

INTRODUCTION

A. HISTORICAL REVIEW OF THE TRIBE DALBERGIEAE

Pre-Linnaean period : Though the genus *Dalbergia* was established in 1781 by the younger Linnaeus and the tribe Dalbergieae founded in 1822 by Brongniart, several species of the tribe were mentioned by pre-Linnaean workers on Asiatic botany, the most important being 'Hortus Indicus Malabaricus' by H.A. van Rheed Tet van Draackenstyen (1678-1703) and 'Herbarium Amboinense' by Rumphius (1741-1750).

The generic name *Pongamia* Vent. was only a derivative of Rheed's 'Pongam' a local name when he called the species (*Pongamia glabra* Vent.) as 'Pongam minari' (1686). The plants described as 'Tsjeria-cametti-valli' (1688) and 'Noel valli' (1686) were *Derris trifoliata* Lour. and *D. scandens* Benth. respectively. 2 species of *Dalbergia* were described by Rheed as 'Karin-tagera' (1686) and 'Ana Mullu' (1668) which represented *D. monosperma* Roxb. and *D. sympathetica* Nimmo respectively. Rheed not only provided detailed descriptions of these plants but supplemented them with good illustrations.

Rumphius's 'Herbarium Amboinense' was equally important as that of van Rheed. He studied representative species of genera of this tribe. 'Lacca lignum' (1747) was *Dalbergia parviflora* Roxb. 'Tuba siliquosa, Funis convolutus and Tuba radicum' (1747) referred to the present day *Derris trifoliata* Lour., *D. sinuata* Benth. and *D. elliptica* Benth. respectively (Merrill, 1917). Similarly Rumphius recognised 3 distinct species of *Pterocarpus* as 'Lingoum rubrum, L. saxatile and Sandalum rubrum' (1741). *Pongam minari* of Rheed was according to Rumphius 'Malaparius' (1743) It is significant to mention that Rumphius adopted plant names in a way similar to Linnaeus binomial nomenclature.

Post-Linnaean period : Linnaeus (1753 & 1763) described the various species of this tribe under class 'Diadelphia decandria' in genera like *Pterocarpus*, *Cytisus*, *Hedysarum* and *Robinia*. In fact, the type genus *Dalbergia* was described by him (1781) later. A.L. Jussieu (1789) distinguished 4 genera such as *Dalbergia* Linn. f., *Amerimnon* Brown, *Galedupa* Lamk. and *Deguelia* Aubl. under his unnamed class 'Plantae Dicotyledones/polypetalae/stamina perigyna' which was characterised by 10 stamens, mostly diadelphous, lequme 1 celled, capsular, 1-seeded, nondehiscent, plant arborescent and leaves imparipinnate. Josephi Gaerteneri (1791) while stressing on

fruit and seed characters in the delimitation of genera recognised *Pterocarpus* Linn. Persoon (1807) was the first botanist to recognise most of the modern genera of the tribe when he classified them under 'Diadelphia decandria' following that of Linnaeus. The plants, described by him were *Dalbergia* with 5 species, *Pongamia* Vent. with 2 species, *Pterocarpus* with 3 species and *Ecastaphyllum* Br. with a single species.

The tribe 'Dalbergieae' was founded by Henry George Brongniart in 1822. He gave more importance on the mode of germination of embryos classifying the different groups in Leguminosae. *Nova Genera at Species Plantarum* of Humboldt et Bonpland by Kunth (1822) followed the sexual system of Linnaeus and the species of this tribe were classified under 'Diadelphia decandria'. The genera, recognised were *Amphymenium* Kunth, *Lonchocarpus* Kunth, *Hecastophyllum* Kunth, *Amerimnum* Br., *Drepanocarpus* Meyer, *Machaerium* Pers., *Andira* Lamk. and *Piscidia* Linn. Ebermayer (1824) published a unique method of delimitation of the family Leguminosae. The difference in floral structure was the main consideration. Dalbergieae was one of the 8 tribes, recognised by him in his work.

Though the tribe was established in 1822 by Brongniart, its exact characters, delimitations from allied tribes were defined only by DeCandolle (1825). The tribe 'Dalbergiees' constituted one of the 11 tribes under Sarcolobees of Papilionacees. 10 genera namely, *Derris* Lour., *Dalbergia* Linn. f., *Pterocarpus* Linn., *Drepanocarpus* Meyer, *Pongamia* Vent., *Ecastaphyllum* Br., *Amerimnum* Br., *Brya* P. Br., *Deguelia* Aubl. and *Endespermum* Bl. were recognised by him. DeCandolle's main point of classification lay 'in the mode of germination and the tribe Dalbergiees was characterised by curved embryos. According to him the tribe, as proposed by its author contained an assemblage of heterogenous elements. For instance *Geoffraea* Linn., *Brownaea* Jacq. belonging to Geoffrees and *Saraca* Linn. of Cassiees should come under the suborder Caesalpines. Similarly *Mullera* Linn. of Lotees and *Diphaca* Lour. of Hedysarees should not have been grouped under Dalbergiees. DeCandolle considered that the affinities of the tribe were more with Phaseolees where genera like *Butea* Roxb. have 1-seeded, indehiscent pods and to some extent Hedysarees through *Brya* where the pod is 1-seeded.

W. Roxburgh (1832) did not recognise the tribe Dalbergieae as such but included the known genera, under the subclass 'Diadelphia decandria'. Many of the present day species of *Derris* were described either under *Dalbergia* or *Galedupa*. R. Wight and C.A.W. Arnott (1834) treated Dalbergieae as one of the 5 subtribes of the tribe Papilionaceae. The subtribe was characterised by stamens variously combined, legume 1-2-seeded, indehiscent and cotyledons fleshy. 3 genera namely, *Pongamia*, *Dalbergia* and *Pterocarpus* were recognised under the subtribe. The genus *Dalbergia* was

divided into 2 subgenera namely *Brachypterum* and *Eudalbergia*, the former comprising all true species of *Derris* and the latter all true Dalbergias. Similarly *Pongamia* contained not only *P. glabra* Vent. but also few species of true *Derris*. J. Lindley (1836) followed Wight and Arnott in the treatment of this tribe. Stephano Endlicher (1836-1840) treated Dalbergieae as one of the 8 tribes under order Papilionaceae with 16 genera, included in it. The tribe was characterised by papilionaceous corolla, 10 mono or diadelphous stamens, indehiscent fruits, fleshy cotyledons and recurved radicle. According to C.F. Meisner (1836-1843) Dalbergieae constituted one of the 6 tribes under suborder Papilionaceae. C.G. Walpers (1842-1846) treated Dalbergieae in a similar manner as one of the 8 tribes under the order Papilionaceae. In his conspectus of the genera, Walpers preferred the generic name *Hacastophyllum* Kunth instead of *Ecastaphyllum* Br. even though the latter was an earlier one. *Moutouchia* Aubl., *Amphymenium* Kunth and *Ateleia* DC. were treated distinct from *Pterocarpus*. Similarly *Brachypterum* Wt. & Arn. was considered different from *Derris* while *Triptolemaea* and *Dalbergia* were regarded as distinct genera. According to Miquel (1855) Dalbergieae was one among the 4 tribes of Papilionaceae, with genera like *Dalbergia*, *Euchresta* and *Pterocarpus*, included under it while a new tribe 'Millettieae' was erected by him to accommodate genera like *Derris*, *Pongamia*, *Brachypterum*, *Mundulea* DC. *Millettia* Wt. & Arn. and *Aganope* Miq. The chief characters of Millettieae were mono-diadelphous stamens, campanulate calyx, indehiscent woody fruits, opposite and pinnate leaves and racemose inflorescence. *Aganope* was a new genus, described by Miquel.

The most important contribution to our knowledge of the tribe Dalbergieae came from G. Bentham when he presented 'A synopsis of the Dalbergieae' (1860). It was the outcome of critical work and evaluation of all the genera and species, known to Bentham at that time. Bentham indeed solved many doubtful problems and presented a clear picture of the tribe as a whole. His concept of the tribe as well as the system of arrangement of the genera can be summarised as follows: The tribe was chiefly characterised by woody climbers, scandent shrubs and erect trees, 5-more pinnately compound leaflets, monadelphous stamens and indehiscent 1-many seeded legumes. It was divided into 3 subtribes namely, Pterocarpeae, Lonchocarpeae and Geoffroyeae. The subtribe Pterocarpeae included 10 genera, the most important and pertinent to our study being *Dalbergia*, *Ecastaphyllum*, *Drepanocarpus* and *Pterocarpus*. The subtribe was characterised by alternate leaflets, legume varying from membranous to suberosely thickened and lateral hilum. The second subtribe Lonchocarpeae was characterised by opposite leaflets and flat legumes. Of the 8 genera included in it, the most important were *Ostryocarpus* Hook. f., *Lonchocarpus*, *Derris* and *Pongamia*. The third subtribe Geoffroyeae was marked by alternate to opposite leaflets, free keels, drupaceous fruit and single pendulous seed. Of

the 5 genera, mentioned under this subtribe, *Euchresta* Benn. comes under our study. The genus *Dalbergia* contained 64 species, while *Derris* and *Pterocarpus* had 34 and 7 species respectively. *Pongamia* and *Euchresta* were represented by a single species.

According to Bentham the tribes as a whole showed affinities with sister tribes like Phaseoleae, Galegeae and Sophoreae. It was, however, well distinguished from Phaseoleae by the arborescent to woody climbing habit and indehiscent fruits, from the arborescent Galegeae by the indehiscent fruits and from Sophoreae by the character of stamens. A total of 286 species were described under 23 genera. The subtribe Pterocapeae was considered as genuine representative while subtribe Lonchocarpeae represented the connecting link to the tribe Galegeae. Bentham's conception of the tribe was again incorporated in the system of classification 'Genera Plantarum' (1865).

J.G. Baker (1876) treated Dalbergieae as one of the 10 tribes under suborder Papilionaceae of the order Leguminosae. It was characterised by mono to diadelphous stamens, indehiscent pods and imparipinnately compound leaves. *Dalbergia*, *Derris*, *Pterocarpus*, *Pongamia* and *Euchresta* were the 5 genera, grouped under this tribe. Kurz (1877) formed a different opinion of the tribe. According to him Dalbergieae did not deserve the rank of a distinct tribe but should be regarded only a section of the subtribe Galegeae under tribe Papilionaceae.

O. Kuntze (1891) made drastic changes in the generic names of the tribe, though he did not comment either on the status or classification of Dalbergieae. He preferred the generic name *Amerimnon* Br. (1756) for *Dalbergia* (1781) on grounds of priority. Further the generic name for *Derris* was replaced by *Pterocarpus* Linn. of 1747. According to Kuntze, Linnaeus in his *Flora Zeylanica* (1747) referred the plant, commonly known as *Derris trifoliata* Lour. to the genus *Pterocarpus*. This was further supported by the fact that the type species of *Derris* (*D. Pinnata* Lour.) was actually *Dalbergia pinnata* (Prain, 1904, Merrill, 1910). These changes have further necessitated to find a suitable substitute for Linnaeus *Pterocarpus* of 1763 for which Kuntze adopted the name *Lingoum* Rumph., a pre-Linnacan name. *Pongamia* Vent. was replaced by *Caju*. Kuntze thus discarded the well established genera, *Dalbergia*, *Derris*, *Pterocarpus* and *Pongamia* of earlier workers.

P. Taubert (1894) treated Dalbergieae as one of the 10 tribes under subfamily Papilionatae of Leguminosae. The tribe was divided into 5 subtribes namely Pterocarpinae, Lonchocarpinae, Geoffraeinae and Anomaliae. *Dalbergia* and *Pterocarpus*, the genera under our study were placed under

Pterocarpinae while *Deguelia* and *Galedupa* were put under Lonchocarpinae. The genus *Euchresta* was included under Geoffraeinae. Taubert too followed Kuntze in discarding *Derris* and *Pongamia* and instead adopted the names *Deguelia* Aubl. and *Galedupa* Lamk. respectively on grounds of priority.

In Engler's *Syllabus Der Pflanzenfamilien* (1964) Dalbergieae remained as one of the 9 well defined tribes under subfamily Faboideae. It was distinguished from others by 10 stamens which were mono to diadelphous. 3 subtribes were recognised such as Dalbergiinae, Lonchocarpinae and Geoffraeinae. *Dalbergia* and *Pterocarpus* came under Dalbergiinae while *Derris* and *Pongamia* were treated under Lonchocarpinae. *Euchresta* was placed under Geoffraeinae.

Hutchinson (1964) in his recent treatise of the tribe has emended characters of Dalbergieae to such an extent as to include only the type genus *Dalbergia*. A new tribe Lonchocarpeae was erected to accommodate *Lonchocarpus*, *Derris* and allied genera. *Pterocarpus* was placed exclusively in a new tribe Pterocarpeae. The genus *Euchresta* found place in the other newly erected tribe Geoffroaeae. It is, therefore, interesting to point out here that Dalbergieae up to the time of Hutchinson remained a single entity to include all the genera, discussed above.

Polhill (1971) revived the generic status of *Aganope* Miq. which was so long treated as one of the distinct sections of the genus *Derris* Lour. by earlier workers except Miquel (1855). In doing so he has merged the African genus *Ostryoderris* Dunn, under *Aganope* and the main points put forward by him were the non-adherence of wing petals to the keels, markedly eccentric hilum of the seed with radicular lobe to be undeveloped and the short spreading radicle in mature seeds.

Nasir and Ali (1977) treated the tribe *Dalbergieae* with only the genus *Dalbergia* as the genus *Pterocarpus* does not extend to Pakistan from India. The genera *Derris* and *Pongamia* were removed from Dalbergieae and placed in the tribe Lonchocarpeae. The recent and most vivid treatment of the tribe is again by Polhill in 'Advances in Legume Systematics' edited by Polhill and Raven (1981) who quoted as follows : The traditional concept of Dalbergieae (Bentham, 1960) is modified to refer *Euchresta* to Euchrestaeae (Ohashi, 1973), *Dipteryx* and *Taralea* to Dipteryxae and Lonchocarpinae to Tephrosieae. It includes Pterocarpeae Hutch. (1964), Dalbergieae sensu Hutch. and part of Geoffroaeae Hutch. The main problem is the disposition of Lonchocarpinae, part of which remains transitional between this tribe and the larger woody galegoid complex wherever a dividing line is placed. Bentham (1860) expressed considerable

doubt but at that time few anomalies existed if genera with dehiscent pods were placed in Galegeae and indehiscent ones in Dalbergieae. Since then the number of exceptions has increased significantly and species have been misplaced frequently between *Derris* (Lonchocarpaceae) and *Millettia* (Tephrosieae), genera virtually indistinguishable in flower. It will be significant to quote here Bentham (1860) : As I have already had occasion to remark.....the greater or less degree of development in different parts of the pod or its appendages, acquired during growth and maturation which often make a great difference in its external appearance, is of very little systematic value ; whilst a tendency to development in one direction and not another or to produce appendages in one part and not another, often difficult to appreciate is on the contrary remarkably constant in genera, otherwise natural. Of *Lonchocarpus*, *Derris* and allies he remarks, "These genera constitute a natural group distinguished among Dalbergieae by their inflorescence, by the wing petals adhering to the keel by means of a lateral fold or protuberance immediately above the claw and by the tenth or upper stamen which although free and at some distance from others at the very base is generally united with or at any rate in close contiguity, with others in the middle, all characters closely connecting them with the woody Galegeae. It seems useful to emphasize not the dehiscence of the pod but the development of specialised seed chambers in Dalbergieae, the 1-few seeds generally invested by hardened endocarp. The fruits may be drupaceous, massive fibrous floats or variously winged. The wings may be formed by expansion of stipe, style, attenuation of the edge of the fruit or by simple fusion or flattening of the valves.

Thus the genera of the tribe can usually be recognised in flower by predominance of less specialised states in the following trends) : a) nectary from hypanthium to intrastaminal disc b) standard developing callouses c) wings becoming interlocked with keels d) Keel petals free, overlapping on lower side edgewise adnate e) stamens progressively joined higher, more firmly united to 10 or 9 + 1 or vexillary stamen free only at base f) ovary with a shortened stipe. Special features of the Dalbergieae are the ovules mostly uniseriate, the ovule chamber often narrowed or restricted to one part of the ovary, any septa formed by the intrusions of the placenta, not by the ovary wall.

In Indian genera *Derris*, *Pongamia* and *Aganope* along with others have been removed from Dalbergieae and placed in the tribe Tephrosieae while the genus *Euchresta* constitutes a separate tribe Euchresteae. (Ohashi, 1973). Geesink (1984) went a step further when he proposed or rather substituted a new name Millettieae for Tephrosieae. He further reinstated the genus *Brachypterum* Wt. as distinct from *Derris* and merged *Pongamia* Vent. with *Millettia* Wt. & Arn. Thothathri (1986) reviewed the asiatic genera critically for their taxonomic status and systematic position.

As a result, the tribe Dalbergieae s.s. consists of only 2 Indian genera namely *Dalbergia* L.f. and *Pterocarpus* Jacq.

KEY TO THE TRIBES

- 1a. Trees or shrubs or lianes. Pods flat and mostly strap-shaped.
 2a. Calyx small ; petals spathulate.
 Leaflets mostly alternate 1) *Dalbergieae*
 2b. Calyx campanulate ; petals spreading.
 Leaflets mostly opposite. 2) *Tephrosieae*
 1b. Shrubs. Pods fleshy, bluish. 3) *Euchresteae*

DALBERGIEAE Bronn. ex DC.

Bronn. ex DC. Mem. Des. Legum. 10 : 383. 1825 et Prodr. 2 : 415. 1825 ; Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 1 : 261. 1832 (as subtribe); Lindl., Nat. Syst. Bot. 156. 1836 (as subtribe); Endlicher, Gen. Pl. Sec. Ord. Nat. 1302. 1836-40 ; Meisner, Pl. Cul. Gen. 1 : 79. 1836-43 ; Endlicher, Ench. Bot. 672. 1844 ; Walp. Repert. Bot. Syst. 1 : 792. 1842 ; Miq. Fl. Ind. Bat. 1 : 125. 1855 ; Benth in Journ. Linn. Soc. 4 (Suppl.) : 26. 1860 ; Benth et Hook. Gen. Pl. 1 : 454. 1865 ; Baker in Hook. f. Fl. Brit. India 2 : 60. 1876 ; Taub. in Engl. & Prantl, Die Nat. Pflanzfam. 3 (2) : 333. 1894 ; Ridley, Fl. Malay. Pen. 1 : 556. 1922 ; Hutch. et Dalz. Fl. Trop. Africa 1 : 505. 1964 ; Hutch. Gen. Fl. Pl. 1 : 389. 1964 (sensu stricto) ; A. Engl. Syll. der. Pflanzfam. 2 : 232. 1864 ; Polhill in Kew Bull. 25 (2) : 259. 1971 ; Polhill in Polhill et Raven, Adv. Leg. Syst. 233. 1981. Thoth in Bull. bot. Surv. India 26 : 183. 1984 (1986).

Trees, shrubs or lianes. *Leaves* mostly imparipinnate, rarely unifoliate ; leaflets alternate to opposite ; stipels present or absent. *Flowers* in racemes or panicles ; bract and bracteoles small, caducous. *Calyx* upper lobes joined higher, sometimes spathaceous, 2-lipped or subtruncate. *Corolla* papilionaceous, standard generally without callouses, keels free, overlapping or shortly adnate on lower side, obtuse, not interlocked with wings. *Stamens* 9-10, monadelphous with sheath split open dorsally, diadelphous (9+1 or 5+5), anthers versatile. *Ovary* 1-few ovuled, style glabrous with a small stigma. *Fruits* drupaceous with 1-few specialised, indehiscent seed chambers, fibrous or winged ; seeds oblong-reniform, testa thin, radicle short. *Seedlings* hypogeous to epigeous.

Type genus : *Dalbergia* Linn. f.

Distrib. : 10 genera, confined to the tropics of old and new world. Except for *Inocarpus* all genera occur in tropical America and only

Andira, *Machaerium*, *Dalbergia* and *Pterocarpus* extend to the old world, only the two latter as far as Asia and only a single species of *Dalbergia* reaching Australia. According to Polhill (l.c.) the tribe seems to have two main centres of affinity, one around *Andira* and *Vatairea* (with *Machaerium* and *Dalbergia* as more specialised representatives) and one around *Pterocarpus*, the latter group, characterised by bright yellow flowers, the wings often enlarged and crimped, the ovary often with placental septa. The *Andira* group comes closest to Tephrosieae especially in the old world, principally african genera *Ostryocarpus*, *Aganope*, *Xeroderris* and *Dalbergiella* and with considerable similarity to the *Dussia* group of Sophoreae and more especially to *Luetzelburgia* of the *Myroxylon* group.

There is not a single species common to Asia and America. A few american species have spread to the coast of Africa and Asia such as *Dalbergia ecastaphylla* Taub. Similarly the african species *Pterocarpus esculentus* has crossed over to the american coast.

Origin and Relationship

The tribe Dalbergieae occupies more or less a middle place in the phylogenetic sequence of the family Fabaceae. In fact in the linear arrangement of tribes, Hedysereae and Dasmodieae with their septate and jointed pods enjoy the highest place and represent the most highly evolved in Fabaceae. Sophoreae and Swartzieae constitute the primitive groups with free stamens. Dalbergieae with its connate stamens and indehiscent fruits might have evolved from the above groups in the tropics.

The modified corolla in *Etaballia* and *Inocarpus* suggest of a primitive position somewhere between Swartzieae and Sophoreae (Hutchinson, 1964, Yakovlev, 1975 and Corner, 1976) or even between Faboideae and Mimosoideae. (Kuhlmann, 1949). According to Barth (1964) pollen grains of *Myrocarpus frondosus* Allem. and *Ormosia subsimplex* Spr. ex Benth. of primitive Sophoreae resemble those of some species of *Andira* and *Dalbergia*.

Cytology : The tribe as circumscribed by Polhill (1981) is fairly uniform cytologically with $n=10$, recorded in all genera except *Centrolobium* where $n=9$.

The situation in *Andira* is not clear with both $n=11$ and $n=10$ reported in *A. enermis* while 2 other species have $n=10$. *Inocarpus* transferred here from Sophoreae has $n=10$, a number which accords as well with Dalbergieae. *Pterocarpus* is the only cytologically diverse genus in the tribe. Most species have $n=11$ and a few $n=10$, but *P. rotundifolius* has been reported as having $n=12$ which needs further verification. Most

likely $x=11$ is basic for Dalbergieae but $n=10$ appears to have been established early in its evolution and to be basic for most genera (P. Goldblatt, 1981).

Palynology : The members of the tribe have rather uniform and un-specialised pollen. The grains are small, tricolporate with only small variations in the tectum and endoapertures (Feruguson and Skvarla, 1981). On the basis of exine pattern, the following types are to be recognised, *Crotalaria vestita* type, *Crotalaria albida* type and *Lathyrus pratensis* type (Ertman, 1952). According to Vishnu Mittre et al. (1962), in confirmity with similarities in floral morphology, the subdivisions of the genera into subgenera on the basis of pollen morphology will not be out of place.

Anatomy : The Dalbergieae contain certain genera that are very different in their wood anatomy from the majority of the genera that make up the tribe. They are the genera, *Andira*, *Vatairea* and *Hymenolobium*, all not occurring in India. These have a rather coarse texture : large vessels. abundant aliform, confluent parenchyma, multiseriate, heterocellular and non-storied rays. The genera like *Dalbergia* and *Pterocarpus* on the contrary have a fine structure, small vessels, evenly distributed, finely banded parenchyma, 1-2-seriate low rays ; all elements are strictly storied. The genera like *Pterodon* and *Centrolobium* differ in parenchyma distribution. They exhibit same low, uniseriate and storied rays as the majority of the genera of Dalbergieae (Time Baretta Kupiers, 1981).

Dalbergia and *Machaerium* are genera where the wood structure may show some variation between the species. For instance in some species of both the genera, the rays are uniseriate and in many others biseriate. The parenchyma distribution in *Dalbergia* is rather variable with apotracheal parenchyma (both as isolated stands and as fine continuous tangential bands), being the most common. *Centrolobium* is the only genus in Dalbergieae that is almost devoid of parenchyma, its rays are exactly like those of other genera of the tribe. (Time Baretta Kupiers, 1981).

The hairs on the stem and leaves are usually uniseriate and non-glandular or at times peltate glandular as in *Pterocarpus*. The lower epidermis of the leaf is normally papillose and rarely the upper epidermis is also papillose as in some species of *Dalbergia*. Epidermis often includes a portion of mucilagenous cells. The presence of hypodermis is rare as in species of *Dalbergia*. The main vascular stand in the petiole is continuous consisting of single vascular strand which is cylindrical. The vessels range from large (200/μ in tangential diameter) as in *Dalbergia* to medium size (100/μ) as in other genera. They are solitary with simple perforations. Wood fibre is exceptionally both thin and thick walled as in *Pterocarpus*.

Embryology : Rau. (1954) opined that a careful and detailed investigation of the embryogeny of a large number of representative species of Fabaceae is necessary for proper elucidation and evaluation of the systematic relationship of the tribes and genera of this family. There appears to be no detailed information on the embryology of the tribe except the haustorium formation in *Dalbergia sissoo* Roxb. (Johri & Garg 1959) and endosperm formation in *Dalbergia sissoo* (Rau, 1951, 1953).

Pollination Biology : Self-incompatibility system has been found in species of *Dalbergia* and *Pterocarpus* (Kalin Arroyo, 1981). Bees are the major pollinators as can be evidenced by the large number of bee species, visiting genera such as *Andira*, *Dalbergia*, *Pterocarpus*, *Piscidia* and *Machaerium*. In fact species of the genus *Xylocopa* are the frequent bee pollinators (Hurd, 1978).

The Leguminosae originated towards the end of cretaceous, approximately 70 million years ago (Raven, 1974). Descent of the family was paralleled by that of bees but it long predated the appearance of nectarivorous birds and bats which are usually considered to have gained prominence around miocene time (Sussman & Raven, 1978). The major phylogenetic tendency in floral biology of the Leguminosae has been economy of pollen and nectar, each of three sub-families representing a different grade of advancement in this trend. Legumes and bees appear to have evolved on reciprocal basis and differences in bee diversity and specialisation on legumes have been noted (Kalin Arroyo, 1981).

KEY TO THE GENERA

Erect trees to climbing shrubs ; flowers small,

white to reddish ; pods oblong to elliptic.

Dalbergia 1

Erect trees ; flowers large, yellow ; pods

suborbicular to orbicular, winged around

Pterocarpus 2

DALBERGIA Linn. f.

A RESUME OF EARLIER WORKS

The genus was established by younger Linnaeus in 1781 in memory of Nicholas Dalberg, a Swedish botanist in order to accommodate 2 plants, one a tree from Ceylon named, *Dalbergia lanceolaria* and another a shrub from Surinam namely, *D. monetaria* [transferred to *Ecastaphyllum* by Person (1808)]. W. Roxburgh (1798) described 3 more species from India namely, *D. latifolia*, *D. paniculata* and *D. rubiginosa*. Willdenow (1800) contributed 2 more species, *D. heterophylla* and *D. arborea* (later transferred to *Derris* and *Pongamia* respectively). W. Roxburgh (1814) again listed 10 species in his 'Hortus Bengalensis' but provided detailed descriptions later in his Flora India (1832). Of these, 3 species were transferred to *Derris* (*D. marginata*, *D. robusta* and *D. scandens*) by latter workers.

Dennstedt (1818) published botanical names for a few Dalbergias, described in van Rheede's 'Hortus Malabaricus' but all of them were not true ones. For instance *D. arborea* is *Pongamia* and *D. heterophylla* is *Derris trifoliata* Lour. (Merril, 1910, 1923). The true Dalbergias in 'Hortus Malabaricus' (1686-88) namely, 'Karin tagera' and 'Ana-mullu' have been referred to *Cassia* Linn. and *Amerimnon* Br. respectively (Dennstedt, 1878). Roth (1821) described *D. arborea* which is now synonymous with *D. lanceolaria* Linn. f. DeCandolle (1825) added 1 more species, *D. timoriensis* which again proved to be *Derris scandens* (Roxb.) Benth. Sprengel (1826) while reviewing the genus did not add any new information but described one new species, *D. sericea* (non Don) which was later transferred to *Millettia*. G. Don (1832) contributed a new species namely, *D. sericea* from Nepal Himalayas which is now a distinct species. Graham identified a number of Dalbergias, catalogued in Wallichian catalogue (1831-32). Unfortunately most of them were nomina nuda for lack of description. However, few like *D. ovata*, *D. foliacea*, *D. cana*, *D. cultrata* and *D. sissoides* have been validated later by subsequent workers. But the majority of the names in the above work were reduced to synonymy. Wall. Cat. 5871, issued under *D. hircina* Ham. was really a mixture of 2 different species (5871 *D. hircina* Ham. *D. lanceolaria* L. f.; 5871B *D. hircina* Ham. *D. sericea* Don). Similarly under Wall. Cat. 5848, 2 different species were represented : 5848 being *D. paniculata* Roxb. and 5848 B being *D. multiflora* Heyne. On the whole 6 new species have been added by Wallich and his colleagues. The catalogue of Wallich further contained *D. ougeinensis* Roxb. which is now *Ougeinia dalbergioides* Benth.

