NOTES ON GUIANA SAPOTACEAE

by

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Notwithstanding the large amount of work spent by several botanists on this family, taxonomy does not appear very satisfactory, and a general agreement on generic limits has not yet been reached. The result has been a perplexing number of generic and sectional names. The present author apologizes for his adding to the number of interpretations.

This study of American Sapotaceae, primarily undertaken in connection with the Flora of Surinam, could not have been completed without the generous loan of specimens by the herbaria at Brussels [B], Berlin—Dahlem [D], Kew [K], and Leyden [L]. In 1934 the author paid a short visit to the herbaria at Brussels [B] and at Paris [P]. The collections of this family at Paris are of special interest owing to the fact that they contain the material studied by Baillon, Pierre and Dubard, and bear numerous notes and analytical drawings, especially by Pierre, attached to the sheets. A number of British Guiana Sapotaceae from the Kew Herbarium was received for determination shortly afterwards. The author feels greatly indebted to the directors of the above mentioned Herbaria for their kind help, and particularly to Prof. Dr. A. Pulle, Utrecht, under whose direction this study was undertaken.

Unless otherwise mentioned the specimens cited are in the Utrecht Herbarium [U].

The principial alterations in the classification of Sapotaceae in this paper are due to the rejection for classifying purposes of the number of flower-parts and, to a certain degree, of the staminodial development also. On the other hand, following Dubard, the shape of the embryo is considered a good taxonomic character.

Number of flower-parts. — The number of flower-parts is by no means as constant as is suggested by the current

distinction between 4-merous *Pouteria* and *Labatia* and 5—6-merous *Lucuma*. As a matter of fact in most generic descriptions of Sapotaceae, and in some specific ones, too, a certain variability is allowed for.

Individual variability, even among flowers of the same branch, was already noticed by Wight in 1850, Icon. IV. 4, p. 13, and has lately been emphasized by Ducke in Ann. Ac. Sc. Bras. VI (1934) p. 210. I found variations of this kind in *Pouteria melanopoda* Eyma (Cf. p. 175), in *Pouteria cladantha* Sandw. (Cf. p. 186), in *Pouteria Gongrijpii* Eyma (Cf. p. 185), in *Pouteria robusta* (Mart. et Eichl.) Eyma, var. *longifolia* Eyma, and in Herb. Rio 22228, described as *Glycoxylon praealtum* Ducke.

Staminodes. — The question of the taxonomic value of the development of staminodes is of special interest, because the distinction between *Chrysophyllinae* or *Chrysophyllées* on the one side and *Sideroxylinae* or *Eubumeliées* + *Lucumées* on the other, is based on the presence or absence of staminodes. This, or a similar arrangement with different names, is to be found in most handbooks and treatises dealing with Sapotaceae, the principal exception being Bentham and Hooker, Genera Plantarum. Baillon, Hist. Plant. (1891), p. 261, criticized this distinction, but maintained it on p. 271. Engler first maintained it (Nat. Pflanzenfam., 1890, 1897), but rejected it in Mon. Afrik. Pfl. fam. VIII (1904) p. 11. In Engl. Jahrb. L, Suppl., 1914, p. 347, Krause criticized Dubard for making *Sideroxylinées* and *Chrysophyllinées* two of the principal subdivisions (out of 3) of Palaquiées (in Rev. Gén. Bot. XIX, 1907, p. 295). In Ann. Mus. Colon. Marseille, 3 sér. III (1915) p. 2, Dubard even raised them to the rank of two of the principal groups (out of 3) of the Sapotaceae. Krause's objections are based on the casual development of a single or a few staminodes in species normally lacking them. This has, in fact, repeatedly been noticed by different authors, especially in *Oxythece, Martiusella, Donella, Zeyherella, Pachystela, Englerophytum*, etc. *Martiusella, Donella* and *Zeyherella* are now generally referred to *Chrysophyllum*, whereas *Oxythece* should be included in *Pouteria*. See also *Pouteria Pullei* n.sp., p. 191. In many cases also, staminodes are minute and easily overlooked. This, together with the casual lacking in some species, may be considered the principal cause that several plants have originally been described under *Chrysophyllum*, without staminodes, e.g. *Chrysophyllum alnifolium* Engl. = *Pouteria Engleri* Eyma, *Chrysophyllum Melinoni* Engl. = *Micropholis guyanensis* (A.DC.)

Pierre, *Chrysophyllum reticulatum* Engl. = *Pouteria reticulata* (Engl.) Eyma.

Hartog, in Journ. Bot. XVI (1878) p. 67, mentions the presence in the young flower-buds of *Chrysophyllum* of soon aborting staminodial tubercles. The same statement can be found in Engl. Mon. Afr. Pfl. fam. p. 10.

Unisexual flowers chiefly occur in the genus *Ecclinusa.* In *E. guianensis* n.sp. no trace of stamens is to be found in female flowers. In *E. ramiflora* Mart. *(Passaveria obovata* Mart.) they are replaced by bundles of hairs (Cf. Fl. Bras. t. 47). This was also observed in a flower of *Pouteria scytalophora* Eyma, where, however, complete flowers were found on the same branch. In several other cases the stamens are reduced to staminodes, as in Gardner 2659 (described as *Chrysophyllum Gardneri* Mart. et Eichl., *Discoluma Gardneri* H.Bn.), B.W. 4384 *(Chrysophyllum cuneifolium* (Rudge) A.DC.) and in Krukoff 1505 (described as *Lucuma inflexa* A. C. Smith).

A very wide range of variability in staminal and staminodial development and in the shape of the staminodes in *Planchonella obovata* (R.Br.) H. J. Lam, has been figured and described by Lam in Bull. Jard. Bot. Buitenzorg sér. 3, VII (1925) pp. 213, 214.

According to Pierre in Urb. Symb. Ant. V (1904) p. 99, staminodes occasionally develop into fertile stamens in *Calocarpum mammosum, Chrysophyllum Cainito* and *Achras Zapota.*

Seed. — In my opinion especially the shape of the embryo should be taken into account. Generally embryos possessing thick, plane-convex cotyledons are destitute of an albuminous sheath, but this cannot be accepted as a rule, as is shown by *Pouteria ptychandra* Eyma. Cf. p. 168. Also Baillon and Dubard declared the degree of albumen development unsuitable for classifying purposes (Baillon, Hist. Pl. XI, 1891, p. 256, Dubard in Ann. Mus. Colon. Marseille XX, 1912, pp. 4, 5, and 3 sér. III, 1915, p. 2). Nor is the caudicle always reduced to a mere point in thick-cotyledonous embryos. This was already admitted by Dubard himself (l.c. 1915, p. 4). Its shape, however — either thick-conical or long-cylindrical — generally leaves little doubt, so in the case of *Pouteria ptychandra* with a conical caudicle and in that of *Chrysophyllum sericeum* A.DC., which has rather thick cotyledons but a long cylindrical caudicle and an albuminous sheath. It should be remarked here that, whereas the degree of anatropy of the ovule determines the place and dimensions of the scar in the seed, the reverse is not necessarily the case. So the variations in the shape and extension

of the scar found in *Pouteria* sens. lat. do not affect the relative positions of the hilum and the micropyle. Cf. p. 164. A basal scar, with hilum and micropyle approached, as in *Sideroxylon* s. str. and *Mimusops* s.str. always indicates full anatropy.

Lecomte's objections against Dubard's classification are before all of a practical kind, as he opposes against a classification which is not necessarily supported by floral characters, so that flowering material cannot be placed in the right genus when fruits are lacking. (Lecomte in Bull. Muséum, 1917, p. 36, 1919, pp. 123, 124). I fully agree with Lecomte that this is a serious drawback, but since almost all floral characters are very unstable, a classification neglecting the characters of the seed appears almost impossible.

Pouteria Aublet, Hist. Pl. Guiane franç. (1775) I, p. 85.

Generis ampliati descriptio emendata: — Arbores lactescentes, foliis plerumque sparsis, raro oppositis vel suboppositis, integris, nervatione valde diversa, estipulatis. Flores in fasciculis axillaribus vel supra cicatrices foliorum delapsorum inserti; sepala 4—5; corolla plus minusve alte tubulosa vel campanulata, lobis 4—6 erectis vel expansis; staminodia cum corollae lobis alternantia ad sinus inserta, integra, subulata, vel ovata, vel triangularia, vel squamiformia, vel partim vel omnes deficientia; stamina corollae lobis isomera iisque opposita; ovarium 1—12-loculare, loculis 1-ovulatis. Fructus uni- vel pluri-spermus; semina testa dura nitida, area ventrale derasa axi adpressa elongata lineari vel elliptica vel interdum seminis dimidiam partem vel magis occupante et parietes laterales loculi adpressa, hilo supero, micropyle infera; albumen nullum, vel raro plus minusve evolutum; embryo cotyledonibus magnis crassis plano-convexis, caudicula infera plerumque punctiforme, raro plus minusve evoluto.

Genus *Pouteria* sensu Dubard generibus sequentibus additis ampliatum: *Lucuma* Molina sensu Dubard, *Labatia* Sw., *Oxythece* Miq., *Barylucuma* Ducke, *Glycoxylon* Ducke, *Pradosia* Liais. Quorum *Lucumae* sectiones praeter *Franchetellam* cum ceteris, genere *Glycoxylon* excepto, pro sectionibus *Pouteriae* acceptandae.

Aublet's description of this genus and of the only species he knew, *P. guianensis*, is very clear, and especially his plate 33 does not leave any doubt about its identity. The circumstance, however, that he attributed a wrong fruit to it, has long impeded a right understanding, and may have been the principal cause that

so many species have been described as *Lucuma*. So, e.g. in de Candolle, Prodr. VIII (1844), was but one species beside *P. guianensis* included in *Pouteria*, viz. *P. sessiliflora* (Sw.) A. DC., *Labatia sessiliflora* Sw., from Haiti, which is the species for which Swartz founded his genus *Labatia*. Martius, in Sitz. ber. Kgl. Bayr. Ak. Wiss. 1861, Bd. 1, p. 572, disclosed the error with the fruit of *P. guianensis*, already suspected by De Candolle, but because he thought the whole of Aublet's plate, with the exception of only the left flower, to belong to *Dasynema*, Tiliaceae (= *Sloanea*, Elaeocarpaceae), he declared *Pouteria* Aubl. a genus spurium, charactere mixto, referring the left flower of Aublet's plate as well as its description to *Labatia*. In Flora Brasiliensis VII (1863), p. 77, only the fruit was excluded from Aublet's description and plate, and *P.guianensis* identified, though erroneously, with *Lucuma psammophila* A. DC. var. *xestophylla* Miq. et Eichl., but no priority was given to Aublet's name.

Also Bentham and Hooker, Genera Plantarum II. ii (1876) pp. 653, 654, preferred *Lucuma* to *Pouteria*. Special attention deserves a note under *Lucuma* in which they point to the existence of intermediate forms connecting *Lucuma* and *Chrysophyllum*. These are *Pometia* Vell., *Oxythece* Miq., *Niemeyera* F. Muell., and *Amorphospermum* F. Muell. In these staminodes are either few, or wholly absent, as in *Chrysophyllum*, but the seeds are exalbuminous, as in *Lucuma*. *Niemeyera* and *Amorphospermum* are Australian genera, which I did not study, but *Pometia* and *Oxythece* should in my opinion be united with *Pouteria*. Cf. pp. 165, 168.

The fact that *Pouteria* is a mixture in as far as Aublet assigned a wrong fruit to it, is fully counterbalanced by the even greater confusion in Molina's diagnosis of *Lucuma*, which was based on some very heterogeneous plants (Molina, Saggio sulla storia naturale de Chile, 1782, p. 161) Molina's 5 species were very inadequately described, and, in the absence of herbarium specimens, the vernacular names and notes about their use supply the principal means of identification. Authors agree, however, that *Luc. keule* Molina and *Luc. spinosa* Molina are no Sapotaceae, the former being *Adenostemon nitidum* Pers., *Gomortega nitida* Ruiz et Pav. (Gomortegaceae), the latter *Gourliaea chilensis* Clos (Leguminosae). This is probably also the reason why Bentham and Hooker gave de Jussieu as the author of *Lucuma*.

Things were thouroughly worked over by Radlkofer, who published two papers dealing with Sapotaceae in Sitz. ber. Math.

Phys. Classe Kgl. Bayr. Ak. Wiss. München XII (1882) and XIV (1884), and who is also the author of the classification of the Sapotaceae in Durand's Index (1888).

In the first paper, pp. 299 and 333, the genus *Pouteria* is reestablished, with 22 species, including the majority of species of De Candolle's section *Guapeba* of *Lucuma*. In the same publication, pp. 299 and 325, *Vitellaria* Gaertn. f., of which Gaertner had described and figured only the fruit, and which had up to that time been included in *Lucuma*, was taken up for plants of De Candolle's sections *Eulucuma*, *Antholucuma* and *Rivicoa* of *Lucuma*, chiefly on account of the supposed occurrence of a thin layer of albumen in their seed (16 spp.). After removal of all these species the genus *Lucuma*, for which Radlkofer retained Molina as the author, was left with only 2 species, *L. bifera* Molin. and *L. valparadisaea* Molin. (l.c. pp. 314, 315). The synonymy of these according to Radlkofer is: 1. *Luc. bifera* Mol. (generally taken as the type-species of *Lucuma*, and placed by Dubard in *Lucuma* sect. *Antholucuma*), *Achras Lucuma* Ruiz et Pav., (?) *Luc. obovata* H.B.K., *Luc. obovata* H.B.K. var. *Ruizii* A.DC.; 1 a. *Luc. bifera* Mol. forma *turbinata* (Mol.) Rdlk., *Luc. turbinata* Mol.; 2. *Luc. valparadisaea* Mol. (type-species of *Gayella* Pierre, *Lucuma* sect. *Gayella* Dubard), *Luc. splendens* A.DC.

O. Kuntze, Revisio Gen. Pl. (1893) p. 194, did not accept the identifications of *Luc. bifera* Mol. and *Luc. turbinata* Mol. as given by Radlkofer, chiefly because these species were not mentioned in the second edition of Molina's book. The identity of *Luc. valparadisaea* Mol., too, he considered so uncertain, that he preferred the later specific name *Luc. splendens* A.DC. Since Molina's genus diagnosis does not in the least resemble anything Sapotaceous, and as, moreover, the 2 species out of 5 which could be identified with any certainty, are no Sapotaceae, Kuntze rejected *Lucuma* Molina altogether. De Jussieu's *Lucuma* (Gen. Pl. 1789, p. 152) was, according to Radlkofer, described independently of Molina's, though based on one of the same species, but O. Kuntze rejected this identification, too.

Since, according to Radlkofer, *Luc. bifera* and *Luc. valparadisaea* have "flores 5- (interdum 4-) meri", whereas the species referred to *Pouteria* should be 4-merous, the number of flower-parts has become the leading factor in deciding whether a species should be placed in *Lucuma* or in *Pouteria* (Engler, Dubard). O. Kuntze in 1893 rightly recognized the unsoundness of this distinction, referring *Lucuma* sensu Rdlk. and *Vitellaria* sensu Rdlk. to *Pouteria* Aubl. em., which thus attained the same extension as

Lucuma sensu Bth. et Hook. 1876. Mainly as a result of controversies with his fellow-botanists on nomenclature, and on the starting point in particular, Kuntze's other work has almost universally been neglected.

So Radlkofer's views were adopted by Engler in Bot Jahrb. XII (1889) p. 514 and in Engl. Prantl, Nat. Pfl. fam. IV. i (1890) p. 141, but in Nachtr. (1897) p. 273 *Vitellaria* is incorporated in *Lucuma*, together with several genera described a few years before by Pierre and Baillon, bringing the number of species of *Lucuma* at about 46.

Pierre, Not. Bot. (January 1891) p. 43, retained but a few species in *Pouteria*, of which he also misinterpreted the type-species *P. guianensis* Aubl. (Cf. p. 176), referring most of the species mentioned by Radlkofer to *Guapeba* Gomes, and making a new genus *Pseudocladia* for *Pouteria lateriflora* (Bth.) Rdlk., *Luc. lateriflora* Bth. ex Miq. et Eichl., and a new genus *Paralabatia* for *Pouteria dictyoneura* Rdlk.

Lucuma is not specially discussed in his 1891 paper, but he made *L. valparadisaea* Molina, which is one of the two species left in *Lucuma* by Radlkofer, a new genus *Gayella*. Besides those mentioned he made several other new genera, e.g. by splitting up *Vitellaria* Gaertn. em. Radlk. in three parts, abolishing the name *Vitellaria*. Several of Pierre's new genera were reduced to sections by Baillon, Hist. Pl. 1891, who himself, too, described a number of new genera, which in turn Engler mostly reduced to sections (Nachtr. 1897). In his posthumous paper in Urban, Symb. V (1904) pp. 100—108, Pierre appears to have adopted Engler's larger conception of *Lucuma*.

In 1904 O. Kuntze, who took 1735 as the starting point for nomenclature, revived *Sapota* Mill., 1740, using it in the same sense as *Lucuma* sensu Engler in Nachtr. Nat. Pfl. fam. but including *Pouteria*. He subdivided it into two sections, viz. (1) *Puteria*, with 4 decussate sepals, and (2) *Sersalisia*, with 5, or 4—6, imbricate sepals (Von Post and Kuntze, Lexicon. Gen. Pl. 1904, p. 499). *Sersalisia* R.Br. 1810 was described with two Australian species. Bentham and Hooker in 1876 referred *Sers. sericea* to *Lucuma*, and Lam in 1925 *Sers. obovata* to *Planchonella*.

Dubard, in Ann. Mus. colon. Marseille XX (1912), Les Sapotacées du groupe des Sideroxylinées, which is the latest general revision of this part of Sapotaceae, retained "Pouteria (selon Radlkofer et Engler)", notwithstanding the fact that he, as a consequence of Pierre's misinterpretation of *P. guianensis* Aubl., inserted the latter in *Labatia* Sw. (Dubard l.c. pp. 30 and

38). Dubard's principal alterations in the generic limits of *Pouteria* and *Lucuma* as compared with Engler are the tranference of the section *Pseudocladia* from *Lucuma* to *Pouteria*, of the section *Crepinodendron* from *Lucuma* to *Micropholis*, and of the sections *Aneulucuma* and *Urbanella* from *Lucuma* to *Calocarpum*, while *Fontbrunea*, treated by Engler as a section of *Sideroxylon*, was put in *Lucuma*, as was the genus *Epiluma* H.Bn.

In Arch. Jard. Bot. Rio de Janeiro III (1922) p. 233 Ducke, in a note under *Lucuma dissepala* (Krause) Ducke, remarks "les genres Vitellaria et Pouteria ne sont pas naturels et ne peuvent, à mon voir, pas être maintenus". In Ann. Ac. Bras. Sc. VI (1934) p. 208 *Lucuma gutta* Ducke is described "e subgenere (vel genere artificiali) Pouteria".

