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**THE PAGES IN THIS VOLUME ARE TOO
TIGHTLY BOUND FOR ALL WORDS TO BE
REPRODUCED IN ENTIRETY**

"3. *Hedychium* cells washed through 70-mesh wire, measured lengthwise, 0.138 mm.

"4. *Hedychium* cells washed through 70-mesh wire, measured crosswise, 0.083 mm.

"5. Best strong thick manila cable paper, 2.835 mm.

"6. Ditto, thin, 2.89 mm.

"It will be observed that the mean size of the cells, taking the mean of the two directions [mean of 3 and 4], is 0.41 mm., or less than 1/20 of the length of the fibres which measure 2.58. It can be understood, therefore, that such small particles as the oval cells will pass through a 70-mesh sieve of the washing drum, the holes of which would be about 0.2 mm., but the same sieve would of course retain the fibres proper. It will be observed also that the mean length of the fibres of the longest and strongest manila papers, which is about 2.85 mm., is only slightly in excess of that of the *Hedychium* fibre, but, as will hereafter be seen, the *Hedychium*, on account of the peculiar nature of the fibres and the cells, is capable of producing a stronger and in many respects more serviceable paper. Moreover, the smallness of the *Hedychium* cells in comparison with the fibres enables the cells to fill the interstices between the fibres. Moreover, these cells, being of a flocculent, sticky and glutinous nature, act as a natural sizing material. We mechanically separated and weighed the cells and fibres with the following results:—

"The actual amount of fibre proper and cells in *Hedychium* unbleached paper, the cells of which have been entirely retained, we find to be as follows:—

Cells	...	...	17.3%
Fibre	...	...	82.7

"When the pulp is completely bleached so as to produce a white paper, the proportion by weight of cells and fibres in the finished paper is as follows:—

Cells	...	...	14%
Fibre	...	...	86

"We have made several trials of this material on the paper machine. The beaten fibre, especially that containing the pith cells, when left in an unbleached condition, has an extremely greasy feel, enough to lead one to suppose that it would only part with its water with very great difficulty on the paper machine. Unlike most greasy feeling pulp, however, the water drains from the machine wire with great rapidity. We have seen the pulp on the wire of the paper machine on five or six occasions. In one case, when making a parchment paper, we observed that the water left the wire quickly after the apron, in fact, in one-quarter of the space taken by a wood-pulp paper made on the same machine at the same speed. This argues in favour of the possibility of comparatively fast running on the paper machine, in spite of the greasy feel and the parchment-like qualities.

"For the purpose of making a comparison of papers producible from the *H. coronarium* with papers with which it is likely to come into competition, we carried out a number of tests as to strength,

breaking strain, elongation, bursting strain and greaseproof qualities. These are contained in Table B (not reproduced).

"We draw attention to this fibre as we believe it may become of great industrial importance to the paper trade. Where circumstances are congenial to its growth, the plant spreads to the exclusion of all other vegetable growth by means of its rhizomes, so that it can be harvested at least once a year, producing a heavy crop. It is a easy pulp to manipulate. It is capable of producing a paper of exceptional strength and can be worked either bleached or unbleached. The fact that the paper in its natural state, without the addition of any materials whatever, can be made to possess greaseproof and self-sizing qualities is a point of commercial importance.

Messrs. Clayton Beadle and Stevens also inform us, that they have dressed some of the fibre from the green stem, and the tensile strength tests indicate that it is almost exactly similar in strength to the best pure manila binder-twine. Samples both of the paper and the fibre have been presented to Kew and have been placed in the Museum.

Owing to the very remarkable paper-making qualities of *Hedychium* and the ease with which the plant spreads under favourable conditions in the tropics, it seems likely that it may be in considerable demand in the near future.

AMOMUM AND ALPINIA.

As *Hedychium* has proved to be so valuable a plant for paper-making, stems of *Amomum hemisphericum* and *Alpinia nutans* have also been submitted to Messrs. Clayton Beadle and Stevens for examination as to their paper-making qualities.

In the accompanying report they mention that in neither case do these plants yield papers showing the self-sizing qualities to be observed with *Hedychium* and under certain conditions also with manila waste, bagasse, and also with banana fibre. The Report is as follows:—

"These plants were passed through sugar-crushing rollers for the removal of juices and to reduce same to the condition of tow. They were then boiled under pressure, each with 20 per cent. of soda, the *Amomum hemisphericum* being boiled for 4 hours at 40 lbs. pressure and the *Alpinia nutans* for 6 hours at 50 lbs. They were afterwards bleached, and the yield of unbleached and bleached fibres expressed on the original green weight of stem as received, as follows:—

On green stem as received.	<i>Amomum.</i>	<i>Alpinia.</i>
Yield—unbleached	7.41	5.9%
bleached	6.36	4.95

"If expressed upon the dry weight of stem the figures are as follows:—

On dry stem.	<i>Amomum.</i>	<i>Alpinia.</i>
Yield—unbleached	58.2	50.0
bleached	49.6	41.5

The average length of unbeaten fibres as contained in each of the pulps taken as an average of 10 measurements was measured with the following results:

	<i>Amomum</i>	<i>Alpinia</i>
Length of fibre	2.54 mm.	2.21 mm.

From a superficial examination of the pulps in each case we think it possible that the *Amomum hemisphericum* could be made to produce a strong brown paper with a long tear. It is also capable of being bleached white. Very much the same remarks may be said to apply to the *Alpinia nutans*.

From Messrs. Clayton Beadle and Stevens' report it would appear that *Amomum* and *Alpinia*, though considerably inferior to *Hedychium*, might nevertheless be quite useful sources of material for the paper-maker. *Amomum hemisphericum* is a native of Java. *Alpinia nutans* is recorded from Hong Kong, Formosa, Cochin China, the Eastern Himalaya and the Malay Peninsula. It is also known from the West Indies, Guatemala, Venezuela, Surinam and Brazil, but like *Hedychium* it has probably been introduced into the Western Hemisphere.

Both *Amomum* and *Alpinia* belong to the Natural Order Zingiberaceae. Their habit of growth is quite similar to that of *Hedychium*, and it seems probable that *Alpinia* would form dense thickets in swampy country. The stems of *Amomum* reach a height of as much as 16 feet, and those of *Alpinia* are stated to attain to 8 to 10 feet in height.

LII.—AKANIACEAE: A NEW FAMILY OF SAPINDALES.

O. STAFF.

The position of the genus *Akania* has been much contested and no satisfactory suggestion has so far been made as to its proper place in the Natural System. *Akania* was described by J. D. Hooker in Bentham and Hooker's Genera Plantarum, vol. i. p. 409 (1862) and placed in Sapindaceae at the end of the suborder Sapindaceae without any further observation. Bentham in Flora Australiensis, vol. i. p. 471 (1863) followed Hooker, adding that *Akania* was "allied to *Harpullia* but very different in the calyx and disk." This remark was probably occasioned by F. v. Mueller's suggestion that the plant which he had then just described as *Cavanilla lucida* (Frage, Phyt. Austr. vol. iii. p. 44; 1862, may be a *Harpullia*. Baillon in Histoire des Plantes, vol. v. (1874) also has *Akania* in Sapindaceae "as the type of a small isolated subseries" and as a "perigenous Sapindaceae" (p. 343), but as a doubtful member of the order (p. 412). He had, however, not then seen the plant. A few years later he received flowering material from the Hamana gardens at Hamana, Algeria, he pointed out that its relationship was with *Nanthoecaceae* which in his opinion connected the Sapindaceae with the Staphyleaceae. This met halfway F. v. Mueller's view, expressed in 1875, in the 76th fascicle of his Fragmenta Phytographiae Australiae,

(vol. ix, p. 90), that *Akania* was referable to the "Staphyleaceae" in spite of its alternate leaves and the absence of stipules. In 1890 Radlkofer discussed at some length the relationship of *Akania* in his paper "Gliederung der Sapindaceae" in Sitzungsber. d. k. Bayer. Akad. Wiss. Band xx. pp. 127-138, and pronounced for Staphyleaceae, but with this admission that the genus represented an anomalous type of that order, the anomaly being in the alternate stipulate leaves, the perigyny of the flowers, the diplostemony of the androecium, the pendulous, epitropous ovules and certain anatomical characters. Solereder in Berichte der Deutschen Botanischen Gesellschaft, Band x. (1892), p. 551, came to the same conclusion and established a tribe *Akanieae* of Staphyleaceae which apart from *Akania* also included *Huertea* and *Tapiscia*. His argument rests mainly on anatomical and seed characters; but even so the new tribe cannot be considered as sufficiently homogeneous. In fact, Pax in his monograph of the Staphyleaceae in Engler u. Prantl's Natürliche Pflanzenfamilien (Teil in. Abt. 5, p. 259; 1893), while accepting *Tapiscia* and *Huertea* as the representatives of a distinct tribe (*Tapiscioideae*) of Staphyleaceae, felt obliged to reject *Akania* not only from that tribe but from the family, relying on the alternate arrangement of the leaves, the absence of stipules and especially the diplostemony of the androecium, the number of ovules in each cell and their pendulous, epitropous orientation.

