous, globose, 6 mm in diam., fanlike nerved, ventral areole orbicular, 2 mm in diam. The 2 wings membranous, glabrous, reniform, greenish-white, up to 5 cm high and 3 cm wide, margin sinuate. Only the midrib of the dorsal crest 0,3 mm prominent.

Distribution: Fr. Guiana.

Gland bearing form: Karouany R. (Kappler n. 1709, type specimen.)

Glandless form: Marowijne R., Djoeka-creek (B.W. n. 3685, fl. March.); Coppename R., bank below Raleigh-falls (Lanjouw n. 989, fr. Sept.).

Vernacular name: Kautété.

2. *Hiraea Gaudichaudiana* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Par. III

(1845), p. 571; Griseb. in Fl. Bras. XII, 1 (1858), p. 98; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 137; — *Tetrapteris Gaudichaudiana* Juss. in St. Hil., Fl. Bras. mer. III (1852), p. 9.

Climbing shrub. Young parts rusty-sericeous. Branchlets compressed, sericeous; branches glabrous, smooth or striate, $\frac{1}{2}$ cm in diam., with few lenticels; internodes 2—10 cm long. Leaves large, coriaceous or coriaceous-chartaceous, obovate or oblanceolate, up to 28 cm long, 11 cm wide, with often glandular-toothed, revolute margin; base slightly cordate or cuneate, top shortly acuminate. Young leaves sericeous, soon glabrescent, rarely midrib remaining sericeous beneath; adult ones with rather smooth, shining upper surface with impressed nerves, beneath midrib and primary nerves strongly prominent, the secondary less, nearly parallel, $1\frac{1}{2}$ —4 mm from each other. Petioles thick, often sericeous, $\frac{1}{2}$ — $1\frac{1}{2}$ cm long with 4—7 mm long, intrapetiolar, setaceous, hirsute stipules at or above the middle. Umbels 3—6-flowered, forming axillary, much contracted yellow-or grey-sericeous panicles. Peduncles sericeous, thickish, 0—1 cm long, consisting of 2 internodes. Pedicels thick (1 mm in diam.), velutinous or tomentose, 1— $2\frac{1}{2}$ cm long, bracteolate at the base. Bracts and bracteoles ovate, $2\frac{1}{2}$ —3, resp. $1\frac{1}{2}$ —2 mm long. Flowers 15—23 mm in diam.; buds globose. Sepals broadly ovate, outside sericeous, 3 mm long, with 8—10 ellipsoid or obovoid glands; petals fleshy, yellow or white, glabrous; limb concave, orbicular, with cuneate, more or less rounded base; 6—7 mm long, margin subentire or slightly fringed, the 5th petal glandular-fimbriate, 5 mm long, fringes $\frac{1}{2}$ —1 mm long. Claw thin, reflexed at the base, 2—3 mm long. Stamens hardly diminishing from the fore-part of the flower to the back-part; the 3 anterior stamens curved and separated from the others; anthers obovoid, $1\frac{1}{2}$ — $2\frac{1}{2}$ mm long, with thick, red, flat-convex connectives, cells parallel. Filaments glabrous, $2\frac{1}{2}$ mm long, united at the

base. Ovary densely hirsute, dorsally with 2 appendages; styles 3, exerted, the anterior one less sigmoid than the other two; tops uncinatate, stigmas at the inner angle. Samaras sparingly pubescent; nut globose, $\frac{1}{2}$ cm in diam.; ventral areole sub-orbicular, 2 mm in diam. Wings membranous, semi-orbicular or elliptical-reniform, $3\frac{1}{2}$ —4 cm high, 2 cm wide; margin undulate or repand; dorsal crest deeply lacerate, hardly $\frac{1}{2}$ cm high and wide, or only midrib prominent.

Distribution: Tropical Brazil.

Gland bearing form: Marowijne R. (Kappler s. n. [L.]); Gonini R. (Versteeg n. 68, fr. Aug.); Brownsberg (B.W. n. 6696, fr. Nov.); without locality: Kappler n. 64 [L.].

3. *Hiraea fagifolia* (D.C.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Par. III (1843), p. 567, t. XIX; Griseb. in Fl. Bras. XII, 1 (1858), p. 99; Ndz. in Verz. Vorles. Lyc. Hos. (1906), p. 14; id. in Engl., Pfl. reich IV (1928), p. 140, t. 18N; Pulle, Enum. Pl. Surin. (1906), p. 467; Small in N.-Amer. Fl. XXV, 2 (1910), p. 123; — *Hiraea fagifolia* (D.C.) Juss., var. *Candolleana* Ndz. in Verz. Vorl. l. c., p. 114; id. in Engl., Pfl. reich l. c., p. 141; — *Banisteria fagifolia* D.C., Prodr. I (1824), p. 590; — *Hiraea Riedleyana* Juss. in Ann. sc. l. c., p. 258; id. in Arch. Mus. l. c., p. 569; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Pulle, Enum. l. c., p. 467.

Climbing shrub; young parts sericeous. Branchlets compressed, striate, grey-sericeous (hairs very short), with few, very small lenticels; branches glabrous, reddish, up to $\frac{1}{2}$ cm in diam.; internodes 1—7 cm long. Leaves chartaceous, mostly obovate, up to 20 cm long and 10 cm wide, usually acuminate (with blunt tip) or rarely apiculate; base mostly rounded or more or less cordate; margin flattish, glandless. Young leaves sericeous, soon glabrescent, the midrib on the lower surface excepted; adult leaves above glabrous, rather smooth, the midrib and primary nerves (9—14 on each side) impressed, the secondary ones nearly parallel, 1—2 mm separated from each

other; beneath midrib and primary nerves strongly prominent, reddish, the secondary ones slightly prominent. Petioles stout, grey-sericeous, $\frac{1}{2}$ —1 cm long, with 2 setaceous, 3—5 mm long, stipules at or little below the top, and dorsally 2 glandular dots. Umbels mostly 4-flowered, forming axillary, contracted, corymbiform panicles. Umbel-bearing peduncles 5—7 mm long, puberulous, on their turn attached to 0—2 mm long peduncles. Pedicels slender, $\frac{1}{2}$ —1 mm in diam., grey-puberulous, 1— $1\frac{1}{2}$ cm long. Bracts and bracteoles concave, ovate, outside puberulous, $1\frac{1}{2}$ —2, resp. 1— $1\frac{1}{2}$ mm long. Flowers 1— $1\frac{1}{2}$ cm in diam.; buds globose. Sepals sub-orbicular, shortly acuminate, 2—4 cm in diam., outside puberulous, glandless or with 8 ellipsoid, 1—2 mm long glands, with free tops. Petals fleshy, yellow or white; limb hollow, orbicular, glabrous, 4—7 mm long, with cuneate, emarginate base, and toothed or fringed margin, the 5th one distinctly glandular-fringed; claws thin, 2—3 mm long. Stamens exserted, the epipetalous ones smaller than the others; the stamen opposite the 5th petal smallest; the 3 anterior ones curved and separated from the others; those opposite the posterior styles with much thicker and longer filaments than the others, and with curved cells, long-protruding beyond the connectives; filaments \pm highly united, anthers large, elliptical or obovate, $1\frac{1}{2}$ —2 mm long, connectives thick, glanduliform, ellipsoid. Ovary hirsute, 1 mm high, carpids 3-crested; styles 3, exserted, sericeous at the base, $4\frac{1}{2}$ mm long, the posterior ones distinctly sigmoid, curved at right angles, with uncinatate tops; the anterior one nearly straight, with long-uncinate top. Stigmas at the inner angle. Samaras glabrous; nut globose, puberulous, 4 mm high, ventral areole elliptical, 2 mm high; the lateral wings sub-orbicular or reniform, membranous, with semi-circular, sinuate exterior, and rather straight interior margin, 2—5 cm high, $1\frac{1}{2}$ — $2\frac{1}{2}$ cm wide; dorsal crest oblique-quadrangular, short, puberulous.

Distribution: Northern South America to Guatemala.

Gland bearing form: Paramaribo near Pl. Beekhuizen (Wullschlägel n. 57 [B.] and s. n. [B.]); near Pl. Kwatta (Kegel n. 804 [G.]); Para district (Wullschlägel n. 917 p. p. [G.]); locality unknown: Hostmann n. 291, 363a, 412 [L.], 494 p. p., s. n. [L.], Kappler n. 412 [L.].

Glandless form: Paramaribo (Splitgerber n. 242 [L.], type of *H. guyanensis* Splitg. msc., fl. Nov.); Para district (Splitgerber n. 468 [L.], *H. guyanensis* Splitg. msc., fl. May); locality unknown: Hostmann n. 494 p. p.; Weigelt s. n. [D.], named *Hiraea Weigeltiana* Rchb.

var. **Blanchetiana** (Moric.) Ndz. in Verz. Vorl. Lyc. Hos. (1906), p. 14; id. in Engl., Pfl. reich IV (1928), p. 141; — *Hiraea Blanchetiana* Moric., Pl. Amer. (1830), p. 140, t. 65; Juss. in Arch. Mus. Par. III (1845), p. 567; Miq. in Linnaea 18 (1844), p. 57; Pulle, Enum. Pl. Surin. (1906), p. 466; — *Hiraea multiflora* Miq. in Nat. Verh. Maatsch. Wetensch. Haarlem II, 7 (1850), p. 83.

Leaves mostly elliptical or oblong; base rounded. Stipules attached below the top of the petiole. Calyx with 8 glands. Dorsal crest of the samara sub-triangular, hardly 2 mm high.

f. **latifolia** Ndz. in Verz. Vorl. l. c., p. 14; id. in Engl., Pfl. reich l. c., p. 141.

Leaves elliptical or obovate.

Gonini R. (Versteeg n. 170, fl. Aug.); Paramaribo (Focke n. 325, fl. and fr. May, 493 [L.], 993 [L.]; Kegel n. 295 [G.] fl. Aug. and 352 [G.]; Essed n. 306, fr. March; Coll. indig. n. 32a, fl. Febr.); Paramaribo, near Kwattaweg (Focke n. 784; 1104, type of *H. multiflora* Miq.; Pulle n. 16, fl. July; Kegel n. 804 p. p. [G.]); Slootwijk (Soeprata n. 23), fl. July); Hemas Boite (Soeprata n. 48A, fl. June); Wagenwegstraat (Soeprata n. 23A, fl. June); Poelepantje (Kegel n. 737 [G.], fl. Febr.); Para district (Splitgerber n. 468a [L.], fl. May), near Pl. La Rencontre (Focke n. 784, fl. Apr.); Saramacca R. (Focke n. 317 p. p.); locality unknown: Splitgerber n. 33 [L.] and s. n. [L.], n. 468 [L.], fl. Jan., 468a [L.]; Focke n. 468 [L.], 1372, and s. n. [L.]; Hostmann n. 363, 493 [L.], and s. n. [L.].

4. **Hiraea chrysophylla** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 258; id. in Arch. Mus. Paris III

(1843), p. 572; Griseb. in Fl. Bras. XII, 1 (1858), p. 100, t. XX; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 122; Ndz. in Verz. Vorl. Lyc. Hos. (1906), p. 16; id. in Engl., Pfl. reich IV (1928), p. 143, t. 1D, 19; Pulle, Enum. Pl. Surin. (1906), p. 467.

Liane or shrub. Young parts covered with golden-yellow hairs. Branchlets sericeous, glabrescent; branches glabrous, brown-violet, striate, with many very small lenticels, 3 mm in diam.; internodes 1—10 cm long. Leaves chartaceous, obovate or oblong, 5—10 cm long, 2½—5 cm wide, with acuminate or apiculate top, and narrowed, obtuse base. Young leaves sericeous; adult ones glabrous above, smooth, with impressed midrib and primary nerves, beneath golden-yellow or rarely silvery sericeous, with strongly prominent midrib and primary nerves, the secondary ones nearly parallel, ½—2 mm from each other, nearly invisible. Margin flat, often with very small glandular dots. Petioles sericeous, 5—7½ mm long, mostly curved, with 2 glands and 2 stipules below the top. Stipules linear, hirsute, 1—4 mm long. Usually 4-flowered umbels, forming a contracted, axillary, shortly puberulous corymbiform panicle, much shorter than the leaves. Umbel-bearing peduncles thin, 7 mm long. Pedicels slender, puberulous, 1—1½ cm long, bibracteolate at the base. Bracts and bracteoles ovate, obtuse, outside sericeous, 1—2½ mm long. Flowers 1,7 cm in diam.; buds globose. Sepals ovate, acute, 2 mm long, outside sericeous, with 8 or 10 ellipsoid, 1 mm long glands with free tops. Petals fleshy, glabrous, yellow; limb concave, orbicular, 6 mm in diam., with cuneate base, toothed or shortly fimbriate margin (fringes hardly ½ mm long); the 5th one distinctly glandular-fimbriate; claw thin, curved. Stamens exerted; filaments glabrous, rather highly united; epipetalous stamens smaller than the others, the stamen opposite the 5th petal smallest; those opposite the 2 posterior sepals longer and thicker, strongly curved, with decurrent anthers; the 3 anterior stamens slightly curved, separated from the other 7, which are curved

to the for-part of the flower. Anthers orbicular, $\frac{1}{2}$ mm long, with thick, globose connectives. Ovary ovoid, 1 mm high, hirsute, carpids dorsally 3-crested; styles 3, sericeous at their bases; the posterior ones semi-circular-sigmoid, longer and thinner than the small, thick, simply curved anterior one. Tops hammer-shaped, long-uncinate, with stigmas at the inner angles. Samaras pubescent; the 2 lateral wings 1 cm long, divided into 3 ovate, oblong or linear lobes; the lobes thick-coriaceous, entire. Dorsal crest nearly entire, semi-oblong, 1—2 mm high, 5 mm long.

Distribution: Northern Brazil, Guiana.

Glandless form: Tapanahoni R. (Versteeg n. 803, fl. Aug.); Cottica R. near Moengo (Lanjouw n. 423, fl. Aug.); upper Commewijne R. (Hostmann n. 225, and n. 318 [L.]; Focke n. 1225); upper Suriname R. (B.W. n. 5448, fl. June); upper Coppename R. (Boon n. 1075, fl. Aug.); Wajombo (B.W. n. 3146, fl. Nov.); Corantijne R., near Goud-creek (B.W. n. 3577, fl. Oct.).

Gland bearing form: Marowijne R., Siparawyne-creek (Kappler n. 2127 [L.]); Commewijne R. near Pl. Waiampibo (Splitgerber n. 511 [L.], named: *H. discolor* Splitg. msc., fl. Jan.); Suriname R., Kabelstation (Lanjouw n. 1153, fl. Nov.); Suriname R., Sara-creek, Abontjeman (Coll. ind. n. 302, fl. May); upper Gran Rio (Stahel n. 222, fl. and fr. March); upper Gran Rio, Maupé-dam (Stahel n. 205, fl. Febr.); Saramacca R. (Wullschlägel n. 55 [B.]); upper Saramacca R. near Janbasigado (Pulle n. 193, fl. Jan., n. 406, 436, 478, fl. March); locality unknown: Hostmann n. 1107 p. p.; Tulleken n. 1075 [L.].

Vernacular names: Talekirang; Talikji (Car.).

3. DIPLOPTERYYS Juss., emend. Niedenzu.

Lianes or climbing shrubs. Leaves opposite, entire, the secondary nerves nearly parallel, veins areolate. Stipules large, interpetiolar. Umbels 4-flowered in terminal or axillary panicles or corymbs. Bracts and bracteoles oblanceolate or linear-spathulate. Aestivation of the sepals valvate; sepals oblanceolate or spathulate, velutinous on both sides, with 8, pairwise united

glands. Petals orbicular, generally cochleate, toothed or fringed, outside sericeous. Stamens 10, all fertile; the 3 posterior ones much smaller than the others; the 2 opposite the posterior-lateral petals with longer and thicker filaments and anthers than the anterior ones. Ovary pilose, 3-lobed. Styles 3, sigmoid, short, obtuse or uncinata. Samaras attached to a pyramidal torus, at last becoming more or less free; each with at least 5 longitudinal wings. Cotyledons flat, straight.

Distribution: Species 7 in Peru, Brazil, Guiana, Trinidad.

1. *Diplopterys rosea* (Miq.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. IV (1912), p. 20; id. in Engl., Pfl. reich IV (1928), p. 228; — *Hiraea rosea* Miq., Stirp. Surin. (1850), p. 84; — *Jubelina rosea* (Miq.) Ndz. in Pulle, Enum. Pl. Surin. (1906), p. 472.

Liane. Branchlets compressed, densely velutinous-tomentose (hairs bifid); branches cylindrical, glabrescent; internodes 1—12 cm long. Leaves opposite, entire, membranous-chartaceous, obovate, up to 18 cm long and 10 cm wide; base oblique, obtuse or rounded; top obtuse or very short-acuminate; margin flat, with few, glandular dots. Young leaves densely velutinous-tomentose, glandless; adult ones minutely punctulate above, with few scabrous hairs and impressed midrib and primary nerves; beneath with persistent hairs, midrib strongly prominent, primary nerves (7 on each side) slightly prominent, the secondary ones parallel, 3—5 mm from each other, veins areolate. Petioles velutinous, glandless, above canaliculate, 10—18 mm long. Stipules thick, triangular, hirsute, 1 mm long. Umbels 4-flowered, forming terminal or axillary, ample, densely rusty-velutinous, up to 4 × compound panicles. All peduncles compressed, canaliculate; 2—4 umbels on short, ½ cm long peduncles. Pedicels with incurved top, abruptly thickened, sericeous, up to 1 cm long, bibracteolate at the base. Bracts and bracteoles petiolate, pink, velutinous, linear-oblongate, concave, with thick top, acuminate or obtuse, 7—13, resp.

5—7 mm long. Flowers $1\frac{1}{2}$ cm in diam.; anterior part enlarged. Sepals pink, sericeous, spatulate-linear, thickened towards the top, 5—6 mm long, already in bud inclined towards the anterior part of the flower, with 8, pairwise connate, white-greenish, broadly ovoid (broader than the sepals), 2—3 mm long glands. Petals pink, outside sericeous, orbicular; the 2 anterior ones cochleate, nearly entire, 8 mm long, the others flat, 4—5 mm long and glandular-fimbriate. Claws sericeous, 3—4 mm long. Stamens diminishing from the fore- to the back-part of the flower. The episcpalous ones smaller and thinner; the 3 posterior ones reduced; the 2 stamens opposite the posterior-lateral petals with sigmoid, thick filaments and thick anthers. Filaments glabrous, flat, united up to the middle. Ovary ovoid, hirsute, $1\frac{1}{2}$ mm high. Styles 3, the posterior ones sigmoid, thicker and slightly longer than the straight anterior one. Young samaras densely sericeous, with thick and long hairs (arms of the hairs 2 mm long), glabrescent. Nut with a rather broad rostrum (1 mm) at the base; ventral areole linear, 6—7 mm long; the 2 lateral cells empty, the other one ovoid. Wings membranous-chartaceous, with deep-wavy margin, the 2 lateral ones oblong-elliptical, 3— $3\frac{1}{2}$ cm wide, 4— $4\frac{1}{2}$ cm high, bases confluent. Dorsal wing semi-orbicular, $3\frac{1}{2}$ cm long, hardly 2 cm wide; the 2 intermediate appendages one half shorter than the dorsal wing, forming transverse, wavy winglets.

Distribution: Guiana.

Upper Marowijne R. (Kappler ed. Hohenack. n. 1807, fl. Aug., type of *Hiraea rosea* Miq.); Tapanahoni R. (Versteeg n. 720, fl. Aug.).

4. TETRAPTERIS Cav.

Low, climbing or erect shrubs, mostly lianes. Leaves opposite, entire, petioled, chartaceous or coriaceous, glabrous or sparingly pubescent, reticulate, glandless. Stipules interpetiolar, attached to the petiole or to the branch, inconspicuous, deciduous. Corymbs or umbels in terminal panicles, rarely axillary, or

terminal, simpl racemes, corymbs or umbels. Bracts and bracteoles ovate, lanceolate or elliptical, now and then leaf-like. Sepals 5, broad, persistent, with quincuncial aestivation, with 8, rarely 10 glands, or glandless. Petals 5, unguiculate, usually glabrous, yellow or reddish; limb concave, ovate, orbicular or obovate, with acute, rounded or cordate base and revolute, nearly entire or toothed margin (rarely the 5th one fimbriate). Stamens 10, all fertile, actinomorphic, the episepalous ones usually slightly longer. Filaments triangular or subulate, up to $\frac{1}{3}$ — $\frac{1}{2}$ connate; anthers broad, glabrous or rarely hirsute. Ovary consisting of more or less united carpids; each carpid with crest. Styles 3, usually nearly equal and straight, short, obtuse, stigmas mostly truncate. The 1—3 samaras attached to a pyramidal torus, at last more or less free. Wing X-shaped, divided into 4, rarely 2 segments; the parts equal, or the lower ones (rarely the upper ones) smaller. Various dorsal and intermediate emergences. Seeds pear-shaped or sub-globose. Cotyledons thick, nearly equal, replicate.

Distribution: Species about 60, from Argentina and Rio Grande do Sul to Cuba and Mexico.

1. *a.* Umbels, mostly 4-flowered, forming compound panicles, with normal and reduced leaves..... 2
- b.* Umbels or racemes, but without leaves..... 4
2. *a.* Leaves thin-chartaceous, glabrous, or with few hairs beneath 3
- b.* Leaves thick-chartaceous, densely-sericeous beneath 7. **T. calophylla** Juss.
3. *a.* The 2 posterior styles 2 × thicker and as long as, or $\frac{1}{2}$ mm longer than the anterior one. No appendages between dorsal crest and wing of the samaras 8. **T. crispa** Juss.
- b.* Styles nearly equal. Many intermediate appendages. 6. **T. discolor** (G. F. W. Meyer) D.C.
4. *a.* Stipules interpetiolar, attached to the branch, leaving annular scars. Umbels mostly 4-flowered, forming a panicle. Lower segments of the wing

- much shorter than the upper ones 5. **T. mucronata** Cav.
- b. Stipules petiolar, attached to the base of the petiole. Racemes or corymbiform racemes. Segments of the wing nearly equal..... 5
5. a. Sepals nearly glabrous. Petals glabrous with long-fimbriate margin. Filaments filiform, up to 4 mm long. Carpids glabrous. Wing of the samara glabrous, membranous. Intermediate appendages wanting..... 3. **T. fimbripetala** Juss.
- b. Sepals outside sericeous. Petals sericeous or glabrous with entire or toothed margin. Filaments broad, $1\frac{1}{2}$ —3 mm long. Carpids sericeous. Wing coriaceous, nearly glabrous or sericeous. Intermediate appendages many 6
6. a. Axillary many-flowered racemes. Bracts and bracteoles 6—4, resp. 4—3 mm long. Flowers $1\frac{1}{2}$ —2 cm in diam. Sepals erect. Dorsal crest deeply lacerated into many lobes 1. **T. maranhamensis** Juss.
- b. Corymbiform racemes or panicles. Bracts and bracteoles 3—1, resp. $1-\frac{1}{2}$ mm long. Flowers $1-1\frac{1}{2}$ cm in diam. Sepals strongly recurved. Dorsal crest nearly entire. 4. **T. acutifolia** Cav.
- c. Axillary and terminal racemes. Bracts and bracteoles 2—3, resp. 3—5 mm long, one of the latter with a gland. Flowers $1\frac{1}{4}$ cm in diam. Sepals incurved. Dorsal crest nearly entire 2. **T. squarrosa** Griseb.

1. **Tetrapteris maranhamensis** Juss. in Arch. Mus. Paris III (1843), p. 537; Griseb. in Fl. Bras. XII, 1 (1858), p. 87, t. 15; Pulle in Rec. Tr. Bot. Néerl. IX (1912), p. 144; Ndz. in Engl., Pfl. reich IV (1928), p. 179; — *Hiraea gracilis* Benth. in Hook. Lond. Journ. Bot. VII (1848), p. 135; Griseb. in Linnaea 22 (1849), p. 24.

Liane. Young parts white-sericeous, with long hairs, soon glabrous. Branchlets compressed, very slender, nearly glabrous; branches cylindrical, dark-violet, glabrous, ribbed, up to 3 mm in diam., with many, small grey lenticels; internodes $\frac{1}{2}$ —3 cm

long. Leaves chartaceous, lanceolate-oblong, or ovate-oblong, up to 9 cm long, 3 cm wide; base rounded or subcordate; margin flat; top very acute and long-acuminate. Young leaves white-sericeous; adult ones above glabrous, shining, with slightly prominent nerves, beneath dull, glabrous or with few hairs, the rusty midrib and primary nerves (5—8 on each side), prominent, secondary ones densely reticulate; lower surface with few glandular dots. Petioles glabrous, slender, canaliculate above, $1\frac{1}{2}$ —2 mm long. Stipules inconspicuous. Racemes axillary, somewhat sericeous, many-flowered, up to 10 cm long; peduncle often with small, $1\frac{1}{2}$ — $\frac{1}{2}$ cm long, leaves. Pedicels slender, glabrescent, erect-patent, thickened towards the top, 8—11 mm long, bibracteolate in the middle, bracteate at the base. Bracts and bracteoles lanceolate or linear-lanceolate, outside sericeous, 4—6, resp. 3—4 mm long, base often petioled. Flowers $1\frac{1}{2}$ —2 cm in diam. Sepals triangular-ovate, erect, outside densely sericeous, inside glabrous, except at the base, 3— $3\frac{1}{2}$ mm long, with 8 oblong, 2 mm long glands. Petals yellow, membranous, unequal; limb nearly flat, obovate or sub-orbicular, 5—9 mm long, outside sericeous, base slightly sagittate-cordate, margin toothed or nearly entire, claws straight, $1\frac{1}{2}$ —2 mm long; 5th petal smaller. Stamens glabrous, slightly exserted. The stamen opposite the glandless sepal very short; those opposite the styles largest, with flat, $2\frac{1}{2}$ —3 mm long, filaments, united at the base. Anthers erect, curved, elliptical, $\frac{1}{2}$ —1 mm long; cells nearly as long as the connectives. Carpids slightly connate, densely sericeous, with 4 appendages. Styles nearly straight, glabrous, slender, more or less equal, 3— $3\frac{1}{2}$ mm long, attached at the base of the ventral side of the carpids; tops compressed, uncinat. Samaras glabrescent. Nut sericeous, cylindrical, obconical, radially ribbed, 2 mm long. Sub-basal areole orbicular, 1 mm in diam. Segments of the wing coriaceous, nearly equal, linear-oblong or linear-ob lanceolate, nearly entire, up to 8 mm long, $2\frac{1}{2}$ mm wide.

Dorsal crest nearly semi-orbicular, lacerate; the many lobes lanceolate, 2—3½ mm wide. Many intermediate, aculeate-lingulate 2—3½ mm long appendages.

Distribution: Northern Brazil, Guiana.

Upper Suriname R. (Wullschlägel n. 827 p.p. ex Niedenzu).

2. **Tetrapteris squarrosa** Griseb. in Fl. Bras. XII, 1 (1858), p. 87, t. 16; Ndz. in Engl., Pfl. reich IV (1928), p. 181; Pulle in Rec. Tr. Bot. Néerl. IX (1912), p. 144; — *Bunchosia squarrosa* Griseb. in Linnæa 22 (1849), p. 11; — *Tetrapteris fimbripetala* Griseb. in Linnæa l. c., p. 23; — *Tetrapteris complicata* Miq., Stirp. Surin. (1850), p. 82; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Tetrapteris rhodopteron* Oliv. in Trans. Linn. Soc. Lond. 2e ser. Bot. (1887), p. 272.

Climbing shrub or liane. Young parts with very short, sericeous hairs, very soon glabrous. Branchlets slightly puberulous, compressed, dark-brown; branches cylindrical, grey, slender, 2½ mm in diam.; internodes 2—6 cm long. Leaves coriaceous or chartaceous, ovate or lanceolate, 11—15 cm long, 5½ cm wide; base mostly obtuse or rounded; margin flat or slightly revolute; top acuminate, with generally obtuse acumen. Young leaves sparingly pubescent; adult ones above glabrous, shining, smooth, beneath with long-persistent sericeous hairs, only midrib prominent, primary nerves (5—7 on each side) hardly prominent, veins obsolete. Stipules minute, ½—1 mm long, or wanting. Petioles glabrescent, slightly canaliculate above, 4—6 mm long. Racemes straight, axillary, peduncled, 10—25-flowered, with long-persistent sericeous hairs, up to 10 cm long. Pedicels 12 mm long, bracteolate at or below the middle, bracteate at the base; the upper ones shorter. Bracts lanceolate-ovate, fleshy, outside nearly glabrous, with prominent midrib, 2—3 mm long, top often revolute or circinnate. Bracteoles larger, elliptical, fleshy, nearly glabrous, concave, 3—5 mm long, one of them with a large gland at the outside. Flowers 1¾ cm in diam. Sepals ovate-lanceolate, outside slightly

sericeous, 4—5 mm long, top acutish, slightly incurved, with 10 very thick, oblong, longitudinally furrowed, decurrent glands, 3—4 mm long, with recurved, free tops. Petals yellow, glabrous, ovate or obovate, 4—6 mm long, base somewhat sagittate, margin toothed; claw thick, 1—2 mm long. Stamens hardly exerted, the episepalous ones hardly longer; filaments flat, glabrous, rather highly connate, $2\frac{1}{2}$ mm long. Anthers linear-lanceolate or elliptical, with cordate base, slightly puberulous, 1— $1\frac{1}{2}$ mm long. Carpids slightly united, densely hirsute, 1 mm long, with many appendages. Styles nearly equal, glabrous, thickish, slightly recurved towards the top, attached to the basal, ventral side of the carpids; tops acutish or hardly compressed. Samaras nearly glabrous; nut obconical, radially ribbed, sericeous, 3 mm in diam.; sub-basal areole orbicular, 1 mm in diam. Lateral wing distinctly 4-parted, rigid-coriaceous, segments nearly equal, oblong or spatulate-oblong, nearly entire, or top slightly retuse, glabrous, up to 12 mm long, and $3\frac{1}{2}$ mm wide. Dorsal crest nearly entire, semi-orbicular, 2—3 mm high, up to 5 mm long, at the top protruding 2 mm between the upper segments. The many transversal, intermediate crests lingulate, parallel, 1—3 mm long.

Distribution: Northern South America as far as Peru.

Gonini R. (Versteeg n. 224, fl. and fr. Aug.); savannah near Bergendaal (Focke n. 1153, fl. Oct., type of *T. complicata* Miq.); savannah near Brownsberg (Lanjouw n. 1247, fl. Nov.); Brownsberg (B.W. n. 6643, fl. Sept.); Para district (Wullschlägel n. 917 p. p. [B.]; n. 827 p. p. [B.]; Kegel n. 317 [D.]); upper Suriname R. (Wullschlägel n. 919 p. p. [B.]); Gros Placer (coll. indig. n. 153, fl. and fr. Apr.); Coppename R. near Raleigh falls (Lanjouw n. 736, fl. Sept.; n. 959, fl. Sept.); upper Coppename R. (Boon n. 1223 and n. 1222, fr. Oct.; n. 1144, fr. Sept.); upper Nickerie R., Blanche Marie falls (Tulleken n. 342, fl. Sept.; n. 357 [L.], fl. Sept.).

3. ***Tetrapteris fimbripetala*** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 263; id. in Arch. Mus. Paris III (1843), p. 544; Pulle, Enum. Pl. Surin. (1906), p. 468; Ndz. in Engl., Pfl. reich IV (1928), p. 182.

Liane. Young parts sparingly appressed white-pruinose-puberulous, soon glabrescent. Branchlets compressed, glabrous; branches cylindrical, dark-purple, smooth, up to $2\frac{1}{2}$ mm in diam. Internodes 2—5 cm long. Leaves coriaceous or chartaceous, oblanceolate, obovate or oblong, up to 12 cm long, 5 cm wide; base acute, rarely obtuse; margin revolute; top acuminate. Young leaves slightly pubescent; adult ones soon glabrous, above smooth and shining, with impressed midrib, and slightly prominent primary nerves, below with several, often more or less obsolete, glands, midrib strongly prominent, primary nerves (8—10 on each side) and the few, laxly reticulate secondary ones slightly prominent. Petioles usually glabrous, canaliculate above, 6—15 mm long. Stipules minute or wanting. Racemes axillary, nearly glabrous, lax, 4—8-flowered, $7\frac{1}{2}$ cm long; peduncles compressed, $2\frac{1}{2}$ cm long. Pedicels compressed, puberulous, $1\frac{1}{2}$ —2 cm long, jointed 5—8 mm above the base, bibracteolate 2—3 mm below the joint. Bracts ovate or triangular, acute, sericeous, $1\frac{1}{2}$ —2 mm long. Bracteoles large, leaf-like, sub-orbicular or ovate, with acute base and very short petioles, 3—5 mm long, often biglandular at the base. Flowers 2— $2\frac{1}{4}$ cm in diam. Sepals erect, ovate, $3\frac{1}{2}$ mm long, more or less glabrous, with 10 ellipsoid or oblong, $1\frac{1}{2}$ —2 mm long glands. Petals yellow, glabrous, membranous, with many veins, concave, orbicular, 7—9 mm long, base cuneate, margin long-fimbriate (fringes 1 mm long), claws recurved, slender, 2—3 mm long. Stamens exserted, those opposite the posterior styles longer and thicker than the others; the episepalous ones hardly longer than the others. Filaments long, filiform, glabrous, slightly connate at the base, the 2 largest 4 mm long. Anthers oblong, glabrous, 1— $1\frac{1}{2}$ mm long. Carpids slightly connate, glabrous, 1 mm high, with many appendages. Styles nearly equal (5 mm), attached to the base of the carpids, exserted, glabrous, the posterior ones recurved at the base, the anterior one nearly straight; tops obtuse. Samaras glabrous. Nut

glabrous, cylindrical, radially veined, 2—3 mm in diam.; the sub-basal areole orbicular, somewhat concave, 1 mm in diam. Segments of the wing nearly equal, membranous, glabrous, red, oblique, linear-oblongate, with acute top and hardly confluent bases, up to 2 cm long, 5—8 mm wide. Dorsal crest trapezoid, deep-sinuate, 5 mm high, 6 mm long, the dorsal top acute, protruding 5 mm between the upper segments of the wing. Intermediate crests wanting.

Distribution: Guiana.

Patrick savannah (Coll. indig. n. 174, fl. and fr. May); Sectie O (Pulle n. 178, fl. Jan.); Zanderij I (Pulle n. 64, fr. July); along railway, km 118 (Stabel s. n., fr. Aug.); Brownsberg (B.W. n. 6817, fr. March); Maratakka R. (B.W. n. 3507, fr. Sept.; n. 3456, fl. Nov.); without locality: Hostmann n. 1252; n. 1227 [K.].

4. *Tetrapteris acutifolia* Cav., Diss. IX (1790), p. 433, t. 261; D.C., Prodr. I (1824), p. 587; Juss. in Arch. Mus. Paris III (1843), p. 534; Miq. in Linnaea 18 (1844), p. 56; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 189; — *Tetrapteris lancifolia* Juss. in Arch. Mus. l. c., p. 536; Griseb. in Fl. Bras. XII, 1 (1858), p. 82.

Liane. Young parts yellow- or grey-sericeous. Branchlets compressed, very slender, glabrous or sericeous; branches cylindrical, smooth, dark-violet, nearly glabrous, up to 3 mm in diam.; internodes 1—6(—10) cm long. Leaves chartaceous, ovate-lanceolate or ovate, up to 13 cm long, 5½ cm wide; base obtuse or rounded; margin recurved, often with few, small glands; top acute or long-acuminate. Young leaves sericeous, (hairs thin, 700 μ long, curled, feet short); adult ones above smooth, metallic shining, beneath the rusty midrib prominent, primary nerves (5—8 on each side) slightly prominent, slightly curved, not attaining the margin; secondary ones laxly reticulate. Petioles mostly slender, canaliculate above, with long-persistent, sericeous hairs, often with 2 minute glands at or above the middle, 4—6 mm long. Stipules minute.

Racemes few-flowered, 4—6 cm long, often corymbiform, forming lax, densely sericeous, terminal (or in the axils of the upper leaves) panicles. Pedicels densely sericeous, slender, oblique-erect, 6—12 mm long, bracteate at base, at $\frac{1}{3}$ from the base bibracteolate. The lower bracts often lanceolate, more or less amplexicaulous, densely sericeous, up to 3 mm long, the upper ones ovate, 1—1½ mm long, with rounded or acutish top. Bracteoles ovate or sub-orbicular, concave, thickish, outside sericeous, $\frac{1}{2}$ —1 mm long, base somewhat amplexicaul. Flowers 1 cm in diam. Sepals outside sericeous, inside glabrous, oblong or linear, 3—5 mm long, tops strongly recurved, with 8, oblong, narrow, 1—3 mm long glands, with free and recurved tops. Petals membranous, outside more or less sericeous, yellow, elliptical or ovate, 3 mm long, base cuneate or sub-sagittate, margin nearly entire or serrate; claws patent, sericeous, slender, 1—2 mm long. Only the anthers of the nearly equal stamens exerted. Filaments broadish, 1½—2 mm long, outside sericeous, up to $\frac{1}{3}$ connate. Anthers glabrous, broadly elliptical, with cordate base, recurved, 1 mm long; cells parallel, slightly protruding beyond the base of the ellipsoid, dark, connectives. Carpids united at the ventral side, densely sericeous. Styles sericeous at the base, nearly straight, tops obtuse. Samaras sericeous. Nut ovoid, densely sericeous, 4 mm long; ventral arcole ovate, acute, small, 2 mm high. Segments of the wing coriaceous, sericeous at the base, nearly equal, ovate, oblong-obovate or linear-oblong, 1—1¼ cm long, 4—7 mm wide; tops rounded or slightly emarginate. Dorsal crest ring-shaped, beginning at the insertion of the style, ending between the lower segments, 2—4 mm high. Between dorsal crest and wing a row of verrucous or wing-like, 1—5 mm high appendages.

Distribution: Brazil to Guiana.

Gonini R. (Versteeg n. 106, fl. and fr. Aug.); upper Suriname R. (Wullschlägel n. 919 [B.] p. p.); upper Cottica R. (Focke n. 682, fl. Oct.); upper Suriname R. (B.W. n. 5110, fr. May).

5. *Tetrapteris mucronata* Cav., Diss. IX (1790), p. 434, t. 262, f. 2, emend. Kosterm.; D.C., Prodr. I (1824), p. 587; Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 9; id. in Arch. Mus. Paris III (1843), p. 521; Griseb. in Fl. Bras. XII, 1 (1858), p. 80; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 198, f. 22D; Kosterm. l. c., p. 5; — *Tetrapteris crebriflora* Juss. in St. Hil., Fl. Bras. mer. l. c., p. 8; id. in Arch. Mus. Par. l. c., p. 521; Griseb. in Fl. Bras. l. c., p. 80; Ndz. in Engl., l. c., p. 197; — *Banisteria eglandulosa* Vellozo, Fl. flum. IV (1827), p. 290, t. 155.

Climbing shrub. Young parts with golden-yellow, sericeous hairs, very soon glabrescent. Branchlets nearly cylindrical, thin, smooth; branches cylindrical, rufous, striate, $\frac{1}{2}$ cm in diam.; internodes 1—5 cm long. Leaves ovate, elliptical or oblong, up to 7, resp. 12 cm long, 7, resp. $5\frac{1}{2}$ cm wide, coriaceous, base acute, obtuse or slightly rounded; margin revolute, top obtuse, acuminate or mucronate. Adult leaves glabrous, shining, above midrib and primary nerves slightly prominent, beneath midrib strongly, primary nerves prominent, secondary ones densely reticulate. Lower leaf surface with glandular dots. Petioles thickish, slightly marginate, canaliculate above, glabrous, $\frac{1}{2}$ —1 cm long. Stipules membranous, distinct, triangular, 0,3 mm long, attached to the branch, very soon deciduous, leaving an annular scar. Umbels 4—6-flowered, forming a simple, axillary panicle, $\frac{1}{2}$ — $\frac{1}{3}$ length of leaf, rarely equal in length (subspec. *eumucronata*), or longer than the subtending leaves (subspec. *crebriflora*). Pedicels slender, sericeous, 6—10 mm long, bracteolate somewhat below the middle, bracteate at the base, on a compressed, 1 cm long peduncle. Bracts of the umbels lanceolate, acute, with two, 3—6 mm long glands at the base, or glandless. Bracts and bracteoles of the flowers lanceolate-subulate, 1—2, resp. 0,3 mm long. Flowers 1— $1\frac{1}{2}$ cm in diam. Sepals erect, sparingly haired, elliptical or sub-orbicular, 2 mm long, with 8 ellipsoid, $1\frac{1}{2}$ mm long glands or glandless. Petals white or yellow, glabrous,

orbicular or elliptical or oblong-obovate, concave, 4—5 mm long, with cuneate or cordate base, crenulate margin, and 1—1½ mm long claws; 5th petal flat, 3 mm long, with broader, 2 mm long claw. Androecium slightly or distinctly zygomorphous, and then anterior stamens much larger and thicker than the posterior ones. Anthers erect, those of the posterior stamens elliptical, 1 mm long, of the anterior ones oblong, 2 mm long, with cells protruding beyond the thick, glanduliform, connectives. Filaments glabrous, rather highly connate. Ovary ovoid, hirsute, 1 mm high, carpids with 2 glabrous appendages. Styles thin, straight, glabrous, 2 mm long, the anterior one 1 mm longer than the posterior ones; tops obtuse or slightly capitate, more or less compressed. Samaras glabrous. Nut sub-globose, 4 mm in diam.; ventral areole ovate, acute, 3 mm long. Segments of the wing entire, obovate, oblong or linear-oblong, coriaceous; the lower ones (up to 3 ×) smaller than the upper ones. Dorsal crest semi-ovate, 1 cm long, up to 2½ mm high, with wavy margin, thorn-shaped at the base. Intermediate winglets thorn-shaped on each side.

Distribution: Northern South America, from Panama to Bolivia; West Indies.

Subspec. **eumucronata** Kosterm. (*T. mucronata* sensu Ndz.).

Panicles ½—⅓ of the length of the subtending leaves. Petals orbicular or elliptical. Androecium distinctly zygomorphous.

f. **ovata** Ndz. in Verz. Vorl. Lyc. Hos. (1909), p. 30; id. in Engl., Pfl. reich IV (1928), p. 199.

Leaves usually ovate or obovate, up to 10 cm long, 7 cm wide. Segments of samara obovate, upper ones 13 mm long, 8 mm wide, lower ones 10 mm long, 5 mm wide. Dorsal crest up to 4 mm long, with 2 large teeth, the basal one up to 7 mm long.

Paramaribo (Wullschlägel n. 56 [B.], fl. Aug.); near Poelephantje (Kegel n. 982 [G.]); Para district near Berlijn (Wullschlägel n. 1389 [B.] and n. 1390 [B.]), without locality: Wullschlägel n. 917 p. p. [B.] and s. n. [B.].

f. **ovalis** Ndz. in Verz. Vorl. l. c., p. 36, id. in Engl. l. c., p. 199.

Leaves usually elliptical. Segments of the samara oblong, upper ones 15 mm long, 5 mm wide, lower ones 10 mm long, 4 mm wide.

Tapanahoni R. (Versteeg n. 716, fl. July); Wajombo R. (Pulle n. 551, fl. Sept.); without locality: Hostmann n. 1142 (gland bearing form, named *T. spec.* Benth. Lond. Journ. Bot. VII, 1848, p. 134); Hostmann s. n. [L.]; Kappler n. 626 [L.]; Kegel n. 954, n. 982 and s. n. [G.].

f. **oblonga** Ndz. in Verz. Vorl. l. c., p. 37; id. in Engl. l. c., p. 199.

Leaves usually oblong, up to 12½ cm long, 5 cm wide. Segments of samara linear-oblong, upper ones up to 16 mm long, 4 mm wide, lower ones 12 mm long, 3 mm wide. Dorsal crest nearly rectangular, 5 mm wide.

Upper Lawa R. (Kappler n. 2125, fl. Nov. and n. 2126 [L.], fr. Nov.); Paramaribo (Kegel n. 953 [G.] and s. n. [G.]); Brownsberg (B.W. n. 726, fl. Sept.); without locality: Kappler n. 150 [K.].

Subspec. **crebriflora** (Juss.) Kosterm. l. c., p. 5.

Panicles as long as or longer than the subtending leaves. Petals oblong-obovate. Androecium slightly or distinctly zygomorphous.

var. **dubia** Griseb. in Vidd. Medd. Kjöb. (1875), p. 142; Ndz. in Engl. l. c., p. 198.

Pedicels bracteolate 3—4 mm from the base. Bracts and bracteoles lanceolate, 2 mm long. Posterior stamens larger. Anterior style longer. Samaras with elliptical segments.

Distribution: Brazil, Peru, Guiana.

Paramaribo (Went n. 536, fr. Oct.); Gran Rio (Hulk n. 226, fr. Sept.); without locality: Kappler a. 1862 [L.] and s. n.

6. **Tetrapteris discolor** (G. F. W. Meyer) D.C., Prodr. I (1824), p. 587; Juss. in Arch. Mus. Paris III (1843), p. 525; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 121; Ndz. in Engl., Pfl. reich IV (1928), p. 205, t. 22, f. F; — *Triopteris discolor* G. F. W. Meyer Prim. Fl. Esseq. (1818), p. 182.

Climbing shrub. Young parts grey-sericeous. Branchlets compressed, white-sericeous or sub-glabrous; branches cylindrical, grey, glabrous, striate, 3 mm in diam., usually with many tuberculate, reddish lenticels; internodes 1—5½ cm long. Leaves thin-chartaceous, oblong or elliptical, up to 13 cm long, and 5 cm wide; base obtuse, margin flat; top acuminate. Young leaves sericeous; adult ones glabrous, except along the nerves beneath; above smooth, shining, lower surface with many glands, midrib and primary nerves (6—8 on each side) prominent, secondary ones slightly prominent, reticulate. Petioles nearly glabrous, canaliculate above; up to 1 cm long. Stipules ovate or lanceolate-ovate, 1—2 mm long, deciduous, leaving an annular scar. Umbels axillary, usually 4-flowered, forming a short, corymbiform, leaf-bearing, terminal panicle, up to 5 cm long. Peduncles of the umbels thick, compressed, of 2 internodes, the lower internode (1 cm) longer than the upper one (up to 5 mm) with 2 elliptical, 2—5 mm long bracts at the joint. Pedicels pubescent, 3 mm long, bracteate at the base, bibracteolate in the middle. Bracts ovate, acute, outside puberulous, 1½ mm long; bracteoles sub-orbicular, 1 mm long, swollen at the base, outside puberulous. Flowers ¼ cm in diam. Sepals ovate or lanceolate, erect, glabrous, 3—4 mm long, margin ciliate, with 8 thick, ellipsoid, 2½—3 mm long glands, with more or less free and recurved tops. Petals yellow, patent, fleshy, glabrous, elliptical, concave, 4—5 mm

long, with sagittate base and nearly entire margin; claws $1\frac{1}{2}$ —2 mm long. The episepalous stamens slightly longer. Filaments glabrous, broad-triangular, 1 mm long, up to $\frac{1}{2}$ connate. Anthers obovoid, cells protruding $\frac{1}{2}$ mm beyond the base of the thick, glanduliform, 1 mm long connectives. Carpids ovoid, densely hirsute, 1—2 mm high, with appendages. Styles thick, straight, 1 mm long. Tops crest-shaped with arcuate, decurrent stigmas, the anterior one less curved and hardly decurrent. Samaras sericeous. Nut globose, densely sericeous, $\frac{1}{2}$ cm in diam.; ventral areole ovate, acute, large, 4 mm high. Lateral segments of the wing coriaceous, obovate, entire, the lower ones up to $3 \times$ shorter than the upper ones, 10×6 mm, resp. 18×8 mm. Dorsal winglet semi-orbicular, 4 mm high, 8 mm long. Many intermediate, obovate or linear, or rectangular, 2—8 mm high, appendages.

Distribution: From Bolivia to Guatemala; Lesser Antilles.

Locality unknown: Wullschlägel n. 918 [B.].

var. **surinamensis** (Miq.) Ndz. in Verz. Vorl. Lyc. Hos. (1909), p. 42; id. in Engl. l. c., p. 206; Pulle in Rec. Trav. Bot. Néerl. IX (1912), p. 144; — *Tetrapteris surinamensis* Miq. in Linnæa 18 (1844), p. 55; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Tetrapteris puberula* Miq. in Tydschr. Nat. Gesch. X (1843), p. 84; id. in Linnæa 18 (1844), p. 56; Juss. in Arch. Mus. Paris III (1843), p. 525; Pulle, Enum. l. c., p. 467.

Leaves obovate-oblong, up to 16 cm long, 6 cm wide, very long (2—3 cm) acuminate. Ventral areole of the samara sub-orbicular. Wings oblong.

Distribution: Guiana.

Wanica-pad (Focke n. 640, type of *T. surinamensis* Miq., fr. Sept.; n. 74 [L.], fl. Aug.); lower Suriname R. (Focke n. 330, type of *T. puberula* Miq., fl. Sept.); Brownsberg (B.W. n. 6646, fl. Oct.); Saramacca R. (Pulle n. 179, fr. Jan.); without locality: Focke n. 107 [L.]; Kappler n. 62 [L.]; Hostmann n. 983 [L.] and s. n. [L.].

var. **brownsbergensis** Kosterm. l. c., p. 5.

Leaves glabrous, obovate-oblong, with acute base and short-acuminate top with blunt point. Petioles up to $1\frac{1}{2}$ cm long. Inflorescences, when fruiting up to 20 cm long.

Brownsberg (B.W. 658, fr. Sept.; v. Emden III, fr. Sept.).

7. **Tetrapteris calophylla** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 264; id. in Arch. Mus. Paris III (1843), p. 525; Griseb. in Fl. Bras. XII, 1 (1858), p. 77; Pulle, Enum. Pl. Surin. (1906), p. 467; Ndz. in Engl., Pfl. reich IV (1928), p. 209, t. 22, f. L.

