Dolichandrone and Markhamia
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XXII.—DOLICHANDRONE AND MARKHAMIA.

T. A. Sprague.

The name *Dolichandrone* was given in 1841 by Fenzl* to a group which contained two Australian Bignoniaceous trees, *Spathodea heterophylla*, R. Br., and *S. alternifolia*, R. Br., and which he treated as a section of the South American genus *Dolichandra*, Cham.

Seemann raised *Dolichandrone* to generic rank in 1862,† and quoted *Bignonia spathacea*, Linn. fil. as the type of the genus.‡ He subsequently published a generic description, and an enumeration of the species recognised by him.§ These included five Asiatic ones (*D. Rheedii*, *D. Lawii*, *D. falcata*, *D. crispa*, and *D. serrulata*), and two from Australia (*D. heterophylla* and *D. filiformis*).

The genus *Markhamia* was published in 1863 by Seemann‖ in a single line: "*Markhamia*, Seem. (type, *Spathodea stipulata*, Wall.). Asia trop." Seemann did not indicate how his new genus differed from *Dolichandrone*, nor did he ever supply a description of it.

In 1865 he described¶ the new genus *Muenteria*, which included two African species: *M. stenocarpa*, Seem., a new species collected by Welwitsch in Angola; and *M. tomentosa*, Seem. (*Spathodea tomentosa*, Benth.). He stated that *Muenteria* was allied to *Dolichandrone* and *Markhamia*, but did not mention how it differed from either. Five years later Seemann transferred *Spathodea lutea*, Benth., *S. zanzibarica*, Bojer, and *S. puberula*, Seem., to *Muenteria*.

Bentham reduced *Markhamia* and *Muenteria* to *Dolichandrone*, but recognised them as distinct sections.** K. Schumann restored *Markhamia* to generic rank and treated *Muenteria*, Seem., as a synonym, transferring to *Markhamia* all Seemann's species of *Muenteria*, and describing two additional ones.†† He stated that the capsule of *Dolichandrone* was quadrilocular owing to the presence of a false septum, which was absent in *Markhamia*; but this distinction between the two genera is not borne out by examination of herbarium specimens: an incomplete false septum exists in both genera.

The corolla, however, affords characters which amply justify the treatment of *Markhamia* as a separate genus. In both genera the corolla-tube is more or less funnel-shaped: in *Dolichandrone*, however, the lower and cylindric part of the tube is greatly

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* Darstell. und Erläut. p. 113 (Denkschr. Baier. Bot. Ges. Regensb. vol. iii. p. 265).

† Ann. Mag. Nat. Hist., ser. 3, vol. x. p. 31.

‡ Journ. Bot. 1863, p. 226.

§ l.c. 1870, p. 379.

‖ l.c. 1863, p. 226.

¶ l.c. 1865, p. 329.

** Gen. Plant. vol. ii. p. 1046.

†† Engl. u. Prantl. Nat. Pflanzenfam. vol. iv. 3 B, pp. 229, 242; Engl. Pflanzenw. Ost-Afr. vol. C, p. 363.

developed, and much exceeds the calyx, and the limb is almost actinomorphic; whereas in *Markhamia* the cylindric part of the tube is very short and concealed in the calyx, only the upper part of the funnel being visible, and the limb is conspicuously bilabiate. In addition, *Dolichandrone* has pure white, fragrant flowers which are open during the night, whilst those of *Markhamia* are yellow (rarely pink or lilac), or have a yellowish tube, spotted with purple, and brown-purple lobes, and expand in the daytime. Roxburgh says of *D. crispa*: "the large pure white fragrant flowers . . . expand in the evening and drop in the morning."* Wight states that those of *D. arcuata* usually expand in the evening and drop off in the morning,† and Ridley describes the flower of *D. Rheedii*‡ as "white, with a long tube, and a spreading circle of petals, and very fragrant, scenting the air deliciously in the early morning. The flowers are nocturnal, apparently opening after dark and commencing to fall by seven o'clock in the morning." The nocturnal expansion, white colour and powerful scent of the flowers, and the long, slender corolla-tube all point to the pollination of *Dolichandrone* by moths. No observations as to the pollination appear to have been published, and the genus is not mentioned in Knuth's Handbuch der Blütenbiologie.

It seems desirable to give an enumeration of the species referred to *Dolichandrone* and *Markhamia* respectively, as the synonymy is rather involved, and some of the species are not very well known.

Dolichandrone, *Seem.* in Ann. Mag. Nat. Hist. ser. 3, vol. x. p. 31 (1862); in Journ. Bot. 1863, p. 226; et l.c. 1870, p. 379; Benth. et Hook. f. Gen. Plant. vol. ii. p. 1046, partim (sectionibus *Markhamia* et *Muenteria* exclusis); K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3 B, p. 75.—*Spathodea*, R. Br. Prodr. p. 471; Bureau, Monogr. Bignon. p. 50; non Beauv. *Dolichandra*, sect. *Dolichandrone*, Fenzl in Denkschr. Baier. Bot. Ges. Regensburg, vol. iii. p. 265 (1841).

A. *Species australianae.*

1. **D. alternifolia,** *Seem.* in Journ. Bot. 1870, p. 340; Bailey, Class. Index Pl. Queensl. p. 29 (1883); Queensl. Fl. p. 1135. *D. heterophylla*, F. Muell. Fragm. vol. iv. p. 149, partim; Seem. in Journ. Bot. 1870, p. 382, partim. *Spathodea alternifolia*, R. Br. Prodr. p. 472 (1810); DC. Prodr. vol. ix. p. 209; Benth. Fl. Austral. vol. iv. p. 538.