Excluded by Radlkofer from Sapindaceae and by Pax from Staphyleaceae, *Akania* remained "incertae sedis" and was enumerated and described as such by Harms in Nachträge zum ii.-iv. Teil der Natürliche Pflanzenfamilien (1897), p. 331. Solereder in his Systematische Anatomie der Dicotyledonen (1898), pp. 275, 276 (Engl. transl. 1908, pp. 242, 243), adheres to his view expressed in 1892, but without adducing new reasons or discussing the views put forward by Pax. Since then no further contribution on the subject has appeared. I myself examined the dried material at Kew some years ago without arriving at any result except the negative one that *Akania* agreed neither with Sapindaceae nor with Staphyleaceae.

The fact that in the present year a specimen of *Akania Hillii* flowered in the Temperate House at Kew and that the plant was selected for figuring in the Botanical Magazine induced me to take the matter up once more in order to see whether a place in the system could not be found for this stray genus.

The descriptions which we possess of the structure of *Akania* are neither in an exact agreement nor are they quite correct.

The original description by J. D. Hooker is erroneous in two points of importance, namely as to the character of the festivation of the corolla and the number of the stamens. Hooker described the petals as amblicate, and this statement is repeated in Baillon, Histoire des Plantes (vol. v. p. 412) and in the Natürliche Pflanzenfamilien (Nachträge p. 341). Baillon, however, in 1878 pointed out (in Bull. Soc. Linn. Paris, i. p. 224), that he found the corolla clefted in all the flowers he examined of the specimen which he received from Hamana, and this is also my experience from herbarium specimens as well as from the fresh material at Kew.

The number of stamens varies from 8 to 9, but is usually 8, and I never observed 5 or 10. The gaps in the androecium are always in the inner whorl, but their positions are not constant.

The contorted aestivation adds to the characters which tend to exclude *Akania* from the *Sapindaceae* as well as from the *Staphyleaceae*. But if neither *Sapindaceae* nor *Staphyleaceae* are available to receive *Akania*, where is it to be placed? No other family has been suggested, and yet it is abundantly clear that the affinity lies with the *Sapindales*, Benth. and Meisn. f. or *Sapindales-Sapindaceae*, Engelm. in which subseries it occupies an isolated position, comparable to that of the small families of the *Ulmaceae*, *Ulmiferae*, and *Aceraceae*, although more detached than either. This means to express the condition taxonomically, that *Akania* represents a distinct family in the subseries of the *Sapindaceae*, the appropriate name for which would be *Akaniaceae* and its diagnosis as follows:—

Akaniaceae. *Stam.* (Ham. nov.): ex similitudine *Sapindacearum*, a caeteris familiis subseriei petalorum aestivatione contorta, disci absentia et endosperme amplo.

Flores hermaphroditi, actinomorphi, receptaculo magis minusve hemisphaerico haud alto. *Calyx* inferus, sepalia 5, eutopice imbricatis, secundo axin versus spectante, paulo inaequalibus. *Petala* 5, aequalia, dextrorsum vel sinistrorsum contorta, in receptaculo margine inserta. *Discus* nullus. *Stamina* fere semper 8 (raro 9), quorum 5 externa episepala in medio receptaculo, caetera vero circa ovarii basin inserta; filamenta elongata, filiformia; antherae oblongae, basifixae, basi breviter bilobae. *Ovarium* integrum, 3-loculare; stylus simplex, rectus, filiformis; stigma minute 3-lobum. Ovula in quoque loculo 2, superposita, anatropa, pendula, raphe adaxiali, micropyle supra, integumentis 2. *Fructus* capsularis, loculicide valvis 3 coriaceo-lignosis dehiscens. *Semina* exarillata, globoso-ovoidea, testa crustacea; endospermum carnosum, amplum, cotyledonibus accumbens. *Embryo* amplus, rectus; cotyledones transversae, crassae, subplanae; radícula superior, brevissima, recta.

Arbores. *Folia* alterna, exstipulata, imparipinnata, coriacea. *Inflorescentiae* paniculatae.

LIII.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO MORTI REGII
CONSERVATARUM.

DECADES LXVII.—LXIX.

661. *Dalmanium Pardomii*, Craib [Ranunculaceae-Helleboreae]; a *D. trichophora*, Franchet, cui affinis, petalorum lateralium lobis 5 mm. longis 1 mm. latis recedit.

Bracteae lanceolatae, acutae, 2.7 cm. longae, 6 mm. latae, supra fore glabrae, infra sparse villosae, longe ciliatae, 8 mm. infra apicem dente solitario latere utroque instructae; bracteolae 2, 3 mm. inter se distantes, parte superiore pedicelli affixae, oblongo-lanceolatae, integrae, 1.4 cm. longae, 4 mm. latae, indumento ut bracteae.

pedicelli erecti, rachidi adpressi, infimi 14 cm., intermedii 6.5 cm. longi, pilis albis divergentibus instructi. *Sepalum* posticum late ellipticum, acuminatum, 2.3 cm. longum, 2 cm. latum, intra glabrum, extra pilis longiusculis instructum; calcar rectum, 2 cm. longum, validiusculum; sepala lateralia 4.8 cm. longa, 1.2 cm. lata, indumento ut posticum sed praecipue medio marginibusque infima 1.7 cm. longa, 1 cm. lata, indumento postici. *Petala* postica 3 cm. longa, apice bifida; lateralia apice biloba, lysis ad 5 mm. longis et mm. latis barbatis. *Filamenta* summo apice glabra, paulo inferius pilis longiusculis divergentibus instructa, dein complanata, basi 1.25 mm. lata. *Ovaria* 3, villosa; stylus glaber, apice bifidus.

COLINA. KAGO: Minchu, 2400 m., Pardom, 142, cult. Hort. Veitch.

662. *Tetracera Havilandii*, Ridl. [Dilleniaceae]; species *T. walleri*, Martelli, affinis, haud sericea autem atque foliis diversa, a *T. Radula*, Martelli, differt sepalis aequalibus marginibus exceptis glabris.

Frutex scandens. *Folia* obovata, apice rotundata vel emarginata, basi cuneata, in petiolum decurrentia, coriacea, 12 cm. longa, 7 cm. lata, scabrida, costa superne depressa hirta, capillis adpressis; petioli breves, complanati, marginibus hirti. *Paniculae* parvae, ramis pilis stellatim patentibus munitis. *Sepala* sub fructu subaequalia, ovata, glabra, scabra, marginibus ciliatis. *Carpella* 3, ovata, apiculata, nitida, 3 cm. longa.

SARAWAK. Kuching, Oct. 8, 1892, Haviland, in Herb. Kew.

663. *Tetracera scabricalis*, Ridl. [Dilleniaceae]; species *T. Radula*, Martelli, proxima, sed caule insigniter scabrido, foliis oblongis obtusis basibus rotundatis, ramis paniculae pilis stellatis munitis differt.

Frutex scandens, caule validulo ligneo, primo scabrido, pilis brevibus rigidis mox pilis delapsis pustuloso-scabrido. *Folia* oblonga, obtusa, basi rotundata, apice obtusa, 10 cm. longa, 4 cm. lata, marginibus inter apices nervorum sinuatis, coriacea, superne atque inferne scabra, nervis 7-jugis subtus elevatis, costa superne depressa, hirta (folia juvenilia superne hirta, pilis dissitis rigidis pallidis); petioli scabridi, complanati, atri, 5-6 mm. longi. *Paniculae* 10-14 cm. longae, basi ad medium nudae, ramis paucis brevibus scabridis hirtis, rachi pilis brevibus stellatis munito. *Flores* copiosae. *Bracteae* oblongae, obtusae, 5 mm. longae, pedicellos superantes, extus hirtae, marginibus dense ciliatis. *Sepala* exterioria ovata orbicularia, rotundata, interiora magis oblonga, sericeo-pubescentia, marginibus ciliatis, subtus in centro sericea, 5 mm. longa, 3 mm. lata. *Petala* tennia, glabra, paulo longiora. *Stamina* breviuscula, apicibus sub-obtriangularibus, saepe inaequaliteribus. *Styli* et *carpella* 3.

BRITISH NORTH BORNEO. Sandakan, Oveagh.

664. *Talauma Beccarii*, Ridl. [Magnoliaceae]; species *T. Cordollei*, Bl., affinis, foliis glabris, nervis numerosioribus petalisque longioribus et latioribus differt.