The work of Wight and Arnott (1834) forms the starting point for the systematic classification of the genus. It was divided into 2 subgenera- 1. *Brachyterum* Wt. & Arn. and 2. *Eudalbergia* Wt. & Arn. One species namely, *D. scandens* Benth. was placed under *Brachyterum* which was characterised by opposite leaflets, truncated calyx and pod, winged on the seminiferous suture. The subgenus *Eudalbergia* on the other hand was well marked for its alternate leaflets, 5 toothed calyx cup, and stalked pods without being winged on the sutures. One of the notable features in Wight's classification was the further subdivision of the subgenus *Eudalbergia* into 2 distinct groups namely, 1) stamens all united into a sheath split on the dorsal side, 2) stamens isodiadelphous. This became the basis for George Bentham (1852) to divide the genus into natural sections. The subgenus *Brachyterum* of Wight became later a section under *Derris*. The authors further validated Graham's *D. sissoides* and *D. congesta* of Wallichian catalogue. Nimmo (Graham, 1839) described *D. sympathetica* from Western India while Dalzell (1850) added 2 more species namely, *D. acaciaefolia* and *D. monosperma*. The total number of species under *Dalbergia* up to this time (1850) from the area under study stood at 11.

The most important contribution to our knowledge of *Dalbergia* was made by George Bentham (1852 & 1860). In his first preliminary work (1852) he recognised 3 major sections namely, '*Sissoa*' with 18 species, '*Selenolobium*' with 2 species and '*Dalbergaria*' with 8 species. The section '*Sissoa*' was characterised by 9-10 monadelphous stamens and elongate pods while section '*Selenolobium*' had similar stamens differing at the same time in the short, 1-seeded, lunar-shaped pods. The section '*Dalbergaria*' had isodiadelphous stamens and similar pods as in '*Sissoa*'. Bentham described 3 new species namely, *D. confertiflora*, *D. velutina* both from Sylhet and *D. assamica* from Assam. Bentham also validated a few of the Wallichian names with detailed descriptions such as *D. ovata*, *D. cultrata*, *D. foliacea*, *D. hircina*, and *D. flexuosa*. Subsequent to this preliminary studies, he (1860) published a monograph on the tribe Dalbergieae, based mainly on his previous work. Besides the fruit, other characters were also taken into consideration in the classification of the genus. Contrary to earlier work wherein greater importance was attached to fruit characters, Bentham attempted a delimitation of this character as he felt that the major reliance on pod characters was largely responsible for inclusion of species of such genera as *Derris*, *Lonchocarpus* Kunth etc. *Ecastaphyllum* P. Br. was treated as a separate genus. He accepted in principle 4 sections-namely-'*Triptolema*', '*Sissoa*', '*Dalbergaria*' and '*Selenolobium*', but divided them further into series as follows: *Triptolemeae Americanae*, *T. Gerontogaeae*, *Sissoae Americanae*, *S. Gerontogaeae* and *Dalbergariae Gerontogaeae*. The American species were, therefore kept separate from Asiatic and African elements. Bentham himself admitted that this sort of division of the genus was more for convenience in indenti-

fication rather than for phylogenetic considerations. Out of the 64 species, treated in his work, 27 are distributed in the area under study, namely 16 from India, 4 from Burma and 1 from Ceylon. Of the remaining 6, *D. monosperma* and *D. lanceolaria* are common to India and Ceylon while *D. tamarindifolia*, *D. velutina*, *D. stipulacea* and *D. rimosa* are found both in India and Burma. 4 new species namely, *D. thomsoni* from Assam, *D. stocksii* from Western India, *D. gardneriana* from Nilgiris and *D. purpurea* from Burma were described in this work.

Miquel (1855) followed Bentham in the grouping of species and added one new species *D. pseudo-sissoo* from Java. Thwaites (1859-1864) contributed 2 more species from Ceylon namely, *D. championii* and *D. mooniana*. Of these, the former has now been reduced to *D. pseudo-sissoo* Miq. and latter formed the basis of a new genus *Pericopsis*, described by Thwaites (1864) himself. S. Kurz's contribution to the genus was mainly in the form of 4 new species from Burma and India between 1873-1876 namely, *D. glauca*, *D. nigrescens*, *D. stenocarpa* and *D. glomeriflora*. Of these 4, the first 3 have been reduced to synonymy under *D. obtusifolia* Prain, *D. paniculata* Roxb. and *D. sericea* G. Don respectively. Kurz also validated one wallichian catalogue name, *D. cana* by providing a description. Bentham and Hooker in their monumental work 'Genera Plantarum' (1865) recognised *Dalbergia* as a distinct genus with 4 well defined sections such as '*Triptolema*', '*Sissoa*', '*Dalbergaria*' and '*Selenolobium*'. The concept of the genus was more or less similar to that of Bentham's earlier work (1960).

Baker (1876-1878) in Hooker f. Flora of British India followed more or less Bentham's (1852) concept of the tribe but deviated a little in raising the status of sections *Sissoa*, *Dalbergaria* and *Selenolobium* to that of subgenera. Also the section '*Triptolema*' of Bentham did not find a place here. Instead Baker's subgenus '*Sissoa*' contained 3 subdivisions but without any assignment of rank as follows: 1. Leaflets large 2. Leaflets few and small 3. Leaflets many and small. A total of 29 species were altogether recognised with 2 new varieties namely, *D. ovata* var. *obtusifolia* and *D. tamarindifolia* var. *pubescens*, the former from Burma and the latter from Western India respectively. Similarly *D. acaciaefolia* Dalzell from Concan was treated under *D. tamarindifolia* as a variety. *D. gardneriana* Benth., a species considered distinct from *D. congesta* by Bentham was merged with the latter. *D. stenocarpa* Kurz, though kept separate was regarded as an imperfectly known species. *D. junghuhnii* Benth. was regarded strictly a Malaysian species. According to Baker, the 28 species were distributed as follows, 11 from India proper, 6 from Ceylon. Of the remaining 11 species, *D. vo'ubills* was common throughout India, Burma, Ceylon and Bangladesh while *D. stipulacea* and *D. reniformis* occurred in India, Burma and Bangladesh. *D. lanceolaria* was found in India,

Ceylon, Pakistan and Bangladesh while *D. monosperma* was confined to India and Ceylon only. 5 species namely *D. rimosa*, *D. confertiflora*, *D. velutina*, *D. tamarindifolia* and *D. spinosa* were chiefly from undivided India. Kurz (1877) made a drastic change in transferring the subgenus 'Selenobium' under the genus *Drepanocarpus* May. Consequently the 3 species were named *Drepanocarpus monospermus*, *D. spinosus* and *D. reniformis*. C. B. Clarke (1889) described *D. wattii*, an interesting and rare species from Manipur.

Taubert (1890) reduced *Ecastaphyllum* to *Dalbergia* and placed it under the section 'Selenobium'. He had not accepted Baker's union of 'Triptolema' and 'Sissoa', still less had he agreed to Kurz's transfer of 'Selenobium' under *Drepanocarpus*. He simply followed Bentham in recognising the same 4 sections namely 'Triptolemaea', 'Sissoa', 'Dalbergaria' and 'Selenobium'. In the first 2 sections the Asiatic and American species were placed under 'Gerontogae' and 'Americanae' respectively. 12 Asiatic species were treated under the above 4 sections. O. Kuntze (1891) used the generic name *Amerimnon* P. B. instead of *Dalbergia* as adopted by Adanson (1763) on grounds of priority. According to him this was the earliest and validly published name for the present day *Dalbergia*. He had therefore transferred all the known species to *Amerimnon*.

A comprehensive taxonomic revision of the genus *Dalbergia* in South-east Asia was published by David Prain (1904). After Bentham's classical work (1860) Prain's monograph was the major contribution towards the taxonomy of the genus. Prior to this he made a number of preliminary studies on the genus (1897, 1901). In his first account (1897) he recognised 3 subgenera namely, 'Dalbergaria', 'Sissoa', and 'Selenobium'. 6 new species, all from Burma were added to the already existing 30 from Asia namely, *D. oliveri*, *D. collettii*, *D. burmanica*, *D. hemslevi*, *D. kurzii* and *D. prazeri*. *D. garderiana* Benth. and *D. congesta* Grah. ex Wt. & Arn. were kept distinct from one another, while *D. nigrescens* Kurz and *D. stenocarpa* Kurz were reduced to *D. paniculata* Roxb. and *D. hircina* Ham. ex Benth. respectively. *D. millettii* Benth. was reported for the first time from Assam, India. Prain preferred the name *D. torta* Grah. in place of *D. monosperma* Dalz. on grounds of priority. He described another new species *D. kingiana* from Burma (1898).

In his second account on the Asiatic species (1901) Prain reinstated Bentham's subgenus 'Triptolema' and set a limitation to the subgenus *Selenobium* for only those species with thick, corky pods. A new section 'Unguiculatae' was erected under subgenus 'Sissoa' besides two other sections viz. 'Sissoa verae' and 'Sissoa pseudoselenobieae'. The subgenus 'Dalbergariae' had one section 'Dalbergaria' while subgenus 'Triptolemae' comprised two sections namely 'Triptolemae verae' and 'Triptolemae pseudo-

selenobieae'. The third subgenus '*Selenobium*' was divided into two sections namely '*Selenobieae pseudodalbergariae*' and '*Selenobieae pseudosisae*'. Out of the 70 species, dealt in this work, 40 were distributed in the area under our study as follows : 17 from India, 13 from Burma, 1 from Ceylon. Of the remaining 9, *D. velutina*, *D. tamarindifolia*, *D. stipulacea*, *D. confertiflora* and *D. rimosa* were common to India, Burma, Pakistan and Bangladesh. *D. reniformis*, *D. volubilis* and *D. paniculata* were common to India and Burma only while *D. monosperma* was common to India, Burma and Ceylon. Prain substituted the name *D. emarginata* Roxb. for *D. sissooides*. Baker's *D. ovata* var. *obtusifolia* and *D. tamarindifolia* var. *acaciaefolia* were raised to independent species. *D. pseudosissoo* and *D. championii* were reduced to *D. rostrata* Wall. (nomen). *D. tamarindifolia* var. *pubescens* was raised to an independent species with a new name, *D. malabarica*. A new name *D. candantensis* was given to *D. monosperma*. *D. stocksii* and *D. sympathetica* were *D. melanoxyton* and *D. multiflora* respectively. A new species *D. coromandeliana* and a variety *D. melanoxyton* var. *glabrescens* were also described in this work.

In the meanwhile 3 regional floras were published by Cooke (1902), Prain (1903) and Duthie (1903). Cooke in his Bombay flora recorded 11 species for that area. *D. sissoo* and *D. melanoxyton* were regarded as cultivated ones. *D. monosperma* Dalz. was replaced by *D. torta* Grah. as the correct name and its systematic position was clarified. He followed Baker (1876) in treating '*pubescens*' and '*acaciaefolia*' as only varieties of *D. tamarindifolia* Lour. He further clarified the confusion that existed between *D. volubilis* and *D. confertiflora*. Prain's account (l.c.) of the genus for Bengal was more or less identical to his earlier works (1897 & 1901), mentioned above. Duthie (l.c.) enumerated 6 species from the Upper Gangetic Plain, all of which had a wide distribution.

Based on his earlier studies (1897, 1901) Prain wrote his monograph (1904) 'The species of *Dalbergia* in South-East Asia. He deviated much from Bentham and other earlier workers in the treatment of the genus. To begin with he did not agree to the creation of '*Selenobium*' either as a subgenus or even a section. According to him the pods of this group were not uniform and their allies were not '*Sissoae*' or '*Dalbergariae*' or '*Triptolemeae*' but were found scattered throughout the genus. The structure of the pod was mainly due to adaptation for dispersal through water and protection of the seed in swampy forests. The turgid or suberised pods were, therefore, chiefly due to environmental factors. Hence this cannot constitute a taxonomic character of much significance. According to him, Bentham's sections '*Triptolema*' and '*Dalbergaria*' were natural and useful but '*Sissoa*' was rather unnatural. The latter included

many species which were precisely *Dalbergarias* except for the monadelphous stamens. Prain therefore recognised 4 sections under the following 2 subgenera : 1. '*Sissoa*' 2. '*Amerimnon*'. The former was not exactly the same as that proposed by Bentham (1852) and followed by Baker and Kurz since it eliminated all species with monadelphous stamens and hastate wing-petals. Similarly '*Amerimnon*' was not equivalent to '*Dalbergaria*' of the above authors as it included monadelphous species with wing-petals similar to those of diadelphous ones. The 2 sections under subgenus '*Sissoa*' were '*Triptolemea*' and '*Podiopetalum*' while the 3 sections under subgenus '*Amerimnon*' were '*Endespermum*', '*Miscolobium*' and '*Dalbergaria*'.

Prain was guided by one important factor in arriving at the above classification. His method had been to devise means of identification of various species rather than of phylogenetic consideration. With this background, he created as many as 24 series. The following is the arrangement of the series with species :

I. Sect. <i>Triptolemea</i>		
Ser. 1. Nummularieae	—	2 species
„ 2. Parviflorae	—	3 „
„ 3. Discolor	—	1 „
„ 4. Rimosae	—	8 „
„ 5. Phyllanthoides	—	4 „
„ 6. Mimosoides	—	3 „
II. Sect. <i>Podioptalum</i>		
Ser. 7. Foliaceae	—	6 „
„ 8. Cultratae	—	2 „
„ 9. Sissoo	—	1 „
III. Sect. <i>Endespermum</i>		
Ser. 10. Rostratae	—	3 „
„ 11. Rubiginosae	—	4 „
„ 12. Menooides	—	2 „
„ 13. Congestae	—	4 „
„ 14. Polyphyllae	—	7 „
IV. Sect. <i>Miscolobium</i>		
Ser. 15. Velutinae	—	2 „
„ 16. Ovatae	—	5 „
„ 17. Latifolia	—	3 „
„ 18. Polyadelphe	—	1 „

V. Sect. *Dalbergaria*

Ser. 19. Sericeae	— 2	„
„ 20. Lanceolarieae	— 9	„
„ 21. Canae	— 7	„
„ 22. Volubilis	— 1	„
„ 23. Stipulaceae	— 2	„
„ 24. Reniformes	— 4	„

86 species have been accounted for South-east Asia of which 42 occur in the areas under our study. As regards nomenclature and treatment of taxa there was not much variation from his earlier work (1901). The nomenclature of *D. sympathetica* has been changed to *D. multiflora* Heyne and *D. rostrata* Grah. has replaced the name for the species hitherto known as *D. championii* and *D. pseudo-sissoo*. The name *D. candenatensis*, proposed by Prain (1901) for *D. monosperma* has again been changed to *D. torta* Grah. Further *D. congesta* a species, confined to S. India has extended its range of distribution upto Burma and that *D. latifolia* upto Malayan Peninsula. The two Burmese species *D. burmanica* and *D. ovata* have also been reported from lower China.

Brandis (1907) listed 36 species in his forest trees of British India and followed more or less Baker's treatment (1876) in the nomenclature and distribution of species. However he deviated in recognising 5 distinct groups under the genus without assigning any status to them as follows : 1. Trees or shrubs ; stamens 9 or 10, monadelphous. Species such as *D. sissoo*, *D. latifolia*, *D. rimosa*, *D. ovata* and *D. cultrata* were included in this category. 2. The second group was characterised by climbers with 9 or 10 monadelphous stamens. The species included here were *D. rubiginosa*, *D. tamarindifolia* etc. 3. The third category consisted of trees with 10 isodiadelphous stamens and with species like *D. lanceolaria*, *D. paniculata*, *D. kurzii*, *D. sericea*, *D. oliveri* etc. 4. The fourth group were climbers with 10 isodiadelphous stamens and thin pods. Species such as *D. volubilis*, *D. spinosa* were placed under this group. 5. The last group had in it trees, shrubs or climbers with falcate to reinform, coriaceous pods. The species, included in this were *D. spinosa*, *D. monosperma* and *D. reniformis*. Talbot (1909) recorded 11 species for the Bombay Presidency which included the cultivated one, *D. sissoo*. He doubted about the occurrence of *D. spinosa* as wild in the Presidency and preferred the name *D. stocksii* instead of *D. melanoxyton* even though the latter was an earlier name. He further adopted *D. torta* Grah. in place of *D. monosperma* Dalz.

Merrill (1910) described 6 species from Philippines and among them only 2 (*D. pinnata* and *D. candenatensis*) occur in the area under study.

He added 1 new variety *badia* under *D. pinnata*. Gamble (1918) recorded 16 species from the Presidency of Madras. His treatment of the genus was similar to that of Prain's monograph (1903), especially in nomenclature. His work had clearly shown that *D. congesta*, *D. gardneriana*, *D. malabarica*, *D. acaciaefolia* and *D. coromandeliana* were purely Southern Indian species of restricted distribution and that the first 2 were endemic to Nilgiris. Haines (1922) reported 9 species from Bihar and Orissa. He has shown that the distribution of *D. rubiginosa* from South India has extended up to Orissa. He described 1 variety under *D. lanceolaria* without assigning any epithet, distinguishing the same from the typical plant by dense racemes, smaller flowers and densely hairy calyx tube. This variety can no longer stand distinct as *D. lanceolaria* is a highly variable species.

Ridley (1922) accounted for 12 species in the flora of Malayan Peninsula. Among them 7 were exclusively of Malayan origin and remaining 5 (*D. parviflora*, *D. rostrata*, *D. torta*, *D. tamarindifolia* and *D. velutina*) were also distributed in the area under consideration. Merrill (1923) gave a full account of the genus in his flora of Philippines, enumerating therein 10 species. Of these, 8 were confined to Philippines and Malaysian Islands while remaining 2 were also common in our area (*D. candenatensis* and *D. pinnata*). Parkinson (1923) enumerated 4 species from the Andaman Islands (*D. confertiflora*, *D. tamarindifolia*, *D. volubilis* and *D. monosperma*). Kanjilal et al. (1931) reported 15 species from Assam, among which *D. velutina* and *D. foliacea* were not based on any collections. The former was included on the strength of Wall. Cat. 5848 B and the latter on cultivated specimens. He also expressed his doubt as to the occurrence of *D. paniculata* from Assam, as was reported by earlier workers.

Backer et Bakhuizen (1963) enumerated 7 species for the flora of Java of which 4 were common in the area under study. Among the 4, *D. sissoo* and *D. latifolia* represented cultivated forms, leaving behind *D. pinnata* and *D. candenatensis* as truly wild.

Santapau (1967) reported 4 species from Khandala in Western ghats namely, *D. latifolia*, *D. sympathetica*, *D. lanceolaria*, and *D. volubilis*.

Thothathri in course of his taxonomic studies on the genus *Dalbergia* (1970-86) published a series of papers. He discussed (1970) the distribution of *Dalbergia stipulacea* Roxb. in Bhutan. 2 new species (*Dalbergia clarkei* from Assam and *D. travancoria* from Kerala) and 3 new varieties (*Dalbergia rimosa* Roxb. var. *griffithii* and *D. millettii* Benth. var. *oldhamii* both from

Assam and *D. obtusifolia* Prain var. *rogersii* from Burma) were described by him (1971, 1972). In a series of 3 more publications (1974-76), 6 new species were described by him such as *Dalbergia bhutanico*, *D. duarensis*, both from a Eastern Himalayas, *D. peguensis*, *D. pseudo-ovata*, *D. prainii*, all from Burma and *D. tinneveli* from Sri Lanka. His further intensive studies (1978) resulted in the discovery of 7 new varieties (*Dalbergia rimosa* Roxb. var *laevis*, *D. cultrata* Grah. ex Benth. var *tavoyensis*, *D. cultrata* Grah. ex Benth. var. *maymyensis*, *D. stipulacea* Roxb. var. *kurzii*, *D. stipulacea* Roxb. var *mogkokensis* all from Burma, *D. confertiflora* Benth, var. *listeri* from Bangladesh and *D. volubilis* Roxb. var. *assamica* from Assam, and 2 new forma *D. stipulacea* Roxb. f. *puberula* and *D. velutina* Benth. f. *burmanica* both from Burma were added new to science.

Nasir & Ali (1977) in 'Flora of West Pakistan' places only *Dalbergia* in the tribe Dalbergieae with 3 species. Hara et al (1979) in their 'Enumeration of Flowering Plants of Nepal, described 8 species from Nepal.

Polhill and Geesink's (1981) exhaustive treatment of the sub-family Papilionoideae in 'Advances in Legume Systematics' keeps only *Dalbergia* and *Pterocarpus* in the tribe Dalbergieae. The remaining genera *Derris* and *Pongamia* are assigned to tribe Tephrosieae while the genus *Euchresta* is placed in the tribe Euchrestae. The genus *Dalbergia* according to them is pantropical with about 100 species occurring both in old and new world.

Correct interpretation of few species of *Dalbergia*, described by Rheede in 'Hortus Indicus Malabaricus' (1686-88) were given by Thothathri in 1981. This was followed by the addition of one more new species (*Dalbergia beddomei* from Kerala in 1983. He discussed (1983, 1984) on the distribution of *Dalbergia pseudo-sisoo* Miq. and *D. mimosoides* Franch.

In 1985, Thothathri, proposed a new series 'Pinnatae' in the genus and discussed about the taxonomic status of *Ecastaphyllum* P. Br. In the same paper he effected changes in the status and consequently nomenclature of 9 taxa, and discussed on the distribution of *Dalbergia melanoxydon*, *D. sericea* G. Don and *D. sissoo* Roxb. The pod characters of *Dalbergia burmanica* Prain, *D. congesta* Grah. ex Wt. & Arn. and *D. lacei* Prain were furnished for the first time. The tribe Dalbergieae and the asiatic genera were critically reviewed for their taxonomic status and systematic position by Thothathri in 1986.

DALBERGIA Linn. f. (nom. gen. conserv.)

Dalbergia Linn. f. *Suppl. Pl. Syst. Veg.* 52. 1781 ; *Juss. Gen. Pl.* 362. 1799 ; *Lam. Encycl. Meth.* 2 : 255. 1790 et *Illust. Gen.* 2 : t. 601. 1796 ; *Roxb. Pl. Corom.* 2 : 7. 1798 ; *Willd. Sp. Pl.* 3 : 902. 1800 ; *Pers. Syn. Pl.* 276. 1807 ; *Roxb. Hort. Beng.* 53. 1814 ; *Roth. Nov. Sp. Pl.* 332. 1821 ; *DC. Mem. Des Legum.* 385. 1825 et *Prodr.* 2 : 416. 1825 ; *Spr. Syst. Veg.* 3 : 123. 1826 ; *Guill. Perr. & Rich. Fl. Senegamb.* 227. 1830-33 ; *Roxb. Fl. Ind.* 3 : 220. 1832 ; *Wight et Arn. Prodr. Fl. Pen. Ind. Or.* 1 : 264. 1834 ; *Lindl. Nat. Syst.* 156. 1836 ; *Grah. Cat. Pl. Bombay* 55. 1839 ; *Endlicher, Gen. Pl.* 1304. 1840 ; *Walp. Repert. Bot. Syst.* 1 : 799. 1842 ; *Voigt. Hort. Suburb. Calcutt.* 240. 1845 ; *Benth. in Miq. Pl. Jungh* 1 : 254. 1852 ; *Lindl. Veg. Kingdom* 555. 1853 ; *Miq. Fl. Ind. Bat.* 1 : 126. 1855 ; *Thwaites, Enum. Pl. Zeyl.* 2 : 93. 1859 ; *Benth. in Journ. Linn. Soc.* 4 (Suppl.) : 28. 1860 ; *Dalz. et Gibs. Bombay Fl.* 77. 1861 ; *Benth. in Mart. Fl. Brazil* 15(1) : 217. 1862 ; *Benth. et Hook. f. Gen. Pl.* 1 : 544. 1865 ; *Baker in Oliver Fl. Trop. Afr.* 2 : 231. 1871 ; *Bedd. Fl. Sylvat.* 2 : 88. 1871 ; *Brandis, For. Fl.* 147. 1874 ; *Kurz in Journ. Asiat. Soc. Beng.* 45 : 128. 1876 ; *Baker in Hook. f. Fl. Brit. India* 2 : 230. 1876 ; *Kurz, l.c.* 278. 1877 et *For. Fl. Brit. Burma* 1 : 341. 1877 ; *Watt, Dict. Econ. Prod.* 3 : 5. 1890 ; *Taubert in Engl. & Prantl, Die. Nat. Pfl. fam.* 3(3) : 333. 1894 ; *Trim. Fl. Ceyl.* 2 : 88. 1894 ; *Prain in Journ. Asiat. Soc. Beng.* 66. 112, 442. 1897 et *Rec. bot. Surv. India* 1 : 240. 1898 ; *Kanjilal. For. Fl. N. W. Prov.* 128. 1901 ; *Prain l.c.* 70 : 39. 1901 ; *Cooke, Fl. Pres. Bombay* 1(2) : 394. 1902 ; *Talbot. Tr. Shr. Clim. Bombay Pres.* 135. 1902 (ed. 2) ; *Prain, Beng. Pl.* 1 : 409. 1903 et in *Rec. bot. Surv. India* 2 : 300. 1903 ; *Duthie, Fl. Upp. Gang. Pl.* 1(1) : 263. 1903 ; *Prain in Ann. Roy. bot. Gdn.* 10(1) : 25. 1904 ; *Gage in Rec. bot. Surv. India* 3 : 48. 1904 ; *Prain. Ibid.* 200. 1904 ; *Brandis, Indian Tr.* 232. 1907 ; *Bourdillon, For. Tr. Travancore* 132. 1208 ; *Talbot, For. Fl. Bombay Pres. Sind* 1 : 422. 1909 ; *Merr. in Philip. Journ. Sci.* 5 : 95. 1910 ; *Haines, For. Fl. Chotanagpur* 334. 1910 ; *Ramarao, Flow. Pl. Travancore* 129. 1914 ; *Merr. Interpr. Rump. Herb. Amboin.* 270. 1917 ; *Parker, For. Fl. Punjab* 166. 1918 ; *Gamble, Fl. Pres. Madras* 2 : 379. 1918 ; *Haines, Bot. Bihar. Or.* 3 : 293. 1922 ; *Ridley, Fl. Malay Penin.* 1 : 588. 1922 ; *Pittier in Journ. Wash. Acad. Sci.* 12 : 54. 1922 ; *Parkinson, For. Fl. Andaman Isl.* 148. 1923 ; *Merr. Enum. Philip. Flow. Pl.* 2 : 294. 1923 ; *Cowan et al. Tr. North Beng.* 51. 1929 ; *Alston, Suppl. Trim. Fl. Ceyl.* 6 : 86. 1931 ; *Kanjilal et al. Fl. Assam* 2 : 98. 1938 ; *Benthall, Tr. Calcutta.* 152. 1946 ; *Wealth India* 3 : 3. 1952 ; *Hutch. et Dalz. Fl. West Trop. Afr.* 1 : 513. 1954 ; *Backer et Bakhuizen van Den Brink, Fl. Java* 1 : 613. 1963 ; *Hutch. Gen. Flow. Pl.* 1 : 389. 1964 ; *Engler, Syll. Pfl. fam.* 2 : 232. 1964 ; *Dwyer in Ann. Mus. Bot. Gard.* 52 : 4. 1965 ; *Ohashi in Hara's Fl. East Himalaya* 148. 1966 ; *Santapau in Rec. bot. Surv. India* 16(1) : 74. 1967 (ed. 3) ; *Thoth. in Indian For.* 96 : 15. 1970 et *Journ. Jap. Bot.* 46 : 73. 1971 ; *Gillett, Polhill and*

Verdcourt, Fl. Trop. East Africa 95. 1971 ; Thoth. in Reinwardtia 8 : 329. 1972 et Journ. Jap. Bot. 50 : 52. 1975 et Bull. bot. Surv. India 14 : 189. 1972 (1975) et Ceylon Journ. Sci. (Bio.) 12 : 47. 1976 ; Srivastava, Fl. Gorak. 95. 1976 ; Nasir & Ali, Fl. W. Pakist. 56. 1977 ; Oomachan, Fl. Bhopal 118. 1977 ; Saldanha & Nicolson, Fl. Hassan, Karnataka 245. 1978 ; Bhandari, Fl. Indian Desert 113. 1978 ; Shah, Fl. Gujarat Pt. II : 200. 1978 ; Raizada & Saxena, Fl. Muss. 1 : 166. 1978 ; Thoth. in Bull. Bot. Surv. India 17 ; 64. 1975 (1978) ; Naik, Fl. Osman. 112. 1979 ; Bennet, Fl. Howrah 168. 1979 ; Hara, Stearn & Williams Flow. Pl. Nep. 2 : 114. 1979 ; Thoth, in Taxon 30 : 43. 1981 ; Varma, Fl. Bhagal. 112. 1981 ; Deb, Fl. Tripura 156. 1981 ; Balakrishnan, Fl. Jowai 1 : 167. 1981 ; Manilal & Sivarjan, Fl. Calicut 82. 1982 ; Thoth. in Proc. Indian. Acad. Sci. (Pl. Sci.) ; Gunn, Nom. Leg. Gen. 79. 1983 ; Singh, Fl. Bans. 77. 1983 ; Thoth. in Journ. Bombay nat. Hist. Soc. 81 (1) : 238. 1984 ; Matthew, Fl. Tam Nad. Car. 3(1) : 381. 1983 ; Saldanha, Fl. Karnat. 1 : 443. 1984 ; Guhabakshi, Fl. Mursh. 104. 1984 ; Haridasan & Rao, Fl. Megh. 1 : 286. 1985 ; Thoth. in Bull. bot. Surv. India 25 : 869. 1983 (1985) et Bull. Bot. Surv. India 26 : 183. 1984 (1986).