Distrib. Queensland.

F. Mueller and Seemann considered *D. alternifolia* as a mere form of *D. heterophylla*, but Bentham, followed by F. M. Bailey, treated it as a distinct species; and this seems to be the best course to adopt in the present state of our knowledge. The Queensland specimens quoted by Bentham under *D. heterophylla*

* Fl. Ind. vol. iii. p. 104.

† Wight Ic. vol. iv. pt. 2, p. 9.

‡ Journ. As. Soc. Straits, no. 59, p. 40.

(Rockingham Bay, *Dallachy;* between Cleveland Bay and Rockingham Bay, *Hill*) should, however, in the writer's opinion, be referred to *D. alternifolia.*

2. **D. heterophylla,** *F. Muell.* Fragm. vol. iv. p. 149 (1864), in obs., excl. syn.; Seem. in Journ. Bot. 1870, p. 382; Bailey Queensl. Fl. p. 1135; Ewart et Davies. Fl. Northern Terr. p. 250. *Spathodea heterophylla,* R. Br. Prodr. p. 472 (1810); DC. Prodr. vol. ix. p. 207; Benth. Fl. Austral. vol. iv. p. 538.
Distrib. Northern Australia.

3. **D. filiformis,** *F. Muell.* Fragm. vol. iv. p. 149 (1864), in obs.; Seem. in Journ. Bot. 1870, p. 383; Ewart et Davies, Fl. Northern Terr. p. 250. *Bignonia filiformis,* A. Cunn. ex DC. in Ann. Sc. Nat. ser. 2, vol. xi. p. 286 (1839), nomen. *Spathodea filiformis* DC. Prodr. vol. ix. p. 209 (1845); Benth. Fl. Austral. vol. iv. p. 539.
Distrib. Northern Australia.

B. *Species asiaticae.*

4. **D. spathacea,** *K. Schum.* Fl. Kaiser Wilhelms Land, p. 123 (1889); K. Schum et Lauterb. Fl. Deutsch, Sudsee, p. 540; Schimper, Indomal. Standfl. p. 129; Whitford in Philipp. Journ. Sc. vol. i. p. 674; Merrill, Fl. Manila, p. 429; Merrill, Interpr. Rumph. Herb. Amboin. p. 469; Merrill, Spec. Blancoan. p. 349. *D. Rheedii,* Seem. in Journ. Bot. 1870, p. 380; C. B. Clarke in Hook. f. Fl. Brit. Ind. vol. iv. p. 379; Ridl. in Trans. Linn. Soc., Bot., vol. iii. p. 327; et in Journ. As. Soc. Straits, no. 33, p. 120; Trimen Fl. Ceylon, vol. iii. p. 282; Gamble, Man. Ind. Timb. ed. 2, p. 512; King et Gamble, Mat. Fl. Mal. Penins. Gamopet. p. 377; Brandis, Indian Trees, p. 494; Watt, Dict. Econ. Prod. India, vol. iii. p. 174; Koorders in Meded's Lands Plantent. vol. xix. p. 552; Boerl. Handl. Fl. Ned. Ind vol. ii. p. 600; Prain in Rec. Bot. Surv. India, vol. ii. pp. 246, 247, 326; Bourdillon, For. Trees Travancore p. 275; Guillaumin in Ann. Mus. Col. Marseille, 1911, ser. 2, vol. ix. p. 204; Ridl. in Kew Bull. 1910, p. 203; Ridl. in Journ. As Soc. Straits, No. 59, pp. 40, 146 (1911). *D. longissima,* K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3 B, p. 240 (1894); Koord. Exkursionsfl. Java, vol. iii. p. 184. *Bignonia spathacea,* Linn. f. Suppl. p. 283 (1781); Retz. Obs. Bot. fasc. v. p. 5; Willd. Sp. Pl. vol. iii. p. 304; Blanco, Fl. Filip. p. 499. *B. longissima,* Lour. Fl. Cochinch. p. 380 (1790). *B. longiflora,* Willd. ex DC. Prodr. vol. ix. p. 206 (1845), in syn. *Spathodea Rheedei,* Spreng. Syst. vol. ii. p. 835 (1825), quoad syn.; Wall. Cat. n. 6516; DC. Prodr. vol. ix. p. 206; Miq. Fl. Ned. Ind. vol. ii. p. 754; Wight, Ic. t. 1339; Beddome, For. Man. p. clxviii.; Kurz, Rep. Veg. Andaman Isl. p. 43; Kurz in Journ. As. Soc. Beng. vol. xlv. p. 142; Kurz, For. Fl. Brit. Burma, vol. ii. p. 234. *S. longiflora,* Vent. Choix, p. 40 (1803); Pers. Syn. vol. ii. p. 173; Decne in Nouv. Ann. Mus. Hist. Nat. Par. 1834, vol. iii. p. 380; Span. in Linnaea, 1841, vol. xv. p. 326. *S. rostrata,* Span. l.c., in syn. *S. grandiflora,* Zipp. ex

Span. l.c., in syn. *S. Loureiriana*, DC. Prodr. vol. ix. p. 209 (1845). *S. luzonica*, Blanco, Fl. Filip. ed. 2, p. 350 (1845); ed. 3, vol. ii. p. 284, t. 242. *S. Diepenhorstii*, Miq. Fl. Ned. Ind. vol. ii. p. 754 (1856-59). *S. macroloba*, Miq. l.c. Suppl. p. 565 (1860). Niir Pongelion, Rheede, Horto. Malab. vol. vi. p. 53, t. 29 (1686). Lignum equinum, Rumph. Herb. Amboin. vol. iii. p. 73, t. 46 (1750).