The above review demonstrates the instability of generic limits, especially as concerns *Pouteria* and *Lucuma*. Since the distinguishing characters given by Engler and Dubard are almost valueless, it appears reasonable to unite *Pouteria* and *Lucuma*. I fully agree with Kuntze, however, that there is no justification whatever for preferring the younger generic name *Lucuma* to *Pouteria*. The principal arguments for uniting *Lucuma* and *Pouteria* are in my opinion:

(1) that the number of flower-parts, the principal distinguishing character according to Engler and Dubard, shows such a great diversity within *Lucuma* sensu Dubard, that it appears quite arbitrary to attribute generic value to the 4-merous flowers in *Pouteria;* moreover individual variations are so frequent as to pervert any classification based primarily on the number of flower-parts.

(2) that the differences between the two genera as understood by Engler (Nachträge) and Dubard, are of the same order as those between the sections distinguished by these authors in each of these genera.

Labatia. — The same arguments as in the case of *Pouteria* and *Lucuma* may be brought forward with respect to the genus *Labatia*. This genus was described by Swartz in his Prodr. Veg. Indiae Occ. 1788, p. 32, with one species, *Lab. sessiliflora*. In Schreber's edition of Linné's Genera Plantarum, II, 1791, p. 790, Swartz mentioned *Pouteria* Aubl. as a synonym of *Labatia*, and on p. 820 the genus *Chaetocarpus* Schreb., published in vol. I, p. 75 as a new name for *Pouteria*, based on the fruit figured by Aublet, is also referred to *Labatia* Sw. In Swartz's Flora Ind. Occ. I 1797, p. 263, *Chaetocarpus* Schreb. and *Pouteria* Aubl. are

given as synonyms of *Labatia*. For particulars see Radlkofer in Sitzber. Math. Phys. Cl. Kgl. Bayr. Ak. Wiss. München XIV, 1884.

In 1826 Martius described and figured a new species from Brazil, which he considered to belong to *Labatia* Sw. (Mart., Nov. Gen. et Sp. II, 1826, p. 71, tab. 161, 162). The fruit of this *Lab. macrocarpa* Mart. *(Pouteria macrocarpa* D. Dietr. 1839) is baccate, 4(2)-celled, and contains seeds in which the smooth glossy part only occupies a narrow dorsal strip, owing to the coherence of almost the whole seed with the walls of the ovary-cell. This Martius erroneously held to be a parietal placentation, which was strongly doubted by De Candolle. The right interpretation is given in Fl. Bras.

De Candolle, Prodr. VIII, 1844, p. 164, followed Swartz in considering *Labatia* Sw. and *Pouteria* Aubl. synonyms, but retained *Labatia* Mart. for *Lab. macrocarpa.* Mart. This was also done by Bentham and Hooker, Gen. Pl. II ii (1876) pp. 655 and 657, with the only difference that they referred *Labatia* Sw. to *Lucuma*, placing *Pouteria* in the "genera affinia aut dubia v. exclusa". In 1884 Radlkofer, after an examination of Swartz's plant, re-united *Labatia* Sw. and *Labatia* Mart. As a result of Pierre's misinterpretation of the type-species of *Pouteria*, Pierre and Baillon applied the name *Pouteria* to *Labatia macrocarpa* Mart. and some related species.

Since the flowers of the species included in *Labatia* only differ in minor points from those of the species referred to *Pouteria*, the peculair structure of the seed has been taken as the principal distinguishing feature of *Labatia*. This kind of seed, which looks very different from those with a more or less oblong or even linear scar occurring in most species of *Pouteria*, is linked with these, however, by the seeds of *Pouteria multiflora* (A.DC.) Eyma *) and *Pouteria macrophylla* (Lam.) Eyma **), in which both areas occupy about an equal portion of the seed's surface. Cf. Hook. Ic. 2498 and Fl. Bras. tab. 29. In *Pouteria trigonosperma* n.sp., which has flowers of the ordinary *Antholucuma*-type, except for the number of ovary-cells, the seeds are triquetrous, and only the dorsal, free side is thickened and glossy, whereas the lateral sides are very thin, almost membranous, and cohere with the

*) *Pouteria multiflora* (A.DC.) Eyma, nov. comb., *Lucuma multiflora* A.DC. 1844.

**) *Pouteria macrophylla* (Lam.) Eyma, nov. comb., *Chrysophyllum macrophyllum* Lam. 1793, *Lucuma rivicoa* Gaertn.f. 1807. (I do not think Gaertner's description, based on the seed, a valid publication of *L. rivicoa).*

septa. Cf. Fig. 1 (p. 172). As to the floral structure, I should like to remark that the bivalvate appearance of the calyx in the flower-buds, the 2 exterior sepals completely including the interior ones, is not a special feature of *Labatia*, as Bentham and Hooker supposed it to be, but is to be found in all 4-merous flowers of *Pouteria*. Cf. Radlkofer in Sitz.ber. Math. Phys. Cl. K. Bair. Ak. Wiss., München, XIV (1884) p. 438.

The name *Labatia* Sw. 1788 is antedated by *Labatia* Scopoli, Introductio 1777, p. 197 (= *Ilex*, Aquifoliaceae).

So far the genera united belong to a group on the close interrelationships of which all authors agree. A consideration of the doubtful value of staminodial development as a generic character, together with a further application of Dubard's grouping according to the shape of the embryo, leads to the including in *Pouteria* of also *Oxythece*, *Barylucuma*, *Glycoxylon* and *Pradosia*.

Oxythece — Miquel described *Oxythece* in Fl. Bras. VII (1863) p. 105 with two species, *O. leptocarpa* Miq. and *O. pseudosideroxylon* Miq., both from Amazonian Brazil. The generic diagnosis was drawn up after the flowers and fruit of *O. leptocarpa*. The principal characters of *Oxythece* according to Miquel are (1) the absence of staminodes, which would place it near *Chrysophyllum*, and (2) the exalbuminous seeds, in which it differs from that genus but agrees with *Lucuma* (now *Pouteria*). Indeed, Bentham and Hooker placed it at the end of *Lucuma*, together with some other species without staminodes which they considered more or less intermediate between *Lucuma* and *Chrysophyllum*. (Gen. Pl. II. ii, 1876, p. 654).

It was found, however, that some staminodes did occur occasionally (Baillon, Pierre), even in flowers of the type-specimen (Ducke in Arch. Jard. Bot. Rio de Janeiro VI, 1933, p. 74). This, together with the generally 2-celled ovary, short style, and exalbuminous seed with thick-leaved embryo, indicates that its relations are with *Pouteria* § *Pseudocladia*, much more than with Engler's *Chrysophyllinae*. One wonders that Miquel did not include *Sideroxylon cuspidatum* A.DC., *Sid. elegans* A.DC., *Sid. robustum* Mart. et Eichl., and *Lucuma glabrescens* Mart. et Eichl. in *Oxythece*, especially since he himself pointed to the habitual resemblance of the two first mentioned and *Ox. pseudosideroxylon*. Baillon, Hist. Pl. XI (1891) p. 292, footnote n. 7, recognized *Sid. cuspidatum* and *Sid. elegans* as *Oxytheces*, and Pierre, in Urban Symb. Ant. V (1904) p. 161, also referred,

though with (?), *Sid. robustum* (erroneously *Lucuma robusta)* to that genus.

All species can be easily recognized by their straight, parallel nervation, resembling that of *Manilkara,* but always immersed above, and by the dull, often pruinose or glaucous undersurface of their leaves. The number of ovary-cells, which Pierre considered one of the principal features of *Oxythece,* is not always the same, but 2 appears to be the rule. Pierre also found 2 ovary-cells in O. *leptocarpa* Miq. and in O. *pseudosideroxylon* Miq., which both, according to Miquel, should be 5-celled, and in *Sid. robustum* Mart. et Eichl., for which a 4-celled ovary was described. *Lucuma glabrescens* Mart. et Eichl., too, was described with a 5-celled ovary, but MS notes by Pierre in Herb. Paris give the number as 3, rarely 2, for the type-collection Spruce 2029, admitting, however, that another specimen in the Paris Museum exceptionally had 5 ovary-cells. It may be that this relates to two sheets without collector's name from Pará. For no apparent reason Baillon made *Luc. glabrescens* a new genus *Gymnoluma.* Ducke, l.c. p. 73, pointed to its resemblance to *Oxythece.*

The close relationship between § *Oxythece* and § *Pseudocladia* is also shown by the fact that Pierre referred *Lucuma ramiflora* (Mart.) A.DC. with (?) to *Oxythece.* Dubard, p. 35, placed this species, *Labatia ramiflora* Mart., *Pouteria ramiflora* (Mart.) Rdlk., in *Pouteria* § *Pseudocladia* (Pierre) Dubard. It forms a connecting link between § *Pseudocladia* and § *Oxythece,* together with some other species, e.g. *Pouteria egregia* Sandw., *Pouteria cladantha* Sandw., and *Pouteria ovata* A. C. Smith. These all have a more or less parallel nervation, but not immersed above, as in *Oxythece.* In this respect *Oxythece inophylla* (Mart.) Rdlk., too, differs from *Oxythece* Miq. Pierre doubted its place in that genus on account of its 5-celled ovary, and Ducke made it a new genus *Glycoxylon.* Cf. p. 167. I am not quite certain about the relationships of *Oxythece ? Schomburgkiana* Pierre, which is the same as *Lucuma rigida* Mart. et Eichl., *Pouteria rigida* (Mart. et Eichl.) Rdlk.

The name *Oxythece* Miq. 1863 should be regarded as an orthographic variant of *Oxytheca* (Cambridge Rules Artt. 61, 70). This was also O. Kuntze's opinion, who included *Oxythece* as a section *Oxytheca* in *Pometia* Vell. (von Post and Kuntze, Lex. Gen. Phan., 1904, pp. 410, 456). Consequently *Oxytheca* Nutt. 1847 (Polygonacea) invalidates *Oxythece* Miq. as a generic name.

Barylucuma — *Barylucuma* Ducke, described with one species, *B. decussata* Ducke from the State of Pará, appears to be nearly related to the *Oxythece* group. Its leaves are almost the same, and their decussate position is by no means a very fundamental difference, as also in the *Oxythece* group the leaves are often more or less opposite, thought never constant so, as in *Barylucuma*. Staminodes are well-developed, and the ovary is 3, mostly 4-celled. The fruit of *Barylucuma* is still unknown, but the other characters are favourable to its inclusion in *Pouteria* s.l. *Barylucuma* was described in Arch. Jard. Bot. Rio de Janeiro IV (1925) p. 161, pl. 19.

Glycoxylon — Ducke founded his genus on 3 species, one already described as *Chrysophyllum inophyllum* Mart. ex Miq., the other two new, viz. *Glyc. pedicellatum* Ducke and *Glyc. Huberi* Ducke. (Arch. Jard. Bot. Rio de Janeiro III, 1922, pp. 234, 235). More detailed diagnoses of the genus and its species appeared in Arch. IV, 1925, pp. 162-166, together with notes on affinities and an additional species, *Glyc. praealtum* Ducke. The species mentioned represent two types. *G. inophyllum* and *G. pedicellatum* have leaves resembling those of *Pouteria* § *Pseudocladia*, the principal primary nerves being straight and parallel, alternating with lesser ones, and not connected by uninterrupted secondary nerves. In some specimens determined as *G. pedicellatum*, e.g. in Jard. Bot. Rio de Janeiro n. 17595 [U], the consistency of the leaves approaches that of *Barylucuma* and *Oxythece*. *G. inophyllum*, which Pierre referred to *Oxythece*, though with doubt, owing to its 5-celled ovary, also differs in its nervation which is prominent above.

In *G. Huberi* and *G. praealtum* the primary nerves are connected by uninterrupted secondary ones, and lesser primaries are lacking. This facies strongly reminds one of *Pradosia*. The differences with *Pradosia* according to Ducke are (1) the mostly opposite leaves and branchlets in *Glycoxylon*, (2) the insertion of the flowers on the younger branchlets, and (3) the green or white flowers. These differences only exist, however, between *Glycoxylon* and *Pradosia lactescens*, but do not hold true if *Glycoxylon* is compared with *Pradosia glycyphloea* as interpreted by Kuhlmann in 1930. As I have already explained above I do not think it advisable to attach much importance to the opposite position of the leaves and branches in these groups of plants, and this view is supported by the variability of this character in *Pradosia*, even in the same specimen. The

sweet taste of the bark of all species of *Glycoxylon* (hence the names Glycoxylon, páo dôce = sweet wood, and casca dôce = sweet bark) is also characteristic for *Pradosia glycyphloea*, which also bears the name casca dôce. The curious folded stamens (at least in bud) are another point in common of *Glycoxylon* and *Pradosia*.

Pradosia — Liais' description of *Pradosia*, in his Climats, Géologie, Faune et Géographie botanique du Brésil, 1872, pp. 612-616, belongs to the same species as is figured on tab. 25 of the Flora Brasiliensis as *Lucuma glycyphloea*. Liais as well as Martius, Miquel and Eichler thought this to be the same as *Chrysophyllum glycyphloeum* Casar., but, according to Kuhlmann's interpretations in Arch. Jard. Bot. Rio de Janeiro V, 1930, p. 206, it is not that species but *Pometia lactescens* Vell., *Pradosia lactescens* (Vell.) Kuhlm.

Up to that time the two species had been confounded by all authors. Nomenclatorial history of these species is highly complicated, and Kuhlmann's interpretation is chiefly based on the sweet bark of *P. glycyphloea*, that of *P. lactescens* being bitter. Both have been recorded for the States of Rio de Janeiro and Minas Geraes.

As said above, *P. glycyphloea* (Casar.) Liais sensu Kuhlm. cannot be separated from *Glycoxylon*. *P. lactescens* (Vell.) Kuhlm. is a little more different; its flowers, beside being cauliflorous, externally more resemble those of some species of *Chrysophyllum* or *Pouteria* § *Nemaluma*. With the latter it also agrees in the one-seeded fruit with soft pericarp. The folded anthers, on the other hand, relate it with *P. glycyphloea* and *Glycoxylon*.

Pouteria ptychandra Eyma is undoubtedly very nearly related to this species. Its flowers are in dense fascicles on branches about as thick as a finger, and its anthers are folded. The fruit also agrees well, but the embryo, though with thick semiellipsoid cotyledons, has a conical caudicle, and is enclosed within two well-developed though thin sheets of albumen. Cf. p. 189, Fig. 2 (p. 190).

Bentham and Hooker, Gen. Pl. II, ii (1876) p. 654, placed *Pometia* under *Lucuma*, among the plants occupying an intermediate position between *Lucuma* and *Chrysophyllum*. O. Kuntze made *Pradosia* Liais a section *Eupometia* of *Pometia* Vell., and *Oxythece* Miq. another section *Oxytheca*. (von Post and Kuntze, Lex. Gen. Pl., 1904, p. 456). *Pometia* Vell., 1825, is antedated by *Pometia* Forst., 1776 (Sapindacea).

Radlkofer in 1882 referred *Pometia lactescens* to *Pouteria* (in Sitz. ber. math. phys. Cl. Kgl. Bayr. Ak. Wiss. München, XII, 1882, pp. 294, 333). Baillon (1891) and Engler (1891) both retained *Pradosia.*

It will be asked why, in view of such a variety of types as represented by the numerous sections of *Pouteria*, it would not be preferable to assign generic rank to at least some of these. A consideration of the close interrelationships and intermediate forms as discussed under the headings of the genera newly united with *Pouteria* clearly shows the impracticability of this. The same or similar arguments induced Engler and Dubard to reduce most of Pierre's and Baillon's genera to sections or their synonymy. I prefer, however, Engler's slightly greater number of sections to Dubard's fewer and consequently more heterogeneous ones. A more detailed discussion is better left to a monographer dealing with the whole genus or group. For the same reason I refrained from publishing all new combinations, especially since a monograph of this genus is already in preparation elsewhere.

It cannot be denied that at first sight some of the sections appear rather distinct, but the occurrence of intermediate forms prohibits the assigning of generic rank to any of them. This especially applies to § *Antholucuma* A. DC. The species in this section are characterized by large flowers with a long, slender style and with the stamens inserted in the upper part of the tube, while in the leaves the primary nerves are connected by uninterrupted secondary ones. There are, however, several connecting links with *Pouteria* s. str. So *Pouteria cayennensis, Chrysophyllum cayennense* A. DC., *Lucuma pulverulenta* Mart. et Eichl., which is the type-species of Baillon's section *Pholidoluma*, has the essential characters of § *Antholucuma*, but its flowers are smaller, and with a shorter style, as in *Pouteria* s. str. *Lucuma gutta* Ducke has flowers of the *Antholucuma* type, but 4-merous, and the nervation of its leaves approaches that of *Pouteria* s. str. The large flowers and the nervation of the leaves of *Pouteria Jenmanii* (Pitt.) Sandw., *Lucuma Jenmanii* Pitt., link § *Guapeba*, in which it was inserted by Sandwith, to § *Antholucuma.*

As regards the species with few-celled ovary and short style, which Dubard considered more closely related, I refer to what is said on p. 165 on the relationship between § *Pseudocladia* and § *Oxythece*, and on p. 167 on those between § *Oxythece*,

§ *Barylucuma* and § *Pradosia-Glycoxylon.* This clearly shows that these characters have no more than sectional value. From what has been said on the number of flower-parts follows that the distinction between *Pouteria* § *Pseudocladia* and *Lucuma* § *Franchetella* cannot be maintained, so the latter section is abandoned. See also p. 184. Of neither of these two sections have the fruit, seed and embryo of the type-species been described, but those of e.g. *Pouteria ovata* A. C. Smith are of the ordinary *Pouteria* type.

Pouteria Sagotiana (H.Bn.) Eyma nov. comb., *Eremoluma Sagotiana* H. Bn., *Lucuma Sagotiana* (H. Bn.) Engl., has a long, flask-shaped 1-celled ovary, and may therefore be maintained as a section. Its other characters agree with § *Pseudocladia.* Its fruit also agrees.

Lucuma retusa Spruce ex Miq. et Eichl., *Vitellaria retusa* Radlk., type of *Lucuma* § *Coptoluma* H. Bn., which Dubard placed in *Lucuma* § *Gayella,* is probably better referred to *Micropholis.* Its fruit and seed are unknown.

Pouteria *(§ Antholucuma)* **grandis** Eyma, nov. sp.

