

KJELLBERGIODENDRON AND WHITEODENDRON,
MALAYSIAN MYRTACEAE — LEPTOSPERMOIDEAE
METROSIDERINAE

BY

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During the past decades it has become clear that the *Myrtaceae* of Malaysia are taxonomically of a far more varied character than they appeared to phytographers of the 19th century. The genus *Eugenia* s.l. (the *Syzygium*-complex and its segregates) now rivals, in number of species, the genus *Eucalyptus* in Australia. Many of the Australian-New Caledonian genera have been shown to possess representatives in Malaysia (*Myrtella*, *Mearnsia*, *Syncarpia*, *Agonis*, *Fenzlia*, *Myrtus*, *Mooria*) and others are far richer in species than anticipated (*Metrosideros*, *Decaspermum*, *Tristania*, *Melaleuca* (7), *Xanthostemon*) according to MERRILL & PERRY (5).

However, there is also a manifestly endemic element, specially in the East Malaysian province. *Xanthomyrtus* Diels (2) is now a fairly large genus occurring from Mt Kinabalu eastward, culminating in a large number of species in the New Guinean highlands. *Octamyrtus* Diels now contains six species (9). The late Mr C. T. WHITE has recently described two other endemic genera, viz. *Eucalyptopsis* from Buru & New Guinea (9, p. 139) and *Basisperma* from New Guinea (8). In 1936 Dr BURRET, of Berlin, described the singular genus *Kjellbergiodendron* from Celebes (1).

But also Borneo, that great centre of plant distribution in West Malaysia does seem to contain still unrecognized novelties in the *Myrtaceae* which seem of extraordinary interest to Myrtaceous taxonomy as is shown by the new genus described below.

It shows a most remarkable though unmistakable resemblance to *Kjellbergiodendron* but in contrast to it it is capsular-fruited, thus challenging the familiar, still current division of the family in fleshy-fruited *Myrtoideae* and capsular-fruited *Leptospermoideae*. The case is so strong, that — for separating these two genera — I assume this division to be artificial, whatever the consequences will be. *Kjellbergiodendron*, *Whiteodendron* and *Basisperma* belong together to the *Tristania*-complex of the *Leptospermoideae*. I feel strengthened by the remarks made by BURRET who already pointed to the aberrant place of *Kjellbergiodendron* in the *Myrtoideae* and to its affinity with *Tristania*. *Whiteodendron* gives the final clue to this relation.

I have to tender my sincere thanks to the Regius Keeper of the

Botanic Gardens at Edinburgh and the Director of the Royal Botanic Gardens, Kew, for having the privilege to examine some types of *Tristanias*.

Whiteodendron gen. nov.

Tristaniae affine sed recedit adelphiis filamentorum basi in tubum connatis; fructu uniloculari; semine unico magno. (Fig. 1.)

Arbor glabra, haud magna, omnibus partibus glandulosa; ramulis teretibus, cortice haud in *Tristaniae* modo exfoliante. Gemma terminalis cuspidiformis longa teres, falcata, acuta.

Folia spiraliter, ordinata, manifeste obliqua, obovato-oblonga, integerrima basi angustata in petiolum perbreve, crassum in sicco transverse rugulosum, apice acutiuscula obtusave; costa robusta, facie inferiore prominens, supra leviter canaliculata; nervi laterales numerosissimi paralleli cum costa angulum $\pm 60^\circ$ metientem efformantes, apice connati nervo intramarginali duplici.