Liane. Young parts with short, densely golden-yellow sericeous hairs. Branchlets compressed; branches cylindrical, sericeous, up to 8 mm in diam.; internodes 2—12 cm long. Leaves thick chartaceous, large, ovate or obovate, or elliptical, up to 30 cm long, and 14 cm wide, base rounded or more or less cordate, margin revolute; top obtuse, rarely with long and acute acumen. Young leaves densely sericeous; adult ones above glabrous, shining, nearly smooth, with more or less impressed midrib and primary nerves, secondary hardly prominent, reticulate; beneath sericeous, midrib and primary nerves (7—11 on each side) prominent, secondary ones more or less parallel, slightly prominent. Leaves of the inflorescence orbicular, $\frac{1}{2}$ —2 cm long, membranous, sericeous, with cordate base and acuminate or emarginate top. Petioles canaliculate, slightly sericeous or glabrous, 1—3 cm long. Stipules interpetiolar, connate, ovate-acute, or lanceolate, 2 mm long, very soon deciduous, leaving an annular scar. Umbels mostly 4-flowered, forming corymbiform, up to $3 \times$ compound, terminal (or in the axils of the upper leaves), leaf-bearing panicles. All peduncles canaliculate or ribbed, sericeous, those of the umbels thick, 2 cm long, jointed in the middle, with 2 large bracts and stipules. Pedicels 6—10 mm long, bibracteolate in the middle, bracteate at the base. Bracts ovoid, acute, thick, outside puberulous, 2 mm long; bracteoles ovate-orbicular,

outside puberulous, 1 mm long. Flowers 17 mm in diam. Sepals broadly ovate, triangular, incurved, outside puberulous, 3—5 mm long, with 8 very thick, obovoid, $2\frac{1}{2}$ —3 mm long glands. Petals yellow, glabrous, concave, orbicular, 5—7 mm in diam.; base cordate or rounded; margin undulate and lacerate-toothed or crenulate; claws reflexed, 2 mm long; 5th petal smaller. Stamens exerted. Filaments glabrous, 2 mm long, up to $\frac{1}{3}$ — $\frac{1}{2}$ connate, the epipetalous ones broader. Anthers obovate, nearly glabrous. Carpids puberulous, with appendages. Styles exerted, the curved posterior ones much thicker and longer than the nearly straight anterior one, with contort-uncinate tops, the anterior one with obtuse top with decurrent stigma. Samaras golden-yellow sericeous. Nut semi-ovoid, 1 cm long, with broad, ovate, acute, 1 cm high ventral areole. Upper segments of the wing 3—6 \times longer than the lower ones, coriaceous, entire, linear-oblong, up to $4\frac{1}{2}$ cm long, 12 mm wide; lower segments elliptical or obovate, usually 1— $1\frac{1}{2}$ cm long, 5—7 mm wide. Dorsal crest falcate, elliptical, $1\frac{1}{2}$ mm high, 5 mm long; on each side a single, intermediate, 6 mm long winglet or small crest, or appendages wanting.

Distribution: Northern Brazil, French Guiana.

Paramaribo (Wullschlägel n. 915 and n. 915a [B.]); near Pl. Jagtlust (Splitgerber n. 587 [L.], fl. Febr.); Guiana Goud Placer (Coll. indig. n. 96, fr. Apr.); upper Saramacca R. (Pulle n. 229, fl. and fr. Apr.).

8. **Tetrapteris crispa** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 265; id. in Arch. Mus. Paris III (1843), p. 52; Ndz. in Engl., Pfl. reich IV (1928), p. 213, t. 4, f. F, t. 22, f. K; J. F. Macbride in Field Mus. VIII (1930), p. 121; — *Tetrapteris acapulcensis* Kunth in H.B.K., Nov. gen. V (1821), p. 130 (col. ed.); D.C., Prodr. I (1824), p. 587; Juss. in Ann. sc. l. c. , p. 261; id. in Arch. Mus. l. c., p. 521.

Liane. Branchlets compressed, grey-sericeous; branches glabrous, smooth, reddish, up to 4 mm in diam., with few

lenticels; internodes 1—12 cm long. Leaves membranous-chartaceous, ovate, obovate, elliptical or lanceolate-ovate, up to 15 cm long, 10 cm wide; base obtuse, acute, rounded or sub-cordate; margin slightly undulate; top slightly acuminate. Young leaves sericeous; adult ones glabrous, except the principal nerves on the lower surface; above smooth, beneath along the margin small glands, midrib prominent, primary nerves 5—6 on each side, the many secondary ones slightly prominent, somewhat parallel, veins reticulate. Leaves of the inflorescences shortly acuminate or apiculate, broadly ovate, obovate, elliptical or sub-orbicular, $\frac{1}{2}$ —3 cm long, crispy. Petioles slender, glabrescent, canaliculate above, 12—20 mm long. Stipules ovate, puberulous, $1\frac{1}{2}$ —2 mm long. Umbels usually 4-flowered, shortly peduncled, in sub-corymbose panicles, forming compound, axillary panicles. Branches and branchlets of the inflorescence with 2 conspicuous, leaf-like, sub-orbicular bracts. Pedicels 5—10 mm long, pubescent, jointed somewhat below the middle, and there bibracteolate. Bracts and bracteoles nearly equal, appressed to the petioles, ovate or ovate-lanceolate, $1\frac{1}{2}$ mm long, with thin, pilose margin, and swollen base. Flowers 1— $1\frac{3}{4}$ cm in diam. Sepals erect, glabrous, ovate, 5 mm long, with 8 thick glands, the anterior ones obovoid, 2— $2\frac{1}{2}$ mm long, posterior ones oblong, 3— $3\frac{1}{2}$ mm long, with free tops. Petals yellow, glabrous, patent, obovate, 5—7 mm long, somewhat contracted above the cordate or hastate base, lower part carinate, margin undulate; claws recurved, 1—2 mm long. Stamens glabrous, equal, only the elliptical, 1—3 mm long anthers exerted; cells protruding $\frac{1}{2}$ mm beyond the base of the sub-globose, or ellipsoid, $\frac{1}{2}$ mm long connectives. Filaments up to $\frac{1}{3}$ united. Carpids hirsute, crested. Styles slightly exerted, short, straight, the posterior ones twice as thick as the anterior, equal in length or up to $\frac{1}{2}$ mm longer; tops compressed, uncinat, stigma of the anterior style crest-shaped, of the others oblique-decurrent. Samaras

sericeous, especially the nut. Nut ovoid, thick, $\frac{1}{2}$ cm high; ventral areole ovate, acute or acuminate, 5 mm high. Upper segments of the wing entire, coriaceous, obovate-oblong, up to 3 cm long, 1.5 cm wide, with rounded tops; lower segments entire, elliptical, up to 10 mm long, 5 mm wide. Dorsal crest 3—5 mm high, 10 mm long. Intermediate appendages wanting.

Distribution: From Minas Geraes to Mexico.

Upper Suriname R., near Goddo (Stahel n. 47, fr. Jan.).

5. DOLICHOPTERYS Kosterm.

Lianes. Leaves entire, petioled. Stipules inconspicuous. Racemes terminal, elongated, branched at the base. Pedicels bracteate and bibracteolate at the base. Sepals 4, each with a sub-orbicular, radially sulcate, large gland. Flowers unknown. Samara 3 or by abortion 1, attached to a pyramidal, trigonous receptacle. Dorsal wing of the samara large, crest-shaped, lateral wings very long, erect-divaricate, narrowly oblong. Cotyledons equal, replicate.

Distribution: Species 1, endemic.

1. *Dolichopterys surinamensis* Kosterm. in Rec. Tr. Bot. Néerl. 32 (1935), p. 279; also in Med. Bot. Mus. & Herb. Ufr. n. 21 (1935), p. 279.

Liane. Branchlets, petioles and inflorescences covered with velutinous, fuscous-ferruginous pube. Branchlets thick, obsoletely angular, internodes usually 4 cm long, up to 6 mm diam. Leaves obovate-oblong, base rounded, margin hardly recurved, top emarginate, 15—20 cm long, at top 7—9 cm wide, coriaceous, rigid, above glabrous, green, shining, midrib impressed, slightly pilose at base, primary nerves (8—11 on each side) prominulous, not attaining the margin, arcuately united, veins prominulous, densely reticulate, beneath densely sub-sericeous tomentellous, midrib tomentose, strongly prominent, primary nerves prominent; secondary ones prominulous, veins obsolete. Petioles thick,

sub-angular, canaliculate, up to $2\frac{1}{2}$ cm long. Stipules not seen. Racemes forming a few-branched, many-flowered terminal panicle, up to 18 cm long. Flower clusters sessile. Pedicels thick, $1\frac{1}{2}$ mm diam., up to 8 mm long. Bracts and bracteoles small, ovate-lanceolate, densely tomentose, up to 3 mm long, deciduous. Flowers unknown. Calyx-glands 4, large, 3 mm diam., sub-orbicular, radially sulcate, hollowed in the centre. Styles subulate, curved, 3 mm long, glabrous, stigma obtuse. Samaras densely reddish-rusty sericeous-tomentose. Nut globose, tomentose, up to 13 mm diam., ventral areole flat, sub-orbicular, top acute, up to 6 mm diam. Dorsal crest chartaceous, large, ring-shaped, sub-triangular, base elongated, up to 2 cm long, obtuse, top short, obtuse, up to 12 mm long. The lateral wings chartaceous, sericeous, erect-divaricate, linear, up to 6 cm long, 9 mm wide, top rounded, margin entire, reddish (Stahel). Cotyledons equal, flat.

Distribution: Endemic.

Upper Gran Rio (Stahel n. 223, fr. March).

6. HETEROPTERIS Kunth.

Lianes, erect or climbing shrubs. Leaves opposite, mostly entire, petioled, or very rarely sessile, thick-membranous or coriaceous, glabrous or pubescent, often with glands on the lower surface. Parenchym with solitary or clustered crystals. Stipules inconspicuous. Mostly terminal racemes, or corymbs, usually forming panicles. Flowers small. Pedicels bibracteolate in the middle. Sepals 5, persistent, with 8—10 glands or glandless. Petals 5, unguiculate, glabrous, sub-orbicular or reniform, yellow, reddish or white, mostly entire, not rarely carinate. Stamens 10, all fertile, glabrous, the episepalous ones longer than the others and moreover the posterior ones generally smaller than the anterior ones. Anthers usually elliptical, erect, attached above the base, glabrous, rarely pilose, without appendages. Ovary 3-locular, 3-lobed, carpids dorsally

gibbose. Styles 3, free, nearly straight, short; top obtuse, capitate, acute or uncinata, stigmas at the inner angles. Samaras 1—3, attached to a pyramidal torus, at last more or less free. Dorsal wing developed, with thick lower, and thin upper margin or wing entirely thickened. Cotyledons straight, slightly unequal, flat-convex.

Distribution: Species about 80, in tropical America, including the West Indies; one species in western tropical Africa.

1. *a.* Leaves glabrous beneath. Petioles glandless. Cristals solitary. Racemes. Androecium and gynaecium zygomorphous 2
- b.* Leaves golden-yellow sericeous beneath. Petioles biglandular in the middle. Cristals in clusters. Umbels mostly 4-flowered, arranged in panicles. Androecium actinomorphic; the epipetalous stamens shorter. The 3 styles straight, with obtuse tops 1. **H. macrostachya** Juss.
2. *a.* Leaves very large, up to 40 cm long, 15 cm wide, with few appressed hairs beneath, and strongly prominent nerves. Petioles up to 1½ cm long. Racemes 20—40-flowered, up to 30 cm long. Pedicel 5—10 mm long, the upper joint with the flower often deciduous, the lower part with the bracteoles at the top persistent. Top of the styles pediform, with broad claw. Wing of the samara horizontal or bent back, entirely thickened, usually without appendage 3. **H. multiflora** (D.C.) Hochreutiner
- b.* Leaves up to 25 cm long, 9 cm wide, glabrous beneath, veins on both surfaces densely reticulate, nerves slightly prominent. Petioles 2—8 mm long. Racemes 15—20-flowered, 1½—10 cm long, forming panicles. Pedicels 2—6 mm long. Tops of the styles uncinata, rounded or angulate. Wing of the samaras only thickened along the lower margin, ascendant, upper margin with an appendage at the base 2. **H. nervosa** Juss.

1. **Heteropteris macrostachya** Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 275; id. in Arch. Mus. Paris III (1843), p. 450, t. 14; Griseb. in Fl. Bras. XII, 1 (1858), p. 73; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 120; Pulle, Enum. Pl. Surin. (1906), p. 468; Ndz. in Engl., Pfl. reich IV (1928), p. 342; — *Heteropteris* (?) *apiculata* Miq., Stirp. Surin. (1850), p. 81; — *Banisteria apiculata* (Miq.) Robinson ex Small in N.-Amer. Fl. XXV, 2 (1910), p. 136; — *Banisteria obovata* Small l. c., p. 136.

Liane or shrub. Young parts and inflorescences golden-yellow sericeous. Branchlets compressed, rufous-sericeous; branches cylindrical, glabrous, grey, striate, with many minute, white lenticels, up to 7 mm in diam., internodes 1–8 cm long. Leaves coriaceous, ovate, obovate or oblong, up to 20 cm long, 10 cm wide; base obtuse, rounded or more or less cordate, rarely cuneate; margin nearly flat; top usually shortly acuminate or apiculate, rarely emarginate or obtuse. Young leaves sericeous, above less; adult ones above glabrous or nearly so, smooth, shining, nerves not prominent, beneath golden-yellow sericeous, with a row of few, glandular dots along the margin; midrib strongly prominent, primary nerves (8–12 on each side) prominent, secondary nerves more or less parallel, slightly prominent, veins inconspicuous, densely reticulate. Leaves of the inflorescence gradually diminishing to bracts. Petioles thickish, rusty-sub-sericeous, up to 12 mm long, biglandular in the middle. Usually 4-flowered umbels, solitary or 1–3 together in a sessile or peduncled, up to 3 cm long corymb; corymbs forming a narrow, axillary or terminal, elongated, leaf-bearing panicle. Pedicels thick, compressed, sericeous, 3–8 mm long, bibracteolate at or above the middle, bracteate at the base. Bracts ovate, bracteoles orbicular, both erect, outside sericeous, inside glabrous, 1–1½ mm long. Flowers 1–1½ cm in diam. Sepals erect, ovate, acute, 2–5 mm long, outside sericeous, with 8, thick, oblong or slightly sigmoid, conglutinous or more or less connate, 2½–4 mm long glands.

Petals yellow with a brown stripe (Versteeg), fleshy, unequal, concave-carinate, ovate, $3\frac{1}{2}$ —6 mm long, base sagittate, margin nearly entire; 5th petal smaller, glandular-undulate at the base. Claws thick, carinate, curved, $1\frac{1}{2}$ — $2\frac{1}{2}$ mm long; 5th one straight. Stamens included, 4 mm long. Filaments outside puberulous, broad, $\frac{1}{3}$ or nearly entirely united. Anthers oblong-elliptical, glabrous, bent back, 1—2 mm long; cells slightly exceeding the thick, glanduliform connectives. Ovary ovoid, 2 mm high, hirsute. Styles equal, glabrous, triangular, slightly recurved towards the top. Tops obtuse, slightly dilated. Samaras usually 2 (3rd one abortive), thick, golden-yellow sericeous, ascendant. Nut nearly globose, compressed, smooth, 1 cm in diam. Endocarp not protruding into the cells. Ventral areole flat, ovate, acute, 4 mm high. Wing semi-obovate, up to 6 cm long, 2 cm wide, lower margin thick, straight, curved at the top, upper margin thinner, wavy, curved and often contracted at the base, forming a small appendage.

Distribution: From Costa Rica to Peru; West Indies.

f. **oblonga** Ndz. in Engl., Pfl. reich IV (1928), p. 342; Pulle, Enum. Pl. Surin. (1906), p. 468.

Leaves oblong, up to 20 cm long, 8 cm wide.

Marowijne R. (Kappler ed. Hohenack. n. 1915, fl. Aug., type of *H. apiculata* Miq.; n. 1995 [L.], fl. Aug.); Marowijne R. (Wullschlägel n. 1900 [B.]).

f. **ovata** Ndz. in Engl. l. c., p. 434; Pulle, Enum. l. c., p. 469.

Leaves ovate or obovate, up to 15 cm long, 10 cm wide.

Gonini R. (Versteeg n. 169, fl. Aug.); Suriname R. near Gottadam falls (Tresling n. 258, fl. July); lower Coppename R. (Went n. 145 and n. 110, fl. Aug.); without locality: Hostmann n. 897.

2. **Heteropteris nervosa** Juss. in St. Hil., Fl. Bras. mer. III (1832), p. 26; id. in Arch. Mus. Paris III (1843), p. 461; J. F. Macbride in Field Mus. Nat. Hist.

VIII, 2 (1930), p. 120; — *Heteropteris suberosa* (Willd.) Griseb. in *Linnaea* XIII (1839), p. 229; id. in *Fl. Bras.* XII, 1 (1858), p. 68; Pulle, *Enum. Pl. Surin.* (1906), p. 469; Ndz. in *Engl., Pfl. reich* IV (1928), p. 369; — *Banisteria suberosa* Willd. *Herb. n.* 8885 (nomen nudum); Small in *N.-Amer. Fl.* XXV, 2 (1910), p. 137; — *Heteropteris Lessertiana* Juss. in *Arch. Mus. l. c.*, p. 462; — *Heteropteris Candolleana* Juss. l. c., p. 463; — *Heteropteris eglandulosa* (non Juss.) Miq. in *Linnaea* 18 (1844), p. 737, p. 54; — *Heteropteris anoptera* Juss. in *Ann. scienc. nat.* 2 sér. *Botan.* XIII (1840), p. 276; id. in *Arch. Mus.* III (1843), p. 459; Pulle, *Enum. p.* 469; Ndz. in *Pfl. reich* IV, p. 365.

Liane or shrub. Branchlets compressed, rufous-sub-sericeous; branches cylindrical, glabrous, dark-grey, at last suberous, up to 5 mm in diam., beset with tuberculate lenticels; internodes $\frac{1}{2}$ —10 cm long. Leaves entire, chartaceous or coriaceous, elliptical, obovate, oblong or lanceolate, up to 25 cm long, 9 cm wide; base obtuse or rounded, rarely acute; margin hardly recurved; top oblique-acuminate. Very young leaves slightly rufous-sericeous; adult ones soon glabrous on the shining, brown or grey upper surface, with slightly prominent nerves; beneath dull or shining, glabrous or with scattered hairs (denser along the midrib), often with a row of small glands along the margin, midrib strongly prominent, primary nerves prominent, curved, not attaining the margin, the secondary ones more or less parallel, veins densely reticulate. Petioles thick, glabrous, canaliculate above, 2—6 mm long. Leaves of the inflorescences $\frac{1}{2}$ —3 cm long, or reduced to 3—6 mm long bracts. Racemes rufous-sericeous, 15—20-flowered, up to 10 cm long, forming axillary or terminal ample panicles. Pedicels straight, mostly thickish, 2—6 mm long, bibracteolate at or slightly below the middle, bracteate at the base. Bracts and bracteoles ovate, or nearly lanceolate, acute or acuminate, more or less concave, 2—5, resp. $1\frac{1}{2}$ —3 mm long. Flowers $1\frac{1}{2}$ cm in diam. Sepals outside rufous-sericeous, ovate or nearly

lanceolate, 3—5 mm long, top revolute, glands 8, ellipsoid or oblong, 1—3 mm long, or glandless. Petals yellow, membranous, glabrous, obovate, elliptical or ovate, toothed, 5—9 mm long, the 5th one with hastate base, 4—6 mm long. Claws straight, 2—3½ mm long, the 5th one thicker and slightly longer. Stamens 4-adelphous, glabrous, the 3 opposite the styles longer and thicker than the others (3 mm), the stamen opposite the 5th petal separated from the others, curved between the posterior styles. Filaments slender, slightly connate at the base. Anthers orbicular, ½ mm long, cells curved, slightly protruding beyond the base of the ovoid, glanduliform, dark-red connectives. Ovary globose-ovoid, sericeous, ½ mm high. Styles glabrous, the anterior nearly straight, slightly shorter than the recurved posterior ones (3 mm); tops more or less foot-shaped, with a long claw (up to ½ mm), claw of the anterior one longer. Samaras ascendant, rufous-sub-sericeous, nut horizontal, compressed, nearly glabrous, 7 mm long, 4 mm high, 2 mm thick. Dorsal wing nearly semi-obovate, up to 4½ cm long, 1½ cm wide. Outer margin slightly curved, thick; inner (ventral) margin thin, sigmoid, with an obtuse 6 mm long, 2 mm high, appendage at the base. Endocarp not protruding into the cell.

Distribution: Northern South America, from Panama to Peru; West Indies.

Gland bearing form (var. *Lessertiana* (Juss.) Griseb.).

Lawa R. (Kappler, ed. Hohenack. n. 1710, fl. Nov.; n. 2122 [D.]); Sara-creek, near Abontjoeman (Coll. indig. n. 239, fl. May); Suriname R. near Waira waira (Tresling n. 136, fl. July), near Joden-savannah (Kegel n. 1184 [G.]); Paramaribo (Wullschlägel n. 56 [B.] p. p.); upper Suriname R. (Wullschlägel n. 858 [B.]); sectie O (Pulle n. 201, fl. Aug.); Para district (Wullschlägel n. 1323 [B.]); lower Saramacca R. (Kappler n. 65); upper Saramacca R. (Pulle n. 453, fl. Febr.; n. 494, fl. March); without locality: Wullschlägel n. 56 [B.] p. p.; Hostmann n. 1107 p. p., n. 224, n. 1139.

Glandless form (var. *Candolleana* (Juss.) Ndz.).

Paramaribo (Wullschlägel n. 56 [B.], p. p.); Bergendaal

(Focke n. 378, fr. Sept.); sectie O (B.W. n. 5372, fl. Aug.); Brownsberg (B.W. n. 6535, fr. June); Suriname R. near Kabelstation (Lanjouw n. 1229, fl. Nov.); upper Saramacca R. (Pulle n. 431, fl. Jan.); Coppename R. near Kaaimanstone (Lanjouw n. 715, fl. Sept.), near Raleigh falls (Lanjouw n. 976, fl. Sept.); upper Nickerie R. (B.W. n. 1009, fl. Febr.); without locality: Hostmann n. 1107 p. p.; Kappler n. 1107a [D.]; Wullschlägel n. 56 [G.].

Vernacular names: Moeléi (Car.); Hoeliaballi (Arow.).

3. **Heteropteris multiflora** (D.C.) Hochreutiner in Bull. N.-York Bot. Gard. VI (1910), p. 277; — *Byrsonima multiflora* D.C., Prodr. I (1824), p. 589; — *Heteropteris reticulata* (Poir.) Ndz. in Arb. Bot. Inst. Lyc. II (1903), p. 54; id. in Engl., Pfl. reich IV (1928), p. 374; Pulle, Enum. Pl. Surin. (1906), p. 469; Fawcett and Rendle, Fl. Jam. IV (1920), p. 233; — *Malpighia reticulata* Poir., Enc. Bot. Suppl. IV (1816), p. 8; — *Byrsonima reticulata* D.C. l. c., p. 581; — *Banisteria reticulata* Robinson ex Small in N.-Amer. Fl. XXV, 2 (1910), p. 637; — *Heteropteris platyptera* Juss. in Arch. Mus. Paris III (1843), p. 445, t. 14.

Tree, shrub or liane. Young parts rusty-sericeous. Branchlets compressed, rusty and slightly sericeous; branches cylindrical, glabrous, up to 7 mm in diam., with tuberculate lenticels; internodes up to 13 cm long. Leaves entire, coriaceous, elliptical, ovate-oblong or lanceolate-oblong, up to 40 cm long, 15 cm wide; base obtuse or rounded; margin nearly flat; top acute often rather long-acuminate. Young leaves rufous-sericeous; adult ones above glabrous, shining, nerves slightly prominent, veins densely reticulate, beneath dull, with few, small, sericeous hairs, midrib and the curved primary nerves (6—9 on each side) strongly prominent, veins slightly prominent; often a row of few, small glands along the margin. Petioles thick, glabrous, up to 1½ cm long. Leaves of the inflorescence suddenly diminishing to small bracts. Racemes 20—40-flowered, with compressed peduncles, forming axillary and terminal, up to 30 cm long, pyramidal, rusty-sericeous, peduncled, ample

panicles. Pedicels thickish, 5—10 mm long, bibracteolate at or below the middle, bracteate at the base; the upper joint often deciduous, the lower part with the bracteoles at its top persistent, giving a characteristic appearance to the panicle. Bracts and bracteoles large, slightly concave, ovate, acute, sericeous, 2—6 mm long, persistent. Flowers $1\frac{1}{4}$ — $1\frac{3}{4}$ cm in diam. Sepals lanceolate or oblong, 3—6 mm long, outside sericeous, top strongly recurved, with 8 thick, oblong, $1\frac{1}{2}$ —3 mm long glands. Petals unequal, yellow, broadly elliptical, membranous, glabrous, 5—6 mm long, margin toothed or crenulate; the 5th one smaller with hastate base, often glandular-fimbriate at the base. Claws recurved, 2 mm long; 5th one thick, straight, 3 mm long. Stamens exserted, 4-adelphous, sigmoid. The 3 stamens opposite the styles longer than the others (3 mm); the stamen opposite the 5th petal separated from the others, curved between the posterior styles. Filaments filiform, slightly connate at the base; anthers glabrous, curved; cells protruding beyond the base of the thick, glanduliform connectives. Ovary globose, hirsute, 2 mm high. Styles exserted, nearly equal, 4 mm long, glabrous, the posterior ones sigmoid, the anterior one nearly straight; tops uncinatate; claw of the anterior style up to $\frac{1}{2}$ mm long. Samaras rufous-sub-sericeous, glabrescent, horizontal. Nut large, up to 2 cm long, $1\frac{1}{4}$ cm high, 6 mm thick. Endocarp not protruding into the cell. Ventral areole ovate, acute, 3 mm high. Dorsal wing entirely thick-coriaceous, fanlike veined, horizontal or bent downward, semi-orbicular, up to $3\frac{1}{2}$ cm long, $2\frac{1}{2}$ cm wide. Upper margin semi-circular, usually without appendage at the base; lower margin thickest, straight, or bent back.

Distribution: Northern South America, Jamaica.

Lower Marowijne R. near Albina (Versteeg n. 556, fl. July); Commewijne R. near Pl. Waiampibo (Splitgerber n. 512 [L.], fl. Jan.; s. n. [L.]); Sectie O (B.W. n. 4248, fl. Febr.); Paramaribo (Kegel n. 704 [G.]; Saramacca R. (B.W. n. 5590, fl. and fr. Jan.; Wullschlägel n. 916 [B.]

upper Saramacca R., Watramiri (B.W. n. 2664, fl. Febr.); without locality: Hostmann n. 531; s. n. [L.]; Focke n. 102 [L.]; Stahel s. n.

7. BANISTERIA Juss. (non Linn.).

Erect or scandent shrubs. Leaves entire, petiolate, opposite or very rarely 3-whorled, commonly leathery, glabrous or copiously pubescent, often glandular at the base. Stipules interpetiolar, inconspicuous, rarely connate, deciduous. Umbels mostly 4-flowered, usually in leafy or bracteate panicles, rarely in corymbs; very rarely racemes. Pedicels bibracteolate at or rarely slightly above the base. Sepals 5, usually with 8—10 glands. Petals 5, unequal, long-unguiculate, mostly pink, rarely yellow or white; limb very often fringed, seldom merely toothed. Stamens 10, all fertile, rarely actinomorphic, and then the episepalous stamens larger; usually zygomorphic, and then the stamens opposite the 3 anterior sepals and the 2 posterior-lateral petals enlarged; the 3 posterior ones often small. Filaments free or united at the base, usually glabrous. Anthers without appendages, or the connectives enlarged; glabrous or pilose. Ovary hirsute, 3-lobed, dorsally compressed-gibbose; styles 3, free, equal, rarely the anterior one longer than the others; tops usually truncate with mostly capitellate stigmas. Samaras 1—3, attached to a pyramidal torus, becoming free, each with a large dorsal wing, upper margin thick, lower one thin; the lateral nut smooth, verrucous, or with 1—∞ winglets. Embryo straight, curved or inflexed; cotyledons unequal or sub-equal.

Distribution: Species 83, in tropical America, including the West Indies.

1. *a.* Young parts grey-pilose. Leaves with acute base, long-acuminate top and glandless margin. Petioles nearly glabrous, glandless. Anthers and styles pilose. Wing of the samara with a triangular or rounded appendage at the base 1. **B. lucida** Rich.
- b.* Young parts rusty-subsericeous. Leaves with obtuse,

rounded or sub-cordate base, shortly acuminate top, and with long-stipitate glands along the margin towards the top. Petioles rusty-subsericeous, biglandular at the top. Anthers and styles glabrous. Wing without appendage . . 2. **B. leptocarpa** Benth.

1. **Banisteria lucida** Rich., Cat. Leblond in Act. soc. hist. nat. Paris I (1792), p. 109; Juss. in Arch. Mus. Paris III (1843), p. 411; Ndz. in Engl., Pfl. reich IV (1928), p. 441, t. 5B, 34 J and K.; Miq., Stirp. Surin. (1850), p. 78, t. 20; Pulle, Enum. Pl. Surin. (1906), p. 468; — *Banisteria lobulata* E. Meyer, in Pl. Surin. Gött. (1824), p. 813; — *Banisteria appendiculata* Juss. in Arch. Mus. Paris III (1843), p. 413, t. 13; — *Banisteria divaricata* Juss. l. c., p. 412; — *Banisteria polita* Miq., Stirp. Surin. (1850), p. 80, t. 21; — *Banisteria calocarpa* Miq. in Linnaea XVIII (1844), p. 53; Ndz. in Engl. l. c., p. 437.

Climbing shrub. Young parts grey-pilose. Branchlets erect or patent, compressed, sulcate with very short, grey or dusky hairs; branches cylindrical, smooth, glabrous, dusky or grey, up to 5 mm in diam.; internodes 1–8 cm long. Leaves opposite, elliptical, obovate- or lanceolate-oblong, coriaceous, 5–17 cm long, 1.2–5 cm wide; base acute; margin slightly revolute; top with long (up to 2 cm), slightly obtuse acumen. Young leaves grey-pilose; adult ones glabrous, shining, black (when dried) above, with prominent midrib and curved, slightly prominent primary nerves; beneath opaque, rusty, with few scattered hairs, the midrib and the strongly curved, towards the margin disappearing primary nerves, prominent, the secondary ones reticulate. Both surfaces minutely punctulate, beneath with few, minute glands. Petioles more or less glabrous, 4–10 mm long, glandless, canaliculate above. Stipules interpetiolar, triangular, connate, deciduous, leaving an annular scar, hardly $\frac{1}{3}$ mm long. Umbels 4-flowered, usually 3–5 in axillary corymbs, many times shorter than the leaves; peduncles of the umbels slender (sometimes wanting), rusty-sericeous, with 1–3 internodes (upper one mostly longer), $1\frac{1}{2}$ – $\frac{1}{2}$ cm long,

bracteate at the joints. Pedicels slender, rusty-sericeous, $1\frac{1}{2}$ — $2\frac{1}{2}$ cm long, bracteate and bibracteolate at the base. Bracts and the somewhat united bracteoles broadly ovate, obtuse, outside rusty-sericeous 1 — $1\frac{1}{2}$ mm long. Flowers $1\frac{1}{2}$ — 2 cm in diam.; buds ovoid-globose, densely sericeous. Sepals nearly orbicular, outside rusty-sericeous, 2 — 3 mm long, with 8 ellipsoid or rarely obovoid, thick, $1\frac{1}{2}$ — 2 mm long glands. Petals yellow, outside rusty-sericeous, obovate-cochleariform, 6 — 11 mm long; base acute, margin fimbriate; the 5th one glandular-fringed, 4 — 6 mm long; claw outside sericeous, reflexed, 2 mm long, of the 5th petal thick, straight, narrowed at the top, 3 — 4 mm long. Stamens exerted; the 3 opposite the styles thicker and longer than the others (4 mm) with incurved filaments; the 3 posterior stamens shorter than the others, with slender filaments, curved between the posterior styles, with resupinate anthers. Filaments glabrous, united at the base; anthers obovate-oblong, pilose, with very thick connectives. Ovary densely hirsute; styles 3, attached to the ventral side of the carpids, sigmoid, gibbose at base; the posterior ones only at base, the anterior one far beyond the middle hirsute; tops obtuse, slightly capitellate, stigmas ditto. Samaras pink, sparingly rusty-sericeous; nut sub-globose, 8 mm in diam., with 6 — 12 veins in the lower part, and more or less imbricate, lacerate, up to 2 mm high lobes towards the top; ventral areole oblong, hardly 1 mm long; dorsal wing semi-obovate, 4 — 5 cm long, $1\frac{1}{2}$ — $1\frac{3}{4}$ cm wide, contracted and 4 — 8 mm wide at base; the thick interior margin straight, nearly at right angle curved towards the top, with a triangular or rounded, 1 — 7 mm high, 2 — 6 mm wide, appendage at the base; the thin ventral margin straight or curved, wavy. Cotyledons fleshy, sub-equal, nearly straight.

Distribution: Tropical Brazil, Guiana, West Indies.

Upper Marowijne R. (Kappler ed. Hohenack. n. 1900, type of *B. polita* Miq.; n. 61 [L.]; n. 417); Lawa R. near Cottica (B.W. n. 5315, fl. June); Perica R. (Wullschlägel n. 1387 [B.]); Paramaribo near Heremitage (Wullschlägel

n. 1388 [B.]); Paulus-creek, Albina, Marowijne, Saramacca (Wullschlägel n. 54 [B.]); Joden-savannah (Focke n. 329, type of *B. calocarpa*); Brownsberg (B.W. n. 6663, fl. Sept.); upper Suriname R. (B.W. n. 5127, fr. May); Suriname R. near Cassepoera-creek (Kegel n. 1182 [G.]); without locality: Hostmann n. 1027 (named: *Malpighia glabra* L. by Steudel) and *B. lobulata* Meyer by Benthams, s. n. [L.]; Meyer n. 813 [G.], type of *B. lobulata*; Wullschlägel s. n. [B.].

2. **Banisteria leptocarpa** Benth. in Lond. Journ. Bot. VII (1848), p. 130; Ndz. in Engl., Pfl. reich IV (1928), p. 412; — *Banisteria elegans* Tr. et Planch., subsp. *cordata* Ndz., var. *ciliata* Ndz. l. c., p. 413; Kosterm. l. c., p. 8.

Shrub, often climbing. Young parts and inflorescences with dense, short, rusty, sub-sericeous hairs. Branchlets compressed, rusty sub-sericeous; branches cylindrical, striate, fuscous, with long-persistent, rusty hairs; internodes 2—10 cm long. Leaves opposite and pseudo-alternate, coriaceous-chartaceous, ovate, oblong-ovate or obovate, up to 10 cm long, and 6 cm wide, with obtuse or rounded base, flat margin, with patelliform, especially towards the abrupt and shortly acuminate top, long-stipitate glands. Young leaves rusty sub-sericeous, adult ones nearly glabrous, except the nerves, above smooth, shining, beneath opaque, with strongly prominent midrib, the arcuate primary nerves (4—6 on each side) prominent, parallel, the secondary ones parallel, slightly prominent, veins reticulate. Petioles thick, rusty sub-sericeous, 5—13 mm long, with 2 glands at the top. Stipules interpetiolar, triangular, sericeous, hardly 1 mm long. Leaves of inflorescences abruptly diminishing to 8 mm long bracts. Umbels mostly 4-flowered on peduncles of 2 internodes, solitary or in axillary, up to 15 cm long panicles, with long, naked, compressed, common peduncles. Pedicels bibracteolate and bracteate at the base, slender, glabrous, thickened towards the top, 8—14 mm long. Bracts and bracteoles broadly ovate or orbicular, outside sericeous, 1, resp. $\frac{1}{3}$ mm long. Sepals erect, outside with few appressed hairs, inside glabrous, orbicular-ovate, 3—5 mm long, with 8

globose-ellipsoid, 1 mm long glands, or glandless. Petals yellow, slightly unequal, glabrous, limb sub-orbicular, (5th one obovate) 5—8 mm in diam., base cordate, margin of the 1st petal toothed, of the others long-fimbriate, of the 5th one glandular-fimbriate at the base. Claws straight, 1—3 mm long. Stamens glabrous, long-exserted, the 3 anterior ones curved, the 7 posterior retrorsely curved; the 3 stamens opposite the anterior sepals longer and much thicker than the others (4 mm), with very thick, sub-globose, glandular, 1 mm long, connectives, thickened towards the top, and exceeding the small cells for nearly 1 mm; the other stamens with small connectives. The 3 posterior stamens small, sigmoid between the posterior styles, the next ones with highly connate filaments, longer and thicker, than the remaining ones. Anthers elliptical, cells slightly protruding beyond the base of the connectives. Ovary long-hirsute, 3-lobed; styles 3, glabrous, exserted, 3 mm long, the posterior ones sigmoid, the anterior one nearly straight; stigmas orbicular-capitellate. Samaras erect, pubescent; nut small, smooth, attached with a slender stalk; wing yellow, nearly glabrous, slender semi-obovate, contracted at the base, 2½ cm long, 1 cm wide. Lower margin curved at the top, the thick upper margin at the base. Cotyledons 3½ mm long, linear-oblong, straight, flat, replicate.

Distribution: Guiana, Trinidad.

Glandless form: Weyne-weg, between Albina and Moengo tapoe, savannah-forest (Lanjouw n. 440, fl. Aug.).

Gland bearing form: Weyne-weg, between Albina and Moengo tapoe, savannah-forest (Lanjouw n. 502, fl. Aug.).

8. STIGMAPHYLLON Juss. ¹⁾

Lianes. Leaves opposite or pseudo-alternate, entire or (often on the same plant) cleft, with 2 large glands, generally attached to the long petioles, rarely at the midrib beneath.

¹⁾ This name is differently spelled as: *Stigmatophyllum*, *Stigmaphyllum*, *Stigmatophyllon*. I use the original spelling of Jussieu.

Stipules inconspicuous or wanting. Flowers in short, dense, sessile, corymbiform racemes; racemes arranged like the flowers of a large, long-branched, lax, compound dichasium. Pedicels usually bibracteolate above the middle. Sepals 5, the 4 lateral ones biglandular. Petals 5, unguiculate, glabrous, unequal, yellow, the 4 lateral ones concave, margin toothed or fringed; the limb in bud already more or less corrugate. Stamens 10, the 4 opposite the lateral petals more or less sterile (according to Haumann Merck in Rec. Inst. Bot. Bruxelles 9 (1913), p. 21, all stamens are fertile in *S. littorale*; it is possible, that, in studying living material, this is also the case with the other *Stigmaphyllons*) the others fertile; the 3 stamens opposite the styles thicker than the alternating ones; those opposite the posterior styles longer and thicker than the 3rd one. Anthers mostly short and thick, ovate-oblong, glabrous or more or less villose; connectives thick, glanduliform. Filaments glabrous, united at the base, or up to the middle. Ovary 3-lobed, 3-locular, gibbose; styles 3, short, top usually dilated into a claw-like, foot-like, or leaf-like appendage, those of the anterior style symmetrical, of the posterior ones asymmetrical; stigmas at the inner angle, often protruding. Samaras 1-3, attached to a pyramidal, trigonous receptacle, with large, elongated dorsal wings with thick upper (ventral) and thin lower margin. Lateral nut smooth, verrucous or with 1-∞ winglets; endocarp often protruding into the cell. Cotyledons thick, often unequal, plicate, incurved at the top.

Distribution: Species 60, in tropical America, including the West Indies.

1. *a.* Leaves pinnately nerved. The stamens opposite the anterior style very thick, and longer than those opposite the posterior styles. Wing of the samara elongated-triangular. Cotyledons slightly unequal, corrugate and divided. 1. ***S. puberum*** (Rich.) Juss.
- b.* Leaves palmately nerved. The stamens opposite

- the anterior style slightly shorter and thinner than those opposite the posterior styles. Wing oblong-spathulate. Cotyledons entire, not corrugate, flat. 2
2. *a.* Leaves membranous, glabrous, ovate-lanceolate; base cordate; top acuminate; margin repand. 2. ***S. convolvulifolium*** (Cav.) Juss.
- b.* Leaves membranous-chartaceous, orbicular or more or less ovate; base reniform; top rounded, hardly acuminate or apiculate with silvery or bronze-coloured sericeous or tomentose hairs beneath; margin sub-entire with obsolete glands. 3. ***S. fulgens*** (Lam.) Juss.

1. ***Stigmaphyllon puberum*** (Rich.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 376; Miq. in Linnaea 18 (1844), p. 52; Griseb. in Fl. Bras. XII, 1 (1858), p. 39; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 504, t. 36, f. K, L; Pulle, Enum. Pl. Surin. (1906), p. 470; Small in N.-Amer. Fl. XXV, 2 (1910), p. 144; Fawcett and Rendle, Fl. Jam. IV (1920), p. 237; — *Banisteria pubera* Rich., Cat. Leblond in Act. soc. hist. nat. Paris I (1792), p. 109; — *Banisteria fulgens* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 181; — *Hiraea spec.* Miq. in Hostmann pl. Surin. 803a; — *Banisteria Meyeri* Splitg. msc. [L.].

Climbing shrub; young parts covered with golden-yellow, sericeous hairs. Branchlets compressed, sericeous; branches cylindrical, glabrescent, smooth, reddish-green; internodes 5—15 cm long, up to 3 mm in diam. Leaves opposite, entire, membranous, oblong, ovate or lanceolate, up to 16 cm long and 8 cm wide; base rounded or sub-cordate; margin repand; top acuminate. Young leaves sericeous; adult ones above nearly glabrous with hardly prominent nerves, beneath with appressed, mostly golden-yellow sub-sericeous hairs (arms of the hairs 1 mm long); biglandular at the base, midrib strongly prominent, primary nerves prominent, the few secondary ones hardly visible under the hairs. Petioles sericeous, thin, 1—4 cm long.

Stipules intrapetiolar, broad, sericeous, hardly $\frac{1}{2}$ mm long. Peduncle axillary, compressed, sericeous, 7—20 cm long, at the top with 2 lanceolate, sericeous, 3—10 mm long bracts, with 2 large circular glands at the base; inflorescence for the rest as in the genus. Pedicels (the outer ones longest) sericeous, 3—8 mm long, bracteolate a little above the base, bracteate at the base. Bracts and bracteoles ovate-lanceolate, 1 mm long, outside sericeous. Flowers 15—20 mm in diam.; buds globose. Sepals ovate, $2\frac{1}{2}$ — $3\frac{1}{2}$ mm long, outside sericeous, with 8 ellipsoid or obovoid 1 — $1\frac{1}{2}$ mm long glands. Petals outside red, inside more yellow (Tresling), glabrous, the 4 exterior galeate or cochleate, already corrugate in bud; base cuneate; margin fringed, 5—10 mm in diam.; the 5th one flattish, orbicular, glandular-fimbriate. Claws 2—3 mm long; the 5th one thick, contracted at the top, 3—4 mm long. The stamens opposite the lateral sepals more or less sterile; the stamen opposite the anterior style very thick, longest (5 mm), those opposite the posterior styles longer than the others; the 3 posterior stamens short and strongly incurved between the posterior styles. Anthers glabrous, elliptical; connectives (especially of the sterile ones) very thick-glandular. Filaments more or less highly united. Ovary hirsute, $1\frac{1}{2}$ mm high; styles rather straight, glabrous, the anterior one slightly longer and thicker (4 mm), with a long-unguiculate, reniform-subcordate leaflet with pendulous, sagittate-acute lobes at the top; the posterior one with a falcate-acute leaflet at the top. Stigmas long-protruding at the inner angle. Samaras sericeous, mostly 2, the 3rd abortive. Nut globose, compressed, without crests; ventral areole ovate, 3 mm high. Dorsal wing dark-red (Tresling), elongated-triangular, 3 cm long, at the base 12 mm wide, at the obtuse top 6—10 mm wide; upper margin thick, straight, with an obtuse appendage at the base, lower margin nearly straight, wavy, arcuate at top and base. Cotyledons fleshy, rather unequal, corrugate and divided.

Distribution: From Costa Rica to Peru; West Indies.

Upper Cottica R. (Focke n. 715, fl. Oct.); Perica-creek (Wullschlägel n. 1386 and s. n. [B.]); Paramaribo (Wullschlägel s. n. [B.]); Splitgerber n. 129 [L.], type of *Banisteria Meyeri* Splitg., fl. Nov.); Paulus-creek (Wullschlägel n. 52 [B.]); Contiano (Soeprata n. 20, fl. July); Slootwijk (Soeprata n. 5H, fl. July); Susannadaal (Soeprata n. 8G, fl. July); Pl. Jordaan (Focke n. 554, fl. Oct.); Pl. La Poule (Samuels n. 176 [D.]); Suriname R. near Koemba falls (Tresling n. 230, fl. July); Saramacca R. (Wullschlägel n. 52 [B.]); without locality: Hostmann n. 803, 803a [G.] 965, 191; Focke s. n. [L.]; Wullschlägel s. n. [B.]; Meyer s. n. [G.].

2. ***Stigmaphyllon convolvulifolium*** (Cav.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 374; Griseb. in Fl. Bras. XII, 1 (1858), p. 38; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 489, t. 36, f. F; Pulle, Enum. Pl. Surin. (1906), p. 469; Small in N.-Amer. Fl. XXV, 2 (1910), p. 143; — *Banisteria convolvulifolia* Cav., Diss. IX (1790), p. 428, t. 256; — *Banisteria dichotoma* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 181; D.C., Prodr. I (1824), p. 588; — *Stigmaphyllon latifolium* Benth. in Lond. Journ. Bot. VII (1848), p. 128; Pulle, Enum., p. 470.

Climbing shrub or liane. Young parts with grey-sericeous hairs. Branchlets compressed, velutinous, soon glabrescent; branches cylindrical, fulvous or reddish, striate, up to 4 mm in diam.; internodes 5—20 cm long. Leaves opposite, palmately nerved, entire, membranous, ovate or ovate-lanceolate, up to 15 cm long and 11 cm wide; base cordate, margin slightly repand, with sessile or ciliiform glands; top acuminate. Young leaves sub-sericeous; adult ones with long-persistent hairs, glabrescent, except along the nerves; nerves not prominent above; beneath midrib and primary nerves prominent, the secondary ones nearly parallel, 3—6 mm from each other, slightly prominent; veins laxly reticulate. Petioles slender, glabrous, 2—7 cm long, with 2 large glands at the top. Stipules very small, soon deciduous. Peduncles compressed,

puberulous, up to 10 cm long, with 2 ovate, acute, 3 mm long bracts with large circular glands at the top; the branches up to 7 cm long; inflorescences for the rest as in the genus. Pedicels sericeous, becoming thicker towards the top, 3—15 mm long (the outer ones longest), articulate and bracteolate at or above the middle, bracteate at the base. Bracts ovate-lanceolate, acute; bracteoles ovate, acute, outside sericeous, 1—1½ mm long. Flowers 2—3 cm in diam.; buds globose. Sepals outside sericeous, orbicular-ovate, 2—3½ mm long, the 4 lateral ones with 8 ellipsoid, 1—1½ mm long glands. Petals outside yellow, inside more reddish (Versteeg) with irregular dots at the margins, glabrous; limb orbicular, 8—12 mm in diam. (5th one 5—7 mm) with fringed margin, the 4 lateral ones concave. Claws recurved, 2—3 mm long, the 5th one with contracted top, 3—4 mm long. The 4 stamens opposite the lateral sepals more or less sterile; the 3 stamens opposite the styles thicker and longer than the others (2 mm), the stamen opposite the anterior style slightly shorter and thinner than the other 2. Anthers glabrous, elliptical, connectives (especially of the sterile ones) very thick, glandular, sub-globose. Filaments glabrous, more or less highly connate. Ovary hirsute; styles 3, 2½ mm long, hirsute at the base or higher up, the anterior style with a symmetrical, horizontal, reniform, plicate, 1 mm long leaflet at the top, the slightly curved posterior ones with an asymmetrical, semi-reniform, 1 mm long, pendulous leaflet at the top; stigmas long-protruding at the inner angles. Samaras 2, 3rd one abortive, with green, sericeous nut and red, glabrous wing. Nut obovoid-cylindrical, 3 mm high, radially crested, the crests enlarging to winglets at the top; ventral areole obovate, slightly concave, 3 mm high. Dorsal wing spatulate, nearly erect, 3—5 cm long, up to 1½ cm wide; upper margin thick, straight, rounded at the top, with an obtuse, 4 mm high appendage at the base; lower margin thin, curved, wavy at the top. Cotyledons oblong-ovate, flat, nearly equal, entire, replicate.

Distribution: Northern Brazil, Guiana, Venezuela, West Indies.

Marowijne R. near Armina falls (Lanjouw n. 528, fl. Aug.); upper Marowijne R. (Kappler ed. Hohenack, n. 1899 [L.], s. n., fl. Aug.); Tapanahoni R. (Versteeg n. 861, fl. and fr. Sept.); Gonini R. (Versteeg n. 47, fl. and fr. Aug.); Paramaribo (Wullschlägel n. 914 [B.] and s. n. [B.]; coll. indig. n. 155; Kegel n. 126 [G.], fl. July); Suriname R. near Waktibasoe (Tresling n. 35, fl. July), near Petodam falls (Tresling n. 364, fl. Aug.); Sara-creek, Dam (B.W. n. 3449, fl. Dec.); Coppename R. (Boon n. 1104, fl. and fr. Sept.; n. 1048, fl. and fr. Aug.); locality unknown: Essed n. 35a, fl. Febr.; Hostmann n. 146, type of *S. latifolium* Benth., n. 706 [L.], s. n. [L.]; Meyer n. 170 [G.], type of *Banisteria dichotoma* G. F. W. Meyer.

Vernacular names: Koni koni réré; koni koni cassaba rerei; koni koni cassava; Konijnen cassave (S.D.).

3. **Stigmaphyllon fulgens** (Lam.) Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 289; id. in Arch. Mus. Paris III (1843), p. 370; Griseb. in Fl. Bras. XII, 1 (1858), p. 39; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 118; Ndz. in Engl., Pfl. reich IV (1928), p. 492; Pulle, Enum. Pl. Surin. (1906), p. 470; — *Banisteria fulgens* Lam., Enc. Bot. I (1783), p. 368; Cav., Diss. IX (1790), p. 426, t. 253; — *Banisteria splendens* D.C., Prodr. I (1824), p. 588; — *Stigmaphyllon hypoleucum* Miq. in Linnaea XVIII (1844), p. 51.

Climbing shrub or liane. Young parts sericeous-tomentose. Branchlets compressed, grey-sericeous-tomentose; branches cylindrical, with long-persistent hairs, glabrescent, fulvous, reddish or grey, striate; internodes 5—20 cm long. Leaves opposite, entire, membranous or chartaceous, orbicular or ovate, up to 17 cm long and wide; base reniform or more or less cordate; margin repand, coarsely crenate or sub-entire, with sessile, obsolete glands; top rounded, shortly acuminate or apiculate; palmate at the base, penninerved at the top. Young leaves sericeous; adult ones rather glabrous above, with hardly prominent nerves; beneath with silvery or bronze, short, very

dense, sericeous hairs, midrib and primary nerves prominent, the few secondary ones 3—4 mm from each other, nearly parallel, not prominent. Petioles thick, sericeous, up to 7 cm long, with 2 large, patelliform, sessile glands at the top. Stipules interpetiolar, very broad, emarginate, hardly 1 mm long, glabrous. Peduncles puberulous, compressed, up to 18 cm long, with 2 orbicular, acute, $1\frac{1}{2}$ mm long bracts with 2 large globose glands at the top. Inflorescences for the rest as in the genus. Pedicels sericeous, becoming thicker towards the top, 7—12 mm long, jointed, swollen and bracteolate at the middle, bracteate at the base. Bracts and bracteoles ovate, acute, outside sericeous, 1 mm long. Flowers 15—17 mm in diam.; buds globose. Sepals ovate, acutish, 2— $3\frac{1}{2}$ mm long, outside sericeous, the 4 lateral ones with 8 yellow, ellipsoid, $1-1\frac{1}{2}$ mm long glands. Petals terra-cotta, with yellow spot in the middle (Lanjouw), glabrous, obovate or sub-orbicular, already corrugate in bud, the 4 lateral ones concave, 6—7 mm in diam. with toothed margins; claws slender, 1—2 mm long, of the 5th one 2—3 mm long. The 4 stamens opposite the lateral sepals sterile; the 3 stamens opposite the styles thicker and longer than the others (3 mm), the stamen opposite the anterior style slightly shorter and thinner than the other 2. Filaments glabrous, more or less highly united. Anthers glabrous, elliptical, with very thick (especially those of the sterile ones) sub-globose, glandular connectives. Ovary sericeous, $1\frac{1}{2}$ mm high; styles 3, glabrous, 3 mm long with long-protruding stigmas at the inner angles; the anterior one straight and thinner than the others with a symmetrical, horizontal, unguiculate, obcordate, plicate leaflet at the top; the posterior ones sigmoid with an asymmetrical, pendulous, semi-reniform leaflet. Samaras 2, 3rd one abortive, red, puberulous. Nut semi-globose, 4—6 mm high with a lacerate, 1—3 mm high crest at each side, parallel to the dorsal wing; ventral areole ovate, acute, 3 mm high. Dorsal wing oblong-spathulate, sub-erect, up to $4\frac{1}{2}$ cm

long, and 1½ cm wide, slightly contracted above the broad base, wine-red (Lanjouw); upper margin thick, straight, with rounded top, with an obtuse or rounded, 1—3 mm high appendage at the base; lower margin thin, arcuate, wavy. Cotyledons fleshy, unequal, the small one plicate at the top, the larger one replicate.