Arbor, 35½ m altus, 40 cm diametiens (ex For. Dept. 2131), ramulis crassis, junioribus (ex B.W. 3226) griseo-brunneo-puberulo-tomentosis. Foliorum petioli 3—7 cm longi, laminae obovato-oblongae (vel in B.W. 3226 longe obovatae), (14) 16—30 cm longae, longitudine latitudinem (1½) 2—2¼-plo superante, apicem acumine breve lato obtuso munitum versus subrotundatae, basi obtusae in petiolum contractae, coriaceae, margine revolutae, supra glabrae, subtus indumento brevissimo brunneo opaco plus minusve minute puberulae, juniores (ex B.W. 3226) et supra sparse puberulae indumento utrinque subnitido, nervo mediano supra subplano vel basi plus minusve immerso, subtus valde prominente, nervis primariis 1—2 cm distantibus, supra planis vel subimmersis, subtus valde acute prominentibus, subrectis, marginem versus curvatis, nervis secundariis supra subplanis vel subimmersis, subtus graciliter prominulis indumento saepius obtectis, primarios connectentibus, reticulatione inconspicuo. Flores in fasciculis paucifloris axillaribus vel supra cicatrices foliorum delapsorum dispositi; pedicelli robusti circ. 1¾ cm longi, ferrugineo-puberulo-tomentosi; sepala 4, exteriora 2 elliptico-oblonga, in alabastro ellipsoideo interiora includentes, 1½ cm longa, ut pedicelli ferrugineo-puberulo-tomentosa, interiora 2 oblonga vel obovato-oblonga exteriora nonnihil superantia, indumento pallidiore; corolla cylindrica, usque 1¾ cm longa, pallide viridis, lobis 6 oblongis apice subtruncatis, tubi ½ partem aequantibus; staminodia subulata stamina subaequantia;

stamina fauci vel paullulo altius inserta, filamentis latis brevibus, antheris extrorsis sed rimis introrsis dehiscentibus; ovarium late ovoideum, pilosum, 6-loculare, stylo longo filiforme basi adpresse piloso circ. 11 mm attingente, stigmate non incrassato 6-verrucoso. Fructus subglobosus vel ellipsoideo-globosus, maximus visus circ. 5 cm longus, minute ferrugineo-puberulus, dein glabrescens, calyce persistente deflexa, pedicello crasso usque 2¼ cm longo, seminibus non bene evolutis.

Guiana anglica: ad rivulum Simuni Creek dictum, alt. circ. 100 m., prope fl. Rupununi infra Montes Kanaku (Davis, Forest Dept. British Guiana n. 2131, typus, in Herb. Kew, cum floribus lectus Aug. 1931).

Surinamo: Brownsberg, arbor n. 53 (B.W. n. 3226, cum fructibus lectus Sept. 1917).

Nomen indigenum: Guiana anglica: Bakupar (Wapisiana).

This species appears nearly related to *Lucuma arguacoensium* Karsten from Colombia. According to Karsten's diagnosis in his Florae Columbiae Spec. Sel. I, p. 120 and pl. 64, the latter has leaves not acuminate at the apex, 10—12 flowers in each bundle, the 2 inner sepals glabrous, the corolla white, with minutely ciliate lobes, and staminodes which surpass the stamens.

Pouteria *(§Antholucuma)* **trigonosperma** Eyma, nov. spec. — Fig. 1.

Arbor, latice albo, ramulis pallidis glabris, junioribus minute densissimeque obscure rubro-brunneo-tomentosis. Foliorum petioli 2½—3 cm longi, plus minusve tomentelli, laminae obovatae, oblongo-obovatae, vel oblongae, usque 19 cm longae, longitudine latitudinem 1½—1¾-plo superante, recurvatae itaque siccitate plicatae, apice rotundatae vel obtusae vel subretusae, basi obtusae, subcoriaceae vel coriaceae, raro chartaceae, glabrae, statu sicco supra nitidae brunneae subtus opacae pallidioresque, nervo mediano supra minute acute prominulo, subtus valde prominente, nervis primariis 1¼—2 cm distantibus, supra planis subtus prominentibus, nervis secundariis supra planis vel grosse prominulis canaliculatisque subtus graciliter prominulis, nervos primarios connectentibus, reticulatione ultimo denso subtus prominulo. Flores in fasciculis paucifloris axillaribus vel supra cicatrices foliorum delapsorum dispositi; pedicelli 1½—2 cm longi, florem versus incrassati; sepala 4, exteriora 2 longe ovato-deltoidea, in alabastro ovoideo obtuso interiora includentes, 11—13 mm longa, ut pedicelli obscure rubro-brunneo-puberulo-tomentosa, interiora 2 oblonga, 13—15 mm longa, indumento pallidiore; corolla cylindrica, usque 16 mm longa, alboviridis, lobis 6 oblongis, apice rotundatis truncatis, longitudine eum tubi vel ½ partem aequante; staminodia

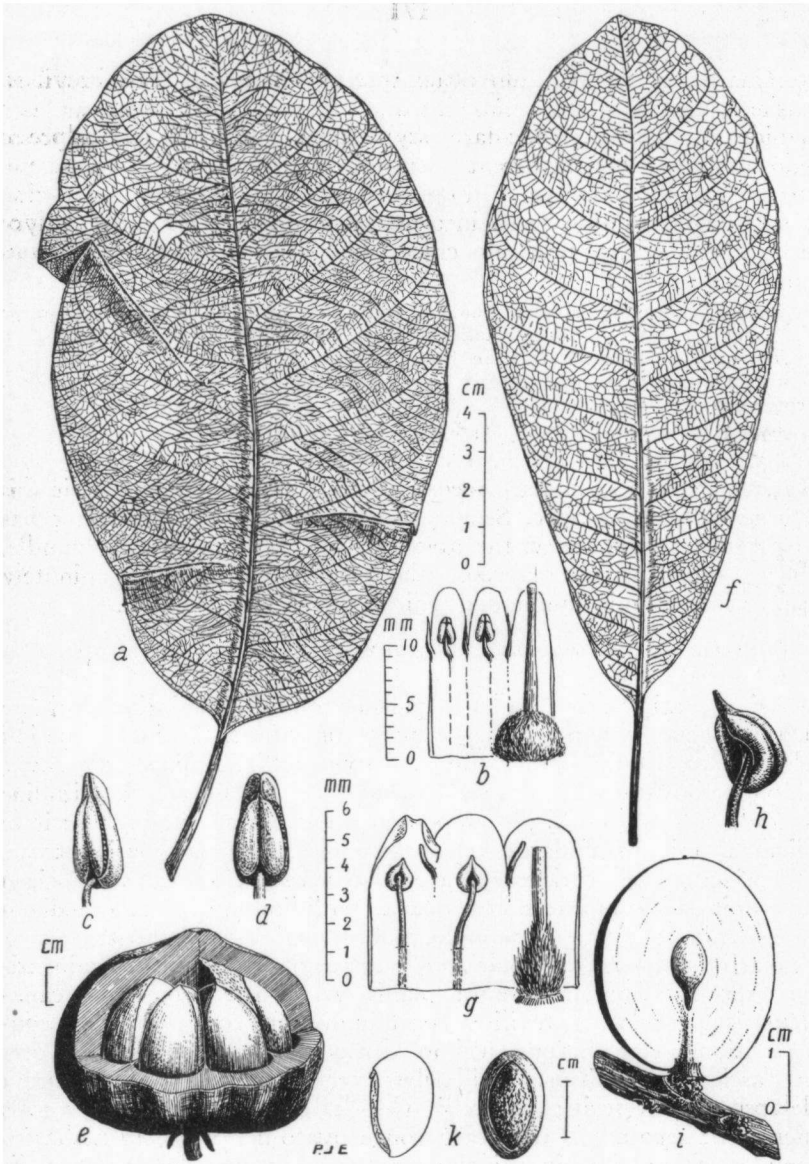

Fig. 1. *Pouteria trigonosperma* Eyma. a: leaf (B.W. 1798); b: flower (B.W. 1798); c, d: anther (B.W. 311); e: fruit (combined drawing). *Pouteria guianensis* Aubl. f: leaf (van Hall 27); g: flower (B.W. 4062); h: anther of g; i: fruit containing immature seed (van Hall 27); k: seed (B.W. 381).

subulata, stamina aequantia vel superantia, decurrentia; stamina prope faucem inserta, filamentis brevibus decurrentibus, antheris oblongis apicem truncatum versus subangustatis, extrorsis, sed rimis in primis apice introrsis dehiscentibus; ovarium depressum, 7—8 loculare, stylo longo cylindrico e basi adpresse pilosa apicem versus sensim angustato, exserto, circ. 12—14 mm attingente, stigmate subgloboso sublobulato. Fructus magnus, circ. 7 cm diametiens, subglobosus vel apice subelevato, pericarpio tenue, carnoso, seminibus triquetribus 7—8 bene evolutis, quorum testa partibus lateralibus dissepimentis arcte cohaerentibus membranacea, parte tertia externa libera coriacea nitidissima brunnea, embryone magno, cotyledonibus 2 crassissimis, radicula minutissima, punctiforme.

Surinamo: Zandery I, arbor n. 222 (B.W. n. 1514, ster., lectus Dec. 1915; n. 2294, cum alabastris lectus Junio 1916; n. 3604, ster, lectus Jan. 1918; n. 3898, cum alabastris lectus Julio 1918; n. 4113, cum fructibus lectus Nov. 1918; n. 4354, cum alabastris lectus Julio 1919, folia tantum novella gerens; n. 4722, cum alabastris lectus Julio 1920); Zandery I (B.W. n. 2823, cum alabastris parvis fructibusque lectus Apr. 1917); Sectie O, arbor n. 66 (B.W. n. 1341, ster., lectus Nov. 1915; n. 1798, typus, in Herb. Rheno-traj., cum floribus lectus Junio 1916; n. 1816, cum alabastris parvis lectus Maio 1916; n. 2388, typus fructus, lectus Aug. 1916; n. 2920, cum alabastris lectus Junio 1917; n. 3381, cum floribus fructibusque lectus Oct. 1917; n. 3822, cum fructibus lectus Maio 1918; n. 3941, defl., lectus Aug. 1918); Sectie O, arbor n. 503 (B.W. n. 311, cum floribus lectus Apr. 1915; n. 1251, ster., lectus Nov. 1915; n. 3177, cum floribus lectus Julio 1917; n. 3948, defl., lectus Aug. 1918; n. 4398, defl., lectus Aug. 1919; n. 5419, cum fructibus lectus Nov. 1921).

Nomina indigena: Bosch koesoewé, Mabijara (S.D.); Boesi koesoewé, Mabi jara, Sabana mabiara (N.E.); Abènbèlè, Janboka (Sar.); Mabijara, Jawahe papaja, Iawé hepapaja, Jawohe paikoelia (Arow.); Mapijara, Mapirian, Mapiran, Mapiran warian, Mapilan, Mapiwalan (Kar.).

The most typical feature of *Pouteria trigonosperma* is the structure of its fruit and seed, which has already been discussed on page 164. The shape and dimensions of the flowers are typically those of *Pouteria* sect. *Antholucuma (Lucuma* sect. *Antholucuma* of A. De Candolle and others). The leaves show a striking similarity to those of *Pouteria psammophila* (Mart.) Radlk. from Rio de Janeiro. The latter can be distinguished at first sight, however, by its much smaller, subsessile flowers, which, moreover, differ in other respects, too.

The degree of shrinking in dried material can be judged by a comparison of dry flowers of B.W. 311 with flowers of the same collection preserved in alcohol.

	dry	after 1 minute boiling	preserved in alcohol
inner sepals	11 mm	13½ mm	15 mm
corolla	11 mm	14 mm	16 mm

Pouteria cayennensis (A. DC) Eyma, nov. comb.; — *Chrysophyllum cayennense* A. DC., Prodr. VIII (1844) p. 160; — *Lucuma pulverulenta* Mart. et Eichl. in Fl. Bras. VII (1863) p. 70.

The only Surinam specimen referred to this species, Splitgerber 1039 [L], of which I found an unnumbered duplicate inserted under *L. pulverulenta* in the Paris Herbarium, has its leaves shorter petioled than in Martin's specimen at Paris (± 8 mm against 20 mm) and the lamina more shiny beneath. It bears no flowers, and so its identity is not quite certain.

Dubard included *C. cayennensis* in *L. pulverulenta*, maintaining the younger specific name.

The identity of *Chrysophyllum cayennense* and *Lucuma pulverulenta* was first stated by Baillon, who made *C. cayennense* the type of *Lucuma* § *Pholidoluma* H. Bn. (Hist. Pl., 1891, p. 281). See also p. 169. I may add that in Herb. Paris 3 specimens of *Pouteria Caimito* (Ruiz et Pav.) Rdlk., a sterile one collected by Martin and two by Mélinon, of which one with fruit, have been inserted under *C. cayennense*, and perhaps also been distributed under that name. This is at least the case with some fragments of Mélinon's plant in Herb. Utrecht.

Pouteria melanopoda Eyma, n. sp.

Arbor, ramis pallidis vel griseis, junioribus ferrugineo-tomentosis. Foliorum petioli 1½—4 cm longi, statu sicco nigri, laminae oblongae vel obovato-oblongae, apicem acuminatum versus rotundatae, basi subacutae vel obtusae, 12—28 cm longae, longitudine latitudinem 2¼—3½-plo superante, chartaceae vel subcoriaceae, glabrae, nervo mediano supra plano vel prominulo, subtus prominente, nervis primariis 1—3½ cm distantibus prope marginem curvatis, supra prominulis, subtus prominentibus, nervis secundariis utrinque acute prominulis, medio inter primarios in reticulationem mergentibus rarius primarios connectentibus, reticulatione ultimo subdenso nec densissimo utrinque acute prominulo. Flores in fasciculis axillaribus vel supra cicatrices foliorum delapsorum dispositi, pallide brunnei; pedicelli 4—7 mm longi; sepala 5, ovata, patentia, utrinque sed extus magis quam intus ut pedicelli adpresse

ferrugineo-pilosa; corolla subturbinata, 3—3½ mm longa, lobis (4) 5 subacutis vel subacuminatis, longitudine eum tubi aequante; staminodia ovato-acuminata vel ovato-lanceolata, minuta; stamina ad vel prope faucem inserta, filamentis subbrevibus, antheris ovoideis apiculatis introrsis; ovarium ovoideum vel depressum, dense ferrugineo-tomentosum, 4—5-loculare, in stylum brevem glabrum apice clavatum sensim vel abrupte angustatum. Fructus ignotus.

Suriname: Sectie O, arbor n. 687 (B.W. n. 1377, ster., lectus Nov. 1915; n. 6020, typus, in Herb. Rheno-traj., cum floribus lectus Decembri 1922).

Nomina indigena: Riemhout (S.D.); Lohoedoe (N.E.); Bobi waata (Sar.); Asepoekoe, Kwatasi, Hariraro assépoekoe (Arow.); Wasé poekoelan. Wasé poekoerian, Assé poekoe (Kar.).

Pouteria guianensis Aubl., Hist. Pl. Guiane franç. (1775) I, p. 86, III, pl. 33 excl. fruct. — Fig. 1 (p. 172).

The identity of this species, the type-species of the genus *Pouteria* Aubl., has long puzzled authors on Sapotaceae. This may be partly due to the scarcity of material referable to Aublet's plate; in fact I did not find a single collection of this species in the Paris Herbarium. I did not see the fragments collected by Sieber in Pará referred to by Radlkofer in Sitz. ber. Math. Phys. Cl. Kgl. Bayr. Ak. Wiss. München XII (1882) p. 331, but a sterile sheet of van Hall 27, Surinam [U], bears a note by Radlkofer (1910) declaring the anatomical structure of the leaf identical with that of Aublet's plant in the British Museum. Moreover, Dr. van Ooststroom, during his visit to London in 1933, kindly compared a sheet of B.W. 4062, Surinam, with Aublet's, without finding any specific difference. The Surinam material, from at least 4 different trees in the reserves Zandery I, Sectie O and Brownsberg, may thus safely be held to be the same species as that figured by Aublet.

Flowering and fruiting material of van Hall 27 had already been determined as *Pouteria guianensis* Aubl. by Pulle in 1909 (in Rec. Trav. Bot. Néerl. VI, 1909, p. 285).

As regards the various misinterpretations of *P. guianensis*, it should be taken into account that in the beginning matters have been complicated by the fact that Aublet figured a wrong fruit with his *P. guianensis*. This De Candolle, Prodr. VIII (1844) p. 164, already suspected, and Martius, in Sitzber. Kgl. Bayr. Ak. Wiss. 1861, Bd. 1, p. 572, excluded the whole of Aublet's plate except only the left flower, referring the fruit to *Dasynema*, Tiliaceae (= *Sloanea*, Elaeocarpaceae). The remainder, being

the left flower and the description of the same, he referred to *Labatia.*

Miquel and Eichler, in Fl. Bras. VII, 1863, p. 77 (not A. De Candolle as writes Huber in Bull. Soc. Bot. Genève VI, 1914, p. 197), placed *P. guianensis,* with only the fruit excluded, as a synonym at *Lucuma psammophila* (Mart.) A.DC., var. *β xestophylla.* The 2 specimens cited with var. *xestophylla,* viz. Widgren 689, ster., Rio de Janeiro [B] and Luschnath s.n., fr., Praya de Lagoa da Gavia [B], though showing some superficial likeness to *P. guianensis,* differ in their connecting secondary nerves being less interrupted and in their nervation being not conspicuously light-coloured as in *P. guianensis.* The fruit and seeds of Luschnath's plant resemble those of *P. guianensis,* the seeds having a scar about 6 mm broad. The type-specimen of *Labatia psammophila* Mart., Prince von Wied s.n., fl., Cabo Frio, Rio de Janeiro [B], has the leaves broadly rounded at the base, the stamens inserted at the middle of the tube, and ciliate staminodes, shaped like the corolla-lobes but slightly smaller.

Pierre, in his Notes Botaniques, 1891, p. 44, sais that the 3 or 4 of Aublet's sheets he saw in the British Museum in 1883 did not appear different from *Labatia macrocarpa* Mart. and from Sagot 476 determined by Sagot as *Lab. macrocarpa* Mart. His conclusion is that the branch figured by Aublet on pl. 33 is not of *Pouteria guianensis* Aubl. In an undated note, however, attached to a sheet of Sagot s.n., Karouany, Fr. Guiana [P], he confesses that he did not compare the plants in the Br. Museum with Aublet's plate nor with Sagot's plant, and that he is not at all certain as to whether the latter should be called *P. guianensis.* I did not see these collections in the Br. Museum myself, but from Dr. van Ooststroom's informations follows that the plant now labelled *P. guianensis* Aubl. there is neither identical with Martius' nor with Sagot's. The plants with obtuse leaf-base which Pierre dubiously referred to *P. guianensis* should likewise be discarded. (Mélinon s.n., Fr. Guiana, and Schomburgk 467, Roraima, Br. Guiana). All these plants have rather short petioles, not exceeding ½—1 cm, leaves glaucous beneath, close, uninterrupted connecting secondary nerves, and seeds with the horny part of the testa reduced to a small dorsal stripe. *P. guianensis,* on the other hand, has longer petioles, 2—4 cm long, leaves not glaucous beneath, much more distant and interrupted connecting secondary nerves, and seeds with the horny part of the testa not reduced and with an ordinary linear-elliptic scar.