Amerimnon P. Br. Hist. Jamaic. 288. 1756. *Ecastaphyllum* P. Br. Ibid. 299. 1756. *Pterocarpus* Berg. Vet. Acad. Handb. Stockh. 116. 1769 non Linn. *Acouroa* Aubl. Pl. Guian. 753. t. 301. 1775. *Drakensteinia* Neck. Elem. 3 : 33. 1790. *Endespermum* Bl. Cat. Gew. Buitenz. 23. 1823. *Sem-ionotis* Schott Wien. Zeitschr. 3 : 804. 1829. *Hecastophyllum* H.B. & K. Nov. Gen. et Sp. 6 : 387. 1834. *Miscolobium* Vog. Linnaea 11 : 200. 1837. *Triptolemea* Mart. Fl. 20 : 122. 1837. *Leiolobium* Benth. in Ann. Wien. Mus. 2 : 94. 1838. *Podiopetalum* Hochst. Fl. 24 : 657. 1841.

Trees or shrubs, the latter often climbing or straggling ; branches spreading, at times ending in spines or twisted or hooked. *Leaves* imparipinnate, alternate, stipulate ; leaflets 3 to many, rarely unifoliate, mostly alternate, rarely subopposite, petiolulate, exstipellate, entire, acute to retuse or emarginate at apex, rounded to cuneate at base, glabrous to puberulous or at times pubescent ; stipules ovate to subulate, mostly small, deciduous. *Inflorescence* axillary to terminal racemes or panicles or cymes. *Flowers* small, mostly white, rarely purple to violet, pedicellate ; bract small, often persistent, bracteoles 2, at the base of the calyxcup, often deciduous, glabrous to pubescent. *Calyx* campanulate, 5-toothed, teeth varying, lowest one longest and acute, laterals ovate-triangular, upper 2 rounded, often connate, cup glabrous to puberulous to pubescent without. *Corolla* papilionaceous, vexillum ovate, oblong or orbicular, clawed, glabrous ; wings distinctly clawed, oblong, cuneate to truncate at base, at times auriculate ; keels coherent at lower margin and connate at apex. *Stamens* 9-10, mono to diadelphous (5+5 or rarely 9+1) sheath when monadelphous.

hous split on the dorsal side ; filaments vary in length, free on their upper third or fourth ; anthers small, erect, didymous, dehiscence by special pores and rarely by longitudinal slites. *Ovary* linear to oblong, stipitate, glabrous to pubescent especially at sutures, style slender, incurved, stigma minute, terminal, ovules 1-few. *Pods* samaroid, indehiscent, oblong, ovate or at times falcate, rarely orbicular, stalked, usually flat, thin, at times thickened and reticulated against the seeds, neither winged nor margined, glabrous to puberulous to pubescent at times ; seeds reniform, plano-compressed, exalbuminous, radicle inflexed.

Type species : *Dalbergia lanceolaria* Linn. f. (Lectotype).

Distrib : A pantropical genus with 100 species in tropical Asia, Africa, America and Australia.

Typification : Linnaeus in the protologue (1781) for the genus *Dalbergia*, described the fruit as follows : 'Fructus pedicellatuc, nondehiscens, leguminosus membranaceo-compressus, seminiferus' and named 2 species, *D. lanceolaria* and *D. monetaria*, the former characterised by nondeishcent, lanceolate, samaroid fruits and the latter by dehiscent, ovate, nummiform fruits. Of the 2 species, *D. lanceolaria* fits more appropriately to the generic description especially the fruit which forms the most important taxonomic character of the genus. Hence it should become the lectotype of the genus. This was approved during the International botanical Congress, 1905, held in Vienna when the genus itself was conserved.

Validity of the Genus : It is worthwhile to point out that there existed 5 earlier names, prior to *Dalbergia* Linn. f. (1781). They were *Ecastaphyllum* P. Br. (1756), *Amerimnon* P. Br. (1756), *Salken* Adans (1763), *Solori* Adans (1763), *Pterocarpus* Berg. (1769) and *Acouroa* Aubl. in the chronological order.

The genus *Acouroa* Aubl. was erected exclusively for species with nummular pods in which case the earlier name *Ecastaphyllum* would be most proper one for such species. The generic name *Pterocarpus* Berg. can never be used due to the existence of earlier homonyms, *Pterocarpus* Linn. (1747, 1763), the one having been reduced to a taxonomic synonym of *Derris* Lour. and the other recognised as valid name for the present day species of *Pterocarpus*. The names *Salken* and *Solori* of Adanson, though by mistake recognised by Kuntze (1891) were actually founded on 2 well known species of *Derris* Lour., namely *D. scandens* Benth. and *D. trifoliata* Lour. Both the names were, therefore, reduced to synonyms of *Derris*.

Thus are left with only 2 names, *Ecastaphyllum* and *Amerimnon* for consideration. Browne (1756) employed the former to include only species

with nummular pods, and the latter for species with samaroid pods. So long as this delimitation of pod character exists, the 2 names are perfectly valid. A critical evaluation of the fruit characters in comparison with other floral and vegetative characters revealed that the above principle of classification of species is purely artificial. On the other hand, Linnaeus erected *Dalbergia* to include species both with samaroid pods (*D. lanceolaria*) and nummular pods (*D. monetaria*). The name *Dalbergia* therefore seems to be the most appropriate and legitimate one. With these in view it was conserved at the International Botanical Congress (1905), held in Vienna with *D. lanceolaria* as the lectotype.

Distribution Pattern : The pattern of distribution among the 45 species in the areas under study is worth mentioning. 5 species have a wide range of distribution in Asia, Malaysia and China. For instance, *D. candanensis* and *D. pinnata* occur in Asia, Malaysia and China while *D. stipulacea* and *D. rimosa* are fairly common to Asia, Indo-China and China except Malaysia. *D. lanceolaria* is again well distributed in India, Sri Lanka, Burma and Indo-China. 12 species have distribution in 2 or 3 countries as follows : *D. pseudo-sisso* and *D. sissooides* in India, Sri Lanka and Malaya while *D. spinosa* and *D. velutina* are common to India, Burma Pakistan, Bangladesh and Malaya. *D. volubilis* is another species, found in India, Sri Lanka, Burma and Bangladesh. *D. reniformis* and *D. millettii* var. *mimosoides* are Indo-Burmese and Indo-Chinese respectively while *D. confertiflora* is an Indo-Bangladesh species. *D. kingiana*, *D. cultrata* and *D. yunnanensis* var. *collettii* are Burmo-Chinese while *D. parviflora* is Burmo-Malayan in character. The present work has revealed the occurrence of *D. ecastaphylla*, an American species in India and thus extended its range of distribution to the old world. *D. melanoxyton* is another African species, found fairly common in Western India. *D. sissoo* is the only species, extensively cultivated in Burma and Malaya whereas it occurs wild in India, Afghanistan and Baluchistan.

Of the remaining 25 species 15 are native of India proper such as *D. bhutunica*, *D. clarkei*, *D. congesta*, *D. coromandeliana*, *D. duarensis*, *D. gardneriana*, *D. horrida*, *D. latifolia*, *D. malabarica*, *D. rubiginosa*, *D. sericea*, *D. thomsonii*, *D. tinnivelliensis*, *D. travancorica* and *D. wattii* respectively. Among them *D. congesta* and *D. gardneriana* are endemic to Nilgiris while *D. wattii* is another endemic species of Manipur. 10 species are strictly confined to Burma as follows : *D. burmanica*, *D. cana*, *D. kurzii*, *D. lacei*, *D. oliveri*, *D. ovata*, *D. obtusifolia*, *D. peguensis*, *D. prainii* and *D. pseudo-ovata*. *D. burmanica* and *D. lacei* represent endemic species of Burma. It is interesting to point out that there is not a single species either native or endemic to either Sri Lanka or Pakistan or Bangladesh. Further details are provided in Tables I & II and Maps 1-19.

Cytology : The genus *Dalbergia* has not been cytologically fully investigated except for a few stray counts of chromosome numbers during the somatic and meiotic stages. The genus is characterised by $x=10$ chromosomes (Darlington and Wylie, 1956 ; Atchison, 1951). Somatic or diploid number for species like *D. lanceolaria* Linn. f., *D. latifolia* Roxb., and *D. melanoxyton* Guill. & Perr. have been determined to be 20 (Atchison, 1951). The 'n' chromosome of *D. spinosa* Roxb. has been reported by Mallick and Ghosh to be 10 (Askell Love, 1968). Similarly 'n' chromosome of *D. assamica* Benth., *D. cultrata* Grah. ex Benth. and *D. stipulacea* Roxb. were studied and reported to be 10 by Mehra and Hans (Askell Love, 1969).

Palynology : All the species of this genus are characterised by 3-zonicolporate grains. On the basis of exine pattern, two types can be distinguished as follows : 1. *Crotalaria albida* type wherein grains are fairly reticulate, variable in size, and nexine thinner than sexine. Such pollen have been observed in *D. volubilis* Roxb. and *D. sympathetica* Nimmo. 2. *Lathyrus pratensis* type wherein grains are psilate. Species of this category are *D. latifolia* Roxb., *D. lanceolaria* Linn. f. and *D. sissoo* Roxb. ex DC.

Pollen grains of *D. volubilis* Roxb., *D. sissoo* Roxb. ex DC., *D. latifolia* Roxb. and *D. lanceolaria* Linn. f. are subprolate in shape while it is prolate-spherical in *D. sympathetica* Nimmo (Vishnu Mittre and Sharma, 1962).

Embryology : Embryological studies on this genus are very scanty. The haustorium and endosperm development in *Dalbergia sissoo* Roxb. has been worked out, the former by Johri and Garg (1959) and the latter by Rau (1953). The haustorium is a prominent sac like structure which gradually merges into the endosperm proper. It degenerates after the early globular stage of the proembryo and during the short period of its activity it consumes most of the nucellus. The remains of the degenerated haustorium persists through the heart-shaped or even the early dicotyledonous stage of the embryo but eventually becomes indistinguishable.

During the endosperm formation the nucellar cells at chalazal end are much enlarged which are however crushed on account of encroachment by embryo sac. The endosperm is free nuclear at first but later on, cell formation takes place, filling the entire cavity of the seed with this tissue. The remains of the nucellus can be recognized at the chalaza but some of the nucellar cells at base as also some chalazal cells become very thick-walled to form the barrier tissue. The food reserve is mostly protein but oil is also present.

Table 1 : Distribution Pattern of Asiatic Species of Dalbergia

Species	India	Sri Lanka	Burma	Pakistan	Bengla- desh	Malaysia	Viet- nam	China	Remarks
<i>Dalbergia burmanica</i>	--	--	×	--	--	--	--	--	An endemic species to Burma; its reported occurrence from China by Prain is wrong
<i>D. bhutanica</i>	×	--	--	--	--	--	--	--	So far reported from Bhutan only.
<i>D. cana</i>	--	--	×	--	--	--	--	--	Widely distributed species. So far reported from Assam only.
<i>D. candenatensis</i>	×	×	×	--	×	×	×	×	
<i>D. clarkei</i>	×	--	--	--	--	--	--	--	
<i>D. confertiflora</i>	×	--	--	--	×	--	--	--	An endemic species to Western India.
<i>D. congesia</i>	×	--	--	--	--	--	--	--	
<i>D. coromandeliana</i>	×	--	--	--	--	--	--	--	A species confined to South India.
<i>D. cultrata</i>	--	--	×	--	--	--	--	×	So far known from North Bengal, India.
<i>D. duarensis</i>	--	--	--	--	--	--	--	--	
<i>D. ecastaphylla</i>	×	--	--	--	--	--	--	--	A native of tropical and Central America and also from West Africa; a new record for Asia.
<i>D. gardneriana</i>	×	--	--	--	--	--	--	--	An endemic species to Western India.
<i>D. horrida</i>	×	--	--	--	--	--	--	×	A species confined to Western India.
<i>D. kingiana</i>	--	--	×	--	--	--	--	--	

<i>D. kurzii</i>	—	—	×	—	—	—	—	—	A species confined to Burma only.
<i>D. lacei</i>	—	—	×	—	—	—	—	—	An endemic species to Burma.
<i>D. lanceolaria</i>	×	×	×	×	—	—	×	—	A common species.
<i>D. latifolia</i>	×	—	—	—	—	—	—	—	A common species.
<i>D. malabarica</i>	×	—	—	—	—	—	—	—	A species confined to Western India.
<i>D. melanoxylon</i>	×	—	—	—	—	—	—	—	A native of Africa but introduced in the area under study.
<i>D. millettii</i> var. <i>mimosoides</i>	×	—	—	—	—	—	—	×	
<i>D. oliveri</i>	—	—	×	—	—	—	—	—	Its occurrence in Thailand as reported by Prain is doubtful.
<i>D. ovata</i>	—	—	×	—	—	—	×	—	Does not occur in China as reported by Prain.
<i>D. obtusifolia</i>	—	—	×	—	—	—	—	—	
<i>D. parviflora</i>	—	—	×	—	—	×	—	—	
<i>D. peguensis</i>	—	—	×	—	—	—	—	—	Reported so far from Burma only.
<i>D. pinnata</i>	×	—	×	—	×	×	×	×	Widely distributed species in Asia.
<i>D. prainii</i>	—	—	×	—	—	—	—	—	So far reported from Burma only.
<i>D. pseudo-ovata</i>	—	—	×	—	—	—	—	—	So far reported from Burma only.
<i>D. pseudo-sissoo</i>	×	×	—	—	—	×	—	—	
<i>D. reniformis</i>	×	—	×	—	—	—	—	—	
<i>D. rimosa</i>	×	—	×	—	—	—	×	×	
<i>D. rubiginosa</i>	×	—	—	—	—	—	—	—	
<i>D. sericea</i>	×	—	—	—	—	—	—	—	A species confined to Eastern and North Western Himalayas.

<i>D. sissoo</i>	×	—	—	—	—	—	—	—	
<i>D. sissoides</i>	×	—	—	—	—	×	—	—	
<i>D. spinosa</i>	×	—	×	—	×	×	—	—	
<i>D. stipulacea</i>	×	—	×	—	×	—	×	×	Widely distributed species.
<i>D. thomsonii</i>	×	—	—	—	—	—	—	—	Confined to Eastern Himalayas.
<i>D. tinneveliense</i>	×	—	—	—	—	—	—	—	Reported so far from South India.
<i>D. travancorica</i>	×	—	—	—	—	—	—	—	So far reported from South India.
<i>D. velutina</i>	×	—	×	—	—	×	—	—	
<i>D. volubilis</i>	×	×	×	—	×	—	—	—	
<i>D. wattii</i>	×	—	—	—	—	—	—	—	An endemic species to Manipur, India.
<i>D. yunnanensis</i> var. <i>collettii</i>	—	—	×	—	—	—	—	×	A native of China.

Economic Importance : The genus is of economic importance as many of its species yield valuable timbers of commerce. The timber of *D. sissoo* is used for boat-building, carts, carriages and rail-sleepers. The Indian rose or black wood is derived from *D. latifolia* whose timber is greatly valued for fine furniture and cabinet works. *D. melanoxylon*, better known in commerce as African or Chinese black wood or Sudan ebony is another species whose timber is used for musical instruments and handles of surgical instruments. The hard-wood of *D. oliveri* is mainly employed for making propeller shafts and chisels. The plant parts of *D. lanceolaria* are of medicinal value and agricultural implements are made out of its timber. More details are given under each species.

Table : 2 Endemism in the Genus Dalbergia within the Area under Study

Area under Study	Total Number of Species	Number of Endemic Species	Percentage
India	31	3	Nearly 10%
Burma	23	2	Nearly 9%
Sri Lanka	4	nil	—
Pakistan	1	nil	—
Bangladesh	6	nil	—

SUBDIVISIONS OF THE GENUS

The genus *Dalbergia* Linn. f. is divisible into 4 sections, as follows :

Sect. 1 *Sissoa* Benth. emend. Thoth.

Sect. 2 *Dalbergia*

Sect. 3 *Selenobia* Benth.

Sect. 4 *Ecastaphylla* (P. Br.) Thoth. stat. nov.

KEY TO THE SECTIONS

- 1a. Stamens monadelphous ; vexillum erect ; pod thin to coriaceous Sect. *Sissoa* 1
- 1b. Stamens mono to diadelphous ; vexillum erect to reflexed ; pods coriaceous
- 2a. Stamens only diadelphous ; pods oblong to orbicular

- 3a. Leaf multifoliolate ; vexillum reflexed ; pods oblong Sect. *Dalbergia* 2
- 3b. Leaf mostly unifoliolate ; vexillum erect ; pods round to orbicular Sect. *Ecastaphylla* 3
- 2b. Stamens mono to diadelphous ; pods falcately oblong and at times lunar Sec. *Selenobia* 4

Section 1. *Sissoa* Benth. emend. Thoth.

Benth. in Journ. Linn. Soc. 4 (Suppl.) : 29. 1860 (as series) ; Benth. et Hook. f. Gen. Pl. 1 : 545. 1865 ; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876 (as subgenus); Taubert in Engl. & Prantl, Die Nat. Pflan. fam. 3 (3) : 335. 1894; Prain in Journ. Asiat. Soc. Beng. 66 : 114. 1897 et Ann. Roy. bot. Gard. 10 (1) : 25. 1904 (as subgenus proparte).

Endespermum Bl. Cat. Gew Buitenz. 23. 1823; Prain l. c. 19 (1) : 25. 1904 (as sect. proparte). *Podiopetalum* Hochst. Flora 24 : 657. 1841; Prain l. c. 10 (1) : 25. 1904 (as sect. proparte).

Leaflets 5-40, smaller to larger; vexillum erect; stamens monadelphous; style short, stout and cylindrical; pods thin to coriaceous.

Type D. Sissoo Roxb. ex DC.

The section is divisible into the following series : 1. *Ovatae* Prain emend. Thoth. 2. *Rimosae* Prain emend. Thoth. 3. *Congestae* Prain emend. Thoth. 4. *Pinnatae* Thoth.

KEY TO THE SERIES

- 1a. Leaflets 5-9, larger (3-19 × 3-11 cm)
 - 2a. Pods smooth but veined opposite the seeds Ser. *Ovatae* 1
 - 2b. Pods suberosely thickened and veined opposite the seeds Ser. *Rimosae* 2
- 1b. Leaflets 5-40, smaller (0.5-8 × 0.3-4 cm.)
 - 3a. Leaflets few, 5-11 ; inflorescence usually short and congested Ser. *Congestae* 3*
 - 3b. Leaflets many, 9-40 ; inflorescence usually longer and laxer Ser. *Pinnatae* 4

Ser. 1. *Ovatae* Prain in Ann. Roy. bot. Gard. 10 (1) : 29. 1904 emend. Thoth.

Mostly trees; leaflets mostly ovate, large; bracteoles obtuse; pods samaroid, ovato-oblong to oblong, smooth but veined opposite the seeds.

Lectotype : *D. ovata* Grah. ex Benth.

Ser. 2. *Rimose* Prain l. c. 26. 1904 emend. Thoth.

Scandent shrubs, often climbing; leaflets large; flowers smaller; pods oblong, suberosely thickened opposite the seeds.

Lectotype : *D. rimosa* Roxb.

Ser. 3. *Congestae* Prain l. c. 28. 1904 emend. Thoth.

Erect trees to climbers; leaflets medium sized; inflorescence short, axillary, congested raceme; pods samaroid, oblong.

Lectotype : *D. congesta* Grah. ex Wt. & Arn.

Ser. 4. *Pinnatae* Thoth. in Bull. Bot. Surv. India 25 : 170. 1984 (1985).

Mostly climbers or scandent shrubs, rarely trees; leaflets smaller and more in number; inflorescence longer and laxer; pods samaroid, ovato-oblong to oblong.

Type : *D. pinnata* (Lour.) Prain.

Section 2. *Dalbergia* Benth. emend. Thoth. Benth. in Journ. Linn. Soc. 4 (Suppl.) : 30. 1860 (as series); Benth. et Hook. f. Gen. Pl. 1 : 545. 1865; Baker in Hook. f. Fl. Brit. India 2 : 235. 1876 (as subgenus); Taubert in Engl. & Prantl, Die Nat. Pflanz. fam 3 (3) : 335. 1894; Prain in Journ. Asiat. Soc. Beng. 66 : 114. 1897 et Ann. Roy. bot. Gard. 10(1) : 25. 1904 (pro parte).

Amerimnon P. Br. Hist. Jamaic. 288. 1756; Prain l. c. 10 (1) : 25. 1904 (as subgenus pro parte).

Type : *D. lanceolaria* Linn. f.

The section is divisible into the following series 5. *Dalbergiae* 6. *Canae* Prain emend. Thoth. 7. *Stipulaceae* Prain emend. Thoth.

KEY TO THE SERIES

1a. Leaflets obtuse at apex

2a. Bracts and stipules not conspicuous, deciduous

2b. Bracts and stipules very conspicuous, persistent

1b. Leaflets acute to shortly acuminate at apex

Sec. *Dalbergiae* 5

Ser. *Stipulaceae* 7

Ser. *Canae* 6

Ser. 5. *Dalbergiae*

Mostly trees and rarely climbers ; leaflets obtuse ; stipules deciduous; flowers larger; pods narrowly oblong to lanceolate, 2-4-seeded.

Lectotype : *D. Lanceolaria* Linn. f.

Ser. 6. *Canae* Prain in Ann. Roy. bot. Gard. 10 (1) : 30. 1904 emend. Thoth.

Trees ; leaflets acute ; stipules deciduous ; pods oblong glabrous to pubescent.

Lectotype : *D. cana* Grah. ex Kurs

Ser. 7. *Stipulaceae* Prain l. c. 30. 1904 emend. Thoth.

Climbers to shrubs; bracts and stipules conspicuous, persistent ; pods oblong, thickened opposite the seeds.

Lectotype : *D. stipulacea* Roxb.

Section 3. *Selonolobia* Benth. in Journ. Linn. Soc. 4 (Suppl.) : 31. 1860 (as Ser.); Benth. et. Hook. f. Gen. Pl. 1 : 545. 1865 ; Baker in Hook. f. Fl. Brit. India 2 : 237 1876 (as subgenus) ; Taubert in Engl. & Prantl, Die Nat. Pflanz. fam. 3 (3) : 335. 1894 ; Prain in Journ. Asiat. Soc. Beng. 66 : 120. 1897.

Drepanacarpus Kurz in Journ. Asiat. Soc. Beng. 45 : 281. 1877 (non E. Mey).

Leaflets 5-11, medium sized; vexillum mostly erect ; stamens mono to rarely diadelphous; pods falcately oblong, lunar to reniform.

Lectotype : *D. candenatensis* (Dennst.) Prain

Section 4. *Ecastaphylla* (P. Br.) Thoth. in Bull. bot. Surv. India 25 : 169. 1983 (1985).

Ecastaphyllum P. Br. Hist. Jamaic. 288. 1756; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 50. 1860; Benth. et Hook. f. Gen. Pl. 1 : 545. 1865.

Leaf mostly unifoliolate, larger; inflorescence short, axillary, congested raceme; stamens diadelphous; pods rotund to orbicular.

Type : *D. Ecastaphylla* (Linn.) Taub.

KEY TO THE SPECIES

Sect. 1. *Sissoa*

Ser. 1. OVATAE

- 1a. Erect trees; leaflets 5-9
- 2a. Leaflets 5-7, mostly glabrous, rarely puberulous; rachis of leaf and inflorescence mostly glabrous, rarely brown silky
- 3a. Pods linear-oblong, strap-shaped *D. sissoo* 1
- 3b. Pods oblong to lanceolate, coriaceous
- 4a. Pods oblong; leaflets as well as rachis and petiolule glabrous
- 5a. Inflorescence axillary panicle, 3-11 cm long
- 6a. Leaflets orbicular to obovate, retuse to emarginate at apex; pods obtuse at apex *D. latifolia* 2
- 6b. Leaflets ovate to obovate, acute at apex; pods acute at apex with a longish apicule *D. sissoides* 3
- 5b. Inflorescence axillary and terminal panicles, much branched mostly 16-38 cm long
- 7a. Leaflets smaller, 6-13.4 × 3.5-6.4 cm, acuminate at apex *D. ovata* 4
- 7b. Leaflets larger, 6.5-18.5 × 4.5-10.5 cm, obtuse at apex *D. obtusifolia* 5
- 4b. Pods lanceolate, narrowed at both ends; leaflets brown puberulous below as well as that of rachis and petiolule *D. pseudo-ovata* 6
- 2b. Leaflets 7-9, puberulous below, rachis of leaf and inflorescence grey pubescent *D. lacel* 7
- 1b. Climbing shrubs, at times erect; leaflets mostly 3, rarely 5 *D. pseudo-sissoo* 8

Ser. 2. RIMOSAE

- 1a. Leaflets 7, puberulous beneath; rachis and branches of inflorescence glabrous; flowers smaller, 3-4 mm long *D. rimosa* 9
- 1b. Leaflets 7-9, glaucous beneath; rachis and branches of inflorescence rusty tomentose; flowers comparatively larger, 6 mm long *D. kingiana* 10

Ser. 3. CONGESTAE

- 1a. Mostly climbers, rarely scandent shrubs; flowers white; pods thin :
- 2a. Stipules larger, 7-9 mm long; bract and bracteoles distinct, 2-3 mm long, rusty pubescent, persistent even after fruiting *D. travancorica* 11
- 2b. Stipules, upto 7 mm long, bract and bracteoles upto 2 mm long
- 3a. Branches, leaflets, rachis of leaf and inflorescence pubescent; pods thin, samaroid, 3.5-4.5 cm long mostly 1-seeded
- 4a. Leaflets 7-11; panicles congested *D. gardneriana* 12
- 4b. Leaflets 5; panicles, lax *D. beddomei* 13
- 3b. Branches, leaflets, rachis of leaf and inflorescence puberulous to pubescent; pods 2.5-7.5; cm long, 1-2-seeded
- 5a. Bark rust coloured; leaflets 3-7, stipule ovate; inflorescence axillary raceme or panicle, 2-3 cm long; pods 2.5-5.7 cm long *D. rubiginosa* 14
- 5b. Bark not rust coloured; leaflets 5-11, stipule lanceolate; inflorescence axillary congested panicle, 2.0-5.2 cm long; pods 5.0-7.5 cm long *D. congesta* 15
- 1b. Erect trees; flowers pale-rose; pods coriaceous
- 5a. Leaflets 7-11, rachis and petiolule glabrous; pods oblong, 3.5-8 cm. long, 1-2 seeded, smooth against the seeds *D. cultrata* 16
- 5b. Leaflets 11, rachis and petiolule puberulous to pubescent; pods ovate, 3.8-4.7 cm. long, 1-seeded, reticulately veined against the seed *D. prainii* 17

Ser. 4. PINNATAB

1a. Climbers or stragglers

2a. Leaflets 9-20, larger, obovate to elliptic-oblong; pods up to 14 cm long

3a. Rachis of leaf and inflorescence rusty pubescent; leaflets rusty pubescent, stipule lanceolate

D. velutina 18

3b. Rachis of leaf and inflorescence mostly puberulous and at times pubescent; stipule ovate

4a. Pods oblong, 4-14 cm, 1-3-seeded, smooth against the seeds

5a. Branches armed with straight or hooked thorns; inflorescence axillary and terminal, much longer, 7.5-32.5 cm long, flowers almost sessile; pods glabrous

D. confertiflora 19

5b. Branches not armed with straight or hooked thorns; inflorescence short, axillary, 2.5-6.5 cm long, flowers pedicellate; pods puberulous

D. horrida 20

4b. Pods ovato-oblong, 6 cm long, 1-seeded, reticulately veined against the seed

D. yunnanensis var.
colletii 21

2b. Leaflets 15-40, smaller, linear-oblong to trapezoid-oblong; pods up to 8.5 cm long

6a. Leaflets elliptic to linear-oblong, petiolulate; pods ovato-oblong, thin to coriaceous

7a. Leaflets glabrous; pods thin, membranous, smooth over seed, 1-seeded

D. clarkei 22

7b. Leaflets pubescent; pods coriaceous, reticulated over seeds, 1-2-seeded

D. milletii var.
mimosoides 23

6b. Leaflets trapezoid-oblong, almost sessile; pods oblong, strap-shaped

8a. Rachis, leaflets and inflorescence puberulous; pods 3-8.5 cm long, 1-3-seeded

D. pinnata 24

8b. Rachis, leaflets and inflorescence densely rusty pubescent; pods 3-4.5 cm long, 1-seeded

D. malabarica 25

1b. Erect shrubs or trees

9a. Erect shrubs; leaflets 7-11; inflorescence 2-3.5 cm long

10a. Leaves longer, 4-9 cm long, leaflets smaller, 0.6-0.9 × 0.3-0.8 cm, glabrous beneath, pods ovato-oblong, 1.7-3.8 × 2.4-1.5 cm., reticulately veined against the seeds

D. coromandeliana 26

10b. Leaves shorter, 3.5-4.5 cm long, leaflets larger, 1.0-1.3 × 0.5-0.8 cm, glaucous beneath; pods elliptic-oblong, 3-4 × 1.8-2 cm

D. tinneveli 27

9b. Erect trees; leaflets 9-15; inflorescence 3.5-17.5 cm long

11a. Leaflets obovate to ovato-oblong, 1-3 × 0.5-1.5 cm; inflorescence 6.5-17.5 cm long, flowers white; pods ovato-oblong, 3-4 × 1-1.3 cm

D. melanoxylo 28

11b. Leaflets oblong, 2.7-5 × 1.2-2 cm, unequal at base; inflorescence 3.5-7 cm long, rachis and branches pubescent, flowers purple; pods narrowly oblong, 5-6.5 × 1.2-1.4 cm