Frutex ramis paucis, alabastris et apicibus ramorum hirtis, capillis flavis. *Folia* obtusiuscula, cuspidata, 18 cm. longa, 5 cm. lata, glabra, coriacea, nervis 14-jugis, intra marginem arcuatis, retentionibus in utroque latere conspicuis; petioli 2 cm. longi, ad basin

subito incrassati. *Petala* lata, oblonga, obtusa, apice rotundata, 4 cm. longa, 1½ cm. lata. *Stamina* linearia, acuminata, acuta, 1½ cm. longa. *Syncarpium* acuminatum, supra apices staminum serotio lanuginosum, 3 cm. longum, 1 cm. latum, apicibus carpel-lorum glabris obtusis.

SARAWAK. Beccari, 3959.

Very distinct from what I take to be the true *T. Candollei*, Bl., in the narrower leaves more plainly reticulated, and the petals longer, and broader in proportion to their length.

665. *Uvaria maulliana*, Ridl. [Anonaceae]; species sine dubio *U. purpurea*, Bl., affinis, differt toto modo inflorescentia, quae paniculata est, atque a caule lignoso exorta; foliis fere glabris et versus apicem lateribus versus basin attenuatis, calyce in flore expanso irregulariter disrupto.

Frutex scandens, partibus juvenilibus ferrugineo-tomentosis. *Folia* tenuiter coriacea, obovata, oblanceolata aut elliptica, apice saepe abrupte cuspidata, versus apicem latiora, ad basin obtusam attenuata, 13-24 cm. longa, 5-9 cm. lata, cuspidate 1 cm. longo, nervis 13-jugis tenuibus, costa decidue ferrugineo-tomentosa, aliter glabra; petioli crassi, transversim rugosi, 5 mm. longi. *Flores* racemosi aut paniculati, ramis paniculae 5-12 cm. longis validis, rufo-tomentosis; bractee persistentes, lanceolatae, obtusae, rigidae, rufo-tomentosae, 5-7 mm. longae. *Alabastra* ovoidea, 2 cm. longa, pedicellis bibracteatis 2-5 cm. longis. *Calyx* ovoideus rufo-tomentosus aut farinosus, irregulariter disruptus. *Petala* oblongo-ovata, extus farinosa, intus glabra, 7 mm. longa, 5 mm. lata. *Stamina* lineari-oblonga, 2 mm. longa, appendice complanato quadrangulati. *Torus* hemisphaericus. *Carpella* plura, truncata, stigmatibus brevibus. *Ovula* 6-9 in loculo.

SARAWAK. Tegora, Haviland, 417; foot of Bembang, Haviland, 409; Beccari, 1120.

The leaves of Beccari's specimen are smaller, more coriaceous and elliptic, but it resembles otherwise Dr. Haviland's fine series.

666. *Uvaria lanuginosa*, Ridl. [Anonaceae]; ab *U. parviflora*, Hook. f. et Thoms., foliis et ramis tomento aurantiaco-rufo tectis distincta.

Caules, folia, flores tomento aurantiaco rufo undique tecti. *Folia* elliptica, cuspidata, versus basin rotundatam attenuata, 14 cm. longa, 5 cm. lata, nervis 7-8-jugis intra marginem arcuatis; petioli 1½ cm. longi. *Flores* parvi, "pallidi," in racemis extra-axillaribus; pedicelli 5 mm. longi; bractee ovatae vel ovato-lanceolatae, obtusae, 5 mm. longae. *Sepala* ovata, obtusa, 5 mm. longa. *Petala* oblonga, obtusa, versus apicem dilatata, 1 cm. longa. *Stamina* breviuscula, oblonga, appendicibus majoribus. *Carpella* pauca, hirta. *Ovula* in seriebus 2, circiter 16.

SARAWAK. Near Kuching, Haviland and Hose, 334.

"Petals pale."

667. *Artabotrys Havilandii*, Ridl. [Anonaceae]; species *A. polygamus*, Miq. et *A. hamato*, Bl., affinis, floribus in anco complanato tomentoso majusculo, ramis pluribus brevibus; petalis lanceolatis hirtis, carpellis ovoideis breviter rostratis distincta.

Frutex scandens, ramis brunneis vel nigris longitudinaliter rugosis, partibus juvenilibus hirtis. *Folia* coriacea, adulta glabra, elliptica, acuminata, basi cuneata, in petiolum decurrentia, 12 cm. longa, 4 cm. lata vel minor, nervis 7-jugis in utroque latere elevatis gracilibus irregulariter anastomosantibus; petioli 1 cm. longi vel breviores. *Flores* in racemis validis complanatis (juvenilibus rufo-tomentosis) in ramis pluribus brevibus; bractee ovatae, 2 mm. longae, rufo-tomentosae; pedicelli hirti, 0.5-1 cm. longi. *Sepala* ovata, triangularia, acuta, cuspidata, rufo-tomentosa. *Petala* lanceolata, obtusa, supra basin vix angustata, in utroque latere hirta, 1½ cm. longa, 5 mm. lata; inferiora angustiora. *Stamina* pauca, appendicibus majusculis rotundatis albescens. *Carpella* circiter 10, juvenilia clavata, rugosa, matura ovoidea, ad basin angustata, apicibus breviter rostratis, 2 cm. longa, 1 cm. lata.

SARAWAK. Kuching, Haviland, 1629, 3340; Beccari, 381, 786, 713, 554.

668. *Artabotrys hirtipes*, Ridl. [Anonaceae]; species *A. hamato*, Bl., affinis, pedicellis bracteis sepalisque pilis rufis tectis foliis coriaceis glabris differt.

Frutex ramis nigris pilis brevibus rigidis tectis. *Folia* coriacea, glabra, elliptica, longe cuspidata (cuspidate 1 cm. longo), basi paulo attenuata, 10 cm. longa, 3-5 cm. lata, nervorum 9-jugis ad apices arcuatis reticulationibus conspicuis, petioli 6 mm. longi. *Flores* magni; pedicelli pilis rufis tecti, 1 cm. longi; bractee ovatae, acuminatae, pilis longis rufis tectae. *Sepala* ovata, lanceolata, acuminata, 5 mm. longa, pilis rufis tecta. *Petala* externa lanceolata, obtusa, carinata, tomentosa, basibus paulo dilatata, supra excavationem haud angustata, 2.5 cm. longa, 1 cm. lata ubi latissima; petala interiora angustiora et breviora. *Stamina* pauca, glabra, appendicibus majoribus. *Carpella* subcuneiformia, apicibus latis complanata, 2 cm. lata, tomentosa.

SARAWAK. Rejang Kapit, Haviland, 2326; Kuching, Haviland, 2106, in fruit.

The Kuching plant has more coriaceous leaves, 15 cm. long and 6 cm. across and stouter pedicels than the other specimen.

669. *Polyalthia coriacea*, Ridl. [Anonaceae]; arbor *P. congregata*, King, affinis, sed, foliis distincte petiolatis rigidioribus floribus minoribus breviter racemosis in trunco sitis.

Arbor parva. *Folia* coriacea, glabra, costa utroque latere et nervis subtus hirtis exceptis, elliptica, obtusa vel oblonga, breviter acuminata, 21-42 cm. longa, 10-16 cm. lata, basi late rotundata, nervis paribus 20 superne depressis subtus elevatis parallelis, nervulis transversis parallelis, petioli validi, 4 cm. longi, densi hirti. *Flores* caulium in racemum brevem dispositi, pedunculo validulus, hirtus, 1 cm. longus vel minor; bractee ovatae, omnes rufo-hirtae; pedicelli 2-3 cm. longi. *Sepala* triangularia, acuta vel acuminata, extus tomentosa, 6 mm. 2 cm. longa. *Petala* flava vel lactea, oblonga, obtusa, 4 cm. longa, 1 cm. lata. *Torus* semiovoideus, hirtus. *Pistilla* hirta. *Carpella* matura cylindrica, breviter rostrata pedicellata, velutinoso, 4 cm. longa, 2 cm. lata.

SARAWAK. Mt. Buan, Limestone. Haviland, 2002; Bidl, C. J. Brooks, 1057.

Brooks' plant differs from Haviland's in its much larger leaves shortly acuminate at the tip, and larger distinctly acuminate sepals, but I have little doubt that they both belong to the same species.

670. *Polyalthia eriantha*, *Ridl.* [Anonaceae]; species affinis *P. oblongae*, King, floribus multo majoribus dense sericeo-lanuginosis, foliis ellipticis acuminatis majoribus subtus pubescentibus, nervorum paribus 9-10, nervulis parallelis differt.

Arbor, partibus juvenilibus lanuginoso-hirtis flavescens. *Folia* elliptica, acuminata, basi angustata, 20-30 cm. longa, 8-10 cm. lata, tenuiter coriacea, superne glabra, subtus minute pubescentia, nervis tenuibus superne in costis parvis subtus elevatis 9-10-jugis, nervulis parvis, reticulationibus tenuibus; petioli crassi, pubescentes, 1 cm. longi. *Flores* singulis, extus, minima velutino-lanuginosa (staminibus exceptis), pedicellis crassis 2 mm. longis suffulti; bracteae ovatae. *Sepala* ovata, obtusa, 7 mm. longa. *Petala* externa ovata, lanceolata, obtusa, 2 cm. longa, 1 cm. lata; interna minima, angustiora. *Stamina* copiosa, appendicibus rotundatis. *Carpella* hirta.