Pierre's misinterpretation was taken over by Dubard,

who, in Ann. Mus. colon. Marseille, XX, 1912, p. 38, cites *P. guianensis* Aubl. as a synonym of *Labatia macrocarpa* Mart. The specimens seen by him are: Sagot 476, Mélinon s.n., Poiteau 1480, and Schomburgk 467. His misinterpretation of the type-species was counteracted, however, by his retaining the genus Pouteria sensu Radlkofer et Engler.

It probably was the circumstance that on the plate, drawn for Pierre by Delpy in 1885 [P], two different plants but with a certain likeness in habit are figured, under the names *Pouteria guianensis* Aubl. and *Ragala sanguinolenta* Pierre, which misled Benoist to consider them synonymous and the same as *Ecclinusa sanguinolenta* Pierre. (B e n o i s t, Les Bois de la Guyane franç. in Arch. de Bot. V, 1931, Mém. n. 1). The specimens cited, Benoist 230 and 304 are both *Eccl. sanguinolenta* (Pierre) Engl. I did not find the type-specimen of *Chrysophyllum sessiliflorum* Poir., which Benoist also mentions among the synonyms of *Eccl. sanguinolenta,* but according to Pierre's MS notes in Hb. Paris, this may be right.

There are several fruiting specimens among the Surinam material of *Pouteria guianensis.* In most cases, however, the contents of the fruits have been eaten by ants, and only the outer, harder parts of the fruit-wall and the testa of the seeds have been left. The description of the embryo is from B.W. 381 and 2829, both from tree n. 42 in the Zandery I reserve.

F r u c t u s primo late ellipticus, dein subglobosus, circ. 4—4½ cm longus, laevis, glaber, pericarpio firme, inprimis quoad partes exteriores; semina plerumque 2 evoluta, late oblongo-ellipsoidea, utrinque rotundata, non complanata, circ. 2 cm longa, testa dura nitida, area derasa axi adpressa elliptica, circ. 14 mm lata, hilo supero; albumen nullum; embryo cotyledonibus crassis plano-convexis, caudicula punctiforme.

Pouteria hispida Eyma, n. sp.

Arbuscula, 6 m alta, latice albo, ramulis crassis, partibus junioribus angulatis, pilis rigidis erectis pallide ferrugineis vel aureo-fulvis obsitis. Foliorum ad apices ramulorum congestorum petioli ½—1¼ cm longi, ut ramulis hispidi, laminae oblanceolatae, 8—20 cm longae, longitudine latitudinem 3½-plo superante, apice subacuta, basin subacutum vel subobtusum versus attenuatae, chartaceae vel papyraceae, ad nervationem principalem utrinque sed inprimis subtus fulvo-hispidae et praeterea pilis sparsis pallidis marginalibus et ad nervos minores munitae, nervo mediano supra inprimis basin versus plus minusve impresso, subtus valde

prominente, nervis primariis 7—11 mm distantibus subrectis ad marginem curvatis, supra prominulis, subtus valde prominentibus, nervis secundariis crebris primarios angulo circ. 90° connectentibus, utrinque sed subtus magis ac supra ut reticulatione ultimo acute prominulis vel prominentibus. Flores (alabastra subglobosa 2 mm diametientia solum visa) in ramulos junioribus supra cicatrices foliorum delapsorum dispositi; pedicelli 1 mm longi; sepala 4, ovata, acuta, pilis adpressis statu sicco pallidissimis dense obsita; corolla circ. 2 mm longa, lobis 4 rotundatis subdenticulatis tubum aequantibus; staminodia subulata; stamina ad basin tubi inserta, glabra, filamentis filiformibus, antheris ovoideis acutis extrorsis; ovarium ovoideo-conicum, pilosum, 4(?)-loculare, stylum crassum cylindricum versus attenuatum. Fructus ignotus.

Surinamo: in silva prope Wonotobo ad fl. Corantyn (B.W. n. 2863, typus, in Herb. Rheno-traj., cum alabastris lectus Octobri 1916).
Nomen indigenum: Toewonoele (Kar.).

Its relations are probably with Glaziou 21700 and 21701 from Goyaz, mentioned without description in Glaziou's list under the names *Lucuma minutiflora* Pierre and *Lucuma dentata* Pierre, which have stamens inserted about the middle of the tube, as is also the case in minute flower-buds of Krukoff 6344 (S. Amazonas).

Pouteria *(§Nemaluma)* **Engleri** Eyma, nom. nov.
Chrysophyllum alnifolium Engl. in Engl. Jahrb. XII (1890) p. 522, non Baker in Flora Trop. Africa III (1877) p. 499.

This species was described as a *Chrysophyllum*, without staminodes. A sketch with the type-specimen (Mélinon, Fr. Guiana) in Paris, however, shows one small deltoid staminode. I also observed this in several flowers among the Surinam material, e.g. B.W. 2403 and B.W. 4034, but also flowers were found in which all staminodes were equally well-developed, e.g. in B.W. 1225. In this latter case, but in some other flowers, too, the staminodes are ovate acute, with a deltoid base. In flower-buds of B.W. 4389 not even a faint indication of staminodes could be found, whereas a fullgrown flower of B.W. 4783, collected from the same three, had 4 well-developed truncate staminodes. Although the Surinam material of this species is rather abundant, the corollas of most flowers are lacking, and so no great numbers of flowers could be sacrificed in order to ascertain the range of variability of staminodial development on the same tree.

A fruiting specimen from British Guiana (Forest Dept. Br. Guiana n. 2362, François Creek, Mahaicony R. [K]), and another from Surinam (B.W. 4242, from the same tree as the flowering

B.W. 4783), have exalbuminous seeds containing an embryo with thick, semiellipsoid cotyledons and inconspicuous, punctiform radicle. This, together with the occurrence of staminodes excludes this species from *Chrysophyllum* and refers it to *Pouteria.* In its 1-seeded fruit and the soft fleshy pericarp, collapsing round the seed in the dry fruit, it approaches sect. *Pradosia,* with which it also agrees in the outward appearance of its flowers, but from which it differs in the straight, not folded filaments of its anthers, which are inserted near the base of the tube.

Judging after MS notes in Herb. Paris this is one of the 2 or 3 species which Baillon attributed to his genus *Nemaluma* (Hist. Plant., p. 293).

Pouteria Caimito (Ruiz et Pav.) Radlk. in Sitz. ber. Math. phys. Cl. Kgl. Bayr. Ak. Wiss. München, XII (1882) p. 333; — *Achras Caimito* Ruiz et Pav., Fl. Peruv. et Chil. III (1802) p. 18, t. 240; — *Lucuma Caimito* (Ruiz et Pav.) Roem. et Sch., Syst. IV (1819) p. 701; — *Labatia Caimito* (Ruiz et Pav.) Mart., Herb. Fl. Bras. (1837) p. 170.

Achras Caimito was originally described from eastern Peru, but Huber, in Bol. Mus. Goeldi IV (1904) p. 388, seems to doubt its spontaneous occurrence there. A. De Candolle, Prodr. VIII (1844) p. 167, and also Pierre in a MS note in Herb. Paris, remark that plate 240 is rather bad, showing the leaves lanceolate acuminate and obtuse, the pedicels about as long as the petioles, and the flowers larger than in Pavon's plant. Also, as remarked by De Candolle, was the style erroneously described as 8-lobed instead of 4-lobed. These, however, are minor discrepancies, well fitting in with the rather wide range of variability of this species as now understood, and to which Huber, l.c., drew attention when discussing the cultivated abiu of Pará. According to Huber the variability affects shape and dimensions of the leaves and fruit, as well as the consistency and taste of the latter. Cf. also Pio Corrêa, Dicc. Plant. uteis do Bras. I (1926) p. 5. The specimens afterwards referred to this species agree well with those of Ruiz and Pavon in various herbaria [e.g. P, B, D].

The resemblance of *P. Cainito* and *P. laurifolia* (Gomes) Rdlk., described from Rio de Janeiro, is so great, that I am very much inclined to ascribe the difference in the seed, given in Fl. Bras. VII pp. 79 and 80, but already doubted by Radlkofer, l.c. pp. 333, 273 — in *P. Caimito* hilum basal, in *P. laurifolia* apical — to be due to some error. If this might prove to be the case, *P.*

laurifolia could well be considered a small and narrow-leaved form or variety of *P. Caimito*. Synonymy of *P. laurifolia* is: *P. laurifolia* (Gomes) Rdlk. (1882) p. 333; — *Guapeba laurifolia* Gomes in Mem. Ac. Ulyss. III, Mem. Corr. (1812) p. 19, t. 2; — *Lucuma laurifolia* A. DC, Prodr. VIII (1844) p. 166. *Guapeba laurifolia* is Gomes' only species and accordingly the type-species of *Guapeba* Gomes.

Labatia reticulata Mart., Herb. Fl. Bras. (1837) p. 170, likewise described from Rio de Janeiro, was already in D.C. Prodr. referred to *Luc. laurifolia* as a variety. Martius himself had already suspected it to be synonymous with *Guapeba laurifolia*. To this variety De Candolle also referred, l.c. p. 671, *Achras Guapeba* Casar. Nov. Stirp. Bras. Dec. p. 61.

Lucuma temare H.B.K. Nov. Gen. et Sp. (1818) p. 241, fol. ed. p. 189, *Richardella temare* Pierre, Not. Bot. (1891) p. 20 (type Humboldt 929, S. Fernando, Esmeralda, Orinoco [P, ster.]), has a rather similar nervation as has *P. Caimito*, but the shape of the leaves is long oblong, to 18 x 4 cm. Its flowers are unknown; the fruit is described as „ovoideo carnoso glutinoso trispermo, seminibus ovato-oblongis".

Pouteria laevigata (Mart.) Radlk., l.c. XIV (1884) p. 453, *Labatia (?) laevigata* Mart. Herb. Fl. Bras. (1837) p. 172, *Lucuma ? laevigata* (Mart.) A.DC., Prodr. VIII (1844) p. 167, included by Dubard in *P. Caimito* (in Ann. Mus. Col. Mars. XX, 1912, p. 31), is, as far as I can judge from two detached leaves of the type-specimen (Martius, R. Japurá, Amazonas) in Herb. Utrecht, a different species. Its obovate oblong leaves are rounded or retuse at the apex, and the undersurface of the dry leaf does not show the conspicuous light coloured dense reticulation on a dark ground which is so characteristic for *P. Caimito*, but is evenly ochraceous-brown coloured, with a rather lax reticulation. It was described without flowers, but with sessile fruit, containing 4 seeds „uti in Labatia Caimito comparata".

According to a note with Baker 75 [U] the fruits of *P. Caimito* are at Pará commonly infested by the larvae of a Trypetid fly. This is evidently also the cause why only small, woody fruits are present in the Surinam material.

Pouteria filipes Eyma, n. sp.

Arbor ramulis gracilibus ut petioli ferrugineo-puberulis tomentosisve. Foliorum petioli graciles 1½-2 cm longi, laminae lanceolatae vel oblongo-lanceolatae medio vel paullulo supra medium

latissimae longitudine latitudinem 3-plo superante, apice acuminatae vel cuspidatae, basi acutae, usque 18 cm longae, chartaceae, supra glabrae, subtus pilis griseis vel griseo-fulvis parallele adpressis munitae, nervo mediano supra prominulo, subtus prominente, nervis primariis 7-12 mm distantibus hinc inde nervis minoribus dimidio brevioribus alternantibus, curvatis, supra planis vel prominulis, subtus valde prominentibus, nervis secundariis crebris utrinque aequaliter vel subtus nonnihil magis quam supra acute prominulis primariorum partes superiores connectentibus. Flores in fasciculis circ. 7-floris supra cicatrices foliorum delapsorum ad ramulos juniores dispositi; pedicelli graciles, filiformes, circ. 7 mm longi, adpresse pilosi; sepala 4, oblongo-elliptica, circ. 3 mm longa, horizontaliter patentia, margine dense ciliata, exteriora 2 in alabastro valvata interiora includentia extus dense adpresseque griseo-pilosa, interiora 2 tenuiora lateribus inprimis basi glabris; corolla cylindrica vel paullulo subturbinata, 3-4 mm longa, flavido-alba, lobis 4 rotundatis, longitudine circ. 1/3 partem tubi aequante, margine ciliis crispis dense ciliatis; staminodia uti lobi corollae efformata sed dimidio minora; stamina circa medium tubi inserta, glabra, filamentis bene evolutis, antheris extrorsis apiculatis; ovarium ellipsoideum, pilosum, 4-loculare, stylo cylindrico non exserto. Fructus ignotus.

Surinamo: Brownsberg, arbor n. 1141 (B.W. n. 2091, ster., lectus Julio 1916; n. 6366, typus, in Herb. Rheno-trajectino, cum floribus lectus Jan. 1924).

Nomina indigena: Moraballi firobero (Arow.); Tometome kjin kwatere (Kar.).

Closely related to For. Dept. British Guiana n. 2289 [K] from Moraballi Creek, Essequibo R., which differs in its glabrous leaves, the absence of lesser primary nerves, and the reddish colour of the indumentum on the younger parts of the branchlets.

Pouteria scytalophora Eyma, n. sp.

Podoluma Glaziovii H. Bn. ex Glaziou in Bull. Soc. Bot. France LVII, Mém. III (1910) p. 442, nomen; — ? *Pseudocladia Melinoni* H. Bn., Hist. Pl. XI (1891) p. 291, nomen; — ? *Lucuma Melinoni* (H. Bn.) Engl. in Engl.-Prantl, Nat. Pfl. fam. Nachtr. (1897) p. 275, nomen.

Arbor excelsus, ramulis junioribus obscure ferrugineo-tomentosis. Foliorum petioli 1½-2 cm longi, laminae longo-ellipticae vel elliptico-oblongae, usque 23 cm longae, longitudine latitudinem 2½-2¾-plo superante, apice cuspide angusto obtusoque 4-12 mm longo cuspidatae, basi obtusae vel acutae, subcoriaceae, supra

nisi juventute glabrae, subtus dense minute ferrugineo- vel cinereo-puberulotomentosae, indumento non nitente, nervo mediano supra plano vel prominulo, subtus prominente, nervis primariis 6-13 (-16) mm distantibus curvatis, nervis minoribus brevioribus interjectis, nervis secundariis crebris parallelis primariorum partes superiores connectentibus, nervatione supra plano vel inconspicue prominulo, subtus acute prominente sed reticulatione indumento obtecto. Flores in fasciculis densifloris axillaribus dispositi; pedicelli 4-7 mm longi; sepala 4, late ovata, ciliata, extus ut pedicelli adpresse ferrugineo-pilosa; corolla cylindrica vel subturbinata, 2½-3 mm longa, virescens, tubo extus adpresse piloso, lobis 4 erectis rotundatis, longitudine eum tubi vel ½ ad 1/3 partem aequantibus, glabris; staminodia crassa lineari-oblonga truncata, unde nomen specificum; stamina ad basin tubi inserta, glabra, filamentis gracilibus, antheris extrorsis non apiculatis, stamina in floribus nonnullis deficientia linea transversa pilosa solum indicata; ovarium depresso-globosum 8-costatum, pilis ovoideo-globosum, 2-loculare, stylo cylindrico ovarium pilosum aequante; alabastra brunnea. Fructus ellipsoideus vel oblique ovoideo-ellipsoideus, usque 3 cm longus, longitudine latitudinem circ. duplo superante, apice obtusus vel apiculatus, basi rotundatus, in statu vivo viridis, in statu sicco griseus vel brunneus, glaber, semine unico exalbuminoso lateraliter complanato, hilo angusto basin versus subampliato, embryone cotyledonibus crassis semiellipsoideis, radicula minutissima, punctiforme.

Surinamo: Brownsberg, arbor n. 1026 (B.W. n. 1726, cum alabastris lectus Apr. 1916; n. 3315, cum fructibus lectus Sept. 1917; n. 3468, cum fructibus lectus Nov. 1917); Brownsberg, arbor n. 1230 (B.W. n. 6719, cum alabastris lectus Junio 1924; n. 6873, cum alabastris lectus Junio 1925; n. 6949, cum floribus lectus Dec. 1926); Brownsberg, arbor n. 1237 (B.W. n. 6623, typus, in Herb. Rheno-traj., cum floribus lectus Junio 1924; n. 6775, typus fructus, lectus Jan. 1925); Brownsberg (B.W. n. 6548, cum floribus fructibusque lectus Julio 1924).

? Guiana gallica: specimina a Mélinon ad fl. Maroni lecta in Herb. Paris asservata quorum alabastriferum nomine *Pseudocladia Melinoni* H. Bn. notatum, quamquam nonnullis diversa, fortasse huc referenda; vide infra.

Brasilia: Rio de Janeiro: Caminho do Macaco ad Vista Chineza (Glaziou n. 128, ster. [P]; Glaziou n. 16239, cum alabastris lectus [P, B] *Podoluma Glaziovii* H.Bn. ex Glaz.).

Nomina indigena: Surinamo: Konoko balli (Arow.); Remoe epe (Kar.).

The Surinam plants agree with those collected by Glaziou in the State of Rio de Janeiro, only differring in their older leaves being minutely but densely reddish puberulous beneath, whereas

Glaziou 16239 has them glabrous or almost so. The insertion of the stamens at the base of the tube, which is also shown on a drawing with Glaziou 16239 at Paris, is not in accordance with the characters of *Podoluma* H. Bn., Hist. Pl. p. 290, where the stamens are said to be inserted near the mouth of the tube. *Podoluma Glaziovii* was published without description in the list of Glaziou's plants.

In the habitually rather similar *Pseudocladia Melinoni* from French Guiana, the stamens are inserted about the middle of the tube, if one may judge after the analytical drawings in the Paris Herbarium. It also differs in the dense dark red tomentum on the undersurface of the leaves, which are narrower than in the Surinam material (12½ x 4 cm). According to a note by Baillon on the sheet in Herb. Paris its flowers are 4-merous with a 2-celled ovary, but a more recent note, with some analytical drawings, by Lecomte, gives the number of flower-parts as 5, and only one ovule. *Pseudocladia Melinoni* was first mentioned as one of 2 species of *Pseudocladia* Pierre (Baillon, Hist. Pl., p. 291), with a note that in this species only female flowers were known. This agrees with the casual occurrence of female flowers in the Surinam plants, though there they are to be found on the same branches as the normal flowers. The combination *Lucuma Melinoni* (H. Bn.) Engl. was also published without description, but both names are given in the Index Kewensis as if the species had been effectively published.

I thought it preferable to describe the Surinam plants under a new name, instead of validating one of these nomina nuda. One reason is, that among the Surinam plants full-grown flowers and mature fruits from the same tree are available, whereas Glaziou's plants have only flower-buds, and those of Mélinon minute flower-buds and young fruits. Although the very young state of the flower-buds may explain the different position of the stamens in *Pseudocladia Melinoni*, it does not appear advisable to take this specimen as the type of the species just described. As to *Podoluma Glaziovii*, which, though from a more distant locality, more closely resembles the Surinam material, the name *Glaziovii* is likely to be confounded with *Pouteria Glazioveana* Dub. The latter is a very different species, first described as *Lucuma psammophila* A. DC. var. *macrophylla* Raunkiaer.