Distrib. Malabar, Travancore, Ceylon, Sundribuns, Lower Burma, Andaman and Nicobar Islands, Malay Peninsula, Sumatra, Java, Timor, Philippines, Borneo, Celebes, Amboina, New Guinea, Solomon Islands, New Caledonia.

Dolichandrone spathacea seems to be mainly a coastal tree.* According to Beddome, it is common about Tellicherry and elsewhere in the plains of Malabar; it is found on the banks of rivers in Northern Travancore (Bourdillon); in Ceylon it occurs in moist low country, chiefly near the coast, and especially in mangrove swamps (Trimen); it is generally distributed in the Sundribuns, occurring both along the sea-face and in the swamp-forest (Prain). Ridley has recorded it from mangrove swamps and tidal rivers in the Malay Peninsula. It is very common in Java, but is confined to saline ground in the neighbourhood of the coast, and is especially frequent in mangrove swamps (Koorders). According to Merrill, it is widely distributed on the sea-shore and along tidal streams in the Philippine Islands; and it occurs in similar situations in New Guinea (Schumann and Lauterbach). According to Comins, it grows by riversides in San Cristoval, Solomon Islands. The occurence of *D. spathacea* in rice fields near Kanga village, Lower Siam, is explained by Ridley as follows: "The tree is about 60 ft. tall, and is the commonest one in the paddy fields. Doubtless it is one of the relics of the time when the whole of this country was a tidal swamp, gradually filling up after the disappearance of the sea, which overlay all this area. There are several more seashore plants still scattered over the paddy fields, such as the sand-spurge, *Euphorbia Atoto*."

Writing of the origin of the Sundribun flora, Prain mentioned *D. spathacea* as "the only swamp-forest tree for which introduction by wind seems unequivocal," and included it in a list of species which owe their presence at the sea-face of the Sundribuns to some agency other than that of ocean currents. Whilst its local dissemination is no doubt effected to a large extent by wind, the following considerations suggest that dispersal by means of ocean currents may also take place.

The seeds of *D. spathacea* are peculiar in having comparatively short opaque wings of a spongy texture similar to that of the body of the seed, and which has been termed "corky" by Clarke and other authors. The wings of the other species, and of most bignoniaceous seeds, are as long as or longer than the body of the seed, and very thin and hyaline. In these respects the seeds of *D. spathacea* are at the same time worse adapted for transport over long distances by wind, and better adapted for dispersal by

* The records from the interior of Burma are apparently referable to *D. serrulata*.

means of ocean currents. Taking into account also the littoral habitat of *D. spathacea*, and the considerable distances oversea separating various parts of its area of distribution, it seems not unlikely that ocean currents may have played some part in the wide dissemination of the species, although direct evidence of this is up to the present lacking.

5. **D. serrulata,** *Seem* in Journ. Bot. 1870, p. 383, emend. (specimine ex India centrali excluso); affinis *D. spathaceae*, K. Schum., a qua foliolis minoribus brevius acuminatis, corollae tubi parte superiore longiore, capsulae septo crasso suberoso, seminum alis membranaceis differt.

Arbor 9-15 m. alta (fide *Witt*). Folia 8-22 cm. longa, 2-5-juga; foliola elliptica vel elliptico-oblonga, rarius obovata, 3-8 cm. longa, 1·5-4·5 cm. lata, basi (lateralia inaequaliter) cuneata, in cuspidem 4-6 mm. longam acutam acuminata, integra vel supra medium dentata, supra praesertim versus petiolulum minute lepidota; terminale 5-24 mm. petiolulatum; lateralia 1-10 mm. petiolulata. *Corollae tubus* 11-13 cm. longus; pars superior 5-6 cm. longus. *Capsula* sectione transversa rectangulari, 7-8 dm. longa, 1-1·5 cm. lata, 4-6 mm. crassa; septum crassum, suberosum. *Semina* 2·5-3·5 cm. longa, alis membranaceis.—*Dolichandrone*, n. 7, Brandis, Indian Trees, p. 494 (1906). *D. Rheedii*, Craib in Kew Bull. 1911, p. 433, non Seem. *Bignonia serrulata*, Wall. ex DC. in Bibl. Univ. Genèv. vol. xvii. p. 124 (1838); et in Ann. Sc. Nat., Ser. 2, vol. xi. p. 286 (1839). *B. laeta*, Wall. Cat. n. 6505 (1832); DC. Prodr. vol. ix. p. 171. *Bignonia* foliis pinnatis, floribus maximis, fere spithamaeis infundibuliformibus sub-2-labiatis laciniis crispatis. Griff. Priv. Journ. p. 148 (1847). *Spathodea serrulata*, DC. Prodr. vol. ix p. 206 (1845). *Stereospermum serrulatum*, DC., l.c. in syn.; Kurz, For. Fl. Brit. Burma, vol. ii. p. 230 (1877).