SARAWAK. Five miles from Kuching, *Haviland*, 410.

671. *Disepalum grandiflorum*, *Ridl.* [Anonaceae]; frutex *D. anomala*, Hook. f. affinis, floribus majoribus petalis longioribus, internodio inter calycem et corollam distincto differt.

Frutex ramis pallidis. *Folia* elliptica, cuspidata vel ovata, basi angustata, 8-13 cm. longa, 5-5.2 cm. lata, tenuia, glabra, nervis gracillimis 8-jugis; petioli 5 mm. longi. *Flores* singuli, foliis summis oppositi; pedicelli ebracteati, graciles, 3 cm. longi. *Sepala* 2, ovata, obtusa, deflexa, 1 cm. longa, 8 mm. lata. *Corolla* 2 mm. supra calycem inserta; petala rufo-hirta, basi in cupulam connata, 2 cm. longa, 1 cm. lata; lobi 7 mm. longi. *Stamina* copiosa, appendicibus orbicularibus convexis.

SARAWAK. Baram, *Hose*, 142; Marudi, *Hose*, 214.

672. *Unona jambosifolia*, *Ridl.* [Anonaceae]; frutex *U. Wrayi*, Hemsl. affinis, foliis magnis ellipticis basi cordatis subpeltatis fere sessilibus, nervis 10-jugis procul a marginibus arcuatim anastomosantibus, floribus binis, petalis crassiusculis subaequalibus ovato-lanceolatis, ovulis in ovario 1-4, seminibus 1-4 pro carpello.

Frutex. *Folia* subcoriacea, glabra, subtus pallida vel rufescentia, lanceolata vel elliptica, acuminata, basi rotundata vel cordata, subpeltata, 17 cm. longa, 5-7 cm. lata, nervis superne depressis 10-jugis 5 mm. a folii margine regulariter arcuatim anastomosantibus; petioli 2-4 mm. longi, crassi, hirti. *Flores* binis, in parte inferiore rami positi; pedicelli pubescentes, 1 cm. longi. *Sepala* semi-orbicularia, crassa, pubescentia, pilis rufis ciliata. *Petala* subaequalia, ovata, lanceolata, oblonga, 1 cm. longa, 6 mm. lata, crassiuscula, pilis rufescentibus marginalibus exceptis glabra. *Stamina* plurima, appendicibus latis complanatis aequaliter. *Patella* hirta. *Carpella* vix circiter 14, globosa vel cylindrica, 10 cm. longa, 7 mm. lata, hirta breviter rostrata, stipitibus 7 mm. longis. *Semina* 1-4.

BRITISH NORTH BORNEO. Batu Putih, *Cragg*, Kudat, *Fraser*.

673. *Unona conchylata*, *Ridl.* [Anonaceae]; frutex *U. Wrayi*, Hemsl. affinis, petalis brevioribus et minoribus, obtusis, interioribus latioribus costatis, floribus in ligno vetusto singulis differt.

Frutex, cortice pallido. *Folia* elliptica, cuspidata, basi rotundata, 10-18 cm. longa, 4-5 cm. lata coriacea, glabra, nervis 8-jugis, nervis secundariis fere aequae conspicuis, reticulationibus in pagina utraque elevatis; petioli crassi, transversum rugosi, 5 mm. longi. *Flores* in ligno vetusto angulati; pedicelli 1 cm. longi, sub fructu incrassati. *Sepala* ovata, acuta vel obtusa, 1 mm. longa. *Petala* lanceolata, obtusa, 2.5 cm. longa, 6 mm. lata, pubescentia; interiora fittiora, costis elevatis e basi ad longitudinem currentibus. *Stamina* brevia, 5-seriata, appendicibus angulatis complanatis pallidis. *Styli* hirti. *Ovula* circiter 11 (ex *Haviland*). *Carpella* matura 4, ovulea vel oblonga, 1.5 cm. longa, 1 cm. lata, stipitibus 6 mm. longis.

SARAWAK. Kuching, *Haviland*, 1779.

Petals at first pale then claret colour.

674. *Goniothalamus parallelovenius*, *Ridl.* [Anonaceae]; species *G. uvarioidi*, King, ut videtur affinis, foliis magnis oblongis iis *G. Curtisii*, King, similibus, floribus quam in *G. uvarioidi* multo majoribus, petalis interioribus longioribus.

Folia magna, oblonga, basi versus paullo angustata, apice cuspidata, obtusa, basi rotundata, tenuia, coriacea, glabra, nervis 36-jugis, parallelis subtus conspicue elevatis intra marginem arcuatis, costa convexa. *Flores* magni; pedicelli raldidi, 2.5 cm. longi. *Sepala* coriacea, triangularia, obtusa, 6 cm. longa, basi 5 mm. lata. *Petala* exteriora coriacea, anguste lanceolata, acuminata, obtusa, 6.5 cm. longa, 1 cm. lata, basi dilatata 5 mm. longa, minute farinoso-hirta; petala interiora late lanceolata, basi angustata, obtusa, 4 cm. longa, 1.2 cm. lata. *Stamina* angustata, linearia, 3 mm. longa, appendicibus angustis conicis erectis scabris.

SARAWAK. Beccari, 3772.

I have only seen a single flower and leaf of this species, but it seems very distinct from any other.

675. *Mitrephora rufescens*, *Ridl.* [Anonaceae]; arbor parva rufo-hirta, *M. longipetala*, Miq., e descriptione affinis, petalis autem multo minoribus exterioribus ovatis interioribus ungue lineari apice reniformi, ut in *M. longipetala* lineari-lanceolato et pollice parum longiore.

Arbor parva, circiter 5 m. alta, ramis petiolis nervis et partibus juvenilibus rufo-hirtis. *Folia* elliptica ad lanceolata, acuminata, basi rotundata vel breviter cuneata, 16-20 cm. longa, 5-8 cm. lata, tenuiter coriacea, superne in statu adulto glabra; petioli 5-8 mm. longi. *Flores* in racemos rufo-hirtos perbrèves dispositi; limbum apertum; bracteae ovatae, persistentes. *Sepala* ovata, acuta, rufo-hirta. *Petala* exteriora ovata, acuta, 6 cm. longa, 5 mm. lata, extus sericea, intus glabra; interiora ungue lineari, apice dilatato reniformi, extus pubescentia, limbo intus sericeo. *Stamina* copiosa, glabra, appendicibus semiglobosis rotundatis.

J. SARAWAK. Beccari, 1616; Matang, *Haviland*, 1035; Batu, in limestone, *Haviland*, 2249.

SUMATRA. Singai Buluk Padang, *Beccari*, 916, 968.

676. *Oxymitra linderifolia*, *Ridl.* [Anonaceae]; frutex glaber, *O. glauca*, Hook. f. et Thoms., affinis, foliis coriaceis, nervis paucioribus, petalis latioribus differt.

Frutex glaber. *Folia* coriacea, superne brevia, subtus glauca, elliptica, cuspidata, acuta, basi rotundata aut breviter cuneata, 15-18 cm. longa, 6-8 cm. lata nervis 9-jugis subtus elevatis, costa convexa superne depressa; petioli 1-1 cm. longi. *Flores* singuli, in pedicellis extra-axillaribus 1 cm. longis; bractea mediana, brevis, lanceolata. *Sepala* pugioniformia, basi lata, apice angustata, 4 mm. longa. *Petala* exteriora lanceolata, linearia, pubescentia, 9 mm. longa, 3 mm. lata; petala interiora eorum angustum formatum, 5 mm. longa. *Torus* minimus, hirtus. *Pistilla* conica, hirta. *Orula* 1-2, superposita. *Carpella* maturae globosae, 5 mm. longa, stipite aequilongis.

SARAWAK. Kuching, *Haviland*, 3133. *Haviland and Huse*, 2893.

The latter specimens, which are in fruit, have smaller flowers but appear to belong to the same species as the flowering ones.

677. *Melodorum fagifolium*, *Ridl.* [Anonaceae]; species *M. litseaefolia*, King, affinis, foliis haud tomentosis sed furfuraceis, paniculis brevibus, staminibus paucis, appendicibus rotundatis haud rostratis differt.

Frutex scandens, glabrescens, ramis rufo-furfuraceis. *Folia* ovata vel elliptica aut oblonga, apice cuspidata, basi rotundata superne parce furfuracea, subtus magis furfuracea, pallida, 7-10 cm. longa, 4-5 cm. lata, nervis 9-jugis superne inconspicuis subtus prominulis haud arcuatis; petioli atri, rufo-furfuracei, 1-5 cm. longi. *Paniculae* breves, subterminales, laxae, 7 cm. longae, furfuraceae; bractee parvae, 1 mm. longae, lanceolatae, ovatae; pedicelli 7 mm. longi. *Alabastra* longe conica, triquetra, obtusa, acuminata. *Sepala* ovata, 2 mm. longa. *Petala* exteriora lanceolata, extus rufo-furfuracea, 1 cm. longa; petala interiora breviora, lanceolata, glabra. *Stamina* in verticillis 4, appendicibus rotundatis planis haud rostratis convexis glabris. *Pistilla* pauca, hirta.