Pouteria reticulata (Engl.) Eyma, nov. comb.; — *Chrysophyllum reticulatum* Engl. in Engl. Jahrb. XII (1890) p. 522.

The type collection of this species is Glaziou 12070 from Rio de Janeiro. In Glaziou's list in Bull. Soc. Bot. de France X (1910) Mém. iii p. 437 this number is mentioned under *Lucuma minutiflora* Fr. Allem., together with Glaziou 11155 and 2041, also from Rio de Janeiro. Glaziou 2041 is another species than the other two, as was probably already noticed by Dubard. *Lucuma minutflora* Fr. Allem. was described from Mt. Hiapaba in Ceará. Judging from Allemao's description and plate it resembles *P. reticulata*, differring chiefly in having a 5-celled ovary. As I did not see any specimens from Ceará I think it safer not to use the name *minutiflora* for the other specimens. The name *Lucuma minutiflora* Pierre appears as a nomen nudum in Glaziou's list, p. 438, for a very different plant, Glaziou 21700 from Goyaz. This may be the same species as Glaziou 21701, also from Goyaz, *Lucuma dentata* Pierre, nom. nud., l.c. p. 438. Its relations are probably with *Pouteria hispida* Eyma.

Pouteria reticulata appears related to *Lucuma tarapotensis* Eichl. ex Pierre, *Franchetella tarapotensis* (Eichl.) Pierre, which is the type species of the genus *Franchetella* Pierre and the only species in Dubard's section *Franchetella* of *Lucuma*. Indeed, Dubard, p. 23, united the two species under the name *Lucuma tarapotensis* Eichl.. In my opinion, however, the type-specimen of the latter, Spruce 4561 from Tarapoto, Eastern Peru [B, P, G], differs too much, having leaves rather densely fulvo-tomentose beneath and dull glaucous above, whereas *P. reticulata* has glabrous, shining leaves which are of a brown colour when dry. Besides, the reticulation of the leaves is denser in *P. reticulata*. An intermediate position, though specifically distinct from both, is occupied by *Lucuma anibaefolia* A. C. Smith, from Matto Grosso, which has rather dull, glabrous leaves, glaucous above, and with a wider reticulation than *P. reticulata*. Its flowers are 6-merous, whereas the other two are 5-merous. The occurrence of short lateral flowering branchlets is one of the points in favour of uniting § *Franchetella* with § *Pseudocladia*.

Pouteria reticulata should not be confused with *Labatia reticulata* Mart., which is synonymous with *Pouteria laurifolia*. Cf. p 180.

The Guiana material agrees well with the type-collection of *C. reticulata* [D, P]. That from Surinam was collected from a single tree, n. 711 in Sectie O reserve, that from British Guiana from a tall tree along the Camasia Road, Cuyuni River, Forest Dept. n. 1025 [K]. The Arawak name of the latter is given as Kokiritiballi. For the other vernacular names see Flora of Surinam. All specimens mentioned have well-developed deltoid staminodes.

Also the analytical drawings made for Pierre from the type material show them, which makes Engler's overlooking them difficult to explain. In Forest Dept. 1025 also the epipetal stamens are staminodial, at least in the few flowers analysed. The insertion of the stamens in B.W. 4182 is lower than in the others, but similar variations were noted in other species (Cf. p. 186), and, moreover, only flower-buds of B.W. 4182 could be dissected.

Pouteria *(§ Pseudocladia)* **Gongrijpii** Eyma, n. sp.

Arbor, trunco recto cylindrico subangulato, cortice obscure griseo, latice albo, ramulis junioribus minute ferrugineo vel fulvo-tomentosis. Foliorum petioli ½—1¼ cm longi, statu sicco nigri, laminae obovato-oblongae vel suboblongae, 10—20 cm longae, longitudine latitudinem circ. 2½-plo superante, apice cuspidatae, basi acutae, coriaceae, supra glabrae, subtus pilis adpressis distinctis flavis minutis nonnisi lente cernendis munitae, statu sicco inprimis subtus ochraceo-brunneae, nervo mediano supra plano vel prominulo, subtus prominente, nervis primariis 1—1½ cm distantibus, curvatis, supra subplanis, subtus prominentibus, plerumque nervis minoribus brevioribus interjectis, nervis secundariis utrinque prominulis distantibus primariorum partes superiores plus minusve connectentibus. Flores in fasciculis axillaribus vel supra cicatrices foliorum delapsorum dispositi; pedicelli graciles circ. 6 mm longi; sepala (4)5, ovatae, in flore aperto (B.W. 440) patentia, circ. 1½ mm longa, extus ut pedicelli adpresse rufo- vel aureo-pilosa; corolla (ex B.W. 440) cylindrica, circ. 2 mm longa, albo-flavida, lobis (4) 5 ovatis, acutis vel obtusis, longitudine ¾ partem tubi aequante; staminodia subulata; stamina ad faucem inserta, filamentis brevibus subcrassis, antheris ovoideis, subextrorsis; ovarium depressum, pilosum, 2-loculare in stylum crassum digitiforme glabrum attenuatum. Fructus solitarii ellipsoidei, utrinque rotundati, maximus visus 16 mm longus, 13 mm diam., pedicello 1¼ cm longo, corolla persistente deflexa, statu vivo viridis sicco niger, maturus ex scheda obscure brunneus, seminibus nondum bene evolutis.

Surinamo: Zandery I, arbor n. 120 (B.W. n. 1385, typus, in Herb. Rheno-traj., cum alabastris floribusque nondum bene expandis lectus Nov. 1915, n. 1595, cum fructibus lectus Jan. 1916; n. 4051, cum alabastris lectus Nov. 1918); Zandery I, arbor n. 121 p.p. (B.W. n. 440, cum floribus lectus Nov. 1914).

Nomina indigena: Koni-koni-hoedoe (N.E.); Kokonihoedoe (Sar.); Moraballi, Aseepoekoe (Arow.); Wokko moloko tèllè, Aroomé, Oro oromé (Kar.).

Pouteria cladantha Sandwith in Kew Bull. 1931, n. 10, p. 480. — Fig. 2 (p. 190).

The Surinam material, collected from 3 different trees, is habitually identical with Sandwith 113 from British Guiana, differring as a rule, however, in having almost always 5-merous flowers, whereas the species was described as 4-merous. A 4-merous flower was found, however, among the normally 5-merous ones on a branch of Lanjouw 813. Also a specimen from Br. Guiana, For. Dept. record n. 2233 [K], collected in 1931, has normally 5-merous flowers. There remains some slight variability in the shape and insertion of the stamens:

Jenman 2395 (from diagnosis): tube as long as the lobes, stamens inserted in the middle of the tube, the staminodes under the sinuses.
For. Dept. Br. Gui. record n. 2233: flb., tube twice as long as the lobes, stamens and staminodes inserted at about the same level in the throat, filaments curved, very thick, anthers truncate.
B.W. 4789; fl., tube long, stamens and staminodes inserted at about the same level in the throat, filaments curved, not very thick, anthers acute.
Lanjouw 813: flb., tube rather long, stamens inserted slightly below the staminodes, filaments curved, very thick, anthers truncate.
Pulle 342: flb., tube shorter, stamens inserted below the staminodes, filaments short and straight, anthers truncate.

In *P. cladantha* the flower-clusters are borne on rather slender short or elongated branchlets, which sometimes also bear ordinary leaves, but more often are destitute of them, or have them reduced to very small dimensions. This suggests a lateral inflorescence with well-developed rhachis.

Among the species showing the same kind of inflorescence two are more closely related to *P. cladantha*, viz. *Pouteria ovata* A. C. Smith and *Pouteria ramiflora* (Mart.) Rdlk.

P. ovata A. C. Smith (type Froes 1841, Maranhao [dupl. U]) is very near *P. cladantha*, but has a light-coloured nervation, which is also more prominent on the upper side of the leaf. The last-mentioned character may be considered of minor importance, however, as in Pulle 342 both types of nervation occur. On the other hand the curious broad midrib on the upper side of the leaves of *P. cladantha* against the rather flat or sharply prominulous one in *P. ovata*, may be of some value. Froes 1841 has 4-merous flower buds, the stamens appear inserted on or near the throat, filaments short, almost straight, staminodes thick, subulate.

Pouteria ramiflora (Mart.) Rdlk., *Labatia ramiflora* Mart., *Lucuma ramiflora* (Mart.) A. DC., *Labatia elliptica* Pohl, appears more closely related to *P. ovata* than to *P. cladantha* as regards

nervation of the leaves and robustness of the „inflorescences". Martius' diagnosis gives the midrib and primary nerves as rufous villous-tomentose beneath, but in a specimen collected by Pohl at Corrego de S. Domingo [U] the whole lower surface is covered with a rather lax grey web, whereas in some of Glaziou's plants, e.g. 19608 [B], 21704 [B], 21705 [B], 21706 [B], the leaves are dull but glabrous beneath, except the villose-tomentose midrib in 19608 and 21706. In both *P. cladantha* and *P. ovata* the lower surface of the leaves is more or less shiny. The flowers of *P. ramiflora* are usually 4-merous. *P. ramiflora* has been reported from Minas Geraes and Goyaz. More material of these species is needed before anything can be decided as to their specific value.

Pouteria *(§ Oxythece)* **dura** Eyma, nov. sp.; — *Sideroxylon durum* Klotzsch in scheda ex Fl. Bras. VII (1863) p. 56, et in Rich. Schomburgk, Reisen in British Guiana III (1848) p. 975, nomen; — *Sideroxylon cuspidatum* A.DC. var. *crassifolium* Miq. et Eichl. in Fl. Bras. l.c., ubi diagnosis.

Species nervis utrinque impressis, foliis subtus non pruinosis, distincta.

Specimina a me visa:

Surinamo: loco non indicato (Coll. van Hall n. 80, ster., lectus Junio 1907).

Guiana anglica: ad rivulum Moraballi Creek dictum, pr. Fl. Essequibo pr. Bartica (Sandwith n. 328, cum floribus lectus Sept. 1929 [K]); ad fl. Pomeroon (Schomburgk n. 1470, cum floribus lectus Sept. 1843, typus *Sid. cuspidati* var. *crassifoliae* in Hb. Berlin ex Fl. Bras., duplum a me visum in Hb. Paris); loco non indicato (Schomburgk n. 910, cum floribus lectus anno 1841 [P, U]).

Nomina indigena: Surinamo: Sulparatarie (Ind.); Akwasiba, Sagwenkihoedoe.

Guiana anglica: Kokiritiballi (teste Sandwith).

The name *crassifolia* could not be used in combination with *Pouteria* because of the older homonym *Pouteria crassifolia* (Eichl.) Radlk. Although the distinction between species of sect. *Oxythece* is often very difficult and their specific value not always quite certain, var. *crassifolium* appears sufficiently distinct to give it specific rank.

It may be that var. *crassifolium* and var. *ellipticum* are the same species, and the somewhat intermediate Persaud 105 [K] seems to point in that direction, but I do not believe that these are varieties of the plant described as *Sideroxylon cuspidatum* (Schomburgk 518 [B]). Glaziou 9505, mentioned under *Sideroxylon cuspidatum* DC. in Glaziou's list in Bull. Soc. Bot. de France LVII

(1910) Mém. III, p. 440, has a very different facies, and probably does not belong in § *Oxythece* at all.

Pouteria *(§ Oxythece)* **robusta** (Mart. et Eichl.) Eyma, nov. comb.; — *Sideroxylon robustum* Mart. et Eichl. in Fl. Bras. VII (1863) p. 56; — *Oxythece? robustum* Pierre in Urb. Symb. Ant. V (1904) p. 161.

var. **longifolia** Eyma, nov. var. — fig. 2 (p. 190).

Differt laminis foliorum plerumque longioribus, (8—) 10—20 cm longis, longitudine latitudinem 2—3-plo superante, apice rotundatis vel obtusis vel plerumque abrupte obtuso-acuminatis, nec retusis nec emarginatis, florum pedicellis apice non incrassatis, sepalis plerumque angustioribus extus ut pedicellis pilis fulvis adpressis munitis. In speciminibus surinamensibus a me examinatis staminodia desunt.

Fructus aboris typi n. 545 unicus suppetens fractus, itaque descriptio fructuum arboris n. 142 sequitur.

Fructus maturus (B.W. 2560, lectus Dec. 1916) subpyriformis, apicem obtusum versus subito contractus, basin versus in stipitem attenuatus vel subcontractus, 3½ cm longus, 1¾ cm diametiens, minute adpresse griseo-tomentellus, pericarpio firmo, latice copioso, unilocularis; semen unicum oblongo-ellipsoideum, lateraliter complanatum, testa papyracea, cicatrice lineari totam faciem ventralem percurrente, exalbuminosum; embryo cotyledonibus crassis, radicula inconspicua.

Fructus juniores ejusdem arboris minute rufo vel fulvo-tomentosi.

Typus B.W. n. 5069, arboris n. 545 Surinamo in Sectie O cum floribus lectus Febr. 1921. Specimina plurima Surinamo ab arboribus sequentibus lecta in Herb. Utrecht conservata huc referenda: Brownsberg, arbor n. 1088, arbor n. 1254; Zandery I, arbor n. 142, arbor n. 132; Sectie O, arbor n. 545.

Specimen florifer in Guiana gallica prope St. Jean ad fl. Marowyne a Benoist sub n. 1037 [P] lectum verisimiliter etiam huc referendum.

The leaves of this variety show a striking resemblance to those of species of *Manilkara*.

In the slender pedicels var. *longifolia* approaches Schomburgk's British Guiana plant described as *Sideroxylon cuspidatum* A. DC. var. *ellipticum* Miq. et Eichl. [B], but in the robustness of its branches and leaves it agrees much better with *P. robusta* from Southern Venezuela (Spruce 3331, ad flumina Casiquiari, Vasiva et Pacimoni [B, P]).

Lucuma glabrescens Miq. et Eichl. 1863, *Vitellaria glabrescens* Radlk. 1882, *Gymnoluma glabrescens* H. Bn. 1891, appears related, and will perhaps have to be reduced to a variety of *P. robusta*. Its leaves are more yellowish brown beneath, its nervation is more

ascending and more curved near the margin and finely prominulous beneath, and some staminodes may be found. It is not clear why Baillon made this a new genus *Gymnoluma.*

Pouteria *(§ Pradosia)* **ptychandra** Eyma, n. sp. — Fig. 2 (p. 190).

Arbor excelsus, latice albo, ramulis junioribus plus minusve fusco-tomentosis. Foliorum petioli 1¼—2 cm longi, laminae obovato-lanceolatae, 8—13½ cm longae, longitudine latitudinem 2½—3½-plo superante, apice in acumen sublongum obtusum acuminatae, basin versus angustatae, chartaceae vel subcoriaceae, infra ad nervos pilis sparsis adpressis munitae, nervo mediano supra canaliculatim immerso, subtus valde prominente, nervis primariis 7—12 mm distantibus, supra planis, subtus prominentibus, curvatis, nervis secundariis crebris parallelis nervos primarios connectentibus. Flores ad ramos defoliatos vetustiores fasciculis perdensifloris dispositi; pedicelli validi circ. 19 mm longi; sepala 5, ovata rotundata, subpatentia, 2—2½ mm longa, extus ut pedicelli minutissime adpresse pilosula; corolla subcylindrica, 4—5 mm longa, brunnea, in statu sicco nigra, tubo extus ut sepala pilosulo, lobis 5, elliptico-oblongis obtusis tubum duplo superantibus; staminodia nulla; stamina in fauce tubi inserta, glabra, filamentis crassis, basi lata infra insertionem deccurrentibus, superne attenuatis, parte ⅓ apicali subito extrorsum deflexa ad insertionem in connectivum iterumque subito reflexa, antheris extrorsis; ovarium longo conico 5-costatum, 5-loculare, ferrugineo-pilosum, apice sensim in stylum glabrum transiente, stigmate 5-lobo. Fructus ellipsoideus, 4¼ cm longus, glaber, flavus, in statu sicco niger, pedicello robusto circ. 12 mm longo, pericarpio carnoso, semine unico evoluto, nonnihil lateraliter complanato, cujus testa hilo lineari excepto cornea nitidissimaque, embryone lateribus albumine tenue cincto, cotyledonibus 2 semiellipsoideis, caudicula exserta nec punctiformis.

Surinamo: Brownsberg (B.W. n. 6154, cum fructibus lectus Junio 1923); ad fl. Lucie sup. (B.W. n. 6943, typus, in Herb. Rheno-traj., cum floribus lectus Aprili 1926).

The relations of this species are discussed on page 168.

Pouteria surinamensis Eyma, n. sp.; — *Chrysophyllum oleaefolium* auct., non Miq., Pulle, Enumeration (1906) p. 368.