Flores magni, 5-meri, in cymas terminales axillaresque pedunculatas dispositi, paniculam terminalem foliatam efformantes; pedunculi et rachides inflorescentiae complanati, crassi; bracteae jam ante anthesin delabentes (cicatrices tantum visae); pedicelli perspicui articulati; bracteolae deficientes vel flori valde proximae; alabastra globosa; calycis tubus late obconicus; ovarium apice leviter convexum, basi abrupte in stipitem longum contractum; calycis segmenta in praefloratione imbricata, integerrima late rotundata, latiora quam longa, persistentia; petala quincuncialia in alabastro cucullatim imbricate, deinde plana, basi lata affixa, magna, obovata, dense glandulosa, decidua; stamina numerosissima, connata in 5 adelpia magna oppositipetala; adelpia in alabastro, incurva, basi in tubum conspicuum annuliforme connata; filamenta tum in margine ut in facie interiore adelphiorum filiformia; antherae parvae, medio dorso affixae; thecis rima longitudinali dehiscentibus. Ovarium inferum, 3-loculare, apice leviter convexum, calycis tubo totum adnatum; stylus brevis, tenuiter filiformis; stigma punctiforme; placentae in quoque loculo ovarii basi approximatae, multi-ovulatae; uno ovulo tantum excrescente ceteris abortivis, in fructu tamen perspicabilibus; capsula fere tota superior, 1-locularis, tenuiter duro-coriacea, fere pro dimidia parte 3-valvis, extus subverrucosa, intus nitide straminea; semen unicum, basale oblique affixum, inde et ipsum obliquum, magnum, late ellipsoideo-globosum, notatum 3-costulis tenuibus cum valvis capsulae alternantibus, praeterea interdum cum 3 sulcis levibus, valvis oppositis; testae crassae, durae, nitidae stratum intimum extimumque tenues, medium spongioso-suberosum, crassum; cotyledones inaequalissimae, altera (exterior) crassissima, alteram (interiorem) tenuem induplicatam amplectens; plumula terminalis robusta.

Dedicated to the memory of our dear friend, the late MR C. T. WHITE, Government Botanist of Queensland, who, in undisputed authority, few weeks before his lamented death, had agreed to revise the capsular-fruited Myrtaceae for the Flora Malesiana.

By its capsular fruit and phalanged stamens the new genus doubtless

belongs to the Leptospermoideae—Metrosiderinae in the affinity of *Tristania* sect. *Lophostemon* to which it was, in absence of fruit, referred by Sir WILLIAM WRIGHT SMITH, who already observed its unique position within the genus *Tristania*.

Few-seeded fruits are in this group very rare. C. T. WHITE described (8) them from the genus *Basisperma* (New Guinea). Though this genus certainly belongs in the same affinity it is radically different from *Whiteodendron* by its habit, its equal-sided leaf with one intra-marginal nerve, its superior 2-celled ovary and 2-seeded fruit, and by a very different type of androecium which consists of c. 12 stamens in a not distinct phalanx before each petal and apparently no staminal tube. The stem-tip is undescribed and not developed in the duplicate specimen available to me.

However, there is another genus which is unmistakably closely allied, i.e. *Kjellbergiodendron* Burret (1). The set of conformable characters includes a remarkable resemblance in habit, a distinct though shorter, slightly curved branch-tip, an inclination to oblique leaves, and exactly the same size and structure of the flowers with synadelphous phalanges save the ovary which is 2-celled and inferior, the ovules being attached in the middle of the dissepiments. It has also one big seed with thick cotyledons, and the same coarse flattened forked peduncles and stalks, and mode of branching.

The fruit of *Kjellbergiodendron*, however, is fleshy and indehiscent, by which character it belongs to the Myrtoideae. This seems a quite unnatural position and I feel strengthened in this by the remark of BURRET himself who observed that *Kjellbergiodendron* reminds strongly of the Leptospermoideae, specially of *Tristania* sect. *Lophostemon* and that it is aberrant in the Myrtoideae both by its spirally arranged leaves and its peculiar phalanges.

Now we know the characters of the fruit of *Whiteodendron*, I have not the slightest hesitation to refer *Kjellbergiodendron* to the Leptospermoideae where it apparently represents a derivate of *Tristania*-ceous stock.

We have here to consider that the two differences between *Kjellbergiodendron* and *Whiteodendron* viz. resp. a fleshy wholly inferior fruit against a capsular nearly superior fruit may not be uncorrelated, as an extra, thick, fleshy layer of receptacle-derived calycinal tissue will prohibit or anyhow not facilitate splitting of a principally capsular fruit. This is also observed in *Tristania* where the calycinal tissue encloses the capsule in different species to various degrees but in none of the species the valves extend their splitting over the calyx! As a matter of fact it is remarkable that there are no Myrtaceae known to me which show both a wholly inferior fruit and at the same time a dehiscent fleshy fruit (including the fruiting calyx). This correlation diminishes the taxonomic importance of capsular against fleshy fruits.