D. burmanica 29

Sect. 2. Dalbergia

Ser. 5. DALBERGIAE

1a. Erect trees

2a. Tall, spreading trees, 15-25 m high; leaf 10-26 cm long, leaflets 7-17; pods oblong, longer, 4-15 cm long

3a. Petiolules 2-7 mm long; keels equal or slightly shorter than wings; pods 5-15 cm long

4a. Leaflets 9-15, at times glaucous beneath; inflorescence 10-15 cm long, flowers white; pods thickened but smooth against the seeds

D. oliveri 30

4b. Leaflets 7-17; inflorescence 5-20 cm long, flowers pinkish to bluish white; pods reticulately veined against the seeds

D. lanceolaria 31

3b. Petiolules 6-9 mm long; keels much shorter than wings; pods 4-8 cm long

D. pegneusis 32

2b. Medium sized trees; leaf 17-40 cm long, leaflets 13-27; pods oblong to linear-oblong, shorter, 2.5-6 cm long

- 5a. Leaf 34-40 cm long, leaflets 23-27, oblong, 6.5-9.2 × 2.2-2.5 cm; pods smooth against the seeds *D. bhutanica* 33
- 5b. Leaf 13-32 cm long leaflets 13-21, 3-5 × 1.2-3.5 cm; pods reticulately veined against the seeds
- 6a. Younger shoots, rachis, leaf and inflorescence glabrous; pods coriaceous *D. duarensis* 34
- 6b. Younger shoots, rachis, leaf and inflorescence silky pubescent; pods ligulate *D. sericea* 35
- 1b. Climbers or scandent shrubs
- 7a. Leaf 10-22 cm long; inflorescence terminal, copiously branched, 13.5-30 cm long, flowers blue to lilac, 6-8 mm long; pods longer, 5-9 cm long, coriaceous, 1-3-seeded *D. volubilis* 36
- 7b. Leaf 4-10.5 cm long; inflorescence terminal and axillary, 9-18 cm long, flowers white, small, 2-3 mm long, pods shorter, 6 cm long, strap-shaped, 1-seeded *D. thomsonii* 37

Ser. 6. CANAB

- 1a. Medium sized trees, 15-20 m high; leaves 16.5-43.5 cm long, leaflets 7-19, oblong to obovato-oblong; inflorescence 8-5-24 cm long; pods 6.5-13.5 × 1.2-3.5 cm
- 2a. Leaflets 14-19, oblong, puberulous beneath, inflorescence 8.5-12.5 cm long; pods finely velvety *D. cana* 38
- 2b. Leaflets 7-11, obovato-oblong, cuneate at base, glabrous beneath, inflorescence 12-24 cm long; pods glabrous *D. kurzii* 39
- 1b. Small trees, 10 m high; leaves 12.5-17 cm long, leaflets 9-11, lanceolate, involute at margin; inflorescence 3.5-5.5 cm long; pods 6-7 × 1.6-1.7 cm *D. wattii* 40

Ser. 7. STIPULACEAE

Small trees or scandent shrubs; stipules prominent, ovato-lanceolate; inflorescence conspicuous by prominent obovate, empty bracts; flowers pale blue

C. stipulacea 41

Sect. 3. Selenolobis

- 1a. Climbers
- 2a. Unarmed climbers with or without branches modified into hooks; stamens monadelphous

- 3a. Leaflets 5, obovate; flowers 3-6 mm long; pods falcately curved, flat, 1-seeded *D. candenatensis* 42
- 3b. Leaflets 5-9, ovate to ovato-lanceolate; flowers smaller, 3-3.5 mm. long; pods curved, turgid, 1-3-seeded *D. parviflora* 43
- 2b. Armed climbers with branches modified into spines; stamens isodiadelphous *D. spinosa* 44
- 1b. Erect trees *D. reniformis* 45

Sect. 4. *Ecastaphylla*

- Leaf unifoliolate, leaflets ovato-oblong to oblong; inflorescence axillary, congested raceme; stamens diadelphous *D. ecastaphylla* 46

1. *Dalbergia sissoo* Roxb. (Hort. Beng. 53. 1814, nomen) ex DC. Prodr. 2: 416. 1825; Roxb. Fl. Ind. 3: 323. 1832; Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 264. 1834; Grah. Cat. Pl. Bombay 55. 1838; Voigt, Hort. Suburb. Calcutt. 241. 1845; Benth. in Miq: Pl. Jungh. 1: 254. 1852 et Journ. Linn. Soc. 4 (Suppl.): 40. 1860; Dalz. et Gibs. Bombay Fl. (Suppl.) 24. 1861; Bedd. Fl. Sylvat. t. 25. 1869; Stewart, Punjab Fl. 65. 1869; Brand. For. Fl. 149. 1874; Baker in Hook. f. Fl. Brit. India 2: 231. 1876; Gamble, Manual Ind. Timb. 124. 1881; Watt, Dict. Econ. Prod. India 3:13. 1890; Talbot, Bombay List 74. 1894; Gamble, List Tr. Shr. Climb. Darjeeling Dist. 28. 1896; Woodr. in Journ. Bombay nat. Hist. Soc. 11: 426. 1897; Prain in Journ. Asiat. Soc. Beng. 70(2): 40. 1901; Kanjilal, For. Fl. Sch. Cir. N.W. Prov. 128. 1901; Cooke, Fl. Pres. Bombay 1(2): 395. 1902; Talbot, Tr. Shr. Woody Climb. Bombay Pres. 136. 1902 (ed. 2); Duthie, Fl. Upper Gang. Pl. 1(1): 264. 1903; Prain, Beng. Pl. 1: 411. 1903 et in Ann. Roy. bot. Gard. 10(1): 57. 1904; Brandis, Indian Tr. 233. 1907 (ed. 2); Talbot, For. Fl. Bombay Pres. Sind 1: 422. 1909; Burkill in Rec. bot. Surv. India 4: 106. 1910; Haines, For. Fl. Chotanagpur 355. 1910; Bamber, Pl. Punjab. 24. 1916; Witt, Tr. Shr. Climb. Econ. Herb. North & Berar For. Circles Centr. Prov. 82. 1916; Gamble, Fl. Pres. Madras 2: 384. 1918; Parker, For. Fl. Punjab 166. 1918; Collett, Fl. Simlensis 146. 1921; Troup, Silvicult. Indian Tr. 1: 294. 1921; Haines, Bot. Bihar. Or. 3: 293. 1922; Heinig, List Pl. Chittagong 21. 1925; Cowan A.M. et J.M., Tr. North Bengal 51. 1929; Kanjilal U.N. et al. Fl. Assam 2: 100. 1938; Biswas, in Indian For. Rec. (N.S.) 3: 16. 1941; Benthall, Tr. Cal. 152. 1946; Wealth Ind. 3:7. 1952; Bor, Man. Indian For. Bot. 88. 1953; Hutch. et Dalz. Fl. Trop. W. Afr. 1: 515. 1954 (ed. 2); Rao in Bull. bot Surv. India 2: 399. 1961; Deb Ibid. 3: 266. 1962; Santapau, Fl. Saurashtra 1: 179. 1962; Nair et Malhotra in Bull. bot. Surv. India 3: 143. 1962; Backer et Bakhuizen van

den Brink, Fl. Java 1 : 615. 1963 ; Maheshwari, Fl. Delhi 135. 1963; Joseph in Bull. bot. Surv. India 5 : 287. 1964 ; Maheshwari, Ibid. 5 : 125. 1964 ; Hiroyoshi Ohashi in Hara's Fl. East Himalaya 148. 1966 ; Thoth. et al in Bull. bot. Surv. India 8 : 136. 1967 ; A.S. Rao et al. Ibid. 9 : 101. 1968; Singh et al. Ibid. 11 : 3, 8. 1969 (1971) ; Bhatt et al. Ibid 11 : 312, 314. 1969 (1971) ; Kausik, Ibid 11 : 52. 1969 (1971) ; Panigrabi et al. Ibid 11 : 92, 95. 1969 (1971) ; Rao et Verma, Ibid. 11 : 407. 1969 (1971) ; Mishra, Ibid. 11 : 324. 1969 (1971) ; Thaker et al. Ibid. 12. 117. 1970. (1972) ; Malhotra et al. Ibid. 13 : 299. 1971 (1973) ; Mazumdar, Ibid. 13 : 126. 1971 (1973) ; Saxena, Ibid. 13 : 81. 1971 (1973) ; Thoth. in Rec. bot. Surv. India 20(2) : 71. 1973 ; Singh et Dixit in Bull. bot. Surv. India 14 : 47, 61. 1972 (1975) ; Ohashi, Fl. East. Himal. (3rd Rep.) 62. 1975 ; Srivatsva, Fl. Gorak. 95. 1976 ; Oomachan, Fl. Bhopal 119. 1977 ; Nasir & Ali, Fl. W. Pak. 100 : 56. 1977 ; Jain et Hazra in Bull. bot. Surv. India 17 : 82. 1975 (1978) ; Shah, Fl. Gujarat 2 : 202. 1978 ; Saldanha and Nicolson, Fl. Hassan, Karnat. 246. 1978 ; Bhandari, Fl. Indian Desert 113. 1978 ; Raizada & Saxena, Fl. Muss. 1 : 166. 1978 ; Naik, Fl. Osman. 112. 1979 ; Bennet, Fl. Howrah 169. 1979 ; Hara, Stearn and Williams, Flow. Pl. Nepal 2 : 115. 1979 ; Dawre et al. in Bull. bot. Surv. India 21 : 130. 1979 (1981) ; Deb, Fl. Tripura 156. 1981 ; Varma, Fl. Bhagalpur 112. 1981 ; Rao et Razi, Fl. Mysore 433 1981 ; Sen et al. in Bull. bot. Surv. India 22 : 169. 1980 (1982) ; Bir & Kumari, Ibid. 22 : 46. 1980 (1982) ; Singh, Fl. Bans. 77. 1983 ; Shetty & Pandey, Fl. Tonk 57. 1983 ; Nair and Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983 ; Mathew, Fl. Tam. Nad. Car. 3(1) : 386. 1983 ; Sharma et al. Fl. Karnat. Analysis 70. 1984 ; Chowdhary & Wadhwa, Fl. Himachal Prad. 1 : 198. 1984 ; Naithani, Fl. Chamoli 154. 1984 ; Mukerjee, Fl. Pach. & Bori 82. 1984 ; Saldanha, Fl. Karnat. 1 : 466. 1984 ; Haridasan & Rao, For. Fl. Megh. 288. 1985 ; Verma et al. Fl. Rajpur Durg & Rajnand. 98. 1985 ; Rao, Fl. Goa, Diu Dam. Dad. & Nagar. 1 : 112. 1985 ; Thoth. in Bull bot. Surv. India 25 : 172. 1983 (1985).

Amerimnon sissoo (Roxb.) O. Ktze. Rev. Gen. Pl. 1 : 159. 1891.

Deciduous trees, 10-30 m tall, trunk 2-4 m in girth at base ; bark grey to pale brown, flaking in narrow longitudinal strips ; younger shoots tomentose ; branches spreading. *Leaves* imparipinnate, alternate, 8.0-5.5 cm long, main rachis zig zag, at times puberulous to pubescent when young : leaflets usually 5, at times 3, rarely 4, alternate, suborbicular, obcordate, broadly ovate to obliquely ovate, 3.9-9 × 3-7 cm, conspicuously and abruptly cuspidate at apex, rarely obtusely acute or obtuse (Bombay—*Fernandez*), narrow to rounded at base, entire, coriaceous, puberulous to pubescent when young, glabrous when old, distal leaflets always larger, lateral veins 8-12 pairs ; petiolules 3-7 mm long, pubescent at first, glabrous later, stipels absent. *Inflorescence* axillary

panicle composed of several short, subsecund branches, rachis and branches pubescent, 3.5-7.0 cm long. *Flowers* yellowish white, 7-9 mm long, sessile to shortly pedicellate at times; bracts present, bracteoles 2, oblong, 2 mm long, puberulous to pubescent, caducous. *Calyx* campanulate, 4.5-6.0 mm long, puberulous to pubescent without, segments 5, oblong, ciliate, two upper ones rounded, three lower acute with the middle one longest. *Corolla* vexillum suborbicular, emarginate, 7-8 mm long, narrowed at base into a long claw, emarginate at apex; wings and keels oblong, distinctly clawed. *Stamens* 9, monadelphous, staminal sheath 5.5-7 mm long, split open dorsally, anthers 2 celled. *Ovary* oblong, 4-8 mm long, stipitate, puberulous to pubescent, style short, stigma capitate, ovules 5-6. *Pod* linear-oblong, strap-shaped, indehiscent, 4.8-9.7 × 9.7-1.3 cm, stipitate, glabrous, acute at apex, rounded at times, mucronulate, base narrow, distinctly reticulated against the seeds, usually 1-3-seeded, rarely up to 4-seeded (Kumaon *Gill*); *seed* reniform, brown to brownish black, 8.0-9.5 × 4.0-5.5 mm, compressed.

Type : East India *Roxburgh* s.n. (Holotype, K).

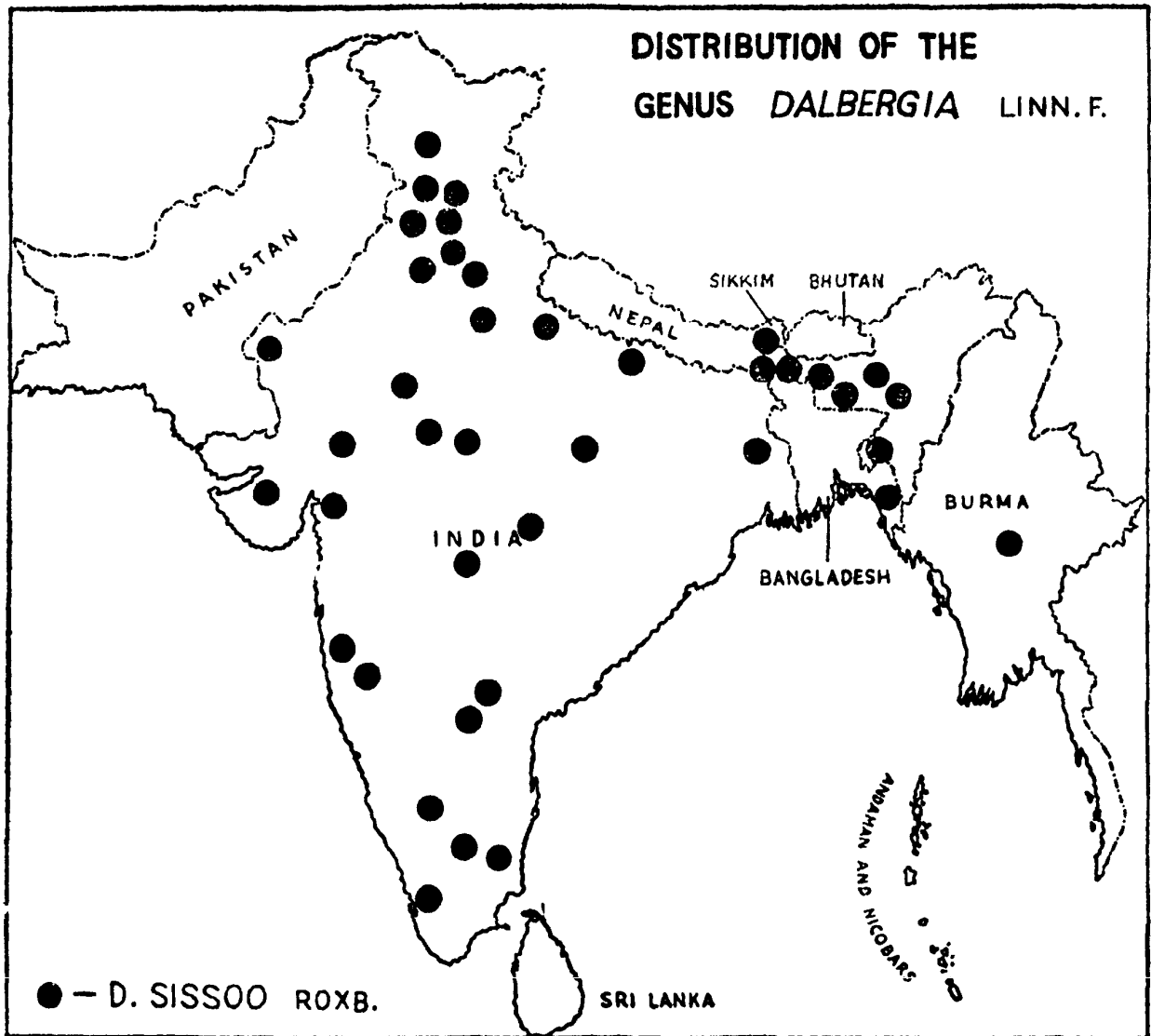
Flower : March to June. *Fruit* : November to February.

Distribution : INDIA (Assam, W. Bengal, Bihar, Madhya Pradesh, Eastern Himalayas, Gujarat, Maharashtra, North West Himalayas, Panjab, Rajasthan, Southern and Western India), BANGLADESH, BURMA, BALUCHISTAN, AFGHANISTAN AND MALAYSIA (cultivated). (Map-1.)

Specimens examined :

Assam : Kamrup, Mothanguri, Jul. 1959 *R.S. Rao* 10040 (ASSAM) ; Gauhati, Jan. 1937 *Deka* 23051 (ASSAM) ; without definite locality (Kamrup) *Rep. Econ. Prod.* 16633 (ISIM) ; Goalpara, 1914 *U. Kanjilal* 6909 (ASSAM) ; Howbari village, Kokrajhar, Mar. 1972 - *Deka* 51213 (ASSAM) ; Holtugaun, Mar. 1936 - *Dinaa Nath* 12998 (ASSAM) ; in plains *G. Mann* 36 (ASSAM) ; Phulani, Mikir hills, Jun. 1963 - *Deb* 35396 (ASSAM) ; North Lakhimpur, Mar. 1962 - *Panigrahi* 27764 (ASSAM) ; Doboka, 150 m, Nowgong district, Aug. 1964 *Balakrishnan* 39470 (ASSAM) ; Nowgong, Mar. 1885 *Clarke* 37633A (LE) ; Kulsı plantation *G. Mann* s.n. (ASSAM) ; Dalgaon to Orang R. F., July 1958, *Panigrahi* 14290 (ASSAM) ; Koihugaun, Feb. 1934 *Deka* 13104 (ASSAM) ; Darrang district (without definite locality), 50 m, May 1916, *U. Kanjilal* 6927 (ASSAM) ; without definite locality (ASSAM) - *Jenkins* s.n. (CAL) ; Tipperah hill, 150-300 m, Agartala *Debbarmann* 1034 (CAL) ; East India *Ritchie* s.n. (Herb. Hort. Bot. Edin.) (LE).

West Bengal : Jantia, Jalpaiguri district, May 1949 - *Narayanaswami* 2981 (CAL) ; Buxa duars *Rep. Econ. Prod.* s.n. (ISIM) ; Bengal (without definite locality) - *Kurz* s.n. (CAL) ; Krishnanagar, Nadia district, Jan. 1884 - *Clarke* 34508D (LE).



Map-1

Bihar : Udaipur, Champaran district, Apr. 1960 *Ramam*. 821 (BSA); Sone Bridge, Koilwar, Mar. 1956 - *Saran & Party* 25953 (LWG); Udaipur forests, Champaran district, Apr. 1963 *Thothathri* 9935 (CAL); Canary Prills, Hazaribagh district *R.N. Banerjee* 3204 (CAL).

Madhya Pradesh : Mandla, 1000 m, Feb. 1961 *Joseph* 12273 (BSA, MH); Ratlam, Aug. 1964 *Arora* 5651 (BSA); Rewa, Feb. 1963 *Panigrahi* 6163 (BSA); Bichiya river, 400 m, Sept. 1959 *Sebastine* 8745 (MH); Rewa town, 400 m, Apr. 1960 - *Sebastine* 1001 (MH); Majhauili, Sidhi district, Jul. 1968 *Sen Gupta* 12920 (BSA); Gwalior, Nov. 1890 *Maries* 270 (CAL); Kashengarh, Jaipur - Collector? (ISIM); Agar Sarangpur road, Jul. 1960 *Wadhwa* 59625 (BSI); Parora, Sept. 1957 *Puri* 27407 (BSI); Banglapore, Hoshangabad district, May 1961 *Joseph* 12496 (MH); Dharmpeth, Nagpur (cultivated), March 1959 - Mirashi 501 (BLAT); Shivapuri National Park, (Planted) Aug. 1972 *Panigrahi* 17094 (BSA); Sidhi, Jan. 1971 *Sengupta* 14307 (BSA); Satna, Sept. 1974 *Mamgain* 20849 (BSA); Rajnandgaon, Nagpur road, Aug. 1974 & Sept. 1976, *Pant* 20408, 25388 (BSA); Raipur, Jun. 1972 & Aug. 1976 *Verma* 177726, 24904 (BSA), Ambikapur, Mar. 1974, *Sengupta* 19944 (BSA); Seoni, Mar. 1975 & Mar. 1978 - *Banerjee* 22298 & 28587 (BSA); Bilaspur, July 1973 *Murti* 19370 (BSA) Raigarh, Mar. 1976 & Sept. 1974 *Radha Krishnan* 24366 & 21152 (BSA); Raigarh Nov. 1971 - *Sengupta* 16206 (BSA); Durg, Apr. 1974 & Aug. 1978 *Pant* 20144 & 29294 (BSA); Balaghat, Oct. 1973 - *Nair* 18575 (BSA); Damoh, Aug. 1978 & Apr. 1980 *Shukla* 28722 & 30211 (BSA); Chattarpur, Feb. 1282 - *Bhaskar Dutt* 32731 (BSA).

Eastern Himalayas : Sikkim, Narchu river, Jan. 1900 - *Kari* s.n. (CAL); Without definite locality (Sikkim), 330 m *Hooker* s.n. (CAL. KW); Siereke, Darjeeling Terai, Jul. 1874 *Gamble* 2200 C (CAL); Terai, 1916 *Modder* 312 K (CAL).

Gujarat : Harni pond, Baroda, Apr. 1255 - *Shah* 4014, 4016 (BLAT); Shatrunja hills, Palitana, Aug. 1960 *Seshagiri Rao* 63761 (BSI); Between Dholka and Navasari, Aug. 1960 *Seshagiri Rao* 63922 (BSI); Jamnagar, Dec. 1959 *Ansari* 53878 (BSI).

Maharashtra : Poona, Thangaon, Feb. 1958 - *Mahajan* 32115 (BSI); Law College, Apr. 1956 - *Jain & Vartak* 605 (BSI); Without any details (Poona) *Collector?* s.n. (BSI); without definite locality (Poona) 1889 - *Tilak* s.n. (CAL); Without any details (Poona) *Collector?* s.n. (CAL); Pashan, Sept. 1954 *Irani* 18070 (BLAT); Bandankhind, Apr. 1963 - *K.V. Rao* s.n. (BLAT); Pashan, Oct. 1960 - *Subramanian* 64916 (BSI); Rahta, Mar. 1957 *Puri* 12304 (BSI); Rahta, Shirdi road, Sept. 1956 - *Puri* 5802 (BSI); Hivre garden, Jun. 1956 - *Puri* 2587 (BSI); Nagar, Mar. 1957 *Puri* 12269 (BSI); Kawi, May 1957 - *Jain* 17725 (BSI); Umed

Bhavan-Bhuj, Jan. 1957 *Jain* 11495 (BSI) ; Purandar, Nov. 1954 *Panthaki* 2117 (BLAT) ; Bund Baretta, Jan. 1956 *Panthaki* 2509 (BLAT) ; Bombay, city, Apr. 1883 *Patel* s.n. (BLAT) ; Victoria garden (cultivated), Feb. 1957 - *Fernandez* 3745 (BLAT); Victoria garden, Mar. 1899 - *Collector* 10846 (BLAT) ; Prabhadevi, Sept. 1956 *Fernandez* 2713 & 2714 (BLAT) ; Victoria garden, Jan. 1903 *Superintendent* s.n. (BSI) ; Laval-Khangaon, Bldana district, Sept. 1963 *Seshagiri Rao* 90718 (BSI) ; Ballarpur. Chandrapur district, Oct. 1970 *Malhotra* 12304 (BSI) ; Varoda, Jalgaon district, May 1982 *Rao* 161903 (BSI) ; Chandni, Yewtmal district, Dec-1976 *Karthikeyan* 148346 (BSI) ; Debewadi, Satara district, Apr. 1983 *Deshpande* 165680 (BSI) ; Nandgaon, Ratnagiri district, Oct. 1970 *Kulkarni* 121508 (BSI).

North West Himalayas : Kashmir, Domel, May 1918 *Hallberg* 11849, 11828 (BLAT) ; Thathri-Kistawar, 680-1800 m, Sept. 1958 *T.A. Rao* 7774 (BSD) ; Jammu, 750 m, Sept. 1970 - *Bhattacharyya* 41281 (BSD) ; Himachal Pradesh, Champa, 1000 m, Aug. 1896 *Gammie* 18197 (DD) ; Rakh, along river Ravi, July 1974 *Wadhwa* 53486 (BDS) ; Una, Kotta village, July, 1977 - *Uniyal* 61084 (BSD) ; Hamirpur, Aug. 1977 - *Viswanathan* 61495 (BSD) ; Kangoo, 660 m, Aug. 1977 - *Murti & Prasad* 62202 (BSD) ; Jeori, 1400 m, May 1962 - *N.C. Nair* 21799 (BSD) ; Rampur, 1300 m, Jun. 1962 *N.C. Nair* 20857 (BSO) ; Below Kombarsen, Simla, 1333 m, Jun. 1878 *Gamble* 61518 (CAL) ; Chumba, 1000 m, Oct. 1874 *Clarke* 23723D (LE, CAL) ; Kangra, 1333 m, Oct. 1874 *Clarke* 23810 D(CAL) ; Yunasar, 1333 m, Sept. 1883 *Dr. Schlich* s.n. (CAL); Thadia, Tons Valley, 1100 m, *H. Pirson* 1084 (BLAT); Without definite locality (N.W. Himalayas), *Royle* s.n. (LE, CAL); Etawah - *Hume* s.n. (CAL); Banda, Mar. 1901 *A.S. Bell* 314 (CAL); Delhi, Dec. 1875 *O. Kuntze* 7248 (CAL); N.W. India (without definite locality) *Stewart* s.n. (LE).

Panjab : Rajpur, Jun. 1955 *Kaul & Party* 22949 (LWC); Between Delhi and Jullandar, Nov. 1953 *Kaul & Party* s.n. (LWG); Lahore - *Brandis* 2985 (CAL); Meerut, Apr. 1843 *Collector* s.n. (CAL); Faridkot, Mar. 1966 - *N.C. Nair* 36562 (BSD); Dharmasala, Jul. 1963 *Malhotra* 28941 (BSD); Bhatinda, Jun. 1963 - *N.C. Nair* 27795 (BSD); Ludwa, May 1963 *N.C. Nair* 26437 (BSD); Yamuna nagar, May, 1963 *N.C. Nair* 26381 (BSD) ; Lambi, Ferozpor district, Feb. 1963 *N.C. Nair* 26226 (BSD); Rohtak, Aug. 1962 - *V.J. Nair* 23271 (BSD); Nizampur, May 1962 *N.C. Nair* 20677 (BSD); Hissar, Apr. 1962 *V.J. Nair* 19930 (LE, BSD). Without definite locality (Panjab), 1960 - *Clarke* 130 (CAL); Without any locality (Panjab). Nov. 1938 *Collector* ? s.n.(CAL); Hoshiarpur, Talwara, Aug. 1971 - *Mishra* 46814 (BSD); Nara Neai Forest Rest House, Aug. 1977 *Vohra & Danial* 60305 (BSD); Dunera, Pathankot, 690 m. Oct. 1983 *Charanpret* 9713 (BSD); Hissar, Apr. 1980 - *Van der Maesen* 1833 (CAL).

Rajasthan : Siroh, Mount Abu, Jul. 1966 *Jain* 5399(BSI); Mount Abu, Nov. 1959 *Jain* 60162 (BSI); Mount Abu, Oct. 1958 - *Jain* 46687 (BSI); Palanpur road, Mount Abu, Jul. 1957 *J.A.V.* 22547 (BSI); Mount Abu, Sept. 1916 *Collector?* 12118, 2276, 2253 (BLAT); Kota, Kota Naka road, May 1965 *Wadhwa* 9213 (BSI); Shahabad, Sept. 1968 *Mazumdar* 13225 (BSI); Madali-ki-ghati, Udaipur, Nov. 1957 - *J.A.V.* 29410 (BSI, BSA); Daosa Sainthal, Jaipur, Feb. 1965 *Wadhwa* 8152 (BSA); Amarsagar, Jaisalmer district, Sept. 1964 *Wadhwa* 5207 (BSA); Jhalawa Apr. 1964 *Verma* 3360 (BSA); Ajmeer, Aug. 1874 *Collector ? s.n.* (CAL); Merwar *Collector s.n.* (CAL); Jaipur, Mar 1961 *M.A. Rau* 14388 (BSD); Kashengarh, Jaipur - *Collector ?* (ISIM); Loharu, Jun. 1959 *Jain* 54446 (BSI); Erimpura, Pali district, Oct. 1960 *Seshagiri Rao* 66839 (BSI); Bani park plantation, Nov. 1957 *Vasavada* 29513A (BSI); Shyampura forests, Banswara, Sept. 1961 - *Kanodia* 75397 (BSI); Without any details *Collector ?* 127 (CAL); Chakia, Mar. 1964 *Panigrahi* 2792 (BSA, LE); Sariska Tiger Reserve, Oct. 1983 *Parmar* 9645 (BSJO) Banswara District, Near Danpur village Mar. 1977 *Singh* 4264 (BSJO); Pipal Khunt, Aug. 1976 *Singh* 2922 (BSJO); Bharatpur District, Near Dig, Mar. 1982 *Parmar* 8579 (BSJO); Bhilwara district, Mejadam, Sept. 1978 *A.N. Singh* 6036 (BSJO); Bikaner district, Gajner Palace garden, 244 m, Sep. 1957 *G.P. Roy* 2078 ((BSJO); Churu district, Gandhi Udayan (Taranagar), July 1976 *G.P. Roy* 2525 (BSJO); Ganganagar district, Gharsana, Nov. 1976 *G.P. Roy* 3835 (BSJO); Satrana, Oct. 1977 *G.P. Roy* 4907 (BSJO); Jaisalmer district, Chandan forest Nursery, Nov. 1973 *G.L. Tiwari* 787 (BSJO); Jalor district, Ahor, 1978 *Vyas* 5883 (BSJO); Jodhpur district, Lordi village, Aug. 1977 *Singh* 4361 (BSJO); Pali district, Phulad Desuri road, Aug. 1975 - *Shetty* 1858 (BSJO); Tonk district, Kacha Bundha R.F., 445 m Sept. 1974 - *Shetty* 1278 (BSJO); Near Frasen Bridge, May 1977 *Pandey* 4740 (BSJO).