Distrib. Burma: Irrawaddy valley; Shwebo district, *Smales*; Thabet Kyin, *J. W. Oliver* (fide Brandis, l.c.); hills opposite Pagam, *Wallich*; Thayet Myo, *Griffith* (ex Priv. Journ. p. 148); Prome, *Brandis* (fide *Brandis*, l.c.). Lower Siam: Paknampo, common in dry deciduous forest, *Witt.*

When in a flowering state *D. serrulata* bears a strong resemblance to *D. spathacea*, and has been referred to that species. This may perhaps account for the inland distribution in Burma attributed to *D. spathacea* (*Spathodea Rheedii*) by Kurz, who says that it is "not unfrequent in the lower and upper mixed forests from Prome and the Pegu Yomah down to Tenasserim"; but is is possible that the area of the two species overlap. Gage has recorded *D. Rheedii* as one of the more common and conspicuous trees in the fairly open deciduous forest covering the Nwamadaung range, Minbu District, Upper Burma; but it seems possible that the tree in question will prove to be *D. serrulata*. (Rec. Bot. Surv. India, vol. iii. p. 86).

The capsules of *D. serrulata* strongly resemble those of *Stereospermum*, so that, in the absence of flowers, it was formerly assigned to that genus.

6. **D. atrovirens,** *Sprague.—D. crispa,* Seem. in Journ. Bot. 1870, p. 381, excl. syn. nonnull.; C. B. Clarke in Hook. f. Fl. Brit. Ind. vol. iv. p. 379; Gamble, Man. Ind. Timb. ed. 2, p. 512; Brandis, Indian Trees, p. 494, fig. 174; Cooke, Fl. Bombay, vol. ii. p. 329; Talbot, For. Fl. Bombay, vol. ii. p. 308, fig. 436. *Bignonia atrovirens,* Heyne ex Roth, Nov. Sp. pp. 284, 402 (1821); et ex Wall. Cat. n. 6515 C. (1832). *B. crispa,* Ham. in Roxb. Fl. Ind. vol. iii. p. 103 (1832). *B. parviflora,* Hb. Madr. ex. Wall. Cat. n. 6517 B. (1832), in syn. *Spathodea atrovirens,* Spreng. Syst. vol. ii. p. 835 (1825). *S. crispa,* Wall. Cat. n. 6515 (1832); DC. Prodr. vol. ix. p. 206; Dalz. et Gibs. Bombay Fl. p. 160; Brandis, For. Fl. p. 350; Beddome, For. Man. p. clxviii. *S. crispa* var. *petiolulosa,* DC. Prodr. vol. ix. p. 206 (1845).

Distrib. Peninsular India: Belgaum, Dharwar, Mysore, Tinnivelly (Kutallum), Pondicherry. According to Beddome (l.c.), it is not uncommon in subalpine forests throughout the Madras Presidency.

The earliest name for this species is *Bignonia atrovirens,* Heyne, a co-type of which is preserved in the Wallichian Herbarium at Kew, under n. 6515 C. Clarke treated *B. atrovirens* as a synonym of *Dolichandrone falcata* in the Flora of British India, but subsequently identified it with *D. crispa* (MS. in Herb. Wallich). K. Schumann cannot be quoted as the authority for the combination *D. atrovirens* (Heyne), as he used the name for a different species, *D. falcata.* Roth's description of *Bignonia atrovirens* leaves no doubt that the specimen which Heyne sent him belonged to the softly pilose form of *D. crispa,* grown in the Calcutta Botanic Gardens from seeds sent from Mysore by Hamilton (Roxb. Fl. Ind. vol. iii. p. 103), and mentioned by C. B. Clarke (Fl. Brit. Ind. vol. iv. p. 380). This was distributed under Wall. Cat. n. 6515 A. The specimen of *B. atrovirens* sent by Heyne to Wallich belongs, on the other hand, to the glabrous form of the species.

7. **D. arcuata,** *C. B. Clarke* in Hook. f. Fl. Brit. Ind. vol. iv. p. 380 (1884); Gamble, Man. Ind. Timb. ed. 2 p. 513; Brandis, Indian Trees, p. 493. *D. crispa,* Seem. in Journ. Bot. 1870, p. 381, quoad syn. *Spathodea arcuata,* Wight Ic. t. 1340 (1850): Beddome, For. Man. p. clxix.

Distrib. Madras: Ootacamund and Coimbatore; Malabar: Palghat and Valiyar.

D. arcuata differs from *D. atrovirens* in the larger number (up to 11) of leaflets, which are elliptic and shortly or not at all cuspidate, the shorter petiolules, the rather longer calyx, and the larger corolla, with a wider tube and more coarsely undulate lobes. Specimens collected by Wight at Palghat and Valiyar in the Malabar district differ from typical *D. arcuata* in being relatively glabrous, and in the longer petiolules. Clarke referred the Palghat tree to *D. crispa,* but Wight did not distinguish it from *D. arcuata,* and Brandis referred it to the latter.

Beddome's specimen from the Kurnool hills, referred to *D. arcuata* by Clarke and Brandis may possibly belong to this

species, but the material is insufficient to determine it with certainty. It has velvety-pubescent 5-foliolate leaves, and reniform lateral leaflets, with petiolules 7-10 mm. long.