These considerations do not lead to a topsyturvy of the current subfamily division of the Myrtaceae, though it is possible that exceptional cases comparable to the present one may occur elsewhere in the family.

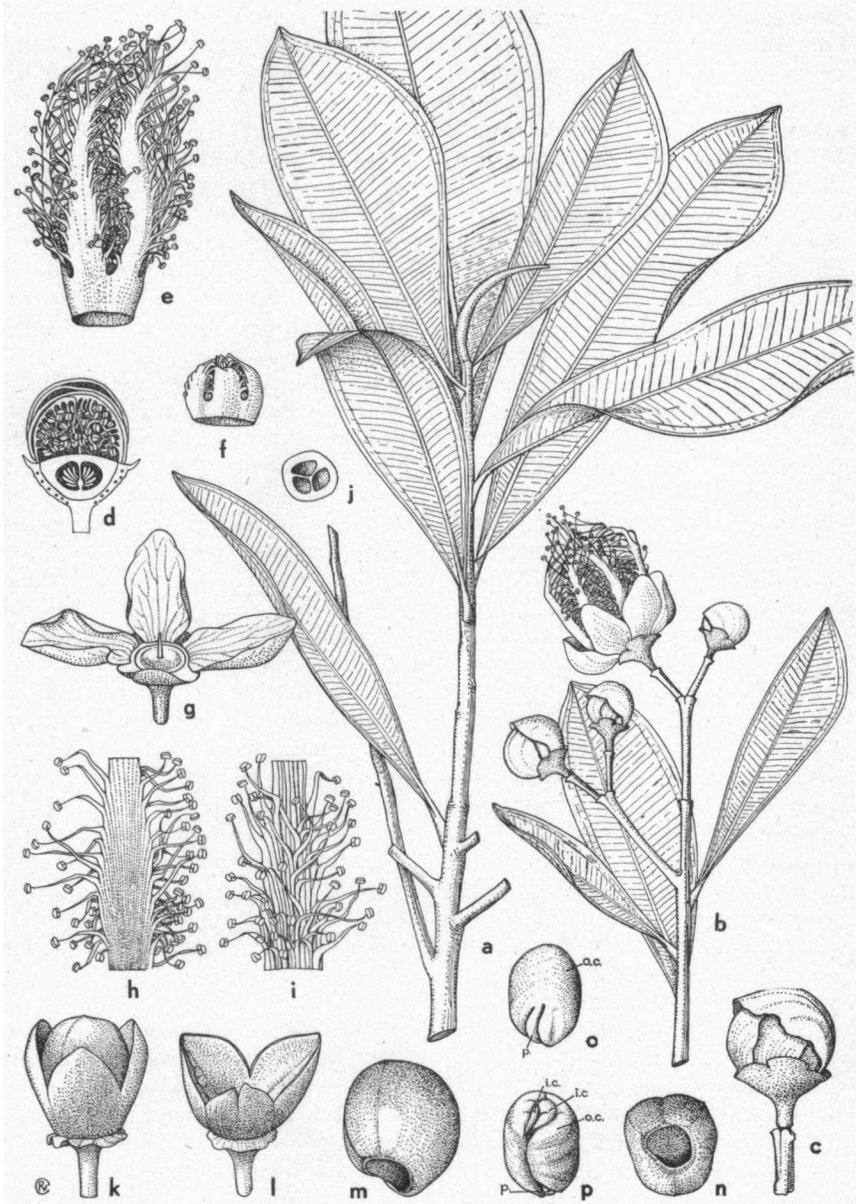


Fig. 1. *Whiteodendron moultonianum* (W. W. Sm.) Steen. *a*, Twig, *b*, part of inflorescence, *c*, bud, *d*, bud in section, *e*, androecium, *f*, androecium in bud, *g*, flower beyond anthesis with only 3 petals, *h*, part of phalange, outer side, magn., *i*, ditto, inner side, *j*, bottom of ovary in cross section, *k*, opened fruit with protruding seed, *l*, ditto, without seed, *m*, seed with oblique base, *n*, seed, basal view showing hilum, *o*, embryo (p = plumula, o.c. = outer cotyledon), *p*, ditto, other side (i.c. = folded inner small cotyledon). *a* and *k*—*o* after Beccari P. B. 3017, others after Beccari 879. *a*—*b* $\times \frac{3}{4}$, *c*—*g*, *j*—*p* $\times 1\frac{1}{2}$.