Arbor (Pulle 336: 5 m alt., Stahel 39: arbor excelsus), ramulis hinc inde oppositis gracilibus pallidis glabris, junioribus apice adpresse pilosis. Foliorum petioli 7 mm longi, adpresse pilosi,

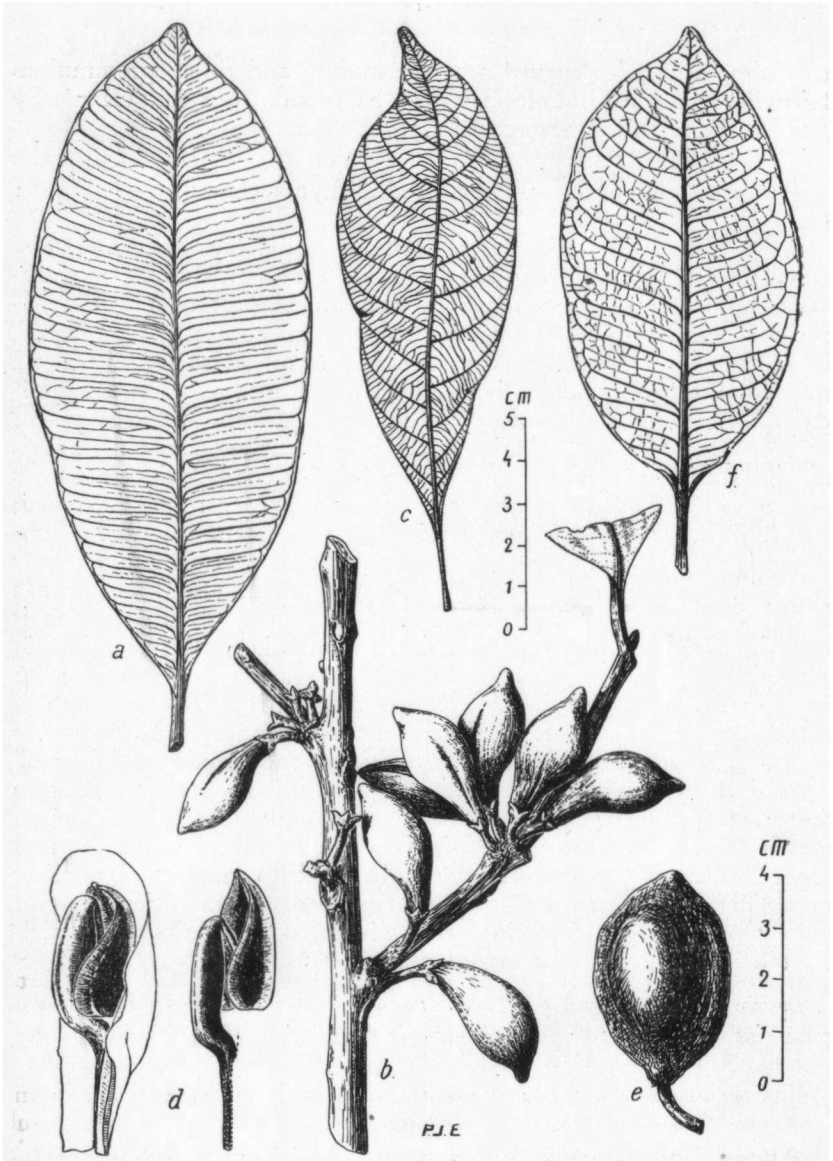

Fig. 2. *Pouteria robusta* (Mart. et Eichl.) Eyma, var. *longifolia* Eyma. a: leaf (B.W. 5069); b: fruits (B.W. 2560). *Pouteria ptychandra* Eyma. c: leaf (B.W. 6943); d: anther of c; e: fruit (B.W. 6154). *Pouteria cladantha* Sandw. f: leaf (B.W. 4179).

laminae elliptico-oblongae, 6—11½ cm longae, longitudine latitudinem 2—2½-plo superante, apice plus minusve longe obtuseque acuminatae, basi acutae, coriaceae, nervo mediano subtus adpresse piloso excepto glabrae, nervo mediano supra canaliculatim immerso, subtus valde prominente, nervis primariis 5—8 mm distantibus curvatis, supra canaliculatim immersis, subtus prominulis vel prominentibus, nervis secundariis inter reticulationem densum parum conspicuis, supra planis vel immersis, subtus prominulis, primarios connectentibus. Flores in fasciculis axillaribus vel supra cicatrices foliorum delapsorum dispositi; pedicelli 2 mm longi, adpresse pallide pilosi; sepala 5, suborbicularia, obtusa, patentia, extus basi pallide adpresse pilosa; corolla turbinata, circ. 2½—3 mm longa, virescens (vel alba, Pulle 336), lobis 5 ovato-oblongis vel ovatis, longitudine circ. 1⅓ partem tubi aequantibus; staminodia nulla; stamina fauci inserta, filamentis apicem versus attenuatis, antheris late ovoideis, subtruncatis, extrorsis, glabris; ovarium e basi lata 5-angulare, 5-loculare, aureo-pilosa, in stylum glabrum subaequilongum attenuatum, stigmate 5-angulare. Fructus ellipsoideus, maximus visus 19 mm longus, 11 mm latus, in statu vivo immaturus obscure viridis, maturus flavus, minute tomentosus, semine unico evoluto, cujus testa hilo lineari excepto cornea nitidissimaque, exalbuminoso, embryone cotyledonibus 2 semiellipsoideis, caudicula parva exserta, nec punctiforme.

Surinamo: ad fl. Suriname sup. prope Goddo (Stahel n. 39, typus, in Herb. Rheno-traj., cum floribus lectus Jan. 1926); ad fl. Saramacca prope Janbasigado (Pulle n. 336, cum floribus lectus Jan. 1903); Kaboeri, arbor n. 505 (B.W. n. 4839, ster., lectus Sept. 1920; n. 5919, cum fructibus lectus Julio 1922).

Nomen indigenum: Kienboto (N.E.).

Pouteria Pullei Eyma, n. sp.

Arbor, circ. 35 m altus, latice albo, ramulis e cicatricibus fasciculorum florum verrucosis, griseis, junioribus ferrugineo- vel brunneo-tomentosis. Foliorum petioli 1—1½ cm longi, laminae lanceolatae utrinque attenuatae, apice ipso obtuso, 7—14 cm longae, longitudine latitudinem 3½—4-plo superante, chartaceae, supra glabrae, subtus indumento brevissimo opaco rufo plus minusve tomentosae, in statu sicco subtus ferrugineo-brunneae, nervo mediano supra plano, subtus prominente, nervis primariis circ. 5 mm distantibus, subrectis, prope marginem curvatis, utrinque subaequaliter prominulis, nervis secundariis crebris parallelis, utrinque aequaliter acute gracileque prominulis, primarios connectentibus. Flores (non nisi alabastra fere matura visa) in fasciculis axillaribus vel supra cicatrices foliorum delapsorum dispositi; pedicelli usque 4 mm longi;

sepala 5, ovata, ut pedicelli minute adpresse pilosa; corolla 2 mm longa, lobis 5, oblongo-ellipticis, longitudine eum tubi circ. 5-plo superante; staminodia minuta dentiformia vel deltoidea pro flore singula vel pauca plus minusve evoluta inaequalia; stamina circa medium tubi inserta, filamentis subcrassis, brevibus, antheris ovoideis apicem versus subattenuatis, extrorsis, glabris; ovarium truncatum pilosum, 5-loculare, apice stigmatibus 5 triangularibus munitum. Fructus ignotus.

Surinamo: ad flumen Kabalebo prope cataractis Avanavero (Pulle n. 456, typus, in Herb. Rheno-trajectino, cum alabastris lectus Septembri 1920).

The exact place of this species cannot be ascertained as long as the seed is unknown. Its facies and floral characters are more favourable to its inclusion in *Pouteria* than in *Chrysophyllum.* Its relations are probably with *Pouteria surinamensis* Eyma and with the species described as *Glycoxylon praealtum* Ducke. From the latter it differs in having anthers with straight, not folded, filaments.

The same applies to *Chrysophyllum cochlearium* H. Lec. from French Guiana, of which the fruit is unknown, too.

Sarcaulus brasiliensis (A. DC) Eyma, nov. comb.; — *Chrysophyllum brasiliense* A. DC., Prodr. VIII (1844) p. 156; — *Chrysophyllum macrophyllum* Mart., Herb. Fl. Bras. (1837) p. 175, non auctt. al.; — *Sarcaulus macrophyllus* (Mart.) Radlk. in Sitz. ber. Kgl. Bair. Ak. Wiss. XII (1882) p.p. 293, 310.

The monotypic genus *Sarcaulus* is characterized by its thick, fleshy, globose corolla, with valvate lobes, and its 5-celled ovary. Its facies and other characters are those of *Pouteria* § *Pseudocladia,* and more particularly of the *Franchetella* part. The staminodes, overlooked by previous authors, were discovered by Radlkofer. The fruit of *Sarcaulus* is unknown.

The specific name *macrophyllus,* which Radlkofer adopted from *Chrysophyllum macrophyllum* Mart., has to be discarded because of several older homonyms. See also Cambridge Rules Art. 61.

Achrouteria Eyma, nov. gen.

Genus floribus *Pouteriae,* fructibus *Chrysophylli Achradisve,* unde nomen. Arbor foliis alternis estipulatis integris, nervis secundariis primarios hinc inde connectentibus. Flores in fasciculis axillaribus vel supra cicatrices foliorum delapsorum congesti; sepala 5; corolla urceolata, lobis 5, $^1/_3$ partem tubi aequantibus; staminodia in sinubus parva subulata; stamina ad basin tubi inserta, filamentis

longis, antheris extrorsis; ovarium depressum 5-loculare, stylo cylindrico crasso. Fructus pericarpio firme carnoso siccitate non deformato, cortice tenue laeve, seminibus pluribus evolutis quorum testa hilo lineari excepto cornea nitidissimaque, embryone albumine 2-foliato incluso, cotyledonibus foliaceis, caudicula bene evoluta.

Species unica guianensis. Specimina nonnulla Brasiliae meridionalis verisimiliter etiam huc referenda.

The same combination of staminodia-bearing flowers and seeds containing an embryo with leafy cotyledons and surrounded by albumen is also found in the American genera *Syzygiopsis*, *Micropholis* and *Achras*. The lacking of intermediate forms makes it advisable to describe *Achrouteria* as a new genus.

Syzygiopsis is a monotypic genus described by Ducke from Pará (in Arch. Jard. Bot. Rio de Janeiro IV, 1925, p. 158). *S. oppositifolia* has opposite leaves with a close secondary nervation connecting the primaries, flowers with stamens inserted on the throat, and 1-seeded fruit with a soft pericarp.

Micropholis differs in the parallel nervation of its leaves, the insertion of its stamens on the throat, and its short style.

The genus *Achras*, which has similar fruits and seeds, differs in the parallel nervation of its leaves and in its large flowers with staminodes almost equalling the corolla-lobes, stamens inserted on the throat, and with a long slender style.

The West African genus *Breviea* has large flowers with a long tube and stamens inserted in the upper part of the tube.

Achrouteria pomifera Eyma, n. sp. — Fig. 3 (p. 194).

Arbor (For. Dept. 1040: circ. 30 m alt., circ. 30 cm diametiens; Lanjouw 816: 10—12 m alt.), trunco basi costato, latice albo (For. Dept. 804 et 913), ramulis glabris, junioribus siccitate sulcatis. Foliorum petioli circ. 1 cm longi, laminae obovatae vel oblongo-obovatae, circ. 7 (5—11) cm longae, longitudine latitudinem 1¼—1¾-plo superante, apice obtusae vel subrotundatae vel saepe emarginatae, basi acutae in petiolum contractae, chartaceae vel subcoriaceae, glabrae, nervo mediano lato supra subplano, subtus prominulo, nervis primariis 4—7 mm distantibus, hinc inde nervo minore interjecto, utrinque, sed subtus magis ac supra, prominentibus, subrectis, prope marginem arcuatis, nervis secundariis in typo supra prominulis, subtus prominentibus, in specimine Forest Dept. 804 planioribus, nonnullis vel in specimine Forest Dept. 913 plurimis primarios connectentibus, reticulatione supra inconspicuo, subtus acute prominulo, non denso. Flores in fasciculis axillaribus

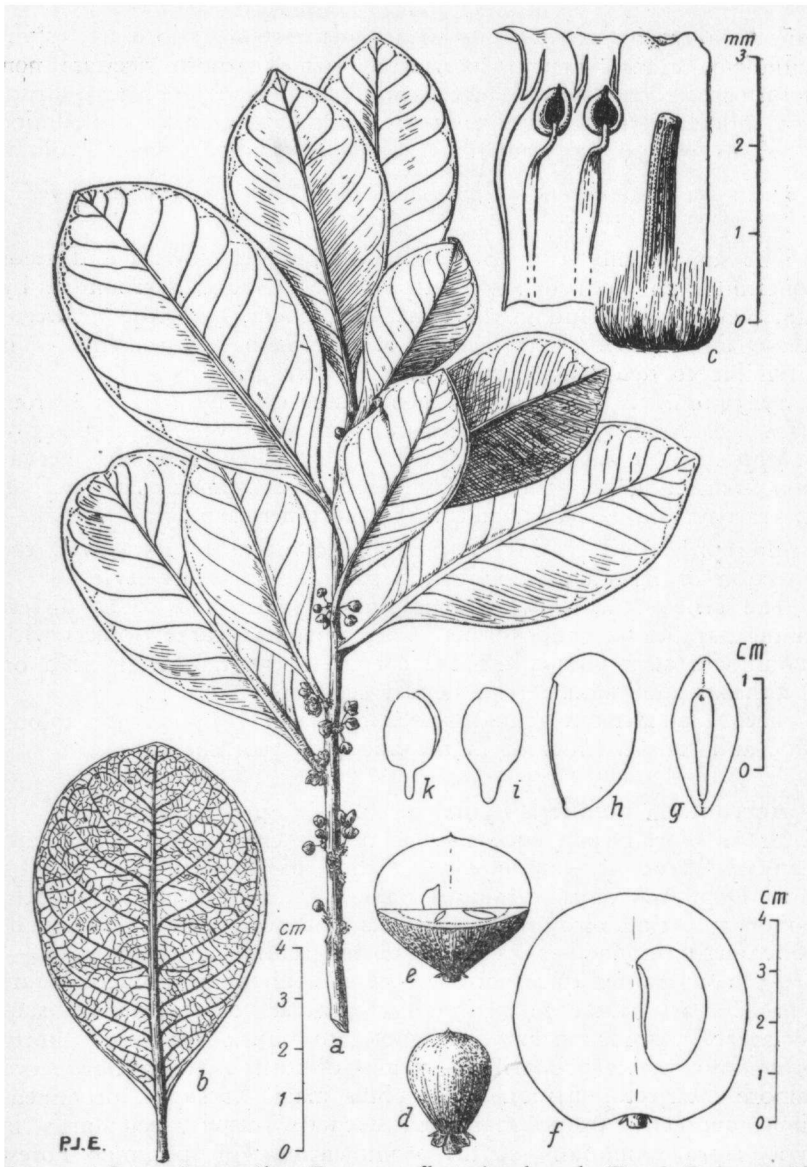

Fig. 3. *Achrouteria pomifera* Eyma. a: flowering branch (Forest Dept. 1040); b: leaf of a; c: flower of a; d: young fruit (Lanjouw 816); e: immature fruit (Forest Dept. 804); f: fruit (Forest Dept. 913); g, h: seed of e; i: albumen of g; k: embryo of g.

vel supra cicatrices foliorum delapsorum congesti; pedicelli 1½—2 mm longi, tenues, adpresse pilosi; sepala 5, late ovata, 2—3 mm longa, extus pilis sparsis adpressis obsita; corolla urceolata, circ. 3½ mm longa, viridi-alba fere alba, lobis 5 late rotundatis, longitudine ⅓ partem tubi aequantibus; staminodia parva, subulata; stamina ad basin tubi inserta, filamentis longis taeniiformibus, antheris ovoideis apiculatis extrorsis; ovarium depressum pilosum, 5-loculare, stylo cylindrico crasso.

Fructus solitarii vel bini, maturi subglobosi, maximus visus (n. 913) circ. 5 cm diametiens, immaturi late obovoidei, stylo partim persistente apiculati, pedicello crasso, sepalis persistentibus deflexis, pericarpio firme carnoso siccitate non deformato, cortice tenue laeve, seminibus pluribus evolutis quorum testa hilo lineari excepto cornea nitidissimaque, embryone albumine 2-foliato incluso, cotyledonibus foliaceis, caudicula bene evoluta.

Guiana anglica: inter fl. Aruka et fl. Amakura, in colle (Forest Dept. British Guiana n. 913, cum fructibus lectus Apr. 1929 [K]); ad fl. Cuyuni, in colle pr. Tinamou Falls, alt. circ. 45 m (Davis in Forest Dept. British Guiana n. 1040, typus, in Herb. Kew, cum floribus lectus Mart. 1931); ad fl. Kurnabaru, pr. fl. Demerara (Hohenkerk in Forest Dept. British Guiana n. 804, cum fructibus lectus Aug. 1919 [K]).

Surinamo: pr. fl. Suriname, in Patricksavanne (B.W. n. 193, ster., lectus Oct. 1912); ad fl. Coppename, in silva pr. Raleighfalls (Lanjouw n. 816, cum fructibus immaturis lectus Sept. 1933).

? Brasilia: Santos (Mosén in Hb. Glaziou n. 3650, cum fructibus immaturis magis obovatis pallidioribusque [P]); Rio de Janeiro, Floresta da Tijuca (Glaziou n. 12935a, cum flore unico sessile [P]).

Nomina indigena: Guiana anglica: Limonaballi (913, 1040) (Araw.); Haimara-kushi (804).

Surinamo: Batabaly (193).

The drawings of the seed and the embryo were made from Forest Dept. 804 because these fruits had been better preserved than the larger ones of Forest Dept. 913. The seeds are identical except for the dimensions.

Glaziou 12935a has been included under the name *Lucuma Moseniana* Glaz. n.sp.? in the list of Glaziou's plants in Bull. Soc. Bot. France, LVII, Mém. III (1910), p. 439, but without description. An unnumbered fruiting sheet, Glaziou s.n., in Herb. Paris, bears a reference to *Lucuma meruocana* Fr. Allem., though neither agreeing with Allemao's plate nor with the other Glaziou numbers referred to that species. *Achrouteria pomifera* Eyma bears some resemblance to *Chrysophyllum obtusifolium* Fr. Allem, as figured on plate 12, Trabalhos Commiss. Scientif. de Exploraçao, Botan. 3 (1866), but this plate shows a much denser secondary nervation and no staminodes.

Micropholis (Griseb.) Pierre, Not. Bot. (1891) p. 37.

Pierre adopted the generic name *Micropholis* from Grisebach's section *Micropholis* of the genus *Sapota* Plum., which contained only one species, *S. rugosa* Gr. As Grisebach cites *Chrysophyllum*, Sw.! under his *Sapota rugosa*, *Chrysophyllum rugosum* Sw., Prodr. (1788) p. 49 and Fl. Ind. Occ. I (1797) p. 484, from Jamaica may be considered as the type-species of *Micropholis*. I may add that, owing to the misinterpretation of Swartz's species, the specific name *rugosa* has been employed in various combinations for different plants.

In his Notes botaniques, Sapotacées (1891), where the first description of the genus *Micropholis* is to be found, together with an enumeration of 20 species, Pierre did not specially mention the differences with *Sideroxylon*, in which the species of *Micropholis* had been generally included up to that day, but in his posthumous paper published by Urban in Symb. Ant. V (1904) p. 111 the importance of the different form of the scar on the seed — long, narrow and ventral in *Micropholis*, short, more or less concave and basal in *Sideroxylon* — is emphasized. This same character was mentioned by Engler (in Engl. Prantl, Nat. Pfl. fam. IV. i, 1890, p. 144) among the differences between his two american sections *Eichlerisideroxylon* and *Mastichodendron* of the genus *Sideroxylon*, the former of which is *Micropholis* Pierre, the latter part of *Sideroxylon* L. sensu Dubard. In Nachträge, 1897, p. 276, Engler arranged the 27 sections of *Sideroxylon* in two groups according to the form of the scar and the insertion of the hilum. Dubard even attributed so much importance to the form of the scar, that he made it the leading character in arranging Sapotaceous genera. The two genera, as understood by Dubard, can at once be distinguished by the nervation of their leaves, the primary nerves being distant and generally curved in *Sideroxylon*, closer to very close and parallel and generally almost straight in *Micropholis*. Although in other cases, e.g. in *Pouteria*, similar differences have no more than sectional value, the absence of intermediate forms and especially the different shape of the scar in my opinion justify the segregation of *Micropholis* from *Sideroxylon*.