8. **D. falcata,** *Seem.* in Journ. Bot. 1870, p. 381; C. B. Clarke in Hook, f. Fl. Brit. Ind. vol. iv. p. 380, excl. syn. nonnull; Gamble, Man, Ind. Timb. ed. 2, p. 512; Watt, Dict. Econ. Prod. India, vol. iii. p. 174; Brandis, Indian Trees, p. 493, fig. 173; Cooke, Fl. Bombay, vol. ii. p. 329; Talbot, For. Fl. Bombay, vol. ii. p. 310; Haines, Trees Centr. Prov. p. 167. *D. Lawii,* Seem. in Journ. Bot. 1870, p. 380; C. B. Clarke in Hook. f. Fl. Brit. Ind. vol. iv. p. 380; Brandis, Indian Trees, p. 493; Prain, Bengal Pl. vol. ii. p. 789. *D. serrulata,* Seem. l.c. 383, quoad specimen ex India centrali tantum, excl. syn. *D. atrovirens,* K. Schum. in Engl. et Prantl, Nat Pflanzenfam. vol. iv. 3B. p. 240, sed non *Bignonia atrovirens,* Heyne. *D. crispa,* K. Schum. l.c. 240, fig 92A, non Seem. *Spathodea falcata,* Wall. Cat. n. 6517A (1832); DC. Prodr. vol. ix. p. 206, excl. syn. nonnull; Dalz. et Gibs. Bombay Fl. p. 160; Bedd. Fl. Sylv. t. 71; Brandis For. Fl. p. 350. *S. crispa,* Bureau, Monogr. Bignon. Atlas, p. 30, t. 27 (1864), non Wall. *Bignonia spathacea,* Roxb. Cor. Pl. vol. ii. p. 24, t. 144 (1798), non Linn.; Roxb. Fl. Ind. vol. iii. p. 103. *B. falcata,* König ex Roxb. l.c. in syn.

Distrib. India: Rajputana, Bundelkhand, Behar, Central Provinces, Berar, Konkan, Belgaum, Mysore, Madras. According to Beddome, l.c., it is common in most of the forests in the Madras Presidency.

The figure in Roxb. Cor. Pl. t. 144 is poor, especially as regards the shape of the corolla-lobes, but there seems to be no reason for supposing that the capsule belongs to a different species from the flowering branch, as stated by Clarke.

Dolichandrone Lawii appears to be merely a glabrous form of *D. falcata,* as suggested by Brandis. The variation in the indumentum is not correlated with the degree of curvature of the capsule.

C. *Species africana.*

9. **D. alba,** *Sprague.—Spathodea alba,* Sim, For. Fl. Port. E. Afr. pp. 92, 116, t. 75 (1909).

Distrib. Portuguese East Africa.

Sim's description and figure leave little doubt that *Spathodea alba* is really a *Dolichandrone.* The spathaceous calyx, the almost actinomorphic white corolla with a long slender cylindric tube and lobes with wavy margins, and the powerful perfume of the flowers all point to this genus, which was previously unknown from Africa. It may be useful to reproduce his description in a slightly modified form, as the work in which it was published is probably not accessible to many botanists.

Spathodea alba—Arbor parva. *Folia* opposita, imparipinnata; foliola 4-juga, subsessilia, ovata, obvata vel elliptica, 5-10 cm. longa, apice rotundata vel obtusa, integra, undulata, glabra. *Racemus* terminalis, usque 4·5 dm. longus, multiflorus. *Flores*

speciosi, albi, suaveolentes, tres tantum simul expansi. *Pedunculus* 5-10 mm. longus. *Calyx* 2-3 cm. longus, unilateraliter fissus. *Corollae tubus* 4-5 cm. longus, cylindricus; limbus rotatus; lobi 2·5 cm. longi, 2 cm. lati, marginibus undulatis. *Pistillum* gracile, 4 cm. longum. *Capsula* linearis, compressa, 3-6 dm. longa, 2-2·5 cm. lata, 2-3 mm. crassa, pubescens, polysperma. *Semina* 1 cm. longa, alis lateralibus inclusis 4 cm. lata.—A small tree, frequent in Lower Gaza, M'Chopes and Inhambane; also present in the forests of Magenja da Costa. So strongly scented that one administrador thought a perfume industry might arise to utilise it.

Vernacular names: Insanye (Gaza and Zuvalla); Dane, Madane or Idane (between Inharreme and Inhambane); Naguro (Quelimane District).

Yields a light grey, very equal timber, of good surface, better than *Trichilia*, less red; weight about 45 lbs.; rings about 12 mm. apart, with many intermediate pores; rays not visible. Valuable board timber, not bored. Bark thin, flaky. Sometimes a large tree.

Markhamia, *Seem.* in Journ. Bot. 1863, p. 226, sine descr.; K. Schum. in Engl. et Prantl, Nat Pflanzenfam. vol. iv. 3B, p. 242 (1895); Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 522. *Muenteria*, Seem. in Journ. Bot. 1865, p. 329; et l.c. 1870, pp. 211, 338; non Walp. (1846). *Dolichandrone*, sect. *Markhamia* et *Muenteria*, Benth. in Benth. et Hook. f. Gen. Plant. vol. iv. p. 1046 (1876).

The species of *Markhamia* fall into three very natural groups. In the first, which includes *M. stipulata*, *M. cauda-felina*, *M. lutea*, *M. platycalyx* and *M. Hildebrandtii*, the corolla is yellow, and the pseudo-stipules (*i.e.* the first pair of leaves of an axillary shoot, which simulate stipules) are foliaceous and orbicular.

The second group includes *M. sessilis*, *M. tomentosa* and *M. obtusifolia*, and is characterized by a yellow corolla and subulate pseudo-stipules. The third group contains *M. puberula*, *M. stenocarpa*, *M. zanzibarica* and *M. acuminata*. It differs from both the preceding groups in the brownish purple corolla-lobes and purple spotted tube; and has foliaceous, orbicular pseudo-stipules.

The nearest affinities of *Markhamia* are with *Heterophragma*, DC., which differs in its non-spathaceous, irregularly lobed calyx.