Distribution: Northern Brazil, Guiana, Venezuela, West Indies.

Upper Cottica R. (Focke n. 683, fl. Oct., type of *S. hypoleucum* Miq.); Charlottenburg (Hostmann & Kappler n. 696 [D.]); Pl. Voorburg (Wulfschlägel n. 53 [B.]); Pl. Republiek (Gonggrijp n. 49, fl. and fr. Sept.); savannah near Republiek (Kuyper n. 12, fl. Oct.); Sectie O (B.W. n. 5861, fl. and fr. June); Suriname R. near Kabelstation (Lanjouw n. 1325, fl. and fr. Nov.; n. 1185, fl. Nov.); upper Suriname R. near Goddo (Stahel n. 146, fl. Jan.); lower Saramacca R. near Mindrinetti (Pulle n. 34, fr. Nov.); Saramacca R. (Wulfschlägel n. 53 [B.]); Donder-creek (B.W. n. 831, fl. Jan.); without locality: Hostmann n. 1029; coll. unknown, comm. Miq. s. n. [G.].

Vernacular names: Akoeli kjejeré (Car.); Kalia (Arow.); Faja Djon; Konijnen-kassave (S.D.).

9. BRACHYPTERYS Juss.

Litoral, erect shrubs or woody vines. Leaves opposite, entire, petioled, thick-membranous or chartaceous, pinnatifid. Top of the petiole or base of the midrib with 2 glands. Stipules minute. Flowers solitary or in peduncled, umbel-like corymbs. Bracts large. Flowers yellow. Sepals 5, persistent, with 8 glands. Petals unguiculate, unequal. Stamens 10, more or less fertile. Filaments united at the base. Anthers without appendages; connectives large. Ovary 3-locular. Styles 3, divaricate; top ending in a leaf-like appendage or claw. Fruit with 1—3 cocci. Cocci sub-globose with a small dorsal winglet or crest. Cotyledons unequal, the large, conduplicate one embedding the hardly conspicuous other one.

Distribution: Species 2, in tropical America and West Indies.

1. **Brachypterys ovata** (Cav.) Small in N.-Amer. Fl. XXV, 2 (1910), p. 138; Fawcett and Rendle, Fl. Jam. IV (1920), p. 235; — *Banisteria ovata* Cav., Diss. IX (1790), p. 429, t. 257; D.C., Prodr. I (1824), p. 590; — *Banisteria picta* Kunth, Nov. gen. et spec. V (1821), p. 124 (col. ed.); — *Banisteria brachyptera* D.C. l. c., p. 591; — *Brachypterys borealis* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 291; id. in Arch. Mus. Paris III (1843), p. 356, t. XI, f. 16; Griseb. in Fl. Bras. XII, 1 (1858), p. 35; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 117; Miq. in Linnaea 18 (1844), p. 51; — *Stigmatophyllum ovatum* (Cav.) Ndz. in Ind. lect. Lyc. Braunsb. (1900), p. 31; id. in Engl., Pfl. reich IV (1928), p. 515, t. 38, f. A—D; Pulle, Enum. Pl. Surin. (1906), p. 470.

Shrub, with erect, climbing or pendulous, slender branches. Branchlets compressed, canaliculate, as all the young parts with grey, very short, sericeous hairs; branches nearly cylindrical, smooth, greyish or brownish, striate, up to 5 mm in diam.; internodes 2—6(—15) cm long. Leaves opposite, entire, chartaceous, pinnately nerved, ovate, lanceolate-ovate or lanceolate, 4—11 cm long, 2—5 cm wide; base rounded, acute or cuneate; margin flat; top acute or slightly obtuse. Young leaves sericeous; adult ones glabrous, green above, the nerves not prominent; beneath with persistent, glaucous, soft, lanuginose-sericeous hairs, the midrib strongly prominent with 2 glands at the base; the primary nerves hardly prominent, the few secondary ones laxly reticulate, not prominent. Stipules interpetiolar, very small. Petioles nearly glabrous, slender, canaliculate above, 1—1½ cm long. Pseudo-umbels, 2—8-flowered, shortly stalked and enveloped by 2 orbicular-ovate or orbicular leaves, 1—4 cm in diam., with 2—5 mm long pedicels, at the end of a compressed, axillary, puberulous, up to 7 cm long peduncle; stalk of the umbel slender, now and then dichotomous. Pedicels glabrous, slender, thickened towards the top, 1½—3 cm long, bracteate at the base, and bibracteolate somewhat above the base. Bracts and bracteoles ovate, acute, outside sericeous,

1 mm long. Flowers 2—3½ cm in diam.; buds globose. Sepals outside glabrous, ovate, 3—4 mm long, margin ciliate, with 8 oblong, 2½—3 mm long glands. Petals yellow, unequal, flat, sub-orbicular, 7—13 mm in diam., with cuneate base; claws slender, 2—4 mm long. Stamens all fertile, 4 of them somewhat reduced; the 3 stamens opposite the styles longer and thicker than the others (5 mm), the stamen opposite the anterior style slightly shorter than the other 2. Anthers glabrous, elliptical, with thick, glanduliform connectives; filaments glabrous, broad, rather highly united at the base. Ovary sericeous, 2 mm high, deeply 3-sulcate; styles 3, equal, straight, glabrous, 3 mm long, attached to the ventral side of the carpids, top with a long, dorsal, slightly curved, compressed claw, stigmas protruding at the inner angle. Fruit mostly dicocous (one abortive), cocci nutlike, puberulous, green, attached to a very high, pyramidal torus. Nut sub-globose, 1 cm in diam., with warty ridges at the sides; dorsal winglet acute, triangular, thick, 3—5 mm high; ventral areole circular, 6 mm in diam. One cotyledon reduced, 1½—2 mm long, embedded in the large, fleshy, 14 mm long other one.

Distribution: Coast vegetation of South America and the West Indies.

Cottica R., Matappica-creek (Focke n. 275, fl. Dec.); lower Commewijne R., Nijd en Spijt (Tulleken n. 136 [L.], fl. Sept.); Paramaribo (Wullschlägel n. 51 [B.]; Tulleken n. 19 [L.], fl. and fr. July, n. 136 [L.]); Wolfenbützel (Went n. 5, fl. July); Slootwijk (Soeprata n. 8H, fl. July; n. 21J, fl. July); Tourtonne straat (Soeprata n. 6B, fl. June); Tourtonne-land-creek (Soeprata n. 2B, fr. June); Combé (Went n. 337, fr. and fl. Oct.); Combéweg (Went n. 569, fl. Jan.); Zanderij I (Samuels n. 520 [D.]); Suriname R. (Splitgerber n. 12 [L.], type of *Banisteria riparia* Splitg. msc.); Para district (Kuyper n. 24, fl. Dec.; Versteeg n. 465, fl. June); W-Coronie, swamp (Lanjouw n. 1071, fl. Oct.); Side-creek of Corantijne R. near Nw-Nickerie on salty clay (Lanjouw n. 644, fl. Aug.); locality unknown: Menge n. 51, ex. reliq. Wullschlägel [B.]; Hostmann ed. Kappl. n. 278 [D.]; Hostmann n. 278 [L.], s. n. [L., U.]; Stahel s. n.; Obermüller s. n. [L.]; Eyken-Sluiters n. 10D [L.].

10. SPACHEA Juss.

Trees or scandent shrubs. Young parts rufous-, or rusty-hirsute, rather soon glabrescent. Leaves opposite, entire, petioled, thin, soon glabrous, usually white-punctulate or glandular beneath. Stipules united, intrapetiolar. Short, terminal, rusty-pilose, many-flowered pseudo-racemes, with pendulous flowers; often 1—3 flowers on minute bracteate peduncles. Pedicels bibracteolate at the base, one of the bracteoles dorsally with a terminal, oblique gland. Sepals 5, broad, persistent, not accrescent, 4 of them, rarely all, biglandular. Petals 5, longer than the sepals, unguiculate, broad, glabrous, entire or toothed, red or pink. Stamens 10, sometimes 1—4 of them abortive. Filaments glabrous, united at the base into a hirsute ring; anthers glabrous, without appendages. Ovary 2—3-lobed, 2—3-locular, glabrous. Styles 2 or 3, short, truncate, stigma truncate or bilobed. Fruit attached to a flat or concave torus, consisting of 2 or 3 smooth, bony, not dehiscent cocci. Seeds sub-globose; testa membranous.

Distribution: Species 4 in tropical South America, including the West Indies

1. *Spachea elegans* (G. F. W. Meyer) Juss. in Deless., Icon. III (1837), p. 19, t. 31; id. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 326; id. in Arch. Mus. Par. III (1843), p. 326, t. VIII, f. 9; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 116; Pulle, Enum. Pl. Surin. (1906), p. 470; Ndz. in Engl., Pfl. reich IV (1928), p. 586, t. 42, f. K; — *Spachea elegans* (G. F. W. Meyer) Juss., var. *oblonga* Ndz. in Arb. Bot. Inst. Braunsb. V (1914), p. 18; id. in Engl., Pfl. reich l. c., p. 587; — *Malpighia elegans* G. F. W. Meyer, Prim. Fl. Esseq. (1818), p. 178; — *Byrsonima elegans* D.C., Prodr. I (1824), p. 580; — *Spachea ossana* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 326; id. in Arch. Mus. Par. III (1843), p. 327, t. VIII, f. 9; Small in N.-Amer. Fl. XXV, 2 (1910), p. 150; — *Byrsonima Herbert-Smithii* Rusby, Descr. of Amer. Pl. (1920), p. 37.

Tree or shrub, 3—13 m high. Young parts and inflorescences rufous-hirsute. Branchlets glabrescent, rufous, 1—2 mm in diam.; branches grey, canaliculate, with few, tuberculate lenticels, 3½ mm in diam.; internodes ½—4 cm long. Leaves membranous-chartaceous, oblong or elliptical-oblong, up to 20 cm long, 3—7½ cm wide; base acute; top acuminate or mucronate. Young leaves rusty-sericeous, soon glabrous, except midrib beneath; adult ones rather smooth with prominent midrib beneath, primary (7—10 on each side) and secondary nerves slightly prominent and densely reticulate on both surfaces; lower surface punctulate, with 2 large, orbicular glands at the base. Petioles puberulous, up to 1 cm long. Stipules sericeous, 3—4 mm long, leaving an annular scar. Terminal, rusty-hirsute, up to 50-flowered, up to 15 cm long pseudo-racemes; flower-bearing peduncles patent, 1 mm long. Pedicels reflexed when flowering, when fruiting erect, sericeous, 5—8 mm long, bibracteolate at the base. Bracts triangular-acute or subulate, persistent, sericeous, 2—10 mm long; the glandless bracteoles subulate with ovate base, 2—4 mm long, the others partly transformed into a large gland. Flowers 1—1½ cm in diam. Sepals elliptical or orbicular, 3—5½ mm long, outside glabrous, except at the base; margin ciliate with 8—10, often 1 or 2 pairs united, thick, ellipsoid or oblong, 2—4 mm long glands with free and often recurved tops. Petals pink, fleshy, usually reflexed; limb orbicular, or ovate-or obovate-orbicular, 3—4 mm long, glabrous, with fringed margin; claws 2—3½ mm long. Stamens nearly equal, filaments thick, glabrous, the bases united into a hirsute ring; anthers elliptical, glabrous, ¾—1½ mm long. Carpids 2, slightly united, 1½ mm high, ellipsoid-ovoid, glabrous; styles 2, sigmoid-patent, thick, glabrous, 1½ mm long. Fruit dehiscent into 2 glabrous, whitish-green, areolate, semi-ovoid nuts. Embryo incurved; cotyledons plicate.

Distribution: Guiana, Trinidad, St. Vincent.

Commewijne R. near Pl. Waiampibo (Splitgerber n. 510

[L., fl. Jan.); upper Saramacca R. near Janbasigado (Pulle n. 160, fl. Jan.); Coppename R., Raleigh falls (Lanjouw n. 966, fr. Sept.); Kabalebo R., Kaboeri, tree 690 (B.W. n. 5948, fl. July; n. 4935, ster. Dec.); without locality: Kegel n. 254 [D.].

var. **obovata** Ndz. in Arb. Bot. Inst. Braunsb. V (1914), p. 18; id. in Engl. l. c., p. 587.

Leaves oblanceolate, obovate; base acute; with mostly short obtuse acumen; up to 14 cm long, and 7 cm wide. Gland not larger than the bracteole.

Distribution: Guiana, Amazonian district.

Locality unknown: Leschenault (ex Niedenzu); Hostmann n. 57 [D.], n. 1043 (named *Byrsonima densa* by Steudel) and s. n.

11. MALPIGHIA Linn.

Low trees, shrubs or shrublets. Leaves opposite, entire or spiny-toothed, usually petiolate, coriaceous, chartaceous or membranous, glandless, glabrous, softly or coarsely pubescent (with sometimes stinging hairs). Stipules slender, inconspicuous, deciduous. Flowers in axillary and terminal, many-flowered corymbs or umbels, rarely solitary. Pedicels bibracteolate in the middle or at $\frac{1}{4}$ from the base. Bracteoles small, glandless. Flowers zygomorphous. Sepals 5, persistent, not accrescent, with 6—10 large, sessile glands; the 6 posterior glands equal, more or less longer than the 0—4 anterior ones. Petals 5, orbicular, concave, unguiculate, glabrous, red, pink or white; the 2 anterior ones (exterior in bud) at the base only, the intermediate ones up to the middle or higher, the fifth, posterior one, along the whole margin toothed or ciliate, or sometimes with very long fringes; the anterior and intermediate ones oblique, with broad, toothed, cilliate or fringed anterior part, posterior part small, with entire margin. Stamens 10, all fertile, glabrous, slightly incurved or recurved, the epipetalous shorter than the alternating ones, but those opposite the 2 intermediate

petals always thicker; filaments rather long, united as far as the middle, or at the base only; anthers ovate, sub-cordate; connectives usually inconspicuous. Ovary 3-lobed, 3-locular, glabrous; styles 3 (or less), always free, with oblique, obtuse or dilated top with stigmas at the inner angle; the posterior styles equal, the anterior one shorter. Drupes globose, thick-fleshy, attached to a flat or concave torus, with 3 pyrenes; pyrenes 3—5-crested, often transversally ribbed. Endocarp bony, seeds ovoid, cotyledons nearly straight or shortly uncinatate, radicle short.

Distribution: Species about 36, in tropical America, including the West Indies.

1. a. Leaves membranous or chartaceous, elliptical-, linear-, or obovate-oblong; margin entire. The 2 stamens opposite the intermediate petals not longer than the next ones. Tops of the styles obtuse or swollen or more or less uncinatate 1. **M. puniceifolia** L.
- b. Leaves rigid-coriaceous, orbicular or elliptical; margin with large teeth, ending in coarse spines. Anthers of the 2 stamens opposite the intermediate petals thicker, and with more curved filaments than the next ones. Tops of the styles oblique-pediform, uncinatate.
 2. **M. coccigera** L.

1. **Malpighia puniceifolia** L., Spec. Pl. ed. II, 1 (1762), p. 609; D.C., Prodr. I (1824), p. 578; Juss. in Arch. Mus. Par. III (1843), p. 264, t. 4; Griseb. in Fl. Bras. XII, 1 (1858), p. 31; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 116; Ndz. in Engl., Pfl. reich IV (1928), p. 622; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 156; Fawcett and Rendle, Fl. Jam. IV (1920), p. 226; — *M. puniceifolia* L., var. *vulgaris* Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 8; id. in Engl. l. c., p. 623.

Shrub or tree, 2—5 m high. Branches becoming spiniform, dark-grey, striate, with few, orbicular, tuberculate lenticels; internodes $\frac{1}{2}$ —3 cm long. Leaves entire, crowded, membranous or chartaceous, elliptical- or obovate-oblong or lanceolate-

oblong, with obtuse top; up to 7 cm long, 2—3 cm wide; base acute or obtuse. Young leaves sericeous with thin or pungent hairs (arms of the hairs 1—2½ mm long), very soon glabrescent. Adult leaves with prominent midrib, hardly prominent primary nerves above, inconspicuous beneath, veins indistinct. Petioles glabrous, 2—4 mm long. Corymbs or umbels 1—6-flowered, with short, 1—10 mm long peduncle, or sessile. Pedicels sericeous, 6—15 mm long, bibracteolate below the middle. Bracts and bracteoles lanceolate, sericeous, 1—1½, resp. ½—1 mm long. Flowers 1½ cm in diam.; buds subglobose, 4 mm high. Sepals ovate, 2½—3 mm long, outside sericeous, 2 sepals with 2, the next ones with 1 ellipsoid, 2 mm long gland, the 5th sepal glandless. Petals pink or violet, sub-orbicular, the 4 anterior broadly elliptical with hastate base, the 5th one fan-shaped, with cuneate base, already corrugate when flowering and hence looking smaller. The 5th petal fringed along the whole margin, the others at the base only. The 2 posterior epipetalous stamens much larger than the others and somewhat larger than the episepalous ones. Filaments (2 excepted) filiform, united at base; anthers elliptical. Ovary ovoid, glabrous; styles 3, the posterior ones longer and thicker than the anterior one, tops obtuse or swollen (in var. *obovata* more or less uncinata); stigmas at the inner angle. Drupe red, broadly ovoid or sub-globose, slightly sulcate, 10—16 mm high, with obtuse base. Pyrenes 3-crested; crests thin, 1½—3 mm high, the interspaces with transverse, muricate ridges.

Distribution: Northern South America as far as Panama, West Indies. Cultivated.

var. *obovata* Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 8; id. in Engl l. c., p. 623.

Leaves obovate or ovate. Umbels 1—4-flowered. Top of the styles uncinata, compressed.

Paramaribo near Tourtonne straat (Soeprata n. 3B, fl. June; Wullschlägel s. n. [B.]); locality unknown: Splitgerber n. 482 [L.]; Pulle n. H. 39; Wullschlägel n. 76 p. p. [B.], 913 [B.].

Vernacular name: Kersenboom (S.D.).

2. **Malpighia coccigera** Linn. Spec. Pl. I (1753), p. 426, n. 6; Jacq., Ic. (1776—1783) t. 470; Bot. Reg. VII (1821), t. 568; Juss. in Arch. Mus. Par. III (1843), p. 336; Griseb. in Fl. Brit. W.-Ind. Isl. (1859), p. 117; Duss, Fl. Antill. (1897), p. 114; Small in N.-Americ. Fl. XXV, 2 (1910), p. 160; Fawcett and Rendle, Fl. Jam. IV (1920), p. 229; Ndz. in Engl., Pfl. reich IV (1928), p. 636, t. 44, f. K, L; — *Malpighia coccifera* Cav., Diss. VIII (1789), p. 408, t. 235, f. 2; — *M. heteranthera* R. Wight, Ill. Ind. Bot. I (1831), t. 49.

Climbing, creeping or erect shrub, or treelet. Branchlets thin, 1—2 mm in diam., flexible, dark, scabrous; branches thin, 2—3 mm in diam., glabrous, grey with verrucous lenticels; internodes $\frac{1}{2}$ —2 cm long. Leaves rigid-coriaceous, orbicular, elliptical, varying to ovate or obovate; base rounded or subcordate; top rounded or emarginate-tricuspidate; 1—3 cm long, $\frac{1}{2}$ —2 cm wide; margin recurved, quite entire in the younger leaflets, in the older ones with large, distant teeth, ending in coarse, 1—2 mm long spines. Young leaves very soon glabrescent; adult ones glabrous, deepgreen, shining above, with slightly prominent midrib, primary nerves (3—8 on each side) and laxly reticulate secondary ones; beneath less shining, with less prominent nerves. Petioles very short, thick or wanting. Stipules lanceolate, 1—2 mm long. Flowers in axillary, 2-flowered umbels, or mostly solitary. Pedicels slender, glabrous, reddish-green, 1—2 cm long, bracteate at the base, jointed $\frac{1}{3}$ — $\frac{1}{2}$ from the base, somewhat below the joint bibracteolate. Bracts and bracteoles ovate, obtuse, $\frac{1}{2}$ —1 mm long, outside and membranous margin hirsute. Flowers 1—2 $\frac{1}{2}$ cm in diam.; buds sub-globose, 3 mm in diam. Sepals ovate or oblong, erect, glabrous (except below the glands), greenish; margin whitish;

2—4 mm long, $\frac{1}{2}$ —1 mm wide, one glandless, the 2 next ones each with 1 gland, the remaining ones with 2 glands; glands oblong, erect, green, shining, 2—2½ mm long, with free tops. Petals pink or whitish, scentless, membranous, glabrous, unequal; limb of the largest petal orbicular, 6—10 mm long with cuneate base; margin fringed; the smallest petal with cordate base, 4—4½ mm long, the next ones oblique, fimbriate at one side; the 2 petals opposite the glandless sepal approximate. Claws long, narrow, 1½—5 mm long. Stamens glabrous, the 2 opposite the larger styles extrorsely convex, larger than the others (3—5 mm); the 3 stamens opposite the glandless sepal smallest (1—1½ mm); of the larger 3 opposite them the middle one straight, the outer ones recurved. Anthers oblong, $\frac{1}{2}$ —1½ mm long. Ovary 3-sulcate, green, shining, 1 mm long; styles 3, the larger ones incurved, 3½—4½ mm long, the 3rd one thinner, slightly curved, 1½—2 mm long; tops oblique, pediform, uncinat; stigmas at the inner angle. Drupe sub-globose, red, 1 cm in diam., 3-, or by abortion 2-furrowed. Exocarp thin, endocarp membranous, dorsally ribbed.

Distribution: West Indies; cultivated in the Tropics.

var. **microphylla** Ndz. in Ind. lect. Lyc. Braunsb. (1899), p. 19; id. in Engl. l. c., p. 636.

Leaves generally $\frac{3}{4}$ cm long, $\frac{1}{2}$ cm wide, the larger one orbicular, 1 cm in diam. Flowers 12—15 mm in diam.

Locality unknown: Menge-Wullschlägel s. n. [B.].

12. BUNCHOSIA L. C. Rich. ex A. L. de Juss.

Low trees or shrubs. Young parts either sericeous (feet of the hairs short and slender) or more or less hispid, or tomentose (feet of the hairs rather long and thick). Leaves opposite, entire, petioled, usually thickish, glabrous or scarcely or densely pubescent, often with glands. Stipules interpetiolar, distinct or united, acute, more or less linear-lanceolate, hardly 1—2 mm

long. Racemes axillary, elongated, usually many-flowered. Pedicels bibracteolate at or above the base, one of them usually with a large, dorsal or slightly lateral, orbicular, decurrent gland. Sepals 5, persistent, biglandular, often 2 or 4 pairwise united, hardly accrescent. Petals 5, unguiculate, orbicular-reniform, limb reflexed, glabrous, toothed or undulate. Stamens 10, all fertile; filaments united at the base, glabrous, anthers glabrous; connectives usually inconspicuous. Ovary 2—3-locular, glabrous or sericeous. Styles 2—3, free or more or less united; stigmas oblique-capitellate. Drupe attached to a flat or slightly concave torus, ovoid, globose or reniform, yellow, red or brown, with 2—3 pyrenes, without crests. Cotyledons straight or slightly uncinat, flat-convex.

Distribution: Species about 50, in tropical continental America and the West Indies.

1. *a.* Leaves membranous, above more puberulous than beneath; top acuminate; 6—14 very small glands along the basal margin. The 5th petal (and often one of the others) somewhat glandular at the base; margin lacerate-toothed. Ovary sericeous 1. **B. glandulifera** (Jacq.) Kunth
- b.* Leaves chartaceous or coriaceous, glabrous; top with acute or blunt, rather long acumen; 2 glandular dots beneath at the base, or glands wanting. All petals with glands along the whole margin. Ovary glabrous. 2. **B. nitida** (Jacq.) L. C. Rich.

1. **Bunchosia glandulifera** (Jacq.) Kunth, Nov. gen. V (1821), p. 119 (coll. ed.); D.C., Prodr. I (1824), p. 581; Juss. in Ann. sc. nat. 2e sér. Bot. (1840), p. 324; id. in Arch. Mus. III (1843), p. 338; Ndz. in Engl., Pfl. reich IV (1928), p. 652, t. 45, f. A, K; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 162; — *Malpighia glandulifera* Jacq., Collect. IV (1790), p. 207, V, p. 5, f. 3; — *Malpighia glandulosa* Jacq. Icon. rar. III (1786), p. 469; — *Bunchosia hypoleuca* Miq., Stirp. Surin. (1850), p. 77.

Shrub or tree. Young parts more or less sericeous (arms of the hairs 500 μ long, 40 μ thick; wall 1 μ thick; straight; feet nearly wanting). Branchlets glaucescent, compressed, slightly sericeous; branches glabrous, grey, cylindrical, with many prominent, orbicular or elliptical, white lenticels; internodes 1—5 cm long, up to $\frac{1}{2}$ cm in diam. Leaves membranous, broadly ovate or obovate or elliptical, 4—19 cm long, 3—11 cm wide, base obtuse or rounded; margin revolute; top acuminate. Young leaves sericeous; adult ones glaucescent, above with few hairs, nerves impressed, beneath sparingly grey-sericeous, midrib strongly prominent, primary nerves slightly prominent, the few secondary ones lax-reticulate; 6—14 glandular dots in a row, 1 cm from the margin. Petioles thin, slightly sericeous, broadly canaliculate above, 4—10 mm long. Stipules acute, sericeous, 1—2 mm long. Racemes axillary, erect, 4—11 cm long, with thick (1—3 mm in diam.) slightly sericeous rachis, thickening towards the insertion of each pedicel. Peduncle 3—4 $\frac{1}{2}$ cm long, naked or with reduced leaves. Pedicels 5—13 mm long, sericeous, bibracteolate at or slightly below the middle, bracteate at the base, thickening towards the top. Bracts lanceolate, acute (upper ones ovate, acute), outside sericeous, 2—6 mm long. Bracteoles ovate, sericeous, 1—1 $\frac{1}{2}$ mm long, both, or one of them with a large gland. Flowers 15—18 mm in diam. Sepals ovate, 3 $\frac{1}{2}$ —5 mm long, outside nearly glabrous, margin ciliate; with 8—9 obovate or oblong, 2—4 mm long glands (the united ones often longer). Petals yellow, glabrous, nearly equal, concave, ovate, obovate or sub-orbicular, 4—8 mm long, base decurrent, margin lacerate; claws recurved, 3—4 mm long. The 5th petal glandular at the base (often also one of the others). Stamens exerted, the episepalous ones slightly longer, (3 $\frac{1}{2}$ mm). Filaments broad, glabrous, up to $\frac{1}{3}$ united. Anthers elliptical, glabrous, conspicuously protruding beyond the base of the yellow, semi-globose connectives. Ovary sericeous, ovoid-oblong, slightly compressed, 2 mm high, 2-celled. Style 1,

exserted, sericeous, thick, cylindrical, 3 mm long, with 2 polygonous, peltate stigmas. Drupe ovate, glabrous, fleshy, outside yellowish, inside scarlet, up to 2 cm in diam.

Distribution: Northwestern South America, Guiana, West Indies.

Paramaribo (Splitgerber n. 998 [L.], fl. May, named *Bunchosia glauca* Splitg.); Wilhelmina mountains (B. W. n. 7145, fl. June); without locality: Focke n. 1258, type of *B. hypoleuca* Miq.; Wullschlägel n. 1901 [D.]; Blochmann [D.].

2. ***Bunchosia nitida*** (Jacq.) L. C. Rich. ex A. L. de Juss. in Ann. Mus. XVIII (1811), p. 481; D.C., Prodr. I (1824), p. 329; Juss. in Arch. Mus. Paris III (1843), p. 336; Ndz. in Engl., Pfl. reich IV (1928), p. 657, t. 3, f. P; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Americ. Fl. XV, 2 (1910), p. 163; — *Malpighia nitida* Jacq., Enum. Pl. Carib. (1760), p. 21; Cav., Diss. VIII (1789), p. 411, t. 239, f. 1.

Shrub. Very young parts with few, appressed, sericeous hairs. Hairs compass-needle-shaped, 300 μ long, 30–45 μ in diam., wall 1 μ thick, feet nearly wanting. Branchlets slender, nearly cylindrical, glabrous, greyish or brownish; branches grey or dark-brown, 3–5 mm in diam. with many orbicular or at last transverse, linear, small lenticels; internodes 1–7 cm long. Leaves chartaceous or coriaceous, elliptical or oblong, to ovate-lanceolate or oblong-lanceolate, up to 17 cm long, 7 cm wide; base acute or narrowed; margin recurved; top with rather long acute or blunt acumen, or obtuse. Young leaves very soon glabrescent; adult ones glabrous, green and shining on both surfaces, above smooth, beneath midrib prominent, primary nerves (4–9 on each side) slightly prominent, veins densely reticulate; on each side of the midrib at the base a glandular dot or glands wanting. Petioles slender, glabrous, 4–14 mm long. Stipules distinct, small, glabrous, triangular. Racemes axillary, simple (or more or less paniculate), many-flowered, oblique-erect, up to 10 cm long. Rachis thickish, compressed,

pubescent; peduncle 1—3 cm long. Pedicels thickish, pubescent, 4—13 mm long, bibracteolate at $\frac{1}{3}$ — $\frac{1}{2}$ of the length, bracteate at the base. Lower bracts lanceolate, sparingly haired, $1\frac{1}{2}$ —3 mm long, upper ones ovate-lanceolate or ovate, smaller. Bracteoles broadly ovate, acute, 1 mm long, generally one of them with a very large gland at the base, the other with a small gland, or glandless. Flowers 12—17 mm in diam.; buds ovoid, 4—5 mm long. Sepals not accrescent, glabrous, ovate to oblong, 4—5 mm long, margin ciliate, with 8 or 7, obovate, obovate-oblong or oblong glands, the united ones trapezoid or obcordate, $1\frac{1}{2}$ —3 mm long. Petals white, glabrous, membranous, orbicular, ovate or obovate, 4—8 mm long, the whole margin usually glandular-toothed; claws rather straight, 3—4 mm long, the 5th one thicker. Stamens glabrous, exserted, nearly equal. Filaments thin, up to $\frac{1}{3}$ united, 2—3 mm long. Anthers sub-globose, $\frac{1}{2}$ mm long, cells long-protruding beyond the base of the semi-globose, yellow connectives. Ovary glabrous, ovoid, 2-lobed, 2-celled. Styles 2, glabrous, partly or entirely confluent, 2 mm long. Stigmas distinct, capitellate or disc-shaped. Drupe globose, 2-lobed, yellow or reddish, 13—16 mm in diam.

Distribution: Northern South America, West Indies.

Lower Suriname R. near Pl. Jagtlust (Splitgerber n. 401, [L.], fl. Dec.).

13. BYRSONIMA L. C. Rich. ex A. L. de Juss.

Shrubs, shrublets, often scandent, or low trees, rarely (*B. coriacea* and *B. Acerugo*) high trees. Young parts sericeous or tomentose, with forked, antler-shaped or compass-needle-shaped hairs. Leaves opposite, entire, varying in size, sessile or petioled, usually thick, glandless, reticulate. Petioles often short and thick. Stipules intrapetiolar, usually flat, connate, persistent, or rarely deciduous, small, rarely very large. Usually many-flowered terminal racemes, sometimes compound at the

base. Pedicels generally bibracteolate at the base. Bracts and bracteoles small or moderate. Sepals 5, persistent, sometimes markedly accrescent, broad, biglandular or (often in the same species) glandless; glands contiguous. Petals 5, long-unguiculate; limbs orbicular or cochleariform with cordate or reniform base, glabrous, yellow, red or white; margin nearly entire, toothed or incised; claws semi-circular recurved. 5th Petal flattish, corrugate, with thick, straight claw. Stamens 10, all fertile; filaments nearly equal, hardly united at the base; the united part, like the receptacle densely hirsute (hairs forked with sub-parallel arms). Anthers long, linear, oblong, ovoid, or obovoid, glabrous or pilose, often with large connectives. Pollen up to 15 μ in diam. Ovary 3-lobed, 3-locular, ovoid or globose, rarely conoid, glabrous or (often in the same species) sericeous. Styles 3, subulate, straight, or curved only at the top; stigma subulate. Drupe attached to a flat or slightly concave torus, ovoid or globose, yellow, orange or red, with one 3-locular pyrene, with 3, or by abortion less, seeds. Exocarp thin, fleshy; endocarp bony or woody, with sharp ridges. Cotyledons sub-equal, circinnate.

Distribution: Species about 100, in tropical America, including the West Indies.

1. *a.* Leaves densely reticulate, primary, secondary and tertiary nerves parallel, forming nearly rectangular areoles. Stipules very large, more than 2 cm long, membranous, deciduous. Hairs antler-shaped or stellate. 9. ***B. stipulacea*** (Juss.) Niedenzu.
- b.* Leaves reticulate, secondary and tertiary nerves not parallel. Stipules small, up to 1 cm long, coriaceous, persistent. Hairs compass-needle-shaped or bifurcate (except: *B. verbascifolia*). 2
2. *a.* Anther cells as long as the connectives 3
- b.* Anther cells shorter than the connectives; top of the connective ending in a thick, conoid or obtuse, nearly straight or recurved appendage (see also *B. Aerugo*) 7

3. *a.* Leaves very short-petioled or sessile; adult leaves very densely sub-velutinous, velutinous, or lanuginose beneath. Arms of the hairs up to 2 mm long, with very long ($\frac{1}{2}$ mm) feet 4
- b.* Leaves petioled. Beneath with long-persistent sub-sericeous or sub-velutinous hairs, generally glabrescent (exc. *B. Aerugo*). Arms of the hairs $\frac{1}{3}$ —1 mm long, with short (50—100 μ) feet 5
4. *a.* Leaves obovate, oblanceolate or elliptical-oblong, up to 14 cm long and 8 cm wide; base decurrent into the petiole. Leaves grey- or slightly rufous-sub-velutinous or sericeous-tomentose beneath; feet and arms of the hairs slender. Stipules 3—5 mm long. Racemes 3—8 cm long 4. ***B. cydoniifolia*** Juss.
- b.* Leaves spatulate, sessile, up to 35 cm long and 20 cm wide. Leaves very densely velutinous or tomentose beneath; feet and arms of the hairs long and thick. Stipules 5—12 mm long. Racemes elongate, 10—25 cm long 5. ***B. verbascifolia*** (L.) Rich.
5. *a.* Bracts and bracteoles coriaceous, persistent, on both sides sericeous. Bracts small (1—5 mm), bracteoles equal in length or smaller. Feet of hairs short (up to 60 μ), slender, arms straight. 6
- b.* Bracts and bracteoles thin, deciduous, outside velutinous, inside nearly glabrous, linear-lanceolate, large (2—6, resp. 1—3 mm long). Feet of the hairs rather long (up to 110 μ), arms nearly straight, or slightly flexuous 1. ***B. crassifolia*** (L.) Rich.
6. *a.* Tree or treelet. Leaves elliptical-, or oblong-lanceolate, up to 18 cm long and $5\frac{1}{2}$ cm wide, shining above, with long-persistent hairs beneath, glabrescent. Bracts and bracteoles straight, ovate, acute, 2 resp. $\frac{1}{2}$ —1 mm long. Anthers linear-oblong, glabrous or sericeous between the parallel cells; cells not longer than the connective. Ovary glabrous, or at first sericeous 2. ***B. coriacea*** (Swartz) Kunth.
- b.* Stout trees, up to 35 m high. Leaves elliptical,

- elliptical-oblong or obovate-oblong, up to 25 cm long and 10 cm wide, shining, mostly pruinose above; densely rusty-farinose-sericeous beneath. Bracts lanceolate or linear, obtuse, uncinata or circinnate, 4—5 mm long; bracteoles ovate, 1 mm long. Anther cells diverging, with hornlets at the top, as long as or slightly longer than the sericeous thick, clavate, red connectives. Ovary sericeous. 3. **B. Aerugo** Sagot.
7. a. Top of the anther cells obtuse or rounded. Bracts and bracteoles 1—3½ mm long. Ovary glabrous. 8
 b. Bracts and bracteoles short, hardly 1 mm long. Top of the anther cells mucronulate, with ¼—1½ mm long hornlets. Ovary densely sericeous, except at the base 8. **B. obversa** Miq.
8. a. Leaves oblanceolate, oblong or oblong-lanceolate with cuneate base. Petioles 2—10 mm long. Sepals outside sericeous, inside glabrous. Anthers glabrous; appendage of the connective very large (12 mm). 6. **B. densa** (Poir.) D.C.
 b. Leaves elliptical, ovate, obovate or sub-orbicular, with cordate and often narrowed base. Petioles short (1½—½ mm). Sepals outside glabrous, inside sericeous. Anthers densely strigose at the top; appendage of the connective ½—⅓ of the length of the cells 7. **B. coccolobifolia** Kunth.
1. **Byrsonima crassifolia** (L.) Rich. ex A. L. de Juss. in Ann. Mus. Par. XVIII (1811), p. 481, emend. Ndz.; Kunth in H.B.K., Nov. gen. V (1821), p. 115 (coll. ed.); D.C., Prodr. I (1824), p. 579; Juss. in Arch. Mus. Par. III (1843), p. 291; Miq., Stirp. Surin. (1850), p. 86; id. in Linnaea 18 (1844), p. 50; Griseb. in Fl. Bras. XII, 1 (1858), p. 18; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 114; Triana and Planch. in Ann. sc. nat. 4e sér. Bot. XVIII (1862), p. 312; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 168, p. p.; Ndz. in Engl., Pfl. reich IV (1928), p. 718; — *Malpighia crassifolia* L., Spec. Pl. I (1753), p. 426, n. 3; Aubl., Pl. Guia. I (1775), p. 457, III t. 182; — *Malpighia Mourcila* Aubl. l. c., p. 459, t. 241; Cav., Diss. VIII (1789), p. 412,

t. 241; — *Byrsonima rhopalaeifolia* Kunth l. c., p. 114; D.C. l. c., p. 580; — *Byrsonima montana* Kunth l. c., p. 115; — *B. ferruginea* Kunth l. c., p. 116, t. 446; D.C. l. c., p. 579; Juss. l. c., p. 291; — *B. cubensis* Juss. l. c., p. 292; — *B. crassifolia* (L.) Kunth, var. *typica* Ndz. in Arb. Bot. Inst. Lyc. I (1901), p. 16; id., in Engl. l. c., p. 720.

Small shrub, or low, stunted tree, up to 10 m high. Wood rather heavy, strong (Pfeiffer). Young parts with short, rusty or rufous-velutinous hairs. Hairs compass-needle-shaped, with nearly straight or slightly flexuous, 400—600 μ long arms, 25—50 μ in diam.; feet thin, 50—110 μ long. Branchlets cylindrical, sulcate, rusty-sub-velutinous, up to 3 mm in diam.; branches cylindrical, glabrous, grey, up to 5 mm in diam.; internodes $\frac{1}{2}$ —6 cm long, those at the end of the branches often reduced. Leaves coriaceous, varying in size and shape, oblong or elliptical to ovate or obovate, 3—20 cm long, 2—15 cm wide; base obtuse or slightly acute, slightly decurrent into the petiole; margin revolute; top acute, \pm short-acuminate or slightly obtuse. Young leaves rusty-velutinous; adult ones glabrescent, shining above, with long-persistent hairs along the slightly prominent midrib, beneath dull, sub-velutinous, at last glabrescent, except along the strongly prominent midrib, primary nerves (7—10 on each side) prominent, arcuate at the margin, veins densely reticulate. Petioles slightly velutinous or glabrous, $\frac{1}{2}$ —2 $\frac{1}{2}$ cm long. Stipules persistent, thick, ovate or ovate-lanceolate, velutinous, 3—5 mm long. Racemes or pseudo-racemes, peduncled, terminal, elongate, many-flowered, rufous-velutinous, 4—12 $\frac{1}{2}$ cm long. Pedicels velutinous, 7—12 mm long, bracteate and bibracteolate at the base, 1—3 on 0—4 mm long peduncles. Bracts and bracteoles triangular or ovate, acute, deciduous, crisp, outside velutinous, inside nearly glabrous, 2—3, resp. 1—3 mm long. Flowers 1—2 cm in diam.; buds ovoid, 5 mm long. Sepals erect, or slightly recurved at the top, ovate, outside sericeous, 3—5 mm long, with oblong, 2—3 mm long, glabrous glands. Petals patent, yellow, turning

reddish when fading, glabrous, concave, orbicular-reniform, with nearly entire margin, 5—9 mm in diam., with 3—5 mm long claws; 5th petal flattish, irregular-slashed, 3—4 mm long, with thick claw. Stamens nearly equal, exerted. Filaments glabrous, except base, 2—3 mm long, hardly connate at the base. Anthers linear or oblong, usually pilose; cells as long as or slightly longer than the 2—3½ mm long, inside pilose, connectives. Ovary sub-globose, glabrous or slightly sericeous. Styles in youth curved at the top, glabrous, as long as the stamens. Torus-hairs rusty, ½—⅓ of the length of the filaments. Drupe globose, green, at last yellowish, with a sour flavour, 5—8 mm in diam., 3- (or by abortion 1- or 2-)celled. Exocarp thin-fleshy, endocarp woody, minutely verrucous or ribbed.

Distribution: Mexico, Central America, Northern South America, West Indies.

Patrick savannah (Boldingh n. 3904a, fl. Oct.; Coll. indig. n. 178, fl. May); Joden savannah (Focke n. 348, fl. Oct.; Wullschlägel n. 47 p. p. [B.]); Zanderij I (Samuels n. 302 [L.], fl. May; Kuyper n. 71, fl. July; B.W. n. 5491, fl. Dec.); Sectie O (Lanjouw n. 153, fl. July; Pulle n. 145, fr. Aug.; B.W. n. 471, fl. and fr. Oct.; B.W. n. 2820, fl. Apr.); Sectie O, tree n. 528 (B.W. n. 2555, fl. Dec.; n. 1206, fl. and fr. Oct.; n. 1805, fl. June; n. 2608, fl. and fr. Jan.; n. 4681, fl. May; n. 4752, fl. Oct.; n. 5072, fl. Febr.); savannah near Berlijn (Essed n. 34 b-d, fl. Jan.); savannah near Brownsberg (Lanjouw n. 1254, fl. Nov.); Para district near savannah Kompas (Went n. 366, fl. Sept.); Dondercreek (B.W. n. 828, fl. Jan.; Pulle s. n.); without locality: Hostmann et Kappler 1009a; Splitgerber s. n., mis. de Vriese [L.].

var. *cinerea* (Poir.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. (1901), p. 17; id. in Engl. l. c., p. 722; — *Malpighia cinerea* Poir., Suppl. IV (1813), p. 7; — *Byrsonima cinerea* D.C. l. c., p. 580; Juss. in Arch. Mus. Par. l. c., p. 281; Griseb. in Fl. Bras. l. c., p. 12; id. in Fl. Brit. W.-Ind. Isl. l. c., p. 114.

Lower leaf surface with persistent, grey-sericeous hairs.

Distribution: Brazil, Guiana.

Zanderij I (B.W. n. 563); Para district, Pl. Onoribo (Wullschlägel n. 46 [B.]); near Joden savannah, pl. Berlijn (Kegel 1146 [G.] and s. n. [ex hb. Garcke; D.]); Pl. Berlijn (Wullschlägel n. 49 named *B. spicata* by Pulle [B.]); upper Suriname R. (Focke n. 233, fl. Nov.); without locality: Hostmann n. 126; n. 146a [G.]; n. 810 p. p. [U, D.]; Wullschlägel 47 p. p. [G.].

var. **Spruceana** Ndz. in Arb. Bot. Inst. l. c., p. 18; id. in Engl. l. c., p. 722; — *B. Spruceana* Ndz. in Engl.-Prantl Nat. Pflz.fam. Nachtr. zu III, 4 (1897), p. 207.

Leaves lanceolate, 7—12 cm long, $1\frac{1}{2}$ —3 cm wide; densely prominulous reticulate; shining above, below dull, glabrescent. Petioles nearly 1 cm long. Anthers pilose. Ovary puberulous.

Distribution: Para, Guiana, Venezuela, Colombia.

Without locality: Splitgerber a. 1837 (ex Ndz.).

Vernacular names: Moeleidan, Moeréiran, Moeléi, Moeréi, Moelehi (Car.); Hori, Hoelia, Horia (Arow.); Sabana kwarie, Moeli, Moeléi (N.E.); Savanna kwarie (S.D.); Sabana mango (Sar.).

2. **Byrsonima coriacea** (Swartz) Kunth in H.B.K., Nov. gen. V (1821), p. 113 (coll. ed.), emend. Ndz.; D.C., Prodr. I (1824), p. 580; Small in N.-Amer. Fl. XXV, 2 (1910), p. 167; Fawcett and Rendle, Fl. Jam. IV (1920), p. 221, p. p., f. 74; — *Malpighia coriacea* Swartz, Prodr. (1788), p. 74; — *Byrsonima coriacea* (Swartz) Kunth, var. *Swartziana* Ndz. in Engl. l. c., p. 699.

Shrub or tree, up to 40 m high. Bark dark-brown with white spots. Young parts densely rusty- or rufous-sericeous. Hairs compass-needle-shaped, with straight, 300—500(—1000) μ long, thick hairs, with short, 10—50(—70) μ long, thin feet. Branchlets cylindrical, striate, sericeous; branches glabrous, grey, striate, up to 4 mm in diam.; internodes $\frac{1}{2}$ —4(—10) cm long, often reduced at the top of the branch. Leaves coriaceous, lanceolate, up to 18 cm long, and $5\frac{1}{2}$ cm wide; base narrowed or cuneate, tapering into the petiole; margin slightly revolute; top acute or acuminate, acumen generally blunt. Young leaves

densely sericeous, adult ones above light-green, glabrous (along midrib long-persistent hairs), shining, nerves slightly prominent, beneath light-brown, with long-persistent hairs, glabrescent, with slightly prominent nerves. Petioles sericeous, 4—15 mm long. Stipules broadly ovate, thick, persistent, $1\frac{1}{2}$ —4 mm long, outside sericeous. Racemes or rarely pseudo-racemes, terminal, peduncled, 15—40-flowered, up to 15 cm long, rusty-sericeous. Pedicels slender, sericeous, 6—15 mm long, bracteate and bibracteolate at the base, on 0— $2\frac{1}{2}$ mm long peduncles. Bracts and bracteoles thick, straight, persistent, ovate, acute, outside sericeous, inside slightly pilose, 2, resp. $\frac{1}{2}$ —1 mm long. Flowers $1\frac{1}{2}$ cm in diam.; buds globose-ovoid, 5—6 mm long. Sepals ovate, top recurved, sericeous, 3— $3\frac{1}{2}$ mm long, with ellipsoid, glabrous, 2 mm long glands, or glandless. Petals glabrous, yellow, concave, reniform, 5—6 mm long, 7—8 mm wide, with reflexed 3—4 mm long claws; 5th petal flattish, corrugate, with hastate base, 5×3 mm, with thick, straight, $2\frac{1}{2}$ mm long claw. Stamens nearly equal, exserted. Filaments glabrous, 1—2 mm long, hardly connate at the base. Anthers linear-oblong, 3 mm long, glabrous or sericeous between the parallel cells, nearly as long as the connectives. Torus-hairs 1—2 mm long. Ovary ovoid, glabrous or at first sericeous; styles glabrous, 5 mm long. Drupe yellow, globose, up to 14 mm in diam.; exocarp thin-fleshy, endocarp bony, verrucous,

Distribution: Jamaica.

var. *spicata* (Cav.) Ndz. in Engl. l. c., p. 700; — *Malpighia spicata* Cav., Diss. VIII (1789), p. 409, t. 237; — *Byrsonima spicata* Rich. ex A. L. de Juss. in Ann. Mus. Paris XVIII (1811), p. 481; Kunth in H.B.K., Nov. gen. l. c., p. 113; D.C., Prodr. I (1824), p. 580; Griseb. in Fl. Bras. XII, 1 (1858), p. 12; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 115; Juss. in Arch. Mus. Paris III (1843), p. 294; Pulle, Enum. Pl. Surin. (1906), p. 471; Small in N.-Amer. Fl. XXV, 2 (1910), p. 168; — *Byrsonima lanceolata* Miq. in Linnæa 18 (1844), p. 602; — *Byrsonima*

crassifolia, forma *angustifolia* Miq. l. c., p. 736; — *Byrsonima Hostmanni* Benth. in Lond. Journ. Bot. VII (1848), p. 120.

Leaves oblong-lanceolate or elliptical-lanceolate, chartaceous, with many (15—40 on each side) parallel, distinct primary nerves.

Distribution: Tropical South America, including the West Indies.

Glandbearing form: Zanderij I, tree n. 146 (B.W. n. 3375, fr. Oct.); Para (Splitgerber n. 991 [L.], fl. March); Onoribo (Focke n. 876, type of *B. lanceolata* Miq., fl. March); Pl. Berlijn, Onoribo, Para (Wullschlängel n. 48 [B.]); without locality: Hostmann n. 1009, type of *B. Hostmanni* Benth., and of *B. crassifolia*, forma *lanceolata* Miq.; Focke n. 373; Hohenacker, Arzn. n. 438 [D.]; Nolte [G.]; Wullschlängel n. 46, 48, 49 [G.].

Glandless form: Osembo (Essed n. 35a, fl. Jan.); Zanderij I, tree n. 146 (B.W. n. 439, fl. Nov.; n. 1207, fl. Oct.; n. 2285, fl. Aug.; n. 2515, fl. Dec.; n. 3902, fl. July; n. 4786, fl. Sept.).

f. **propinqua** (Benth.) Ndz. in Arb. Bot. Inst. Lyc. I (1901), p. 5; id. Engl. l. c., p. 701; — *Byrsonima propinqua* Benth. in Lond. Journ. Bot. VII (1848), p. 120; — *B. coriacea* × *B. crassifolia* Ndz. l. c.

Anther cells on both sides pilose. Adult leaves golden-yellow-sericeous beneath.

Patrick savannah (Boldingh n. 3889, fl. Oct.); Joden savannah (Tulleken n. 166 [L.], fl. Aug.; Kegel n. 1147 [G.]); Berlijn, Para (Wullschlängel n. 50 [B.]; Republiek (Kuyper n. 8, fl. Oct.).

Vernacular names: *Holia*, *Hoelia* (Arow.); *Moeleri*, *Moelí*, *Moeroei* (Car.); *Savanna* or *sabana kwarie* (N.E.).

3. ***Byrsonima Aerugo*** Sagot in Ann. sc. nat. 6e sér. XII (1881), p. 178; Sandwith in Kew Bull. 5 (1935), p. 311; — *Byrsonima altissima* auctt., non Aublet, Ndz. in Engl. Pf. reich IV (1928), p. 716, f. 46H.