Andhra Pradesh : Narasapur, Medak district, Apr. 1959 *Sebastine & Thothathri* 7961 (MH); Samanthagram, July 1981 - *Yesoda* 188 (MH); Aklasapur, Karimnagar district, July 1964 *Subba Rao* 20230 (MH).

Tamil Nadu : Pondicherry *Perrottet* 176 (LC, KW); Pen. Ind. Or.— *Wight* 826 (CAL, LE); Ootagamund, Jun. 1959 *Wadhwa* 57940 (BSI); Cuindy Park, Madras, Mar. 1814 *Collector s.n.* (MH); Kothapatti, Dharmapuri district, July 1978 *Vajravelu* 58003 (MH); Thiruvarur, Thanjavur district, Sept. 1977 - *Ramamurthy* 51301 (MH); Without exact locality - *Herb. Wight s.n.* (MH); Without any details *Collector s.n.* (MH); Kili-koode, Tiruchi district, Feb. 1978 *Rajendaran & Diravium* 12093 (CAL); Srirangam, Tiruchi district, July 1979 - *Perianayagam et al* 23782 (CAL); Nochiyam, Perambalur Taluk, Tiruchi district, Nov. 1978 *Matthew & Perumal* 19205 (CAL); Chidambaram Taluk, Kollidem bridge, Tiruchi district, Apr. 1978 *Matthew* 12896 (CAL); Old Coleroon to Thandavarayam Pettai, South Arcot district, Oct. 1978 *Perumal* 17997 (CAL);

Karnataka : Hassan, Oct. 1958 *Wadhwa* 44630 (BSI); Nandi Hills, Jan. 1956 *Janaki Ammal* 7058 (BSI); Bangalore, Sept. 1900 - *Meebold* 11330 (CAL); Lalbagh, Bangalore, Apr. 1927 - *Macrovicz* s.n. (LE).

Kerala : Palghat, 1850 - *Cleghorn* s.n. (CAL); Colatoorpolay, 66 m, Mar. 1895 *Bourdillon* 535 (MH); Bonward Estate, 550 m, Sept. 1971—*Banerjee* s.n. (CAL).

Uttar Pradesh : Dehradun, Rajpur, 1000 m, Apr. 1960 - *Hari Saxena* 396 (DD); Timli forest, Dec. 1956- *Chanda & party* 43149 (LWG). Dehradun, 1000 m, Apr. 1894 *Forester* 36 (CAL); Dehradun—*King* s.n.; (CAL); Hathibarkala, 680 m, Sept. 1956 *T.A. Rao* 851 (BSD); Mothronwala, 700 m, Apr. 1958 *Dakshini* 3976 (BSD); Respana banks, Apr. 1961 - *Bhattacharyya* 13873 (BSD) ; Jakhan, May 1961 *Malhotra* 15454 (BSD) ; Bindal Mar. 1962 *Malhotra* 2013 2 (BSD); Sahasradhara, Jul. 1963 *Malhotra* 28703 (BSD); Lachhiwala forest, Apr. 1966 *Malhotra* 36851 (BSD); Dehradun-*Collector* ? 10852 (BLAT); Kumaon, Tercha khet, 2666 m, Aug. 1913 *Cill* 614 (CAL, LWG); Kumaon - *Rep. Econ. Prod.* 17039 (ISIM); Bankatwa, Gonda district, Jun. 1898 *Harsukh* 21484 B (DD); Saharanpur—*Collan* 19751 (ISIM); Siwalik, Jaunsur divison, Mar.-Dec. 1922 *H.R. Sharma* 45 (LE); without definite locality (Siwalik) *E. Thurston* s.n. (ISIM); Villkaudiram, 43 miles from Benaras, Mar. 1956 *Saran & party* 25421(LWC); Kotdwar, Nainital fores, Ramnagar district, May 1956 *Kapoor & Jhamman* 27481 (LWC); Bulandshare, Apr. 1954 *Kaul & party* 7962 (LWG); Bahraich, Rupaideha, Feb. 1955 *Misra* 7897 (BSA); Payapur, Jul. 1954 *Chandra & party* 11801 (LWG); C.D.R.I. grounds. Lucknow, Apr. 1956 - *Janaki ammal* 231 (BSA); Belan river bank, Mirzapur district, Jul. 1956 *Misra* 9759 (BSA); Tehrighat, Gorakhpur district, Mar. 1966 *Panigrahi et Saran* 10754 (BSA); Mussouri hills *Collector* ? 10945 (BLAT); Agra, Mar. 1956- *T.A. Rao* 8307 (BSD) ; Agra, Mar. 1961 - *M.A. Rau* 14462 (BSD) ; Mohaba, Hamirpur, Mar. 1962 *Bhattacharyya* 20901 (BSD) ; Mailani, Aug. 1962 - *Malhotra* 23530 (BSD); Buland Shah, Apr. 1963 *N.P. Singh* 25512 (BSD) ; Mailani, Apr, 1964 *Malhotra* 26858 (BSD) ; Corbett National Park, Deikala, Oct. 1970 *Pant* 43351 (BSD); Near Damunda Bridge Apr. 1971 *Pant* 43679 (BSD) ; Patenpani, May, 1971-*Pant* 43825 (BSD); Rajaji Game Sanctuary, Sukh Rau, Apr. 1970 *Rao* 40039 (BSD) ; Shanar-ghat, Pilibit district, Aug. 1972 - *Malhotra* 50475 (CAL) ; Lucknow, Mar. 1976 - *Ibrahim Hussain* 87753 (MD).

Bangladesh : Sitapuhur reserve, Chittagong hill tract, Aug. 1885 *Ellis* 49 (CAL).

Burma : Moly Lashio road, 1116 m, Maymyo district *Nigkau* 547 (CAL); Ahlone (Monywa), Chindwin river, Jul. 1916 - *G. Rogers* 1088 (cultivated) (CAL).

Wall. Cat. : Oudh, 1825 - 5850E (LE) ; HBC 5850 (LE) ; No locality 5850 C, G (LE).

A. *Etymology* : The specific name refers to the local name 'sissoo' with which the plant has been known in Bengal and northern India.

B. *Ecology* : The plant is a large deciduous tree and grows gregariously in alluvial forests, characteristic of gravelly river beds in the sub-himalayan tracts. It prefers a light porous soil and thrives in low lying sandy tracts. The trees grow gregariously in beds of rivers on new alluvial land, thrown up in the shape of islands or in low banks, formed of deposit of sand, shingle boulders, the sissoo forming forests either pure or mixed with *Acacia catechu* Willd. It grows from plains to an elevation of 300 metres in Sikkim Himalayas and 1000-1300 metres in Baluchistan and North Western Himalayas. New foliage begins to appear in February and flowers in March-July. The pods ripen during cold season (November to February), and usually remain in the tree till the next flowering season. The seeds germinate in June-July.

C. *Cytology* : $n=10$ (Patil, 1958, Nanda 1962).

D. *Distribution* : In the Calcutta herbarium there is one specimen collected from Maymyo district, Burma in 1920-25 and doubtfully marked '*D. sissoo*'. This, on examination is found to be this species beyond doubt and so its occurrence in Maymyo district, constitutes a new record for Burma. It was collected at an altitude of 1118 meters in Indly Lashio road, Maymyo district.

It is rather difficult to assess the exact locality where *D. sissoo* is truly wild. De Candolle (l.c. 1825) and Roxburgh (l.c. 1832) considered it to be a native of Bengal but without any definite locality. Stewart (l.c. 1869) regarded it as indigenous to the Kachi forests, Punjab on the islands of Indus, opposite to Bannu. Brandis (l.c. 1874) remarked that it was a native of sub-himalayan tract. Watt (l.c. 1890) believed it to be a native of sub-himalayan belt. J.H. Lace opined that the plant was indigenous to the Harnai, the Mehrab-Tangi and up to Sharigh (1300 metres) in Baluchistan. According to G. Mann its occurrence in the Eastern Duars of the Goalpara district in Assam was natural. Such are the varied reports by the earlier workers. A perusal of the above statements makes one thing clear. *D. sissoo* is indigenous in the gravelly river beds of the sub-himalayan tracts extending from Assam to Punjab. This was the view of Prain (l.c. 1904) to which the author agrees fully.

E. *Economic importance* : The plant commonly known as 'sissoo' or 'shisham' yields the finest timber, extensively used for various purposes such as boat-building, carts, carriages, agricultural implements and as

sleepers in railways. As the wood takes to intricate and ornamental carving, high class furniture are made out of it. It is planted often as an avenue as well as a shade tree in tea gardens on account of ease with which cuttings strike. The foliage is used as fodder for camels in Baluchistan. Decoction of leaves is said to be useful in gonorrhoea. The leaf mucilage mixed with sweet oil is applied in excoriations. The roots are astringent and wood is useful in cutaneous affections. The bark is made into pills and used to check cholera. Decoction of leaves is used in eruptive diseases (Santapau l.c. 1962).

2. *Dalbergia latifolia* Roxb. Corom. Pl. 2 : 7, t. 113. 1798 et Hort. Beng. 53. 1814 ; DC. Prodr. 2 : 416. 1825 ; Roxb. Fl. Ind. 3 : 221. 1832 ; Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 264. 1834 ; Grah. Cat. Bombay Pl. 55. 1839 ; Voigt Hort. Suburb. Calcutt. 240. 1845 ; Wight, Ic. t. 1156. 1850 ; Benth. in Miq. Pl. Jungh. 1 : 254 1852 ; Miq. Fl. Ind. Bat. 1 : 128. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 38. 1860 ; Dalz. et Gibs. Bombay Fl. 77. 1861 ; Bedd. Fl. Sylvat. t. 24. 1869 ; Brandis, For. Fl. 148. 1874 ; Kurz, Prelim. Rep. For. Pegu : App. B : 44. 1875 ; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1877 et For. Fl. Brit. Burma 1 : 342. 1877 ; Gamble, Man. Ind. Timbers 127. 1881 ; Watt, Dict. Econ. Prod. India 3 : 7. 1890 ; Talbot, Bombay List 74. 1894 ; A.K. Nair, Flow. Pl. W. India 92. 1894 ; Gamble, List Tr. Shr. Climb. Darjeeling Dist. 29. 1896 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Prain in Journ. Asiat. Soc. Beng. 66 : 442. 1897 et Ibid. 70 : 41. 1901 ; Kanjilal, For. Fl. Sch. Cir. N.W. Prov. 129. 1901 ; Talbot, Tr. Shr. Wood. Climb. Bombay Press. 136. 1902 (ed. 2.) ; Cooke, Fl. Press. Bombay 1(2) : 336. 1902 ; Duthie, Fl. Upper Gang. Pl. 1 (1) : 263. 1903 ; Prain, Beng. Pl. 1 : 411. 1903 et in Ann. Roy. bot. Gard. 10(1) : 80. 1904 ; Brandis, Indian Tr. 233. 1907 (ed. 2) ; Bourdillon, For. Tr. Travancore 132. 1908 ; Talbot, For. Fl. Bombay Press. Sindh : 423. 1909 ; Haines, For. Fl. Chotanagpur 335. 1910 ; Ramarao, Flow. Pl. Travancore 129. 1914 ; Witt, Tr. Shr. Climb. Econ. Herb. N. Berar For. Cir. Centr. Prov. 82. 1916 ; Parker, For. Fl. Punjab 167. 1918 ; Gamble, Fl. Press. Madras 2 : 383. 1918 ; Troup, Silvicult. Indian Tr. 1 : 318. 1921 ; Haines, Bot. Bih. Or. 3 : 294. 1922 ; Cowan, A.M. et J.M. Tr. N. Bengal 52. 1929 ; Benthall, Tr. Cal. 154. 1946 ; Wealth Ind. 3 : 4. 1952 ; Bor, Man. Indian For. Bot. 89. 1953 ; Hutch. et Dalz. Fl. Trop. W. Africa 1 : 515. 1964 (ed. 2.) ; Santapau, Fl. Purandar 46. 1957 ; Sebastine et al. in Bull. bot. Surv. India 2 : 278. 1961 ; Backer et Bakhuizen van den Brink, Fl. Java 1 : 615. 1963 ; Rao et Sastry in Bull. bot. Surv. India 6 : 273. 1965 ; Sebastine et Henry Ibid. 8 : 306. 1966 ; Hiroyoshi Ohashi in Hara's Fl. East. Himalaya 148. 1966 ; G.S. Rao et al. in Bull. bot. Surv. India 9 : 101. 1968 ; Ellis, Ibid. 10 : 154. 1968 ; Venkatareddi, Ibid. 11 : 145. 1969 (1971) ; Cherian & Pataskar Ibid. 11 : 381, 386. 1969 (1971) ; Thaker, Ibid. 12 : 114, 117. 1970 (1972) ; Shah & Patel, Ibid. 12 : 18, 22. 1970 (1972) ;

Malhotra & Moorthy, *Ibid.* 13 : 298. 1971 (1973); Mazumdar, *Ibid.* 13 : 126. 1971 (1973); Sharma et al. *Ibid.* 15 : 50, 56. 1973 (1976); Kapoor & Kapoor, *Ibid.* 15 : 79. 1973 (1976); Sen Gupta, *Ibid.* 15 : 187. 1973 (1976); Nasir & Ali, *Fl. W. Pak.* 100 : 57. 1977; Saldanha & Nicolson, *Fl. Hassan Karnat.* 245. 1978 (2nd ed.); Shah, *Fl. Gujarat* 2 : 201. 1978; Naik, *Fl. Osman.* 112. 1979; Hara, Stearn & Williams, *Flow. Pl. Nep.* 2 : 105. 1979; Basak & Guhabakshi in *Bull. bot. Surv. India* 19 : 46. 1977 (1979); Debroy et al. in *Indian For.* 106 : 309. 1980; Verma, *Fl. Bhagalpur* 112 1981; Malhotra & Rao in *Bull. bot. Surv. India* 22 : 5. 1980 (1982); Ramachandran, *Ibid.* 23 : 141. 1981 (1983); Singh, *Fl. Bans.* 77. 1983; Nair & Henry, *Fl. Tam. Nad. (Ser. I)* 1 : 103. 1983; Matthew, *Fl. Tam. Nad. Car.* 3(1) : 384. 1983; Saldanha, *Fl. Karnat.* 444. 1984; Verma, *Fl. Raipur Durg & Rajnand.* 98. 1985; Rao, *Fl. Goa, Diu, Dam. Dad. & Nagar.* 1 : 110. 1985.

Dalbergia emarginata Roxb. (*Hort. Beng.* 53. 1814, nomen) *Fl. Ind.* 3 : 224. 1832; Voigt, *Hort. Suburb. Calcutt.* 241. 1845; Prain in *Ann. Roy. bot. Gard.* 19(1) : 80. 1904. (Type-HBC, *Roxburgh*). *Amerimnon latifolium* (Roxb.) O. Kuntze, *Rev. Gen. Pl.* 1 : 159. 1891.

A tree, 10-40 m high, trunk 6 m in girth; stem erect with a crown of spreading branches; bark smooth. *Leaves* imparipinnate, alternate, 15-30 cm long, rachis straight, glabrous; leaflets 3-7, usually 5, alternate to sub-opposite, orbicular to broadly obovate, 3.4—13.0 × 3.3—10.5 cm, entire, obtuse to emarginate at apex, rarely acute, shortly cuneate to rounded at base, coriaceous, glabrous, glaucous beneath, distal ones always larger than others, lateral veins 6-7 pairs, ascending; petiolules 5-10 mm long, glabrous. *Flowers* arranged in axillary, corymbose panicles, fasciated on old wood below upper leaves or in axil of old leaves; inflorescence 4.0—11.3 cm long, rachis glabrous; flowers white, 6-8 mm long, distinctly pedicellate; bracts present, bracteoles 2, oblong, caducous; pedicels slender, 2-5 mm long. *Calyx* campanulate, 4-5 mm long, mouth 5-toothed, upper 2 subconnate, lateral pair obtuse and lower most acute, all teeth veined, calyx and teeth glabrous. *Corolla* vexillum ovate to broadly elliptic, rarely suborbicular, 5.0-5.5 mm long, clawed; wings and keels clawed, blade auricled, keels connate, all petals veined. *Stamens* 9, monadelphous, staminal sheath 5-7 mm long, split open dorsally, filaments free on their upper third, longer ones alternating with shorter ones. *Ovary* oblong, stipitate, 5-7 mm long, glabrous, ovules, 3-5, style slender, curved, stigma minute. *Pod* oblong to oblong-lanceolate, flat, indehiscent, 4.5-10.2 × 1.5-2.6 cm, coriaceous, glabrous, abruptly pointed at apex, narrowed at base into a stalk, coriaceous, sparingly veined especially over the seed; seed compressed, oval to slightly reniform, 6.5 × 4.0-4.5 mm smooth, brown to black.

Type : Roxb. *Corom. Pl. t.* 113. 1798 (Lectotype).

Flower : August to September. *Fruit* : October to April.

Distribution : INDIA (Andamans, Andhra Pradesh, W. Bengal, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Karnataka, Orissa, Rajasthan, Sikkim, Tamil Nadu and Uttar Pradesh), NEPAL and MALAYAN PENINSULA (Map-2).

Specimens examined :

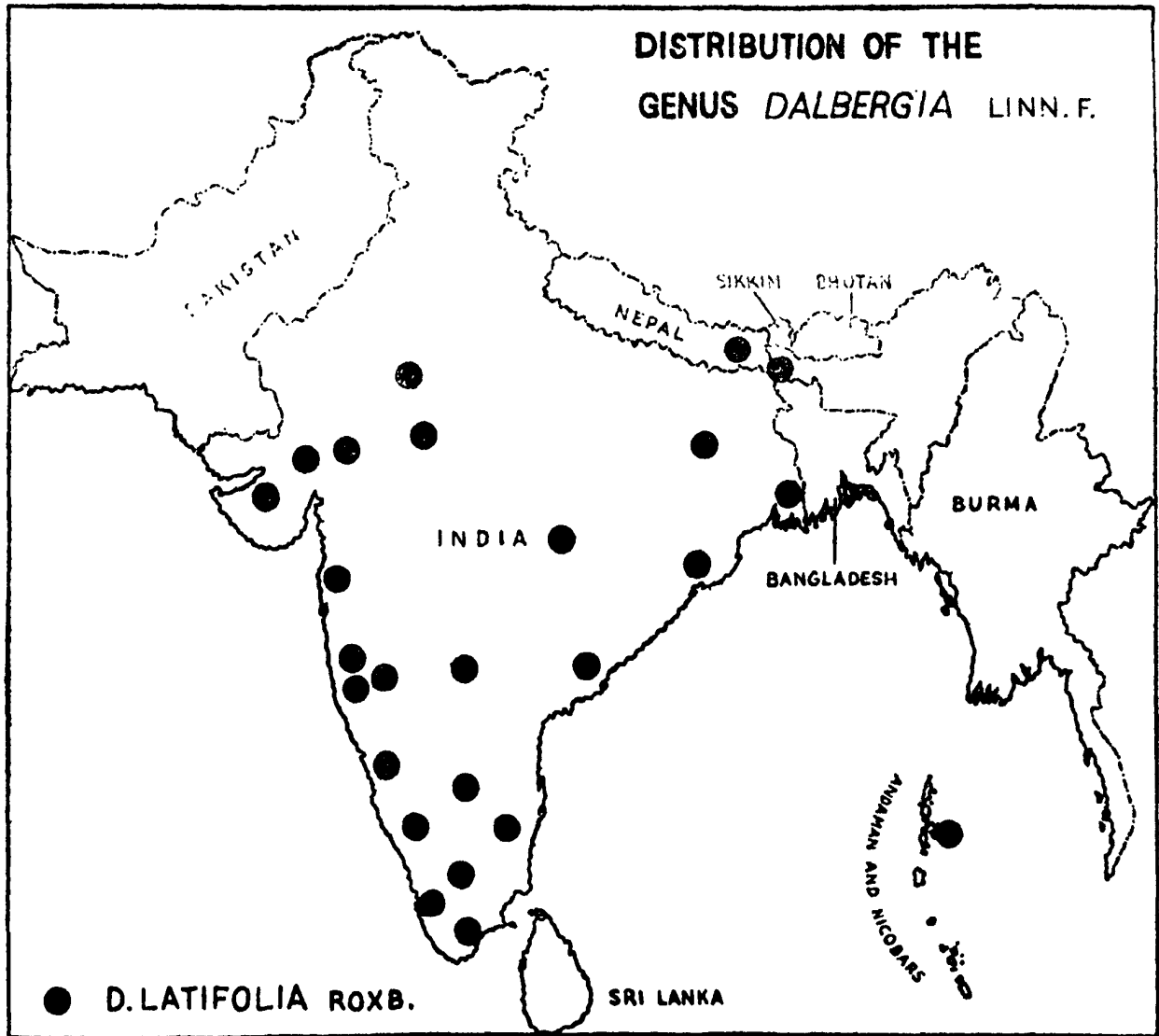
Andhra Pradesh : Ethakonda, 600 m, Codavary district, Oct. 1920—*Narayanaswami* 568 (CAL) ; Rampa Chodavaram, Rampa district, Nov. 1920—*Narayanaswami* 268 (CAL) ; Chittur, Mamendur, Mar. 1914—*Collector* ? (MH) ; Palmaner R.F., Oct. 1938—*Jacob* 452 (MH) ; Aklasapur 200 m, Karimnagar district, Dec.—1964—*Subbarao* 22502 (MH) ; Pakhal, 290 m, Warangal district, Mar. 1963—*Henry* 15961 (MH) ; Pegarikutta east, 733 m, Narasapur, Medak district, Sept. 1958—*Sebastine* 6696—(MH) ; Kurnool, Road to Gazalapallechelama, 320 m, Dec 1963 *Ellis* - 18045 (MH) ; Namalano, Mahanadi, 460 m, Aug. 1965 - *Ellis* 25464 (MH).

W.Bengal : Darjeeling terai, Aug. 1973 - *Gamble* 2258 D (CAL) ; Howrah district, Sept. 1869 *Kurz* s.n. (CAL) ; Roy. Bot. Garden, Sibpur - *Rep. Econ. Prod.* s.n. (ISIM) ; HBC, Sept. 1958 *Collector* s.n. (CAL) ; Roy. Bot. Garden, Sibpur Howrah - *Naskar* 205 (CAL).

Bihar : Chotanagpur, Jaigai, 66m, Palamew, Dec 1880 *Gamble* 8845 (CAL) ; Hundrugagh, Sept. 1896 *Prain* s.n. (CAL) ; Tundi forests, Manbhum, 1880 *J. Campbell* s.n. (CAL).

Gujarat : Pavagadh hill, Baroda, Dec. 1954 - *Santapau* 19896, *Panthaki* 2192 (BLAT) ; Laloi, S. Katia district, Jamnagar *Santapau* 1726 (BLAT) ; Junagadh, Oct. 1951 - *Santapau* 13772 (BLAT) ; Khandesh, Dec. 1918 *Blatter* 12464 (BLAT).

Kerala : Palghat, Walayar R.F. 175 m, Oct. 1963 *Joseph* 17891 (MH) ; Attapadi block, 450 m, Aug. 1966 *Vajravelu* 27857 (MH) ; Agali forest, 575 m, Oct, 1965 *Vajravelu* 26313 (MH) ; North Malabar *Rep. Econ. Prod.* 17405 (ISIM) ; Tolpetty, Cannanore district, Nov. 1978 *Ramachandran* 58721 (MH) ; Thekkadi, Idukki district, Dec. 1974 *Vivekanandan* 45677 (MH) ; Mukali Palghat district, Nov. 1973 *Vajravelu* 46140 (MH) ; Aglali forest, Palghat district, Feb. 1979 *Vajravelu* 60787 (MH) ; Chindaki forest. Oct. 1979 - *Nair* 64678 (MH) ; Way to ParambiKulam Dam, Trichur district, 1200 m, Mar. 1978 *Ansari* 1192B (CAL).



Map 2

Madhya Pradesh : Baranji, Mandla, Feb. 1907 - *Gyan Singh* 1392 (DD); Bilaspur, Oct. 1970 *Panigrahi* 13230A (BSA); Rajnandgaon, Nov 1974 - *Pant* 21556 (BSA); Raigarh Apr. 1976 *Radhakrishnan* 24558 (BSA).

Maharashtra : Poona, Katraj, Aug. 1956 *Puri* 2925 (BLAT); Katraj, Nov. 1954 *Panthaki* 2058 (BLAT); Tinai ghat, Nov. 1902; *Gammie* 15805 (BLAT, BSI); Kajrat, Apr. 1949 - *Fernandez* 261 (BLAT); Manjri Nursery, Oct. 1906 - *Ryan* 1452 (BSI); Alirajpur, Sept. 1958 *G.S. Puri* 23567 (BSI); Nard, Aug. 1980 *Kanethkar* s.n. (BLAT) Shivahill, Khed Taluk, Dec. 1961 *Janardhanan* 76505 (BSI); Tondwal, Jul. 1967 *John Cherian* 111184 (BSI); Sawarna Kumbhala, Nasik district, Sept. 1967 *John Cherian* 111550 (BSI); Turanmal, Akrani district, May 1907 *Talhot* 4988 (BSI); Satara *Kulp* 810 (BLAT); Tungar, Chandip, Oct. 1861 *Das* 4233 (BLAT); Parol, Oct. 1961 *Das* 4361 (BLAT); Bombay, Kanheri Caves, Apr. 1904 *Bhide* s.n. (BSI); National Park, Borivli. Oct. 1954 *Herbert* 213A (BLAT); Mumbra, Mar. Apr. 1954 *Shenoy* 2563, 2392-93 (BLAT); Borivli, Kanheri Caves, Nov. 1918 *Blatter* 11434, 11480 (BLAT); Parsik, Thana, Dec. 1918 *Collector?* 10475 (BLAT); Parsik hill, Oct. 1925 - *Acland* 408 ((BLAT); Ghodbundar, Jan. 1954 *Santapau* 17925 (BLAT); Aarey milk colony, Goregaon, Apr. 1958 - *Tavakari* 1116 (BLAT); Vehar lake, Nov. 1958 *Shah* 10060 (BLAT); Powai, Oct. 1955 - *Panthaki* 2292 (BLAT); Khandala, Kune stream, Mar. 1943 *Santapau* 1690 (BLAT); Behrani's plateau, Jun. 1946 *Santapu* 9111 (BLAT); St. Xavier's Villa, Apr. 1946 *Santapau* 8786 (BLAT); Khandala, Oct. 1918 *Blatter* 10247 (BLAT); Khandala, Apr. 1944 - *Santapau* 3977, 4698 (BLAT); Convalescence home, Mar. 1952 *Santapu* 14081 (BLAT); Waghai, Dang's district, Oct. 1954 *Panthaki* 1741 (BLAT); Neral, Jummappatti, Aug. 1960 *Irani* 5090 (BLAT); Hills opposite to Ajanta caves, Nov. 1961 *R.S. - Rao* 71427 (BSI); Daman, Athal forest, Nagar havali. Oct. 1963 *Ansari* 94025 (BSI); Dolara forest, Nagar havali, Oct. 1963 *Ansari* 94113 (BSI); Along Daman ganga river, May 1953 *Seshagri Rao* 89230 (BSI); Dudhani, May 1953 *Seshagiri Rao* 89177 (BSI); Manekshahgarh, Chandrapur district, Nov. 1962 *Malhotra* 119641 (BSI); Borivli National Park, Bombay, Oct. 1984 - *Sharma* 167227 (BSI); Lonar Lake, Buldhana district, Oct. 1984 - *Diwakar* 164806 (BSI); Kashmar, Akola district, Aug. 1977 - *Kamble* 150300 (BSI); Deodongra, Nasik district. Mar 1984 *Narasimhan* 166387 (BSI); Piperkhali, Bhandra district, Sept. 1976 *Malhotra* 144798 (BSI).

Karnataka : North Kanara, Castle rock, Oct. 1902—*Gammie* 15522 (BSI); Yellapur, Dec. 1955 *Panthaki* 2487 & 2488 (BLAT); Kala nuddi, Dec. 1852 - *Dr. Ritchie* 230 (CAL); Yellapur, Haliyal road, Dec. 1955 *Bole* 1520 (BLAT); Sakrabile, Mysore, Apr. 1905 *Barber* 7020 (CAL); Mercara, Coorg, Dec. *Hohenackar* 622 (LE, KW).