A. *Corolla lutea; pseudostipulae orbiculares.*

1. **M. stipulata,** *Seem.* in Journ. Bot. 1870, p. 341; K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242. *Bignonia stipulata*, Roxb. Hort. Beng. p. 47 (1814), nomen; Roxb. Fl. Ind. vol. iii. p. 108 (1832). *B. campanulata*, Ham. ex Wall. Cat. n. 6518A. *Spathodea stipulata*, Wall. Cat. n. 6518A; n. 6518D; n. 6518C, quoad specim. e Segaen; Wall. Pl. As. Rar. vol. iii. p. 20, t. 238 (1832); DC. Prodr. vol. ix p. 205; Kurz, Rep. Veg. Andaman Isl. p. 43; Kurz, For. Fl. vol. ii. p. 234. *S. campanulata*, Ham. ex Wall. Pl. As. Rar. vol. iii.

p. 20 (1832), non Beauv. *S. velutina*, Kurz in Journ. As Soc. Beng. vol. xlii. p. 90 (1873); Kurz, For. Fl. vol. ii. p. 235 (1877). *Dolichandrone stipulata*, Benth. ex C. B. Clarke in Hook. f. Fl. Brit. Ind. vol. iv. p. 379 (1884); Brandis, Indian Trees, p. 493; Gamble, Man. Ind. Timb. ed 2, p. 512; Watt, Dict. Econ. Prod. India, vol. iii. p. 174; Gage in Rec. Bot. Surv. India, vol. iii. p. 86.

Distrib. Upper and Lower Burma; Andaman Islands.

Corolla foetid but eaten (Brandis); limb yellow, tube dirty reddish outside.

According to Gage, l.c., *M. stipulata* is amongst the more common and conspicuous trees in the fairly open deciduous forest covering the Nwamadaung range, in the Minbu district of Upper Burma. Kurz states that it is "rather rare in the open and the drier upper mixed forests of the Pegu Yomah and Martaban, as far down as Rangoon; also Ava." The type of *Spathodea velutina*, Kurz, is not at Kew, but, judging from the description, it seems hardly separable from *M. stipulata*, even as a variety.

M. stipulata, var. **Kerrii,** *Sprague;* capsules densissime lanatis differt.—*M. stipulata*, Craib. in Kew Bull. 1911, p. 433.

Distrib. Siam: Lakon district; near Hang Sut, in deciduous jungle, 360 m., *Kerr* 1013.

A well-marked variety, or possibly a distinct species. As noted by Craib, the indumentum of the capsule resembles that of *M. cauda-felina*, but the capsule is broader, the seeds are larger and the flowers smaller than in that species.

The following specimens may be assigned provisionally to *M. stipulata* var. *Kerrii*, though the material does not admit of a complete comparison:

Yunnan: Red River valley, south of Mengtze, 900 m., *Henry* 10121; Szemao, on mountains, 1200 m., *Henry* 10121 A. Kwangsi: Lungchow, on plain, *Morse* 291. Tonkin: woods near Phuong Lam, *Balansa* 3796.

2. **M. cauda-felina,** *Craib* in Kew Bull. 1911, p. 433, in obs. *Spathodea cauda-felina*, Hance in Journ. Bot. 1872, p. 257; et l.c. 1874, p. 177. *Dolichandrone cauda-felina*, Benth. ex Hemsl. in Journ. Linn. Soc. Bot. vol. xxvi. p. 235 (1890).

Distrib. China: Hainan.

The flowers are the largest in the genus: corolla 12-14 cm. in diameter, limb sulphur-yellow, tube dirty yellowish red outside. According to Hance, the fresh flowers have a disagreeable smell, much like that of raw shrimps.

A specimen collected at Montufar, Albay, Luzon, Philippine Islands, by Vidal (No. 3398), has leaves rather resembling those of *M. cauda-felina*, but the flowers (which are unfortunately in the bud stage) seem rather smaller, and the indumentum of the calyx is finer than in that species. Vidal's specimen is mentioned as *Dolichandrone* sp. in Cat. Pl. Herb. Fl. For. Filip. p. 127 (1892).

3. **M. lutea,** *K. Schum.* in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242, quoad syn., excl. loc.; De Willd. et Durand, Reliq. Dewevr. p. 172; Sprague in Hook. Ic. Pl. sub. t. 2800; Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 525. *Spathodea lutea*, Benth. in Hook. Niger Fl. p. 461, quoad specim. e Fernando Po. *Muenteria lutea*, Seem. in Journ. Bot. 1870, pp. 211, 338, excl. specim. a Barter lect. *Dolichandrone lutea*, Benth. ex Hook. f. et Jacks. Ind. Kew. vol. i. p. 785 (1893).

Distrib. West Africa: Gold Coast, Cameroons, Fernando Po, Belgian Congo (fide De Wild. et Durand).

Corolla yellow (*Mann, Vogel*). A form with lilac corolla has been collected in the Gold Coast Colony by Mr. T. W. Brown.

4. **M. platycalyx,** *Sprague* in Hook. Ic. Pl. t. 2800 (1905); et in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 525. *Dolichandrone platycalyx*, Baker in Kew Bull. 1894, p. 30.

Distrib. Uganda; British East Africa.

An important timber tree, common and widely distributed in Uganda and British East Africa, where it is known respectively under the vernacular names "Lusambia" and "Lusiola." According to Mahon (Herb. Kew.), it yields the finest of local timbers in the Entebbe district; and Moon (Herb. Kew.) states that in Kavirondo it forms a very fine timber tree, up to 70 ft. high; and that the wood takes a beautiful polish and is used by the natives for making stools and for hut slabs.

The corolla is of a rich yellow colour, with the lower lobes striped on the inside with red. (*Wilson.*)

5. **M. Hildebrandtii,** *Sprague* in Hook. Ic. Pl. t. 2800, fig. 9 (1905); et in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 526. *Dolichandrone Hildebrandtii*, Baker in Kew Bull. 1894, p. 31.