Stout trees, up to 35 m high, stem up to 1 m in diam., bark thick, reddish, wood hard, reddish. Young parts densely reddish

or rusty-farinose or -sericeous. Hairs compass-needle-shaped, with straight, 200—300 μ long, thick (15—30 μ) arms, and slender, short, 10—40 μ long feet. Branchlets sericeous, sulcate, cylindrical, up to 3 mm in diam.; branches cylindrical, glabrous, greyish, striate, up to 4 mm in diam. Leaves thick-coriaceous, elliptical, ovate- or obovate-oblong, 8—15 cm long, 5½—7½ cm wide; base acuminate, decurrent; margin revolute; top acuminate or acute. Young leaves densely rusty-sericeous, adult ones above glabrous, often pruinose, nerves slightly prominent, beneath densely rusty farinose-sericeous, primary nerves (8—10 on each side) strongly prominent, arcuate, not attaining the margin, secondary ones slightly prominent, reticulate. Petioles canaliculate, nearly glabrous, flattish above, 1—4 cm long. Stipules persistent, connate, ovate-acute, outside sericeous, 2—4 mm long. Racemes rufous-sericeous, 6—8 cm long, peduncles 1—2 cm long. Pedicels sericeous, slender, 4—15 (when fruiting) mm long, bracteate and bibracteolate at the base. Bracts coriaceous, persistent, circinnate, linear, outside sericeous, inside nearly glabrous, greenish, 4—5 mm long. Bracteoles coriaceous, persistent, straight, slightly concave, orbicular, outside sericeous, inside nearly glabrous, 1 mm long. Flowers up to 1½ cm diam.; buds ovoid, 4 mm long. Sepals triangular-obtuse, recurved at the top, sericeous (outside more densely), 2—3 mm long, with large, yellow, oblong, 1½—2 mm long glands. Petals yellow or white (Benoist), patent, glabrous, orbicular, cochleate, 5—9 mm in diam., base hastate or cordate, claws semi-circular recurved, 4 mm long, 5th petal flat, ovate, corrugate, with sagittate base, 3 mm long, claw thick, straight, 4½ mm long. Stamens nearly equal, only anthers exerted. Filaments broad, glabrous, 2 mm long, hardly connate at the base. Anthers 2½—3 mm long, cells extrorsely curved at the top, with lyre-haped hornlets, as long as, or slightly longer than the sericeous, thick, clavate, red connectives; cells long-protruding beyond the base of the connectives. Receptacle

with 1—1½ mm long hairs. Ovary sericeous, ovoid; styles as long as the stamens. Drupe semi-globose, reddish, 9 mm in diam., hollow below. Exocarp thin-fleshy, endocarp bony, thick, verrucous.

Distribution: French Guiana.

var. **occidentalis** Ndz. in Arb. Bot. Inst. Lyc. Braunsb. I (1901), p. 15; id. in Engl. l. c.

This variety differs from the typical form (var. *orientalis* Ndz. l. c.) in the size of all its parts, and the less pruinose leaves. Leaves up to 22 cm long, 9 cm wide. Primary nerves 10—15. Stipules 3 mm long. Racemes up to 8 cm long; peduncles 1—2 cm long; bracts 4 mm long.

Distribution: Brit. Guiana.

Brownsberg, tree n. 1154 (B.W. n. 1707, ster. March; n. 2072, fr. July; n. 2877, fl. May; n. 2930, fr. and fl. June); tree n. 83 (B.W. n. 3272, fr. Sept.); tree n. 1156 (B.W. n. 1759, ster. Apr.; n. 2073, fr. July).

4. **Byrsonima cydoniifolia** Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 58; id. in Arch. Mus. Par. III (1843), p. 281; Griseb. in Fl. Bras. XII, 1 (1858), p. 6; Pulle, Enum. Pl. Surin. (1906), p. 472; Ndz. in Engl., Pfl. reich IV (1928), p. 731.

Shrub or treelet, up to 6 m high. Young parts grey- or reddish-velutinous. Hairs compass-needle-shaped, arms flexuous, ½—1½ mm long, feet 250—400 μ long; both 15—30 μ in diam. Branchlets cylindrical, thickish, up to 4 mm in diam., grey-velutinous; branches cylindrical, glabrous, suberous, grey, striate, 4 mm in diam., ringed at the nodes; internodes 0.1—3 cm long. Leaves chartaceous, obovate, oblanceolate or elliptical, 5—14 cm long, 2—8 cm wide; base cuneate, long-decurrent into the petiole; margin flat; top rounded, obtuse or acute, often slightly emarginate. Young leaves grey- or reddish-velutinous or subsericeous; adult ones smooth, puberulous above, with partly (except midrib) disappearing hairs; beneath grey-

velutinous, midrib strongly prominent, primary nerves (7—10 on each side) prominent, arcuate ascendent, not attaining the margin, veins nearly invisible under the hairs, reticulate. Petioles short (in consequence of the long-decurrent leaf-blades) 0—5, rarely up to 15 mm long, reddish-velutinous, thickish. Stipules broadly ovate-triangular, obtuse, thick, outside hirsute, inside glabrous, 3—5 mm long. Pseudo-racemes closely packed, many-flowered, terminal, velutinous, up to 18 cm long; peduncles 1—4 cm long. Pedicels generally 2—4 on a very short peduncle, thickish, erect or patent, velutinous, 8—17 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles subulate, deciduous, thin, outside velutinous, inside glabrous, 5—7, resp. 1—2½ mm long. Flowers 1½ cm in diam., buds sub-globose, up to 6 mm long. Sepals ovate, with recurved top, outside sericeous-tomentose, inside glabrous, 4 mm long, with cuneate-obovate 2—3 mm long glands. Petals yellow, glabrous, thickish, orbicular, cochleate, 6 mm in diam.; base cordate; margin entire; claws strongly recurved, 4 mm long; 5th petal flat, reniform, 3 × 5 mm, wrinkled, with erose-toothed margin; claw thick, 4 mm long. Stamens exserted, the epipetalous ones slightly shorter. Filaments flat, glabrous, united and densely haired at the base; torus densely haired, hairs 2—2½ mm long. Anthers elliptical, oblong or linear-oblong, 2—3 mm long; cells hirsute, parallel, at the top as long as, at the base slightly longer than the thick, oblong, red connectives. Ovary conoid, 3-sulcate, glabrous or pilose, 2 mm high. Styles glabrous, 3 mm long. Drupe globose, 8 mm in diam., endocarp woody, slightly verrucous.

Distribution: Brazil, Bolivia, Guiana.

Upper Suriname R. (Hostmann and Kappler, ed Hohenack. n. 1296 [L.], p. p.) named by Steud.: *B. verbascifolia* D.C.).

5. *Byrsonima verbascifolia* (L.) Rich. ex A. L. de Juss. in Ann. Mus. Paris XVIII (1811), p. 481; Kunth in H.B.K., Nov. gen. V (1821), p. 113 (coll. ed.); D.C.,

Prodr. I (1824), p. 579; Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 57; Griseb. in Fl. Bras. XII, 1 (1858), p. 5; id. in Fl. Brit. W.-Ind. Isl. (1859), p. 114; Pulle, Enum. Pl. Surin. (1906), p. 472; Small in N.-Amer. Fl. XXV, 2 (1910), p. 170; Ndz. in Engl., Pfl. reich IV (1928), p. 735; — *Malpighia verbascifolia* L., Spec. Pl. I (1735), p. 426, n. 4; Aubl. Pl. Guia. I (1775), p. 460, III t. 184; Cav., Diss. VIII (1789), p. 411, t. 240; — *Malpighia crassifolia* Vellozo, Fl. flum. IV (1827), t. 170, (1825), p. 193.

Tortuous, small trees, up to 3 m high, with knotted, dwarfish trunk. Bark dark-red; wood reddish. Young parts with very dense, hispid-velutinous, partly rigid, tomentum. Hairs varying in shape and length, arms mostly serpentine, up to 2 mm long, feet up to 300 μ long. Branchlets cylindrical, thick, velutinous, up to 1 cm in diam.; branches glabrous, very thick, suberous, epidermis coming off in rings; internodes $\frac{1}{4}$ —2 cm long. Leaves sessile, but not amplexicaul, tufted on spurlike branchlets, coriaceous, oblong-ob lanceolate, obovate or spatulate, up to 35 cm long, and 20 cm wide; base gradually narrowed or cuneate, long-decurrent into the petiole; margin flat; top rounded or notched. Young leaves densely velutinous-tomentose; adult ones above smooth, hispid, or sometimes glabrescent, beneath velutinous-tomentose, nerves hardly prominent, hidden by the sometimes rufous hairs. Petioles very short or wanting. Stipules broadly ovate or triangular, united, outside reddish-velutinous, inside glabrous, 5—12 mm long. Racemes or pseudo-racemes, terminal, long-hispid or velutinous, 8—25 cm long. Peduncle 0—6 cm long, with stipules or bracts at the base. Pedicels tomentose, mostly thick, 5—16 mm long, bracteate and bibracteolate at the base; on 0—2 mm long peduncles. Bracts and bracteoles thin, lanceolate, linear, or filiform, often with 2—3 $\frac{1}{2}$, resp. 1—1 $\frac{1}{2}$ mm broad base; outside tomentose, inside glabrous, 5—25, resp. 3—9 mm long. Flowers 1 $\frac{1}{2}$ —2 cm in diam.; buds ovoid, up to 5 mm long. Sepals ovate, obtuse, outside tomentose, inside glabrous, nearly

straight, 3—6 mm long, when fruiting slightly accrescent, with obovate 2—3 mm long glands. Petals yellow, sub-orbicular, concave, up to 10 mm in diam., with cordate base, toothed margin, and reflexed, 4 mm long claws; 5th petal flat, orbicular-reniform, corrugate, 4—5 mm long, with thick, straight, 4—5 mm long claw. The epipetalous stamens slightly shorter; only anthers exerted. Anthers glabrous or pilose, 2 mm long, cells parallel, at the top nearly as long as, at the base longer than the red, thick connectives. Filaments glabrous, 2½—3 mm long, hardly connate at the base. Receptacle with 2—3 mm long hairs. Ovary hirsute or glabrous (not in Surinam specimens); styles glabrous, 3 mm long. Drupe globose, 1 cm in diam.; exocarp thin, fleshy, endocarp woody.

Distribution: Northern South America, including the West Indies.

Subspec. *villosa* Griseb. in *Linnaea* XIII (1839), p. 250; id. in *Fl. Bras.* XII, 1 (1858), p. 5; Pulle, *Enum.* (1906), p. 472; *Ndz. l. c.*, p. 736.

Leaves up to 35 cm long, reticulate; above densely hispid, glabrescent, beneath densely velutinous-tomentose. Hairs of the upper surface often sessile, with one reduced arm, seeming simple, beneath with nearly equal, flexuous arms. Bracts and bracteoles filiform, up to 2½, resp. 1 mm long. Sepals accrescent, up to 15 mm long. Ovary generally hirsute. Drupe up to 1¼ cm in diam.

f. *spathulata* *Ndz.* in *Arb. Bot. Inst. Lyc. Braunsb.* (1901), p. 29; id. in *Engl. l. c.*, p. 737.

Leaves spathulate, up to 35 cm long, 17½ cm wide, base gradually narrowed, wing-like decurrent into the petioles.

Upper Suriname R. (Hostmann and Kappler ed. *Hohenack.* n. 1296 p. p.).

6. *Byrsonima densa* (Poir.) D.C., *Prodr.* I (1824), p. 580; *Juss.* in *Ann. sc. nat. 2e sér. Bot.* XIII (1840), p. 334;

id. in Arch. Mus. Paris III (1843), p. 303; Ndz. in Engl., Pfl. reich IV (1928), p. 744; Benoist in Arch. Bot. V (1931), p. 162; — *Malpighia densa* Poir., Enc. méth. Suppl. IV (1797), p. 7; — *Byrsonima amazonica* Griseb. in Fl. Bras. XII, 1 (1858), p. 14; Ndz. in Engl. l. c., p. 744; — ? *Byrsonima punctulata* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 335; id. in Arch. Mus. l. c., p. 309; Griseb. in Fl. Bras. l. c., p. 15; Ndz. in Engl. l. c., p. 744.

Shrub or tree, up to 20 m high, trunk up to 60 cm in diam., wood soft, bark rather thin (v. Emden). Young parts rusty-pilose, soon glabrous. Branches cylindrical, glabrous, or with few, straight hairs, grey, 3 mm diam., striate, with lenticels; branches cylindrical, glabrous, 4 mm diam., with many lenticels; internodes $\frac{1}{2}$ –3(–8) cm long, nodes annular. Leaves chartaceous-coriaceous, oblanceolate, oblong or oblong-lanceolate, 3–12(–15) cm long, $1\frac{1}{2}$ –4(–6) cm wide; base cuneate, decurrent into the petiole; margin revolute; top obtuse or rounded, often oblique, or shortly acuminate. Young leaves glabrous; adult ones above smooth, shining, nerves slightly prominent, beneath mostly dull, with strongly prominent midrib, primary nerves (8–10 on each side) straight, ascendent, arcuate at the margin and there united with the next ones, veins densely reticulate. Petioles thickish, marginate, glabrous, 2–10 mm long. Stipules united, free above the middle, divided into 2, triangular, acute, $1\frac{1}{4}$ mm long segments, thick, outside glabrous, with thick, long-persistent hairs at the base of the inside, conspicuous after the falling off of the leaves. Terminal, densely-packed, 5–10 cm long racemes, with lax, rufous hairs on the rachis; peduncle $1\frac{1}{2}$ –3 cm long. Pedicels slender, rufous-puberulous, at first reflexed, at last erect-patent, 7–12 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles persistent, thickish, broadly ovate or sub-orbicular, outside glabrous, inside and margin puberulous, 1– $1\frac{1}{2}$, resp. 1 mm long. Flowers fragrant, 7–10 mm in diam.; buds sub-globose, 3 mm in diam. Sepals ovate, concave, top curved,

outside slightly sericeous, 2—2½ mm long, with ovoid-cuneate glabrous, 1—1½ mm long glands. Petals reddish or white, glabrous, thickish, sub-orbicular, cochleate; margin nearly entire or erose; 3—3½ mm in diam., with reflexed, 2 mm long claw; 5th petal flattish, sub-orbicular, erose, 3 mm long, with straight and thicker, 3 mm long claw. Stamens exerted, the epipetalous ones slightly longer. Filaments fleshy, glabrous, except at the inside of the base (hairs 1 mm long), 2½ mm long, hardly united. Anthers transversally attached with parallel, glabrous, distinct, elliptical, 7 mm long cells, pendulous from the cordate, red, small connectives, with a very large, obtuse-conoid, straight, 1¼ mm long appendage. Ovary conoid, glabrous; styles glabrous, 3 mm long. Drupe globose, 4 mm in diam., shining; exocarp thin-fleshy; endocarp thick, woody, with high radial and transverse ridges, 3 (or by abortion 2- or 1-) seeded.

Distribution: Guiana, Amazonian district.

Cottica (B.W. n. 5355, fl. June); Patrick savannah (Coll. indig. n. 203, fl. May); Brownsberg (B.W. n. 3858, fl. May; n. 6452, fl. Apr.; n. 6829, fl. Apr.; v. Emden s. n., fr. Sept.); Brownsberg, tree n. 1231 (B.W. n. 6661, fr. Oct.; n. 6740, fl. June).

Vernacular name: Hoeliadamaro (Arow.).

var. **emarginata** Kosterm. l. c., p. 10.

Leaves oblanceolate, with emarginate top, clustered at the end of very short branches; internodes 1—5 mm long.

Kabalebo R. near Dalgerberg (Pulle n. 595, fr. Sept.).

7. **Byrsonima coccolobifolia** Kunth in H.B.K., Nov. gen. V (1821), p. 114 (coll. ed.); D.C., Prodr. I (1824), p. 580; Juss. in St. Hil. Fl. Bras. mer. III (1832), p. 85; id. in Arch. Mus. Par. III (1843), p. 502; Griseb. in Fl. Bras. XII, 1 (1858), p. 17; Small in N.-Amer. Fl. XXV, 2 (1910), p. 170; Ndz. in Engl., Pfl. reich IV (1928), p. 749, t. 47, f. C, D; — *Byrsonima sessilifolia* Benth. in Lond. Journ. Bot. VII (1848), p. 124; Sandwith in Kew Bull. 5 (1935), p. 311.

Low trees or shrubs, with the leaves clustered at the end of the branches. Only very young parts and pedicels rusty-sericeous. Hairs compass-needle-shaped, with straight, 150—500 μ long arms, 20—30 μ in diam.; feet 15 μ long. Branchlets glabrous, cylindrical, angular or striate, grey, fulvous, up to 3 mm in diam.; branches cylindrical, very suberous, greyish, up to 6 mm in diam.; internodes $\frac{1}{2}$ —6 cm long. Leaves sessile or sub-sessile, coriaceous, elliptical, ovate, obovate, ovate-lanceolate or sub-orbicular, up to 15 cm long and 10 cm wide; base sub-cordate or often narrowed; margin flat; top obtuse or rounded, often emarginate. Young leaves glabrous; adult ones minutely punctulate; midrib and primary nerves (8—12 on each side) prominent, veins densely reticulate. Petioles thick, glabrous, $\frac{1}{2}$ —1 $\frac{1}{2}$ mm long. Stipules deciduous, broadly ovate or sub-orbicular, outside sericeous, inside glabrous, 2—3 mm long. Usually simple, peduncled, terminal, straight, glabrous (except pedicels), up to 15 cm long racemes; rachis angular with long-persistent hairs. Pedicels rufous-sericeous, thickish, 5—9 mm long, bracteate and bibracteolate at the base. Bracts and bracteoles lanceolate-ovate or ovate, acute, persistent, sericeous at margin and base, 2—3 $\frac{1}{2}$, resp. 1—1 $\frac{1}{2}$ mm long. Flowers up to 14 mm in diam.; buds ovoid, 5 mm long. Sepals ovate, top recurved, outside glabrous, inside sericeous, 3—4 $\frac{1}{2}$ mm long, with oblanceolate, white or reddish, glabrous, 2 mm long glands. Petals glabrous, pink, reddish or lilac, concave, sub-orbicular, with cordate base, entire margin, 4—6 mm long, and strongly reflexed 2—3 mm long claws; 5th petal flat, reniform, corrugate, 5 mm long, with thick, straight, canaliculate, 4 mm long claw. Stamens nearly equal, exserted. Filaments glabrous, except at base, fleshy, flat, 2 mm long, hardly connate at the base. Anthers linear, 2—3 $\frac{1}{2}$ mm long, cells densely strigose at the obtuse and usually free top; connective glabrous, with a conical, straight, or recurved appendage, $\frac{1}{2}$ — $\frac{1}{3}$ of the length of the cells. Torus-hairs slightly longer than the filaments.

Ovary ovoid, glabrous, sulcate; styles glabrous, 4—5 mm long. Drupe globose, top acute, up to 8 mm in diam. Exocarp thin-fleshy, endocarp bony, verrucous.

Distribution: Northern South America, West Indies.

Saramacca R., Poika savannah (B.W. n. 305, fl. May);
Coesewijne savannah (B.W. n. 5131, fl. May); Corantijne R.,
Oreala savannah (Pulle n. 535, fl. Sept.).

Vernacular names: Alatakoea, Moelei (Car.).

8. *Byrsonima obversa* Miq., Stirp. Surin. (1850), p. 76;
Pulle, Enum. Pl. Surin. (1906), p. 472; Ndz. in Engl.,
Pfl. reich IV (1928), p. 757.

Trees. Young parts rusty-sericeous. Branchlets angular or sulcate, sericeous, up to 3 mm in diam.; branches glabrous, grey, up to 4 mm in diam.; internodes $\frac{1}{2}$ —5(—10) cm long. Hairs compass-needle-shaped, arms nearly straight, 250—350 μ long, 15—20 μ in diam., the wall partly verrucous, feet funnel-shaped, up to 12 μ long. Leaves thin-coriaceous, obovate or oblanceolate, 4—12 cm long, 2—6 cm wide; base cuneate or acute, decurrent into the petioles; margin flat; top broadly rounded or rarely obtuse, subapiculate. Young leaves very soon glabrous; adult ones rusty-red, glabrous, shining above, with hardly prominent nerves; beneath pallid, very densely, minutely punctulate, midrib and the parallel, erect-patent primary nerves (8—11 on each side) slightly prominent, veins reticulate. Petioles sub-sericeous, glabrescent, canaliculate above, 4—8 mm long. Stipules connate, ovate-orbicular, outside sericeous, inside glabrous, 1—1 $\frac{1}{2}$ mm long. Racemes rufous-subsericeous, terminal, peduncled, up to 12 cm long. Pedicels slender, sericeous, often circinnate, $\frac{1}{2}$ —1 cm long, bracteate and bibracteolate at the base. Bracts and bracteoles thickish, persistent, slightly concave, ovate or orbicular, outside sericeous, hardly 1 mm long. Flowers up to 1 $\frac{1}{2}$ cm in diam. Sepals erect, ovate or obtuse-triangular, sub-sericeous, 2—3 mm long, with ellipsoid or oblanceolate, pink (Lanjouw), 2—3 mm long glands. Petals

glabrous, pink, concave, sub-orbicular, 4—6 mm long, base cordate, margin nearly entire or toothed, with reflexed 2 mm long claws; 5th petal flat, ovate, corrugate, 2 mm long, base hastate, claw thick, straight, $2\frac{1}{2}$ mm long. Stamens exerted, nearly equal. Filaments glabrous, 1—2 mm long, hardly connate at the base. Anthers linear, cells appressed-hirtellous, tips ending in setaceous, $\frac{3}{4}$ — $1\frac{1}{2}$ mm long hornlets, longer than or nearly equal to the thick, clavate, glabrous, often slightly recurved, appendage of the sericeous, 4 mm long, connectives. Torus-hairs one half the length of the filaments. Ovary ovoid, densely sericeous, except at base; styles glabrous, 4 mm long. Drupe globose, apiculate, 1 cm in diam., with persistent accrescent calyx. Exocarp thin-fleshy, endocarp bony, verrucous.

Distribution: Guiana, Para.

Tapanahoni R. (Versteeg n. 682, fl. July); Cottica R. near Moengo (Lanjouw n. 458, fl. Aug.); Brownsberg (B.W. n. 6681, fr. Nov.); upper Suriname R. near Dottera Soela (Tresling n. 294, fl. Aug.); lower Coppename R. (Went n. 143, fl. Aug.); Kabalebo R., Watramiri-creek, tree n. 1620 (B.W. n. 1890, ster. June; n. 3885, fl. July; n. 4040, fr. Oct.; n. 4426, fr. Oct.; n. 5004, fr. Dec.); without locality: Hostmann n. 665 (type specimen); Hostmann ed. Hohenacker n. 665a [D.].

Vernacular names: Madabrieballi (Arow.); Weneran (Car.).

9. *Byrsonima stipulacea* Juss. in Ann. sc. nat. 2e sér. Bot. XIII (1840), p. 332; id. in Arch. Mus. Paris III (1843), p. 287; Griseb. in Fl. Bras. XII, 1 (1858), p. 18; — *Byrsonima longibracteata* Mart. in Regensb. Fl. 24. Beibl. (1841), p. 61; — *Alcoceratobrix longibracteata* (Mart.) Ndz. in Arb. Bot. Inst. Lyc. Braunsb. I (1901), p. 45; — *Alcoceratobrix stipulacea* (Juss.) Ndz. in Engl., Pfl. reich IV (1928), p. 762.

Tree, up to 30 m high, wood medium hard and heavy, light to dark reddish brown. Young parts reddish-velutinous. Branchlets cylindrical, velutinous, glabrescent, brown or greyish, up to 5 mm in diam.; branches cylindrical, twisted, glabrous,

grey-suberous, up to 7 mm in diam.; internodes $\frac{1}{2}$ —6 cm long. Leaves entire, bullate, coriaceous, ovate, obovate or oblong, up to 18(-25) cm long, $3\frac{1}{2}$ —8(-10) cm wide; base acute or cuneate, long-decurrent into the petiole; margin revolute; top acute or shortly acuminate, rarely obtuse. Young leaves rufous-velutinous; adult ones above smooth, glabrous (except at the base), dark (when dried), with impressed nerves, beneath rufous-velutinous, midrib strongly prominent, primary nerves parallel, curved at the margin, and there anastomosing, strongly prominent, secondary and tertiary nerves prominent, parallel, forming nearly rectangular areoles. Hairs antler-shaped or stellate, with 100—180 μ long feet, 25 μ in diam., the arms 30—60 μ long. Petioles thick, densely hispid-velutinous, 6—20 mm long. Stipules intrapetiolar, membranous, outside velutinous, inside glabrous, deciduous, very large, ovate-lanceolate, acute or obtuse, 6—22 mm long, up to 8 mm wide, closing round the branches or racemes. Racemes straight, terminal, velutinous, up to 20 cm long, base enclosed by 2 stipuliform bracts; peduncle $\frac{1}{2}$ —4 cm long. Pedicels rufous-velutinous, becoming thicker towards the top, up to 13 mm long, bracteate and bibracteolate at the base. Bracts ovate-lanceolate, acute, outside velutinous, 6—12 mm long, 2—3 mm wide, deciduous; bracteoles ovate, acute, 3—6 mm long, 1—3 mm wide, outside velutinous, deciduous. Flowers up to 2 cm in diam.; buds globose, 4 mm high. Sepals thick, ovate, strongly recurved at the top, velutinous on both sides, 5 mm long, with oblong, 2—3 mm long, glands or glandless. Petals yellow, reflexed, glabrous, concave, sub-orbicular, 6—8 mm long, with cordate base and nearly entire margin, with 3 mm long claws; 5th petal flat, ovate or reniform 3 mm long, corrugate, base hastate, margin sub-glandular fringed, with thick, straight, $3\frac{1}{2}$ mm long claw. Stamens nearly equal, exerted. Filaments glabrous, halfway connate, flat, the episepalous ones broader, 2 mm long. Anther-cells linear, 2 mm long, densely hirsute, with long hairs

at the top, at the base auricled; connective dark, glabrous, oblong, with often recurved, cylindrical appendage, 1 mm longer than the cells. Torus hairs half the length of filaments. Ovary ovoid-pyramidal, sericeous; styles glabrous, thicker in the middle. Drupe globose, yellow, top apiculate, up to 1½ cm in diam. Calyx enlarged in fruit, woody. Exocarp fleshy, 5 mm thick, endocarp woody, slightly ribbed.

Distribution: Bahia, Guiana.

gland-bearing form: (*Alcoceratobrix rugosa* (Benth.) Ndz. in Arb. Bot. Inst. l. c., p. 45; id. in Engl. l. c., p. 763; — *B. rugosa* Benth. in Lond. Journ. Bot. VII (1848), p. 118; Griseb. in Fl. Bras. l. c., p. 18).

Brownsberg (B.W. n. 6903, fl. Aug.; n. 6585, fr. June); along railway, km 15,5 (B.W. n. 6361, fl. Jan.).

LAURACEAE

BY

A. J. G. H. KOSTERMANS (Utrecht).

Trees or shrubs, usually aromatic, sometimes parasitic, twining, leafless herbs. Leaves simple, rarely lobed, usually alternate, penninerved or plinerved. Stipules wanting. Inflorescences usually axillary panicles, spikes, racemes or umbels. Bracts deciduous or forming an involucre. Flowers generally small, regular, hermaphrodite or dioecious, sometimes polygamous-dioecious, generally fragrant; tube small or conspicuous, conical, infundibuliform or urceolate, generally increasing to a cupule at the base of the fruit, rarely deciduous, sometimes enveloping the whole fruit; perianth segments 4 or 6 in a double row, the outer ones often smaller than the alternate inner ones, deciduous or persistent. Stamens generally in 3 or 4 rows of 3, alternate, attached to the tube; the outer 2 rows fertile, usually glandless, introrse or rarely extrorse, or staminodial, sometimes wanting; stamens of the 3rd row usually fertile with introrse, extrorse, lateral or apical cells, base of the filaments with 2 glands at the outside; 4th row usually sterile, staminodial. Anthers ovate, oblong, rectangular or triangular, usually 2- or 4-celled, cells in 2 vertical rows or in one arcuate row, opening by valves, generally from base to top, the valves often persistent, patent. Pollen simple, globose. Filaments usually free, rarely those of the 3rd row united; basal glands generally sessile and free, sometimes higher up at the filament. Ovary free, as a rule epigynous, 1-celled with a solitary, anatropous, pendulous ovule, attached near the top of the cell. Style usually

conspicuous, stigma obtuse or rarely capitulate. Fruit a one-seeded berry or drupe, with an enlarged and persistent flower tube, surrounding the base of the fruit, rarely enveloping it; sometimes the whole perianth persistent, rarely deciduous. Seed without albumen, testa usually membranous. Cotyledons flat-convex, including the radicle and the usually well-developed plumule.

Distribution: 40 genera with about 1000 species, widely distributed in tropical regions, a few beyond the tropics in the temperate zones.

Principal literature:

- C. G. Nees ab Esenbeck, *Systema Laurinarum* (1836).
 C. F. Meissner in De Candolle, *Prodromus* XV, 1 (1864), p. 1; id. in Martius, *Flora Brasiliensis* V, 2 (1868), p. 138.
 C. Mez in Verh. Botan. Ver. Brandenburg 30 (1889), p. 1; id. in Jahrb. Botan. Garten Berlin V (1889); id. in Arb. Botan. Garten Breslau I (1892), p. 71.
 A. J. G. H. Kostermans, *Studies in South American Malpighiaceae, Lauraceae and Hernandiaceae, especially of Surinam, also in Med. Bot. Mus. en Herb. Utrecht* n. 25 (1936).

- | | | |
|-------|---|-----------------------|
| 1. a. | Parasitic, twining, leafless herbs with slender, filiform stems | 12. Cassytha. |
| b. | Woody plants with green leaves | 2 |
| 2. a. | Perianth of 4 segments, ♂ flower with 12 stamens, ♀ flower with 4 staminodes | 1. Laurus. |
| b. | Perianth of 6 segments, usually 3, 6 or 9 fertile stamens | 3 |
| 3. a. | Anthers 4-celled | 4 |
| b. | Anthers 2-celled | 7 |
| 4. a. | Leaves triplinerved. Anthers of the outer rows introrse, of the 3rd row extrorse; 4th row staminodial | 3. Cinnamomum. |
| b. | Leaves penninerved, rarely sub-triplinerved | 5 |
| 5. a. | Staminodes of the 4th row large, sagittate, stipitate. Filaments of the outer rows of stamens long, filiform. Perianth not or hardly enlarged in fruiting, usually persistent | 2. Persea. |
| b. | Staminodes of the 4th row small, stipitiform or | |

- wanting. Filaments of the outer rows of stamens usually small. Perianth tube persistent, enlarged, forming a cupule at or around the base of the berry. 6
6. *a.* Anther cells in 2 vertical rows ... 4. **Ocotea.**
b. Anther cells in one, slightly arcuate or horizontal row 5. **Nectandra.**
7. *a.* Flowers dioecious; gynaecium sterile, stipitiform or wanting in the male flowers; anthers minute, sterile in the female ones .. 11. **Endlicheria.**
b. Flowers hermaphrodite 8
8. *a.* Outer 6—9 stamens fertile..... 9
b. Outer 6 stamens sterile or abortive 11
9. *a.* Outer 6 stamens fertile, inner ones staminodial. 8. **Aiouea.**
b. Outer 9 stamens fertile, those of the 4th row usually abortive (*Aniba Kappleri* with sterile, but distinct 3rd row) 10
10. *a.* Stamens of the 3rd row free 6. **Aniba.**
b. Stamens of the 3rd row united 7. **Systemonodaphne.**
11. *a.* Stamens of the 3rd row fertile, outer 6 stamens changed into foliaceous, scale-shaped staminodes. 9. **Acrodiclidium.**
b. Stamens of the 3rd row fertile, outer 6 stamens abortive 10. **Mezilaurus.**

1. LAURUS L.

Evergreen trees or shrubs. Leaves alternate, coriaceous, penninerved. Flowers dioecious or hermaphrodite in axillary, peduncled, involucrate umbels; involucre deciduous. Perianth 4-fid; segments equal. Male flowers with 8—12 fertile filaments in 2 or 3 rows; filaments with 2 subsessile glands in the middle; anthers introrse, oblong, 2-celled. Ovary rudimentary or wanting. Female flowers with 4 staminodes. Style short. Stigma obtuse-trigonal. Berry ellipsoid, often surrounded by the truncate or lacerate perianth base. Cotyledons large, oily; radicle at the top, included.

Distribution: Two species in Asia Minor, Mediterranean region, Canary isl.; cultivated.

1. *Laurus nobilis* L., Spec. pl. I (1753), p. 369; Nees, Syst. (1836), p. 579; Miq. in Linnæa 18 (1844), p. 246; Meissn. in D.C., Prodr. XV, 1 (1864), p. 233; Pulle. Enum. Pl. Surin. (1906), p. 185; Hegi, Fl. Eur. IV (1921), p. 11.

Shrub or tree, up to 10 m high, densely leaved and branched. Bark glabrous, greenish; wood smooth; buds ovate, covered by 4—6 ovate, acute, sub-sericeous, deciduous scales. Leaves alternate, aromatic, coriaceous, lanceolate, elliptical-lanceolate or oblong, 7—10 cm long, 2½—3 cm wide, top acute or acuminate, rarely acutish or obtuse, margin sub-undulate, base acute, above dark-green, glabrous, midrib and primary nerves hardly prominent, beneath paler, midrib reddish, strongly prominent, primary nerves patent, disappearing towards the margin, veins densely reticulate. Petioles 1 cm long, reddish-green, canaliculate above. Panicles or 4—6-flowered pseudo-umbels short, axillary, 1—3 together, surrounded by brown deciduous, ovate or orbicular, concave, glabrous bracts. Peduncle 3—8 mm long, nearly cylindrical, glabrous, rather thick. Pedicels short, puberulous, 2½ mm long. Flowers dioecious, whitish-green or yellowish; the 4 perianth segments obovate or elliptical, obtuse, longitudinally 5-nerved. Male flowers with 10—12, rarely less, stamens, filaments with 2 large, subsessile glands about the middle, rarely outer rows of stamens glandless. Filaments long, glabrous, filiform. Anthers introrse, elliptical, sub-rectangular, obtuse, glabrous, with oblong, large cells. Female flower with 2—4 hastate staminodes with subulate or obtuse tops. Ovary shortly stipitate, oblong, glabrous; style glabrous, thick, short with depressed-capitate, sub-trigonus stigma. Berry at last black, ovoid, up to 2½ cm long; pedicel not thickened.

Distribution: Cultivated.

2. *PERSEA* Mill.

Trees or shrubs. Leaves alternate, chartaceous or coriaceous, usually pilose. Panicles axillary or sub-terminal. Flowers large,

in cymes or pseudo-umbels, without involucre, hermaphrodite; tube very short or wanting; perianth segments 6, equal or the outer ones smaller, usually persistent. Stamens 9, generally fertile; 4th row of stamens staminodial; filaments filiform, as a rule longer than the anthers, hirsute or glabrous; 3rd row with distinctly stipitate, usually large glands, the stalks of the glands united with the filaments, the glands therefore apparently attached at $\frac{1}{7}$ — $\frac{1}{2}$ of the filament; anthers generally 4-celled, ovate, cells large, the lower ones touching the lateral side of the upper ones; exterior anthers introrse, interior 6 anthers extrorse or extrorse-lateral. Staminodes large, distinctly stipitate, cordate or sagittate, top often hirsute. Ovary sub-globose, glabrous or pilose; style usually longer, glabrous or pilose; stigma dilated, large. Berry globose or ellipsoid. Fruiting pedicel not or slightly thickened; perianth not enlarged or dediduous.

Distribution: About 60 species, chiefly in South America.

1. a. Lower surface of young leaves densely sericeous; of adult ones white-pruinose 1. **P. Benthamiana** Meissn.
- b. Lower surface of the leaves sparingly puberulous or glabrous, not pruinose 2
2. a. Leaves chartaceous, elliptical, up to 30 cm long. Perianth segments 5—7 mm long, oblong-lanceolate. Glands large, stipitate; ovary pubescent. Berry pear-shaped, up to 20 cm long 2. **P. americana** Mill.
- b. Leaves coriaceous, lanceolate, up to 13 cm long. Perianth segments $1\frac{3}{4}$ mm long, ovate-orbicular. Glands small, sessile. Ovary glabrous. Berry globose, 1 cm diam. .. 3. **P. coriacea** Kosterm.

1. **Persea Benthamiana** Meissn. in D.C., Prodr. XV, 1 (1864), p. 44; id. in Fl. Bras. V, 2 (1866), p. 154; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 149; — *Persea nivea* Mez in Jahrb. l. c., p. 148; — *Persea venosa* Benth. (nec Nees) in pl. Spruc. n. 2766.

Tree. Branchlets densely rusty- or yellow-sericeous, glabrescent, angular; branches cylindrical, sulcate, dark-grey or brown,

glabrous; buds densely sericeous. Leaves alternate, chartaceous, at last rigid, lanceolate or oblong-lanceolate, (7—)12—17(—21) cm long, (2—) 3½—5(—6½) cm wide; base shortly cuneate, margin slightly recurved, top acute with obtuse point; above glabrous, shining, punctulate-areolate or smooth, midrib impressed, nerves flat; beneath densely sericeous when young, glabrescent, but with long-persistent, appressed hairs; at last distinctly white-pruinose, midrib strongly prominent, primary nerves (5—7 on each side) arcuately ascendent, prominent, disappearing towards margin, bases somewhat decurrent along midrib; secondary nerves parallel, prominulous; veins punctulate-areolate. Petioles slender, tomentellous, hardly canaliculate, 15—35 mm long. Panicles axillary, congested at the top of the branchlets, narrow-pyramidal, lax, elongated, grey-sericeous, up to 18 cm long; peduncles slender, up to 8 cm long, lower branchlets 3 cm long, flowers in contracted, umbel-like dichasia. Pedicels grey-sericeous, 2—3 mm long. Bracteoles minute, deciduous. Flowers yellow, sericeous-tomentose; outer perianth segments broadly ovate, acutish, fleshy, concave, inside glabrous, with 5 parallel nerves, 2 mm long; inner ones lanceolate-ovate, acutish, sericeous, 5 mm long, with 9 parallel nerves; outer 6 stamens with 2¼ mm long, tomentose, slender filaments, the outer ones united at the base with the petals; anthers ovate, obtuse or emarginate, margin slightly constricted, glabrous at the top, 1 mm long, cells large, introrse; 3rd row of stamens somewhat longer, erect; glands reniform, at ½ from the base; anthers oblong-rectangular, glabrous at the top, cells lateral; staminodes 2 mm long, tomentose, top covered with a triangular, thickened, red, glandular margin, the hairs protruding distinctly beyond this margin. Ovary tomentose, globose, 1½ mm high, style rather thick, tomentose, 2 mm long, stigma infundibuliform, ½ mm long. Berry globose, slightly compressed, mucronulate, smooth, 6 mm in diam.; pedicel thick, cylindrical, 5 mm long, with persistent, not enlarged perianth.

Distribution: Guiana, Brazil.

Zanderij I, tree n. 80 (B.W. n. 1238, ster. Nov.; n. 2687, fl. Febr.; n. 2767, fl. Apr.; n. 2904, fr. May; n. 3028, fr. July; n. 4380, fr. Aug.).

Vernacular names: Bastard Pisie (S.D.); Basra Pisie (N.E.); Apisie-ie, Kiesie-ma (Sar.); Boeradie, Boeradie-è (Arow.); Koesapoi, Wonojen-panda (Car.).

2. *Persea americana* Mill., Gard. Dict., ed. 8 (1768); Urb., Symb. IV (1905), p. 244; Fawcett and Rendle, Fl. Jam. III, 1 (1914), p. 207; — *Persea gratissima* Gaertn., Fruct. III (1807), p. 222, t. 221; H.B.K., Nov. gen. II (1817), p. 125 (col. ed.); Nees, Syst. (1836), p. 128; id. in Linnaea 21 (1848), p. 268, 489; Miq. in Linnaea 18 (1844), p. 245, Bot. Mag. 46 (1851), t. 4580; Wight Ic. (1852), t. 1823; Meissn. in D.C., Prodr. XV, 1 (1864), p. 52; id. in Fl. Bras. V, 2 (1866), p. 158; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 145; Pax in Engl.-Prantl III, 2 (1889), p. 115, f. 74; Mez in Arb. Bot. Gart. Bresl. I (1892), p. 113; Duss in Ann. Inst. Col. Marseille III (1897), p. 298; Ducke in Bol. Mus. Goeldi IV (1904), p. 381; Pulle, Enum. Pl. Surin. (1906), p. 183; Standley in U. S. A. Nat. Herb. 23, 2 (1922), p. 290; Brooks in Kew Bull. 1933, p. 224; — *Laurus Persea* L., Sp. pl. I (1753), p. 370; Aubl., Pl. Guia. I (1775), p. 364; — *Persea persea* (L.) Cockerell in Bull. Torr. Bot. Cl. 19 (1892), p. 95.

Tree, 15–45 m high. Bark greyish, wood soft, reddish-brown; branchlets angular, grey-tomentose or nearly glabrous. Leaves alternate and sub-opposite, chartaceous-coriaceous, varying in shape and size, ¹⁾ elliptical, ovate, ovate-oblong or obovate, 7–30 cm long, 4–22 cm wide, base acute or more or less rounded, often unequal, margin slightly recurved, top acuminate or acutish, sometimes rounded; young leaves pubescent, adult ones glabrous above, with flat or impressed midrib and primary nerves, veins prominulous, beneath somewhat glaucous, sparingly puberulous or glabrous, midrib prominent, primary

¹⁾ See: Huber in Bol. Mus. Goeldi VI (1909), p. 54.

nerves patent, arcuate at the margin, veins prominulous, densely reticulate. Petioles glabrescent, canaliculate above, $1\frac{1}{2}$ —6 cm long. Panicles clustered in the axils of the upper leaves, 7—10 cm long, grey-tomentellous, pyramidal, shortly peduncled, flowers congested. Flowers greenish, with yellow centre, $7\frac{1}{2}$ —10 mm long. Pedicels 2—10 mm long, velutinous; bracteoles small, subulate, deciduous or sub-persistent; perianth campanulate-rotate, velutinous or tomentellous, segments nearly equal (outer ones slightly shorter), oblong or oblong-lanceolate, obtuse or acutish, 5—7 mm long; fertile stamens 9, with slender, densely pilose, 2— $3\frac{1}{2}$ mm long filaments; the 3rd row with short-stipitate, semi-globose large glands at the base; anthers oblong, $1\frac{1}{2}$ mm long, top obtuse or slightly emarginate, base truncate, upper cells smaller than the lower ones; staminodes of the 4th row large, glanduliform, sometimes fertile, stipitate, pilose, sagittate, 2 mm long, top apiculate. Ovary globose, ovoid, densely pilose, tapering into the slender, nearly conical, 3 mm long style with slightly dilated stigma. Berry very large, pear-shaped, greenish or purplish (2 varieties), base at last naked, up to 20 cm long, 10—15 cm in diam., with thick, edible mesocarp. Cotyledons large, with acute top, white (according to Standley they are pink in *P. Schiedeana* Nees).

Distribution: Cultivated in the tropics; native country: Mexico (Mez).

Paramaribo, Tourtonne (Kegel n. 1002 [G.]).

Vernacular name: Advocaat (S.D.).

3. *Persea coriacea* Kosterm. l. c., p. 12.

Tree, 15 m high. Branchlets sulcate, sparingly haired, glabrescent; branches cylindrical, smooth, glabrous. Leaves alternate, coriaceous, elliptical or lanceolate, (5—)10—12(—13) cm long, ($1\frac{1}{2}$ —) $3\frac{1}{2}$ — $4\frac{1}{2}$ (—5) cm wide, base shortly acute, margin recurved, top shortly acuminate or acute, in older leaves rounded or emarginate; above glabrous, shining, densely and

finely punctiform-areolate, midrib impressed, primary nerves hardly prominulous; beneath glabrescent, yellowish-brown, microscopically granulate, midrib prominent, primary nerves (7—10 on each side) patent, curved, slightly prominent, veins prominulous, densely areolate. Petioles thin, glabrous, distinctly canaliculate above, up to 2 cm long.

Panicles rather few-flowered in the axils of the upper leaves, broadly pyramidal, up to 10 cm long; peduncle up to 6 cm long, rather slender, glabrous, sulcate; branchlets alternate, up to $1\frac{1}{2}$ cm long. Flowers grey-puberulous; tube very short, merging into the pedicel, sulcate, inside glabrous; perianth segments nearly equal, ovate-orbicular, $1\frac{3}{4}$ mm long, outer ones puberulous inside, inner ones sericeous; outer stamens 2 mm long, filaments densely sericeous outside, nearly as long as anthers, rather slender, flattened; anthers elliptical, top rounded, margin usually constricted, cells introrse; 3rd row of stamens $1\frac{3}{4}$ —2 mm long, filaments $1-1\frac{1}{2}$ mm long, tomentose outside, glabrous inside, with small, sessile, ellipsoid, flattish glands at $\frac{1}{3}$ from the base; anthers elliptical, glabrous, cells extrorse. Staminodes 1 mm long, outside, nearly up to the top, densely sericeous-tomentose, inside glabrous; top sagittate, thickened, dark. Often 1 staminode of the 5th row present. Ovary glabrous, cylindrical, $1\frac{1}{4}$ mm long; style thick, $\frac{3}{4}$ mm long. Berry globose, smooth, 1 cm in diam. Cupule flattish, small, 4 mm in diam., 2 mm high, margin entire; fruiting pedicel thick, obconical, 1 cm long, 3 mm wide at the top.

Distribution: Endemic.

Emma Range, Hendrik Top, 1080 m (B.W. n. 5748, fl., fr. March).

Vernacular name: Hegron pisie.

3. CINNAMOMUM Burm.

Evergreen trees or shrubs, usually with aromatic bark and leaves. Leaves coriaceous, opposite, sometimes alternate, usually

triplinerved, rarely penninerved; buds naked or sometimes with scales. Panicles axillary or terminal, often congested. Bracts wanting or very small. Flowers rather small, hermaphrodite or polygamous by abortion and then the female ones larger; tube infundibuliform; perianth segments 6, deciduous at or somewhat above the base, rarely persistent. Fertile stamens 9 or less; filaments of the 2 outer rows glandless with introrse, 4-celled anthers; 3rd row with stipitate or nearly sessile glands and extrorse, 4-, rarely 2-celled, anthers; anther cells in 2 vertical rows, the upper ones smaller; filaments thin, usually as long as the ovate or oblong anthers. Staminodes of the 4th row ovate or oblong, cordate or sagittate, stipitate, glandless. Ovary sessile, merging into a slender, long style; stigma obtuse or depressed, sometimes somewhat 3-lobed. Berry generally ellipsoid; cupule usually with entire margin.

Distribution: Species about 130 in tropical and subtropical Eastern Asia, Australia and the Pacific.

1. **Cinnamomum zeylanicum** Breyn. in Eph. Nat. Cur. dec. ann. 4 (1789), p. 139; Blume, Bydr. (1825), p. 570; Nees, Syst. (1836), p. 45; Miq. in Linnaea 18 (1844), p. 245; Meissn. in D.C., Prodr. XV, 1 (1864), p. 13; id. in Fl. Bras. V, 2 (1866), p. 147; Pulle, Enum. Pl. Surin. (1906), p. 183; Brooks in Kew Bull. 1933, p. 215; — *Laurus Cinnamomum* L., Spec. pl. I (1753), p. 369; Aubl., Pl. guia. I (1775), p. 362.

Tree, up to 20 m high. Bark rather thick, inside reddish, outside paler. Branches glabrous, cylindrical or sub-tetragonous. Leaves opposite or sub-opposite, rarely alternate, coriaceous or chartaceous, ovate, broadly elliptical or lanceolate-oblong, 6—15(—25) cm long, 4—6 cm wide, base abruptly attenuate, acute or rounded, margin flattish, top slightly acute or acuminate, blunt or rounded, above glabrous, shining, smooth, three- or triplinerved, rarely 5-nerved, but then the 2 lateral nerves rather inconspicuous, primary nerves impressed, disappearing

towards margin, veins hardly prominent; beneath glabrous, slightly paler, bright pink, when young, the 3 middle nerves strongly prominent, decurrent; secondary nerves prominent, parallel, the others densely reticulate. Buds finely silky, naked or obsoletely squamate. Petioles glabrous, canaliculate, slender or thickish, 1—2½ cm long. Panicles terminal or sub-terminal, pubescent or glabrous, lax, often congested; peduncles long, slender, with 3—5(—7), sometimes sub-umbellate, flowers. Pedicels slightly pubescent, 3—4 mm long, minutely bracteate at base. Flowers hermaphrodite, tube shortly campanulate; perianth segments equal, 4—7 mm long, outside grey-tomentose-sericeous, inside sericeous, oblong or slightly obovate, usually obtuse, reticulately veined, usually with a transverse, prominent line above the base, deciduous along this line. Fertile stamens 9; filaments flat, velutinous at base, the 3 inner ones with large, stipitate glands. Staminodes with cordate top and hirsute filaments. Ovary ovoid; style slender, 3 mm long, stigma obtuse. Berry 8—12 mm long, dry or slightly fleshy, dark-purple, apiculate, ellipsoid or ovoid-ellipsoid; cupule enlarged, 8 mm in diam.

Distribution: Cultivated in the tropics.

Locality unknown: Hostmann [L.].

Vernacular name: Kancelboom (S.D.).

4. OCOTEA Aubl.

Trees or shrubs. Leaves alternate, sometimes congested, membranous to rigid, glabrous or pilose. Panicles axillary or pseudo-terminal, few- to ∞ -flowered; berries usually rather few; branchlets dichotomous. Flowers hermaphrodite or dioecious; tube wanting or conspicuous; perianth segments equal, usually deciduous; stamens of the 3 outer rows fertile, 4th row staminodial or wanting; 3rd row with usually sessile, basal glands; anthers 4-celled, cells in 2 vertical rows; cells of the 6 outer anthers introrse, of the 3rd row extrorse or

lateral; in female flowers stamens minute, sterile. Ovary ovoid or ellipsoid, glabrous or pilose, style usually long; in male flowers ovary rudimentary, stipitiform. Berry globose or ellipsoid. Cupule simple- or double-margined, flat or hemispheric.

Distribution: Species about 200 in tropical America, a few in Southern and Eastern Africa and the Mascarenes.

1. *a.* Flowers hermaphrodite; 6 outer stamens foliaceous, ovate-lanceolate, sessile 2
- b.* Flowers dioecious; 6 outer stamens not foliaceous, ovate or rectangular; filaments very short or distinct 4
2. *a.* Leaves oblanceolate to obovate, congested at the top of the branchlets .. 1. *O. rubra* Mez. 3
- b.* Leaves lanceolate to ovate, not congested..... 3
3. *a.* Leaves sub-opposite. Perianth segments densely papillose inside; ovary sericeous. Cupule simple-margined. Berry with hard exocarp 2. *O. Rodiaei* (Rob. Schomb.) Mez.
- b.* Leaves alternate. Perianth segments inside glabrous or nearly so; ovary glabrous. Cupule with double margin. Berry with thin exocarp. 3. *O. barcellensis* (Meissn.) Mez.
4. *a.* Flowers on very short, or nearly wanting pedicels, agglomerate. Leaves usually densely areolate above (see also *O. Wachenheimii* R. Ben.). 5
- b.* Flowers on distinct pedicels, not agglomerate. Leaves more or less reticulate or smooth above. 8
5. *a.* Leaves sub-sessile, densely silvery-sericeous beneath 6. *O. guianensis* Aubl.
- b.* Leaves with distinct petioles, glabrous or tomentose beneath 6
6. *a.* Leaves lanceolate or narrow-elliptical, densely areolate above..... 7
- b.* Leaves broadly elliptical or oblong, smooth above 8. *O. globifera* Mez.
7. *a.* Leaves 9—11 cm long, 3—4½ cm wide, glabrous above, slightly puberulous beneath; the midrib only distinctly impressed above 4. *O. canaliculata* (Rich.) Mez.