N. East India : Between Amraoti and Lewada in Spina valley, 900 m, Dec. 1901 *I.H. Burkill* 31241 (ISIM).

Orissa : Patraputtu, Dec. 1962 *Subbarao* 30288 (Assam).

Rajasthan : Mount Abu, Jaimok, May 1868-*King* s.n. (CAL) ; Mount Abu, 1868 *King* s.n. (CAL) ; Kota, Shahabad, Oct. 1957 - *Jain*. 28970 (BSI) ; Forests of Merwar *Duthie* 4634 (LE) ; Without any details, 1878 *Collector?* s.n. (CAL) ; Siwai, Madhopur range, Jaipur, Jan. 1912 *Parker* 6146 (DD) ; Bagaycha forest, Aug. 1976, 355 m *Singh*, 3056 (BSJO).

Tamil Nadu : Coimbatore, Chinnakarandu, Aug 1929 *Narayanaswamy* 18763 (CAL) ; Shoia karai, Dec. 1914 *Collector ?* 4 (CAL) ; Neeigherry, Sep. 1852 *Wight* 817 (CAL) ; Mount Stuart, 750 m, Annamalai hills, Nov. 1913 *Fischer* 3657 (CAL) ; Lower Poonachi, 975 m, Jan. 1962 *Joseph* 13543 (MH) ; Thabakkarai road, Bargur hills, Aug. 1929 *Narayanaswamy* 18976 (MH) ; Gaddesal, Aug. 914 - *Collector ?* 10746 (MH) ; Sadivayal, Siruvani, Apr. 1961 *Henry* 1291 (BLAT) ; Tinnevelly, Narthem Shola, 660 m Feb. 1913 - *Hooper & Ramaswami* 38347 (MH) ; Thelfat, South Arcot district, Sept. 1899 *Barber* 916 (MH) ; Madras, Sept. 1901 *Bourne* 2495 (CAL) ; Pen. Ind. Or. Herb. *Wight* 17044 (MH), 790, 830 (CAL) ; Bokkapuram R.F., Nilgiri district, Aug. 1970 *Sharma* 35442 (MH) ; Avarihalla R.F., Nilgiri district, Aug. 1970 - *Sharma* 35620 (MH) ; Ayyankoil, Ramanathapuram district, Dec. 1971 *Vajravelu* 39470 (MH) ; Panagudi, Kanyakumari district, Feb. 1972 *Sharma* 39771 (MH) ; Yercaud, Salem district, Nov. 1968 *Deb* 31347 (MH) ; Feb 1969 *Deb* 31467 (MH) ; Denkanikotta, Dharmपुरi district, 950 m, Sept. 1978 *Matthew & Venugopal* 17205 (CAL) ; Yetcaud. Salem district, 600 m, Nov. 1978 *Matthew & Venugopal* 18694 (CAL) ; Arnuthumalai, Dharmपुरi district, 1050 m, Aug. 1978 *Matthew et al* 16533 (CAL) ; Chitteri Hills, Aug. 1978 - *Matthew* 16401 (CAL) ; Dowalagiri R.F., Dharmपुरi district 950 m, May 1979 *Matthew et al* 23228 (CAL).

Uttar Pradesh : Oudh, Gonda, May 1900 *Inayat* 23609 (CAL) ; Bahraich, Jun. 1898 *Harsukh* 22964 (CAL) ; Saharanpur garden *Rec, Econ. Prod.* s.n. (ISIM) ; Dehradun (cultivated), Sept 1893 *Gamble* s.n. (DD) ; Sarju valley 1000-2000 m, Kumaun, Jul. 1876 *Duthie* 5485 (BSI) ; Saharanpur garden, Sept. 1896 *Gammie* s.n. (BSI) ; Motichur, Siwalik & Junsar division, Jun. 1923 - *Sharma* 14 (LE) ; Mirzapur, Jan. 1971 *Panigrahi* 13842 (BSA).

Wall. Cat. Herb. Madras 5852 A (CAL) ; Herb. Heyne 5852 B (CAL) ; HBC—5852 D (CAL) ; HBC from Andamans 5852 (LE, Type of *D. emarginata* Roxb.).

A. Etymology : The specific epithet '*latifolia*' refers to the wide leaflets, characteristic of this species. In fact, the epithet should be strictly '*latifoliolata*' as it applies to leaflets.

B. Ecology : The plant is a large deciduous tree with a rounded crown, growing more or less in mixed deciduous forest. The tree is not gregarious as *D. sissoo* Roxb. and grows more or less scattered. In Coorg, Kanara and Koncan the trees are found in moist ever green forest, usually associated with bamboo. Its principal associates in mixed deciduous forests are *Tectona grandis* Linn. f., *Terminalia tomentosa* Wt. & Arn., *T. paniculata* Roth., *Anogeissus latifolia* Wall., *Xylia xylocarpa* Taub. etc. The trees are found up to an elevation of 100 metres.

C. Cytology : $n = 10$ (Atchison, 1951).

D. Typification : From a perusal of important herbaria, it appears Roxburgh did not leave any herbarium specimen of this species. It has therefore been decided to choose the plate 113 in Roxburgh's Icones, published in 1793 as Lectotype of this taxon.

E. Critical notes : *Dalbergia emarginata* Roxb. which was treated conspecific with *D. latifolia* Roxb. (Bentham l.c. 1860 ; Baker l.c. 1876 ; Prain l.c. 1904) was described by Roxburgh from a specimen, cultivated in the then Royal botanic Garden Calcutta. According to Roxburgh (l.c. 1832) this plant was introduced into the Calcutta botanic garden in 1760 by Col. Kyd who brought a young sapling from the Andman Islands where it was said to be native. There was no specimen, left by Roxburgh in Calcutta herbarium except the beautiful, unpublished plate in his Icones (Ic. 1589). The plate shows that the leaflets are deeply emarginate, and flowers yellowish white. These characters are common in *D. latifolia* also. The author during his visit to the Herbarium of the Komarov Botanical Institute, Leningrad, examined one specimen with following details, 'Herb. Hort. Bot. Calcutta, sis-Mt. Andmans-Cult. in Hort. Bot. Cal. Apart from this specimen there was another specimen with a label reading 'Herb. L. Pierre-Cult. in H.B. Calcutta'. Both these were mounted in the same sheet. The previous one was evidently from the tree, cultivated in the garden through the sapling, brought from Andamans by Kyd and subsequently described by Roxburgh as *D. emarginata*.

Kurz in his report on the vegetation of the Andman Islands (1870) mentioned this plant as occurring in the sandy beaches of South Andman, but there are no specimens, left by Kurz in Calcutta herbarium. It is, therefore, interesting to point out that so far no botanist has ever reported this rare plant which is said to occur in the northern group of Andman Islands. According to Kyd, the tree was found growing in high ground along with trees of Andman red wood (*Pterocarpus dalbergioides* Roxb.) and by no means a common tree. The author who had undertaken several, major botanical explorations in the Andman and Nicobar Island has not come across this plant so far.

F. Economic importance : The plant, being one of the most important timber species, yields the famous Indian rose wood or black wood of commerce. As the wood takes fine polish, it is extensively used in furniture and cabinet work. The wood is also used for decorative carving, ornamental plyboards, wheels of gun-carriages, ammunition boxes and temple cars. Ply boards from Indian rose wood satisfy aircraft specifications.

The leaves are used as fodder and parts of the tree are reported to be useful as stimulant and appetiser and also in dyspepsia, diarrhoea and leprosy. Oil from seeds is used as an antidote to poison. (Ramarao l.c. 1914). The plant is a good shade tree in coffee plantations (Bourdillon l.c. 1908).

3. *Dalbergia sissoides* Grah. (Wall. Cat. 5876. 1832, nomen) ex Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 1 : 265. 1834 ; Walpers, Repert. Bot. Syst. 1 : 799. 1842 ; Benth. in Miq. Pl. Jungh. 1 : 254. 1852 et Journ. Linn. 4 (Suppl.) : 39. 1860 ; Bedd. Fl. Sylvat. t. 24. 1869 ; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876 ; Gamble, Man. Ind. Timb. 127. 1881 ; Watt, Dict. Econ. Prod. India 3 ; 7. 1890 ; Prain in Journ. Asiat. Soc. Beng. 66 : 443. 1893 et Ann. Roy. Bot. Gard. 10 (1) : 81. 1904 ; Brandis, Indian Tr. 233. 1907 (ed 2) ; Bourdillon, For. Tr. Travancore 133. 1908 ; Ramarao, Flow. Pl. Travancore 130. 1914 ; Gamble, Fl. Pres. Madras 2 : 383. 1918 ; Troup, Silvicult. Indian Tr. 1 : 325. 1921 ; Wealth Ind. 3 : 7. 1952 ; Sebastine et al. in Bull. bot. Surv. India 2 : 278. 1961 ; Ellis et al. Ibid. 9 : 7. 1968 ; Joseph et Vajravelu, Ibid. 9 : 21. 1968 ; Vajravelu, Ibid. 10 : 71. 1968 ; Saldanha & Nicolson, Fl. Hassan Karnat. 246. 1978 ; Nair & Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983 ; Sharma et al. Fl. Karnat. Analysis 70. 1984 ; Saldanha, Fl. Karnat. 446. 1984.

Dalbergia javanica Miq. Fl. Ind. Bat. 1 : 132. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 38. 1860. (Java *Horsefield* s.n. Isotype, CAL). *D. latifolia* Roxb. var. *sissoides* (Grah. ex Wt. & Arn.) Baker in Hook. f. Fl. Brit. India 2 : 231. 1876. *Amerimnon sissoides* (Grah.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891. *A. javanicum* (Miq.) O. Kuntze, Ibid. 1 : 159. 1891. *Dalbergia emarginata* Prain in Journ. Asiat. Soc. Beng. 70 : 41. 1901 non Roxb.

A deciduous tree, 15-20 m high ; stem straight with spreading, glabrous branches, trunk 0.75-1.25 m in girth at base, bark smooth. *Leaves* imparipinnate, alternate exstipulate, 10-22 cm long, rachis glabrous ; leaflets 5-7, rarely 3 or 9, alternate, ovate to obovate, rarely oblong, 4.0-7.5 × 2.5-4.0 cm, entire, acute at apex, narrowed at base, glabrous, lateral veins 6-4 pairs, faint ; petiolules, 5-8 mm long, glabrous ; stipel absent. *Inflorescence* flowers in loose axillary panicles, 3-11 cm long, rachis glabrous. *Flowers* white, pedicellate, 5-9 mm long ; bract small, bracteoles 2, larger, all caducous ; pedicels slender, 2-4 mm long. *Calyx* campanulate, 5-6 mm long, glabrous, 5-toothed, upper 2 teeth subconnate,

lower 3 subequal, oblong, subobtuse, veined, imbricate. *Corolla* vexillum ovate, glabrous, 6-7 mm long, distinctly clawed. *Stamens* 9, monadelphous, staminal sheath 7-8 mm long, split open dorsally. *Ovary* glabrous, stipitate, 8 mm long, style slender, stigma minute, ovules 5-7, stipe of the ovary longer than stipe. *Pod* oblong to oblong-lanceolate, indehiscent, 3-12 × 1.0-1.6 cm, glabrous, coriaceous, acute at apex with a longish apicule, gradually narrowed at base into a stalk, 1-3-seeded, reticulated against the seed; seed compressed, elliptic to reniform, 7.5 × 4.5 mm, deep brown to black.

Type : Nilgiris *Noton*, Wall. Cat. 5876 B (Lectotype designated, K).

Flower : January to March. *Fruit* : April to May.

Distribution : INDIA : (Western ghats from hills of Karnataka southwards to Pulneys and hills of Kerala), JAVA. (Map-3).

Specimens examined :

Karnataka : Burghai estate, Apr. 1205 *Barber* 7072 (CAL) ; Sullia, South Kanara, Oct. 1900 *Barber* 2138 (MH) ; Barguar, Saklaspur, Apr. 1905 *Barber* 7072 (MH) ; Ponnampet, Coorg district, Mar. 1938 *Collector?* Acc. no 83918 (MH) ; Kudalini, Bellary district, Jun. 1979 *Manohar & Keshavamurthy* 8213 (CAL) ; Yettinahalla, Hassan district, Mar. 1969 *Saldanha* 12938 (MO).

Kerala : Malabar, Chenath Nair forest, Dec. 1914 *Fisher* 3780 (CAL) ; Attapadi hills, 1066 m, May 1911 *Fisher* 2771 (CAL) ; Palghat, 180 m, Jan. 1900 *Fisher* 1704 (CAL) ; Wynaad, 1000 m, 1885 *Masausan* s.n. (MH) ; Sultan's Battery, 890 m, Calicut district, May 1965 *Ellis* 24029 (MH) ; Sultan's Battery, 900 m, Oct. 1965 *Ellis* 25772 (MH) ; Travancore, Kulathurpuzha, Feb. 1904 *Collector?* 1498 (CAL) ; Colatoorpolay, Quilon, Feb. 1904 - *Bourdillon* 535 (CAL) ; Without any details (Travancore), Jan. 1893 *Thomas* 1559 (CAL) ; Without any details (Travancore) - *Bourdillon* s.n. (CAL) ; Tolpetty, Cannanore district, Nov. 1977 & Mar. 1980 *Ramachandran* 52336, 66839 (MH) ; Begur R.F., Cannanore district, Mar. 1979 *Ramachandran* 62018 (MH) ; Mullakudy, Mar. 1973, Idukki district - *Sharma* 43847 ; Attapadi forest, Palghat district, July, 1979 *Vajravelu* 32191 (MH) ; Mandampatty forest, Palghat district, Apr. 1978 *Nair* 56841 (MH) ; Karivarth slopes, Palghat district Feb. 1979 *Vajravelu* 60543 (MH) ; Mukkali forest, Palghat district, Feb. 1979 - *Vajravelu* 60638 (MH) ; Chindaki forest, Palghat district, Oct. 1979

Nair 64671 (MH); Wynaad district, 1885 *Collector* ? s.n., Acc. no. 17045 & 17046 (MH).

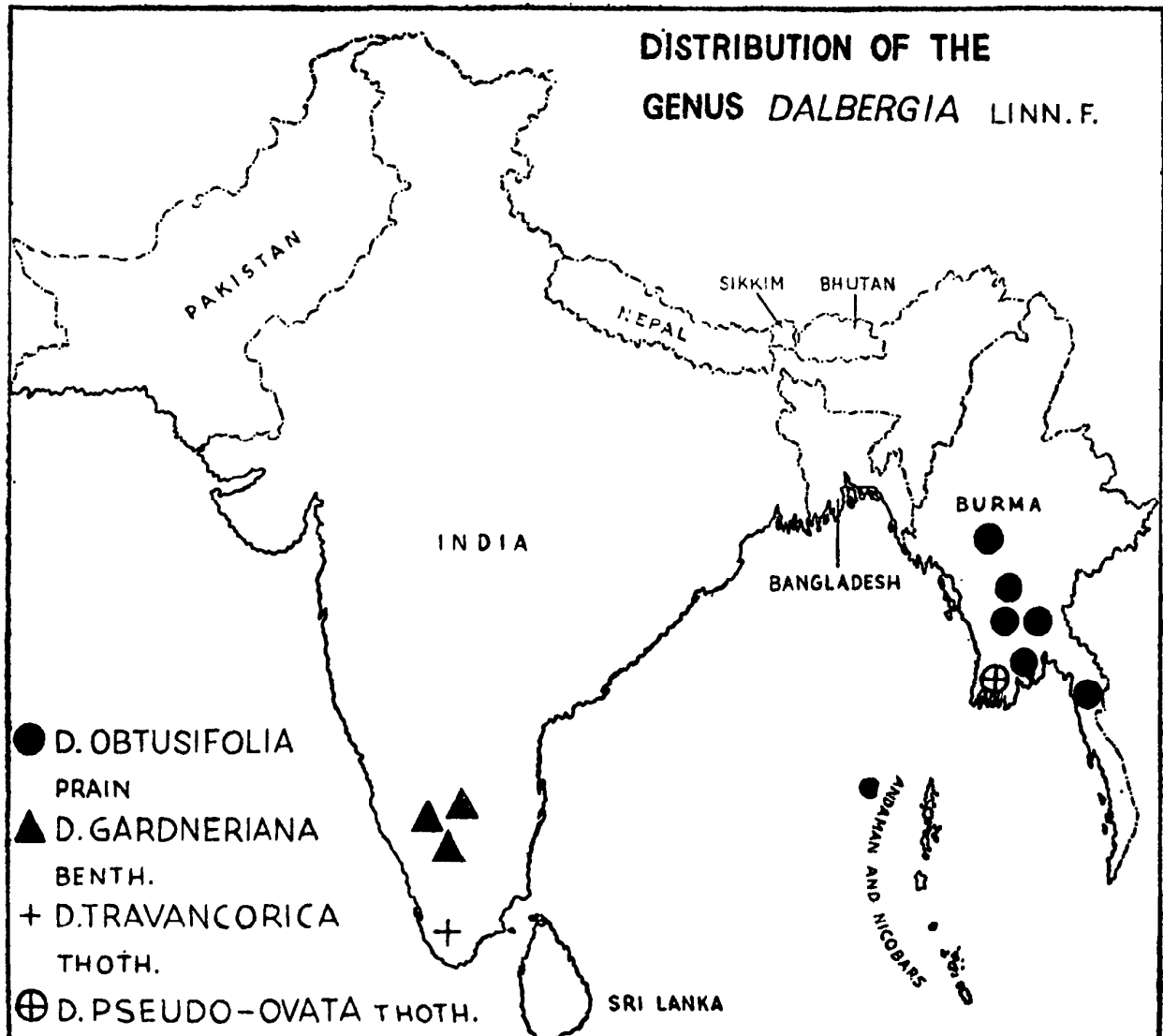
Tamil Nadu : Madras (without definite locality), Sept. 1898 *A.G. Bourne & Thurston* s.n. (CAL, LE); Coimbatore, Girmalam, 1000 m, Mar. 1931 *Jacob* 429 (MH); Top slip, Annamalayas, 750 m, Mar. 1931 *Narayanaswami* 5297 (MH); Anamalays, Mar. *Beddome* s.n. (MH); Hassanur, Aug. 1914 *Collector*. 10555 (MH); Nilgiris, June 1884 - *Gamble* 14374 (CAL); Selagor, 1000 m, Mar. 1870 *Clarke* 11305 C & J (CAL, LE); Pulneys, Kodaikanal ghat, Jul. 1847 *Bourne* 139 R (CAL); Lower Pulney hills, 1000 m, Aug. *Sauliers* 845 (CAL), Pumbli, Courtallam, 267 m, Tirunelveli district, Mar. 1958 *Subramanyam* 5640 (MH); Pen. Ind. Or. *Wight* 931, 815 (CAL); Mundanthurai, Tinnevely district, Mar. 1917 *Collector* ? 14593 (MH); Balarampore 500 m, Kanyakumari district, Jan. 1978 *Henry* 52482 (MH, CAL); Kilaviarumalai, Kanyakumari district, 500 m, Aug. 1976 *Henry* 48114 (MH, CAL).

Wall. Cat. : Pen. Ind. Or. *Wight* 827 (Wall. Cat. 5876 A Syntype MH, K, CAL).

A. Ecology : The plant is a medium sized tree of the deciduous forests, usually growing at lower elevations but occasionally found up to 1666 metres. In Kerala the trees prefer outer hill slopes. In Western ghats the tree grows along with *D. latifolia* Roxb. and can be distinguished at a distance by its new foliage which is golden yellow as compared to the dark green foliage of the latter.

B. Critical notes : *Dalbergia sissoides* Grah. ex Wt. & Arn. is closely related to *D. latifolia* Roxb., and it is rather difficult to distinguish both in the herbaria. This has led many of the earlier botanists to treat this species as a variety of *D. latifolia* Roxb. (Bentham l.c. 1860; Beddome l.c. 1869; Baker l.c. 1876). But a critical examination of the two taxa both in field as well as in the herbaria reveal certain characters which mark them distinct from one another. *D. sissoides* has ovate to obovate leaflets with an acute apex while they are mostly orbicular with a retuse or emarginate apex in *D. latifolia*. The inflorescence is usually longer in *D. sissoides* and the flowers too are larger. The pod in *D. sissoides* is acute at apex with a longish apicule while it is obtuse at apex in *D. latifolia*. Prain in his treatise on the asiatic species of *Dalbergia* (l.c. 1901) treated *D. sissoides* under *D. emarginata* Roxb. but soon corrected his mistake in his later monograph (l.c. 1904) where *D. sissoides* has been regarded as a distinct species.

The examination of the type of *Dalbergia javanica* Miq. from Java confirms again that this species and *D. sissoides* are one and the same



Map 3

plant. Baker (1876) was therefore justified in reducing the former to the latter. However, the plant has not been reported in Backer's Flora of Java, published in 1963 by Bakhuizen van den Brink.

C. *Economic importance* : The wood, commonly known as Malabar blackwood is as economically useful as *D. latifolia* Roxb. The timber is said to be harder and stronger and not so susceptible to good polish.

D. *Typification* : Wall. Cat. 5876 (type) consists of 2 specimens namely, 5876 A (Herb. Wight) and 5876 B (Nilgiris *Noton*). Out of the two syntypes, Wall. Cat 5876 B (Nilgiris *Noton*) has been selected as Lectotype of this taxon.

4. *Dalbergia ovata* Grah. (Wall. Cat. 5854, 1832, nomen) ex Benth. in Miq. Pl. Jungh. 1 : 254. 1852 et Journ. Linn. Soc. 4 (Suppl.) : 40. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1877 et For. Fl. Brit. Burma 1 : 343. 1877 ; Prain in Journ. Asiat. Soc. Beng. 66 : 443. 1897 et Ibid. 70 : 43. 1901 et in Ann. Roy. Bot. Gard. 10(1) : 78. 1904.

Dalbergia glauca Wall. Cat. 5862, 1832, nomen ; Voigt, Hort. Suburb. Calcutt. 241. 1845 (nomen). *Amerimnon ovatum* (Grah.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A small tree, 8-12 m high ; branches glabrous. *Leaves* imparipinnate, alternate, stipulate, 15-28 cm long, rachis glabrous ; leaflets 5-7, rarely 9 (Insein, Burma *Parkinson* 14), ovate to ovato-oblong, 6.0-13.4 × 3.5-6.4 cm, usually alternate, rarely subopposite to opposite, entire, acuminate at apex, rounded at base, coriaceous, glabrous, lateral veins 6-8 pairs ; stipules caducous, petiolules 5-9 mm long, glabrous. *Inflorescence* flowers in much branched terminal and axillary panicles, 16-34 cm long ; rachis glabrous in general but younger ones puberulous to pubescent. *Flowers* white, 5-7 mm long, subsessile to minutely pedicellate ; pedicels slender, 0.6-1.5 mm long puberulous ; bracts deciduous, bracteoles 2, distinct, 2.0-2.5 mm long, puberulous, deciduous. *Calyx* campanulate, 5.0-6.5 mm long, glabrous, 5-toothed, teeth subequal, lowest one obtuse and longer than rest. *Corolla* vexillum oblong to obovate at times, 6 mm. long, emarginate, shortly clawed ; wings and keels distinctly clawed, keels prominently auricled below. *Stamens* 9, monadelphous, staminal sheath 6.0-6.5 mm long, open on the dorsal side, filaments free on their upper third, anthers 2-celled. *Ovary* 5-6 mm long, oblong, long stipitate, mostly glabrous, style bent upwards, stigma minute, ovules 3, reddish brown. *Pod* oblong to oblong-lanceolate, flat, 5.0-11.5 × 1.5-2.0 cm, stalked, rounded at apex with a minute mucro, rarely acute, glabrous, 1-2-seeded, rarely 3-seeded, reticulately veined against the seed ; seeds compressed, oblong to reniform, 6-10 × 3-6 mm, brownish black.

Type : Moolmyn, Burma, 1827 *Wall. Cat* 5854 (Isotype in CAL, LE).

Flower : January to February. *Fruit* : February to April.

Distribution : BURMA (Martaban, Pegu, Tavoy, Tenasserim, Thoun-gyne and Yainway) and SIAM. (Map-3).

Specimens examined :

Burma : Thayagon, Hautawaddy district, Jul. 1906 *J.H. Lace* 2893 (CAL) ; Pyinmadaw reserve, Insein district, Feb. 1925 *C.E. Parkinson* 14 (CAL) ; Mouelmein, 1912 *Meebold* 17215 (CAL) ; Rangoon, Feb. 1914 *Rodger* 17 (CAL) ; Martaban, 1911 *Meebold* 17217, 17216 (CAL) ; King Tung, S. Shan States, 1333 m, Dec. 1909 *MacGregor* 1277 (CAL, BSI) ; Kywemalaing, Thanawaddy district, Feb. 1905 - *J.H. Lace* 2772 (CAL) ; Rangoon, Mar. 1911 *Meebold* 14008 (CAL) ; Dawana range, 333 m, Thaton district, Feb. 1909 *Lace* 4597 (CAL) ; Yainway, Feb. 1869 *Brandis* 1185 (CAL) ; Moulmein *Falconer* 566 (CAL) ; Rangoon, Jan. 1857 - *Cleghorn* 52 & 170 (CAL) ; Pegu road *Kurz* 2610 (CAL, BSI) ; Mouelmein *Parish* s.n. (CAL) ; Kalapauzin river between Southi doung and Yinma, Akyab district, Jan. 1907 - *Burkill* 28004 (ISIM) ; Pegu *Kurz* 2607 (CAL) ; Tavoy, Jan. 1901 *Shaik Mokim* 265 (CAL) ; Kalapurzin river between Suthidoung & Yinma, Akyab district, Jan. 1907 - *Burkill* 2804 (CAL) ; Kaw Kareik, Kyondo to summit of Dawna hills, Amherst district, Mar. 1908 *I.H. Burkill* 3205 (ISIM) ; Moolmyne *Griffith* 125 (KW) ; Rangoon, Feb. 1938 *Dickson* 7138 (LE).

Wall. Cat. : Moolmyne, Martaban, 1827 *Wall. Cat.* 5862 (K, LE, Type of *Dalbergia glauca* Wall. non. Kurz.)

KEY TO THE VARIETIES

- 1a. Leaflets glabrous ; pod markedly reticulated against the seeds var. *ovata*
- 1b. Leaflets puberulous below ; pod not markedly reticulated against the seeds
 - 2a. Inflorescence a terminal panicle var. *puberula*
 - 2b. Inflorescence a short, axillary, congested panicle with densely crowded flowers var. *glomeriflora*

Dalbergia ovata Grah. ex Benth. var. **puberula** Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1876 emend. Thoth.

The variety differs from the typical plant in having 8 leaflets which are persistently puberulous and pods not markedly reticulated against the seeds.

Leaves imparipinnate, alternate, 19.0-21.5 cm long ; leaflets 8, ovate to ovato-elliptic, 4.5-6.2×3-4 cm, alternate, subopposite to opposite, entire, shortly acuminate, rounded at base, subcoriaceous, glabrous above and puberulous below ; petiolules 3-5 mm long, puberulous to pubescent. *Inflorescence* a terminal panicle. *Flowers* not known. *Infructescence* 16 cm long. *Pod* oblong, 3.0-4.5×1.2-1.5 cm, shorter than in the typical plant, 1-seeded, not markedly reticulated against seeds.

Type : Pegu, Irawaddy district - *Brandis* s.n. (Holotype, CAL).

Distribution : BURMA (Pegu and Yamethin district).

Specimens examined :

Burma : Nagalaik reserve, Yamethin district, Jan. 1909 *Lace* 4556 (CAL, DD).

Kurz (l.c. 1876) described the leaflets and panicles puberulous while the author after a careful examination of other collections, observed few more characters as stated above. Further the puberulous nature of panicles as observed by Kurz in this variety is also shared by the typical plant. Hence an amended description is given.

Dalbergia ovata Grah. ex Benth. var. **glomeriflora** (Kurz) Thoth. in Bull. bot. Surv. India 25 : 170, 1985.

Dalbergia glomeriflora Kurz in Journ. Asiat. Soc. Beng. 42 : 70. 1870 ; Baker in Hook. f. Fl. Brit. India. 2 : 246. 1876 ; Kurz, For. Fl. Brit. Burma 1 : 345. 1877 ; Watt, Dict. Econ. Prod. 3 : 6 1890 ; Prain in Journ. Asiat. Soc. Beng. 70 : 50. 1901 et in Ann. Roy. Bot. Gard. 10(1) 77. 1904 ; Brandis, Indian Tr. 237. 1907 (ed. 2). *Amerimnon glomeriflorum* (Kurz) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A medium sized tree, 10-15 m high ; young shoots densely, tawny tomentose. *Leaves* imparipinnate, alternate, stipulate, 16 cm long ; leaflets 7-9, ovate to obovate, 5.0-7.5×3.2-4.7 cm, entire, acute, rounded to cuneate at base, coriaceous, glabrous above, puberulous below especially on the nerves ; petiolules 1.5-3.0 mm long, stipule ovate-obtuse, glabrous. *Inflorescence* a short, congested panicle at the end of young villous shoots in the axil of fallen leaves, 3-4×2.0-2.5 cm *Flowers* small, white, 3-4 mm long, almost sessile ; bract small, bracteoles oblong, just at the base of the calyx cup, deciduous. *Calyx* campanulate, 3 mm long,

glabrous, 5-toothed, teeth ovate-obtuse except the lower, longest and acute one. *Corolla* white, vexillum ovato-oblong, shortly clawed, 2.5-3.5 mm long; wings oblong, clawed; keels well auricled at base. *Stamens* 10, monadelphous, sheath 3 mm long, split open dorsally, at times vexillary filament free above but connate with the sheath at base, filaments free on their upper third, alternately shorter and longer. *Ovary* 2-3 mm long, glabrous except the hairy stipe, style short, slender, stigma minute, ovules 2-3. *Pod* not known.