Kjellbergiodendron is certainly more closely related to *Whiteodendron* than to any other genus of the group; both seem 1-seeded, synadelphous derivatives from the *Tristania* complex in which *Whiteodendron* is still more close to *Tristania* than is *Kjellbergiodendron*.

The exact position of both genera is still to be considered; both show petals with a distinctly broad base which they share with the valvate Eucalyptinae and thus stand in contrast to the unguiculate-petalled *Metrosiderinae*.

Whiteodendron moultonianum (W. W. Sm.) comb. nov. — *Tristania moultoniana* W. W. Smith, Not. R. Bot. Gard. Edinb. 8 (1915) 328.

Rami cinerascetes, robusti; foliorum cicatrices suborbiculares, ± 3 mm diam. Folia omnia in apicibus ramulorum conferta, obovato-lanceolata, 7—18½ cm longa, 2½—6 cm lata, inaequilatera, parte dimidia altera lanceolato-elliptica, altera rhombeo-obovata; folia suprema parviora; nervi laterales utrinque 20—30; primariis aequae crassis ac secundariis, supra parum, infra vix prominentibus; petiolus 1—4 mm longus. Panicula 5—10 cm longa, composita simplexve; pedunculi 2—4½ cm longi; dichotomi; pedicelli $\pm \frac{1}{2}$ cm; calycis tubus planus, denique patelliformis, 5—7 mm diam; inferne abrupte constrictus in basin stipitiformam 3—4 mm (in fructu 8 mm) longam. Sepala ± 1 mm longa, ± 3 mm lata; calyx sub fructu vix ampliatus, glandulas verruciformes ferens; petala sub anthesi late elliptica, ± 10 mm longa, 6—7 mm lata, plana, membranaceo-marginata; tubus stamineus 3—4 mm longus, phalangibus ± 2 cm longis, filamentorum partes liberae usque ad 6 mm longae antherae $\frac{1}{4}$ — $\frac{1}{3}$ mm; stylus 1½ mm. Fructus magnus ellipsoideus, $\pm 1\frac{1}{2}$ cm longus, ± 1 cm latus, cito dehiscens; valvis suborbiculari-triangularibus, acutis, 6—8 mm longis latisque. Semen et fructu protuberans, ± 10 mm longum, ± 8 mm latum, subovoideum, in sicco nitide eburneum, hilum depressum, 3—4 mm diam; testa 1½—2 mm crassa, embryo ± 8 mm longus, ± 5 mm latus.

Sarawak. Swampy country, Nov. 21, 1913, Native collector 172 (typus, Herb. Edinb., Herb. Kew.), fl. red. Kuteing (prob. Kuching), Oct. 1865, O. BECCARI P. B. 879 (= sh. no. 3818, Herb. Flor., in liquid tube no. 269), rather small tree, fl.; ibid. Dec. 1866, O. BECCARI P. B. 3017 (= sh. no. 3819, Herb. Flor.), tree, vern. bilian sipi, fr.; Ragiato di Sarawak (vicinity of Sarawak), Aug. 1867, Bintulu, close to the sea, O. BECCARI P. B. 3704 (= sh. no. 3821, Herb. Flor.), tree, flower white, fl.; Mattang, Sept. 1865, O. BECCARI P. B. 628 (= sh. no. 3820, Herb. Flor.), young buds; Native collector 817 (for Bur. Sci. Manila), dupl. H. L. B., without number and date (distributed as *Tetram(er)ista* sp.), fl.

Though the BECCARI collections were apparently not distributed, various herbaria will be in possession of the native collector no. 817 which was distributed as *Tetram(er)ista* sp.

The colour of the flowers is cited as "red" in the type specimen which possibly refers to flowers post anthesim, whereas the white

colour cited by BECCARI possibly refers mainly to the phalanges. The exocarp and endocarp are at last separating in the herbarium.