SARAWAK. Entagut River, *Huse*, 397.

678. *Melodorum paniculatum*, *Ridl.* [Anonaceae]; species *M. litseaefolia*, King, proxima, floribus majoribus, tomento partium juvenilium costae foliorum (subtus) et inflorescentiae rufo, staminibus paucis oblongis, appendicibus subtriangularibus rostratis distincta.

Frutex, partibus juvenilibus ferrugineo-tomentosis. *Folia* elliptica, acuminata, basi rotundata, coriacea, superne glabra costa media excepta, subtus rufo-tomentosa, 9-11 cm. longa, 2.5-5 cm. lata, nervis 11-12-jugis subtus prominulis; petioli validi 5 mm. longi. *Inflorescentia* terminalis, paniculata, 9-14 cm. longa, ramis 5 cm. longis, omnino rufo-tomentosa; bractee lanceolatae, acutae, 1 mm. longae, pedicelli 1 cm. longi. *Alabastra* ovoida. *Sepala* ovata, triangularia, 2 mm. longa. *Petala* exteriora ovata, subacuminata, obtusa, extus rufo-hirta, nervis pallide tomentosa; petala interiora subaequilongia, crassa, carinata, apice fugaciter hirta. *Stamina* oblonga, pauca, appendicibus subtriangularibus rostratis lucidis brunneo-olivaceis. *Carpella* pauciora, pilis rufis longis tecta, apice glabra.

SARAWAK. Kuching, *Haviland*, 1845.

679. *Melodorum rigidum*, *Ridl.* [Anonaceae]; scandens, foliis coriaceis laevibus nec tomentosis, calyce integro nec lobato gamophyllo, floribus singulis axillaribus insignis.

Frutex scandens, ramis nigris. *Folia* coriacea, elliptica, cuspidata, basi rotundata, 9-11 cm. longa, 3-4 cm. lata, supra laevia, costa depressa, nervis multijugis in utroque latere valde inconspicuis, subtus rufo-furfuracea; petioli 1 cm. longi. *Flores* singuli, axillares; pedicelli rufo-furfuracei, 6 mm. longi. *Calyx* cupuliformis, integer, haud lobatus. *Petala* exteriora lanceolata, obtusa, basi latiora, superne attenuata, rufo-tomentosa, 1.5 cm. longa, ad basin 4 mm. lata; petala interiora multo breviora. *Carpella* matura cylindrica, obtusa, pallide ad basin angustata, 3 cm. longa, 2 cm. lata, tenuiter rufo-brunneo-vulcanosa. *Semina* 7 atro-brunnea, lucida.

SARAWAK. Kuching, *Haviland*, 421 & *Beccari*, 393.

680. *Melodorum longipetalum*, *Ridl.* [Anonaceae]; species *M. jugens*, Hook. f. proxima, sed folia multo coriacea et laevia petala elongata, linearilanceolata, longiora.

Frutex ramis gracilibus, juvenilibus rufo-tomentosis. *Folia* lanceolata, acuminata, acuta, basi rotundata, supra glabra (stoca grisea), subtus glaucescentia, glaberrima costa rufo-tomentosa excepta, nervis supra inconspicuis subtus magis conspicuis in juvenilibus pilis tenuibus nitidis tectis, 6-7 cm. longa, 3 cm. lata; petioli 1 cm. longi, juventute rufo-tomentosi, adulti rufo-furfuracei. *Flores* singuli, axillares; pedicelli 2 cm. longi, aut breviores; bractee parvae, lineares. *Sepala* lanceolata, acuminata, 3 mm. longa. *Petala* exteriora linearilanceolata, acuminata, extus tenuiter rufo-tomentosa, intus glabra, 2.5 cm. longa, 4 cm. lata; petala interiora duplo breviora, linearia, acuminata, glabra. *Carpella* in toro cylindrico pilis sericeis flavis tecto.

SARAWAK. Kuching, *Haviland*, 2102.

"Flowers sweet-scented."

681. *Melodorum ovalifolium*, *Ridl.* [Anonaceae]; frutex scandens, foliis parvis 5 cm. longis ovatis peltatis basi glandulis 2 instructis coriaceis glabris, floribus singulis extra-axillaribus, petalis longis angustis, staminum appendicibus elongatis quasi rostratis.

Frutex scandens, ramis tomentosis. *Folia* parva, ovata vel elliptica, breviter acuminata, obtusa, basi lata, peltata, glandulis elevatis 2 basi, 5 cm. longa, 2.5 cm. lata, coriacea, superne glabra costa excepta, subtus glauca, nervis pilis rufo-tomentosis tectis; petioli pubescentes, 4 mm. longi. *Flores* singuli, foliis oppositi; pedicelli tenues, hirti, 2.5 cm. longi; bractee minutae. *Sepala* ovata, obtusa, rufo-hirta, 2 mm. longa. *Petala* exteriora 2.5 cm. longa, basi 4 mm. lata, superne subabrupte angustata, linearia, obtusa, rufo-hirta; petala interiora brevissima, lanceolata, glabra, acuminata, 5 mm. longa. *Stamina* appendicibus prolongatis media depressis.

SARAWAK. Kuching, *Haviland*, 3144, 3151.

This I think is certainly a *Melodorum*, though in many points it resembles *Ayupia*, for the specimens show that it is clearly a climber. The peltate leaves with two basal glands are very peculiar.

682. *Xyloia congesta*, *Ridl.* [Anonaceae]; species *N. Scurteghiana*, King, affinis, sed foliis floribusque majoribus, floribus congestis in massis parvis in ligno vetusto, petalis exterioribus et interioribus subsimilibus differt.

Ventis glabrescens. *Folia* lanceolata, breviter acuminata, basi angustata, 8-9 cm. longa, 3-5 cm. lata, tenuiter coriacea, supra glabra costa depressa, obscure pubescente excepta, nervis 11-jugis parce pubescentibus, nervulis invisis; petioli 5 mm. longi. *Flores* congestae in nodis ligni vetustis; pedicelli 1 cm. longi, pubescentes. *Sepala* 1 mm. longa, rotundata, pubescentia. *Petala* exteriora e basi latiore linearia, 3 cm. longa, 1 mm. lata; petala interiora similia, vix pubescentia. *Stamina* copiosa, appendicibus irregulariter rotundatis medio depressis. *Pistilla* plura.

SARAWAK. Beccari, 2654.

683. *Xylopi* *coriifolia*, Ridd. [Anonaceae]; arbor foliis ellipticis vel obovatis crasse coriaceis nitidis glabris, floribus paucis in massis extra-axillaribus, carpellis maturis cylindricis elongatis. *Sp. X. ferrugineae*, Baill., similibus.

Arbor ramis validis. *Folia* elliptica, apice obtusa, vel obovata, basi angustata, 11-13 cm. longa, 4-5 cm. lata, valde coriacea, nitida, glabra, nervis in utraque pagina inconspicuis 7-8-jugis intra marginem anastomosantibus, nervulis secundarii fere aequalibus; petioli validi, 5 mm. longi. *Flores* pauci, extra-axillares, 2-3-m; pedicelli 1 cm. longi. *Sepala* ovata, acuta, glabra, 2 mm. longa. *Petala* lanceolata, acuta, sericea. *Carpella* matura cylindrica, basi angustata, 6 cm. longa, 7 mm. lata, stipitibus 1.5 cm. longis.

SARAWAK. Kuching, Haviland and Hose, 3337; Hose, 1906; Beccari, 2652, 3335.

The flowers in all the specimens are very young.

684. *Xylopi* *Havilandii*, Ridd. [Anonaceae]; arbor magna, *X. ferrugineae*, Baill., affinis foliis rigide coriaceis, sepalis connatis lobis lobulibus, carpellis maturis obovatoideis distincta.

Arbor magna, alabastris cupreo-hirtis. *Folia* rigide coriacea, lanceolata, utrinque attenuata, apice subacuta, 6-7 cm. longa, 2-3 cm. lata, glabra nisi costa pilis adpressis tecta, supra fusca, subtus rufo-glaucoscentia (in sicco); petioli canaliculati, 0.5-1 cm. longi, lamina ad basin decurrente. *Flores* plurimi, in axillis racemosi, 3-4 in nodo; pedunculi adpresse hirti, 1 cm. longi; bracteae ovatae. *Sepala* connata, lobis ovatis acuminatis adpresse hirtis 3 mm. longis. *Petala* exteriora linearia, acuminata, basi rotundata, adpresse hirta, 1.6 cm. longa; petala interiora angustiora, linearia, subaequilongia. *Stamina* longiuscula, linearia, appendicibus parvis conicis. *Pistilla* rufo-hirta, stylo longo glabro. *Carpella* (vix matura) obovata, apice rotundata, basi angustata, 2 cm. longa, 7 mm. lata.