As stated on p. 158 I think the charaters of the seed and the embryo of more taxonomic value in this family than the presence or absence of staminodes. This approaches *Micropholis* to *Chrysophyllum*, instead of to *Sideroxylon*. The likeness between species of these genera is sometimes very great indeed. Obviously the authors of Sapotaceae in the Flora Brasiliensis were also struck

by this likeness, as on tab. 45 *Chrysophyllum rufum* and *Sideroxylon Gardnerianum* are figured side by side. In *Micropholis*, however, the development of staminodes appears to be very constant, whereas in the American *Chrysophyllums* they are always lacking, except in the somewhat aberrant *Chr. imperiale* (Linden) Benth. et Hook., *Martiusella imperialis* (Linden) Pierre, where sometimes a few minute staminodes may be found. The same is the case with the African sections *Gambeya*, *Zeyherella* and *Donella* of *Chrysophyllum*. Since especially *Chr. imperiale* does not show the slightest habitual resemblance to *Micropholis*, I do not think it justified as yet to include *Micropholis* in *Chrysophyllum*.

Pierre, in Urb. Symb. pp. 111-131, distinguished 7 sections in *Micropholis*, chiefly former genera of Baillon and himself, which were reduced to 2 by Dubard in Ann. Mus. colon. Marseille XX (1912) pp. 66 and 72, viz. *Eumicropholis* Pierre sensu Dub. and *Crepinodendron* Pierre.

Dubard included all the reduced sections in § *Eumicropholis*. In my opinion, however, a more natural grouping is attained by placing *Sprucella (Pierre)* H. Bn. and *Platyluma* (H. Bn.) Pierre in § *Crepinodendron* instead of in § *Eumicropholis*.

I have retained Dubard's name *Eumicropholis* in preference to Engler's *Eichlerisideroxylon*, published earlier, in Engl. Prantl, Nat. Pfl. fam. IV. i, 1890, p. 144, because the latter name contains a reference to the genus *Sideroxylon*, as a part of which it was meant by Engler. The two species mentioned for *Eichlerisideroxylon*, *S. rugosum* (Sw.) R. et Sch. and *S. Gardneriana* A. DC., are of the *Eumicropholis* type, but in his publication in Engl. Jahrb. XII (1890) p. 518 and in Nachtr. Pfl. fam. (1897) p. 276 Engler also included some species now referred to § *Crepinodendron*. *Crepinodendron* he included as a section in *Lucuma* (Nachtr. p. 274). *Lucuma retusa* Spruce ex Miq. et Eichl., 1863, *Vitellaria retusa* Rdlk., 1882, placed by Baillon with some doubt in *Lucuma*, as a section *Coptoluma*, and which Dubard, also with doubt, referred to *Lucuma* § *Gayella*, shows a striking resemblance to *M. cyrtobotrya* and *M. resinifera*, except that it lacks the racemules which are so obvious in these two species. I therefore refer it as a section *Coptoluma* to *Micropholis*, though its true taxonomic place remains uncertain till its fruit and seed are known.

The proposed definitions are the following (species and specific names chiefly after Dubard):

Sectio 1 *Eumicropholis* Pierre, emend., non sensu Dubard.

Foliorum laminae nervis parallelis confertissimis densissime striatae. Florum fasciculi axillares sessiles.

Species: 1. *M. acutangula* (Ducke) Eyma nov. comb. *(Sideroxylon acutangulum* Ducke); 2. *M. Burchelliana* Pierre; 3. *M. compta* Pierre; 4. *M. crassipedicellata* (Mart. et Eichl.) Pierre; 5. *M. cuneata* (Raunk.) Pierre; 6. *M. cylindrocarpa* (Poepp. et Endl.) Pierre; 7. *M. egensis* (A. DC.) Pierre; 8. *M. eugeniifolia* (H. Bn.) Pierre *(Myrtiluma* H. Bn.); 9. *M. Gardneriana* (A. DC.) Pierre; 10. *M. Glazioveana* Pierre; 11. *M. gnaphaloclados* (Mart.) Pierre; 12. *M. linoneura* Pierre; 13. *M. Martiana* Pierre; 14. *M. Melinoniana* Pierre *(Stephanoluma* H. Bn.); 15. *M. paraensis* (Huber) Eyma nov. comb. *(Sideroxylon paraense* Huber); 16. *M. polita* (Gris.) Pierre; 17. *M. rigida* Pierre; 18. *M. rugosa* (Sw.) Pierre; 19. *M. Schwackei* (Engl.) Pierre; 20. *M. Spruceana* (Mart. et Miq.) Pierre; 21. *M. Ulei* (Krause) Eyma nov. comb. *(Sideroxylon Ulei* K. Krause); 22. *M. venulosa* (Mart. et Eichl.) Pierre *(Meioluma* H. Bn.).

Sectio 2 *Crepinodendron* Pierre

Foliorum laminae nervis primariis quam in sectione praecedente distantioribus haud striatae. Florum pedicelli emergentiis axillaribus cylindricis cicatricibus pedicellorum delapsorum squamulisque lunulatis dense obsitis inserti racemulos efformantes.

Species: 1. *M. achradiformis* Pierre; 2. *M. chrysophylloides* Pierre sensu Dubard; 3. *M. crotonoides* Pierre *(Crepinodendron* Pierre); 4. *M. cyrtobotrya* (Mart.) H. Bn. *(Sprucella* Pierre); 5. *M. garciniifolia* Pierre; 6. *M. guyanensis* (A. DC.) Pierre *(Platyluma* H. Bn.); 7. *M. Imrayana* Pierre; 8. *M. resinifera* (Ducke) Eyma nov. comb. *(Sideroxylon resiniferum* Ducke); 9. *M. rufa* (Mart. et Eichl.) Pierre.

? Sectio 3 *Coptoluma* (H. Bn.) Eyma; — *Lucuma* § *Coptoluma* H. Bn. Habitu omnino sectionis *Crepinodendron* sed florum fasciculis axillaribus sessilibus nec emergentiis cylindricis insertis.

Species:*M. retusa* (Spruce ex Miq. et Eichl.) Eyma, nov. comb. *(Lucuma retusa* Spruce ex Miq. et Eichl.).

The curious racemules are most developed in *M. resinifera*, where they attain a length of 20 mm and 3 mm diam., and in *M. cyrtobotrya*. They are well-developed in *M. crotonoides*, too, so e.g. in Moritz s.n. [U] 7 mm by 1¾ mm. In *M. guyanensis* they rarely exceed 3 mm. In all these species the pedicels are inserted in two rows. Racemules of a similar kind occur in some species of *Rapanea* (Myrsinaceae) and in some Flacourtiaceae.

M. garciniifolia occupies a somewhat intermediate position between sections 1 and 2, having a rather dense parallel nervation

with conspicuous connecting nervules and some faint indications of racemules.

Micropholis venulosa (Mart. et Eichl.) Pierre, Not. Bot. (1891) p. 40; id. in Urb. Symb. V (1904) p. 112; Benoist in Arch. Bot. V (1931) Mém. 1, p. 239; — *Sideroxylon venulosum* Mart. et Eichl. in Fl. Bras. VII (1863) p. 52, t. 20, t. 37; — *Micropholis ? calophylloides* Pierre, Not. Bot. (1891) p. 40; id. in Urb. Symb. V (1904) p. 112; Dubard in Ann. Mus. colon. Marseille XX (1912) p. 71; — *Platyluma calophylloides* (Pierre) H. Bn., Hist. Pl. XI (1891) p. 284, quoad nomen; — *Sideroxylon calophylloides* (Pierre) Engl., Nachtr. (1897) p. 276, quoad nomen; — *Meioluma guyanensis* H. Bn., Hist. Pl. XI (1891) p. 282; — *Sideroxylon guianense* (H. Bn.) Engl., Nachtr. (1897) p. 276, non A. DC.; — *Micropholis mucronata* Pierre in Urb. Symb. V (1904) p. 112.

Some confusion ahs existed owing to Baillon's misinterpreting specimens of *M. guyanensis* (A. DC.) Pierre as *M. calophylloides* Pierre, under the name *Platyluma calophylloides*, and specimens specifically identical with *M. calophylloides* as *Meioluma guyanensis* H. Bn. This confusion has been cleared up by Dubard, who established most of the synonymy mentioned above, but retained the younger specific name *calophylloides*. A more detailed synonymy, however, of *M. venulosa* and *M. guyanensis* was thought useful. Cf. p. 200.

The type-specimen of *S. venulosum* is Spruce 3506 from the Rio Negro „supra ostium fluminis Cassiquiari". Its flowers have been described as 5-merous, but plate 20 of the Fl. Bras. shows 4 sepals, and a note by Pierre in Urb. Symb. p. 112 states that he found 4-merous flowers in all specimens examined, viz. Spruce 506 (probably a misprint for 3506), Spruce 1476, and Schwacke s. n. Among some analytical drawings and notes on a sheet of Spruce 1476 [P] from Barra do Rio Negro references to 4-merous as well as to 5-merous flowers occur. The flowers of *M. calophylloides* are said by Pierre, Not. Bot. p. 40, to be „le plus souvent 4 mères" and the ovary 4-5-celled.

M. venulosa is also rather polymorphous in other respects, especially in the form of the leaves, which vary from elliptic or oblong-elliptic and abruptly cuspidate to ovate-lanceolate with rounded base but gradually narrowed towards the cuspidate apex (e.g. 2 sheets collected by Mélinon in Fr. Guyana [P]).

The Surinam specimens are 4-merous, and agree fairly well with those mentioned by Dubard, except for the shape of

their staminodes, which are triangular in the Surinam ones, while they are rounded in the others.

Very similar in general appearance are *M. Melinoniana* Pierre from Fr. Guyana, with truncate fruit, and *M. acutangulum* (Ducke) Eyma from the state of Pará, with aberrant, very strongly angulated or almost alate, acute fruit, whereas the fruit of *M. venulosa* is acute and terete.

Micropholis guyanensis (A. DC.) Pierre, Not. Bot. (1891) p. 40; id. in Urban, Symb. V (1904) p. 113; Dubard in Ann. Mus. colon. Marseille XX (1912) p. 67, 72; Benoist in Arch. Bot. V (1931) Mém. 1, p. 240; — *Sideroxylon Guyanense* A. DC., Prodr. VIII (1844) p. 182, non Engl., Nachtr. (1897) p. 276, Pulle in Rec. Trav. Bot. Neerl. VI (1909) p. 285; — *Chrysophyllum acuminatum* Poiret, Suppl. II (1811) p. 15, quoad plantam cayennensem; — *Chrys. Melinoni* Engl. in Engl. Jahrb. XII (1890) p. 521; — *Platyluma calophylloides* (Pierre) H. Bn., Hist. Pl. XI (1891) p. 284, excl. syn. Pierre; — *Sideroxylon calophylloides* (Pierre) Engl., Nachtr. (1897) p. 276, ut praec.

De Candolle, in his description of *Sideroxylon Guyanense* A. DC. from Fr. Guyana, refers to *Chrysophyllum acuminatum* Poir., non Lam. According to Poiret *C. acuminatum* occurs in S. Domingo and in Cayenne. The first locality is that given by Lamarck, Ill. des Genres II (1793) p. 44, n. 2469, for the Caimitier acuminé, to which Poiret refers at the end of his description. This species was included in *Chrys. monopyrenum* Sw. in the Index Kewensis (1893) and by Britton and Millspaugh, Bahama Fl. (1920) in *Chrys. oliviforme* L., of which Pierre in Urb. Symb. V (1904) p. 160 had supposed it to be a variety. As remarked by Pierre (1904) p. 160 the specimen in Herb. Lamarck in Paris belongs to the Indian species *C. Roxburghii* Don, and this is also indicated by the note „leaves of the Pitacarra tree" on one of the two sheets, Pitakara being the vernacular name mentioned by Roxburgh, Fl. indica I (1832) p. 599. Since this species shows some superficial resemblance to *M. guyanensis*, this may explain Poiret's including the plant from Cayenne, which is the type-specimen of *M. guyanensis*, in *Chrys. acuminatum*. Another plant in Herb. Lamarck, labelled „no 162 e domingo Chrysophyllum acuminatum", and according to Pierre MS and in Urb. Symb. collected by Martin, bears a reference to *C. oliviforme* var. by Dubard. I did not see in Lamarck's herbarium any specimens with references to *C. oliviforme* in Lam. Enc. I (1783) p. 552.

For the confusion of *M. guyanensis* with *M. venulosa* (Mart. et Eichl.) Pierre, *M. calophylloides* Pierre, see p. 199.

Habitually very similar to *M. guyanensis*, but differing in the paler colour of the indumentum, are *M. chrysophylloides* Pierre sensu Dubard, reported, with numerous local varieties, from Porto-Rico, Martinique, Dominica, and Santa Lucia, and the probably synonymous *M. Cruegeriana* Pierre from Trinidad.

Chrysophyllum L., Spec. Plant. ed. 1 (1753) p. 192, Gen. Plant. ed. 5 (1754) p. 88, p.p., Cf. Richter, Codex, p. 208.

In Linné's Species Plantarum, 1753, only one species, *Chrysophyllum Cainito*, from tropical America, is mentioned. Another species *Chr. glabrum*, also from tropical America, was added in the second edition (1762). Since then the number of species has steadily increased, and in Lemée's Dictionnaire (1930) it is estimated at 110. Among these are, however, quite a number of plants which greatly differ in floral organization and leaf-nervation, and which have either been included because they lacked staminodes, or because of their albuminous seeds. Several attempts have been made to put these into some more homogeneous groups, either by subdividing *Chrysophyllum* into sections (A. De Candolle, Miquel and Eichler, Engler), or by proposing new genera (Pierre, Baillon). For the American species I prefer a single polymorphous genus. *Nemaluma* H. Bn. and *Elaeoluma* H. Bn., which Engler included in § *Aneuchrysophyllum*, should, however, be removed. Cf. p. 179.

No agreement exists on the taxonomic status of some groups of African plants, viz. *Gambeya*, *Donella* and *Zeyherella*. Their inclusion in *Chrysophyllum* is probably justified, notwithstanding the casual development of staminodes. For the relations between *Chrysophyllum* and *Micropholis*, see p. 196.

Ecclinusa Mart. in Flora XXII (1839) Beibl. I, p. 2 (Herb. Fl. Bras. p. 177).

In his desire to honour L. A. Passauer, Martius himself changed the name *Ecclinusa* into *Passaveria*, Fl. Bras. VII (1863) p. 85. Consequently *Passaveria* should be treated as a synonym of *Ecclinusa*, as was done by Bentham and Hooker, Gen. Pl. IIii (1876) p. 654 and Engler in Nat. Pflanzenfam. IVi (1891) p. 147, and should not be retained for a part segregated from *Ecclinusa*, as did Pierre, Not. Bot. (1891) pp. 52, 54. Although the revival of the name *Passaveria* should be rejected, Pierre was right when he pointed to the different

appearance of *Passaveria lancifolia* Mart et Eichl. if compared with *Ecclinusa.* This difference almost solely exists in the nervation of the leaves — *Passaveria* sensu Pierre: close parallel primaries, the principal ones alternating with groups of 3 lesser primaries, and the secondaries forming no straight connections between the principal primairies — *Ecclinusa:* primaries more distant, connected by secondary nerves. As differences of the same order are admitted in the genera *Chrysophyllum* and *Pouteria* (not by Pierre, however!), I do not think there are strong arguments against including *Passaveria* sensu Pierre in *Ecclinusa,* though the nervation and the anatomical differences mentioned by Pierre may justify the formation of two sections. The new combination has to be: *Ecclinusa lancifolia* (Mart. et Eichl.) Eyma, nov. comb. = *Passaveria lancifolia* Mart. et Eichl. in Fl. Bras. VII (1863) p. 86, t. 47, type specimen Spruce 1949, Rio Negro between Barcellos and S. Isabel.

I likewise do not think *Ragala* Pierre, l.c. p. 57, distinct enough to be maintained, as was Engler's opinion, too (Nat. Pflanzenfam., Nachtr. zu IVi, 1897, p. 278).

For the confusion of *Ecclinusa sanguinolenta* (Pierre) Engl., *Ragala sanguinolenta* Pierre, and *Pouteria guianensis* Aubl., which is the type species of the genus *Pouteria,* see p. 177.

Baillon, Hist. Pl. and Engler, Nat. Pflanzenfam., Nachträge, also referred *Prieurella* Pierre to *Ecclinusa.* Pierre's description, in Not. Bot. (1891) p. 68, was made after a few cauliflorous inflorescences collected, without leaves or fruits, by Leprieur in French Guiana [P]. These are identical with those of *Chrysophyllum cuneifolium* (Rudge) A. DC., *Bumelia cuneifolia* Rudge [type in Brit. Mus.], as was probably already discovered by Baillon (l.c. p. 297). Although this species resembles an *Ecclinusa* in the shape of its ovary and style and in its nervation, it should be excluded from that genus on account of its lacking stipules and of its albuminous seeds containing an embryo with foliaceous cotyledons and well-developed caudicle. For the same reasons I agree with its place in *Chrysophyllum.*

The plant mentioned as *Ecclinusa floribunda* Pierre in Glaziou's list in Bull. Soc. Bot. France LVII (1910) Mém. 3, p. 436, and distributed under that name, (Glaziou 21707, Macacos, Rio de Janeiro [P,B]), has long pedicelled flowers and a rather long digitiform style and no stipules. For these reasons it cannot stand in *Ecclinusa.* Its relations are probably with *Pouteria* sect. *Pradosia.* It may be the same as *Eccl. brevipes* Pierre, Not. Bot. p. 57 (type Schwacke 2874, Cajuerco de Campo, Paraná)

of which I saw fragments (leaves and some analytical drawings) in Paris.

Ecclinusa guianensis Eyma, n. sp.

Arbor (30 m altus, B.W. 6151) latice albo, ramulis breviter cinereo-tomentosis, partibus junioribus sulcatis. Stipulae caducae longe ovatae circ. 7 mm longae. Foliorum petioli 1¼-1½ cm longi, adpresse pilosi, laminae oblongae, usque 16 cm longae, longitudine latitudinem circ. 3-plo superante, interdum, e.g. in Lanjouw 733, ovatae, apice acuminatae, basi obtusae vel rarius subacutae, coriaceae, basi nervi mediani subtus ut petioli adpresse pilosa excepta glabrae; nervo mediano supra in valle acute prominulo, subtus valde prominente, nervis primariis parallelis, circ. 5-8 mm distantibus, subrectis, ad marginem arcuatis, supra impressis, subtus acute prominentibus, nervis secundariis crebris parallelis nervos primarios connectentibus supra impressis subtus subplanis, reticulatione ultimo denso utrinque impresso, laminae superficiem inprimis subtus granulatam efficiente. Flores sessiles, in axillis folorium vel supra cicatrices foliorum delapsorum glomerati, alboviridi; sepala 5, ovata, extus adpresse cinereo-pilosa; corolla 3 (—4) mm longa, lobis (4) 5 ovatis, longitudine eam tubi 2-3-plo superante, linea mediana extus adpresse pilosa; staminodia nulla; stamina in parte basali tubi inserta, filamentis bene evolutis, antheris connectivo truncato elongato apiculatis, in floribus femineis nil nisi cicatricibus notata; ovarium globosum, vel sterile cylindricum, pilosum, 5-loculare, stylo brevi crasso cylindrico, stigmatibus 5 planis. Fructus globosus, maximus a me visus circ. 1½ cm attingens, tomentosus, seminibus 2 bene evolutis axi basi insertis, vix lateraliter complanatis, quorum testa hilo lineari laterali-basali circ. 2 mm lato excepto nitida subcoriacea nec firma, embryone cotyledonibus crassis totum semen explentibus caudicula minutissima punctiforme.