Kjellbergiodendron BURRET

Both species distinguished by BURRET (1) were collected and described long before the genus was established. The first sheet was, of course, collected by O. BECCARI in July 1874 near Kendari in Southeast Celebes. This was later described by RIDLEY as *Tristania anacardifolia* Ridl. (6, p. 39). In 1894—95 KOORDERS collected a

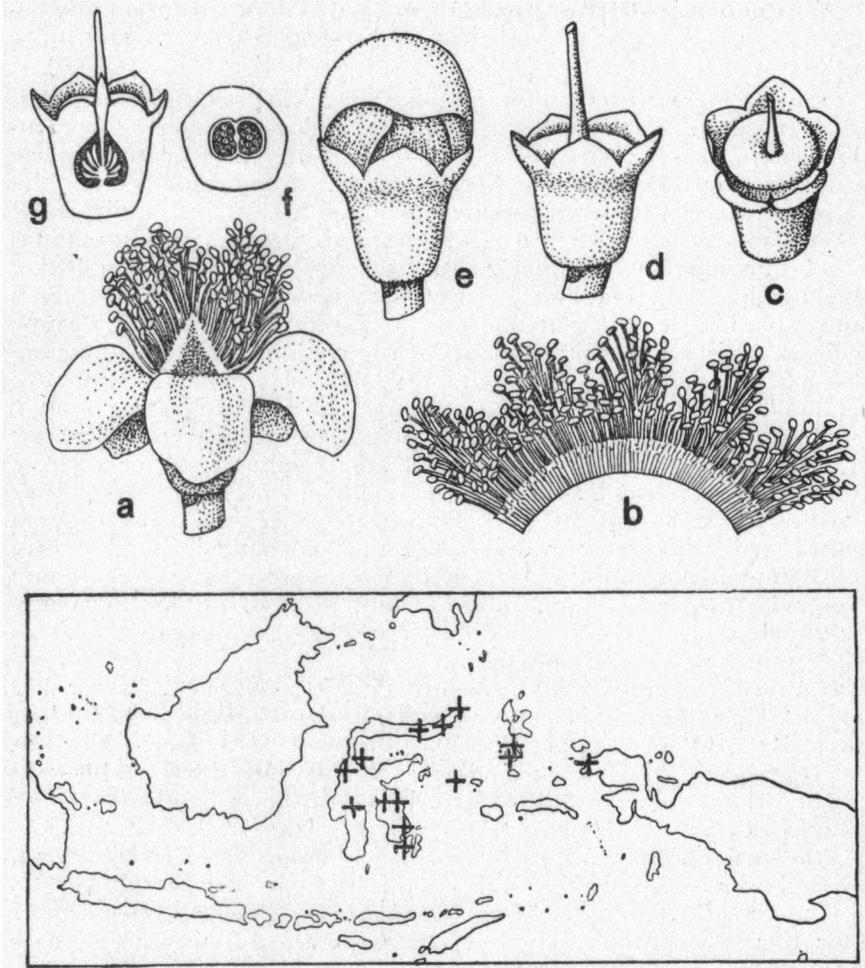


Fig. 2. *Kjellbergiodendron celebicum* (Koord.) Merr. Map of distribution, a. flower in anthesis, b. part of androecium expanded, inner side, c—d. petals and androecium removed, e. bud, f. ovary in cross section, g. longitudinal section, upper part of style not cut, all $\times 2$. After living material cultivated in Kebun Raya Indonesia, Bogor, sub no. XI. A. 23 from Celebes.

species in Northeast Celebes and described it as *Xanthostemon celebicus* Koord. (4, p. 637). Its identity was independently found by me at Bogor about 1940 and by DR MERRILL in 1951 when he checked the revision by GUGERLI (3).

Hitherto the genus has only been recorded from Celebes, but additional material was collected by the Forest Service in Indonesia in some of the Moluccas (see the map). Most sheets were distributed either as "Xanthostemon", as "Myrt." or as "Myrt. gen. nov.", and for the convenience of herbaria possessing duplicate specimens distributed by the Herbarium Bogoriense, the numbers have been cited below.

The species distinguished by BURRET are not very well separated in the Herbarium, as their main distinction lies in the fruit which is small in one and large in the other species.

However, though the fertile material at hand is not very copious, it appears that one number (Cel. II/334) contains both small and large fruits; in the small and certainly very immature ones an appreciably developed embryo is already present. I assume that the full growth of the fruit takes some time and that the difference in size does not yield a specific character.