- b.* Leaves 10—16 cm long, 4—6 cm wide, glabrous above, except the nerves; densely rusty-tomentose, glabrescent beneath; midrib and primary nerves slightly impressed above
 ... 5. *O. glomerata* (Nees) Benth. et Hook.f.
8. *a.* Ovary pilose 9
b. Ovary glabrous 10
9. *a.* Leaves broadly elliptical, top long- and narrowly acuminate; lower surface ochraceous, densely, minutely reticulate; upper surface shining with impressed nerves. Panicles few-flowered
 9. *O. splendens* (Meissn.) Mez.
b. Leaves lanceolate to elliptical; top broadly, shortly acuminate; lower surface dull-green, veins hardly conspicuous; upper surface rather dull with flat nerves. Panicles ∞-flowered.....
 7. *O. Wachenheimii* R. Ben.
10. *a.* Outer 6 stamens sessile or nearly so; leaves caudate-acuminate
 10. *O. caudata* (Meissn.) Mez.
b. Outer 6 stamens with distinct filaments; leaves not caudate 11
11. *a.* Cupule flat..... 12
b. Cupule hemispheric 13
12. *a.* Leaves lanceolate, 8—11 cm long, 2—3 cm wide, densely reticulate above. Flowers small, up to 3 mm in diam.; glands rather small
 11. *O. Neesiana* (Miq.) Kosterm.
b. Leaves broadly lanceolate or elliptical, 12—18 cm long, 5—6 cm wide, laxly reticulate above. Flowers 6 mm in diam.; glands ½ mm in diam.
 12. *O. puberula* Nees.
13. *a.* Leaves rigid-coriaceous, ovate or ovate-oblong, 6—8 cm long, veins not parallel, very laxly reticulate. Flowers hardly pilose; basal glands in male flower very large, surrounding the base of the filaments
 13. *O. Schomburgkiana* (Nees) Benth. et Hook.f.
b. Leaves chartaceous or chartaceous-coriaceous, oblong or elliptical, 10—14 cm long; veins parallel, densely reticulate. Flowers tomen-

tellous; basal glands in male flower rather large, not surrounding the base of the filaments
 14. **O. Petalanthera** (Meissn.) Mez.

1. **Ocotea rubra** Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 258; Pfeiffer, Houts. v. Surin. I (1926), p. 178; R. Benoist in Arch. Bot. V, 1 (1931), p. 72; Sandwith in Kew Bull. 1932, p. 223.

Large tree, up to 30 m high, 1 m in diam. Branchlets thick, internodes very short, slightly yellow-tomentellous at the top, glabrescent, dark; branches thick, suberous, the grey, thin bark scaling off, inner bark red; leaf-scars very large, orbicular or elliptical; buds yellow-sericeous, surrounded by lanceolate-linear, acute, concave, sericeous, 1—1½ cm long bracts. Leaves alternate, congested at the top of the branchlets, coriaceous or rigid-coriaceous, glabrous, oblanceolate, oblong-oblanceolate or obovate, base long-cuneate, decurrent, margin hardly recurved, top rounded or somewhat emarginate, (4—)9—15(—23) cm long, (2—)3—5(—8) cm wide; above green, rather dull, smooth, midrib slightly impressed or flat, nerves and laxly reticulate veins usually nearly invisible; beneath red-brown, midrib strongly prominent, nerves (10—15 on each side) patent, parallel, slightly curved, disappearing at margin, nearly invisible. Petioles slender, glabrous, 1—3 cm long, flat above, base cushionlike thickened, black when dried. Panicles axillary, clustered at the top of the branchlets, narrow, few-branched, rather few-flowered, slightly grey-puberulous, up to 8 cm long; peduncles thickish, shining, compressed, up to 4½ cm long; branchlets opposite, with sericeous, lanceolate, acute, up to 5 mm long bracts. Flowers fragrant, nearly glabrous, in clusters. Pedicels thickish, 5—8 mm long, glabrous with minute bracts at the base; tube 1 mm long, conical, inside glabrous; outer perianth segments glabrous, depressed-ovate, acutish, ¾ mm long, margin inconspicuously ciliate; inner ones ovate, acutish, inside tomentellous, 1¾ mm long, margin ciliate; outer 6 stamens

sessile, pilose, ovate-liguliform, 2 mm long, cells large, introrse, top acutish or obtuse; 3rd row densely tomentose inside, outside pilose, $1\frac{1}{2}$ mm long, filaments short, anthers oblong, obtuse, inside canaliculate, cells laterally dehiscent; basal glands small, flattish, sessile. Staminodes stipitiform, densely hirsute, 1 mm long. Ovary globose, glabrous, 1 mm in diam., style slender, glabrous, $1\frac{1}{2}$ mm long; stigma small. Berry (1—2 on each panicle) depressed-globose, 17 mm high, 21 mm in diam., mucronulate, smooth, mature ones entirely free from the cupule. Cupule large, fleshy, rather flat, 1 cm high, $1\frac{1}{2}$ cm in diam. with entire margin, gradually merging into the thick, conical, up to $2\frac{1}{2}$ cm long pedicel, 6 mm in diam. at the top. Cotyledons semi-globose, 12 mm high.

Distribution: Guiana; Trinidad.

Sectie O, tree n. 539 (B.W. n. 1351, ster. Oct.; n. 3823, fr. Apr.; n. 3946, in bud Aug.), tree n. 37 (B.W. n. 4143, ster. Dec.); Forestry Bureau n. 37, ster. Sept.; sectie O (B.W. n. 5835, ster. May; Gonggrijp n. 59, 60, 61, 62, 63, fr. Oct.; B.W. n. 4327, ster. June); Sectie O, tree n. 12 (B.W. n. 3982, fl. Sept.; n. 4207, fr. Dec.; n. 4412, fl. Sept.; n. 5377, fr. Aug.); Zanderij I, tree n. 33 (B.W. n. 1598, fr. Jan.); Paramaribo (B.W. n. 404, cultivated seedling); lower Suriname R. (Forestry Bureau n. 37, fr. Febr.); Suriname R., Patrick savannah (Gonggrijp s. n., fr. Sept., Apr., July); Blakka watra near Berlijn (B.W. n. 5525 p. p., ster. Nov.); Brownsberg, tree n. 1155 (B.W. n. 1735, ster. Apr.; n. 2485, fr. Nov.; n. 6685, fl. Oct.; n. 6815, fr. March); Watramiri, tree n. 1550 (B.W. n. 1843, ster. May), tree n. 1638 (B.W. n. 2010, ster. May).

Vernacular names: Determa (Brit. Guia.); Grignon (French Guia.); Wane, Wana (N.E.; S.D.); Wonoe, Tapirin, Topoeroe (Car.); Tétéroma, Tetroema, Teleloema, Tèteroema, Demma maata indold (Arow.); Wane isie amain, Wana iesie-amain-domaala-andola, Baaka wana, Bèwana (Saram.).

2. *Ocotea Rodiaei* (Rob. Schomb.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 236; non Pulle, Enum. Pl. Surin. (1906), p. 183; — *Nectandra Rodiaei* Rob. Schomb. in Hook. Lond. Journ. Bot. III (1844), p. 626; id. in Reis. in Brit. Guia. II (1848), p. 343, III, p. 935; non Miq.,

Stirp. Surin. (1850), p. 197; Meissn. in D.C., Prodr. XV, 1 (1864), p. 155; id. in Fl. Bras. V, 2 (1866), p. 264, excl. fig. et descr. Miq.; Baillon, Hist. II (1870), p. 465 et 466; Bentley and Trimen, Med. Pl. III (1880), p. 219, cum fig.; — *Nectandra leucantha*, var., Nees in Linnæa 21 (1848), p. 508, quod cit. spec. Schomb. n. 1703; Miq., Stirp. Surin. p. 196, p. p.

Large tree, up to 40 m high, branched only at the summit; bark smooth, grey; wood very hard and heavy. Youngest branchlets thick, angular, covered with dense, rusty, very thin tomentum, soon glabrescent, dark; branches cylindrical, grey; bark very bitter. Leaves generally sub-opposite, rigid-coriaceous, oblong, elliptical or ovate-oblong, (7—)12—15(—20) cm long, (4—)5—7½ cm wide, base somewhat rounded or shortly acute, margin recurved and often slightly undulate, top shortly acuminate; young leaves very thinly grey- or rusty-tomentellous; adult ones above glabrous, smooth, very shining, nerves obsolete, beneath dull, with long-persistent, thin hairs, midrib strongly prominent, primary nerves rather patent (10 and more on each side) arcuately ascendent, hardly prominent, united at some distance from the margin, veins obsolete, laxly reticulate (the leaves of root-suckers are chartaceous or even membranous; beneath very densely, prominently reticulate, with very long, caudate-acuminate top). Petioles generally thickish, densely tomentellous, canaliculate above, 8(—15) mm long. Panicles axillary, few-flowered, up to 5 cm long, densely, very thinly rusty-tomentellous, few-branched; peduncle very short, compressed; basal branchlets up to 1½ cm long. Pedicels rather thick, 6(—10) mm long; bracts wanting. Flowers yellowish-white, fragrant like jasmine (Schomb.), 5—10 mm in diam.; tube conspicuous, infundibuliform, 2 mm long, slightly constricted at the top, outside densely tomentellous; perianth segments patent, thick, with dense, very thin rusty or grey tomentum outside, inside densely papillose, ovate-elliptical or nearly triangular, obtuse, 4 mm long. Stamens normally 9,

nearly equal, sub-triangular-liguliform or oblong, not constricted at the base, erect, densely papillose, the outer ones 2 mm long, the inner row shorter; outer row extrorse, or introrse, second row introrse, inner row extrorse; 3rd row normally with small glands; connectives distinctly protruding beyond the basal cells. Staminodes wanting. Ovary ovoid-ellipsoid, 1 mm long, tapering into the thick, 2 mm long style, both densely sericeous; stigma rounded, distinct. Berry very large, globose or ovoid-globose, somewhat compressed laterally, up to 7 cm long; exocarp 1—2 mm thick, woody, brittle, grey-brown, speckled with small, whitish dots, testa thin, membranous. Cotyledons very large, flat-convex. Cupule short, shallow, thick, woody, margin entire, 2 cm in diam.

The flowers are generally abnormal, with different number of perianth-segments, up to 24 stamens, with more or less laterally dehiscent cells; glands none; stigma often obsolete.

Distribution: Guiana.

Upper Maratakka R. (Gonggr. and Stahel n. 907, fl., fr. Febr.; n. 142, fr. Sept.); Maratakka R., Martin-creek (B.W. n. 2649, ster. Oct.); Paramaribo (B.W. n. 622, cultivated seedling from spec. B.W. n. 2649).

Vernacular names: Demarara Groenhart, Geelhart (S.D.); Biberoo, Beeberoe, Sipiroe (Car.).

3. *Ocotea barcellensis* (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 237; — *Nectandra Barcellensis* Meissn. in D.C., Prodr. XV, 1 (1864), p. 155; id. in Fl. Bras. V, 2 (1866), p. 264; — *Nectandra elaiophora* Barb. Rodrigues in Vellosia I, 2nd ed. (1891), p. 64, f. 18; Ducke in Arch. Jard. Rio de Janeiro V (1930), p. 113, t. VI; — *Aerodictidium elaiophorum* Barb. Rodr. ex Lecointe, Notes graines oléagin. etc. Amaz., 7th Expos. Int. Caoutch. Paris, Brosch. 8 (1927), p. 29.

Tree, up to 30 m high; wood whitish, bark aromatic. Branchlets slightly grey-pilose, glabrescent, dark; branches grey, striate; buds large, nearly glabrous. Leaves alternate, glabrous, coriaceous, lanceolate-oblong or oblong, 10—15(—20)

cm long, 2—4½(—5½) cm wide, base acute or shortly acute, often more or less obtuse, margin hardly recurved, top acute or long-acuminate; above shining, with hardly prominent midrib and primary nerves, veins inconspicuous, beneath midrib and ascendent primary nerves (7—10 on each side) slightly prominent, veins hardly conspicuous, densely areolate. Petioles glabrous, canaliculate, up to 2 cm long. Panicles axillary, slightly grey-tomentellous, few-flowered, up to 6 cm long; peduncles compressed, few-branched, up to 3 cm long, usually very short. Bracteoles ovate, small, deciduous. Pedicels thickish, grey-pilose, up to 4 mm long. Flowers white, slightly pilose, 5 mm long; tube conical, minute, top not constricted; perianth segments equal, ovate-orbicular, obtuse, outside thinly grey-pilose, inside glabrous, except base, 4 mm long; stamens of the 2 outer rows large, foliaceous, sessile, ovate-lanceolate, papillose, 1½—3 mm long, connectives distinctly protruding beyond the basal, introrse, small cells; stamens of the 3rd row glabrous, elongate-triangular, obtuse, 1½—3 mm long, cells laterally dehiscent, basal glands large, ellipsoid, sessile, anthers canaliculate outside. Staminodes small, ½ mm long, pilose, or wanting. Ovary glabrous, ovoid, 1½ mm long, merging into a rather thick, glabrous, ½—1 mm long style with small lateral stigma. Berry large, ellipsoid, shining, 4—5 cm long, 2—2½ cm in diam. Cupule large, woody, conical, 2 cm long, 3 cm in diam., with double margin, covering 1 cm of the base of the berry; outer margin patent or reflexed, irregular, up to 9 mm wide. Exocarp thin, endocarp thick, fleshy, with strong terpine smell. Cotyledons large, 3 cm long.

Distribution: Amazonian district.

Marowijne R. (B.W. n. 2752, fr. Apr.).

Vernacular names: So-called: Rozenhout (S.D.); Bamba pisie (N.E.).

4. *Ocotea canaliculata* (Rich.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 361; Brooks in Kew Bull. 1933,

p. 219; Sandwith in Kew Bull. 7 (1933), p. 338; — *Laurus canaliculatus* Rich. in Act. Soc. Hist. nat. Paris (1792), p. 108; — *Laurus Caroliniana* var. *b.* Poir., Enc., Suppl. III (1813), p. 324; — *Oreodaphne Cayennensis* Meissn. in D.C., Prodr. XV, 1 (1864), p. 133; id. in Fl. Bras. V, 2, (1866), p. 232, — *Ocotea Grisebachiana* Mez in Verh. Bot. Ver. Brandenb. 30 (1888), p. 6; — *Ocotea scrobiculata* R. Benoist (nomen nudum) in Bull. Soc. Bot. France 75 (1928), p. 979.

Tree or shrub. Branchlets grey- or rusty-tomentose at the top, glabrescent, dark, cylindrical; buds densely sericeous. Leaves alternate, dark, when dried, coriaceous, oblong- or elliptic-lanceolate, (5—)9—11(—14) cm long, (2—)3—4½(—5) cm wide; base cuneate, margin hardly recurved, top acute or shortly acuminate; young leaves densely sericeous beneath; adult ones glabrous, shining above, with impressed midrib and densely areolate, slightly prominent veins; beneath slightly puberulous, glabrescent, midrib strongly prominent, primary nerves (7—10 on each side) rather patent, prominent, basal ones in the margin, upper ones arcuately united, veins densely reticulate. Petioles glabrous, canaliculate, up to 15 mm long. Panicles narrow, axillary near the top of the branches, grey- or rusty-tomentellous, up to 9 cm long; peduncles thick, compressed, 3 cm long; branchlets up to 1½ cm long; flowers nearly sessile, agglomerate. Pedicels ½—1 mm long. Bracteoles deciduous. Flowers yellow, dioecious (hermaphrodite according to Brooks), yellow-tomentose; tube very small, not constricted at the top, inside slightly sericeous; perianth segments patent, equal, 2 mm long, the outer ones broader, ovate, obtuse or rounded, outside tomentose, inside glabrous. Male flower: 2 outer rows of stamens glabrous, 1 mm long; anthers rectangular-ovate, with truncate or obtuse top, cells introrse, filaments very short; 3rd row somewhat larger, glabrous, anthers oblong-rectangular with truncate tops, cells extrorse-lateral, filaments with 2 rather large, globose, sessile, basal glands. Staminodes wanting. Gynaecium stipitiform, glabrous,

1½ mm long. Female flower: Anthers minute, sterile. Ovary glabrous, globose, 1 mm in diam.; style thick, 1 mm long, glabrous; stigma small. "Berry ellipsoid, 1 cm long, 8 mm in diam.; cupule about 1 cm diam., cup-shaped, covering about half the berry; fruiting pedicel enlarged and hardened" (Brooks).

Distribution: Guiana; Trinidad; Northern Brazil.

Brownsberg, tree n. 1225 (B.W. n. 6808, fl. Apr.; n. 6415, fl. March; n. 3291, fr. Sept.).

5. *Ocotea glomerata* (Nees) Benth. et Hook.f., Gen. III (1880), p. 158; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 294; Brooks in Kew Bull. 1933, p. 219; — *Oreodaphne glomerata* Nees in Linnaea 21 (1848), p. 515; Walp., Ann. III (1852—53), p. 312; Meissn. in D.C., Prodr. XV, 1 (1864), p. 113; id. in Fl. Bras. V, 2 (1866), p. 206; — *Oreodaphne Moritziana* Nees in Linnaea 21, l. c.; Meissn. in D.C., l. c.; id. in Fl. Bras. l. c.; — *Ocotea Caracassana* Kl. p. p. ex Nees in Linnaea 21 (1848), p. 516; — *Ocotea nigra* R. Benoist in Bull. Mus. Hist. nat. Paris 30 (1924), p. 511.

Large tree or shrub. Branchlets thick, angular, rusty-tomentellous, glabrescent, dark; buds rusty-tomentose. Leaves alternate, coriaceous or rigid-coriaceous, oblong, elliptical or elliptical-lanceolate, (5—)10—16(—22) cm long, (3—)4—6(—8) cm wide; base more or less acute, margin slightly recurved, top acute or somewhat obtuse; above shining, glabrous, except nerves, midrib and primary nerves impressed, veins densely punctulate-reticulate, beneath with dense brown or rusty tomentum, glabrescent, midrib strongly prominent, primary nerves (6—10 on each side) prominent, slightly curved, ascendent, disappearing towards margin, veins slightly prominent, very densely areolate. Petioles broad, above flat with decurrent leaf-margins, rusty-tomentellous, glabrescent, up to 15 mm long. Panicles pyramidal, axillary near the top of the branches, rusty-tomentellous, up to 20 cm long; peduncles long, thick, sulcate, up to 6 cm long, branchlets patent, flowers agglomerate,

each branchlet in the axil of a deciduous bract. Pedicels 0—1 mm long, thick, densely rusty-tomentose. Flowers yellow, dioecious, 2—3 mm long, densely tomentellous; tube small, inside pilose, up to 1 mm long; perianth segments broadly ovate, slightly acute, thickish, tomentellous, 2—3 mm long. Male flower: outer stamens 1 mm long, filaments 2—3 × shorter, hardly pilose at the base, anthers ovate or ovate-oblong, with obtuse top, base obtuse or slightly cordate, cells large, introrse; stamens of the 3rd row erect, pressed against each other, 1 mm long, filaments rather broad, very short, anthers oblong-sub-rectangular, canaliculate at top and inside, basal glands globose, sessile, rather small; cells extrorse. Gynaecium stipiti-form, glabrous, 1½ mm long, stigma small, but distinct. Female flower: smaller than the male ones; stamens sterile, 1 mm long, outer ones with ½ mm long filaments, inner ones nearly sessile, anthers ovate-truncate or emarginate, glands depressed-globose. Ovary globose, glabrous, 1 mm long, style very thick, 1 mm long, stigma rather small, flat. Berry ovoid-ellipsoid, acutish, 8 mm long, 6 mm in diam., base covered for ⅓ by the thickish, hemispheric, simple- and entire-margined cupule. Cupule 6 mm high, 8 mm in diam., smooth.

Distribution: Venezuela; Brit. Guiana; Trinidad; Brazil.

Female specimens: Zanderij I, tree n. 61 (B.W. n. 1491, ster. Dec.; n. 2556, fl. Dec.; n. 2689, fl. Febr.; n. 3586, fl. Jan.); upper Maratakka R. (Stahel and Gonggr. n. 919, fl. Febr.).

Vernacular names: Pisie, Krassi-pisie (N.E.); Warilipipio, Wajaaka, Siroeaballi, Wane (Car.); Siroeaballi (Arow.); Apisie-a-blaak-man (Saram.).

6. *Ocotea guianensis* Aubl., Pl. Guia. II (1775), p. 781, IV t. 310, excl. fruct.; Nees, Syst. (1836), p. 315, 467; Miq. in Linnaea 19 (1847), p. 126; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 296; Pulle, Enum. Pl. Surin. (1906), p. 183; Benoist in Arch. Bot. V (1931), p. 71, 75; — *Oreodaphne guianensis* Nees in Linnaea 21 (1848), p. 268, 516; Meissn. in D.C., Prodr. XV, 1 (1864),

p. 112; id. in Fl. Bras. V, 2 (1866), p. 204; — *Ocotea sericea* H.B.K., Nov. gen. II (1817), p. 129 (col. ed.); Nees, Syst. l. c., p. 478; — *Oreodaphne sericea* Nees, Syst. l. c., p. 315; id. in Linnaea l. c., p. 516; Meissn. in D.C. l. c., p. 258; — *Laurus Ocotea* Rich. in Act. Soc. hist. nat. Paris I (1792), p. 108; — *Nectandra abortiens* Rol. ex Rottb. in Act. Lit. Univ. Haffn. I (1778), p. 281; id. in Descr. Pl. Surin. (1798), p. 10; — *Nectandra bijuga* Rol. ex Rottb. l. c.; — *Laurus surinamensis* Swartz, Fl. Ind. occ. (1800), p. 708; Nees, Syst. l. c., p. 315, in adn.; Meissn. in D.C. l. c., p. 258; Willd., Spec. II, 1 (1799), p. 482; — *Laurus surinamensis* G. F. W. Meyer, Fl. Esseq. (1818), p. 160; — *Laurus Aubletii* Swartz l. c.; — *Laurus Surca* Willd. mscr., Herb. n. 7797.

Tree, up to 24 m high; bark greyish, wood white, soft. Branchlets thick, straight, up to 5 mm in diam., densely silvery-sericeous, angular, ribs connecting the leaf-bases; leaf-scars very large; buds long, acicular, silvery-sericeous; branches cylindrical, grey-sericeous. Leaves alternate, thick-coriaceous, usually lanceolate or ovate-lanceolate or oblong, (6—)11—16 (—20) cm long, 2—3½(—5) cm wide; base acute or cuneate, decurrent along the petiole, margin nearly flat, top gradually and very acute, sometimes blunt-pointed; young leaves above sericeous near the base, black when dried, beneath densely silvery-sericeous; adult ones above glabrous, except at base and along the basal part of the midrib, shining, densely scrobiculate or reticulate, midrib impressed, other veins slightly prominent; beneath densely silvery -or golden-sericeous, midrib prominent, primary nerves rather patent, covered by the tomentum, veins reticulate; lower leaf surface with 2, or sometimes 3 impressions, made by the vernation: one short, from midrib with a sharp angle to the leaf base, the other long, beginning somewhat higher at the opposite side of the base, ending at the top of the leaf, 2—3 mm from the midrib; the 3rd one usually connecting the long impression with the midrib. Petioles short, sericeous, 2—4 mm long, flat above.

Panicles densely silvery-sericeous in the axils of the upper leaves, pyramidal, 5—17 cm long, ∞ -flowered; peduncles thick, distinctly angular, up to 8 cm long; branchlets of 3rd or 4th order bearing 3—6 agglomerate, very short-pedicelled flowers; each branchlet enveloped by deciduous, concave bracts, those of first order large, leaf-like, 1 cm long, $\frac{1}{2}$ cm wide, gradually diminishing to ovate-acute, 2 mm long bracts. Pedicels very short, thick, sericeous, 1— $2\frac{1}{2}$ mm long. Flowers dioecious, yellow, up to $3\frac{1}{2}$ mm long, fragrant; tube conspicuous, broadly conical, not constricted at the top, 1— $1\frac{1}{2}$ mm long, outside densely sericeous, inside glabrous; perianth segments densely sericeous, especially outside, outer row broadly ovate, obtuse, 2 mm long, inner row narrower, $1\frac{1}{2}$ mm long. Stamens included. Male flower: 6 outer stamens 1 mm long, with very short, pilose filaments; anthers broadly ovate or square, glabrous, base truncate or sub-cordate, top obtuse or slightly emarginate, cells introrse, the upper ones somewhat smaller; the 3 inner stamens broader, filaments very broad; basal glands large, sessile, touching each other; upper cells lateral, lower ones extrorse. Staminodes inconspicuous or wanting. Ovary rudimentary, subulate, often pilose at the base, style long, slender, stigma discoid. Female flower: stamens smaller than in the male flowers, sterile. Ovary glabrous, globose; style slightly longer, cylindrical, glabrous, 1 mm long; stigma large, discoid, somewhat truncate at one side. Berries (a few on each panicle) ovoid, acutish, 1— $1\frac{1}{2}$ cm long, 5—8 mm in diam., $\frac{1}{2}$ — $\frac{1}{3}$ covered by the cupule. Cupule hemispheric, entire, simple-margined, thickish, 5 mm high, 6—10 mm in diam.; pedicel short, hardly thickened.

Distribution: Guiana; Brazil.

Male specimens: Suriname R., Berg en Dal (B.W. n. 5533, ster. Dec.); near Pl. Berlijn, Para district, forest (Splitgerber n. 745, fl. March [L.]); Zanderij I, forest (Lanj. n. 316, fl. July); locality unknown: Dumortier s. n.

Female specimens: Zanderij I, tree n. 232 (B.W. n. 2705,

fl. Febr.; n. 2733, fl. March); Sectie O, tree n. 622 (B.W. n. 790, fr. Oct.; n. 1630, fl. Febr.; n. 2341, fr. Aug.; n. 2606, fl. Jan.; n. 4181, fl. Dec.; n. 4561, fl. March; n. 6055, fl. Febr.); Forest of Zanderij (Samuels n. 245, fr. July [U., L., D.]); Brownsberg (B.W. n. 6573, fl. Aug.); locality unknown: Hostm. et Kappl. n. 1111, fl. [U., D.].

Vernacular names: Pisie, Joro joro pisie (N.E.); Tokkéwé, Tetero sierwaballi, Tokéné mania potano wewe (Car.); Beradié, hohoradikoro (Arow.).

var. **subsericea** Kosterm. l. c., p. 15.

Leaves slightly sericeous beneath.

Distribution: Endemic.

Female specimen: Upper Suriname R. near Goddo (Wilhelmina exped. n. 105, fl. Jan.).

7. **Ocotea Wachenheimii** R. Benoist in Bull. Mus. Hist. nat. Paris 30 (1924), p. 510; — *Ocotea floribunda* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 327, p. p., quoad cit. spec. Wullschlägel, Patris et Poiteau; — *Ocotea arenaensis* Brooks in Kew Bull. 1933, p. 217.

Tree. Branchlets rather thick, angular, puberulous, glabrescent; branches cylindrical, smooth, glabrous, dark. Leaves alternate, chartaceous, narrow-elliptical or oblong, (6—)13—15(—17) cm long, (2½—)4—6(—7½) cm wide; base cuneate, margin hardly recurved, top acuminate, acumen short, broad, obtuse; adult leaves above glabrous, rather dull, midrib and primary nerves hardly prominulous, veins densely areolate, hardly conspicuous, beneath sparingly puberulous, glabrescent, midrib strongly prominent, primary nerves (5—9 on each side) slightly prominent, rather straight, rather patent, disappearing towards margin, veins densely areolate, slightly prominulous. Petioles rather slender, puberulous, canaliculate above, 7—15 mm long. Panicles axillary, congested near the top of the branches, grey-tomentellous, pyramidal, male ones up to 13 cm long, female ones up to 6 cm long; peduncles compressed, usually short, up to 3 cm long, branchlets patent, lower ones up to 4 cm long. Male

flower: pedicels up to 3 mm long. Flowers grey-tomentose, tube short, 1 mm high, flattish, inside puberulous; perianth segments equal, ovate, obtuse or slightly acute, up to $2\frac{1}{2}$ mm long, with 3 parallel nerves, slightly concave, puberulous. Stamens glabrous, outer ones 2 mm long, with slender, often slightly puberulous filaments, 1 mm and more long; anthers ovate, truncate with introrse, large cells; 3rd row same length, anthers narrow-oblong, canaliculate, filaments slender, basal glands sub-sessile, very large, 1 mm in diam. Staminodes wanting. Gynaecium small, stipitiform, puberulous, $1\frac{1}{2}$ mm, or distinct; stigma either distinct or inconspicuous. Female flower unknown. Berry globose, smooth, up to 14 mm in diam. Cupule shallow, usually flattened, discoid with double margin, up to 7 mm diam. Pedicel enlarged, conical, woody, 6 mm long, 3 mm in diam. at the top.

Distribution: French Guiana; Trinidad.

Sectie O, tree n. 682 (B.W. n. 1366, ster. Nov.; n. 3821, fl. May; n. 4667, fl. May; n. 6129, fl. March); Para district near Berlijn (B.W. n. 6408, ster.; Wullschlägel n. 317 [B.]); Brownsberg (B.W. n. 6381, fr. Jan.); locality unknown: Wullschlägel n. 1549, fr. [B.].

Vernacular names: Pisie, Bastard pisie, Salie, Koeratarie (N.E.); Kérétié (Arow.); Waé, Ingi siri (Car.).

8. *Ocotea globifera* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 328; Benoist in Arch. Bot. V (1931), p. 72.

Tree or shrub with buttresses; bark dark-brown. Branchlets angular, sulcate, rusty-tomentellous; branches cylindrical, grey or dark-brown, glabrous, smooth, with many small lenticels; buds densely tomentellous. Leaves alternate, chartaceous, usually broadly elliptical, elliptical or obovate, (10—)12—14(—20) cm long, ($4\frac{1}{2}$ —)7—8(— $11\frac{1}{2}$) cm wide; base shortly acute, margin flat, top shortly acuminate, acumen broad, obtuse, up to 1 cm long; adult leaves above glabrous, shining, smooth, midrib and primary nerves slightly prominulous in a groove, veins laxly reticulate, inconspicuous; beneath microscopically puberulous,

rather dull, midrib prominent, primary nerves (5—7 on each side) ascendent, disappearing at margin, somewhat prominent, veins laxly reticulate, hardly prominulous. Petioles short, thick, glabrous, distinctly canaliculate above, 8—10 mm long. Panicles narrow, axillary at the branchlets, up to 11 cm long, rusty-tomentellous; peduncles compressed, rather slender, 2—4 cm long; branchlets alternate, distant, patent, compressed, short, lower ones 1 cm long, flowers agglomerate. Flowers dioecious (hermaphrodite?), female ones unknown. Pedicels very short or nearly wanting. Male flower: yellow up to 2½ mm long; slightly tomentellous; tube conical, short, 1½ mm long, merging into the pedicel, inside glabrous; perianth segments nearly equal, fleshy, densely, thinly puberulous, ovate-orbicular or ovate, acute, 2 mm long. Stamens glabrous, included, 1½ mm long, outer ones with ovate or elliptical, obtuse anthers with large, introrse cells, filaments distinct, nearly glabrous, ½ mm long; inner 3 stamens with broad filaments, hardly distinct from the oblong, obtuse anthers, basal glands sessile, globose, rather small. Ovary globose, puberulous, ½ mm in diam., style trigonous, subconical, 1½ mm long, pilose at the ribs; stigma distinct, peltate-discoid. "Berry globose, varnished, 11 mm in diam.; cupule pateriform, with simple margin, covering ¼ of the berry" (Mez).

Distribution: French Guiana.

Sectie O, tree n. 20, on rocky hill (B.W. n. 472, fl. Oct.); Brownsberg, tree n. 1004 (B.W. n. 1741, ster. Apr.; n. 3225, fl. Sept.; n. 6639, fl. Sept.); tree n. 1184 (B.W. n. 3261, fl. Sept.).

Vernacular names: Wane pisie (N.E.); Koeroekai (Car.); Sirowaballi, Koeroekai (Arow.).

9. *Ocotea splendens* (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 282; Benoist in Arch. Bot. V (1931), p. 71; — *Oreodaphne splendens* Meissn. in D.C., Prodr. XV, 1 (1864), p. 129; id. in Fl. Bras. V, 2 (1866), p. 227.

Tree. Branchlets minutely yellow or grey-puberulous, angular,

glabrescent; branches cylindrical, rather slender, smooth, dark. Leaves alternate, glabrous, but the axils of the primary nerves beneath barbellate, rigid-coriaceous, broadly elliptical or oblong, (7—)13—17(—22) cm long, (3½—)5—8(—9) cm wide; base abruptly cuneate, margin slightly recurved, undulate, top acuminate, acumen long and narrow, up to 2 cm long, 2—4 mm wide at base; above very shining, nerves more or less impressed, veins inconspicuous; beneath dull, yellowish, midrib strongly prominent, primary nerves (3—4 on each side) prominent, gradually, arcuately ascendent, disappearing at margin, bases decurrent along midrib, secondary nerves very laxly reticulate, prominulous, veins densely areolate. Petioles thick, above flat or slightly canaliculate, dark, glabrous, up to 12 mm long. Panicles axillary, near the top of the branchlets, narrowly pyramidal, slightly grey- or yellow-puberulous, 2½—11 cm long; peduncles slender, up to 5 cm long, basal branchlets up to 1½ cm long, dichotomous; flowers in pseudo-umbels, dioecious. Male flower: Pedicels thickish, grey-tomentellous, ½—1½ mm long; tube infundibuliform, 1 mm long, outside slightly puberulous, inside sericeous; perianth segments nearly equal, rather thick, broadly ovate, acute, tomentellous, 2 mm long, with 3 parallel nerves inside. Stamens glabrous, outer ones 1½ mm long; filaments ½—¾ mm long, anthers ovate, nearly square, with truncate tops; cells large, introrse; stamens of the 3rd row hardly longer, anthers oblong-rectangular, with emarginate top, lower cells extrorse, upper ones more or less lateral; basal glands rather small, sessile. Staminodes wanting. Gynaecium sterile, stipitiform, slightly pilose, 2 mm long; stigma large. Female flower and fruit unknown.

Distribution: French Guiana.

Brownsberg, tree n. 1238 (B.W. n. 6475, fl. June; v. Emden s. n., fl. Sept.).

10. *Ocotea caudata* (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 378, excl. syn. *Licaria guianensis* Aubl.;

Pulle in Rec. Tr. Bot. Néerl. IV (1907), p. 127; — *Oreodaphne caudata* Nees in Linnaea 21 (1848), p. 519; Walp., Ann. III (1852—53), p. 313, excl. cit. spec. Schomb. n. 1087; Meissn. in D.C., Prodr. XV, 1 (1864), p. 138; id. in Fl. Bras. V, 2 (1866), p. 240; — *Ocotea marowynensis* Mez in Jahrb. l. c., p. 380; Pulle, Enum. Pl. Surin. (1906), p. 184; — *Oreodaphne marowynensis* Miq., Stirp. Surin. (1850), p. 201; Walp., Ann., p. 313; — *Nectandra revoluta* Miq., Pl. Hostmann. ed. Hohenack. n. 629 bb; — *Camphoromoea Surinamensis* Meissn. in D.C. l. c., p. 145; id. in Fl. Bras. l. c., p. 249.

Shrub or tree. Branchlets slightly puberulous at the top only, nearly cylindrical, dark; bark rather smooth, grey; buds densely tomentellous. Leaves alternate, chartaceous, at last coriaceous, glabrous, or lower surface with few hairs, lanceolate, elliptical to obovate, (8—)10—13(—16) cm long, (3—)4—5½ (—6) cm wide; base acute, usually narrowly cuneate, margin slightly recurved, usually undulate, top distinctly caudate-acuminate, acumen up to 3 cm long; above somewhat shining, midrib and primary nerves slightly prominent, often in a groove, veins reticulate, prominulous, at last obliterate; beneath midrib prominent, primary nerves (3—5 on each side) arcuate, prominent, the lower ones long-ascendent, leaves therefore somewhat sub-triplinerved, the upper ones more or less arcuately united at some distance from the margin, veins prominulous, laxly reticulate. Petioles 1—1½ cm long, slender, glabrous, canalliculate. Panicles axillary, pyramidal, lax, glabrous, up to 8 cm long; peduncles slender, up to 3 cm long; branchlets patent or reflexed, few, up to 3 cm long, bearing 3—5 flowers. Pedicels 1—4 mm long, slender, glabrous. Bracteoles minute, lanceolate, deciduous. Flowers dioecious, glabrous, white, fragrant. Male flower: tube small, 1 mm long, infundibuliform, hardly constricted at the top, glabrous outside, pilose inside; perianth segments lanceolate or ovate, 1¾ mm long, fleshy, top acutish or obtuse; outer 6 stamens sessile or with very short, pilose filaments, 1 mm long; anthers rectangular, glabrous, top obtuse

or slightly emarginate, cells equal, large; inner 3 stamens 1—1¼ mm long, filaments usually conspicuous, up to ½ mm long, inside densely pilose, anthers narrow, elliptical, top obtuse, glabrous, cells extrorse, large; basal glands rather small, nearly sessile, more or less reniform. Ovary wanting or stipitiform, up to ½ mm long. Female flower: tube slightly longer; segments 1—1¼ mm long, acutish. Stamens minute, ½ mm long, sterile; basal glands small. Ovary ovoid, glabrous, up to 1 mm long; style thick, ¼ mm long, stigma large, reniform. Fruit unknown.

Distribution: Brit. Guiana; Northern Brazil; Bolivia(?).

Male specimens: Marowijne R. (Kappler ed. Hohenack. n. 629 bb [L., G., U.]); upper Marowijne R. (Versteeg n. 585, fl. July); Watramiri, tree n. 1631 (B.W. n. 1925, fl. June; n. 3875, fl. July).

Female specimens: Corantijne R., Kauri creek (B.W. n. 1973, fl. June); locality unknown: Hostmann n. 964, Kappler n. 128 [L., U.].

Vernacular names: Pisie (N.E.); Apiesie-ie (Sar.); Kere-tiballi (Arow.); Wawè cran (Car.).

11. *Ocotea Neesiana* (Miq.) Kosterm. l. c., p. 16; — *Nectandra Neesiana* Miq. in *Linnaea* 18 (1844), p. 745; Nees in *Linnaea* 21 (1848), p. 506; — *Ocotea fallax* (Miq.) Mez in *Jahrb. Bot. Gart. Berl.* V (1889), p. 310; Pulle, *Enum. Pl. Surin.* (1906), p. 183; Benoist in *Arch. Bot.* V (1931), p. 71, 72; — *Oreodaphne fallax* Miq., *Stirp. Surin.* (1850), p. 202; Meissn. in *D.C., Prodr.* XV, 1 (1864), p. 125; id. in *Fl. Bras.* V, 2 (1866), p. 221; — *Gymnobalanus Sprucei* Meissn. in *D.C. l. c.*, p. 140; id. in *Fl. Bras. l. c.*, p. 247; — *Ocotea florulenta* (Meissn.) Mez in *Jahrb. l. c.*, p. 309, excl. syn. *Oreodaphne dispersa* Nees, et *Oreodaphne confusa* Meissn.; — *Oreodaphne japurensis* Meissn. in *D.C. l. c.*, p. 124; id. in *Fl. Bras. l. c.*, p. 219.

Tree. Branchlets cylindrical, smooth, dark-brown, towards the top minutely pilose, soon glabrescent; buds sericeous. Young leaves pilose on the basal part of the lower surface, membranous; adult ones alternate, thin-chartaceous or chartaceous-

coriaceous, glabrous, lanceolate or oblong-lanceolate (5—)8—11 (—14) cm long, (1—)2—3(—4½) cm wide; base acute, slightly decurrent, margin nearly flat, top acuminate or cuspidate-acuminate, acumen obtuse, up to 2 cm long; above olive-green when dried, shining, midrib and primary nerves slightly prominent, veins densely reticulate, prominulous, beneath pale, dull, midrib prominent, reddish, primary nerves (6 and more on each side) rather patent, prominulous, veins densely reticulate, prominulous; veins ending blind. Petioles flattish above, pilose, glabrescent, ½—1½ cm long. Panicles axillary, slender, sericeous-puberulous, short, 3—6 cm long, pyramidal, sometimes with leaves; peduncles nearly wanting; branchlets slightly compressed, up to 1 cm long, branched once or twice; usually 3 flowers together. Bracts lanceolate, acute, 2½—½ mm long, densely sericeous outside, inside less sericeous or glabrous, soon deciduous. Pedicels up to 2½ mm long, slender. Male flower: tube up to ½ mm high, slightly puberulous outside at the base, densely pilose inside; perianth segments ovate or lanceolate-oblong, slightly obtuse, glabrous outside, slightly puberulous inside, up to 1¾ mm long, ¾ mm wide; the 6 outer stamens 1 mm long, anthers ovate-subrectangular, glabrous, cells introrse, top obtuse, connective not exceeding the cells; filaments flat, glabrous, ½ mm long; stamens of the 3rd row 1 mm long, filaments very short, hirsute at the base, basal glands rather small, sub-globose, sub-sessile, anthers ovate, obtuse, lower cells large, extrorse, upper ones smaller, lateral or nearly introrse; staminodes wanting. Ovary subulate, sterile, up to 1½ mm long, hirsute at the base. Female flower: Stamens minute, ½ mm long, same shape as in male flower; cells distinct, sterile. Ovary sub-globose, 1½ mm long, glabrous; style shorter, ½ mm long; stigma discoid-subtrigonus. Berries (only few on each panicle) black, shining, sub-globose, up to 8 mm long, 7 mm in diam., top slightly acute, mucronulate; exocarp thin, fleshy. Cupule flat, small, 4 mm in diam., entire- and simple-

margined, not surrounding the berry. Cotyledons semi-globose, thick, $7\frac{1}{2}$ mm in diam.

Distribution: Guiana, Northern Brazil.

Male specimen: Para district (Kappl. ed. Hohenack. n. 1433, fl. Febr., type of *Nectandra Neesiana* Miq. [U., D.]).

Female specimens: Upper Marowijne R., in marshes (Kappl. ed. Hohenack. n. 2028 [L., D., G.]); Voltzberg (Lanjouw n. 889, fr. Sept.); Gonini R. (B.W. n. 3755, fr. Febr.); Coppename R., forest near Raleigh-falls (Lanjouw n. 855, fr. Sept.).

Vernacular name: Pisie (N.E.).

12. **Ocotea puberula** Nees, Syst. (1836), p. 472; id. in *Linnaea* 21 (1848), p. 524; Miq. in *Linnaea* 18 (1844), p. 246; Mez in *Jahrb. Bot. Gart. Berl.* V (1889), p. 343; Pulle, *Enum. Pl. Surin.* (1906), p. 184; — *Strychnodaphne puberula* Nees et Mart. in *Linnaea* 8 (1833), p. 39, p. p.; Meissn. in D. C., *Prodr.* XV, 1 (1864), p. 142; id. in *Fl. Bras.* V, 2 (1866), p. 244; — *Laurus puberula* Willd. msc. in herb. Willd. n. 7792; — *Oreodaphne acutifolia*, var. *latifolia* Nees, Syst., p. 419, quoad cit. spec. Sello n. 1382; — *Oreodaphne Martiana*, var. *latifolia* Nees, Syst., p. 402; Meissn. in D.C. l. c., p. 135; id. in *Fl. Bras.* l. c., p. 235; — *Gymnobalanus perseoides* Meissn. in D.C. l. c., p. 141; id. in *Fl. Bras.* l. c., p. 243, t. 185; — *Ocotea Martiniana* (Nees) Mez in *Jahrb.* l. c., p. 344; Pulle l. c., p. 184; Pilger in *Engl. Jahrb.* 30 (1902), p. 153; — *Oreodaphne Martiniana* Nees, Syst., p. 415; Meissn. in D.C. l. c., p. 129; id. in *Fl. Bras.* l. c., p. 228; — *Oreodaphne Hostmanniana* Miq., *Stirp. Surin.* (1850), p. 202; — *Ocotea pyramidata* Blake ex F. S. Brandege in *Univ. Calif. Publ. Bot.* VII (1920), p. 326; — *Ocotea prunifolia* Rusby in *Bull. N. York Bot. Gard.* VI (1910), p. 439.

Shrub or tree. Branchlets cylindrical or slightly angular at the top, glabrescent, dark; top in youth tomentellous or tomentose; buds tomentose. Leaves alternate, chartaceous, or at last somewhat coriaceous, elliptical or broadly lanceolate, (8—)12—18(—24) cm long, (3—)5—6(—9) cm wide; base shortly acute, margin hardly recurved, top distinctly, broadly acuminate, acumen usually obtuse; above shining, glabrous,

except the long-persistent hairs on the principal nerves; midrib hardly prominent or impressed, primary nerves slightly prominent, veins laxly reticulate, slightly prominent; beneath puberulous, glabrescent, dull, midrib strongly prominent, primary nerves (5—8 on each side) prominent, rather patent, arcuate, only the upper ones united at the margin, veins slightly prominent, laxly reticulate. Petioles slender, tomentellous, canaliculate, 8—28 mm long. Panicles axillary, narrow, few-branched, few-flowered, male ones up to 8 cm long, tomentellous; peduncles slender, short, branchlets patent, lower ones up to 4 cm long, flowers usually in pseudo-racemes. Pedicels 1—4 mm long, tomentellous. Bracteoles small, ovate-lanceolate or subulate, tomentellous, deciduous. Flowers dioecious, white, slightly puberulous, glabrescent. Male flower: tube nearly wanting, outside puberulous, inside pilose; perianth segments equal, ovate, acute, up to 3 mm long, inside slightly pilose at the base; outer stamens glabrous or nearly so, reflexed, not united with perianth, up to 2 mm long, filaments slightly pilose or glabrous, slender, up to 1 mm long, anthers ovate, obtuse with very large, introrse cells (as in *Persea*) margin more or less constricted; 3rd row erect, 2 mm long, filaments puberulous, 1 mm long, anthers narrow, cells extrorse-lateral, basal glands $\frac{1}{2}$ mm in diam., globose, subsessile. Staminodes wanting. Ovary stipitiform, glabrous, usually somewhat shorter than the stamens; stigma sub-globose, dark, small. Female flower: Panicles $2\frac{1}{2}$ —4 cm long, contracted, few-flowered. Perianth segments oblong-ovate, acute, 2 mm long, base pilose inside. Stamens sterile, $\frac{3}{4}$ mm long, basal glands minute. Ovary globose-ovoid, glabrous, 1 mm long; style 1 mm long, or shorter, stigma very large, dark, obtuse, curved towards flower axis. Berry sub-globose, mucronulate, 7 mm in diam., free from the cupule. Cupule flat, thin, 6 mm in diam., margin undulate, perianth segments often more or less persistent; pedicel obconical, slightly thickened, 6—8 mm long.

Distribution: Tropical South America from Mexico to Argentina.

Male specimens: Paramaribo, Pl. la Rencontre (Focke n. 783, fl. Apr.); Onoribo (Focke n. 882, fl. March); locality unknown: Hostmann n. 1286 (type of *Oreodaphne Hostmanniana* Miq.); Hostmann n. 517 [D.]; coll. unknown [G.]; Splitgerber n. 813 [P.].

Vernacular names: Pisie (N.E.); Wajaaka, Spiroerian, Sipoeroelan (Car.); Sirocaballi kheretie diamaro (Arow.).

The specimens from Sectie O, tree n. 570 (B.W. n. 1172, ster. Oct.; n. 2624, fl. Jan.; n. 6075, fl. Febr.) may belong to this species; leaves and general appearance are the same, the flowers however are minute, with undeveloped anthers, this may be due to the fact, that the flowers are very young.

13. **Ocotea Schomburgkiana** (Nees) Benth. et Hook.f., Gen. III (1880), p. 158; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 337; Pulle, Enum. Pl. Surin. (1906), p. 184, excl. spec. Focke n. 882; — *Oreodaphne Schomburgkiana* Nees in Linnaea 21 (1848), p. 269, 519; Walp., Ann. III (1852—53), p. 313; Meissn. in D.C., Prodr. XV, 1 (1864), p. 128; id. in Fl. Bras. V, 2 (1866), p. 225; — *Ocotea Schomburgkii* Mez mscr. in herb. div.; — *Nectandra nitidula* Miq., non Nees in Linnaea 18 (1844), p. 246.

Shrub or tree, up to 8 m high. Branchlets slightly tomentellous at the top, soon glabrous, brown or dark-grey, cylindrical. Leaves alternate, coriaceous or rigid-coriaceous, glabrous, ovate-oblong or sometimes elliptical, (3—)6—8(—11) cm long, (2—)3—4(—5½) cm wide; base shortly acute, or somewhat cuneate, margin recurved, top acuminate, blunt; above very shining, with slightly prominulous or obsolete nerves, veins laxly reticulate, obsolete; beneath midrib slightly prominent, primary nerves (3—5 on each side) rather patent, straight or arcuately united towards margin, veins slightly prominent, laxly reticulate. Petioles up to 1 cm long, above flat with decurrent leaf-margins, glabrous, usually black when dried. Panicles axillary and sub-terminal, pyramidal, densely ∞ -flowered, grey-tomentellous, up to 10 cm long; peduncles short; female

panicles with less flowers. Pedicels slightly puberulous, $\frac{1}{2}$ — $1\frac{1}{2}$ mm long. Bracteoles deciduous. Flowers dioecious, hardly pilose, white, strongly fragrant. Male flower: tube very short, conical, outside slightly puberulous, inside more or less sericeous; perianth segments ovate-oblong, obtuse, nearly glabrous, patent, margin minutely ciliate, 2 mm long; the outer stamens glabrous, 1 mm long, filaments distinct, as long as the depressed-ovate, truncate anthers with introrse cells; stamens of the 3rd row glabrous, same length, anthers nearly rectangular, canaliculate at the truncate top, glands sessile, large, globose, partly surrounding the filaments. Ovary stipitate, glabrous, 2 mm long, stigma small, triangular-discoid. Female flower: tube $1\frac{1}{2}$ mm long, urceolate; perianth segments 1 mm long; stamens minute, sterile. Ovary globose, glabrous, 1 mm long, style thick, $\frac{1}{2}$ mm long, stigma small. Berry ovoid, acute, smooth, 10 mm long, 6 mm in diam., $\frac{1}{3}$ covered by the cupule. Cupule hemispheric, simple- and entire-margined, rather thin, 7 mm in diam., smooth; pedicel thickened.

Distribution: Brit. Guiana.