Distrib. British East Africa; Usambara.

Corolla yellow (*Hildebrandt*).

B. *Corolla lutea; pseudostipulae subulatae.*

6. **M. sessilis,** *Sprague* in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 526 (1906). *Muenteria tomentosa*, Seem. in Journ. Bot. 1865, p. 330, t. 35, quoad icon. et specim. angolens., excl. syn.; Seem. l.c. 1870, pp. 211, 338, quoad specim. angolens., excl. syn. *Markhamia tomentosa*, Hiern, Cat. Afr. Pl. Welw. vol. i. p. 772 (1900), non K. Schum.

Distrib. West Africa: Lower Congo; Angola.

Corolla yellow, with narrow reddish-purple stripes. (*Welwitsch.*)

M. sessilis, var. **brachyrhyncha,** *Sprague* in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 527 (1906).

Distrib. French Congo.

7. **M. tomentosa,** *K. Schum.* ex Engl. Glied. Veg. Usambara, p. 34 (1894), quoad syn. tantum; K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242, partim; Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 528; Wernham in Cat. Talbot's

Niger. Pl. p. 139. *Spathodea tomentosa*, Benth. in Hook. Niger Fl. p. 462 (1849). *S. lutea*, Benth. l.c. 461, quoad specim. nigericum. *Muenteria tomentosa*, Seem. in Journ. Bot. 1865, p. 330, quoad syn., excl. descr. icon. et specim. angolens.; *M. lutea*, Seem. l.c. 1870, pp. 211, 338, quoad Barter 555. *Dolichandrone tomentosa*, Benth. ex Hook. f. et Jacks. Ind. Kew. vol. i. p. 785 (1893).

Distrib. West Africa: from Senegambia to the Cameroons.

Corolla usually yellow. A form with a rose-coloured corolla has been collected in Spanish Guinea by Tessman.

M. tomentosa, var. **gracilis,** *Sprague* in Dyer Fl. Trob. Afr. vol. iv. pt. 2, p. 528 (1906). *Muenteria lutea*, Seem. in Journ. Bot. 1870, pp. 211, 338, quoad Barter 1310.

Distrib. Northern Nigeria: Nupe, *Barter* 1310.

A very distinct-looking variety, differing from the type in the smaller, very shortly cuspidate calyx. The corolla is golden, with reddish stripes (*Barter*).

8. **M. obtusifolia,** *Sprague.—M. lanata*, K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242 (1895); Sprague in Hook. Ic. Pl. t. 2800, fig. 8; et in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 527; S. Moore et Swynnerton in Journ. Linn. Soc., Bot., vol. xl. p. 155. *M. tomentosa*, K. Schum. in Engl. Glied. Veg. Usambara, pp. 34, 49 (1894), quoad descr. et loc., excl. syn.; et in Engl. Jahrb. vol. xxviii. p. 480. *M. paucifoliolata*, De Wild. Etudes Fl. Katanga, p. 131 (1903). *M. Verdickii*, De Wild. l.c. 132 (1903). *Dolichandrone obtusifolia*, Baker in Kew Bull. 1894, p. 31.

Distrib. Belgian Congo, British Central Africa, Rhodesia, and East Africa, from Usambara to the Zambesi.

The earliest name for the species is *Dolichandrone obtusifolia*, Baker (1894). In Nyasaland and Gazaland it is a tree 6-9 m. high, (*Purves, Swynnerton*), on the lower Shire river and lower Zambesi river, a shrub 1·5-4·5 m. high (*Kirk*), and near the Victoria Falls, a bushy tree 1·8-2·4 m. high, growing on granite sand (*Sykes*). According to Swynnerton, l.c., it is known by the vernacular (Chindao) name "Mubfeya" in Gazaland, where the wood is a favourite with native bowyers, the bark is employed as a substitute for rope, and a decoction of the roots is said to be used for fever and colic.

The corolla is yellow, striped with chocolate (*Purves*).

C. *Corollae lobi brunneo-purpurei; pseudostipulae orbiculares.*

9. **M. puberula,** *K. Schum.* in Engl. et Prantl, Nat. Pflanzenfam. vol. iv 3B, p. 242 (1895): in Engl. Jahrb. vol. xxviii. p. 480; et in Engl. Pfl. Ost-Afr. vol. C, p. 363; Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 523. *Spathodea puberula*, Klotzsch in Peters, Reise, Mossamb. Bot. p. 192 (1861). *Muenteria puberula*, Seem. in Journ. Bot. 1870, pp. 212, 339. *Dolichandrone hirsuta*, Baker in Kew Bull. 1894, p. 31.

Distrib. East Africa, from Uluguru to the Lower Zambesi.

Corolla-lobes brownish purple; tube purple-spotted.

10. **M. stenocarpa,** *K. Schum.* in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242 (1895); Hiern, Cat. Welw. Afr. Pl. vol. i. p. 791; Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 523. *Muenteria stenocarpa,* Seem. in Journ. Bot. 1865, p. 329, t. 36, excl. specim. a Kirk lect. *Spathodea stenocarpa,* Welw. ex Seem. l.c. *Dolichandrone stenocarpa,* Baker in Kew Bull. 1894, p. 31.

Distrib. Angola.

Corolla greenish sulphur in colour outside, deep sulphur inside, marked with longitudinal dark purple lines and spots; lobes dusky purple inside (*Welwitsch* 483); corolla white or yellow, variegated with a rose or violet colour (*Welwitsch* 482).