Type : Prome, Burma—*Kurz* 2611 (Holotype, CAL).

Flower : March-April.

Distribution : BURMA The variety has so been known only from type locality.

A. *Etymology* : The epithet '*glomeriflora*' denotes the arrangement of flowers in densely crowded, head like panicles.

B. *Ecology* : The tree grows rather rare in upper mixed forests of Prome between 300-650 m and is leafless during hot season.

C. *Critical notes and taxonomic status* : *Kurz* (l.c. 1873) described this plant as a distinct species, characterised by diadelphous stamens and was later followed by *Baker* (l.c. 1876) who placed it under the subgenus *Dalbergaria*. Actually the stamens are strictly monadelphous as was clearly pointed out by *D. Prain* (l.c. 1901 & 1904). It cannot therefore be placed under the subgenus *Dalbergaria*, but should find a place in the subgenus '*Sissoa*'. The characters of leaf as well as inflorescence strike a close resemblance to *D. ovata* to which it has been reduced as a variety.

General notes for the species :

A. *Etymology* : The epithet '*ovata*' refers to the characteristic ovate shape of the leaflets of this species.

B. *Ecology* : According to *Kurz* (1877) this species is a small tree, frequent in the upper mixed forests of Pegu Yomah, less so in those from Martaban down to upper Tenasserim, especially along the Choungs. It sheds its leaves during hot season.

C. *Critical notes* : The species, although named by *Graham* in *Wallichian catalogue* (1832) was validated by *Bentham* in 1852. The plant has so far been reported from Burma and Siam (*Prain*, l.c. 1904).

Regarding the habit, *Bentham* (l.c. 1860) doubtfully described it as a tree while according to *Baker* (l.c. 1876) it was scandent. It was *Kurz* (1877) who described it as a middle-sized tree.

The timber is not economically important except for making chisel-handles.

5. *Dalbergia obtusifolia* (Baker) Prain in Journ. Asiat. Soc. Beng. 70 : 42. 1901 et in Ann. Roy. Bot. Gard. 10(1) : 76. 1904 ; Gage in Rec. bot. Surv. India 3 : 49. 1904 ; Nayar & Ramamurthy in Bull. bot. Surv. India 15 : 213. 1973 (1976).

Dalbergia ovata Grah. ex Benth. var. *obtusifolia* Baker in Hook. f. Fl. Brit. India 2 : 231. 1876. *D. giauca* Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1877 et For. Fl. Brit. Burma 1 : 343. 1877, non Wall.

A tree, 10-20 m high ; branches glabrous, stem fluted and buttressed; bark brownish grey, longitudinally striate and minutely fissured. *Leaves* imparipinnate, alternate, stipulate, 21-32 cm long, rachis glabrous ; leaflets mostly 5, rarely 7 (Burma—*Rogers* 365), ovate to elliptic, 6.5-18.5×4.5-10.5 cm, alternate, rarely subopposite, distal ones always largest, entire, obtuse to retuse at apex, rarely shortly cuspidate, narrow to rounded at base, coriaceous, glabrous and somewhat glaucous beneath, lateral veins 7-8 pairs ; stipule caducous ; petiolules 5-9 mm long, glabrous. *Inflorescence* flowers arranged in terminal as well as axillary, profusely branched, loose panicles, 16-38 cm long, younger branches puberulous to pubescent. *Flowers* yellowish white, 5-6 mm long, pedicellate ; bract minute, bracteoles 2, puberulous when young. *Calyx* campanulate with a bract and bracteole at its base, 4 mm long, glabrous, 5-toothed, teeth obtuse, ciliate, reticulately veined. *Corolla* vexillum oblong emarginate, veined, 4.5-6.0 mm long, shortly clawed ; wings clawed with a distinct, oblong, callus on the upper side just above the auricle ; keels clawed and auricled with a folded callus just above it (character not mentioned by earlier workers). *Stamens* 9, monadelphous, sheath 5.0-5.5 mm long, split open dorsally, filaments free on their upper one-third. *Ovary* distinctly stipitate, 6 mm long, glabrous, 3-ovuled, style bent upwards, stigma minute ; ovules small, reddish brown. *Pod* oblong to linear-oblong, 4.0-7.5×1.2-1.6 cm flat, shortly stipitate, rounded at apex, glabrous, 1-2 - seeded, reticulate against seeds; seeds compressed, reniform, brown, 9×6 mm.

Type : Hukung valley, Burma—*Griffith* 1809 (Lectotype designated, K).

Flower : January to February. *Fruit* : March to April.

Distribution : BURMA (Pegu, Martaban, Tenasserim and Shan States). (Map-4).

Specimens examined :

Burma : Kadinbilin reserve, Tharawaddy district, Feb. 1905 *Lace* 2771 (CAL) ; Mohuyin reserve, 300 m, Katha district, Feb. 1910-*Lace* 5131 (CAL) ; Sabyin reserve, 330 m, Toungoo district, Mar. 1914 *Gilbert Rogers* 365 (CAL, DD) ; Katiah hills, Feb. 1901 - *Prazer* 8 (CAL) ; Madoe hill, Upper Burma, Feb. 1893 *King's collector* 224 (CAL) ; Shan States, Upper Burma, Jan. 1981 *Abdul Huk* s. n. (CAL) ; Minbu, Jan. 1903 *Shaik Mokim* 1235 (CAL) ; Kindat, Upper Chindwin, Dec. 1907 *Meebold* 1906 (CAL) ; Katha district, 180 m, Feb. 1926 *Saw Maung Mya* 2335 (DD) ; Between Hsipaw and Mansang, Shan States, Jan. 1904 *Burkill* 24141 (ISIM) ; Upper Burma (without definite locality), 1889 *Conservator of forests* s.n. (ISIM) ; Upper Burma (without definite locality) *A. Smythies* s. n. (CAL) ; Pegu 1871 *Kurz* 1784, 2607 (Syntypes in K, CAL, BSI).

***Dalbergia obtusifolia* Prain var. *rogersii* Thoth.** in *Reinwardtia* 8 : 330. 1972.

D. obtusifolia Prain var. *rogersii* Thoth. differs from the typical plant in having shorter leaves with comparatively smaller, obovate leaflets which are decidedly obtuse at apex and minutely puberulous below.

Branchlets glabrous. *Leaves* imparipinnate, alternate, 8-15 cm, leaflets 5-7, obovate, 2.6 5.0 × 2.2 3.2 cm, entire, retuse at apex, cuneate at base, coriaceous, glabrous above, finely and minutely puberulous on the ventral surface, lateral veins 6-8 pairs, rachis glabrous ; petiolules, 4-5 mm long, glabrous. *Inflorescence* a profusely branched, axillary panicle, 15 25 cm long, rachis puberulous. *Flowers* yellow. Calyx, corolla, stamens and ovary as in the typical plant. *Pod* not known.

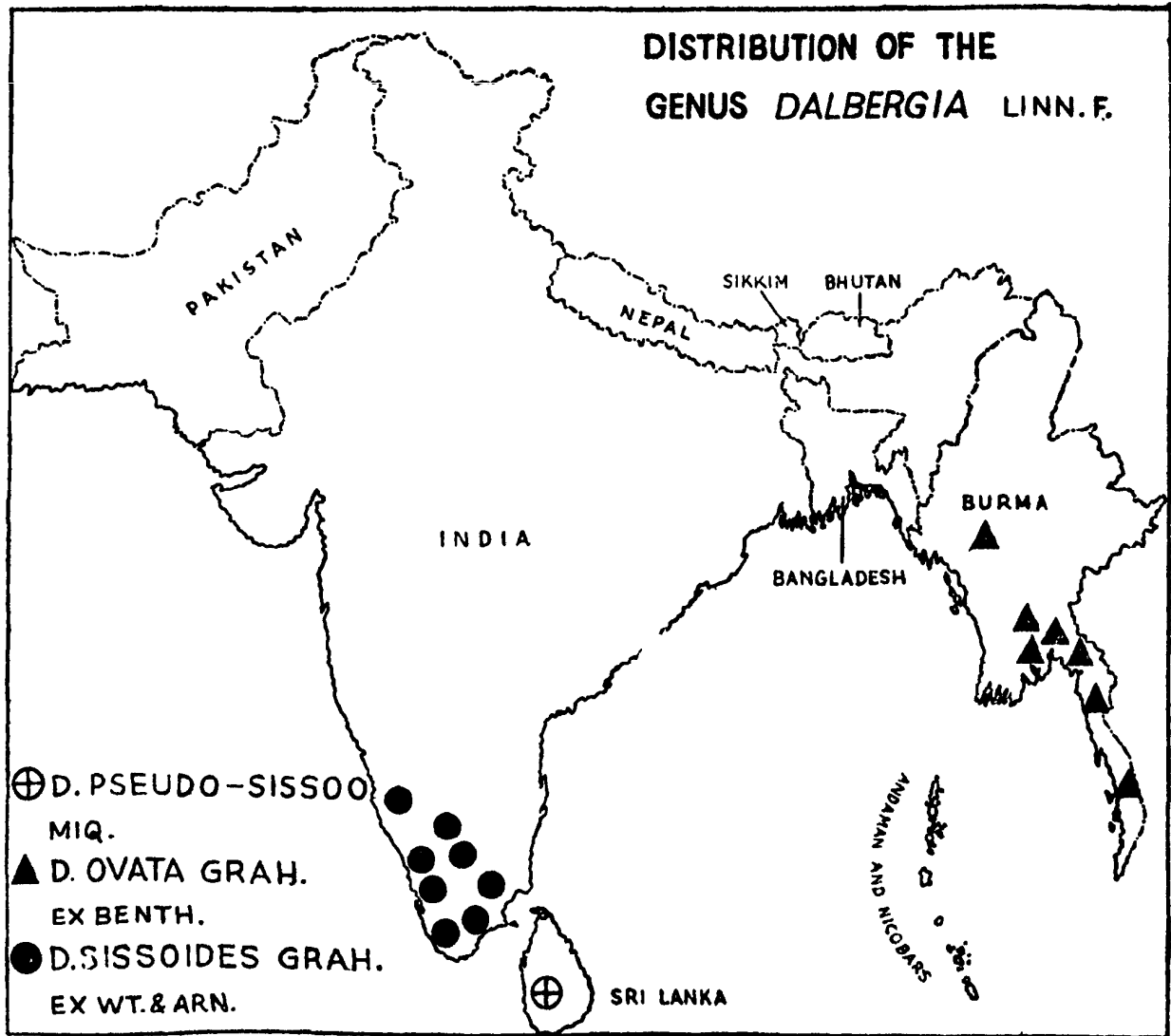
Type : Minbyin reserve, compartment 47, 100 m, Yamethin district, Feb. 1915 *Gilbert Rogers* 583 (Holotype DD).

Distribution : BURMA.

A. Etymology : The specific epithet '*obtusifolia*' denotes the obtuse apex of the leaflets which is characteristic of this species.

B. Ecology : According to *Kurz* (1867) this species is frequent in the Upper mixed forests of Pegu, Martaban down to Tenasserim. The leaves are shed during hot season.

Typification : *Baker* (l. c. 1876) described the plant on the basis of two collections, made by *Griffith* and *Kurz* respectively. *Griffith's* 1809 and *Kurz's* 1784, 2607 from Burma are, therefore, the syntypes. Out of these syntypes, *Griffith* 1806 has been chosen as the lectotype of this taxon.



Map 4

D. Critical notes : The plant was first described as a variety under *Dalbergia ovata* Grah. ex Benth. (Baker l.c. 1876). Later it was raised to the rank of an independent species by *D. Prain* in 1901 and according to him it differs from *D. ovata* in its larger, obtuse leaflets, smaller flowers, obtuse calyx-teeth, and smaller bracteoles. Further the wings and keels of this species differ considerably from *D. ovata* in having callosities, a character neither mentioned nor observed by earlier workers (Baker, 1876, Prain, 1901)

There are a few interesting points in the nomenclatural history of this species. Bentham (l.c. 1852) treated *D. glauca* Wall. as conspecific with *D. ovata* Grah. ex Benth. and this was followed by Baker (1876) and Prain (1901 & 1904). Kurz on the other hand (l.c. 1877) applied Wallichian name to this species under the impression that *D. glauca* Wall. is the same as *D. obtusifolia*. The glaucous nature of the leaflets led Kurz to come to this conclusion. Actually Prain (l.c. 1904) examined Wallichian specimen of *D. glauca* and found it to be identical with *D. ovata*. Further the leaflets of *D. ovata* are to some extent glaucous beneath. Kurz's *D. glauca* (1877, non Wall.) on the other hand is this plant, treated by Baker as a variety of *D. ovata* and later raised to a species, *D. obtusifolia* by Prain.

The nomenclatural difficulty lies in the correct interpretation of *D. glauca* Wall. (Martaban Wall. Cat. 5862) which is not present in Calcutta herbarium. If the leaflets in Wall. Cat. 5862 are glaucous and obtuse at apex, the name *D. glauca* Wall. ex Kurz (1877) has priority over *D. obtusifolia* Prain (1901). The author was able to examine Wall. Cat. 5862, received from Kew herbarium. The sheet contains only pods without any leaflets and the pods are those of only *D. ovata* Grah. ex Benth. Also the author examined a duplicate of the same Wall. Cat. 5872 in the herbarium of Komarov Botanical Institute, Leningrad when he visited the Soviet Union under Cultural Exchange Programme and formed a similar opinion. It is, therefore, concluded that *D. glauca* of Wall. Cat 5862 is same as *D. ovata* Grah. ex Benth.

The wood of this plant is used in a similar manner as that of *D. ovata* Grah ex Benth.

6. *Dalbergia pseudo-ovata* Thoth. in Journ. Jap. Bot. 50(2): 52. 1975. (Fig. 1)

Dalbergia pseudo-ovata Thoth. is related to *D. ovata* Grah. ex Benth. but differs in the pubescent leaflets, and lanceolate pods which are much longer and narrower at both ends. It is placed in the section 'Sissoa' under the series 'Ovatae'.

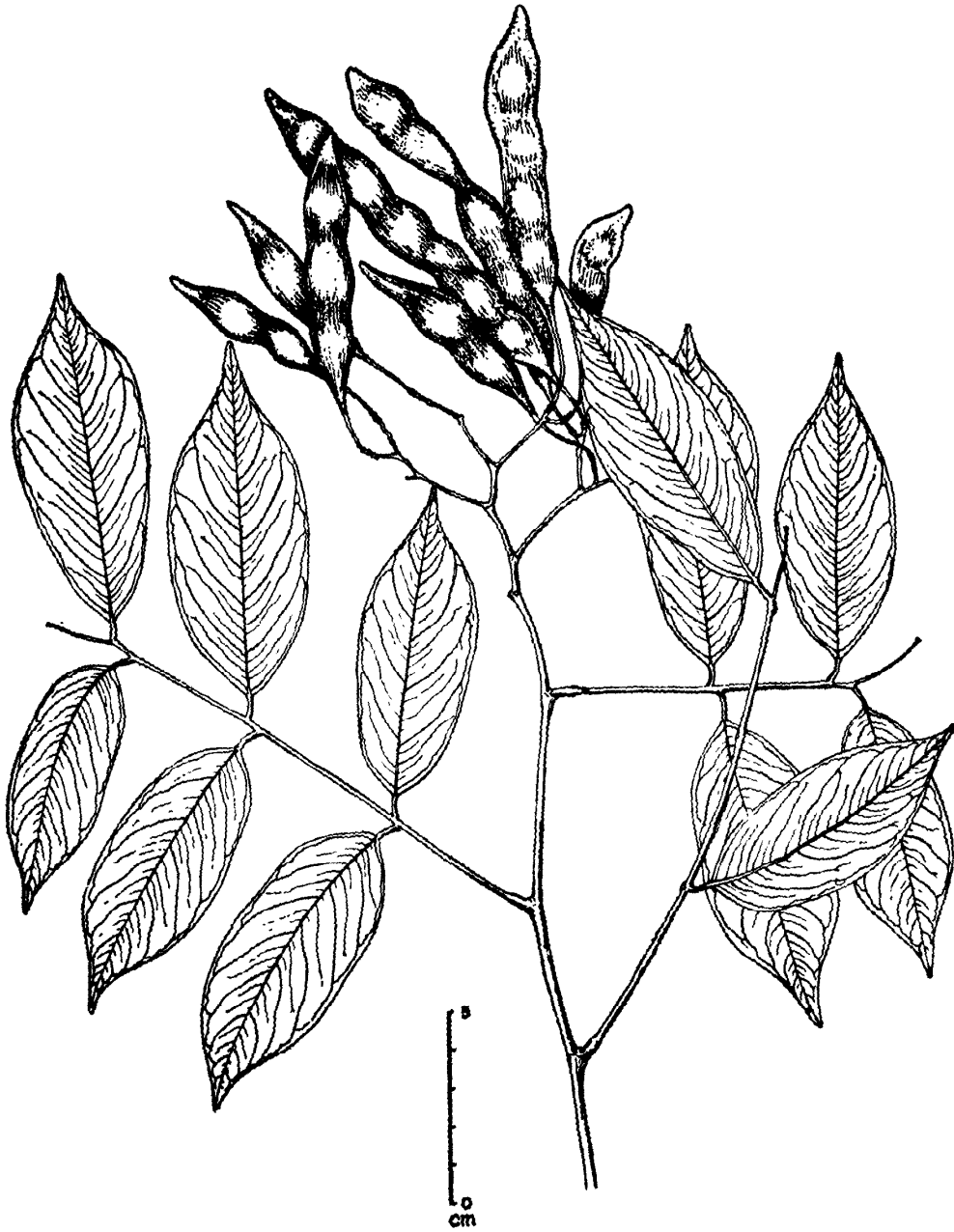


Fig. 1. *Dalbergia pseudo-ovata* Thoth.

A small tree. *Leaves* imparipinnate, alternate, 18-24 cm long; leaflets 5-7, oblong to obovato-oblong, 7.5-9.3 × 3.0-3.7 cm, alternate to subopposite, entire, shortly acuminate at apex, narrowed at base, subcoriaceous, glabrous above, puberulous below, lateral veins 6 pairs; rachis sparsely adpressed brown hairy; petiolules 4-5 mm long, puberulous. *Flowers* not known. *Infructescence* 15 cm long, terminal. *Pod* lanceolate, flat, 6.5-12.2 × 1.0-1.2 cm, tapering below into a long stalk, much narrowed at apex, glabrous, faintly veined opposite the seeds, 1-3 seeded; seeds oblong, brownish black, 9.0 × 5.5 mm, smooth and compressed.

Type: Kangyi reserve, 24 m, Tharawaddy district, Burma, Feb. 1912 *Lace* 5707 (Holotype, CAL; Isotype, K).

Fruit: May.

Distribution: BURMA

(Map 4)

Specimens examined: Burma Forest School Herbarium, 380 ft, Apr. 1213 *Collector* s.n. (K).

A. *Etymology*: The specific epithet '*pseudo ovata*' denotes the false resemblance of this species to *D. ovata* Grah. ex Benth.

B. *Critical notes*: Though the species lacks the flowers, the pod characters are so distinct that it doubtless represents a new taxon with affinities to *D. ovata* Grah. ex Benth.

7. *Dalbergia lacei* Prain in Kew Bull. 58. 1907 emend. Thoth.

A medium sized tree, 7-13 m high; younger branches pale green, puberulous. *Leaves* imparipinnate, alternate, stipulate, 16-25 cm long; leaflets 7-9, alternate, rarely subopposite, ovate to ovato-oblong, 5-8 × 2.5-4.5 cm, entire, narrow to rounded at base, acuminate at apex, glabrous above, puberulous below, lateral veins 6-7 pairs; rachis pale green, puberulous to pubescent, petiolules 3-5 mm long, grey pubescent; stipules small, puberulous, caducous. *Inflorescence* terminal and axillary panicles, 7-14 cm long, 6-8 cm wide, rachis and branches grey pubescent. *Flowers* light yellow to white, 4-5 mm long, pedicellate; bract small, bracteoles ovate, glabrous, deciduous; pedicels slender, 2-4 mm long, pubescent. *Calyx* campanulate, 2.5-3.0 mm long, glabrous, 5 toothed, segments ovate, obtuse, unequal, lowermost longest and acute. *Corolla* vexillum oblong, 4 mm long, retuse at apex, deflexed, clawed; wings oblong, smaller than keels, clawed; keels wide-oblong, longer than wings, blade distinctly auricled below, lobe of the auricle as long as the claw. *Stamens* 10, monadelphous, sheath 5 mm long, split open dorsally, filaments free on their upper third to half. *Ovary* 4.0-4.5 mm long, disti-

nctly stipitate, glabrous, style slender, bent, stigma minute, ovules up to 4. *Pod* indehiscent, narrowly oblong, 3-5 × 1.0-1.2 cm, flat, strap shaped, acute at apex, narrowed at base into a long stalk, glabrous, 1-2 seeded, more or less smooth (Pod characters given for the first time).

Type : Henzada, N. Myanaung reserve, Burma *Lace* 2810 (Holotype, K).

Distribution : BURMA (Map-7).

Flower : April. *Fruit* : April to May.

Specimens examined :

Burma : Saingyane reserve, North Loungoo district, Burma - *Ba Pe* 9496 (DD) ; Haka, on slopes, 634 m, Apr. 1938 *Dickason* 7469 (LE); Haka, Hrawng Vung. 834 m, Apr. 1938 *Dickason* 7643 (LE) ; Aingyi, Mar. 1919 *Collector* of Burma Forest School Herbarium 87 (K); Maymyo Plateau, Mandalay dt. 1166 m, Aug. 1913 *A.E. English* 43 (K).

A. *Etymology* : The species has been named after the collector cum explorer *J.H. Lace*.

B. *Ecology* : The plant is a medium sized tree, found in open mixed forests up to an elevation of 850 m.

C. *Systematic position* : The species has been considered to be a member of the group 'ovatae' (Prain 1907) and near to *D. ovata* Grah. ex Benth. It differs however in having calyx cup obtusely toothed, 10 stamens and leaflets being pubescent on the lower surface.

D. *Critical notes* : *Dalbergia lacei* was known only in flowers when it was described by Prain in 1907 on a single collection of *Lace*. Later collections of *Ba Pe* (1929) and *Dickason* (1938) of this taxon were examined by the author. It is felt that the original description of Prain needed corrections. Further the pod character is given for the first time from the above collections. An emended description is therefore given.

8. *Dalbergia pseudo-sissoo* Miq. Fl. Ind. Bat. 1 : 128. 1855 ; Prain in Journ. Asiat. Soc. Beng. 66 : 118. 1897 ; Alston in Trim. Ceyl. Fl. (Suppl.) : 86. 1931 et Kandy, Fl. 31. 1938 ; Abeywichkrama in Ceyl. Journ. Sci. 2 (2) : 174. 1959 ; Thoth. in Proc. Indian Acad. Sci. (Pl. Sci.) 92 : 25. 1983 ; Nair et Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983.

Dalbergia rostrata Grah. (Wall. Cat. 5867. 1832, nomen) ex Prain in Journ. Asiat. Soc. Beng. 70 : 45. 1901 et in Ann. Roy. Bot. Gard.

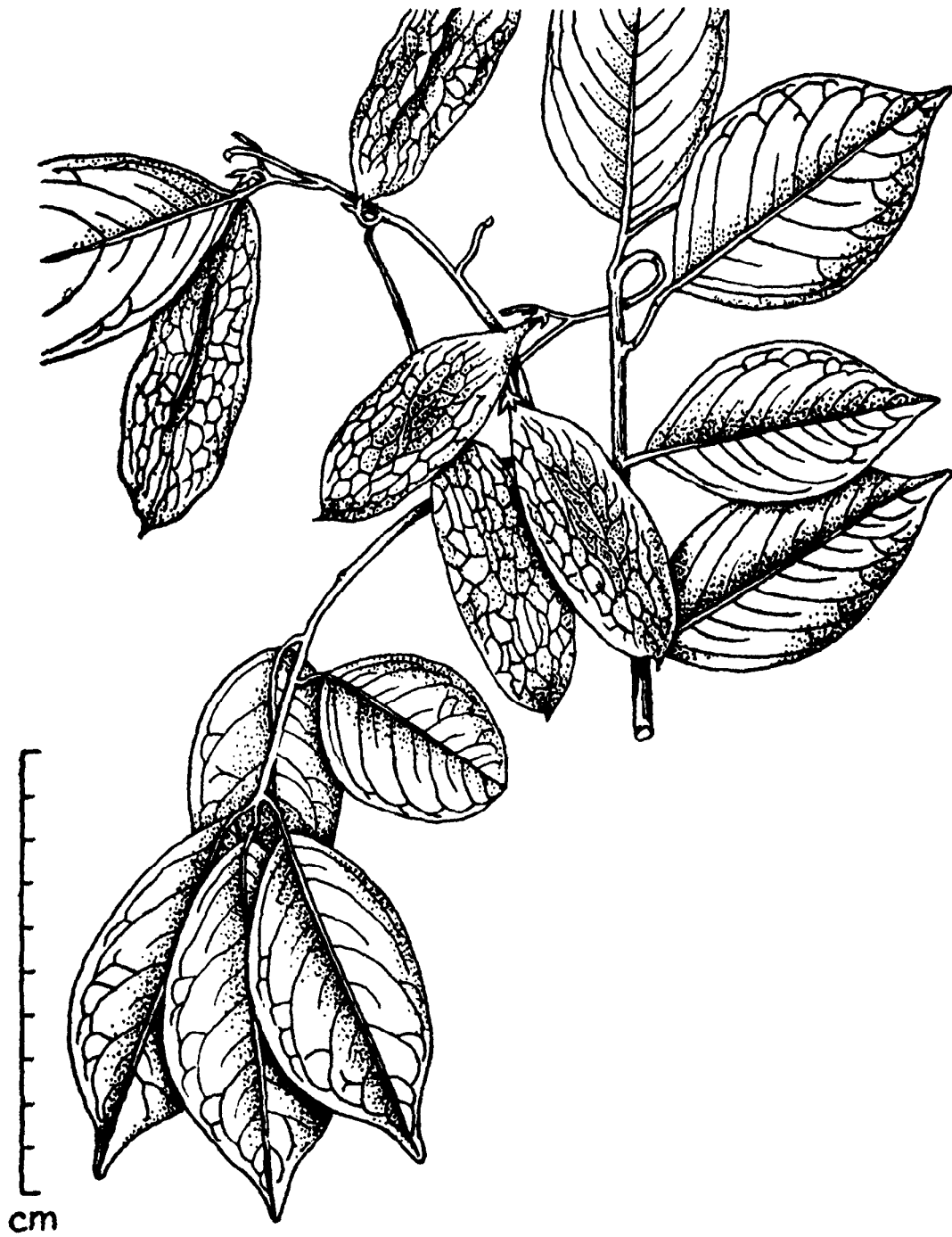


Fig. 2. *Dalbergia pseudo-sissoo* Miq.

(1) : 60. 1904 ; Gamble, Fl. Pres. Madras 2 : 382. 1918 ; Ridley, Fl. Malay. Pen. 1 : 590. 1922. *D. sissoo* Miq. Fl. Ind. Bat. 1 : 128. 1855 non Roxb. ex DC. *D. championii* Thw. Enum. Pl. Zeyl. 94. 1859 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) 39. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876 ; Trim. Fl. Ceyl. 2 : 88. 1894. *Amerimnon pseudo-sissoo* (Miq.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891. *A. championii* (Thw.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891. (Fig. 2)

A climbing shrub, at times erect, up to 6 metres ; branchlets hooked and thus help in climbing. *Leaves* imparipinnate, alternate, stipulate, 8.5-19.0 cm long ; leaflets usually 3, at times 2-5, ovato-oblong, 6.0-12.5 × 3-6 cm, entire, cuneate to rounded at base, shortly cuspidate at apex, coriaceous, glabrous ; rachis glabrous to finely puberulous ; petiolules 4-7 mm long, glabrous to finely puberulous, lateral veins 6-8 pairs. *Inflorescence* axillary panicle with corymbose branches, 8-10 cm long, finely grey downy. *Flowers* creamy white, at times yellow, 6-8 mm long ; pedicels 1.5-2.0 mm long ; bract ovate, bracteoles 2, just at the base of calyxcup, both deciduous. *Calyx* campanulate, 3-5 mm long, 5 toothed, teeth more or less equal, triangular ovate, upper two slightly connate, calyxcup puberulous without. *Corolla* vexillum ovato oblong, long clawed, 6 mm long, deflexed ; wings obovate, long clawed, auriculate at base ; keels boat shaped, clawed. *Stamens* 10, monadelphous, sheath 6 mm. long, split along the dorsal side, filaments free on their upper fourth, alternately shorter and longer. *Ovary* 6 mm long, stipitate, pubescent, ovules 1-2 style slender, stigma minute. *Pod* indehiscent, oblong, flat and ligulate, 7.5-10.0 × 1.3-1.8 cm, obtuse at apex, glabrous, 1-seeded ; seeds oblong, 1.8 × 0.6 cm, reddish brown (After Praln 1904).

Type : Java *Miquel* s. n. (Holotype, U).

Flower : April to September. *Fruit* : November.