SARAWAK. Kuching, Haviland and Hose, 3352; Haviland, 2394.

"Petals yellow; ovules numerous."

685. *Xylopi* *pulchella*, Ridd. [Anonaceae]; species *X. radellae*, Pierre, planta cochinchinensis, affinis foliis parvis rotundatis, sepalis connatis, petalis subaequilongis angustis, staminum appendicibus parvis conicis distinctis.

Arbor (vel frutex) glabra. *Folia* ovata, obtusa, rotundata vel paulo angustata, 4-5 cm. longa, 3-3.5 cm. lata, laevia (in sicco grisea, subtus rufo-brunnea), nervis utrinque 6-7, in pagina utraque inconspicuis; petioli 5 mm. longi. *Flores* singuli, extra-axillares;

pedicelli 5 mm. longi. *Calyx* gamosepalus, glaber, 2 mm. longus, dentibus 3 brevibus. *Petala* exteriora lanceolata, basi dilatata, 1.2 cm. longa, flava, pubescentia; petala interiora multo angustiora, linearia, fere aequilongia, basi sub rubris. *Stamina* plurima, appendicibus conicis parvis rubris (ut in *X. obtusifolia*). *Styli* longi; glutinosi (fide Haviland).

SARAWAK. Kuching, Haviland, 2101.

686. *Xylopi* *lanceola*, Ridd. [Anonaceae]; species *X. caudatae*, King, valde affinis, floribus multo majoribus, petalis multo longioribus, foliis saepe multo majoribus distincta.

Arbor ramis gracilibus. *Folia* lanceolata vel elliptica, acuminata, obtusa, basi rotundata, 1.5-5 cm. longa, 2 cm. lata, subtus sericeo-pubescentia costa pagina utraque pilis adpressis tecta, nervis valde inconspicuis; petioli 2 mm. longi. *Flores* singuli vel bini; pedicelli brevissimi. *Calyx* gamosepalus, 2 mm. longus, lobis brevibus. *Petala* exteriora anguste linearia, basi latiora, 6 mm. longa, 1 mm. lata, minute adpresse hirta. *Stamina* linearia, appendicibus minutis. *Pistilla* pauca, sericeo-hirsuta.

SARAWAK. Beccari, 1908, 3368.

687. *Mezzettia* *pauciflora*, Ridd. [Anonaceae]; species *M. umbellatae*, Beccari, affinis, sed petalis brevioribus, floribus paucis racemosis, foliis rigide coriaceis lanceolatis acuminatis, fructu olivaceoformi differt.

Folia lanceolata, longe acuminata, basi cuneata, 11-14 cm. longa, 3.5-4 cm. lata, coriacea, subtus pallida, nervis 6-jugis intra marginem arcuatim anastomosantibus, costa prominente, reticulacionibus laxis pagina utraque conspicuis; petioli 5 mm. longi. *Flores* pauci, racemosi; pedunculi 1 cm. vel minus longi, extra-axillares; pedicelli 5 mm. longi, coerulesci (ex Haviland). *Sepala* ovata, parva, viridia. *Petala* e basi latiore linearia, 5 mm. longa, sordide alba (ex Haviland), interiora minoria. *Stamina* quadrata, truncata, apice plana. *Ovarium* 1-ovulatum. *Carpellum* maturum 1, cylindricum, obtusum, olivaceoforme, 4 cm. longum, 2 cm. latum, glaucum (ex Haviland). *Semen* ellipsoideum, 2.5 cm. longum.

SARAWAK. Kuching, Haviland, 1952.

688. *Mezzettia* *opsis*, Ridd. [Anonaceae]; genus novum *Mezzettiae*, Becc., affinis, forma staminum, petalis exterioribus brevibus latis rotundatis distinctum.

Arbor habitu *Mezzettiae*, Becc. *Folia* tenuiter coriacea, oblonga, breviter petiolata. *Flores* copiosae, parvae, ex axillis foliorum paniculati hirti. *Sepala* parva, ovata, libera. *Petala* exteriora brevina, late rotundata, ovata; petala interiora longiora, linearia, obtusa, crassiuscula, basi excavata. *Stamina* plura, elliptica, loculis latis apice angustatis acutis. *Pistilla* 6 vel plura, curva, stylo brevi. *Ovulum* 1, basale.

Mezzettia *opsis* *Greggii*, Ridd.; species unica.

Arbor ramulorum ramis nigro. *Folia* elliptica, breviter obtuse cuspidata basi angustata, 12 cm. longa, 4 cm. lata, nervis utrinque 6 subtus elevatis intra marginem anastomosantibus, omnino glabra; petioli 3 mm. longi. *Flores* parvi in paniculas breves hirtas 2 cm. longas dispositi; bracteae ovatae, hirtae, 1 mm. longae. *Sepala*

imbricatis, ovata, hirsuta. Petala exteriora breviter, late rotundata, ovata, interna petala interiora linearibus, obtusis, 5 mm. longa, crassa, subcarnosa, hirsuta, basiibus excavatis androceum tegentibus. *Stamina* circiter 20, elliptica, apice emarginata, 2-locularia. *Carpella* 8 vel plura, stamina vix superantia, styliis brevibus obtusis. *Ovulum* 1, basale.

BRITISH NORTH BORNEO. Tinkayo, Creagh.

This plant seems certainly allied to *Mozzetta* of which it has much the habit. The stamens have, however, the form of those of *Athysanella*. It differs from every genus known to me in the short, broad, rounded outer petals which are much shorter than the inner ones, in the form of the stamens and in the numerous pairs with solitary basal ovules.

688. *Dalbergia maymyensis*, Craib [Leguminosae-Dalbergiaceae]; ab affini *D. assamica*, Benth., stipulis linearibus, foliis paucioribus, paniculis minoribus, racheos pedunculis ramulorumque juvenilibus indumento rufo-tomentoso facile distinguenda.

Arbor medioeris (ex *Lace*); ramuli primo rufo-tomentosi, mox glabri, cortice fusco obtecti. *Folia* cum floribus coetanea, ad 12 cm. longa, 3-10-foliolata, petiolo ad 2 cm. longo suffulta, petiolo rachi petiolulisque primo rufo-tomentosis mox breviter crispatis albidopubescentibus; stipulae lineares, 2 mm. longae, 0.75 mm. latae, cito deciduae; foliola alterna, ovato-elliptica vel elliptico-oblonga, apice parum rotunda, basi terminalia cuneata, lateralia parum inaequalia, cuneata vel rotundata, ad 4.3 cm. longa, 2.1 cm. lata, rigida, juventute utrinque adpresse pubescentia, mox utrinque tenuiter pilosa, nervis lateralibus utrinque 6-8 cum nervis transversis pagina superiore prominentibus inferiore conspicuis, petiolulis ad 4 mm. longis suffulta. *Paniculae* axillares, ad 3.5 cm. diametro, pedunculo communi 3-4 cm. longo ut ramuli rufo-tomentoso suffultae; bractee bracteolaeque deciduae; pedicelli 2 mm. longitudine vix attingentes. *Calycis* tubus 2 mm. longus; lobus infimus lanceolatus, acutiusculus, 2.5 mm. longus, 1.25 mm. latus; lobi laterales oblongi, obtusi, circiter 1.5 mm. longi et lati; lobi infimi basi connati, circiter 2 mm. longi et lati. *Vexillum* reflexum, orbiculatum, circiter 6 mm. diametro; alae 6 mm. longae, 3.5 mm. latae, basi breviter auriculatae; carina circiter 3.75 mm. longa et 2.75 mm. lata; petalorum omnium unguis circiter 1.5 mm. longi. *Stamina* isodiadelphia. *Ovarium* 4 mm. altum, 4-ovulatum, stipite 1.5 mm. longo suffultum, suturis pubescens; stylus cylindricus 1.5 mm. longus, stigmatibus parvo capitato. *Legumina* samaroidum, plerumque late ligulata, apice sentum, basi in stipitem attenuata, ad 2 cm. longum et fere 1.5 cm. latum, glabrum, tenuiter reticulatum nisi tribusve districte reticulatum, 2-3-merum, stipite ad 4 mm. longo suffultum.

INDO-CHINA. Upper Burmese Malay Peninsula, 1050 m., *Lace*, 3113, 4184, 5793, 5848. Ma River, *Siamensis*.

690. *Sedum Woodwardii*, N.E. Brown [Crassulaceae]; affinis *S. Atrov.* Linn. sed foliis obovatis obliquis obtuse dentatis et cymis majoribus laxioribusque differt.