11. **M. zanzibarica,** *K. Schum.* ex Engl. Glied. Veg. Usambara, pp. 34, 36 (1894); et in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242; Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 523. *M. sansibarica,* K. Schum. ex Engl. Glied. Veg. Usambara, p. 16 (1894); in Engl. Pfl. Ost-Afr. vol. C, p. 363; et in Engl. Jahrb. vol. xxxiii. p. 332. *Spathodea tenuifolia,* Bojer, Hort. Maurit. p. 219 (1837), nomen. *S. zanzibarica,* Bojer ex DC. Prodr. vol. ix. p. 208 (1845); Klotzsch in Peters, Reise Mossamb. Bot. p. 191. *Muenteria zanzibarica,* Seem. in Journ. Bot. 1870, p. 339. *Dolichandrone latifolia,* Baker in Kew Bull. 1894, p. 31.

Distrib. East Africa, from Mombasa to Mozambique.

There is an excellent coloured drawing of *M. zanzibarica* in the Kew collection. It was received without a name from L. Bouton in 1863; on the other side of the same cardboard was an uncoloured drawing of *Phyllarthron Bojerianum,* DC., endorsed "Phyllarthron Bojerianum, DC. Prod. Hab. in Ins. Madagascar. Cult. in Ins. Maur." These two drawings were probably executed by Bojer from the living shrub and tree, cultivated at Pamplemousse, and included in his Hortus Mauritianus pp. 219, 221 (1837) under the names *Spathodea tenuifolia,* Boj., and *Arthrophyllum madagascariense,* Boj., respectively. Bojer appears to have sent specimens of *Markhamia zanzibarica* to De Candolle on two occasions: in 1831 under the name *Spathodea zanbibarica,* and in 1839 as *Spathodea tenuifolia.* De Candolle adopted the former name in the ninth volume of the Prodromus, and the effective publication of the species dates from that work, since no description was given of *S. tenuifolia* in the Hortus Mauritianus.

In Zanzibar *M. zanzibaricus* occurs as a shrub 3 m. high on the slopes of coral-limestone hills (*Hildebrandt*); in the coast region of British East Africa it is a small tree, rarely exceeding 9 m. in height (*Battiscombe*). The corolla-tube is buff-coloured with brownish purple spots, and the lobes are brownish purple.

12. **M. acuminata,** *K. Schum.* in Engl. Pfl. Ost-Afr. vol. C. p. 363 (1895); Sprague in Dyer, Fl. Trop. Afr. vol. iv. pt. 2, p. 524; N. E. Brown in Kew Bull. 1909, p. 126; Swynnerton et S. Moore in Journ. Linn. Soc., Bot. vol. xl. p. 155. *M. infundibuliformis,* K. Schum. in Engl. et Prantl, Nat. Pflanzenfam. vol. iv. 3B, p. 242 (1895); et in Engl. Pfl. Ost-Afr. vol. C, p. 363.

Spathodea acuminata, Klotzsch in Peters, Reise Mossamb. Bot. p. 191 (1861). *Muenteria stenocarpa*, Seem. in Journ. Bot. 1865, p. 329, quoad specim. a Kirk lect.

Distrib. East Africa, from Msalala to the Lower Zambesi, Rhodesia, Ngamiland and Transvaal (Zoutpansberg District).

M. acuminata is described as a shrub (*Peters*, *Foye*), or a small tree (*Johnson*, *Swynnerton*). In Ngamiland, according to Lugard, it is a tree 3-3·5 m. high, and "never seems to attain a girth beyond a few inches." On an island near the Victoria Falls, it attains a height of 6-7·5 m., according to Allen.

In Gazaland it is known by the vernacular (Chindao) name "Musiramyati," and yields a durable timber used for rafters, etc. (*Swynnerton*). The known distribution of *M. acuminata* has been extended southwards by its discovery in the Zoutpansberg District of the Transvaal by Mr. J. Foye, who has communicated the following note on its occurrence, through the Division of Botany, Department of Agriculture, Pretoria.

"The situation where this shrub grows is at the base, and on the granite koppies that encircle Messina mine to the south-east like an amphitheatre, a quarter of a mile or so away from the koppies; the shrub is but rarely met with beyond this distance: on the deeper red soil of the flats I have not yet seen a single specimen; it also grows on or about the koppie to the north of the mine of the Messina Company named 'Vogellanzang.' There may of course be many other places, but the above are all that are known to me. One thing I feel pretty sure about, that away from rocky situations it will not be found."

The corolla-lobes are brownish-purple or maroon, and the tube is yellow or buff-coloured with brownish purple spots. The capsule is sometimes 9 dm. long (*Johnson*). A copy of a water-colour drawing by Mrs. E. J. Lugard is contained in the Kew collection.

XXIII.—MISCELLANEOUS NOTES.

George Stephen West.—We have to record, with great regret, the death of Professor G. S. West, D.Sc., M.A., A.R.C.S., F.L.S., which took place on August 7th last, after only a short illness, but he had been in indifferent health for some considerable time. He was Mason Professor of Botany at the University of Birmingham, a post which he had filled with great distinction for ten years, having previously been lecturer under his predecessor, Professor W. Hillhouse. His chief pursuit was the study of Freshwater Algae from all parts of the world, especially of the Diatoms and Desmids, in the latter of which he made for himself an unequalled name: he knew at first sight nearly every British Desmid, and a large proportion of the exotic ones.

He was an excellent lecturer and teacher, much admired and respected by his pupils; he managed his department with great success, and had gathered round him a band of students who