The same can be said about the size and shape of the leaves which are very variable; in the big series of specimens assembled gradually through the activity of the Forest Service in Indonesia all intergrades are present. The smallest leaves are found in no. bb. 5002 measuring $4\frac{1}{2}$ —8 × $2\frac{1}{2}$ —3 cm, the largest are 27 × $11\frac{1}{4}$ cm (in the cited BECCARI number; both sheets consists of fertile material).

Also the size of the inflorescence shows some variation viz. from 6 to 13 cm.

In immature specimens the buds are decidedly smaller and appear not full-grown.

After ample consideration I have come to the conclusion that only one species is represented, the synonymy of which is given below.

Kjellbergiodendron celebicum (KOORD.) MERR. J. Arn. Arb. 33 (1952) 162. — *Xanthostemon celebicum* Koord. Minah. (1898) 637, 465; KOORD.-SCHUM. Syst. Verz. Abt. iii, 1 (1914) 96. — *Tristania anacardifolia* Ridl. J. Bot. 68 (1930) 39, syn. nov. — *Kj. limogeiton* Burret, Notizbl. Berl.-Dahl. 13 (1936) 103, fig. 5. — *Kj. heilogeiton* Burret, l.c.

Celebes. Manado distr.: KOORDERS 18960, 19289, 19288 (sterile and doubtful, distributed as *Tristania celebica* Koord. nom. nud.), 18544, 18962, 18964, 18240, 19302, 18305, 18322, 18321, 18960, 18097, 18192; Bolaäng Mongondow distr.: Pusian, bb. 33108, vern. tombojowan; Gorontalo distr.: Buhu, bb. 19646, vern. tanna lomongo ohule; Donggala distr.: Parigi, bb. 18800, Donggala, bb. 17634, vern. kembangan golaii; Palopo & vicinity: Morante, bb. 20895; Malili distr.: Usu, Cel. II/485, vern. langara, or pude bulu, Cel. II/240—241—242—243, Maholona, bb. 19820, Cel. II/149, vern. langara, Cel. II/353, vern. pude tauru, La Roua, bb. 1836, id. 1890,

id. 1854, Cel II/334, vern. tuwumea, or tanru, Tolé, bb. 26286; Kendari distr.: Lepo Lepo, BECCARI sh. no. 3807 and 3808 (Herb. Flor.), Wawasungu, bb. 5002, vern. tembeüwa. Other bb. numbers are 8456, 13547.

Also cultivated in the Kebun Raya Indonesia, Bogor, sub no. XI. A. 23.

Muna Island (SW. Celebes). Raha distr., Raha, bb. 21097, Lamanu, bb. 20756, Labunti, bb. 4187, vern. timbeüwa, Barangka, vern. karasie.

Moluccas. Sula Islands (E. of Celebes). Taliabu Island, Tg. Waehaja, ATJE (HULSTIJN) 285.

Batjan, bb. 16467.

Halmaheira. Weda distr., Tiloppe, bb. 24838, vern. timil.

In some places *Kjellbergiodendron* seems to be a quite common tree, e.g. in the Malili forests. All localities are situated below 300 m, both in secondary and primary forest; sometimes its occurrence is characterized as common, sometimes as "spread" or rather rare. Its size is rather variable; it may vary from a small tree to one of moderate height (total height 15—32 m, clear bole 5—20 m, diam. 30—60 cm). Flowers have been found in Jan., March to June, and Oct.; fruits in May and June.

Of the cited living plant in the Botanic Gardens the following notes were made (cf. fig. 2). Twigs cinnamon-coloured. Calyx tube yellowish-green, tinged reddish below the lobes. Base of petals rosa in bud, reflexed in anthesis, inner side white. Phalanges with a reddish centre and base, filaments and anthers yellowish. Top of ovary convex yellowish. Style pink. Ovary 2-celled; placenta near the base of the dissepiment, swollen; ovules numerous, elongate, ascending.

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PS. In 1948 Mr PLEYTE collected *Kjellbergiodendron* several times in the Island of Misool; the locality in the Island of Sorong, West New Guinea, indicated on the map should, however, be omitted.