Herba perennis, ubique glabra. *Caulis* circa 30 cm. alti, simplicis, 5 mm. crassi, leviter pluri-angulati, virides. *Folia* alterna, laeva, 3.5-6 cm. longa, 2-3 cm. lata, oblique cuneato-obovata, obtusa,

superne irregulariter et obtuse dentata, inferne longe cuneato-angustata, tenuiter carnosa, viridia. *Cyma* 7-8 cm. diametro, subplanis, 2-5-ramosa; rami dichotomi, sublaeviter bracteati, virides. *Bractee* inferiores magnae, foliiformes, ceterae multo minores (0.8-2.5 cm. longae, 3-10 mm. latae, oblique cuneato-oblongeolatae, acutae vel obtusae integrac. *Flores* 5-10 mm. sejuncti, sessiles, 1.3 cm. diametro. *Sepalae* 4.5 mm. longae, linearis-subulatae, obtusae, carnosae, viridia. *Petala* 5, spatulim radiata, 7 mm. longa, 2 mm. lata, lanceolata, acuta, lutea. *Stamina* 10, erecta, lutea. *Carpella* aere confirma, erecta, pallide lutea.

The origin of this plant is not known with certainty. It was sent to Kew for name on Sept. 24, 1912, by Mr. Robert Woodward, Junior, of Arley Castle, with the statement that it had appeared in a bed with some seedlings of a species of *Sambucus*, of which the seeds were collected in the Rocky Mountains, near Glacier, on Sept. 3, and sown on Nov. 11, 1911, germinating in May, 1912. As the *Sedum* is stated to have a rather woody root-stock with many short shoots, it seems scarcely credible that it is only of four months' growth from seed. There is just a possibility, however, that it may be a stray seedling from a bed about 3 yards away, where seedlings of Wilson's 1910-1911 Chinese collection are growing. This latter assumption seems more probable, because there is no species nearly allied to it known from North America, whilst its nearest ally (*S. Aizoon*, L.), is a native of Northern Asia. *Sedum Woodwardii*, however, is not represented among Wilson's dried plants at Kew.

LIV.—THE SOURCE OF SIAM BENZOIN.

(*Styrax benzoides*, Craib).

The lack of information as to the source of Siam benzoïn has been pointed out at various times in the Pharmaceutical Journal by Mr. E. M. Holmes and in response to his application for assistance to trace the origin of the product Dr. Kerr was communicated with on the subject. We are much indebted to Dr. Kerr for his kind reply to our enquiry from which we have extracted the following interesting information.

The *Styrax* tree which grows on Doi Sootep and which is fairly common at 600-1200 m. altitude in evergreen jungle, particularly in that type of forest where *Quercus Junghuhnii* predominates and where the soil consists of a stiff red clay overlain by a thick layer of humus, was, from flowering material, only believed to be *S. Benzoin* (Kew Bull. 1911, p. 409). The receipt of fruiting specimens showed, however, that it was not *S. Benzoin* but a new species closely allied to *S. suberifolius* and since described as *S. benzoides* (Kew Bull. 1912, p. 267). *S. benzoides*, on Doi Sootep, grows rapidly and attains a height of 12-15 m. and a girth of about 9 dm. but most of the trees are smaller though in other parts larger trees are reported. Several Kamus, natives of the Luang Prabang region from which most of the gum comes, have, without a leading question, identified the Doi Sootep tree as tou kum yan, kum yan being the Lao and Siamese name for gum benzoïn. It

must be admitted that small specific differences might not be noted by the natives, though they are often acute observers of such points particularly where economic plants are concerned.

Dr. Kerr's belief that this tree is the source of the Siamese gum benzoin has been confirmed by the receipt at Kew of a small sample of the gum collected from the Doi Sootep trees which in smell, taste and fumes is identical with commercial Siamese gum benzoin. Though the gum is only casually collected in the Chiengmai district yet nearly every tree examined on Doi Sootep had been hatched and in some cases completely felled. In the majority of cases the cuts were very old and on most trees no gum at all was observed but on a few there was a small incrustation of gum along the cuts. The largest piece of gum obtained weighed about 25 grammes and was found in a hole made by some wood-borer. It was a homogeneous, transparent, pale amber piece with the characteristic odour of Siam benzoin.

The principal method of collecting the gum is by making V-shaped incisions through the bark. The gum runs slowly into bamboo joints placed at the bottom of the V and is not collected until a few weeks after the incision is made. This is generally done during the hot season. Gum is also frequently found in holes made by wood-borers and sometimes on or in the ground at the foot of the trunk. The quality of the gum is the same by whatever method it is collected. Whether any particular tree will yield gum or not can only be ascertained by tapping as only the larger trees and not even all of them yield gum.

None of the gum obtained near Chiengmai is exported, but nearly all of it is used locally, mixed with pig's fat, as an application for the hair. Most of the gum which reaches Chiengmai is brought there by the Kamus during the cold season from the Luang Prabang region to the East of the Mè Kong. A native merchant buys it and ships it to Bangkok. This merchant estimates his yearly purchases at 5 sams (approximately 10 cwt.), but for the last two years the quantity has been less because, he says, it no longer pays the Kamus to collect it and bring it down. Although the merchant had heard that the tree grew on Doi Sootep he had never bought gum from any district but Luang Prabang.

Gum benzoin is also brought to Korat in Lower Siam but no information as to its source is available.

LV.—MISCELLANEOUS NOTES.

MR. F. A. STOCKDALE.—We learn that Mr. F. A. Stockdale, Assistant Director of the Department of Science and Agriculture and Government Botanist, British Guiana, has been appointed Director of Agriculture, Mauritius.

MR. WALTER VICTOR NORTH, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

DR. M. C. COOKE.—In consequence of the announcement in the *Journal of Botany* for September, 1912, p. 206, which we read with deep regret, of the death of our former colleague, Dr. M. C. Cooke, a notice of his life and scientific work appeared in the last number of the *Kew Bulletin*. It gives us much pleasure to learn from Dr. Cooke himself that he is in excellent health.

JOHN DAVIES ENYS.—We notice with regret the announcement of the death of Mr. J. D. Enys of Enys, Penryn, Cornwall, an old and valued correspondent of Kew. Mr. Enys, who was born in October, 1837, was the representative of a family which has been seated at Enys since the time of Edward I. He resided for many years in New Zealand, where he was a magistrate from 1867 to 1891, and no doubt to his long connection with that Colony must be attributed his interest in the New Zealand Flora.

A brief account of the garden at Enys was given in *Kew Bulletin*, 1893, p. 357, and note is made of some of the interesting New Zealand plants cultivated there. Among them were plants of *Fagus Solandri* (not *F. Cunninghamensis* as stated in *Kew Bulletin*) which Mr. Enys brought back to Cornwall from New Zealand. Among other interesting introductions may be mentioned *Fagus Cliffortioides*, a species growing at an altitude of about 2500 feet between Christchurch and Hokitika, plants of which were sent to Kew by Mr. Enys in 1888. One of his first gifts to Kew was the very fine specimen of the New Zealand sheep plant *Rauulia mammillaris*, now in Museum No. 1, which he sent over to England in 1881.

Among horticulturists he is renowned for the introduction and successful culture of the Chatham Island Forget-me-not, *Myositidium nobile*. In a letter to Kew in 1894 he wrote that the leaves of his plants at Enys were nearly 18 inches across, of a vivid green, and nearly 3 feet high.

Another tie with Kew lay in the fact that he was a cousin of Miss Marianne North.

He died on November 7th at Leeds, where he had gone to undergo an operation.

Propagation of *Rhamnus Purshiana* (Cascares Sagrada).—In an article on Cascares Sagrada which appeared in the *Kew Bulletin*, 1908, p. 429, the question of the tree proving a remunerative culture in parts of the British Isles was discussed. With a view to having the tree tested in quantity two separate consignments of seeds were obtained from North America and distributed amongst a number of gardens in various parts of Great Britain and Ireland. Unfortunately, the greater part failed to germinate. As the few trees already in cultivation do not bear seed in great abundance, it was desirable to find out if the tree could be increased by cuttings. A considerable quantity have been put in at various seasons, from the soft cuttings of young wood in June, to autumn cuttings in gentle heat and leafless cuttings in cold frames in early winter.

The autumn and winter cuttings have hitherto been complete failures and the greatest success has been secured with those made of younger wood. In June some cuttings made of the new shoots were put in mild bottom heat in a close frame; they were three or four inches long with a "heel" of older wood at the base, and 50 per cent. took root. In early July, when the wood had, of course, become firmer, a second batch of similar cuttings was put in under the same conditions: of these about 85 per cent. took root. From present experience, therefore, it would seem that July is the best month to take cuttings. Vegetation in the earlier part of the summer of 1912 was considerably in advance of the normal, so that in early July the shoots would be about as far advanced as, in ordinary years, they are in mid or late July. With a little more practice and knowledge of those small particulars in the selection, making and treatment of the cuttings—on which, as propagators know, success so much depends in the case of plants like the present, not among the easiest to deal with—it seems likely that we may expect to get an almost perfect "strike" of July cuttings.