Male specimens: Saramacca R. near Mariepaston (Kegel n. 1302 [G.]; Zanderij I, tree n. 35 (B.W. n. 1452, ster. Nov.; n. 1599, in bud Jan.; n. 2261, fl. Aug.; n. 2690, fl. Febr.; n. 3784, fl. Apr.; n. 5034, in bud Jan.; Forestry Bureau n. 6, ster. Jan.); Sectie O (B.W. n. 1815, fl. May; n. 5836, ster. May); Sectie O, tree n. 6 (B.W. n. 1311, ster. Oct.; n. 2917, fl. June; n. 4499, fl. Dec.; n. 5249, fl. Aug.; n. 5587, fl. Jan.); lower Suriname R. (B.W. n. 6, fl. Jan.); locality unknown: Forestry Bureau n. 6, fl. March.

Female specimens: Saramacca R. near Mariepaston (Kegel n. 1312 [G.]); Sectie O (B.W. n. 3400, fr. Nov.; Leter n. 6; Forestry Bureau n. 9, fl. Apr.); Suriname R., Buffel creek (Gonggrijp n. 174, fr. Jan.); locality unknown: Hostmann n. 240, fr. Nov.

Vernacular names: Pisie, Harde pisie, Sabana pisie (N.E.); Lolie hoedoe, Joekoejapoi, Joekoejapi (Car.); Jekoeroe (Arow.); Apisie-ie, Baaka apiesie-ie (Sar.).

The specimens from Sectie O, tree n. 6 are merging into *O. Petalanthera*; the leaves are elliptical, however smaller as

in *O. Petalanthera*; the panicles are tomentose. The glands are of the same size as in *O. Schomburgkiana*; the flowers are larger as in *O. Petalanthera* and more pilose.

14. **Ocotea Petalanthera** (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 358; — *Oreodaphne Petalanthera* Meissn. in D.C., Prodr. XV, 1 (1864), p. 125; id. in Fl. Bras. V, 2 (1866), p. 220; — *Petalanthera bracteolata* Nees, Syst. (1836), p. 347, p. p.; id. in Linnaea 21 (1848), p. 511, p. p.

Tree. Branchlets densely rusty-tomentose; branches cylindrical, smooth, dark-grey. Buds small, densely tomentose. Leaves alternate, chartaceous-coriaceous or coriaceous, elliptical or oblong, (6—)10—14(—18) cm long, (3—)4—5(—8) cm wide; base acute or shortly acute, margin hardly recurved, top distinctly acuminate, acumen obtuse up to 2 cm long; above glabrous, more or less shining, midrib and primary nerves impressed or hardly prominulous, veins reticulate, slightly prominent or obliterate; beneath dull, reddish or brown when dried, slightly puberulous, glabrescent, with long-persistent hairs on the nerves; young leaves often barbellate in the axils, midrib and the few (3—4 on each side), arcuately ascending primary nerves strongly prominent, secondary nerves usually parallel and horizontal, slightly prominent, veins laxly reticulate. Petioles thick, rusty-tomentose, flat above, leaf-margins decurrent, up to 1 cm long. Panicles short, up to 8 cm long, axillary, near the top of the branchlets, pyramidal, few-branched, ∞ -flowered, rusty-tomentose; peduncles short. Pedicels up to 2 mm long, grey-tomentellous. Flowers dioecious, grey-tomentellous, yellow, fragrant. Male flower: 5 mm in diam.; tube small, urceolate, angular, top not constricted, base merging into the pedicel; perianth segments equal, patent, ovate-oblong, acutish, outside tomentellous, inside glabrous, 2 mm long; the outer rows of stamens glabrous, $1\frac{1}{4}$ mm long, filaments glabrous, $\frac{1}{2}$ mm long, anthers ovate, top obtuse, introrse; 3rd row glabrous, erect, pressed against style, $1\frac{1}{2}$ mm long, filaments broad, $\frac{1}{2}$ mm

long, anthers ovate-rectangular, upper cells lateral, lower ones extrorse, basal glands rather large, sessile, globose. Staminodes wanting. Gynaecium stipitate, nearly glabrous, 2 mm long, stigma large, discoid. Female flower: $3\frac{1}{2}$ mm in diam.; tube cup-shaped, 1 mm long; pedicel short. Stamens minute, sterile. Ovary glabrous, globose-ellipsoid, 1 mm long; style thick, glabrous, 1 mm long, stigma large. Berry ellipsoid, mucronulate, 10 mm long, 6 mm in diam., smooth, $\frac{1}{3}$ covered by the cupule. Cupule hemispheric, 6 mm high, 8 mm in diam., rather thin; pedicel rather thick.

Distribution: Northeastern Peru, Brazil.

Male specimens: Sectie O, tree n. 10 (B.W. n. 3985, ster. Sept.; n. 4507, fl. Dec.; n. 5586, fl. Febr.); sectie O (B.W. n. 4337, ster. June); sectie O, tree n. 759 (B.W. n. 1468, ster. Nov.; n. 1646, ster. Febr.; n. 2594, fl. Jan.; n. 2628, fl. Jan.); Brownsberg (B.W. n. 18, ster. Sept.); Brownsberg, tree n. 1284 (B.W. n. 6766, fl. Jan.).

Female specimens: Sectie O, tree n. 574 (B.W. n. 1175, ster. Oct.; n. 2356, fl. Oct.; n. 2589, fl. Jan.; n. 2905; fr. June; n. 3102, fr. Aug.; n. 2697, fr. March), tree n. 653 (B.W. n. 794, ster. Oct.).

Vernacular names: Pisie, Zachte pisie (N.E.); Wawérjan, Topoporin wéwé, Ajoeroe, Tamoene wajaka (Car.); Siroeaballi ojokto, Siroeaballi kheretie wadilidiamaro (Arow.).

Ocotea ? vernicosa Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 331; Kosterm. l. c., p. 17.

Small tree. Branchlets glabrous, dark, slender; branches cylindrical, smooth, dark; buds nearly glabrous. Leaves alternate, coriaceous, glabrous, shining, obovate or elliptical, 10—14 cm long, 4— $5\frac{1}{2}$ cm wide; base cuneate, margin flat, top abruptly acuminate, acumen broad, obtuse, up to 2 cm long, and 8 mm wide at the base; above midrib and primary nerves prominulous or slightly impressed, veins laxly reticulate, prominulous or obliterate; beneath midrib prominulous or flattish, primary nerves (5—7 on each side) prominent, patent, arcuately united at some distance from the margin, veins prominulous, laxly

reticulate or more or less obliterate. Flower unknown. Cupule red, hemispheric, thick, smooth, 1 cm high, 18 mm in diam., margin entire, slightly double, inner margin erect, thin, hardly 1 mm high, outer one indistinct.

Distribution: French Guiana.

Coppename R. (Boon n. 1213, fr. Oct.).

5. NECTANDRA Rol. ex Rottb.

Trees or shrubs. Leaves alternate, sub-opposite or opposite, rigid or chartaceous. Panicles pyramidal or sub-corymbose, rarely racemose (not in Surinam species), usually axillary. Flowers without involucre, generally rather large, hermaphrodite or dioecious; tube conspicuous or nearly wanting; perianth segments 6, usually patent, nearly equal, deciduous. Fertile stamens 9; 4th row or stamens staminodial, small or wanting; anthers 4-celled, usually papillose, cells in a horizontal, straight or slightly arcuate row, those of the outer 6 stamens as a rule introrse, those of the 3rd row extrorse, the outer cells often lateral. Filaments of the 2 outer rows of stamens usually short or wanting, those of the 3rd row with 2 sessile glands. Stamens in the dioecious species minute, sterile. Ovary globose or ellipsoid, usually glabrous; style as a rule short, rarely longer than the ovary. Gynaecium in the dioecious species stipitiform, rudimentary. Berry globose or ellipsoid. Cupule with simple, entire margin, flattish or hemispheric.

Distribution: Species about 90 in tropical South America.

- | | | | |
|----|-----------|--|---|
| 1. | <i>a.</i> | Flowers dioecious..... | 2 |
| | <i>b.</i> | Flowers hermaphrodite | 3 |
| 2. | <i>a.</i> | Leaves rigid-coriaceous, sericeous beneath; base acute, top acuminate. Outer 6 anthers sessile, square. Basal glands of the 3rd row small..... | |
| | | 1. N. grandis (Mez) Kosterm. | |
| | <i>b.</i> | Leaves chartaceous, tomentellous beneath; base rounded, top caudate-acuminate. Outer 6 anthers | |

- shortly stipitate, rectangular. Basal glands large.
 2. **N. Kunthiana** (Nees) Kosterm.
3. a. Anthers of the 6 outer stamens elongate-triangular;
 connectives distinctly protruding beyond the basal
 cells 4
- b. Anthers of the 6 outer stamens transverse-elliptic;
 connectives not or hardly protruding beyond the cells. 5
4. a. Leaves usually alternate, broadly elliptical or ovate;
 7—14 primary nerves on each side; densely rusty-
 tomentose beneath .. 3. **N. Laurel** Kl. et Karst.
- b. Leaves usually opposite, ovate-lanceolate or ovate;
 6—8 primary nerves on each side of the midrib;
 in youth densely sericeous beneath, adult ones
 glabrescent 5. **N. ambigua** Meissn.
5. a. Anthers of the 6 outer stamens very thick, cells
 overlapped by the thick connectives
 4. **N. Pisi** Miq.
- b. Anthers of the 6 outer stamens flat, cells introrse 6
6. a. Leaves with 3—6 primary nerves on each side of
 the midrib 6. **N. cuspidata** Nees.
- b. Leaves with more than 6 primary nerves on each
 side of the midrib 7
7. a. Panicles 5—10 cm long, nearly glabrous. Perianth
 segments shortly papillose inside
 7. **N. guianensis** Meissn.
- b. Panicles 15—25 cm long, densely sericeous or
 puberulous. Perianth segments densely lanuginose-
 papillose inside 8
8. a. Leaves oblanceolate, chartaceous-coriaceous. Pe-
 tioles slender. Panicles many-flowered with slender
 peduncles 8. **N. surinamensis** Mez.
- b. Leaves broadly elliptical, rigid-coriaceous. Petioles
 thick, broad. Panicles ∞ -flowered with thick
 peduncles 9. **N. kaburiensis** Kosterm.

1. **Nectandra grandis** (Mez) Kosterm. l. c., p. 17, non
 Nees mscr. ex Klotzsch et Karst. in syn. in *Linnaea* 21
 (1848), p. 505; — *Endlicheria grandis* Mez in *Jahrb. Bot.*
Gart. Berl. V (1889), p. 124; — *Nectandra praeclara* Sandwith
 in *Kew Bull.* 1932, p. 224; — ? *Nectandra dioica* Mez in
Fedde, Repert. 16 (1920), p. 308.

Large tree, up to 30 m high (Sandwith). Branchlets thick, angular, sulcate, densely yellow-sericeous. Branches cylindrical, striate, glabrescent, dark-brown; buds densely velutinous-sericeous. Leaves alternate, coriaceous or rigid-coriaceous, elliptical or oblong-elliptical, (10—)18—24(—32) cm long, (4—)7—10(—13) cm wide; base abruptly acute or cuneate, often oblique, margin slightly recurved, top acuminate, acumen $\frac{1}{2}$ —1 cm long, acute, $\frac{1}{2}$ cm wide at the base, top sometimes rounded or emarginate; above glabrous, shining, midrib and primary nerves flattish or slightly prominulous, sometimes slightly impressed; young leaves beneath densely silvery-sericeous, adult ones less sericeous, midrib very thick, strongly prominent, primary nerves (5—10 on each side) prominent, arcuately ascendent, bases decurrent along the midrib, tops gradually disappearing towards the margin, lower ones often marginal; secondary nerves prominulous, nearly parallel; veins prominulous, densely reticulate. Petioles thick, sulcate, densely yellow-sericeous, flat above, up to 4 cm long, with slightly decurrent leaf-margins. Panicles pyramidal, axillary, densely yellow- or grey-sericeous, peach-bloom colour (Sandwith), ∞ -flowered, up to 25 cm long; peduncles (up to 10 cm long) and alternate, patent branchlets (up to 5 cm long) thick, compressed; branches dichotomous, flowers in cymes. Pedicels thick, striate, densely sericeous-tomentellous, orange-red (Sandwith), 2—6 mm long. Bracts deciduous. Flowers fragrant, brown-yellow, dioecious, 4—5 mm in diam. Female flower unknown. Male flower with sub-globose or broadly conical $1\frac{1}{2}$ —2 mm long tube, densely sericeous-tomentellous outside, sericeous inside, not constricted at the top, $2\frac{1}{2}$ mm in diam.; perianth segments fleshy, patent, ovate-triangular, obtuse, densely sericeous-tomentellous, up to 2 mm long, inner ones slightly smaller. Outer 6 anthers sessile, flat, orbicular, nearly square, top truncate, incurved, glabrous, except base; stamens of the 3rd row thickish, nearly 1 mm long, inside glabrous, outside pilose at the base, top truncate

or emarginate; anthers not distinct from the broader filaments, cells extrorse, upper ones minute; basal glands sessile, small, flat, orbicular-triangular. Ovary sterile, glabrous, stipitiform, $\frac{1}{2}$ — $\frac{3}{4}$ mm long. Berry ellipsoid, smooth, 4 cm long, $1\frac{1}{2}$ cm in diam. Cupule very thick, rather smooth, hemispheric, 27 mm in diam., 17 mm high; margin entire; fruiting pedicel very thick, obconical, 1 cm long, nearly 1 cm in diam. at the top.

Distribution: Guiana, Brazil(?).

Brownsberg, tree n. 99 (B.W. n. 3204, fl. Sept.); tree n. 1183 (B.W. n. 5546, fl. Oct.; n. 6908, fl. July); Brownsberg (B.W. n. 629, fl. Sept.; n. 670, in bud Sept.).

Vernacular name: Watjarang (Car.).

2. **Nectandra Kunthiana** (Nees) Kosterm. l. c., p. 19; — *Acrodictidium Kunthianum* Nees, Syst. (1836), p. 269; — *Aydenndron aciphyllum* Nees in Linnæa 21 (1848), p. 496; Walp., Ann. III (1852—53), p. 308; Meissn. in D.C., Prodr. XV, 1 (1864), p. 92; id. in Fl. Bras. V, 2 (1866), p. 181; — *Ocolea Kunthiana* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 291; Benoist in Arch. Bot. V (1931), p. 71.

Tree or shrub. Branchlets thick, angular, densely rusty-tomentellous; branches cylindrical, dark-grey; buds densely tomentose. Leaves alternate, chartaceous, at last rigid-chartaceous, elliptical or oblong, 15—25(—35) cm long, 6—9(—12) cm wide; base more or less rounded, margin hardly recurved, top distinctly caudate-acuminate, acumen up to $3\frac{1}{2}$ cm long, 3—5 mm wide at the base; above glabrous, except the base of the impressed midrib, shining, primary nerves slightly prominulous or somewhat impressed, veins distinct, prominulous, laxly reticulate; beneath glaucescent, laxly tomentellous, nerves densely rusty-tomentellous, midrib strongly prominent, primary nerves (10—15 on each side) patent, prominent, parallel, nearly straight, arcuately united at some distance of the margin; secondary nerves slightly prominent, more or less parallel, 3—6 mm from each other; veins

prominulous, laxly reticulate. Female panicles few-flowered, axillary, densely rusty-tomentellous, narrowly pyramidal, up to 12 cm long; peduncles rather thick, compressed, angular, 3—4 cm long, branchlets erect-patent; flowers yellow in shortened dichasia; male panicles many-flowered, up to 7½ cm long; bracts deciduous. Male flower: Pedicels 1½—3 mm long. Flowers 3—4 mm in diam., densely tomentellous outside; tube urceolate, constricted at the top, 1½ mm long, inside densely sericeous; perianth segments ovate-lanceolate, slightly obtuse, equal, patent or reflexed, inside densely tomentellous, 1½ mm long; 6 outer stamens 1 mm long, flat, anthers glabrous, more or less rectangular, top truncate or emarginate; filaments distinct, shorter than anthers, densely pilose; stamens of the 3rd row 1 mm long, thick, erect, pyramidal, anthers not distinct from the broad filaments, top emarginate, glabrous, upper cells lateral, lower ones extrorse; basal glands large, pyramidal. Staminodes wanting. Ovary glabrous, stipitiform, 1 mm long; style and stigma inconspicuous. Female flower: Pedicel 2—2½ mm long, thick, rusty-tomentellous; tube urceolate, 1 mm long, merging into the pedicel, top constricted, inside sericeous; perianth segments ovate, slightly acute, tomentellous, 1½ mm long. Outer stamens sessile, rectangular, densely hirsute, ½ mm long; 3rd row ¼ mm long, canaliculate inside, glands small, oblong, sessile. Ovary glabrous, ellipsoid, 1½ mm long; style cylindrical, ¾ mm long, stigma minute. Berry ellipsoid, smooth, up to 2½ cm long, 13 mm in diam. Cupule red, hemispheric, rather thin, 5 mm high, 15 mm in diam., margin entire; pedicel very thick, 6 mm long.

Distribution: Guiana.

Upper Suriname R., near Saida (Tresling n. 343, fl. Aug.);

Emma Range (Gonggrijp and Stabel n. 188, fr. March).

Vernacular name: Pisie oema.

3. *Nectandra Laurel* Kl. et Karst. ex Nees in *Linnaea* 21 (1848), p. 505; Walp., *Ann.* III (1852—53), p. 310;

Meissn. in D.C., Prodr. XV, 1 (1864), p. 146; id. in Fl. Bras. V, 2 (1866), p. 251; Kosterm. l. c., p. 18; — *Nectandra Tovarensis* Kl. et Karst. ex Nees in Linnæa l. c.; — *Nectandra villosa*, var. *venosa* Nees in Linnæa l. c., p. p.; — *Laurus venosa* Dombey ex Nees, Syst. (1836), p. 291, in syn.

Tree. Branchlets thick, angular, sulcate, densely rusty-tomentose or villose; branches cylindrical, smooth, dark, glabrescent; buds densely rusty-tomentose. Leaves alternate, the upper ones rarely sub-opposite, chartaceous, at last rigid-coriaceous, broadly elliptical or ovate (6—)9—25(—35) cm long, (3—)3½—9(—15) cm wide; base slightly or distinctly obtuse, with usually strongly inflexed margins, margin slightly recurved, top obscurely or distinctly acuminate; young leaves densely rusty-villose, adult ones above at last glabrous (except on principal nerves) very shining, midrib, primary nerves and secondary nerves impressed; beneath rusty-tomentose, tomentum denser on the nerves, midrib strongly prominent, primary nerves (7—14 on each side) prominent, arcuately ascendent, not united at the margin, secondary nerves parallel, prominent, veins prominulous, laxly reticulate. Petioles rather slender, sulcate, hardly canaliculate, tomentose, glabrescent, 1½—2½ cm long. Panicles axillary, lax, ∞-flowered, broadly pyramidal, sub-corymbose, densely rusty-tomentose, up to 20 cm long; peduncles thick, slightly compressed, up to 7 cm long, lower branchlets patent, up to 5 cm long. Flowers white, 10—15 mm in diam., rotate, hermaphrodite, fragrant, densely rusty-tomentose; tube small, broadly conical, 1 mm high, rusty-tomentose outside, glabrous inside, top not constricted, when deflorate globose with constricted top; perianth segments nearly equal, patent, oblong, elliptical, ovate or sub-orbicular, obtuse or slightly acutish, 5 mm long, 3—3½ mm in diam., outer ones tomentose outside, densely papillose inside, inner ones outside with a tomentose triangle at the base, inside papillose. Outer anthers nearly sessile, foliaceous-dilated, elongated triangular or ovate,

papillose, slightly incurved or erect, $1\frac{1}{2}$ mm long, 1 mm wide at the base, top obtuse or acutish, cells introrse in a slightly arcuate row at the base of the anthers; stamens of the 3rd row papillose, $1\frac{1}{2}$ mm long, anthers triangular, obtuse, filaments slightly narrower, short, lower cells sub-extrorse, upper ones lateral, basal glands large, globose-polygonous, depressed, touching each other. Staminodes small, conical, acute, pilose, often with rudimentary cells inside, sometimes wanting. Ovary obovoid, 1—2 mm long, glabrous or nearly so; style nearly as long, cylindrical, thick, glabrous; stigma large, dark, discoid.

Distribution: Northern Peru, Ecuador, Colombia, Panama, Venezuela.

Brownsberg, tree n. 1278 (B.W. n. 6746, fl. Nov.).

4. *Nectandra Pisi* Miq., Stirp. Surin. (1850), p. 199, t. 60; Walp., Ann. III (1852—53), p. 310; Kosterm. l. c., p. 19; — *Nectandra leucantha* Nees, Syst. (1836), p. 310 p. p.; id. in Linnaea 21 (1848), p. 268, 508, p. p. quoad var. c; — *Nectandra leucantha* Benth. (non Nees) mscr. ex Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 415; — *Nectandra leucantha* Miq. (non Nees), Stirp. l. c., p. 196, p. p., cum. t. 58; — *Nectandra pallida* Miq. (non Nees), Stirp. l. c., p. 196, t. 59A; — *Nectandra Rodiaci* Miq. (non Schomb.), Stirp. l. c., p. 197, p. p., quoad cit. spec. Hostmann n. 235 et A, Kegel n. 193; — *Nectandra vaga* Meissn. in D.C., Prodr. XV, 1 (1864), p. 153; id. in Fl. Bras. V, 2 (1866), p. 261, cum var.; — *Nectandra globosa* Mez (non Aubl.) in Jahrb. Bot. Gart. Berl. V (1889), p. 415, p. p.

Tree, 10—20 m high. Branchlets yellow- or rusty-tomentellous or puberulous, slightly angular, sulcate, rather thick; branches cylindrical, smooth, dark-brown or grey; buds densely yellow-tomentellous. Leaves alternate, rarely the upper ones sub-opposite, chartaceous or rigid-chartaceous, usually ovate, sometimes lanceolate, (10—)14—18(—25) cm long, (4—)5—6(—8½) cm wide; base abruptly acute or slightly obtuse, top acute or

gradually acuminate, acumen blunt, margin distinctly incurved at the base; above glabrous, slightly shining, midrib and primary nerves impressed, veins usually inconspicuous; beneath thinly puberulous, axils often barbellate, at last glabrescent, midrib strongly prominent, primary nerves (5—7 on each side) ascendent, prominent, not united at the margin, secondary nerves parallel, nearly horizontal, 2—3 mm from each other, veins densely reticulate, slightly prominulous. Petioles rather slender, glabrescent, up to 15 mm long. Panicles ∞ -flowered, axillary, near the top of the branchlets, rusty- or grey-puberulous, broadly pyramidal, sub-corymbiform, 6—10 cm long; peduncles thick, compressed, up to 4 cm long, branchlets rather few, up to 2 cm long, dichotomous; usually congested near the top of the peduncle. Pedicels slender, puberulous, 1—2½ mm long, rapidly increasing in length after the flowering period. Bracteoles deciduous. Flowers hermaphrodite, rotate, 6—10 mm in diam.; tube short, broadly conical, outside yellow-sericeous, not constricted at the top till after the flowering period, inside glabrous, 1 mm long; perianth segments obovate-oblong, fleshy, obtuse or acutish, up to 4 mm long, inner ones oblong, slightly smaller, outside sericeous-tomentellous, inside densely papillose. Stamens densely papillose, thick, pressed against each other, cells overlapped by the thick connectives. Outer 6 anthers transversally elliptic, top truncate or mucronulate, $\frac{3}{4}$ —1 mm long, second row slightly broader; filaments minute, cells large, introrse, in a nearly straight row at the basal side of the anthers. Stamens of the 3rd row slightly longer, transverse-oblong, truncate, inside slightly canaliculate, cells extrorse; basal glands large, depressed, globose-polygonous, touching each other. Staminodes of the 4th row stipitiform, club-shaped, acutish. Ovary globose-ellipsoid, 1 mm long, glabrous; style nearly as long, thick, cylindrical; stigma conspicuous, discoid-reniform. Berry ellipsoid-ovoid, smooth, 13—16 mm long, 8—12 mm in diam., 5 mm covered by the cupule. Cupule rather thin, hemispheric, rugulose,

8—12 mm in diam., 8 mm high; pedicel 3 mm long, cylindrical, 1—1½ mm in diam.

Distribution: Guiana, Amazonian district.

Marowijne R. (Kapfl. ed. Hohenack. n. 1827 [G., L.], fl. Aug., type of *N. pallida* Miq.); Tapanahoni R. (Versteeg n. 679, fl. July); Bergen Daal (Focke n. 1305, fl. May, type); Poebantje (Kegel n. 193 [G.], fl. Aug.); Pl. Berlijn (Wulschlägel n. 1548 and s. n. [B.]); upper Suriname R. (Wulschlägel n. 455 [B.]); Suriname R., Kominekoe-creek (Tresling n. 261, in bud July); Brownsberg, tree n. 1052 (B.W. n. 1777, ster. Apr.; n. 3209, fl. Sept.; n. 3992, fr. Sept.; n. 4450, fl. Sept.; n. 5545, fl. Oct.); Watramiri, tree n. 1643 (B.W. n. 1917, ster. May); Toekoemoetoe (B.W. n. 5687, fr. March); locality unknown: Wulschlägel cum. n. div. [G.]; Voltz s. n.; Focke n. 294 [L.]; Hostmann n. 235; Wulschlägel s. n. [B.].

Vernacular name: Pisie.

5. *Nectandra ambigua* Meissn. in D.C., Prodr. XV, 1 (1864), p. 158; id. in Fl. Bras. V, 2 (1866), p. 267; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 416; Kosterm. l. c., p. 21; — *Nectandra leucantha* Nees in Linnaea 21 (1848), p. 508, p. p., quoad cit. spec. Schomb. n. 29.

Tree or shrub. Branchlets densely yellow-tomentellous, slightly angular, sulcate, glabrescent; branches cylindrical, smooth, dark-brown; buds densely yellow-tomentose. Leaves usually sub-opposite or opposite, sometimes alternate, ovate-lanceolate or ovate, sometimes lanceolate (9—)12—18(—20) cm long, (3—)4—5(—7) cm wide, base shortly acute, sometimes obtuse, margin hardly recurved, top gradually acuminate or acute; young leaves above densely yellowish-tomentellous, beneath densely sericeous; adult ones above glabrous, rather dull, midrib and primary nerves impressed, veins inconspicuous, beneath slightly sericeous, glabrescent, midrib strongly prominent, primary nerves (6—8 on each side) ascendent, prominent, not united at the margin, secondary nerves rather few, parallel, 4—5 mm from each other, slightly prominulous, veins usually inconspicuous. Petioles slender, tomentellous, slightly canaliculate

above, 10—18 mm long. Panicles corymbiform, opposite, axillary, near the top of the branchlets, few- or rather many-flowered, densely yellowish-tomentellous, up to 10 cm long; peduncles slender, compressed, up to 5 cm long, branchlets rather few, usually congested near the top of the peduncles, up to 3 cm long, dichotomous. Bracts deciduous. Pedicels slender, densely tomentellous, 3—5 mm long. Flowers white (Schomb.), rusty-tomentellous, 10—11 mm in diam.; tube broadly conical, 1—1½ mm high, densely sericeous, top slightly constricted; perianth segments broadly ovate or obovate, obtuse, 4—4½ mm long, inside densely papillose, outside densely tomentellous; inner ones slightly narrower, densely tomentellous outside, especially a triangle at the base. Outer 6 anthers nearly sessile, papillose, elongated triangular or triangular-ovate, up to 1¾ mm long, top often acuminate with blunt point, cells introrse, basal, filaments minute, glabrous or nearly so; stamens of the 3rd row same length, filaments broad, short, puberulous, anthers broadly ovate-triangular, top obtuse, incurved, cells extrorse, the upper ones somewhat lateral, slightly overlapped by the connective; basal glands large, sessile, depressed, globose-polygonous. Staminodes of the 4th row thick, stipitiform, short. Ovary ovoid-ellipsoid, ¾—1 mm long, glabrous; style thick, cylindrical, 1—1¼ mm long; stigma rather small, discoid-reniform. Berry ellipsoid-ovoid, smooth, mucronulate, 12—14 mm long, 7—8 mm in diam.; 4 mm covered by the cupule. Cupule thin, hemispheric, smooth or ribbed, 8—10 mm in diam., 7 mm high, margin entire; pedicel 4—5 mm long, nearly cylindrical, 1½ mm in diam.

Distribution: Brit. Guiana.

Upper Nickerie R., Crombok falls (Tulleken n. 492 [L.], fl. Sept.; n. 435 [L.], fl. Sept.; Gonggrijp and Stahel n. 1065, fr. Febr.); Arawarwa R. (Nickerie R.) (B.W. n. 3548, fl. Sept.); Corantijne R. near Wonotobo (B.W. n. 3093, fl. June).

Vernacular names: Pisie (N.E.); Wajaaka, Waitjara (Car.); Kanoaballi (Arow.).

6. *Nectandra cuspidata* Nees, Syst. (1836), p. 330; id. in *Linnaea* 21 (1848), p. 510; Miq., *Stirp. Surin.* (1850), p. 200, t. 59 B; Meissn. in D.C., *Prodr.* XV, 1 (1864), p. 159, p. p.; id. in *Fl. Bras.* V, 2 (1866), p. 268, t. 97, cum var. *macrocarpa* et *dubia*, excl. var. *strumosa*; Kosterm. l. c., p. 21; — *Ocotea cuspidata* Mart. et *riparia* Mart. in herb. Monac. ex Nees in *Syst.* l. c.; — *Oreodaphne costulata* Nees in *Linnaea* 21 l. c., p. 520, p. p., quoad cit. spec. Schomb. n. 929; Walp., *Ann.* III (1852—53), p. 313, p. p.; — *Nectandra Pichurim* Mez in *Jahrb. Bot. Gart. Berl.* V (1889), p. 449, excl. type; Pulle, *Enum. Pl. Surin.* (1906), p. 185; Hassl. in *Ann. Cons. Jard. Bot. Genève* (1916—19), p. 96; Standley in *U. S. A. Nat. Herb.* 23, 2 (1922), p. 298.

Tree, up to 20 m high; wood hard, red or yellow. Branchlets slender, rusty-tomentellous or finely greyish puberulous, rarely sub-glabrous, angular at the top, cylindrical, striate towards the base; buds rusty-tomentellous, subulate. Leaves alternate, chartaceous or chartaceous-coriaceous, lanceolate, ovate-lanceolate or oblong-lanceolate, (5—)10—16(—20) cm long, (2—)3—4½(—6) cm wide; base acute, margin slightly recurved, abruptly inflexed at the base, top gradually acuminate, acumen long, narrow, usually acute; adult leaves above glabrous or nearly so, smooth, shining, midrib and primary nerves slightly impressed, veins reticulate, usually inconspicuous, beneath sub-sericeous or tomentellous, glabrescent, dull, midrib strongly prominent, primary nerves (3—6 on each side) ascendent, strongly curved, prominent, puberulous, not united at the margin, secondary nerves parallel, horizontal, 2—3 mm from each other, prominulous. Petioles slender, tomentellous, glabrescent, slightly canaliculate above, 7—11(—20) mm long. Panicles axillary and pseudo-terminal, pyramidal, ∞-flowered, rusty- or greyish-tomentellous, the axillary ones 3—10 cm long, the terminal ones up to 20 cm long, often with leaves; peduncles slender, compressed, branchlets alternate, patent, short, dichotomous. Bracts deciduous. Pedicels tomentellous, 1—4 mm long.

Flowers hermaphrodite, white, fragrant, tomentellous or sub-glabrous, rotate, 3—5 mm in diam.; tube 1 mm long, slightly constricted at the top, sub-sericeous outside, glabrous inside; perianth segments nearly equal or the inner ones larger; outer ones oblong, puberulous outside, slightly papillose inside, glabrescent, up to $1\frac{1}{2}$ mm long, inner ones broadly ovate or oblong up to 2 mm long, outside glabrous, except at the base, inside densely papillose. Outer 6 stamens glabrous, 1 mm long, filaments short, anthers transverse-elliptic, punctulate, cells in a slightly curved row, connectives not exceeding the cells; stamens of the 3rd row cuneate-truncate, pressed against the style, up to $\frac{3}{4}$ mm long, canaliculate at the top and inside, lower (middle) cells extrorse, upper ones sub-lateral; basal glands rather large, sessile, globose, not forming a continuous ring. Staminodes small, subulate or sub-capitellate, glabrous or puberulous. Ovary ellipsoid, glabrous, 1 mm long, gradually merging into a thick, glabrous, short style, stigma small, discoid, sub-triangular. Berry ellipsoid, 1 cm long, 7 mm in diam., nearly free from the thin, shallow, entire and simple-margined cupule. Cupule 5—6 mm in diam., 1—2 mm high; pedicel 6—8 mm long, conical, thick.

Distribution: From Mexico to Southern Brazil; Paraguay(?) and Argentina(?).

Berg en Daal (Focke n. 1306, fl. May); Paramaribo (Voltz s. n.); locality unknown: Hostmann n. 790.

Vernacular name: Pisie (N.E.).

7. *Nectandra guianensis* Meissn. in D.C., Prodr. XV, 1 (1864), p. 160; id. in Fl. Bras. V, 2 (1866), p. 270; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 433, excl. syn. *N. Neesiana* Miq.; Pulle, Enum. Pl. Surin. (1906), p. 185; — *Nectandra salicifolia* Nees in Linnaea 21 (1848), p. 506, p. p. quoad cit. spec. Schomb. 858, Kegel n. 285, 631, Hostmann n. 973 (non Nees, Syst., p. 203).

Tree or shrub. Branchlets rusty-puberulous at the top, soon

glabrous, dark, nearly cylindrical, shining, angular at the top; buds yellow-tomentellous. Leaves alternate, glabrous, chartaceous, lanceolate or oblong, (5—)12—20 cm long, (2—)3½—5 (—6) cm wide; base acute, margin nearly flat, top acuminate with somewhat obtuse point; above shining, midrib slightly impressed, primary nerves prominulous or flat, veins hardly visible; beneath dull, midrib prominent, primary nerves (8—14 on each side) slightly prominent, nearly straight, rather patent, curved and disappearing at the margin, veins densely reticulate, prominulous. Petioles slender, canaliculate above, rusty-tomentellous, soon glabrous, 10—15 mm long. Panicles pyramidal, rather few-flowered in the axils of the upper leaves, nearly glabrous or slightly puberulous, 5—10 cm long, often with few leaves; peduncles slender, compressed, 2—7 cm long, branchlets few, sub-opposite or alternate, congested near the top of the peduncles, 1 cm long, once or twice dichotomous, with 2—3 flowers at the end of the branchlets. Bracts deciduous. Pedicels slightly pilose, 2—3 mm long. Flowers hermaphrodite, sub-glabrous or slightly pilose, rotate, 5—6 mm in diam.; tube 1 mm high, top slightly constricted; perianth segments nearly equal, suborbicular, up to 2 mm long, outside sub-glabrous, inside shortly, densely papillose. Outer 6 anthers flattish, papillose, sessile, transverse-elliptic, slightly incurved, ½ mm long, those opposite the larger petals somewhat broader; cells large, introrse. Stamens of the 3rd row sub-sessile, top truncate or emarginate, papillose inside, ½ mm long, cells sub-extrorse or lateral. Staminodes of the 4th row small, papillose, slightly capitulate. Ovary glabrous, sub-globose, 1 mm long. Style thick, glabrous, very short (⅓ mm) with small, dark, obtuse stigma. Berry (only a few on each panicle) ellipsoid, smooth, 17—22 mm long, up to 11 mm in diam., nearly free from the rather flat, thin, simple- and entire-margined cupule. Cupule 7—12 mm in diam.; pedicel conical, 5—11 mm long.

Distribution: Brit. Guiana.

Paramaribo, Kwatta weg (Focke n. 835, fl., fr. Oct.); Pl. Kwatta (Kegel n. 285 and 631 [G.], fl. Aug.); locality unknown: Hostmann n. 973, s. n. [L.], Splitgerber s. n. [L.], Focke n. 323 [L.]; Wullschlägel n. 453 [B., G.].

8. *Nectandra surinamensis* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 454 (not in Urb., Symb. II (1900), p. 252).

Tree. Branchlets thick, angular, densely yellow-tomentellous or sericeous; branches cylindrical, grey, glabrous; buds densely sericeous. Leaves alternate, chartaceous-coriaceous or coriaceous, oblanceolate or oblong-ob lanceolate, (9—)14—18(—20) cm long, (3—)4—5(—5½) cm wide; base gradually acute, margin hardly recurved, top acuminate, acumen up to 2 cm long, acute; young leaves membranous, sparingly puberulous, usually densely reticulate; adult ones above glabrous, smooth, shining, midrib and primary nerves impressed, veins inconspicuous; beneath sparingly puberulous, glabrescent, midrib strongly prominent, primary nerves (9—11 on each side) ascendent, arcuately united at some distance from the margin (except the lower ones), secondary nerves slightly prominulous, parallel, 4 mm from each other, usually obliterate. Petioles slender, densely sericeous, glabrescent, above usually flat, up to 17 mm long. Panicles axillary, pyramidal, rather few-flowered, lax, up to 15 cm long, puberulous, peduncles slender, compressed, up to 8 cm long, branchlets few, distant, patent, slender, up to 2 cm long, secondary branchlets dichotomous, usually in pseudo-umbels. Pedicels slender, hardly puberulous, 3—4 mm long. Flowers rotate, fragrant, white, 6—11 mm in diam.; tube inconspicuous, hardly ½ mm long, slightly constricted at the top, slightly puberulous outside, glabrous inside; perianth segments nearly equal, ovate or ovate-subrectangular, obtuse, 1½ mm long, 1 mm wide at the base, outside slightly puberulous, inside densely lanuginose-papillose. Outer 6 stamens transversally elliptical, truncate, nearly sessile, outside densely lanuginose-

papillose, hardly $\frac{1}{2}$ mm long; stamens of the 3rd row slightly longer, anthers cuneate, truncate or emarginate, inside canalliculate, lower cells extrorse, upper ones lateral, filaments short, broad, but distinct; basal glands very large, depressed, globose-polygonous, protruding beyond the outer row of stamens. Staminodes hardly $\frac{1}{2}$ mm long, papillose, hastate-stipitiform. Ovary globose, glabrous, hardly 1 mm long; style minute, thick; stigma dark, small, discoid. Berry unknown.

Distribution: French Guiana.

Marowijne R., Siparawini-creek (Kappler ed. Hohenack. n. 2076 [G., L., U.], fl. Sept., type); Brownsberg, tree n. 1275 (B.W. n. 6676, fl. Oct.; v. Emden s. n., fl. Sept.).

9. **Nectandra kaburiensis** Kosterm. l. c., p. 22; — *Nectandra surinamensis* Mez in Urb., Symb. II (1900), p. 252, nec alibi; — *Aniba sulcata* R. Benoist, nomen, in Bull. Soc. Bot. France 75 (1928), p. 976.

Tree, up to 30 m high. Branchlets very thick, angular, sulcate, densely yellow-tomentose or sericeous; branches cylindrical, smooth, grey; buds densely sericeous. Leaves alternate, rigid-coriaceous, broadly elliptical or oblong, rarely oblong-lanceolate, (9—)13—19(—21) cm long, (4—)5—6(—8) cm wide; base acute or cuneate, margin hardly recurved, top acuminate, acumen up to 1 cm long, acute; young leaves sometimes lanceolate, puberulous, adult ones above glabrous, shining, midrib, primary nerves and secondary nerves impressed, beneath sparingly hirsute or puberulous, midrib strongly prominent, primary nerves (10—13 on each side) prominent, straight, ascendent, arcuately united at the margin (except the lower ones), secondary nerves parallel, nearly horizontal, 4—5 mm from each other, slightly prominent, veins nearly invisible. Petioles thick, broad, glabrescent, above flat, 10—15 mm long. Panicles ∞ -flowered, axillary on the branchlets, pyramidal, densely yellow-tomentellous, up to 18 cm long; peduncles thick, compressed, up to 7 cm long; branchlets ascendent, thick,

compressed, up to $7\frac{1}{2}$ cm long, bearing pedunculate pseudo-umbels. Bracts lanceolate-acute, $1-1\frac{1}{2}$ mm long, outside tomentellous, inside glabrous; deciduous. Pedicels slender, tomentellous, $2\frac{1}{2}$ mm long. Flowers fragrant, white or yellowish, rotate, 5—6 mm in diam.; tube $\frac{1}{2}$ mm long, slightly constricted at the top, outside tomentellous or nearly glabrous, inside glabrous; perianth segments ovate or oblong, $1\frac{1}{2}-2\frac{1}{2}$ mm long, outside glabrescent, inside densely lanuginose-papillose. Stamens of the outer rows 1 mm long, filaments short, broad, tomentellous, anthers transversally elliptic or sub-orbicular, truncate, incurved, sometimes slightly emarginate, $\frac{1}{2}$ mm long, outside densely papillose, cells in a slightly curved row, large, introrse, the outer ones often somewhat lateral; stamens of the 3rd row slightly longer, anthers cuneate, top truncate, gradually merging into the broad, short filaments, inside canaliculate, lower cells extrorse, upper ones lateral; basal glands very large, depressed, globose-polygonous, more or less surrounding the filaments. Staminodes of the 4th row $\frac{1}{2}$ mm long, slightly clavate, pilose or glabrous. Ovary glabrous, globose, 1 mm in diam.; style short, or hardly $\frac{1}{2}$ mm long; stigma discoid, small. Berry globose, 12 mm in diam., nearly free from the cupule. Cupule flat, small, 6 mm in diam.; pedicel thick, obconical, 12 mm long, 5 mm in diam. at the top.

Distribution: Guiana, Trinidad.

Kaboerie, tree n. 649 (B.W. n. 4888, ster. Oct.; n. 5901, in bud and fr. July).

6. ANIBA Aubl.

Trees or shrubs. Leaves alternate or pseudo-verticillate, chartaceous or coriaceous, glabrous, papillose or pilose. Panicles axillary, usually clustered at the top of the branchlets, tomentellous or glabrous. Flowers small, hermaphrodite, usually tomentellous; tube distinct, conical or urceolate, generally longer than the perianth; perianth segments 6, equal or the

outer ones smaller. Stamens 9, included, free, all fertile (except: *A. Kappleri* Mez); 4th row staminodial, usually wanting; filaments narrower or broader, as a rule longer than the anthers, mostly pilose; 3rd row of filaments with usually sessile glands; anthers 2-celled; cells of the outer 6 anthers introrse or lateral-introrse, of the 3 inner ones extrorse. Ovary glabrous or pilose, usually ellipsoid, merging into a conical, generally longer style with minute stigma. Berry ellipsoid or sub-globose, smooth, in youth entirely, in maturity partly covered by the usually hemispheric, mostly simple-margined, often verrucous cupule.

Distribution: About 40 species in tropical South America, one in the West Indies.

1. *a.* Stamens of the 3rd row sterile, stipitiform 1. ***A. Kappleri*** Mez.
- b.* Stamens of the 3rd row fertile, with distinct anthers. 2
2. *a.* Lower leaf surface ochraceous-yellow, due to microscopical papillae 3
- b.* Lower leaf surface not papillate, green, reddish-brown or yellowish-green 4
3. *a.* Leaves elliptical, rigid-coriaceous with strongly recurved margin and rounded base. Flowers small, 1 mm long. Cupule and pedicel very thick 2. ***A. rosaeodora*** Ducke.
- b.* Leaves chartaceous-coriaceous, obovate-lanceolate, with cuneate, tapering base. Flowers 2—3 mm long. Cupule and pedicel thickened 3. ***A. firmula*** (Nees et Mart.) Mez.
- c.* Leaves coriaceous, elliptical with shortly acute base. Flowers unknown. Cupule and pedicel rather thick 10. ***A. Gonggrijpii*** Kosterm.
4. *a.* Outer row of perianth segments 3 × shorter than the inner one 4. ***A. Canelilla*** (H.B.K.) Mez.
- b.* Perianth segments equal in length 5
5. *a.* Ovary densely pilose 6
- b.* Ovary glabrous or nearly so 8
6. *a.* Leaves lanceolate or oblanceolate, clustered at the top of the branchlets; lower surface of the leaves

- with strongly prominent midrib and primary nerves, the latter arcuately united at the margin, veins prominulous, reticulate. 5. **A. Taubertiana** Mez.
- b. Leaves elliptical, not clustered; midrib and primary nerves slightly prominent, not or only partly united at the margin 7
7. a. Leaves greenish-yellow beneath, veins obliterate. Outer 6 stamens with dilated filaments, but not so broad as the anthers 7. **A. mas** Kosterm.
- b. Leaves reddish-brown beneath, veins reticulate, prominulous. Outer 6 stamens with elliptical filaments, broader than the anthers 8. **A. riparia** (Nees) Mez.
8. a. Leaves glabrous, shining, reddish-brown beneath, distinctly reticulate on both sides. Connectives of the 6 outer anthers slightly protruding beyond the cells. Ovary ellipsoid. 9. **A. Jenmani** Mez.
- b. Leaves dull, densely rusty-tomentellous beneath, veins usually obliterate. Connectives of the 6 outer anthers distinctly protruding beyond the cells. Ovary cylindrical 6. **A. Hostmanniana** (Nees) Mez.

1. **Aniba Kappleri** Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 52; Pulle, Enum. Pl. Surin. (1906), p. 185; — *Ajouea Guyanensis* Gris. (nec Aubl.) in Kappl., Pl. Surin. n. 1981; — *Aydenndron riparium* Meissn. (nec Nees) p. p. in D.C., Prodr. XV, 1 (1864), p. 89, quoad spec. Kappler n. 1981.

Tree. Branchlets slender, rusty-tomentellous, glabrescent, sulcate; branches slender, cylindrical, grey; buds densely tomentellous. Leaves alternate, chartaceous, glabrous, rather dull, when dried greenish above, brownish beneath, obovate-lanceolate or lanceolate, (6—)11—14(—16) cm long, (2—)3½—4 (—5½) cm wide, base cuneate, somewhat tapering into the pedicel, top acuminate, acumen up to 1½ cm long, 6 mm wide at the base, top obtuse; above midrib prominulous or flat, nerves hardly conspicuous, beneath midrib prominent, primary nerves (7—9 on each side) prominulous, slightly ascendent,

only the upper ones united at the margin, veins obliterate. Petioles slender, glabrescent, slightly canaliculate above, 1 cm long. Panicles pyramidal, ∞ -flowered, clustered at the top of the branchlets, patent, rusty-tomentellous, up to 8 cm long. Peduncles slender, usually short, up to $2\frac{1}{2}$ cm long, branches patent, alternate, somewhat compressed, up to $3\frac{1}{2}$ cm long. Pedicels thick, sulcate, tomentellous, 1—2 mm long. Bracteoles deciduous. Flowers white (Kappler), rusty-tomentellous, 2 mm long; tube conical, not distinct from the pedicel, 6-ribbed, slightly constricted at the top, nearly as long as the perianth; perianth segments $1\frac{1}{4}$ mm long, ovate, acutish, concave, tomentellous on both sides, exterior row broader with fringed margins; stamens included, the 6 exterior 1 mm long, with triangular, introrse-lateral anthers with slightly acute top; connectives minutely protruding beyond the cells; filaments $2 \times$ longer than the anthers, dilated, elliptical, broader than the anthers, densely rusty-lanuginose; stamens of the 3rd row sterile, liguliform-stipitiform, nearly 1 mm long, base lanuginose, for the rest glabrous, top truncate-obtuse; basal glands large, pilose, subglobose, sessile, touching each other; ovary included, slender, ellipsoid, $\frac{3}{4}$ mm long, tomentellous, except base, merging into a slender, conical, glabrescent, $\frac{1}{2}$ mm longer style with curved top and minute stigma. Unmature fruit included in the hemispheric, rusty-verrucous cupule.

Distribution: Endemic.

Marowijne R. (Kappler n. 1981, fl. Aug. [U., D.]); Brownsberg, tree n. 1253 (B.W. n. 6618, fl. Aug.; n. 6765, fr. Jan.), tree n. 1263 s. n., fr. Oct.

2. *Aniba rosaeodora* Ducke in Revue de Bot. Appliq. VIII (1928), p. 845; id. in Arch. Jard. Rio de Janeiro V (1930), p. 109, t. IV, f. 5; „Bois de rose”: See Gonggrijp in: De Indische Mercur, Apr. 23 and 30, 1920.

Large tree, up to 30 m high (Gonggrijp). Bark rufous, wood yellowish-grey, aromatic (Ducke). Branchlets thick, angular,

sulcate, rufous-tomentellous, with white lenticels; branches cylindrical, glabrous, rufous-brown or grey. Leaves alternate, rigid-coriaceous, broadly elliptical, ovate- or obovate-oblong, 14—19(—24) cm long, 4—6(—9½) cm wide, base rounded, margin strongly recurved, top shortly acuminate: acumen broad, obtuse, 1 cm long; upper leaves smaller, 6—9 cm long, 3—4 cm wide. Upper surface glabrous, green, shining, midrib flat or slightly impressed, primary nerves flat, inconspicuous, veins densely reticulate or obliterate; lower surface ochraceous-yellow, due to microscopical papillae, densely and very shortly tomentellous, glabrescent, midrib strongly prominent, primary nerves (9—12 on each side) prominent, patent, slightly curved, hardly united at the margin, veins prominulous, densely reticulate. Petioles thick, glabrescent, canaliculate above, up to 1½ cm long. Panicles narrowly pyramidal, clustered at the young branchlets, densely rusty-tomentellous, up to 10 cm long; peduncles thick, compressed, usually short, up to 4 cm long, branches few, thick, compressed, patent, up to 2½ cm long; pedicels thick, conical, sulcate, very short, merging into the flower tube; bracts deciduous. Flowers rusty-tomentellous, 1 mm long; tube conical, slightly longer than the perianth, sulcate, constricted at the top; perianth segments erect, equal, concave, fleshy, ovate-orbicular, inner ones with fringed margins. Stamens included, the 6 outer ones with elliptical, densely villose filaments, anthers nearly as long, depressed-ovate, broader than long; cells minute; connectives not protruding beyond the cells; 3rd row of stamens with narrower filaments, glabrous at the top; ovary ellipsoid, tomentellous (except at base), shorter than the conical style, with minute stigma. Berry ellipsoid, glabrous, up to 4 cm long, 2 cm in diam., top slightly depressed, mucronulate; cupule hemispheric, thick, slightly rusty-verrucous, 2 cm in diam., 12 mm high; pedicel conical, very thick, 1½ cm long, 1 cm in diam. at the top.

Distribution: Northern Amazonian district; French Guiana.

Tapanahoni R., Doemansingi rapids (B.W. n. 4141, ster. Nov.); near Drie Tabbetje (B.W. n. 5085, fr. Aug.); Gonini R., Langa foetoe falls (B.W. n. 3711, ster. Febr.); Paramaribo, Pl. Onverwacht (Stahel s. n., fl. March); Hendrik top, Emma Range (B.W. n. 5729, fr. March); Wilhelmina Range (B.W. n. 7159, fl. June).

Vernacular names: Echt Rozenhout (S.D.); Bois de rose de Cayenne.