Surinamo: Brownsberg, arbor n. 15 (B.W. n. 6527, typus fructus, et alabastra gerens, lectus Julio 1924); Brownsberg, arbor n. 1138 (B.W. n. 1709, ster., lectus Martio 1916; n. 6431, typus, in Herb. Rheno-traj., cum floribus lectus Aprili 1924); Zandery I, arbor n. 45 (B.W. n. 1263, ster., lectus Nov. 1915); Watramiri, arbor n. 1624 (B.W. n. 2000, defl., lectus Junio 1916); ad fl. Coppename pr. cataractis Raleighvallen (Lanjouw n. 733, cum floribus lectus Sept. 1933; B.W. n. 6151, cum floribus et fructibus parvis lectus Julio 1923); ad basin montis Voltzberg (Lanjouw n. 927, cum fructibus parvis lectus Sept. 1933, specimen foliis parvis notatum); Kaboeri, arbor n. 584 (B.W. n. 4975, ster., lectus Oct. 1920), in colle Dalgerberg, ad fl. Kabalebo sup. (Pulle n. 397, cum floribus lectus Sept. 1920).

Guiana gallica: Godebert (Wachenheim n. 114, ster. [P]); ad fl.

Maroni (Gandoger n. 133, ster., lectus anno 1892 [P]); loco non indicato (Patris s.n., ster.).

Guiana anglica: ad fl. Rupununi pr. Apoteri, alt. circ. 90 m (Forest Dept. British Guiana n. 2066, cum floribus lectus Julio 1931 [K], n. 2070, cum floribus lectus Julio 1931 [K]).

Nomina indigena: Surinamo: Bartaballi (S.D.); Battamballi (N.E.); Malobbi, Battambaali (Sar.); Bataballi, Barataballi, Baalata, Kodiebie joesie (Arow.); Wasépoekoe, Ajowo, Araata were, Poeromotto, Matta matta wèwè (Kar.).

Guiana anglica: ? Bartaballi (Arawak).

Related to *Ecclinusa ramiflora* Mart., *Passaveria obovata* Mart. et Eichl., from Bahia, Pará and Amazonas, which has leaves more or less cuneate towards the base, and much more hairy beneath, at least on the primary and secondary nerves and on the petioles, and secondary nerves prominent beneath.

According to notes with Pulle 397 and Forest Dept. 2066 the latex of *Ecclinusa guianensis* is used to adulterate balata latex.

Achras Zapota L., Spec. Pl., ed. 1 (1753) App. p. 1190.

The application of the name *Achras Zapota* L. was amply discussed by Cook in Contr. U. S. Nat. Herb. XVI (1912) p. 277.

According to Pittier in Contr. U. S. Nat. Herb. XVIII (1917) p. 80 frequent and considerable variation was noted in the relative length of the calyx and corolla, of the latter's lobules and the staminodes. Also in the fruits diferent types exist (cf. Cook pl. 101 and Pittier p. 81). The flowering material from Surinam is too scarce to form an opinion on its variability. Some differences with former descriptions were noticed, however.

In the first place the flowers of Pulle H12 showed the stigma beautifully cut into 12 sections, whereas it has been described as 6-tubercled (Miquel in Fl. Bras.), 6-denticulate (Baillon), or minutely 6-lobed (Engler, Lam). A 12-lobed or -parted stigma is more in accordance with the number of ovary-cells, which is as a rule 12, too. Another point noticed in the same flowers was the absence of a rim connecting the bases of stamens and staminodes as figured in Engler-Prantl, Nat. Pflanzenfam. IV. 1, p. 137, and as described by Pittier for his *A. chicle* and *A. calcicola* (in Journ. Wash. Ac. Sc. IX. 1919, pp. 437, 438). In this respect the Surinam plant agrees with Bot. Magazine pl. 3111 and Fl. Bras. VII pl. 22.

An adherence of the staminodes to the corolla-lobes, as men-

tioned by Pittier for *A. Zapota,* was not noticed.

A fasciated flowering branch, similar to that figured in De Tropische Natuur VI (1917) p. 152 (Dutch East Indies), was also collected in Surinam [U].

Manilkara [Rheede] Adanson, Fam. Plant. II (1763) p. 166.

Dubard, in Ann. Mus. Colon. Marseille 3 sér. III (1915), grouped the *Mimusopeae* in a similar series as the *Sideroxyleae,* according to the structure of the seed and the embryo. I am inclined to accept these characters as a base for classification, but from what I found in *Pouteria,* e.g. in § *Pradosia,* follows that the development of a layer of albumen and the length of the caudicle are of secondary importance. This was admitted by Dubard himself in Ann. Mus. Colon. Marseille XX (1912) pp. 2-5 and in the same periodical 3 sér. III (1915). Dubard admitted 11 genera in the *Mimusopeae.* This number will probably have to be reduced for the reasons just given.

One of the principal results of Dubard's investigations was the reviving of the genus *Manilkara* for a group of species which had, except by Adanson, generally been included in *Mimusops.* The same had already been suggested by Pierre in Urban. Symb. Antill. V (1904) p. 163. Pierre even considered *Manilkara* more closely related to *Achras* than to *Mimusops* s. str.. For convenience's sake, however, he retained *Mimusops* in the old sense. The generic status of *Manilkara* was firmly defended by Lecomte, who, however, attached more importance to the number of flower-parts, which he considered very constant in this group of Sapotaceae, and to the anatomical structure of the leaf, than to the characters of he seed (Lecomte in Bull. du Muséum, 1917, pp. 35-39, and in Notulae systematicae III, 1918, pp. 340-341). Consequently, in Lemée's Dictionnaire some genera kept separate by Dubard, are included in *Manilkara* on account of their floral organization, e.g. *Labramia,* which has a basal scar. In Ann. Ac. Bras. Sc. VI (1934) p. 210 Ducke rejected the segregation of *Manilkara* from *Mimusops* because of the inconstancy of the number of flower-parts. Variations on the same branch had already been noticed by Wight, Icon. IV. 4 (1850) p. 13, tab. 1587, 1588. I think, however, that the combination of several characters, not always very constant nor very important if taken separately, but all differring in a parallel way, justifies the distinction of two genera.

These characters are:

(1) seed	Manilkara	- long ventral scar, hilum and micropyle distant.
	Mimusops	- broad basal scar, hilum and micropyle approached.
(2) embryo	Manilkara	- cotyledons thin, foliaceous, albumen present.
	Mimusops	- cotyledons thick, plane convex, albumen wanting.
(3) flowers	Manilkara	- 6-merous.
	Mimusops	- 8-merous.
(4) leaves	Manilkara	- nervation generally straight, parallel, and rather close; leaves containing sclereids (according to Lecomte).
	Mimusops	- nervation wider, curved; leaves without sclereids (according to Lecomte).

It was proposed at the Sixth International Botanical Congress at Amsterdam, 1935, to place Adanson's Familles des Plantes (1763) on a list of „opera rejicienda". This point was referred to a special committee for investigation, to report to the next congress. In the meantime the name *Manilkara* Adanson remains legitimate. If, however, Adanson's work is accepted for the list, and opinions on the taxonomy of the genera of *Mimusopeae* remain the same, it will be advisable to conserve *Manilkara* against its synonyms *Synarrhena* Fisch. et Mey. (1841) and *Mahea* Pierre (1891). These have never attained general use, whereas *Manilkara* has been adopted by several authors, viz.: Adanson, Familles des Plantes, II (1763) p. 166; Dubard in Ann. Mus. Colon. Marseille, 3 sér. III (1915) pp. 6-28; Lecomte in Bull. du Muséum (1917) pp. 35-39 and in Notulae systematicae III (1918) pp. 340-341; Britton and Wilson in Scientific Surv. Porto Rico and the Virgin. Isl. VI. 1 (1925) p. 72; H. J. Lam in Bull. Jard. Bot. Buitenzorg, sér. 3, VII (1925) pp 7, 12, 238-241, and VIII (1927) pp. 383-387, 481; Benoist in Arch. Bot. V, Mém. 1 (1931) p. 241; Hutchinson and Dalziel, Fl. W. Trop. Afr. II. 1 (1931) p. 14; Chevalier in Rev. Bot. appliquée & Agric. tropic. XII (1932) pp. 261-282, 350; Standley in Trop. Woods 31 (1932) p. 45; Lemée, Dictionnaire Pl. Phanérog. IV (1932) p. 291.

Manilkara bidentata (A. DC.) Chev. in Rev. Bot. appl. & Agric. trop. XII (1932) p. 270; — *Mimusops bidentata* A. DC.,

Prodr. VIII (1944) p. 204; Miq. et Eichl. in Fl. Bras. VII (1863) p. 43; — *Mimusops Balata* auct., Miq. et Eichl. in Fl. Bras. p. 44, p.p.; Pierre in Bull. Soc. Linn. Paris (1885) p. 506; Engler, Mon. Afrik. Pflanzenfam. VIII (1904) p. 60, fig. 12; Pierre in Urban, Symb. Antill. V (1904) p. 164; — *Manilkara Balata* auct., Dubard in Ann. Mus. colon. Marseille 3 sér. III (1915) p. 19; — *? Sapota Mulleri* Bl. in Ann. Sc. nat. 4 sér. VII (1857) p. 225, et in De Volksvlijt, Amsterdam (1857) n. 6 et 7, c. icone; — *Mimusops surinamensis* Miq. in Fl. Bras. p. 43; — *Manilkara surinamensis* (Miq.) Dub., l.c. p. 22.

The circumstance that, as is shown by Chevalier, Aublet (in MS in Hb. Paris) thought this species to be the *Persea* of Plumier, but did not include it in his book, has led to the application of the name *Achras Balata* Aubl., which belongs to a species introduced from Mauritius (Isle de France), to the wild Guiana plant. A. De Candolle described the latter in 1844 under the name *Mimusops bidentata.* Notwithstanding this, the name *Mimusops Balata* (Aubl.) Gaertn. continued to be used for the American species, and so in the Flora Brasiliensis the curious statement can be found that Schomburgk collected, far in the interior of British Guiana, a plant belonging to a species which, according to Aublet, had been introduced in French Guiana from Mauritius. Pierre, having seen Aublet's plants in Hb. Jussieu [P], was of the opinion that Aublet's references to Manilkara and to the Mauritius plant were erroneous, but that nevertheles the name *Mimusops Balata,* based on „Achras Balata Aubl. excl. syn.", should be applied to the Guiana material. As stated above Chevalier in 1932 came to another conclusion. The name *M. bidentata* A. DC. had already been reestablished for the Guiana balata by Huber, in collaboration with Stapff (in Bol. Mus. Goeldi IV, 1904, p. 402).

Beside *M. Balata,* for which no Surinam collections are listed, but which is, erroneously, said to be the Surinam Bolletrie, the Flora Brasiliensis contains the description of another species occurring in Surinam. This, *Mimusops surinamensis* Miq., according to its author differs from *M. bidentata* in having leaves glabrous beneath and glabrous exterior sepals. It has been reported from Surinam and Southern Venezuela, and Dubard also referred to it a plant from French Guiana. Dubard doubted the specific value of *M. surinamensis,* but refrained from including it in *M. bidentata* because of the incompleteness of the material he had seen. In Miquel's diagnosis the staminodes are said to be more or less deeply split into 2 or 3 parts at the top, and the dorsal

appendages are said to be entire. The type specimen, Hostman 739 in Hb. Utrecht, has not a single corolla left, and the sheet of Hostmann 739a in Paris is not much better. In the recent Surinam collections I only found staminodes of the undivided type, and mostly more or less deeply bifid dorsal appendages. These characters of the flower are, however, unsuited for the distinction of species, at least in this particular case, as is shown below. Since not the slightest other difference could be found between Hostmann 739 and e.g. Tree n. 36, their specific identity cannot be doubted.

An analytical drawing with Hostmann 739a in Paris shows the extraordinary variability of the staminodes in the same flower, where regular bidentate staminodes may be found together with acute undivided ones with only a small lateral tooth on each side, as well as all kinds of intermediate forms. That no less variability exists in the shape of the appendages is shown by B.W. 3688, where in the same flower entire as well as deeply bifid appendages were noticed. In the latter case the lobes are sometimes unequal. This also explains that P i e r r e in Urban Symb. p. 166 describes the appendages of var. *Schomburgkii* Pierre as entire, rarely 1-3-fid, whereas E n g l e r, Mon. Afr. Pflanzenfam., p. 61, describes and figures them bifid.

As regards the diferences said to exist between *M. surinamensis* and *M. bidentata*, these do not appear to be constant enough to justify the distinction of two species. The glabrescence of the exterior sepals is, indeed, very variable, and often a matter of age, and no more importance should in this case be attached to the glabrescence of the leaves.

Fruiting material from Surinam has been described as *Sapota Mulleri* Bl. Engler, l.c. p. 62, retained this name for a variety occuring in Surinam. The type-material in Hb. Leiden has larger leaves than most of the other Surinam material. I am not quite certain whether this plant as well as several other varieties referred to this species really belong to *M. bidentata.* Indeed much more flowering material with detailed field notes of *Manilkara* is needed before any useful definitions of the species and their varieties can be given. Engler, l.c., excludes var. *Melinonis* Pierre and var. *Sieberi* (A. DC.) Pierre, which I also think preferable. Cf. p. 210.

Collector's notes invariably give the vernacular name of this species in Surinam as Bolletrie; in a few instances the name Balata is added, and all labels containing Indian names have Borowé as the Arowaccan and Parata as the Caribbean name.

The negro name is Botrie. The Dutch name Paardevleeschhout (horse-flesh wood, from the red colour of the wood) is sometimes encountered in literature, but never on collector's labels.

This appears to be the only species from which commercial balata is procured in Surinam.

Manilkara Huberi (Ducke) Chev. in Rev. Bot. appl. & Agric. trop. XII (1932) p. 351; — *Mimusops Huberi* Ducke in Arch. Jard. Bot. Rio de Janeiro II (1918) p. 14, fig., Ducke in Arch. Jard. Bot. Rio de Janeiro III (1922) p. 238, analytical fig. erroneously under *M. rufula;* — *Mimusops elata* auct., non Fr. Allem., Huber in Bol. Mus. Goeldi IV (1905) pp. 433, 436.

This species is conspicuous for its leaves, which are light-coloured at first, often beautifully orange or yellow, beneath, with distinct darker nervation, the ground-colour becoming paler, to white, with age. The species has hitherto been recorded for the greater part of the state of Pará, and so I do not hesitate to refer to it some sterile specimens from the interior of Surinam (B.W. nn. 366, 3573, 3746, 3879). A deflorate collection from the North-West District of British Guiana is also referable to *M. Huberi* (Wilgress Anderson, Fl. Br. Gui. n. 9 I, Aruka R., Barima [K]), and also a sterile specimen from the same region (Wilgress Anderson, Fl. Br. Gui. n. 9 II, Manura Hill, Aruka R., Barima [K]). Both 9 I and 9 II are said to be larger than the true Bullet tree, and the vernacular names are given as Black Balata or Black Bullet tree. Some leaves collected by the Surinam Forest Officer Gonggrijp on a voyage to Venezuela may equally belong to this species (B.W. n. 4969, near the sources of the Acure, on a plateau about 150 m alt., in Delta Amacuro, N. E. Venezuela).

In Huber's paper, p. 435, *M. elata,* with which is meant *M. Huberi* Ducke, is mentioned among the trees yielding commercial balata, but in none of Ducke's articles is any reference made to *M. Huberi* as a balata-producing tree. This is in accordance with the notes and vernacular names on the labels of the Surinam plants, the names Valsche Bolletrie, Basterd Bolletrie (=false Bolletrie), Brosse Bolletrie, Brosse Balata (= brittle B.) and Badwood, Bad Bolletrie, all pointing to the inferior quality of the latex. In one case (B.W. 366) is stated that the latex did not flow. According to Gonggrijp the Venezuelan tree, which he considered identical with a kind of false balata from Surinam, had white, thick-flowing latex, coagulating on the incisions of the bark, and burning with a sooty flame. Its vernacular name is Purgo negro.

On the other hand, according to Sampaio (teste Chevalier l.c.), *M. Huberi* should yield latex of a good quality (33% of balata according to le Cointe), and a professional balata-bleeder with Rondon's expedition to the region between Obidos, on the Amazon, and the Tumac Humac Mountains, declared that the coagulating latex did not stick to the fingers. In the region visited *M. Huberi* is said to be one of the most frequent trees, not only in the forests on the Cumina R., but also in the Tumac Humac Mts.

The two specimens from British Guiana are said to yield gutta-percha, but nothing is said of the quality.

Manilkara spp.

Beside the material which could be identified with *M. bidentata* and *M. Huberi* there are several sterile or fruiting specimens among the Surinam material not referable to these species. These represent different types, most of them labelled Basterd Bolletrie, Bad Bolletrie or Badwood, and yielding inferior latex. They are not always easily distinguishable from *M. bidentata.* An investigation as to whether the amount and quality of the latex varies in the same species as a result of environmental conditions appears desirable, especially since informations supplied to Pittier on chicle-producing *Achras* seem to point in that direction. (Journ. Wash. Ac. Sc. IX, 1919, p. 434).

Two collections, B.W. 367 and 368, from the Upper Suriname River, may be referable to the species first described as *Mimusops balata* var. *Melinonis* Pierre, but which I, with Engler, do not think conspecific with *Mimusops balata,* or *Manilkara bidentata,* as the latter's name should be. Mélinon's plants from French Guiana [P] have obovate cuneate leaves and obcordate staminodes with denticulate or laciniate upper margin. The Surinam plants agree in the shape of the leaves and also in the nervation, which is light-coloured, rather wide and thicker than in *M. bidentata.* The latex of B.W. 368 is said to coagulate, that of B.W. 367 is said to be non-coagulating. The vernacular name of B.W. 368 is Basterd Bolletrie.

Another species, the vernacular name of which is Anansitete-Botrie, was collected on the Upper Saramacca River (B.W. 5619 and 5640) and in the Emma Range at about 250 m alt. (B.W. 5774). These are all fruiting specimens. B.W. 5774 yielded a copious thick white latex, which after condensation into a tough mass could be drawn out into threads.

EYMA, NOTES ON GUIANA SAPOTACEAE

ERRATA

pp. 182, 189, 191, 193, 195, 203:
for "hilo" read "cicatrice".