W. J. B.

Botanical Magazine for November.—The plants figured are *Eriopsis Helenae*, Kränzl. (t. 8462); *Mesembryanthemum Pearsonii*, N. E. Brown (t. 8463); *Cornus controversa*, Hemsl. (t. 8464); *Iris caroliniana*, S. Wats. (t. 8465) and *Corokia virgata*, Turrill (t. 8466).

We are indebted to Messrs. Sander & Sons for the introduction of *Eriopsis Helenae* to cultivation. The genus which is wholly South American contains only six species. The subject of the illustration is a native of Peru and flowered at Kew for the first time in 1909; the plant having been presented by Messrs. Sander in 1894. The description was drawn up by Kränzl from a specimen which flowered at St. Albans in 1897. The flower scapes, some 60 cm. long, with their numerous yellowish-brown flowers are very striking.

Mesembryanthemum Pearsonii is one of this remarkable group of South African plants with a single pair of leaves and shows considerable resemblance to *M. testiculare* and *M. Bolmaii*. The leaves, however, are much larger than those of the former species and from the latter it differs particularly in having no style but a large sessile discoid stigma. The plant which forms the subject of the illustration was collected during the Percy Sladen Expedition to the Orange River and sent by Prof. H. H. W. Pearson to Kew in 1911 where it flowered shortly afterwards.

The *Cornus* is one of the most elegant of small deciduous trees in cultivation. The leaves are alternate, though this is not very clearly shown in the figure, and in this respect it differs from all other species except *C. alternifolia*, Linn. The plant figured was obtained from Messrs. J. Veitch & Sons. The confusion which has arisen in connection with this species and *C. brachyphylla* has been dealt with under *C. macrophylla*, Wall. (t. 8261). *C. controversa* is a native of the Himalaya and Eastern Asia.

Iris caroliniana is an interesting species from Virginia and Carolina and was first discovered by Mr. W. A. Mauds in North Carolina. It was described by the late Mr. S. Watson from a specimen which flowered in the Harvard Botanic Gardens. The species is closely allied to *I. versicolor*, Linn., but can easily be distinguished by its larger lavender-coloured flowers and green leaves. The plant figured was raised from seeds presented to Kew by the Missouri Botanic Gardens in 1908 but the species had been in cultivation at Kew for some ten years previously.

The *Corokia* figured at t. 8466 has been in cultivation at Kew since 1907 when it was raised from a cutting sent to Kew by the Editor of the Gardeners' Chronicle. It is nearly allied to *C. Cotyneaster* but can be distinguished especially by the larger leaves and scarcely tortuous branches. Only three other species have been described and our plant may be identical with one noted by Mr. Cheeseman in New Zealand, without flowers, in which the branches were not tortuous and the leaves were similar to those of the species illustrated.

Opuntias in the Canary Islands.—Whilst spending some months in the Canary Islands I took the opportunity to study the various species of *Opuntia* growing there, and noticed the following species in Grand Canary and Tenerife:—

1. *Opuntia brasiliensis*, Haw. In a garden at Orotava, Teneriffe. Lowe records this in his "Flora of Maderia," as having been introduced into that island, but he does not state if it had become wild or not, in his time.
2. *Opuntia Ficus-indica*, Webb and other writers, but not the true *O. Ficus-indica* = *O. Tuna* of some writers. This plant Webb called *Opuntia Ficus-indica*, in his "Histoire Nat. des Iles Canaries," iii., 1840, p. 208, stating that it has two varieties:—

a. *spinosa*, with yellowish-white spines.

β. *spinosa* and *parva spinosa*, unarmed or nearly so.

It is also the plant which was collected and distributed by Bourgeau under his No. 1239, with the name of *Cactus Ficus-indica*, and is called *O. Ficus-indica* by Pitard and Proust—"Les Iles Canaries," 1909, p. 197. It is certainly not the *O. Ficus-indica* of the coast regions of the Mediterranean, nor the true *Cactus Ficus-indica*, L.

It appears to have been the plant used principally for the cochineal industry, and is still extensively cultivated at Arucas, in Grand Canary, for this purpose. When given for rearing and feeding the cochineal insect it rarely seems to flower and fruit, but elsewhere—on abandoned cochineal plantations—its rich orange flowers, turning to pink as they fade, are abundantly produced and the fruit is eaten in considerable quantity.

The thorns of this *Opuntia* are short and white, generally two or three together, but in old plants often single, or almost entirely absent.

3. *Opuntia Dillenii*, Haw. Very common close to the sea in Grand Canary, and used for hedges in Teneriffe. This is the *O. Tuna* of Webb and of Bourgeau No. 263, and also of Pitard and Proust.

The spines of this plant are used in the cochineal industry to pin on the rags that protect the insect.

4. *Opuntia monacantha*, Haw. Only found by me once in Grand Canary—probably in what had been a garden.
5. *Opuntia robusta*, Wendl. Cultivated, I believe, formerly for Cochineal, now allowed to grow in a wild state in Teneriffe for its fruit, which according to Schumann "Gesamtbeschreibung des Kakteen," p. 742, is considered in Mexico one of the best to eat.
6. *Opuntia tomentosa*, Salm-Dyck. In Teneriffe, but not very plentiful. On some plants I found Cochineal doing well.
7. *Opuntia* sp., from Grand Canary—a plant with rather long dark thorns, a specimen of which is now in cultivation in the Royal Botanic Gardens, Calcutta, as No. 33,924. It has not yet been identified.
8. *Opuntia* sp. Another species with straight spines from Teneriffe. A specimen of which is now in cultivation at the Royal Botanic Gardens, Kew.

M. BURKILL.

Marram Grass for Paper-making.—Among other plants suggested as suitable for the Paper-maker which have recently been examined in this connection is the common Marram Grass of our coasts, *Amphiphila arenaria*, Link.

This grass, as is well known, is grown on the sand hills around our shores and acts as a very valuable sand-binder. It now appears that it possesses quite useful qualities as a source of material for paper-making. Messrs. Clayton Beadle and Stevens have kindly examined a consignment of Marram Grass sent through Kew from the Norfolk sand hills. They inform us that the grass was boiled under pressure, without passing through crushing rollers, and then bleached. The figures for the yield of unbleached and bleached fibres, expressed on the original green weight of stem as received and on the dry weight, are as follows:—

	Green Stem.	Dry Stem.
Unbleached	17.7 per cent.	31.4 per cent.
Bleached	13.1	25.0

The average length of unbeaten fibres contained in the pulp taken on an average of ten measurements was found to be 0.65 mm.

Marram Grass is found to produce a soft pulp with a short tear which more nearly resembles in general feel and external appearance the pulp produced from Esparto or chemical aspen wood pulp.

The primary function of Marram Grass is of course as a sand-binder, but it is possible that should it be deemed of sufficient importance as a paper-making material its cultivation could be extended over considerable tracts of sandy country bordering the coast in various parts of the British Isles.

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By Gale & Polden, Ltd., at the Royal Botanic
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Popular Official Guide to the Royal Botanic Gardens, Kew,
with map. 1912. Cloth Boards, 6d. By post, 7 $\frac{1}{2}$ d.

Official Guide to the Museums of Economic Botany. No. 1:
Dicotyledons and Gymnosperms. 1907. 10d. By post, 1s.

Official Guide to the Museums of Economic Botany. No. 2:
Monocotyledons and Cryptogams. 1894. 4d. By post, 5d.

Official Guide to the Museums of Economic Botany. No. 3:
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Official Guide to the North Gallery. 5th Ed., revised and
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Hand-list of Coniferae grown in the Royal Gardens. 2nd Ed.
1903. 3d. By post, 4 $\frac{1}{2}$ d.

Hand-list of Trees and Shrubs (2nd Ed.) and Hand-list of
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Hand-list of Ferns and Fern Allies cultivated in the Royal
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Hand-list of Tender Dicotyledons cultivated in the Royal
Gardens. 1899. 2s. 6d. By post, 2s. 10d.

GOVERNMENT HOUSE,
BRITISH EAST AFRICA.

January 27, 1913.

Dear Mr Harcourt,

I have just received your letter and enclosures concerning "Hedychium coronarium" and am sending it on privately to the Director of Agriculture for his information and observations.

I should certainly like to make an experiment with the plant here, though I notice that Sir D. Prain is doubtful of its success, and personally I think our rainfall will be insufficient to satisfy its needs. If you would kindly arrange for a supply of root stocks or seeds, or both, to be sent out, the experiment shall receive every attention.

I see it is considered that seeds are more likely to be successful than roots.

I am most grateful to you for taking this personal interest in the introduction of new products into our most promising country.

With kind regards,

Yours etc.

(Signed) F. CONWAY BELFIELD.