3. **Aniba firmula** (Nees et Mart.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 58¹⁾; — *Aydenndron firmulum* Nees et Mart. in Linnaea VIII (1833), p. 36; id., Syst. (1836), p. 250 and in Linnaea XXI (1848), p. 496, p. p. quoad cit. spec. Sellow n. 369²⁾; — *Aydenndron Sellowii* Meissn. in D.C., Prodr. XV, 1 (1864), p. 88; id. in Fl. Bras. XV, 2 (1866), p. 177; — *Aniba Panurensis* (Meissn.) Mez in Jahrb. l. c., p. 58; Brooks in Kew Bull. 1933, p. 214; — *Aydenndron Panurense* Meissn. in D.C. l. c., p. 89; id. in Fl. Bras. l. c., p. 178; — *Aniba laevigata* (Meissn.) Mez in Jahrb. l. c., p. 59; id. in Arb. Bot. Gart. Breslau I (1892), p. 109; — *Aydenndron laevigatum* Meissn. in D.C., Prodr. l. c., p. 88; id. in Fl. Bras. l. c., p. 178, t. 63.³⁾

Tree. Branchlets slightly angular, rather slender, densely rusty-tomentellous; branches cylindrical, glabrescent, grey; bark smelling of roses. Leaves alternate, chartaceous-coriaceous, obovate-lanceolate or elliptical-lanceolate, sometimes elliptical, (7—)12—14(—18) cm long, (1½—)3½—4(—5½) cm wide; base cuneate or acute, top acuminate, margin slightly recurved; above glabrous, somewhat shining, midrib slightly impressed or flat, primary nerves hardly prominulous, veins obliterate;

¹⁾ Nees published this species as *Aydenndron firmulum* Nees et Mart. in Linnaea 8 (1833), p. 36, citing only Sello n. 369. In the next publication, Syst., p. 250 he cites also a specimen from the Munich herb., named in manuscript by Martius: *Ocotea firmula* (= *Ocotea fasciculata* Mez.). Most probably he derived the epithet from Martius' specimen, but because he neither cited this specimen, nor the name of Martius in his first publication, Sello n. 369 must be considered as the type specimen of *Aniba firmula* (Nees et Mart.) Mez.

²⁾ Nees erroneously cites: Sello n. 3691.

³⁾ The indumentum of the filaments is badly drawn.

when young slightly tomentellous beneath; adult leaves glabrous, ochraceous-yellow, midrib prominent, primary nerves (7—9 on each side) prominulous, patent, arcuate at the margin, hardly united, veins densely areolate or obliterate. Petioles densely yellowish-rusty tomentellous, sulcate, distinctly canaliculate, glabrescent, 8—15 mm long. Panicles broadly pyramidal, patent, densely rusty-tomentellous, clustered near the top of the branchlets, up to 9 cm long, many-flowered; peduncles flattened, rather slender, up to 3 cm long; branchlets rather few, patent, alternate, up to 3 cm long; pedicels thickish, 1—7 mm long; bracts linear, densely tomentellous, carinate, up to $1\frac{1}{2}$ mm long, deciduous. Flowers tomentellous, 2—3 mm long; tube obconical, merging into the pedicel, 1 mm long, top constricted, inside lanuginose; perianth segments fleshy, carinate-concave, equal, 1 mm long, outer ones ovate, obtuse, inner ones orbicular-ovate, with fringed margins. Stamens included, the 6 outer ones 1 mm long, with depressed-ovate, glabrous anthers (broader than high); filaments elliptical, broader than anthers, densely lanuginose; connective not or hardly protruding beyond the introrse cells; 3rd row of stamens slightly shorter, anthers depressed-ovate, smaller than those of the outer rows, glabrous, filaments broad, but narrower than the anthers, lanuginose, except top; basal glands rather large, globose, sessile; ovary ellipsoid, tomentellous, nearly 1 mm long, merging into the conical, pilose, slightly longer style, with minute stigma; berry ellipsoid, $2\frac{1}{2}$ cm long, $1\frac{1}{2}$ cm wide, mucronulate, one half covered by the rather thick, hemispheric, slightly rusty-verrucous cupule with entire margin; pedicel thickened.

Distribution: Brazil, Amazonian district.

Forestry Bureau s. n. (fl. Dec.).

Vernacular name: Rozenhout (S.D.).

4. **Aniba Canelilla** (H.B.K.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 53; Pulle, Enum. Pl. Surin. (1906), p. 185; Ducke in Arch. Jard. Rio de Janeiro IV (1925),

p. 187; Kosterm. l. c., p. 30; — *Cryptocarya Canelilla* H.B.K., Nov. Gen. VII (1825), p. 148 (col. ed.), t. 645; — *Laurus Canelilla* Willd. Herb. n. 7784 (Berol.); — *Cryptocarya pretiosa* Mart. ex Nees, Syst. (1836), p. 237; — *Mespilodaphne pretiosa*, var. *angustifolia* Nees in Linnæa 8 (1833), p. 45; id., Syst., p. 237; id. in Linnæa 21 (1848), p. 495; Meissn. in D.C., Prodr. XV, 1 (1864), p. 103; id. in Fl. Bras. V, 2 (1866), p. 198 et 317; Baillon, Hist. II (1870), p. 462; — *Laurus Quixos* Lam. Dict. III (1789), p. 455; — *Ayden-dron verrucosum* var. *elongatum* Meissn. in D.C. l. c., p. 91; id. in Fl. Bras. l. c., p. 181; — *Aniba elliptica* A. C. Smith in Phytologia I, 3 (1935), p. 115.

Tree, 5–25 m high (Ducke); wood heavy, dark-brown (Ducke). Branchlets yellowish-tomentellous at the top, sub-angular, slender; branches glabrous, cylindrical, grey, rugose; bark with taste and smell of cinnamon; buds densely yellowish-tomentellous. Leaves alternate, sometimes more or less clustered, thinly chartaceous, glabrous, shining, elliptical-lanceolate, lanceolate or subobovate-lanceolate, (9–)13–16(–20) cm long, (2–)3–5(–7) cm wide, base acute, more or less tapering into the petiole, top acute or obscurely acuminate, margin slightly recurved; above midrib impressed or filiform-prominulous in a groove, primary nerves prominulous, veins densely areolate, hardly prominulous; beneath midrib prominent, primary nerves (8–12 on each side) patent, slightly prominent, curved at some distance of the margin and more or less united, veins prominulous, densely areolate. Petioles slender, glabrescent, distinctly canaliculate above, 8–16 mm long. Panicles few-flowered, axillary, yellowish- or grey-tomentellous, up to 6 cm long; peduncles rather thick, sulcate, up to 3 cm long; branchlets few, patent, up to 1 cm long, dichotomous; flowers usually solitary at the top of secondary branches, divaricate; pedicels thick, tomentellous, 2–3 mm long. Flowers yellowish-tomentellous, 2½–3 mm long; tube sub-globose, not constricted at the top, merging into the pedicel, when deflorate: urceolate, constricted at the top; perianth segments fleshy, scale-shaped,

concave, tomentellous, outer ones triangular-ovate, 1 mm long, inner ones $1\frac{1}{2}$ mm long; 6 outer stamens incurved, tomentellous, outer ones longer, $1\frac{1}{4}$ mm long; anthers ovate-oblong, top obtuse, not protruding beyond the introrse cells; filaments broad, thick, longer, but not broader than the anthers; 3rd row of stamens $1\frac{1}{4}$ mm long, tomentellous, anthers depressed-ovate, top curved over the extrorse, narrow, fertile cells; basal glands sessile, globose, large, touching each other; filaments nearly as broad as the anthers, $3 \times$ as long; staminodes 0. Ovary ellipsoid or ovoid-ellipsoid, pilose, glabrescent, 1 mm high, merging into the conical, thick, glabrescent, 1 mm long style; stigma minute. Berry (unmature) included in the globose cupule.

Distribution: Amazonian district; Venezuela; cultivated. Koffiekamp (Wullschlagel n. 1679 [B.]).

5. **Aniba Taubertiana** Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 65.

Tree. Branchlets densely rusty-tomentellous, glabrescent, cylindrical; branches smooth, white-grey; buds tomentose. Leaves alternate, clustered at the top of the branches, chartaceous or coriaceous, lanceolate or oblanceolate, (10—)15—20(—25) cm long, (3—)4—5(— $6\frac{1}{2}$) cm wide, base gradually cuneate, margin nearly flat, top distinctly acuminate; above glabrous, dull, midrib and primary nerves impressed, veins obliterate, beneath slightly tomentellous, glabrescent, brown-rusty, midrib strongly prominent, primary nerves (12—18 on each side) rather patent, prominent, distinctly arcuately united at some distance from the margin, veins prominulous, laxly reticulate. Petioles thick, densely rusty-tomentellous, glabrescent, above flat, 1— $1\frac{1}{2}$ cm long. Fruiting panicles patent, axillary, densely rusty-tomentellous up to 10 cm long; branches patent. Pedicels 1—3 mm long; bracteoles deciduous. Flowers ¹⁾; tube; perianth

¹⁾ Only known in deflorate condition.

segments ovate, top acutish or obtuse, 1 mm long, fleshy, outside tomentellous, inside glabrous, except at the base; 6 outer stamens $\frac{3}{4}$ mm long, filaments broad, gradually merging into the anthers, slightly longer than the anthers, rusty-pilose; anthers depressed-ovate, glabrescent towards top, connectives distinctly protruding beyond the small cells; 3rd row of stamens as long as the others, filaments not distinct from the truncate anthers, densely pilose, except top; basal glands minute, sessile, globose; staminodes 0. Berry sub-globose, smooth, mucronulate, 8 mm long, 6 mm in diam.; cupule hemispheric, minutely ochraceous-verrucous, margin entire, 1 cm in diam., 7 mm high; pedicel obconical, up to 5 mm long.

Distribution: French Guiana.

Sectie O, tree n. 752 (B.W. n. 58, ster. Jan.; n. 1436, fr. Nov.; n. 1643, fr. Febr.; n. 4809, fr. Nov.).

Vernacular names: Pisie (N-E); Witte apiesie-ie (Sar.); Siroeaballi hehoro, Siroeaballi tetero, Koerallaballi (Ar.); Waikarra Pisie, Topoporen-wewè, Tamoene-wawe (Car.).

6. **Aniba Hostmanniana** (Nees) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 67; Pulle, Enum. Pl. Surin. (1906), p. 185; — *Aydenron Hostmannianum* Nees in Linnaea XXI (1848), p. 499; Walp., Ann. III (1852—53), p. 309; Meissn. in D.C., Prodr. XV, 1 (1864), p. 93; id. in Fl. Bras. V, 2 (1866), p. 183.

Tree or shrub. Branchlets thick, sulcate, densely rusty-tomentellous, glabrescent; branches very thick, grey, suberous; buds densely tomentellous. Leaves alternate, more or less clustered at the top of the branchlets, coriaceous or rigid-coriaceous, lanceolate to elliptical, or oblong-ob lanceolate, (5—)15—25(—50) cm long, (3—)5—10(—15) cm wide; base abruptly obtuse or rounded, margin slightly recurved, top acuminate or obtuse; young leaves grey-sericeous-tomentellous beneath, glabrous above; adult ones above glabrous, rather dull, midrib flat, impressed, primary nerves impressed, veins obliterate; beneath densely rusty-tomentellous, sometimes

glabrescent, midrib strongly prominent, primary nerves (12—22 on each side) prominent, rather patent, slightly arcuate, only the upper ones united at some distance of the margin, secondary nerves prominulous, more or less parallel, usually obliterate. Petioles thick, tomentellous, glabrescent, canaliculate, up to 3 cm long. Panicles axillary, clustered at the top of the branchlets, pyramidal, densely rusty-tomentellous, many-flowered, 10—25 cm long; peduncles and patent branches compressed, rather thick, striate; bracts ovate, acute, outside tomentellous, inside glabrous, concave, 1—3 mm long, deciduous. Pedicels densely tomentellous, 1—3 mm long. Flowers rusty-tomentellous, yellow, up to $2\frac{1}{2}$ mm long; tube at first infundibuliform, striate, $\frac{3}{4}$ mm long, when deflorate urceolate, constricted at the top. Perianth segments ovate, sub-orbicular, acutish, fleshy, concave, nearly equal, $1\frac{1}{2}$ mm long, especially outside tomentellous, with 3, more or less distinct parallel nerves; outer 6 stamens 1 mm long, filaments narrowed at the base, densely hirsute, with a ridge inside, gradually merging into the ovate, towards top glabrous anthers with small cells, top obtuse, connectives distinctly protruding beyond the cells; 3rd row of stamens 1 mm long, pressed against the style, densely hirsute, filaments hardly distinct from the anthers; anthers glabrous, top truncate, triangular; basal glands small, globose, sub-stipitate, patent at $\frac{1}{3}$ from the base of the filaments; staminodes 0; gynaeceum 2 mm long, ovary narrowly ellipsoid, glabrous, gradually merging into the thick, cylindrical style, stigma obtuse, indistinct. Berry (sub-mature) ovoid, smooth, mucronulate; cupule hemispheric, ochraceous-verrucous, margin entire, 7 mm in diam., 8 mm high; pedicel obconical.

Distribution: Endemic.

Upper Gonini R. (Versteeg n. 246, fl. Sept.); Sectie O, tree n. 829 (B.W. n. 2445, ster. Sept.; n. 5862, fl. June), tree n. 594 (B.W. n. 1597, fr. Febr.; n. 1891, fr. June; n. 2609, fr. Jan.; n. 3963, fl. Aug.; n. 5841, fl. June); Zanderij I, tree n. 143 (B.W. n. 1495, ster. Dec.; n. 4359,

fr. July; n. 4452, fr. Dec.; n. 5078, fr. Jan.), tree n. 32 (B.W. n. 1258, ster. Nov.; n. 4353, fr. July; n. 4476, fr. Dec.; n. 4738, fl. July; n. 485, fr. Sept.); Forest of Zanderij (Samuels n. 526, ster. July [L.]); Patrick savannah (Gonggrijp s. n., fr. Sept.); upper Suriname R. (Westphal ex herb. van Hall [L.]); Watramiri, tree n. 1675 (B.W. n. 1834, ster. June; n. 4719, fr. June); locality unknown: Hostmann et Kappler n. 155, 103, 1117 [D.], Mulder s. n. Vernacular names: Waikarra Pisie (N.E.); Waikiarra, Sipiropipo (Car.); Kanoaballi (Arow.); Apisie-ie, Banba apisie-ie (Saram.).

7. **Aniba mas** Kosterm. l. c., p. 30.

Tree. Branchlets slightly angular, rusty-tomentellous; branches cylindrical, glabrous, brown; buds rusty-tomentose. Leaves alternate, thin-chartaceous, obovate-elliptical or elliptical, (11—)14—18(—22) cm long, (4—)5—6(—8½) cm wide; base cuneate or acute, top acuminate, acumen broad, obtuse, up to 1½ cm long; above glabrous, somewhat shining, midrib slightly prominulous or flat, primary nerves hardly prominulous, veins obliterate; beneath green-yellow, glabrescent, midrib strongly prominent, thinly tomentellous, primary nerves (10—13 on each side) prominent, patent, arcuately united at some distance of the margin, veins reticulate, prominulous or obliterate. Petioles densely rusty-tomentellous, glabrescent, distinctly canaliculate above, 1—1½ cm long. Panicles ∞-flowered, rusty- or greyish-tomentellous, clustered at the top of the branchlets, pyramidal, up to 9 cm long; peduncles somewhat compressed, furrowed, slender, up to 3 cm long; branchlets rather patent, compressed, up to 2 cm long. Pedicels 1—3 mm long, furrowed, densely grey-tomentellous; bracts ovate, carinate, up to 3 mm long, deciduous. Flowers grey- or rusty-tomentellous, 1½—2 mm long; tube merging into the pedicel; perianth segments ovate or ovate-orbicular, 1 mm long, margins slightly fringed, tops obtuse; stamens included; the 6 outer ones with glabrous, ovate or depressed-ovate anthers, filaments villose, the outer ones dilated, the 3 inner ones as broad as the

anthers; 3rd row of stamens with ovate, glabrous anthers, filaments as broad as the anthers, hirsute only at base; ovary ellipsoid, tomentellous, except at base, merging into the conical, tomentellous style with glabrous top and minute stigma. Fruit unknown.

Distribution: Endemic.

Brownsberg, tree n. 1024 (B.W. n. 6357, fl. Nov.; type); Gonini R. (B.W. n. 3278, ster. July); Tapanahoni R. (B.W. n. 4124, ster. Nov.); Drie Tabbetje (B.W. n. 5388, ster. July); Patrick savannah (B.W. n. 165, ster. Nov.); upper Suriname R. (B.W. n. 369; n. 246a, fr. Oct.).

Vernacular name: Mannetjes Rozenhout (S.D.).

8. *Aniba riparia* (Nees) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 62, p. p.; ¹⁾ — *Ayðendron riparium* Nees in Linnaea 21 (1848), p. 497; Walp., Ann. III (1852—53), p. 308; Meissn. in D.C., Prodr. XV, 1 (1864), p. 89; id. in Fl. Bras. V, 2 (1866), p. 178 (excl. spec. Funck et Schlimm n. 158, Kappler n. 1981, Leprieur n. 224).

Tree. Branchlets slender, somewhat angular, rusty-tomentellous; branches slender, cylindrical, glabrous, brown or grey; buds tomentose. Leaves alternate, glabrous, chartaceous, elliptical or elliptical-lanceolate, (7—)12—15(—18) cm long, (3—)4½—5 (—6½) cm wide; base shortly acute, margin nearly flat, top shortly acuminate, acumen broad, obtuse; above somewhat shining, midrib and primary nerves slightly prominulous or flat, veins obliterate, beneath rufous-brown, midrib slightly prominent, primary nerves (5—6 on each side) prominulous, patent, more or less arcuately united, veins reticulate, prominulous. Petioles slender, glabrous, slightly canaliculate or flat above, 1—1½ cm long. Panicles axillary, pyramidal, rusty- or greyish-tomentellous, up to 7 cm long; peduncles slender, sulcate, up to 2 cm long, branches patent, few, up to 1 cm

¹⁾ Leprieur n. 224 = *A. Mülleriana* Mez; there is a specimen: Mélinon n. 524, determined: *A. riparia* by Mez, but not mentioned in his monograph; its identity however remains doubtful, as the flowers are to young.

long; pedicels thick, sulcate, 1—3 mm long. Flowers rusty-tomentellous, 2 mm long; tube slightly shorter than the perianth, conical, top constricted, merging into the pedicel; perianth segments equal, ovate-elliptical, concave, margin fringed; stamens included, 1 mm long; outer ones with depressed-ovate, glabrous anthers, connectives hardly protruding beyond the introrse cells, filaments broad, elliptical, $\frac{3}{4}$ mm long, densely lanuginose, especially at the margin; 3rd row of stamens with smaller glabrous anthers; filaments thick, broad, lanuginose, except at the top, basal glands sessile, large. Ovary ovoid or ellipsoid, $\frac{1}{2}$ mm long, tomentellous, style slender, tomentellous, conical, $1\frac{1}{2}$ mm long, stigma minute. Berry ellipsoid, smooth, yellow, 2—2 $\frac{1}{2}$ cm long, 15—17 mm in diam., top flattened, mucronulate; cupule hemispheric, thick, 2 cm in diam., verrucous, warts small, margin entire, perianth segments persistent for a long time.

Distribution: Guiana; Northern Brazil.

Brownsberg (B.W. n. 3187, fr. Sept.).

9. **Aniba Jenmani** Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 70.

Tree. Branchlets nearly cylindrical, slender, yellowish-tomentellous; branches cylindrical, rather slender, glabrous, smooth; buds densely yellow-sericeous. Leaves alternate, glabrous, shining, chartaceous-coriaceous, elliptical, (11—)16—18(—21) cm long, (5—)7—8(—9) cm wide, base shortly acute, top shortly acuminate, acumen blunt, margin flat; above midrib flat or slightly impressed, veins densely areolate, slightly prominulous; beneath brown-red, midrib prominent, primary nerves (5—7 on each side) slightly prominent, rather patent, not united at the margin, veins prominulous, densely areolate. Petioles rather slender, 1 cm long, black when dried, glabrous, canaliculate above. Panicles few-flowered, axillary, tomentellous, up to 3 cm long, peduncles rather slender, 1 cm long, branchlets 2 or 3; pedicels thick, hardly tomentellous, $1\frac{1}{2}$ mm

long. Flowers hardly tomentellous, $2\frac{1}{2}$ mm long; tube cylindrical-urceolate, hardly distinct from the pedicel, slightly constricted at the top, $1-1\frac{1}{2}$ mm long; perianth segments triangular-ovate, $\frac{1}{2}-\frac{3}{4}$ mm long, obtuse, inside sericeous, outer ones broader; stamens slightly exerted, outer ones $\frac{3}{4}$ mm long, obtuse, hirsute, anthers small, triangular, acute, cells introrse-lateral, connectives slightly protruding beyond the cells, filaments distinct, narrower than the anthers, $3 \times$ as long; stamens of the 3rd row same length, hirsute, filaments canaliculate inside, nearly as broad as the small, obtuse, depressed anthers with extrorse cells; basal glands large, globose-ellipsoid, sub-stipitate. Ovary glabrous, ellipsoid, 1 mm long, merging into the conical, glabrous, 1 mm long style with minute stigma. Berry (unmature) included in a glabrous, shining, smooth, globose cupule with entire margin; fruiting pedicel obconical, up to 4 mm long.

Distribution: British Guiana.

Brownsberg (B.W. n. 3328, fr. Sept.).

10. **Aniba Gonggrijpii** Kosterm. l. c., p. 37, f. 2.

Tree. Branchlets angular, thick, densely rusty-tomentose; branches cylindrical, smooth, grey. Leaves alternate, chartaceous-coriaceous, elliptical or somewhat obovate-elliptical, 7-12(-15) cm long, 3-5(-7) cm wide, base shortly acute, margin slightly recurved, top shortly acuminate; above glabrous, smooth, veins hardly visible, beneath yellowish, microscopically papillose, glabrous, except the prominent midrib, primary veins (6-10 on each side) prominent, rather patent, the upper ones arcuately united at some distance from the margin, veins hardly prominulous, densely reticulate. Petioles densely rusty-puberulous, distinctly canaliculate above, $1-1\frac{1}{2}$ cm long. Flowers unknown. Fruiting panicles axillary, up to 10 cm long. Berry ellipsoid-ovoid, yellow, smooth, mucronulate, up to 2 cm long, $1\frac{1}{2}$ cm in diam. Cupule thick, rusty-verrucous with whitish, irregular warts, hemispherical, 15 mm high, 17 mm in diam., margin

entire, rather thin; pedicel very thick, obconical, verrucous, merging into the cupule.

Distribution: Endemic.

Upper Suriname R., Parwa-creek, Wane-creek (B.W. n. 369, fr. Oct.).

Vernacular name: Valsch Rozenhout (S.D.).

7. SYSTEMONODAPHNE Mez.

Trees or shrubs. Leaves alternate, glabrous. Inflorescences few-flowered, axillary. Flowers hermaphrodite, without involucre; tube shorter than the perianth; perianth segments 6, equal. The 3 outer rows of stamens fertile, the 4th one abortive; the 6 outer stamens free, glandless; the stamens of the 3rd row biglandular, united into a tube. Anthers 2-celled, outer ones introrse, those of the 3rd row extrorse. Ovary ovoid or obovoid; style nearly as long as the ovary, with distinct stigma. Berry ellipsoid. Cupule sub-pateriform, double-margined, outer margin with persistent perianth segments.

Distribution: Species: one in French and Dutch Guiana.

Systemonodaphne geminiflora Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 79.

Tree or shrub. Branchlets slender, yellowish-tomentellous, glabrescent; branches cylindrical, striate, slender, glabrous, grey or brown; buds densely tomentose. Leaves chartaceous or thinly chartaceous, glabrous, ovate or elliptical, (7—)8—12 (—13) cm long, (2—)3—4(—4,8) cm wide; base shortly acute or rounded, margin flat, undulate, top acuminate, acumen broad, obtuse, $\frac{1}{2}$ — $1\frac{1}{2}$ cm long; above smooth, midrib filiform prominulous, veins inconspicuous; beneath midrib prominent, primary nerves (6—10 on each side) prominulous, rather patent, arcuate, not united at the margin, veins prominulous, densely areolate. Inflorescences axillary, 2—4-flowered, pilose, hardly 1 cm long. Pedicels puberulous, up to 8 mm long. Bracts deciduous. Flowers

slightly puberulous, 3 mm long; tube hardly 1 mm long, broadly conical, top minutely constricted, base merging into the pedicel, outside slightly puberulous, inside densely sericeous; perianth segments equal, sub-orbicular or broadly ovate, more or less obtuse, fleshy, concave, 2—2½ mm long, inside slightly puberulous. Stamens included, 1½ mm long; anthers of the 2 outer rows elliptical, obtuse, merging into the dilated, densely pilose filaments, top of the anthers glabrous, yellow-punctulate, filaments nearly as long as the anthers; stamens of the 3rd row pyramidal, obtuse, anthers not distinct from the broad, thick, united filaments, with very large, sub-globose, sessile glands at one half up the filaments; cells large. Ovary obovoid or ellipsoid-ovoid, 2 mm long, densely sericeous, except base, merging into a nearly as long, glabrous style with obtuse stigma. „Berry ovoid, smooth, 13 mm long, 10 mm in diam., 3 mm covered by the sub-pateriform cupule with persistent perianth” (Mez).

Distribution: French Guiana.

Zanderij I (B.W. n. 158, ster. Apr.).

Vernacular name: Pisie.

8. AIOUEA Aubl.

Tree, shrubs or climbers. Leaves alternate or sub-opposite, penninerved, usually glabrous. Panicles axillary or pseudo-terminal, usually lax, branchlets dichotomous. Flowers hermaphrodite; tube conspicuous, conical or urceolate, longer than the perianth segments, very rarely shorter or wanting (not in Surinam species); segments 6, nearly equal, deciduous; stamens included; outer 6 fertile, inner 6 sterile, or only the first row fertile, or the 3 exterior rows fertile (not in Surinam species); filaments of the fertile stamens conspicuous, pilose or glabrous; 3rd row with sessile or subsessile glands; others glandless; anthers 2-celled, those of the 6 outer stamens extrorse or introrse. Staminodes of the 4th row conspicuous, foliaceous,

sessile or stipitate. Ovary globose or ellipsoid, glabrous; style rather thick, cylindrical. Cupule flat, margin simple; pedicel thickened, obconical. Berry globose or ellipsoid, nearly free from the cupule.

Distribution: Species about 25 in Venezuela, Guiana, Colombia, Northern Peru, Brazil and Trinidad.

1. *a.* Filaments of the 6 outer stamens as long as the anthers; 3rd row of staminodes nearly as long as the glands, much shorter than the style; 4th row of staminodes sessile, triangular-ovate. Cells introrse. Berry ellipsoid 1. **A. densiflora** Nees.
- b.* Filaments of the 6 outer stamens very short; 3rd row of staminodes nearly as long as the style, many times longer than the glands; 4th row of staminodes stipitate, ovate. Cells extrorse. Berry globose
. 2. **A. guianensis** Aubl.

1. **Aiouea densiflora** Nees in *Linnaea* 21 (1848), p. 268, 513; Walp., *Ann.* III (1852—53), p. 311; Meissn. in *D.C., Prodr.* XV, 1 (1864), p. 83; id. in *Fl. Bras.* V, 2 (1866), p. 170, t. 58, cum. var. *vivipara* Nees; Mez in *Jahrb. Bot. Gart. Berl.* V (1889), p. 36; Pulle, *Enum. Pl. Surin.* (1906), p. 185; Corréa, *Dicc. pl. util. Braz.* (1926), p. 129, cum tab.; Brooks in *Kew Bull.* 1933, p. 211.

Tree or shrub. Branchlets thick, glabrous, cylindrical, brown-red; buds pilose, soon glabrous. Leaves alternate, usually congested at the top of the branchlets, coriaceous or rigid-coriaceous, glabrous, oblong or elliptical or elliptical-ovate, (8—)12—16(20) cm long, (3—)4—6(—8) cm wide, above shining, midrib flattish, somewhat prominent, primary nerves prominulous, veins reticulate, rather inconspicuous, beneath midrib prominent, primary nerves (5—10 on each side) patent, straight, more or less arcuately united at the margin, veins reticulate, hardly prominent; base acute or cuneate, margin crisp, slightly recurved, rather pale, top inconspicuously, obtusely acuminate or rarely obtuse. Petioles rather thick, glabrous,

canaliculate, $1\frac{1}{2}$ —3 cm long. Panicles axillary or pseudo-terminal, pyramidal, many-flowered, usually clustered at the top of the branchlets, up to 18 cm long; peduncles rather thick, glabrous, compressed, up to 9 cm long; lower branchlets more or less puberulous, glabrescent, patent, up to 3 cm long, dichotomous. Pedicels sparingly puberulous, slender, 1—3 mm long. Bracteoles puberulous, ovate-oblong, up to 1 mm long, persistent. Flowers sparingly puberulous, 2—3 mm long; tube urceolate, up to 2 mm long, inside puberulous or glabrous, top slightly constricted; perianth segments up to $3 \times$ shorter than the tube, outer row broadly ovate, acutish, puberulous, inner row somewhat longer, ovate-oblong, top depressed-triangular, base somewhat constricted; outer 6 stamens fertile, nearly sessile or with short, broad, pilose filaments, $\frac{1}{2}$ mm long; anthers ovate-triangular, top truncate or emarginate, cells introrse, glabrous; staminodes of the 3rd row stipitiform, pilose, nearly as long as the style, top clavate, basal glands ellipsoid-oblong, conspicuous, sub-sessile; staminodes of the 4th row ovate, $\frac{1}{2}$ mm long, constricted at the base, pilose, top distinctly incised, glabrous. Ovary glabrous, globose, 1 mm in diam.; style thick, cylindrical, 1 mm long; stigma discoid-obconical, distinct. Berry sub-globose, up to 8 mm long, 9 mm in diam. (14×13 mm ex Brooks); cupule nearly flat, thick, hemispheric, smooth, 1 cm in diam., 5 mm high, margin slightly undulate, base merging into the obconical, thick, at the top 4 mm wide, 5 mm long pedicel.

Distribution: Guiana, Trinidad.

Suriname R., Joden savannah (Kegel n. 1785, type [G.]); lower Suriname R. near Pl. Voorburg (Wullschlägel n. 810 [B.]); locality unknown: Hostmann n. 1042.

2. *Aiouea guianensis* Aubl., Pl. Guia. I (1775), p. 311, III, t. 120; Lam., Enc. I (1783), p. 72; Meissn. in D.C., Prodr. XV, 1 (1864), p. 82; id. in Fl. Bras. V, 2 (1866), p. 169, non Nees; Mez in Jahrb. Bot. Gart. Berl. V

(1889), p. 42, excl. spec. Spruce n. 3427¹⁾; Pulle, Enum. Pl. Surin. (1906), p. 185; — *Aiouea tenella* Nees in Linnaea 21 (1848), p. 512; Meissn. in D.C. l. c., p. 82; id. in Fl. Bras. l. c., p. 169, excl. Spruce n. 3427; Baillon, Hist. II (1870), t. 245; — *Laurus hexandra* Willd., Spec. II, 1 (1799), p. 482; — *Dougllassia laurina* Sm. in Rees, Cyclop. 12, ex cit. Aubl. in D.C., l. c.; Swartz in Fl. Ind. Occ. II (1800), p. 708; — *Aiouea rubra* A. C. Smith in Phytologia I, 3 (1935), p. 115.

Tree, 5—8 m high. Branchlets nearly cylindrical, glabrous, dark-brown or reddish; buds yellow-tomentose, glabrescent. Leaves alternate or sub-opposite, chartaceous, at last coriaceous, glabrous, oblong, lanceolate or ovate-lanceolate, 8—20(—25) cm long, 2½—6(—8) cm wide; base acute or cuneate, margin flattish, top acuminate or acute, acumen often narrow and long; above shining, midrib prominulous or impressed, primary nerves thin, immersed or hardly prominulous, veins laxly reticulate, hardly conspicuous or obliterate; beneath rather dull, midrib prominent, primary nerves (5—10 on each side) patent, arcuate, more or less united at the margin, slightly prominent, veins reticulate, prominulous or obliterate. Petioles rather thick, glabrous, canaliculate, up to 15 mm long. Panicles axillary or pseudo-terminal, congested at the top of the branchlets, pyramidal, glabrous, reddish, up to 16 cm long; peduncles slender, compressed, up to 9 cm long, branchlets patent, filiform, lower ones up to 10 cm long, dichotomous. Pedicels filiform, glabrous, 6—8 mm long. Bracteoles minute, ovate-lanceolate, acute, glabrous, persistent. Flowers yellowish, glabrous, 2—3 mm long; tube urceolate, somewhat longer than the perianth segments, base gradually merging into the pedicel; segments glabrous, outer ones ovate, acute, inner ones ovate-triangular, constricted at the base, membranous, up to 1 mm long; outer 6 stamens included, filaments as long as the anthers, slightly pilose or glabrous; anthers ovate-oblong, top truncate

1) = *A. Benthamiana* Mez.

or somewhat emarginate, cells extrorse, glabrous; staminodes of the 3rd row stipitiform, pilose, hardly enlarged at the top, slightly longer than the large, globose, sub-sessile glands, up to $\frac{1}{2}$ mm long; staminodes of the 4th row ovate-triangular or sub-cordate, slightly pilose, sessile, $\frac{1}{2}$ mm long. Ovary ellipsoid, glabrous, about 1 mm long; style slightly longer, cylindrical, rather slender; stigma discoid, rather small. Berry ellipsoid, smooth, $1\frac{1}{2}$ cm long, 7 mm in diam. Cupule flat, margin undulate, giving the impression of persistent perianth segments, 8 mm in diam., hardly distinct from the obconical, 1 cm long pedicel, 6 mm in diam. at the top.

Distribution: French Guiana; Brazil.

Locality unknown: Hostmann n. 263.

9. ACRODICLIDIUM Nees.

Trees or shrubs. Leaves chartaceous, coriaceous or rigid, alternate or opposite. Panicles axillary or pseudo-terminal, few- to ∞ -flowered. Flowers small, hermaphrodite; tube conspicuous, urceolate, top often constricted, rarely tube very small (not in Surinam species); perianth segments 6, equal or nearly so, erect or incurved, deciduous or persistent and thickened; the 6 outer stamens, rarely only the 3 outer ones (not in Surinam species) changed to foliaceous, scale-shaped staminodes; 3rd row of stamens fertile, filaments as long as or longer than the anthers, usually nearly as broad, generally with basal glands; anthers 2-celled, cells extrorse-apical or introrse; 4th row of stamens wanting. Ovary included in the tube, glabrous or pilose, merging into the style, stigma as a rule minute. Berry usually ellipsoid; cupule with 1, 2 or 3 margins; cotyledons flat-convex.

Distribution: Species about 30 in tropical America from Mexico to Southern Brazil.

1. *a.* Anther cells introrse 2
- b.* Anther cells extrorse-apical 3

2. *a.* Leaves rigid-coriaceous, elliptical, 10—14 cm long, usually alternate, smooth beneath. Panicles up to 3 cm long. Flowers 2½ mm long. Filaments glandless. Cupule smooth. 1. **A. cayennense** (Meissn.) Mez.
b. Leaves coriaceous, elliptical, 8—12 cm long, usually alternate, reticulate beneath. Panicles up to 12 cm long. Flowers 1½ mm long. Filaments with basal glands. Cupule verrucous. 2. **A. Canella** (Meissn.) Mez.
c. Leaves rigid-coriaceous, lanceolate, 6—8 cm long, opposite, midrib and primary nerves prominulous beneath, veins indistinct. Flowers unknown. Cupule verrucous with triple margin 7. **A. rigidum** Kosterm.
3. *a.* Leaves opposite 4
b. Leaves alternate 5
4. *a.* Leaves membranous or chartaceous 3. **A. debile** Mez.
b. Leaves rigid-coriaceous. 7. **A. rigidum** Kosterm.
5. *a.* Leaves densely sericeous beneath, 15 cm long 4. **A. Martinianum** Mez.
b. Leaves somewhat tomentellous beneath, 10 cm long. 6
6. *a.* Leaves usually acuminate. Flowers 3½ mm long. Ovary glabrous 5. **A. guianense** Nees.
b. Leaves caudate-acuminate. Flowers 2 mm long. Ovary pilose 6. **A. Aubletii** Kosterm.

1. **Acrodiclidium cayennense** (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 91; Benoist in Arch. Bot. V, 1 (1931), p. 66; — *Aydenndron cayennense* Meissn. in D.C., Prodr. XV, 1 (1864), p. 95; id. in Fl. Bras. V, 2 (1866), p. 186; — *Acrodiclidium copenamense* Pulle in Rec. Trav. Bot. Néerl. VI (1909), p. 263.

Tree. Branchlets glabrous, shining, sub-angular, grey or fuscous; buds glabrous. Leaves alternate or often sub-opposite or verticillate, rigid-coriaceous, glabrous, elliptical, oblong, sub-obovate or oblong-lanceolate, (4½—)10—14(—21) cm long, (2½—)5—6(—7) cm wide, base shortly acute or cuneate, margin slightly recurved, top shortly, obtusely acuminate;

above varnished, midrib flat or somewhat impressed, nerves impressed or inconspicuous; beneath dull, midrib prominulous, nerves (8—10 on each side) rather patent, straight, arcuately united at the margin, veins laxly reticulate, usually inconspicuous. Petioles rather thick, glabrous, above flat with inconspicuous decurrent leaf-margins, 12—22 mm long. Panicles axillary, clustered at the top of the branchlets, short, up to 3 cm long, densely rusty- or grey-tomentellous; peduncles thick, nearly wanting, branchlets dichotomous, thick, very short. Bracts ovate-acute, tomentellous, 1 mm long, deciduous. Flowers greenish, sticky, globose, 2—2½ mm long, densely tomentellous; tube large, 2 mm long; constricted at the top. Pedicels thick, 1—1½ mm long, densely tomentellous. Perianth segments scale-shaped, ovate, obtuse, ¾ mm long, inside glabrous, inner ones slightly shorter; the 6 exterior stamens sterile, nearly as long as the perianth, foliaceous, membranous, ovate-oblong, obtuse or mucronulate, not contracted at the base; stamens of the 3rd row large, compressed against each other, club-shaped, truncate, ¾ mm long, glabrous, glandless; anthers not distinct from the filaments, cells introrse, very small. Staminodes wanting. Ovary globose, glabrous, ¾ mm in diam., as long as the slender conical style; stigma inconspicuous. "Berry ellipsoid, exserted". Cupule very thick, hemispheric, rugulose, 15 mm high, 18 mm in diam., margin double, outer one shortly toothed.

Distribution: French Guiana.

Sectie O, tree n. 703 (B.W. n. 1332, ster. Nov.); Zanderij I, tree n. 75 (B.W. n. 145, ster. Oct.; n. 2254, fl. Aug.); Zanderij I (B.W. n. 5801, ster. Apr.; n. 4317, ster. May; Lanjouw n. 320, fl. July); Brownsberg, tree n. 1007 (B.W. n. 2443, ster. Sept.); upper Coppename R. (Boon n. 1201, fl. Oct., type of *A. coppenamense* Pulle).

Vernacular names: Kaneelhart (S.D.); Kanerichoedoe (N.E.); Atjarie tjanarie, Wajaaka, Ajoewi (Car.); Siroeaballi, Siroeaballi tataroe, Koeralaballi (Arow.); Apisie-ie, Badagos (Bois de rose), Banda apisie-ie (Saram.).

2. **Acrodiclidium Canella** (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 90; Benoist in Arch. Bot. V, 1 (1931), p. 66; Pfeiffer, Houts. v. Surin. II (1926), p. 176; Pulle in Rec. Trav. Bot. Néerl. VI (1909), p. 264; Corrêa, Dicc. de pl. util. Brazil (1926), p. 438; — *Aydenndron Canella* Meissn. in D.C., Prodr. XV, 1 (1864), p. 90; id. in Fl. Bras. V, 2 (1866), p. 180; — *Aniba megacarpa* Hemsl. in Hook. Ic. VIII (1903), f. 2751—2; Mez in Bull. Herb. Boiss. V (1905), p. 234; Brooks in Kew Bull. 1933, p. 213.

Tree, up to 25 m high; trunk 20 cm in diam. with buttresses; bark light-brown. Branchlets thick, cylindrical, glabrous, grey or fuscous; wood fragrant, very hard; buds glabrous or nearly so. Leaves alternate or often sub-opposite or verticillate, glabrous, coriaceous, oblong, elliptical or narrow-oblong, often sub-obovate, (5—)8—12(—20) cm long, (2—)3—5(—8) cm wide, base acute or somewhat cuneate, margin slightly recurved, top shortly, obtusely acuminate; above somewhat shining, dark-green, midrib slightly prominent, primary nerves prominulous, veins laxly reticulate, prominulous or more or less obliterate, beneath dull, midrib prominent, primary nerves (7—10 on each side) patent, rather straight, arcuately united at the margin, slightly prominent; veins prominulous, reticulate. Petioles thick, glabrous, flat above, with inconspicuous decurrent leaf-margins, 1—1½ cm long, usually black, when dried. Panicles many-flowered, axillary, clustered at the top of the branchlets, densely rusty-tomentellous, glabrescent, up to 11 cm long; peduncles rather slender, short, slightly tomentellous, compressed, lower branchlets up to 5 cm long. Flowers usually 3 together at the top of the ½ cm long secondary branchlets. Bracteoles lanceolate, acute, densely tomentellous, 1 mm long, deciduous. Pedicels slender, densely grey- or rusty-tomentellous, up to 3 mm long. Flowers yellow-white, sub-globose, up to 2 mm long; tube large, subglobose, 1½ mm long, tomentellous outside, sericeous inside, top constricted; outer perianth segments ovate-triangular,

obtuse, up to $\frac{3}{4}$ mm long, tomentellous outside, glabrous inside, pellucid-punctulate; inner row half as long, scale-shaped; outer stamens sterile, foliaceous, membranous, glabrous, ovate-obtuse, $\frac{1}{2}$ mm long, usually somewhat contracted at the base; inner row ovate; stamens of the 3rd row fertile, pressed against each other, glabrous, rather thick, $\frac{3}{4}$ mm long, top truncate, filaments not distinct, cells introrse, basal glands small, triangular, membranous. Staminodes wanting. Ovary depressed-globose, glabrous, $\frac{3}{4}$ mm high; style slender, conical, $\frac{1}{2}$ mm long; stigma small. Berry (1—3 on each panicle) slightly exserted, smooth, depressed-globose, mucronulate, up to 7 cm long; cupule very thick, cylindrical, subglobose, 5 cm in diam., densely rusty-verrucous; margin double, outer one of 5 thick, up to 5 mm long, usually incurved perianth lobes.

Distribution: Guiana, Trinidad, Amazonian district.

Zanderij I (Lanjouw n. 319, fl. July); Sectie O, savannah forest (Forestry Bureau n. 42, 42a, fl. July); Kaboeri, tree n. 600 (B.W. n. 4961, fr. Oct.).

Vernacular names: Kancelhart (S.D.); Kanerie hoedoe, Nagre hoedoe (N.E.); Sieroeaballi kjanarie, Kaneerjoe, Ajoewi (Kar.); Apisie-ie, Banba apisie-ie (Saram.).

3. *Acrodiclidium debile* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 99; Sandwith in Kew Bull 1933, p. 337.

Small tree, up to 8 m high, 5 cm in diam. (Stahel). Branchlets very slender, somewhat compressed, rusty-tomentellous; branches glabrous, brown or dark-grey, cylindrical; buds densely rusty-tomentose. Leaves opposite, membranous or chartaceous, elliptical, (6—)10—12(—16) cm long, (2—)3—4 $\frac{1}{2}$ (—5 $\frac{1}{2}$) cm wide, base acute or shortly acute, margin flat, top distinctly caudate-acuminate; glabrescent on both sides, with long-persistent hairs on midrib; reticulation dense, prominent, especially beneath; primary nerves (5—8 on each side) rather patent, arcuately united at $\frac{1}{2}$ —1 $\frac{1}{2}$ cm from the margin. Petioles slender, dark, glabrescent, canaliculate, up to 7 mm long. Panicles very slender, axillary, usually opposite, rusty-pilose, glabrescent, few-flowered,

with few branchlets, up to 8 cm long; peduncles up to 5 cm long, with 2 lanceolate-linear, rusty-tomentose, up to 4 mm long, deciduous bracts at the base. Flowers nearly glabrous, white, 2 mm long, in pseudo-umbels. Pedicels slightly pilose, up to 4 mm long; tube obconical, not constricted at the top, gradually merging into the pedicel, densely sericeous-tomentose inside; perianth segments 1 mm long, the inner ones slightly longer, orbicular or depressed-orbicular, scale-shaped, slightly acutish or obtuse; stamens included, the outer ones staminodial, membranous, foliaceous, ovate and obovate-spathulate, acutish or rounded, $\frac{3}{4}$ mm long; 3rd row of stamens large, fertile, 1 mm long, filaments as broad as the anthers, outside pilose at the base, with 2 very small, membranous, leaf-like glands, inside densely pilose, except at top; cells extrorse-apical, connective not protruding beyond the cells. Ovary ellipsoid 1 mm long, glabrous, gradually merging into the 1 mm long, glabrous, cylindrical, very slender style, with hardly conspicuous stigma. Fruit unknown.

Distribution: Guiana.

Brownsberg (B.W. n. 725 and 6653, fl. Sept.).

4. **Acrodiclidium Martinianum** Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 93; Benoist in Arch. Bot. V, 1 (1931), p. 67.

Tree. Branchlets densely rusty- or yellow-tomentellous or sub-sericeous, cylindrical, rather slender; buds densely rusty- or yellow-sericeous; branches grey. Leaves alternate, coriaceous, at last rigid-coriaceous, elliptical or oblong, now and then lanceolate or oblong-lanceolate, (8—)12—15(—19) cm long, (2—)4—6(—9) cm wide; base acute, usually gradually decurrent into the petiole, margin flat, top shortly acuminate; young leaves densely sericeous beneath, above slightly sericeous; adult ones above light-green, very shining, glabrescent, except the base of the midrib; midrib and primary nerves prominulous, veins laxly reticulate, obliterate; beneath dark-green, densely sub-sericeous, midrib prominent, primary nerves (5—7 on each

side) prominulous, lower ones ascendent, upper ones rather patent, more or less united at the margin, veins laxly reticulate, hardly prominulous. Petioles densely tomentellous, glabrescent, flat or inconspicuously canaliculate above, up to 12 mm long. Panicles axillary, pyramidal, densely sericeous, with very short hairs, up to 7 cm long; peduncles compressed, up to 2 cm long; branchlets few, rather patent, alternate, lower ones up to 3 cm long, flowers generally 3 together. Bracts sericeous, ovate-acute, up to 1 mm long. Pedicels tomentellous, 1—3 mm long. Flowers globose, up to 2 mm long; tube hemispheric, outside tomentellous, sericeous inside, not constricted at the top, 1½ mm long; perianth segments nearly equal, scale-shaped, membranous, broadly depressed-ovate, acutish, glabrous inside, ½ mm long; outer 6 staminodes foliaceous, membranous, nearly glabrous, often somewhat constricted at the base, somewhat shorter than the perianth; stamens of the 3rd row rather thick, united, outside slightly pilose, as long as the perianth, cells apical; basal glands large, pairwise united. Ovary slightly pilose, glabrescent, ellipsoid, 1—1½ mm long, style thick, conical, papillose, ½ mm long; stigma large, conical. Berry (1—3 on each panicle) ellipsoid, light-green, smooth, 18 mm long, 11 mm in diam., top slightly sunken, mucronulate; ⅓ covered by the cupule. Cupule rather thick, hemispheric, obscurely verrucous, 12—15 mm high, 17 mm in diam., margin entire, more or less double; pedicel 3 mm long, 4 mm in diam.

Distribution: French Guiana, Brazil.

Sectie O, tree n. 758 (B.W. n. 1432, ster. Nov.; n. 1645, fr. Febr.; n. 3089, in bud July; n. 3964, fl. Aug.; n. 4199, fr. Dec.; n. 4407, fl. Sept.; n. 4485, fr. Dec.); Brownsberg, tree n. 1130 (B.W. n. 1691, ster. March; n. 4008, fl. Sept.; n. 5291, fl. Oct.; n. 6125, fr. Apr.; n. 6442, fr. March; n. 6794, fr. Febr.; v. Emden s. n., fl. Sept.).

Vernacular names: Pisie (S.D.); Pisie, Magre pisie (N.E.); Apiesie-ie (Sar.); Siroeaballi karowatsiamaro, Siroeaballi ojetak (Arow.); Topoprin wéwé, Tataro sierwaballi, Jorokan pomoire (Car.).

5. **Acrodiclidium guianense** Nees, Syst. (1836), p. 268; id. in *Linnaea* 21 (1848), p. 500; Meissn. in D.C., Prodr. XV, 1 (1864), p. 85; id. in Fl. Bras. V, 2 (1866), p. 173 (exl. fig. ¹) et var. γ ; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 97, excl. spec. Mélinon n. 601; — *Nectandra polyphylla* Nees, Syst. (1836), p. 332; Meissn. in D.C., l. c., p. 160; id. in Fl. Bras. l. c., p. 270; — *Nectandra caudata* Nees et Mart. in Hb. Monac. ex Meissn. l. c.; — *Acrodiclidium gracile* Huber in Bol. Mus. Para VI (1909), p. 70; Ducke in Arch. Jard. Rio de Janeiro V (1930), p. 112.

Tree, up to 30 m high. Branchlets slender, cylindrical, densely rusty-tomentellous or tomentose, glabrescent; branches glabrous, dark-brown or grey; buds rusty-lanuginose or sericeous. Leaves alternate or sub-opposite, membranous, at last chartaceous, lanceolate, oblong or ovate-lanceolate, (6—)9—10(—13) cm long, ($1\frac{1}{2}$ —)2—3(— $4\frac{1}{2}$) cm wide; base usually shortly acute, top acuminate or cuspidate, acumen up to 25 mm long, 5 mm wide at the base; above glabrous, somewhat shining, the very thin midrib and primary nerves prominulous, veins inconspicuous; beneath slightly pilose, glabrescent, dull, midrib prominent, primary nerves (5—7 on each side) arcuately united, prominulous, veins densely reticulate, hardly prominulous. Petioles very slender, canaliculate, tomentellous, glabrescent, up to 8 mm long. Panicles axillary, pyramidal, many-flowered, with few branchlets, rusty-tomentose, up to 7 cm long; peduncles slender, compressed, 2 cm long, lower branchlets up to 1 cm long, patent; flowers 3—9 together. Pedicels slender, tomentellous, 2—4 mm long. Bracteoles lanceolate, outside tomentose, up to 2 cm long, deciduous. Flowers yellowish-white (Went), rusty-tomentellous, up to $3\frac{1}{2}$ mm long; tube sub-cylindrical, up to $2\frac{1}{4}$ mm long, densely sericeous or hirsute inside, constricted at the top; perianth segments nearly equal, fleshy, broadly ovate, acute, glabrous inside, up to $\frac{3}{4}$ mm long; outer 6 staminodes liguliform-

¹) This drawing evidently refers to *A. Meissneri* Mez.

foliaceous or spathulate, membranous or somewhat fleshy, up to 1 mm long, shorter than the segments, pilose at the base; 3rd row of stamens erect, generally slightly exerted, pressed against each other, 1 mm long, narrowly oblong-rectangular, anthers not distinct from the filaments, glabrous inside, hirsute outside, cells small, apical, basal glands rather large, substipitate, base hirsute, flattish; 4th row wanting. Ovary glabrous, ellipsoid, 1 mm long, style very slender, $1\frac{1}{2}$ mm long, stigma inconspicuous.

Distribution: Guiana, Brazil.

Lower Coppename R. (Went n. 128, fl. Aug.); Kaboeri, tree n. 650 (B.W. n. 4852, ster. Oct.; n. 5904, in bud July).

The specimen Tokomoetoe (B.W. n. 5743, fr. Febr.) may belong to this species, but the fruit does not differ from that of *A. Aubletii* Kosterm.

Vernacular name: Pisie (N.E.).

6. **Acrodiclidium Aubletii** Kosterm. l. c., p. 34, f. 3; — *Licaria guianensis* Aubl., Guia. I (1775), p. 313, III, t. 121; Lamarck, Enc. 3 (1789), p. 470; Nees, Syst. (1836), p. 344 et 658; Meissn. in D.C., Prodr. XV, 1 (1864), p. 259; id. in Fl. Bras. V, 2 (1866), p. 281 in adn.; Baillon, Hist. II (1870), p. 466; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 220 et 378; Hallier in Meded. Herb. Leiden 35 (1918), p. 20; Gonggrijp in: De Ind. Mercur, 23 Apr. 1920; Benoist in Bull. Soc. Bot. France 75 (1928), p. 979; Ducke in Arch. Jard. Rio de Janeiro V (1930), p. 108.

Tree. Branchlets slender, nearly cylindrical, densely rusty-tomentellous; branches glabrous, grey. Leaves alternate, chartaceous, elliptical or lanceolate, (5—)7—9(—13) cm long, (2—)2½—3(—4) cm wide; base shortly acute, top caudate-acuminate, acumen up to 1½ cm long, 5 mm wide at the base; young leaves densely areolate above, sericeous beneath; adult ones above glabrous, shining, midrib prominulous in a groove, primary nerves impressed, secondary ones slightly impressed; lower surface brownish, sericeous-tomentellous, glabrescent; midrib prominent, primary nerves (3—4 on each side) prominent,

arcuately ascendent, distinctly united at some distance from the margin, secondary ones prominulous, laxly reticulate, veins inconspicuous. Petioles slender, rusty-tomentellous, glabrescent, canaliculate above, 1 cm long. Panicles pyramidal, axillary, up to 8 cm long, densely rusty- or reddish-tomentellous. Peduncles slender, cylindrical, up to 3 cm long, branches alternate, patent, up to $1\frac{1}{2}$ cm long. Pedicels slender, tomentellous, 3 mm long. Flowers 2 mm long; tube conical, constricted at the top, tomentellous, $1-1\frac{1}{2}$ mm long; perianth segments tomentellous outside, glabrous inside, thick, concave, depressed-obovate, top acute; the 6 outer staminodes glabrous, leaf-like, shorter than the perianth, ovate, acute, inner row somewhat narrowed at the base, 3rd row of stamens hardly $\frac{1}{2}$ mm long, anthers obtuse, cells apical, filaments pilose, nearly as broad and long as the anthers; basal glands distinct, small, foliaceous. Ovary pilose, ellipsoid, hardly $\frac{1}{2}$ mm long, gradually merging into a narrow, $\frac{1}{2} \times$ shorter style; stigma inconspicuous. Berry ellipsoid, smooth, 15 mm long, 9 mm in diam., top more or less flattened, $\frac{1}{3}$ covered by the hemispheric, sub-cylindrical, thin cupule with entire margin and few rusty spots; fruiting pedicel obconical, 2 mm thick at the top.

Distribution: French Guiana.

Zanderij I, tree n. 156 (B.W. n. 4365, fl. July, type; n. 1524, ster. Dec.); Zanderij I (B.W. n. 6424, fr.; Samuels n. 536, fl. July [L.]); Watramiri, tree n. 1633 (B.W. n. 1923, fl. June; n. 4706, fl. July).

Vernacular names: Kaneel pisie (S.D.); Nagrehoedoe (N.E.); Apiesie-ie, Bosoho apiesie-ie, Banba apiesie-ie (Sar.); Sieroe-aballi (Arow.); Atjiarie kanarie, Joroha pomooire (Car.).

7. *Acrodiclidium rigidum* Kosterm. l. c., p. 38, f. 4; — *Acrodiclidium guianense* auct., non Nees, Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 98, p. p., quoad cit. spec. Mélinon n. 601 in hb. Paris.

Tree; 60 cm in diam. (Gonggrijp). Branchlets slender, somewhat angular, densely grey- or rusty-tomentellous; branches

cylindrical, glabrous, grey; buds densely grey-sericeous. Leaves opposite, coriaceous, lanceolate, (5—)6—8(—11) cm long, $1\frac{1}{2}$ —2(— $2\frac{1}{2}$) cm wide, base shortly acute, margin slightly recurved, top acuminate or acute; above glabrous, shining, midrib filiform, slightly prominulous in a groove, primary nerves hardly distinct or impressed; lower surface brownish, thinly pubescent, denser on midrib; midrib prominent, primary nerves (5—10 on each side) rather patent, arcuately united at some distance from the margin, prominulous, veins hardly distinct. Flowers unknown. Panicles axillary, opposite. Berry unknown. Cupule very large and thick, up to 28 mm high, 35 mm in diam., hemispheric, with large rusty warts, margin triple, inner one thin, 1—2 mm high, erect, outer ones 8 mm thick, more or less patent, with large, irregular lobes in a double row, corresponding probably with the strongly enlarged perianth segments.

Distribution: French Guiana.

Sectie O, tree n. 852 (B.W. n. 4249, ster. Febr.; n. 4259, ster. Febr.; n. 4682, fr. May).

Vernacular name: So-called: Rozenhout.

10. MEZILAURUS O. Ktze. ex Taubert.

Trees or shrubs. Leaves chartaceous or coriaceous, alternate or opposite. Panicles axillary. Flowers hermaphrodite, in 3—18-flowered pseudo-umbels, without involucre; tube infundibuliform, longer than the perianth; perianth segments 6, nearly equal, or the exterior somewhat smaller. Stamens included, often exserted. The 2 outer rows of stamens and the 4th row abortive; 3rd row fertile, glandless; filaments thick, fleshy, conglutinate, forming a staminal tube, including the ovary. Anthers not distinct from filaments, 2-celled, usually small; cells generally minute, extrorse and apical. Staminodes wanting. Ovary glabrous or nearly so, ellipsoid or ovoid, merging into a sub-conical or sub-cylindrical style; stigma capitate or somewhat discoid. Berry ellipsoid, with persistent, not enlarged perianth at the base. Cotyledons flat-convex, nearly equal.

Distribution: Species about 10 in Guiana, Central and Northern Brazil.

1. **Mezilaurus Itauba** (Meissn.) Taubert ex Mez in Arb. Bot. Gart. Breslau I (1892), p. 112; Kosterm. l. c., p. 40; — *Silvia Ita-uba* (Meissn.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 107; Ducke in Arch. Jard. Rio de Janeiro IV (1925), p. 190; Benoist in Arch. Bot. V, 1 (1931), p. 65; Ducke in Trop. Woods 42 (1935), p. 18; — *Acrodielidium Ita-uba* Meissn. in D.C., Prodr. XV, 1 (1864), p. 86; id. in Fl. Bras. V, 2 (1866), p. 174, t. 60 (excl. flower); — *Oreodaphne Hookeriana* Meissn. in D.C. l. c., p. 131; id. in Fl. Bras. l. c., p. 230; — *Endiandra Ita-uba* Benth. in Benth. et Hook., Gen. III (1880), p. 154; — "Ita-uba" Spruce in Journ. Bot. III (1851), p. 145; — *Silvia polyantha* Mez in Bull. Herb. Boiss. V (1905), p. 233.

Large tree, up to 40 m high. Wood hard. Branchlets rusty-tomentose at the top, branches glabrous, except in the bark-fissures, greyish; buds rusty-yellowish-sericeous. Leaves alternate-congested at the top of the branches, coriaceous or rigid-coriaceous, elliptical, oblong or obovate, (4—)8—15 cm long, (2½—)3½—6 cm wide, base acute or cuneate, margin nearly flat, top obtuse or slightly emarginate; young leaves sparingly puberulous; adult ones glabrous, shining, especially above; midrib and primary nerves (9—12 on each side) prominent on both sides; primary nerves rather patent, arcuate, disappearing at the margin, veins laxly reticulate, prominulous, especially above. Petioles slender, glabrous, up to 2½ cm long, leaf margins decurrent as far as the base; base cushion-like thickened. Panicles lax, in the axils of the upper leaves, hardly puberulous, up to 12 cm long; peduncles glabrous, slender, compressed, up to 4 cm long; branchlets patent, short, up to 1 cm long, bearing 5—12-flowered pseudo-umbels. Pedicels slightly tomentellous, 2 mm long. Bracts acute, hardly ½ mm long, deciduous. Flowers yellowish-green, tomentellous or nearly glabrous, 1½—2½ mm long; tube broadly conical, not constricted at the top, up to 1¼ mm long; perianth segments minute, broad, the outer ones narrower,

obtuse, outside tomentellous. Stamens exerted; the 2 outer rows wanting or rarely staminodial; 3rd row fertile, glandless, cells extrorse; filaments free, 1—1½ mm long, rusty-hirsute, dilated, top glabrous; connectives as broad as the filaments. Ovary glabrescent, broadly ovoid, 1 mm high, merging into a cylindrical, glabrous, hardly ½ mm long style with discoid-obtuse stigma. Berry black (Spruce), ellipsoid, up to 2½ cm long, 13 mm in diam., having a slight bloom; perianth persistent, hardly enlarged, 3—4½ mm in diam.; pedicel studded with pallid, glandular dots (Spruce), 3—5 mm long, rather thick. Berry sometimes mucronulate; exocarp thin, fleshy, endocarp thin; cotyledons thick, flat-convex.

Distribution: Guiana, Northern Brazil.

Sectie O, tree n. 760 (B.W. n. 2398, fr. June; n. 3088, fl. Nov.; n. 4790, fr. Nov.).

Vernacular names: Kaneelhout (S.D.); Kaneeri-pisie (N.E.); Apiesie-ie (Sar.); Siroeaballi tataro, Ajomontho hororadihoru, Ajomonto diamaro, Sierwaballi tataro (Ar.); Kjarie kjanarie, Kaneerjoe (Car.).

11. ENDLICHERIA Nees (non Presl).

Trees or shrubs. Leaves alternate, chartaceous, coriaceous or rigid, pilose or glabrous. Panicles axillary, often clustered at the top of the branchlets; branchlets dichotomous. Flowers without involucre, dioecious; tube usually very short; perianth segments 6, equal or rarely the 3 outer ones longer (not in Surinam species); fertile stamens 9, rarely only 6 (not in Surinam species); anthers 2-celled; filaments generally shorter than the anthers, those of the 3rd row with basal glands, the others nearly always glandless; anthers of the 6 outer stamens introrse; those of the inner ones extrorse or nearly so; ovary glabrous, usually rudimentary in male flowers, style rather thick, generally shorter than the ovary; stigma discoid or obtuse, often triangular. Berry ovoid or ellipsoid, smooth; cupule hemispheric or pateriform; perianth segments persistent or deciduous.

Distribution: Species about 30 in tropical America from Panama to Southern Brazil.

1. *a.* Leaves and flowers glabrous 1. **E. pyriformis** (Nees) Mez.
- b.* Leaves and flowers pilose 2
2. *a.* Leaves densely golden- or yellow-sericeous beneath. 2. **E. sericea** Nees.
- b.* Leaves tomentose beneath..... 3
3. *a.* Flowers membranous, male ones 3 mm in diam.; tube as long as the perianth, inside glabrous; filaments glabrous. 3. **E. multiflora** (Miq.) Mez.
- b.* Flowers fleshy, male ones 5 mm in diam.; tube very short, inside puberulous; filaments pilose ... 4. **E. endlicheriopsis** (Mez) Kosterm.

1. **Endlicheria pyriformis** (Nees) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 116, excl. spec. Triana n. 1059; — *Cryptocarya pyriformis* Nees, Syst. (1836), p. 220; — *Mespilodaphne pyriformis* Nees ex Meissn. in D.C., Prodr. XV, 1 (1864), p. 108; id. in Fl. Bras. V, 2 (1866), p. 201; — *Mespilodaphne pyriformis* Nees msc. in herb. Kunth, Berol.; — *Nectandra sanguinea* Nees (nec Rottb.) p. p. ex Meissn. in Fl. Bras l. c., p. 201.

Shrub or tree, up to 30 m high. Branchlets slender, with long internodes, smooth, glabrous, somewhat angular at the top, pale-green; branches cylindrical, glabrous, smooth, 5 mm in diam.; wood white (Nees); buds only pilose at the top. Leaves alternate, thin-chartaceous, oblong or elliptical or somewhat obovate-elliptical, (5—)10—14(—19) cm long, (2—)3—5(—7) cm wide, base acute or acute-acuminate, margin hardly recurved, top shortly acuminate or cuspidate with obtuse point; leaves glabrous, olive-green, shining, especially above, veins prominent, densely reticulate especially beneath; primary nerves (5—7 on each side) arcuate, united at the margin, the lower ones ascendent, the upper ones patent; margin often thickened by a nerve at the base. Petioles slender, glabrous, canaliculate above, 5—12 mm long, margins decurrent. Panicles axillary or nearly so, few-

flowered, glabrous, 2—7 cm long, lax; peduncles thin, compressed-angular, up to 4 cm long, branchlets alternate, short, patent, secondary branchlets dichotomous, minute, ending in 1—2 flowers; bracts glabrous, membranous or slightly pilose, ovate-lanceolate, acute, minute, persistent; bracteoles lanceolate, $\frac{3}{4}$ mm long, glabrous, acute, persistent. Pedicels glabrous, 1—4 mm long, rather slender, merging into the tube, bracteolate at the base. Male flower, 3—4 mm long; reddish (Pulle); tube conical-urceolate, 2 mm long; perianth segments ovate-obtuse, 1 mm long, fleshy, glabrous outside, densely papillose inside; 6 outer stamens slightly exerted, hardly 1 mm long, filaments very short, flat, hirsute, anthers narrow, usually truncate, cells large, introrse; 3rd row of stamens $1\frac{1}{2}$ —2 mm long, filaments flat, broad, glands minute, globose, stipitate, stalks hirsute, attached at $\frac{1}{2}$ — $\frac{1}{3}$ from the base; anthers narrow-oblong $\frac{3}{4}$ mm long, cells with patent, large valves. Staminodes wanting. Ovary rudimentary or wanting, glabrous, cylindrical, up to $\frac{1}{2}$ mm long. Female flower: glabrous, 3 mm long; tube urceolate-conical, 2—3 mm long, hardly constricted, fleshy, glabrous outside, densely tomentellous inside towards the top; perianth segments at first erect or slightly incurved, after the flowering period patent, ovate or lanceolate-ovate, somewhat obtuse; the 6 outer stamens $\frac{1}{2}$ mm long, included, sterile, same shape and tomentum as in the male flowers; 3rd row slightly longer, sterile, sessile, base tomentose, filaments nearly as long as the anthers, densely pilose, dilated towards the base, basal glands rather small, sessile, sub-globose, attached at the middle of the filament. Ovary glabrous, globose-ovoid, 1 mm high, top merging into a rather thick, as long style, stigma small, discoid. Berry ellipsoid, smooth, apiculate, up to 2 cm long, 12 mm in diam., nearly free from the cupule. Cupule fleshy, hemispheric-pateriform, 5—10 mm high, 7—15 mm in diam., red; perianth segments persistent for a long time, margin thin, entire; fruiting pedicel thick, obconical, 7— $12\frac{1}{2}$ mm long, merging into the

cupule. Pericarp thin; cotyledons thick, flat-convex, top mucronulate.

Distribution: French Guiana.

Coppename R., forest at the foot of the Voltzberg (Pulle n. 233, fl. Aug., type of the ♂ flower); upper Suriname R., Goddo (Stahel n. 43, fr. Jan.); Emma Range (B.W. n. 5607, fr. March).

Vernacular names: Pisie (N.E.); Woko mapiri (Car.).

2. **Endlicheria sericea** Nees in *Linnaea* 8 (1833), p. 38; Mez in *Jahrb. Bot. Gart. Berl.* V (1889), p. 122; Duss in *Ann. Inst. Colon. Marseille* III (1896), p. 303; — *Goepertia sericea* Nees, *Syst.* (1836), p. 369; Meissn. in *D.C., Prodr.* XV, 1 (1864), p. 174; id. in *Fl. Bras.* V, 2 (1866), p. 284; — *Laurus sericea* Sieber, *Fl. Trinid.* n. 175, ex Nees, *Syst. l. c.*, p. 369; Sieber n. 175, msc., herb. Leiden; — *Laurus sericea* Forsyth ex Meissn. in *Fl. Bras.* l. c., p. 284; — *Laurus sericea* Hook. ex Nees, *Syst. l. c.*, p. 369; non Blume, *Bydr.* II (1825), p. 554; — *Ayden-dron sericeum* Griseb., *Fl. Brit. W.-Ind. Isl.* (1860), p. 284; — *Laurus splendens* Forsyth ex Meissn. in *Fl. Bras.* l. c., p. 284.

Shrub or tree, up to 30 m high; wood white (Nees). Branchlets densely yellow-sericeous, more or less angular, sulcate, dorsal-ventral; branches cylindrical, glabrous, grey; buds densely sericeous. Leaves alternate, rigid-chartaceous, at last coriaceous, ovate, ovate-oblong or elliptical, (6—)10—15(—25) cm long, (2½—)5—7(—9) cm wide; base usually rounded or acute, margin slightly recurved, top acuminate; young leaves densely silvery- or yellow-sericeous, adult ones glabrous above, smooth, usually rather dull, pale-green, nerves and veins prominulous, laxly reticulate, beneath densely golden- or silvery-sericeous, midrib strongly prominent, primary nerves (2—4 on each side) strongly prominent, ascendent, disappearing towards the margin, the lower ones ascendent up to the top of the leaf, bases decurrent along the midrib, the upper ones patent, short, less prominent; veins prominulous, laxly reticulate. Petioles densely sericeous, thick, furrowed, tortuous, flattish above, 1—2 cm long. Panicles

axillary or nearly so, densely sericeous or tomentellous; the male ones many-flowered, up to 10 cm long, the female ones somewhat shorter, few-flowered; peduncles slender, compressed, striate, 5 and more cm long, branchlets alternate, patent, up to 3 cm long, secondary branchlets dichotomous. Pedicels densely sericeous, 3—7 mm long. Male flower yellow- or grey-sericeous, 2½ mm long; tube very short, not constricted, sericeous outside, inside hirsute; perianth segments nearly equal, sericeous outside, inside with very short, sericeous hairs, ovate or elliptical, obtuse or slightly acute, 2 mm long; outer 6 stamens ½—¾ mm long, with rather broad, hirsute filaments, anthers same length or smaller, ovate, glabrous, yellow-punctulate outside, cells large, introrse, valves rufous; 3rd row of stamens thicker, 1 mm long, filaments broad, ovate, not distinct from the anthers, hirsute at the base, basal glands sub-sessile, sub-globose, small; anther cells large, extrorse. Ovary rudiment subulate or lanceolate-acute, glabrous, 1 mm long. Female flower 4 mm long; tube and perianth as in the male flower. Stamens minute, sterile. Ovary large, globose-ovoid, glabrous, 2½ mm in diam., merging into a very short, thick, glabrous style; stigma large, discoid, sub-triangular. Berry ellipsoid, smooth, glabrous, up to 1½ cm long, 8 mm in diam., 3 mm covered by the cupule. Cupule sub-hemispheric, rather flat, purple (Richard), up to 1 cm high, 14 mm in diam., margin thin, entire; pedicel thick, obconical, up to 7 mm long, 4 mm wide at the top, merging into the cupule.

Distribution: West Indies, Trinidad, Guiana, Venezuela, Northern Brazil, Bolivia, Northern Peru.

Marowijne R., Wane-creek (B.W. n. 3692, fr. Febr.).

3. *Endlicheria multiflora* (Miq.) Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 130; Pulle, Enum. Pl. Surin. (1906), p. 186; Kribs in Trop. Woods 13 (1928), p. 22; — *Goepertia multiflora* Miq., Stirp. Surin. (1851), p. 203; — *Ampelodaphne dasyantha* Meissn. in D.C., Prodr. XV, 1 (1864), p. 81; id. in Fl. Bras. V, 2 (1866), p. 168; — *Endlicheria villosa* Mez in Jahrb. l. c., p. 129.

Tree, wood yellowish-green, light and soft (Kribs). Branchlets thick, densely rusty-tomentose, angular or cylindrical, internodes short; buds rusty-tomentose. Leaves alternate, or congested on the branchlets, rigid-chartaceous or coriaceous, oblong, elliptical or obovate-oblong, 10—15(—28) cm long, 4—7(—11) cm wide, base shortly acute or somewhat obtuse, margin recurved, top shortly acuminate; young leaves grey-puberulous above, grey-tomentose beneath, adult ones at last glabrous above, except the long-persistent rusty tomentum on the midrib, smooth, shining, midrib and primary nerves impressed; beneath rusty- or greyish-tomentose, midrib strongly prominent, primary nerves (6—12 on each side) rather patent, prominent, upper ones arcuately united, lower ones disappearing towards the margin, secondary nerves prominent, laxly reticulate, veins densely reticulate, slightly prominent. Petioles thick, densely rusty-tomentose, flat above, base thickened. Panicles pyramidal, axillary, congested on dwarf-shoots, ∞ -flowered, 10—18 cm long; peduncles cylindrical, rusty-tomentose, up to 8 cm long, branchlets very short, grey-tomentose, subtended by 5—7 mm long, ovate-lanceolate or lanceolate bracts; female panicles shorter, more or less spike-shaped. Pedicels 1—2 mm long (of the female flower nearly wanting), bracteate at the base. Bracts linear 1—1½ mm long, outside hirsute, inside glabrous, persistent during a long time. Male flower white-villose, 1—1½ mm long; tube sub-urceolate, narrow, top hardly constricted; perianth segments equal, 1 mm long, villose outside, inside glabrous, lanceolate-ovate or ovate, slightly acute, patent or reflexed; stamens exserted, outer ones 0,3—0,5 mm long; filaments glabrous, nearly as long as the anthers, slender; anthers sub-orbicular, broader than long, connectives not protruding beyond the introrse, rather large cells; 3rd row of filaments slightly longer, erect, basal glands small, globose, shortly stipitate, anther cells extrorse. Staminodes wanting. Ovary small, rudimentary, glabrous, ellipsoid-stipitiform, 1 mm

long, included, style and stigma inconspicuous. Female flower: tube broadly urceolate-obconical, outside hirsute, inside glabrous, $1\frac{1}{4}$ mm long; perianth segments ovate, membranous, inside glabrous, nearly 1 mm long; 6 outer stamens sterile, glabrous, nearly $\frac{1}{2}$ mm long, anthers ovate-truncate; filaments slender, as long as the anthers; 3rd row of stamens rectangular, anthers not distinct from the broad filaments, basal glands small. Ovary glabrous, globose-ovoid, $\frac{1}{2}$ mm long, merging into a thick, exerted, cylindrical-conical, slightly longer style; stigma distinct, discoid, emarginate at one side. Berry ovoid-ellipsoid, smooth, 2 cm long, 11 mm in diam., top mucronulate; $\frac{1}{3}$ covered by the cupule. Cupule hemispheric, rather thin, smooth, 14 mm in diam., 8 mm high, margin entire; fruiting pedicel obconical, thick, 5 mm long, 3 mm in diam. at the top.

Distribution: Brit. Guiana; Amazonian district.

Male specimens: Paramaribo (Cramer n. 81, fl.); locality unknown: Hostmann n. 1163 (type), s. n.; Kegel n. 1163 (mis. Hostmann) [G.], fl. Aug.; Focke n. 101 [L.]; coll. unknown ex herb.? Junghuhn [L.].

Female specimen: Maratakka R. (B. W. n. 3494, fl., fr. Nov.).

4. *Endlicheria endlicheriopsis* (Mez) Kosterm. l. c., p. 43; — *Ocotea endlicheriopsis* Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 300; Benoist in Arch. Bot. V, 1 (1931), p. 73.

Tree. Branchlets thick, angular, densely rusty-tomentose; branches cylindrical, rusty-tomentellous, glabrescent, dark-brown; buds densely rusty-tomentose. Leaves alternate, chartaceous or thick-chartaceous, oblong or elliptical, (8—)14—18(—25) cm long, (4—)5—6 $\frac{1}{2}$ (—9) cm wide; base shortly acute, often oblique, margin recurved, top slightly acuminate; young leaves rusty-tomentose, above soon glabrescent, nerves excepted; adult ones above glabrous, slightly shining, brown-red when dried, midrib and primary nerves impressed, secondary ones slightly impressed, hardly conspicuous, veins nearly inconspicuous;

beneath laxly rusty-tomentose, denser on the nerves, midrib strongly prominent, primary nerves (5—6 on each side) prominent, ascendent, disappearing towards the margin, especially the lower ones following the margin, base of the margin often thickened by a nerve, secondary nerves prominent, parallel and more or less horizontal, 2—4 mm from each other, veins slightly prominent, reticulate. Petioles up to 2½ cm long, densely rusty-tomentose, sulcate, above flat or slightly canaliculate. Panicles axillary, pyramidal, densely rusty-tomentose, male ones up to 15 cm long, ∞-flowered, female ones shorter, with less flowers; peduncles up to 2½ cm long, compressed, sulcate, branchlets alternate, more or less patent, lower ones up to 4 cm long, dichotomous. Bracts lanceolate or linear, acute, densely tomentose, deciduous, 1½ mm long. Pedicels rusty-tomentose, slender, 2—3 mm long. Male flower pateriform, 5 mm in diam.; tube very short, not constricted at the top, infundibuliform, hardly 1 mm long; perianth segments equal, ovate, acutish, fleshy, up to 2 mm long, grey-puberulous inside, tomentellous outside; the 6 outer stamens up to ¾ mm long, anthers transversely oblong, top slightly apiculate, connective slightly protruding beyond the sub-orbicular cells, filaments nearly as long as the anthers, pilose; stamens of the 3rd row nearly 1 mm long, thick, erect, pressed against each other, anthers rectangular, glabrous, top truncate, filaments broad, not distinct from the anthers, inside pilose at the base, anther cells extrorse, basal glands sessile, flattish, small, ovate, acuminate, touching each other. Staminodes wanting. Ovary narrow-ellipsoid, glabrous, ¾ mm long, sterile; stigma inconspicuous. Female flower densely tomentellous, 3 mm in diam.; tube very short, broadly conical, glabrous inside; perianth segments ovate or narrowly ovate, obtuse or acutish, 1¼ mm long; outer 6 stamens sterile, glabrous, ½ mm long, anthers oblong, filaments same length; 3rd row ½ mm long, with sterile, rectangular anthers; basal glands globose, sessile, rather large, ½ mm in diam. Staminodes wanting.

Ovary sub-globose, glabrous, 1 mm long, style very thick and short, stigma discoid. Pedicels rather thick, $1\frac{1}{2}$ mm long. Fruit unknown.

Distribution: French Guiana.

Brownsberg, tree n. 1153 (B.W. n. 2453, ster. Sept.; n. 2936, fl. June; n. 3197, fl. Sept.; n. 5884, fl. June; n. 6884, fl. June).

Vernacular names: Pisie (N.E.); Apisie-ie (Saram.); Siroe-aballi (Car. and Arow.).

12. CASSYTHA L.

Climbing, leafless, parasitic, perennial herbs with slender, twining stems, attaching themselves to their hosts by means of uniseriate suckers (haustoria). Leaves reduced to minute scales or wanting. Flowers small, sessile or pedicelled in the axil of a scale-like bract with 2 similar bracteoles close under the perianth, on usually peduncled racemes, spikes or heads; tube small, increasing in fruit and becoming constricted at the top; perianth segments 6, the outer ones short, broad, resembling the bracts, the 3 inner ones at least twice as long; perfect stamens usually 9, 2-celled, the 2 outer rows with introrse anthers and glandless filaments, the inner ones with extrorse anthers and biglandular filaments; staminodes large, sessile or stipitate; ovary scarcely included in the tube, till after flowering. Fruit globose, drupaceous, completely included in the enlarged perianth tube, the latter usually crowned by the persistent perianth segments. Seeds with a thin testa. Cotyledons fleshy, distinct only when young, completely consolidated when ripe, assuming the appearance of a fleshy albumen. Pericarp of 2 layers, the outer thin, the inner thick and hard.

Distribution: Species about 20, one pantropic; 2 in tropical Africa; 1 on Ceylon; the others Australian.

1. *Cassytha filiformis* L. (non Thunberg), Spec. pl. I (1753), p. 35; Jacq., Stirp. Amer. (1763), p. 115, t. 79 et Pict., t. 166; Gaertn., Fruct. I (1788), p. 133, t. 27, f. 4;

Nees, Syst. (1836), p. 642; Wight, Ic. V (1852), t. 1874; Meissn. in D.C., Prodr. XV, 1 (1864), p. 255; Duss in Ann. Inst. Colon. Marseille III (1896), p. 305; Fawcett and Rendle, Fl. Jam. III, 1 (1914), p. 219, t. 80; Standley in Field Mus. X (1931), p. 202; Kosterm. l. c. p. 43; — *Cassytha americana* Nees, Syst. l. c., p. 644; id. in Linnæa 21 (1848), p. 268, 626; Griseb. in Fl. Brit. W.-Ind. Isl. (1860), p. 285; Meissn. in D.C. l. c., p. 256; id. in Fl. Bras. V, 2 (1866), p. 295, t. 107; Mez in Jahrb. Bot. Gart. Berl. V (1889), p. 490, p. p., excl. syn.: *Cactus pendulus* Sw., *Rhipsalis Cassytha* Gaertn., *Cassytha polysperma* Mill.; Pulle in Rec. Tr. Bot. Néerl. IX (1912), p. 138; — *Cassytha brasiliensis* Mart. in Nees, Syst. l. c., p. 648; — *Cassytha dissitiflora* Meissn. in Vid. Medd. Kjöbnh. (1870), p. 145.

Parasitic climber. Leaves minute, scale-shaped, suckers distinct; stem $\frac{1}{2}$ — $1\frac{1}{2}$ mm in diam., red (Pulle), striate, glabrous, slightly or distinctly tomentellous. Spikes lax, usually solitary in the axil of 3 bracts, slightly or densely tomentellous, $1\frac{1}{2}$ —5 cm long; peduncles 1 mm in diam., 1—3 cm long; bracts membranous, thicker in the middle, glabrous, ovate-lanceolate, $\frac{1}{2}$ —2 mm long, the inner ones ciliate at the margin. Flowers sessile, glabrous, hermaphrodite, $2\frac{1}{2}$ mm long, but after the flowering period rapidly increasing, in the axil of a membranous bract, ciliate at the margin, and 2 bracteoles; bract ovate, 1 mm long; bracteoles smaller, ovate-orbicular; tube nearly wanting, glabrous inside; perianth segments unequal, outer ones ovate-orbicular, concave, membranous, margin ciliate, $\frac{3}{4}$ mm in diam., inner ones ovate, obtuse, thicker, margin not ciliate, $2\frac{1}{2}$ mm and more long. Stamens included, patent, glabrous, $\frac{1}{2}$ —2 mm long, base of filaments attached to the perianth segments; anthers large, ovate-triangular, $\frac{3}{4}$ mm long; connectives distinctly protruding beyond the large cells; filaments, especially of the 3 outer stamens with appendages beneath the anthers, foliaceous-dilated; 3rd row of stamens similar, with 2 large, globose, sessile glands. Staminodes large, glanduliform-foliaceous, glab-

rous, shortly stipitate, $\frac{1}{2}$ mm long. Ovary globose, glabrous, $\frac{3}{4}$ mm in diam.; style rather thick, cylindrical-obconical, as long as the ovary; stigma small, capitate. Fruit globose, 7 mm in diam., included in the enlarged flower tube with persistent, not enlarged perianth segments.

Distribution: Tropics of both hemispheres.

Paramaribo, Kwatta-weg (Pulle n. 10, ster. July); savannah near Republiek (Kuyper n. 92, fl., fr. Oct.); Patrick savannah (Gonggrijp s. n.; Boldingh n. 3836, fl., fr., Oct.); Zanderij I, savannah (Lanjouw n. 187, fl. July); Joden savannah (Kegel n. 1157 [G.], fr. Nov.); Coppename R., savannah near Onobissie (Gonggr. and Stabel n. 1122a, fl., fr. March); locality unknown: Focke s. n. [L.].

HERNANDIACEAE

BY

A. J. G. H. KOSTERMANS (Utrecht).

Trees, shrubs or climbers. Leaves alternate, without stipules, simple or divided, palmately or pinnately nerved. Often oil-cells and cystoliths in the leaves. Flowers hermaphrodite or monosexual, small, in axillary or pseudo-terminal, long-stalked, corymbose panicles. Perianth segments usually in 2 valvate, 3—5-merous whorls or in one imbricate, 4—10-merous whorl. Stamens 3—5 in a single row opposite the outer perianth segments; anthers 2-celled, introrse, dehiscent by valves; filaments often with basal glands. Ovary inferior, 1-celled, with a solitary, pendulous, anatropous ovule. Fruit dry, winged or included in an inflated cupule. Seeds without albumen; embryo straight; cotyledons large, lobed, twisted or shrivelled.

Distribution: Species about 35 in the tropics of both hemispheres.

Principal literature:

- C. L. Blume, *Bijdragen tot de Flora v. Nederl. Indië* (1825), p. 550.
C. F. Meissner in De Candolle, *Prodromus* XV, 1 (1864), p. 261; id. in Martius, *Flora Brasiliensis* V, 2 (1866), p. 299.
H. Baillon, *Histoire des Plantes* II (1870), p. 449, 485.
G. Bentham et J. D. Hooker, *Genera Plantarum* I (1865), p. 690; id. III (1880), p. 164.
F. Pax in Engler-Prantl, *Natürl. Pflanzen-Familien* III, 2 (1889), p. 126.

A. J. G. H. Kostermans, Studies in South American Malpighiaceae, Lauraceae and Hernandiaceae, especially of Surinam, also in Meded. Botan. Museum en Herbarium Utrecht n. 25 (1936).

The key to the genera is only based on the Surinam species.

1. *a.* Climbing shrubs. Leaves trinerved or subtriplinerved with cystoliths. Inflorescences without bracts. Flowers polygamous-dioecious. Glands wanting. Stigma capitate, small. Cotyledons contortuplicate 1. **Sparattanthelium.**
- b.* Big trees. Leaves palmately nerved, usually peltate, without cystoliths. Flowers surrounded by bracts. Flowers monoecious. Filaments with basal glands. Stigma large, reniform-discoid. Cotyledons flattened, more or less shrivelled 2. **Hernandia.**

1. SPARATTANTHELIUM Mart.

Usually climbers. Leaves alternate, tri- or subtriplinerved, entire. Panicles axillary or sub-terminal, without bracts. Flowers in cymes. Flowers small, polygamous-dioecious. Perianth of 4—7 equal segments with sub-imbricate aestivation, deciduous. Perianth tube in the hermaphrodite flowers united with the ovary, in male flowers nearly wanting. Fertile stamens 4 or 5, opposite the perianth segments; filaments filiform, glandless; anthers oblong-linear, cells introrse; connectives hardly protruding beyond the cells. Staminodes none. Style cylindrical, straight, stigma sub-capitellate, small. Fruit dry, ovoid or ovoid-ellipsoid, smooth, putamen coriaceous or woody. Cotyledons contortuplicate.

Distribution: Species about 12 in Guatemala, Bolivia, Guiana and tropical Brazil.

1. *a.* Leaves beneath densely white-lanuginose; distinctly trinerved; base rounded or shortly acute. Fruiting pedicels rather thick ... 1. **S. Botocudorum** Mart.

- b. Leaves beneath sparingly tomentose; subtriplinerved; base sub-cordate. Fruiting pedicels slender, long
 2. **S. wonotoboensis** Kosterm.

1. **Sparattanthelium Botocudorum** Mart. in Denkschr. Ges. Regensb. III (1841), p. 301, t. X, f. 2, t. XI, f. 1; Meissn. in D.C., Prodr. XV, 1 (1864), p. 250; id. in Fl. Bras. V, 2 (1866), p. 293; Benth. et Hook. Gen. I (1865), p. 690; Pulle in Rec. Trav. Bot. Néerl. IX (1912), p. 138.

Climbing shrub. Branchlets rather thick, cylindrical, striate, puberulous, glabrescent; branches cylindrical, smooth, striate. Leaves alternate, membranous, at last chartaceous or thick-chartaceous, obovate-oblong, ovate-oblong or elliptical, 7—9 (—10) cm long, 3—4(—5) cm wide, base usually rounded, sometimes shortly acute, margin slightly recurved, top shortly acuminate; above smooth, glabrous, nerves excepted, principal nerves hardly prominulous; beneath densely white-lanuginose, the 3 principal nerves hardly prominulous, dark, connected by few, usually parallel, horizontal secondary nerves; the 2 lateral nerves arcuately united with 1 or 2 pairs of primary nerves at the top of the leaves. Petioles thin, glabrescent, up to 2 cm long. Panicles corymbiform, axillary, slender, densely, ∞ -flowered, up to 17 cm long, often with small leaves; peduncle glabrous, cylindrical, smooth, up to 7 cm long, lower branchlets up to 7 cm long, patent, sparingly tomentellous. Pedicels densely grey-tomentellous, thin, up to 8 mm long. Flowers slender, up to 4½ mm long. Flower tube sub-globose-ellipsoid, 1 mm long, puberulous, constricted at the top; perianth segments 4, concave, oblong-linear, top rounded, grey-puberulous outside, glabrous inside with strong midrib, 2½—3 mm long. Stamens 4 with glabrous, filiform, contort filaments, hardly ½ mm long, anthers oblong-linear, glabrous, 1 mm long, cells introrse, valves linear, 1 mm long, connectives slightly protruding beyond the cells. Style rather thick, cylindrical, 2 mm long, puberulous; stigma capitellate-discoid, small. Fruiting inflorescences divaricate-

dichotomous, rigid, white, branchlets thickened at the nodes. Fruit ovoid-ellipsoid, acutish, white, with 8 ribs, $1\frac{1}{2}$ —2 cm long, 6 mm wide, dehiscent. Fruiting pedicel thick, slightly discoid at the top.

Distribution: French Guiana, Amazonian district.

Patrick savannah (Coll. indig. n. 164, fl. May); Brownsberg (B.W. n. 6559, fr. June).

2. *Sparattanthelium wonotoensis* Kosterm. l. c. p. 44.

Liane. Branchlets thick, cylindrical, striate, sparingly puberulous; branches glabrous, smooth, striate. Leaves alternate, subtriplinerved, chartaceous, ovate, (4—)5—6(—8) cm long, (2—) $2\frac{1}{2}$ —3(—4) cm wide, base subcordate or rounded, margin slightly recurved, top shortly acuminate, above glabrous, primary and secondary nerves tomentellous, flattish, beneath sparingly tomentose, midrib slightly prominent, the 2 lateral large primary nerves ascendent as far as one half or $\frac{2}{3}$ of the length of the leaf; primary nerves 3—4 on each side, slightly prominent, the upper ones arcuately united, secondary nerves prominulous, laxly reticulate. Petioles slender, glabrescent, up to $1\frac{1}{2}$ cm long. Panicles densely, ∞ -flowered, corymbiform, axillary, up to 10 cm long; peduncle cylindrical, up to 4 cm long, branchlets up to 4 cm long, patent, grey-tomentose. Pedicels slender, grey-tomentose, up to 1 cm long. Flowers smudgy red, 4 mm long, flower tube cylindrical-ovoid, puberulous, $1\frac{1}{2}$ mm long; perianth segments 4, oblong-linear, obtuse, tomentellous outside, glabrous inside. Stamens 4, filaments $\frac{1}{2}$ mm long, glabrous, filiform, contort, anthers oblong-linear, 1 mm long, glabrous, connective slightly protruding beyond the large cells. Style rather thick, puberulous; stigma capitellate, small. Fruiting panicles divaricate-dichotomous, white, branchlets slender, thickened at the nodes. Fruiting pedicel very long, slender (up to 6 cm long). Fruit ovoid-ellipsoid, acute, 15 mm long, 7 mm in diam., ribbed, dehiscent.

Distribution: Endemic.

Rocks near Wonotobo, Corantijne R. (B.W. n. 3120, fl., fr. Oct.).

Vernacular name: Oneka (Car.).

2. HERNANDIA Plum.

Trees. Leaves alternate, usually palmately nerved, cystoliths wanting. Panicles corymbose. Flowers in usually 3-flowered cymes, surrounded by an involucre of 4—5 bracts, the central flower female, the 2 lateral ones male. Male flower with 6—8 perianth segments, stamens 3, opposite the outer perianth segments. Glands either twice as many as the stamens and attached one on each side at the base of the filaments, or as many, or wanting (not in Surinam species). Female flower surrounded at the base by a cupule. Perianth segments 8. Glands usually 4, opposite the outer segments. Ovary inferior. Stigma dilated, irregular, peltate-discoid, large. Style included. Fruit a globular, black, stony nut, more or less distinctly 8-ribbed, included in the much increased, inflated cupule, with an orifice at the top. Embryo with flattened, more or less wrinkled cotyledons.

Distribution: Species about 14, in the tropics of both hemispheres.

1. *Hernandia sonora* L., Spec. pl. II (1753), p. 981; Jacq., Stirp. Amer. (1763), p. 245; Aubl., Guia. II (1775), p. 852; Lam., Enc. 3 (1789), p. 123, excl. syn. *Arbor regis* Rumph.; Descourtilz, Fl. Pitt. et Med. Antill. 2 (1822), p. 143; Meissn. in D.C., Prodr. XV, 1 (1864), p. 263; id. in Fl. Bras. V, 2 (1866), p. 300; Baillon, Hist. II (1870), p. 449. Kosterm. l.c., p. 43. — *Hernandia ovigera* L., Stickman in Am. Acad. IV (1759), p. 125; Meissn. in D.C. l. c., p. 262; id. in Fl. Bras. l. c., p. 299; — *Hernandia guianensis* Aubl., Guia. II (1775), p. 849, III t. 329; Meissn. in D.C. l. c., p. 262; id. in Fl. Bras. l. c., p. 299; Pulle, Enum. Pl. Surin. (1906), p. 187; Benoist in Arch. Bot. V (1931), p. 76; — *Hernandia peltata* Meissn. in D.C. l. c., p. 263; — *Hernandia peltata* Sessé et Moc., Fl. Mex. 2nd ed. (1894), p. 213;

— ? *Hernandia peltata*, var. *cordata* Hochreutiner in Candollea II (1925), p. 365; — *Hernandia catalpifolia* Britton et Harris in Torreya II (1911), p. 174; Fawcett and Rendle, Fl. Jam. III, 1 (1914), p. 221, f. 90.

Tree, 10—20 m high, wood soft. Branchlets thick, smooth, glabrous, slightly puberulous at the top. Leaves alternate, membranous or chartaceous, glabrous or nearly so, broadly ovate, usually peltate, (6—)14—20(—33) cm long, (3—)7—12 (—23) cm wide, base rounded or cordate or more or less truncate, margin flat, top acute or acuminate, with distinct narrow acumen; above midrib and nerves hardly prominulous, beneath midrib prominent, primary nerves usually 5, palmately, 2 nerves often marginal, the upper ones (3—5 on each side) pinnately nerved, prominent, secondary nerves prominulous, very laxly reticulate, other veins hardly conspicuous. Petioles smooth, cylindrical, thick, 15—25 cm long, glabrous. Up to 3 × compound, corymbiform panicles, axillary near the top of the branches, 20—30 cm long; peduncle glabrous, smooth, thick, up to 18 cm long, lower branchlets 5—10 cm long, one half naked. Flowers clustered, usually 3 together, middle one female, the 2 lateral ones male, sometimes a few male ones below them. Flowers surrounded by a whorl of 4 bracts, sometimes one or two male flowers down with a small bract under each pedicel. Bracts oblong or spatulate, 10—2 mm long. Male flower: Pedicel 2—3 mm long, tomentellous; flower tube wanting; perianth segments 6, in 2 rows, fleshy, elliptical, obtuse, up to 6½ mm long, 3 mm wide, densely tomentellous outside, densely pilose inside. Stamens 3; filaments glabrous, slender, before anthesis short, after anthesis up to 2½ mm long, slightly united at the base. Glands normally 6, by union or splitting up 3—9, clavate, top obtuse, substipitate, usually irregular. Anthers elliptical, 1¼ mm long, top emarginate, cells as long as the anther, valves large. Stamens at first pilose inside, glabrescent. Female flower: Pedicel 1 mm long; flower tube glabrous at the base, 3 mm long; perianth

segments 8, elliptical, up to 6 mm long; glands 4, subglobose, sessile. Style glabrous at the base, villose higher up, thickened upwards, deciduous with the perianth segments, $3\frac{1}{2}$ mm long. Stigma very large, reniform-infundibuliform. Cupule in bud small, hemispherical, in anthesis enveloping the tube, margin entire, sometimes 2-lobed. Fruit at last completely included in the inflated, globose, leathery cupule, 6 cm in diam., with an entire, circular orifice at the top. Fruit ellipsoid-ovoid, with 6—8 longitudinal ribs, sessile or shortly stipitate, $2\frac{1}{2}$ cm long, with a broad, rounded, depressed umbo. Embryo divided into 4 or 5 thick, fleshy ruminant lobes, integument thick, spongy.

Distribution: Tropics of both hemispheres.

Coppename R., Kalebas-creek (B.W. n. 802, fl. Jan.);
Wanica R. (Wullschlägel n. 1316 [B.], fr.); locality unknown:
Splitgerber n. 850 [L.].

Vernacular names: Kassabahoedoe (N.E.); Ajowo (Car.);
Kajoeballi (Arow.).

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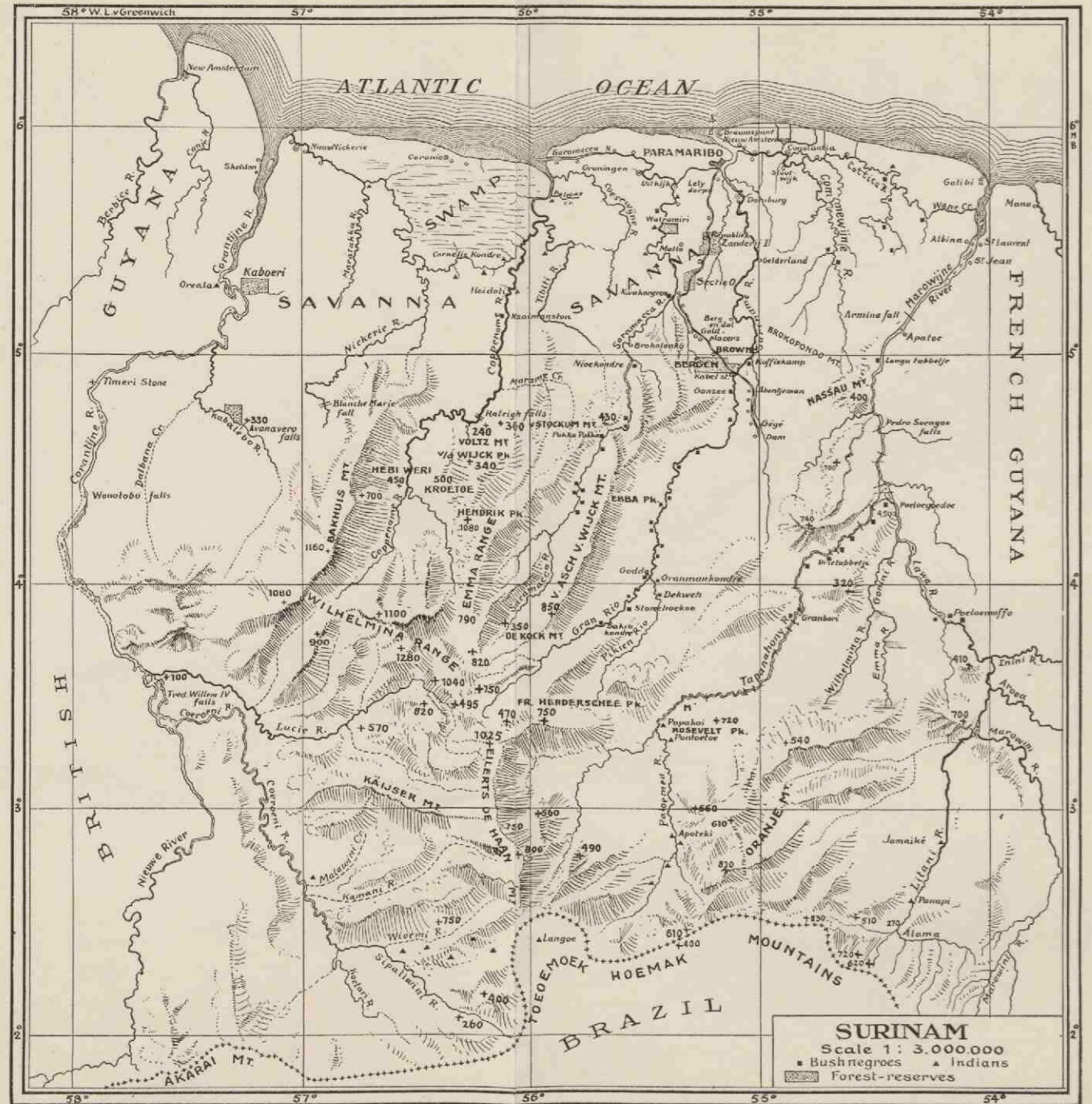
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STELLINGEN.

I

MEZ' systeem der Lauraceae, berustend op het aantal en den bouw der stamina, verdient de voorkeur boven dat van NEES VON ESENBECK; het is evenwel wenschelijk een aantal Amerikaansche geslachten te splitsen.

II

Het is niet raadzaam botanische geslachtsnamen uit de lijst in Kew Bulletin 1935 te conserveeren, voordat in monografisch of daarmede gelijkstaand werk hierover een voorstel is gedaan.

III

Er moet naar gestreefd worden, dat de artikelen van de regels voor botanische nomenclatuur zoodanig geredigeerd worden, dat een subjectieve interpretatie daarvan onmogelijk is.

IV

Artikel 44 van de International Rules of Botanical Nomenclature dient gelezen te worden: „(2) by the citation of a previously and effectively published description of the group under another name, *and the new combination is actually published*”.

V

De samengestelde bladeren van Dicotylen met unifacialen bladsteel zijn vertakt in drie dimensies.

VI

Het hoogere percentage Pinus-pollenkorrels in de mariene en sub-mariene, atlantische of sub-atlantische klei-afzettingen van N.W. Duitschland, is eerder toe te schrijven aan een afzetting van allochthone fossiele pollenkorrels, dan aan een toevoer van pollen over grooten afstand of een selectieve verweering.

VII

De stoffen, die CROCKER, HITCHCOCK en ZIMMERMAN voor hun proeven gebruiken, worden ten onrechte vergeleken met auxine.

CROCKER, HITCHCOCK, ZIMMERMAN in Contr. Boyce Thompson Inst., 1935.

VIII

Radiotropie is slechts een modificatie van traumatotropie.

IX

Het is niet waarschijnlijk, dat het overbrengen van *Bacterium nectarophilum* Doidge, de oorzaak van een „pear blossom blight disease”, uitsluitend geschiedt door bijen.

DU PLESSIS in Sc. Bull., Stellenbosch—Elsenburg College, 1935.

X

De meening van ROSÉN, dat het verterings sap van *Helix pomatia* L. geen proteinase bevat, is op grond van zijn proeven niet bewezen.

BINGER ROSÉN in Zool. Bidrag, Upsala 1932

XI

De X-organismen door LAURIE gevonden in het bloed van walvissen geven geen verklaring voor het feit, dat deze dieren niet onderhevig zijn aan de z.g.n. caisson-ziekte.

LAURIE in Discov. Rep. 7, 1933.

Di