Distribution : INDIA (South India), SRI LANKA, MALAYSIA (Celebes, Borneo, Java, Perak, Penang, Singapore). (Map-3)

Specimens examined :

India : Banks of Tambiraparni river, forests of Ghats, Thirunelveli *Beddome* 2429 (BM).

Sri Lanka : Central Province *Thwaites* 761 (Isotype of *D. championii* Thw. CAL, LE) ; Maskeliya Valley, Kandy district, Central Province, 700 m, Apr. 1972 - *Jayasuriya* et al. 748 (MO) ; Hopewell forest ; Ratnapura district, 900 m, May 1976 *Waas* 1600 (MO).

Wall. Cat. : Singapore Wall. Cat. 5867 (Isotype of *D. rostrata* Grah. CAL).

A. *Etymology* : The specific epithet '*pseudo sissoo*' was chosen by Miquel just to point out its apparent external resemblance to *D. sissoo* Roxb. ex DC.

B. *Ecology* : The plant is a climbing shrub, found in jungles up to an elevation of 1300 m. At times it grows into a scandent shrub.

C. *Critical notes* : The plant has been known under different names in various floras. Miquel (1855) described this plant as *D. pseudo-sissoo* which was the earliest and valid name for this species. Bentham (1860) and Baker (1876) chose the name *D. championii* Thw. for this plant, making *D. pseudo-sissoo* a doubtful synonym. It was D. Prain who in 1897 proved beyond doubt that *D. pseudo-sissoo* and *D. championii* were both conspecific and that the former was a valid one on grounds of priority. Later in 1901 Prain adopted a different name namely, *D. rostrata* Wall. on the ground that *D. rostrata* Wall. Cat 5867. 1832 and *D. pseudo-sissoo* were both identical and the former was an earlier name. It is true both *D. rostrata* Wall. and *D. pseudo-sissoo* Miq represent one and the same species but the former was a nomen nudum in 1832 and hence has no priority over the validly published *D. pseudo-sissoo* in 1855. Ridley (l.c. 1922) followed the mistake of Prain in his flora of Malayan Peninsula. Prain's choice has been most unfortunate and cannot be accepted. *D. championii* Thw. is identical with this species and hence reduced to its synonymy.

D. championii Thw., a native of Sri Lanka was collected by Beddome in 1880 from Tirunelveli forests, South India and has never been collected so far. It therefore represents one of the rare species of the genus in India in spite of the extensive and intensive botanical explorations conducted in South India. Further *Beddome* 2424 is the only collection of this species from India and that too located only in BM. (Thothathri, 1983).

A critical study of this specimen brought out few significant points not mentioned by earlier workers. Baker (1876), Prain (1904) described the pods glabrous and not veined opposite the seeds. The pods in Beddome's specimen are puberulous and distinctly reticulately veined, especially against the seeds. As there is no representative specimen, present in Indian Herbaria, an illustration of *Beddome* 2424 is given.

9. *Dalbergia rimosa* Roxb. (Hort. Beng. 53. 1814, nomen) Fl. Ind. 3 : 233. 1832 ; Wight, Ic. t. 262. 1840 ; Walpers, Repert. Bot. Syst. 1 ; 800. 1842 ; Voigt, Hort. Suburb. Calcutt. 241. 1845 ; Benth. in Miq. Pl. Jungh. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl) : 32. 1860 ; Brandis, For. Fl. 148. 1874 ; Baker in Hook. f. Fl. Brit. India 2 : 232. 1876 ; Prain in Journ. Asiat. Beng. 70 : 61. 1901 et in Ann. Roy. Bot. Gard. 10 (1) : 38. 1904 ; Brandis, Indian Tr. 233. (ed. 2) ; Cowan, A. M. & J. M. Tr. North Beng. 52. 1929 ; Kanjilal U. N. et al. Fl. Assam 2 : 104. 1938 ; Biswas in Indian For. Rec. (N. S.) 3 : 16. 1941 ; Nayar & Ramamurthy in Bull. bot. Surv. India 15 : 213. 1973 (1976) ; Balak. Fl. Jowai 1 : 168. 1981 ; Deb, Fl. Tripura 1 : 155. 1981 ; Haridasan & Rao, Fl. Megh. 287. 1985.

Amerimnon rimosum (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A scandent shrub, often climbing, occasionally erect, 6-8 m high ; branches spreading ; dormant buds develop into spines at times (Kanjilal, 1938). *Leaves* imparipinnate, alternate, exstipulate, 11.5-25.0 cm long ; rachis glabrous to puberulous ; leaflets 7, at times 5, alternate to rarely subopposite, ovate to obovate, elliptic to rarely oblong at times, 5.5-11.0 × 2.5-6.0 cm, entire, acute to rounded at apex, mucronulate at times, retuse to emarginate, narrow at base, membranous, glabrous above, pale and puberulous beneath, lateral veins more than 10 pairs, more or less parallel ; petiolules 3-5 mm long, glabrous to puberulous. *Inflorescence* a lax, terminal panicle, at times in the axils of upper-most leaves, 13-21 cm long, branches of the inflorescence cymose. *Flowers* smallest in the genus, 3-4 mm long, pedicellate, bracteate and bracteolate ; bracteoles 2, ovato-lanceolate, persistent, puberulous. *Calyx* campanulate, 2.0-2.5 mm high, puberulous, 5 toothed, teeth oblong, longer than the tube, lower most one longer than others. *Corolla* white, vexillum ovato-orbicular, emarginate, shortly clawed, 3-4 mm high ; wings and keels oblong, clawed with a callus below where the blade joins the claw (a character not mentioned by earlier workers). *Stamens* 9-10, monadelphous, sheath split open dorsally, 2.5-3.0 mm long, anthers distinct, erect. *Ovary* oblong, 3.0-3.5 mm long, shortly stipitate, glabrous to minutely puberulous, style short, stigma minute ; ovules 2, oval. *Pod* indehiscent, oblong, distinctly stalked 5.5-12.0 × 2-3 cm, coriaceous, glabrous, strongly reticulated against the seeds acute to rounded above, narrowed below, 1-2 - seeded ; seeds brownish black, compressed, reniform, 1.2-1.5 × 0.8-1.0 cm.

Type : Sylhet Roxburgh s. n. (Holotype, K).

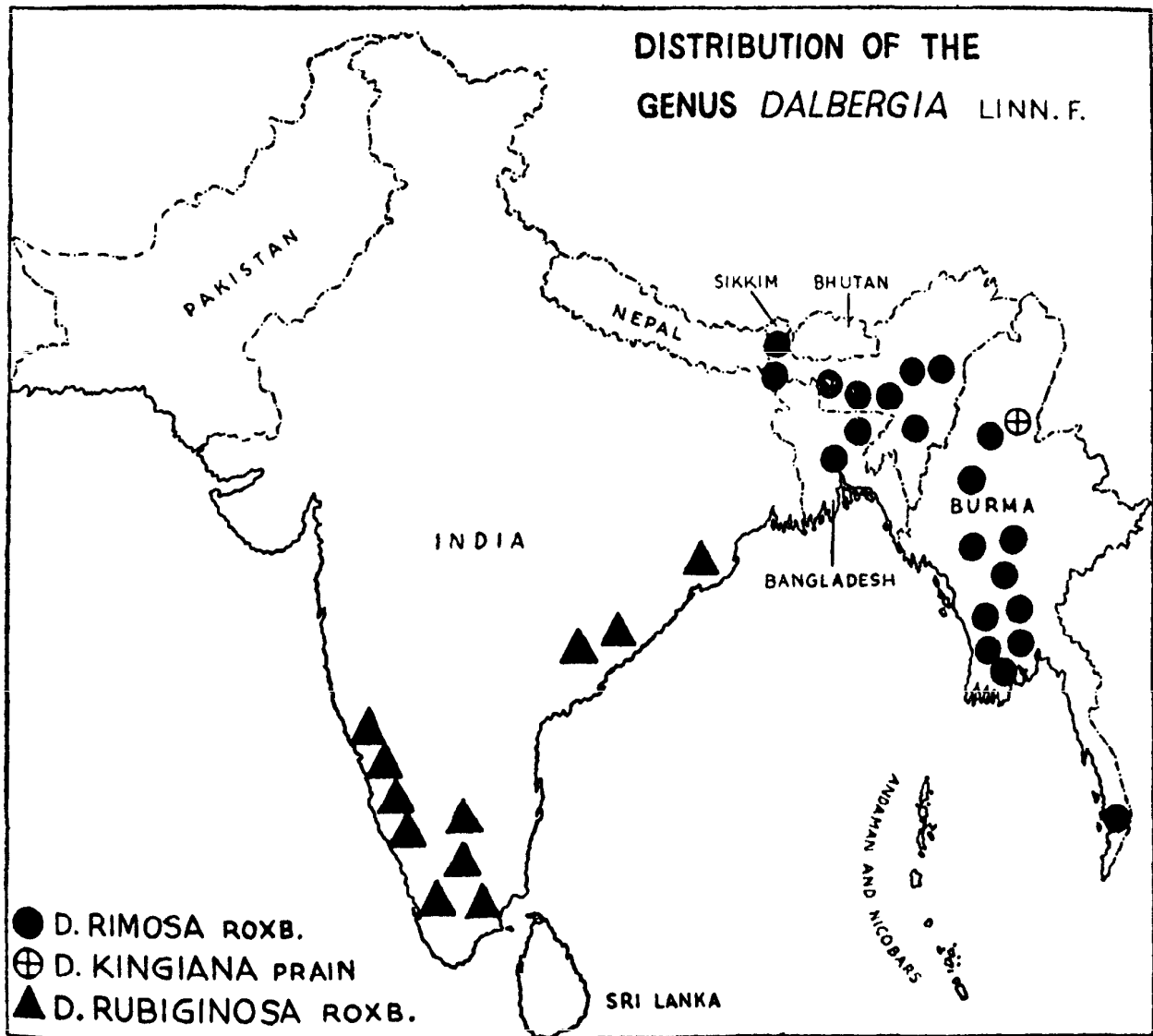
Flower : April to June. *Fruit* : October to December.

Distribution : INDIA (Assam, W. Bengal, Naga hills), Sikkim Himalayas, BANGLADESH (Sylhet), BURMA (Kachin hills and Shan States) and CHINA (Yunnan and Tonkin). (Map-5)

Specimens examined :

Assam : Khasia, Nya bungalow, 800 m, May 1885 *Clarke* 38144 F & G (CAL, LE); Without any definite locality (Khasia), 0-1333 m *Hooker f. Thomson* s. n. (CAL, LE, KW) ; Without clear locality (Khasia) *Criffith* 1801 (CAL, LE.) ; Khasia hills, 1000-1300 m, Jun. 1876 *Kurz* 119, 302, 321 (LE) ; Khasia and Jynteah hills, 1877 *C. Mann* s. n. (CAL) Cherrapunjee, Sep. 1878 *Geo Gallatly* 626 (CAL) ; Khiri, 666 m, Sept. 1886 *Geo Gallatly* 626 (CAL); Khiri, 666 m, Sept. 1886 *Clarke* 44778 A & B (CAL, LE) ; Mount Khasia, 1333 m *Hooker J. D.* s. n. CAL) : Jharia road, Mar. 1932 *Das* 10018 (ASSAM) ; Umsaw forests, May 1936 *Ram Saran* 13290 (ASSAM) ; Nongpoh, May 1923 *U. Kanjilal* 7806 (ASSAM) ; Umsaw river bank, on road to Gauhati, Jun. 1963 *A.S. Rao* 38736 (ASSAM) ; Khasia *Collector* 7, Acc. no. 65735 (MH) ; Garo Hills, Sept. 1975 *M.K.V. Rao* 64039 (ASSAM) ; Thana forest, Aug. 1935 *Deka* 13105 (ASSAM) ; Naga hills, Jirighat, Apr. 1924 *Jagarmani* 500 (DD) ; Workha, May 1885 *Watt* 11770 (CAL, ISIM) ; Neechoogard, 250 m, Oct. 1885 *Clarke* 40895 E & F (CAL, LE) ; Jabooka, May 1899 *M.A. Hock* 982 (CAL) ; Garo hills, Rongrengiri, 330 m, Sept. 1962 *Deb* 29239 (ASSAM) ; Hills, Jun. 1903 *Marten* s.n. (CAL, BSI) ; Nowgong, Dhansiri reserve, Apr, 1914 *U. Kanjilal* 3845 (CAL) ; Dengaon, Apr. 1915 *U. Kanjilal* 5550 (Assam) ; Cachar, Monier Khal on the Sonia river, Aug. 1903 *A.T. Gage* s. n. (CAL) ; Alnee on the Barak river, Aug. 1903 *Gage* s.n. (CAL) ; Banks of Barak river, May 1889 - *J.C. Prazer* 145 (CAL) ; Sonaimookh, Aug. 1903 *Gage* s.n. (CAL) ; Dhekiajuli (Assam), Apr. 1902 *Chatterjee* s.n. (BSI) ; Wakachari, Apr. 1895 *Watt* 11179 (BSI) ; Aizal to Champhai 1100-1400 m, Jun. 1963 *Deb* 30911 (ASSAM) ; Bank of river, 128 miles from Gauhati to Jorghat, May 1957 *Panigrahi* 9250 (ASSAM) ; Sibsagar, Oct. 1896 - *S.E. Peal* s.n. (CAL) ; Koio, May 1885 *G. Watt* 17811 (CAL) ; Golaghat, 1891 *King's collector* s.n. (CAL) ; Gowhatty hills *Simons* s.n. (CAL) ; Without any definite locality (Assam) 1859 *Jenkins* s.n. (CAL, BSI) ; Without any details (Assam), 1893 *Mann* s.n. (CAL) ; Without definite locality (Assam) *Masters* 55 (CAL) ; Tripura, Damcherra to Visam, 388 m, Jan. 1962 *Deb* 26914 (Assam) ; No locality : June 1903 & May 1895 *Marien* s.n. Acc. no. 11770 (MH).

W. Bengal : Jaldakar, Darjeeling district, Feb. 1900 - *G.H. Cane* 40 (CAL) ; Champa moora hills, Tipperah, Oct. 1915 *Debbarman* 923



Map 5

(CAL) ; Munsong, Jun. 1902 *Prain* s.n. (CAL) ; Darjeeling, Apr. 1816 *Collector* s.n. Acc. no 65737 (MH).

Sikkim Himalayas : Rungpo, May 1876 *King* s.n. (CAL) ; Gundha Haga, Apr. 1876 *Gamble* 453E (CAL) ; Simulbari, 330 m, Nov. 1948 *Biswas* 8666 (CAL) ; Without definite locality (Sikkim), 330-1330 m *J.D. Hooker* s.n. (CAL, KW), *Gammie* s.n. (CAL), 1879, *King* s.n. (CAL).

Arunachal Pradesh : Petepara forests, Subansiri district, 500 m, Apr. 1980 *G.D. Pal* 78301 (BSIA).

Bangladesh : Sylhet, Bholagunje, Oct. 1872 *Clarke* 17431F (CAL, LE) ; Without any details (East Bengal) *Griffith* 1801 (LE) ; Tillagarb, Nov. 1932 *A. Das* 10441 (ASSAM) ; Without details, Apr. 1876 *G. Mann* 19 (ASSAM).

Burma : S. Shan States *MacGregor* 693 (CAL) ; Kachin hills, 1897 *Shaik Mokim* s.n. (CAL) ; Tenarserim, 1808 - *Helper* s.n (CAL).

Wall. Cat. : Cultivated in Hort. Bot. Cal. 5853A (CAL, LE) ; Sylhet 5853B (CAL, LE) ; Nepal 5853 (KW).

HBC : Calcutta botanic Garden Acc. No. 130462 (CAL) ; Garden, May 1858 *Collector* ? (CAL) ; Cultivated in R. B. G. Sibpur - *Rep. Econ. Prod.* s.n. (CAL).

A. Etymology : The specific epithet '*rimosa*' signifies the strongly reticulated structure of the pod just above the seeds so as to give a fissured appearance.

B. Ecology : The plant grows well in the sub-himalayan tracts of Sikkim, lower slopes and submontane forests of Terai and Duars up to an elevation of 1350 metres.

The Plant has no economic importance. In Assam the stem is used for making axe handles and seeds are eaten by people of Cachar.

KEY TO THE VARIETIES

- 1a. Pods distinctly reticulated against the seeds
 - 2a. Leaflets ovate to elliptic, mostly acute at apex not glaucous beneath var. *rimosa*
 - 2b. Leaflets elliptic to oblong, mostly obtuse to retuse at apex, glaucous beneath var. *foliacea*
- 1b. Pods smooth over the seeds var. *laevis*

Dalbergia rimosa Roxb. var. **foliacea** (Wall. ex Benth.) Thoth. in Bull. bot. Surv. India 25 : 170. 1983 (1985).

Dalbergia foliacea Wall. (Cat. 5856. 1832, nomen) ex Benth. in Miq. Pl. Jungh. 1 : 255. 1952 et in Journ. Linn. Soc. 4 (Suppl.) : 41. 1860 ; Baker in Hook. Fl. Brit. India 2 : 232. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 (2) : 280. 1877 et For. Fl. Brit. Burma 1 : 347. 1877 ; Prain in Journ. Asiat. Soc. Beng. 70 (2) : 43. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 54. 1904 ; Brandis, Indian Tr. 234. 1907 (ed. 2) Kanjilal et al. Fl. Assam 2 : 108. 1938. *Amerimnon foliaceum* (Wall.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A scandent shrub, at times erect, 6-8 m high ; branches spreading. *Leaves* imparipinnate, alternate, exstipulate, 12-33 cm long, rachis glabrous ; leaflets 7-9, alternate, elliptic to oblong, 4.8-10.5 × 2.3-5.0 cm, entire, obtuse to retuse at apex, narrow to rounded at base, membranous, above, minutely and sparingly puberulous below, lateral veins 10 pairs ; petiolules 2-4 mm long, glabrous. *Inflorescence* axillary and terminal cymose panicles, 11-35 cm long. *Flowers* small, 4-6 mm long, pedicellate ; bracts small, bracteoles 2, ovate-cordate, puberulous. *Calyx* campanulate, 3.5-4.0 mm long, sparingly puberulous without, 5-lobed, upper 2 lobes rounded, connate, lower 3 narrower and shorter than upper 2, all veined. *Corolla* white, vexillum obovate to suborbicular, 4-5 mm long, veined, emarginate, shortly clawed ; wings and keels oblong, clawed. *Stamens* 9-10, monadelphous, sheath split open above, 4.0-4.5 mm long, filaments free on their upper third. *Ovary* stipitate, 4.0-4.5 mm long, puberulous on stipe and on dorsal suture, style bent upwards, stigma minute, ovules 2. *Pod* oblong, flat, 6.5-10.2 × 2-3 cm, 1-2 seeded, glabrous, rounded at apex, rarely acute, narrow to rounded at base, coriaceous and reticulated against the seeds ; seed reniform, brownish black, compressed. 9-12 × 5-6 mm.

Type : Amherst and Maulmyne, 1827 Wall. Cat 5856 A (Lectotype selected CAL ; Isolectotype LE).

Distribution : BURMA (Ava, Martaban, Pegu, Shan Plateau and Tenasserim).

Flower : July to September. *Fruit* : November to January.

Specimens examined :

Burma : Yamethin, Yonbin reserve, 1866 m., Jan. 1909 - Lace 4528 (CAL) ; Tenasserim, Leikpok Chaung, 130 m, Mergui district - Braybon's

collector 82 (DD) ; Without definite locality (Tenasserim) *Helper* 1806 (CAL) ; Upper Burma, Aung Chaung forest, Monchaung, Minbu district, Feb. 1939 *Parkinson* 15724 (DD) ; Maymyo Plateau, 1200 m, Jun. 1911 *Lace* 5298 (CAL) ; Fort Stedman, Nov. 1892 *Abdul Huk* s.n. (CAL) ; Monay, 1896 *Abdul Khalil* s.n. (CAL) ; Shan States, Jan. 1891 *Abdul Huk* s.n. (CAL) ; Kamamaung, Salween, Jan. 1912 *Meebold* 16774 (CAL) ; Tadanguzitaguntoung, Thaungyin division, Nov. 1931 *Collector ?* 12716 (DD) ; Lezin, Thayetungo district, Nov. 1904 *Lace* 2700 (CAL) ; Pegu, Jan. 1871 *Kurz* 2602 (CAL) ; Tharawaddy, Mar. 1901 *Collector ?* s.n. (CAL) ; Rangoon, Jan. 1857 *Cleghorn* 35 (CAL) ; Without details regarding locality, Jul. 1890 *Prazer* 218 & 233 (CAL) ; Pegu *McLelland* s.n. (KW) ; Tavoy, (Kalcffinaung), Nov. 1924 *R.N. Parker* 2276 (K).

Wall. Cat. : Choppedon, 1827 5856 B (CAL) ; Irwaddy, 1826 5856 C (CAL).

A. *Ecology* : The plant grows in mixed forests. In habit it is a scandent shrub, at times growing into a small tree of about 6-8 metres but when it gets a support it grows into a woody climber.

B. *Taxonomic position* : Bentham (1852) described *D. foliacea* as a distinct species, based on Wall. Cat. 5856 which was followed by Kurz (1876 & 1877), Baker (1867) and Prain (1901 & 1904). The author made a critical study of the type as well as authenticated specimens and came to the conclusion that this species did not differ specifically from that of *D. rimosa* Roxb. The inflorescence, flowers and pod are essentially the same in the two species and the only difference lies in the shape and glaucous nature of the leaflets as in *D. foliacea*. It is, therefore, reduced to a variety under *D. rimosa*.

C. *Typification* : Bentham (l.c.) described this taxon, based on Wallichian catalogue 5856 which consisted of 4 different collections as follows : Wall. Cat 5856 A from Amherst & Maulmyne, 1827 ; 5856 B from Choppedon, 1827 ; 5856 C from Irwaddy, 1826 and 5856 D from Prome 1826. Hence a lectotype (Wall. Cat. 5856 A-Amherst & Maulmyne) has been selected.

D. *Distribution* : The variety has so far been known only from Burma but Gamble in his account on trees, shrubs and climbers of Darjeeling district (1896) recorded this plant. It was, however, later pointed out by Cowan (1929) when he revised Gamble's above work that Gamble's plant was not *D. foliacea* Benth. but only *D. rimosa* Roxb. In Calcutta herbarium there is one more sheet from Bengal, supposed to have been collected by Helfer during 1836-38. It is highly doubtful whether Helfer collected this from Bengal as most of his collections were made in Burma

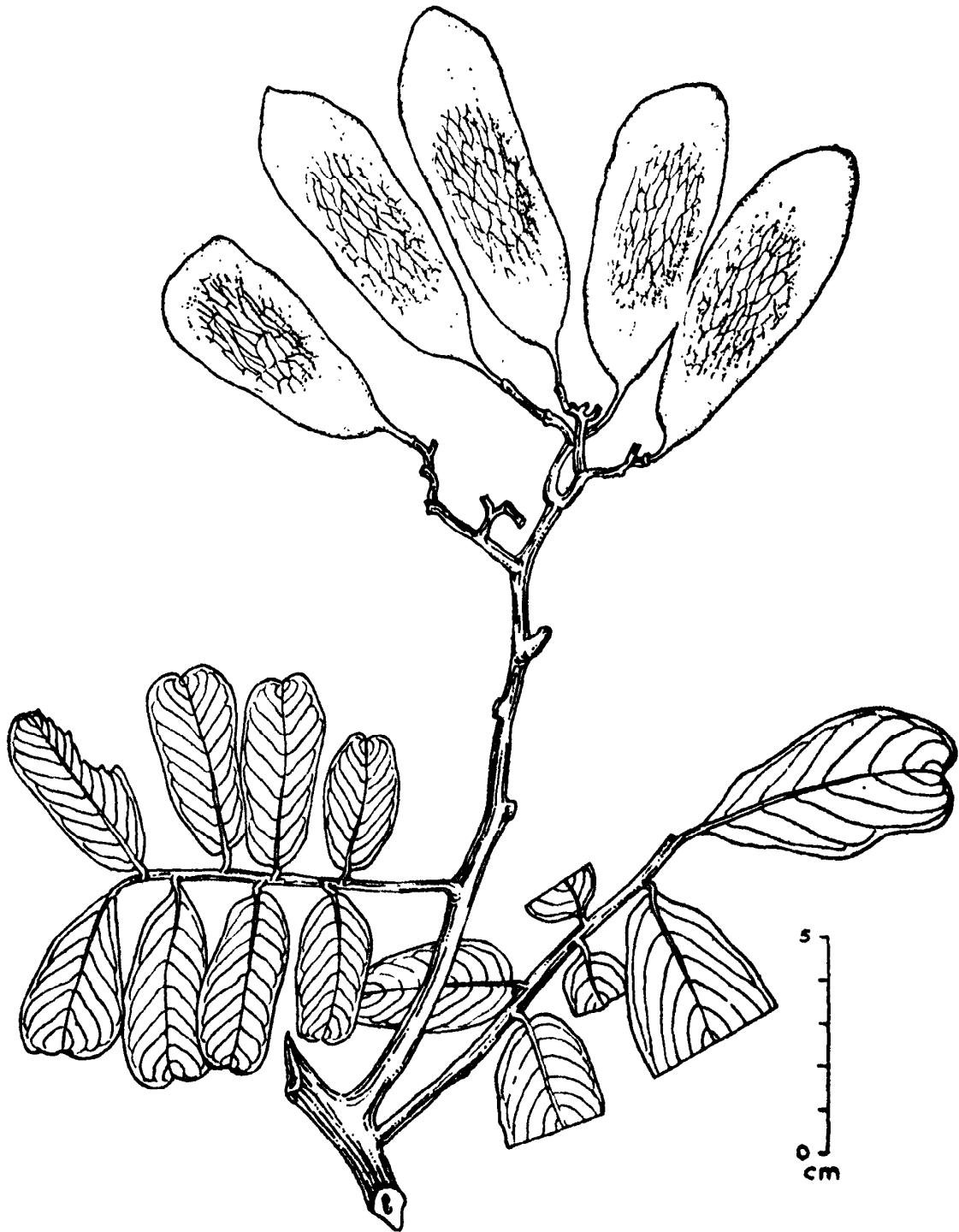


Fig. 3. *Dalbergia rimosa* Roxb. var. *laevis* Thoth.

and Andamans and even here many of his Burmese collections were unfortunately mixed up with Andaman collections and vice versa. Similarly this specimen may have been collected from Tenasserim but wrongly labelled later.

***Dalbergia rimosa* Roxb. var. *laevis* Thoth. in Bull. bot. Surv. India 17 : 64. 1975 (1978). (Fig. 3)**

The variety differs from the typical plant in the pods which are distinctly smooth against the seed.

Leaves imparipinnate, alternate, 12-17 cm long ; leaflets 7, alternate, elliptic oblong, obovate, 4.0-6.5×1.5-3.2 cm, subcoriaceous, entire, narrow to rounded at base, emarginate at apex, glabrous ; rachis and petiolules glabrous ; petiolules 1.5-2.5 mm long. *Infructescence* 19 cm long. *Pod* oblong, stalked, 1-seeded, rounded at both ends, glabrous, distinctly smooth over the seed.

Type : Nahmedaung, Henzeda, Burma, Feb. 1903 *Shaik Mokim* 1355 (Holotype, CAL).

***Dalbergia rimosa* Roxb. var. *griffithii* Thoth. in Journ. Jap. Bot. 46 : 74. 1971.**

D. rimosa Roxb. var. *griffithii* Thoth. differs from the typical plant in the leaflets being obovate to elliptic and distinctly retuse at apex.

A scandent shrub ; branchlets glabrous. *Leaves* alternate, imparipinnate, 11.0-13.5 cm long ; leaflets 5, obovate to elliptic, 3-7×3.0-4.5 cm, alternate, entire, narrow to rounded at base, distinctly retuse at apex, glabrous above, minutely puberulous below ; rachis glabrous, petiolules 3-4 mm long, glabrous. *Infructescence* a terminal panicle, 10×10 cm. *Pod* indehiscent, oblong, flat, 4.5-10.0×2.5-3.0 cm, coriaceous, shortly stalked, obtuse to rarely acute at apex, narrowed at base, glabrous, strongly reticulated just above the seed, 1-2-seeded.

Type : Khasia (without definite locality), Assam *Griffith* s.n. (Holotype, LE).

The new variety was described by the author (1971) during a preliminary study of the genus *Dalbergia* Linn.f. in India.

10. ***Dalbergia kingiana* Prain in Journ. Asiat. Soc. Beng. 67 : 289. 1898 et Ibid. 70 : 46. 1901 et in Ann. Roy. bot. Gard. 10(1) : 61. 1904 ; Brandis, Indian Tr. 234. 1907 (ed. 2) ; Thoth. in Proc. Indian Acad. Sci. (Pl. Sci.) 92 : 24. 1983.**

A large scrambling shrub covered with rusty tomentum ; branches, lenticelled. *Leaf* imparipinnate, alternate. 13-18 cm long ; leaflets 7-9, ovato-oblong, 7-9 × 2.5-3.5 cm, entire, acute to shortly acuminate at apex, narrowed at base, glabrous above, pubescent beneath ; rachis and petiolule glabrous ; petiolules 4-5 mm long. *Inflorescence* a short, axillary and terminal panicles, 5-9 × 4-7 cm. rachis, branches and pedicels rusty tomentose. *Flowers* white, 6 mm long ; bract ovato-lanceate, bracteoles 2, spatulate, both rusty tomentose, deciduous ; pedicels 1.5-2.0 mm long. *Calyx* campanulate, 3-4 mm long, rusty tomentose without, 5-toothed, teeth triangular, upper 2 slightly connate. *Corolla* vexillum ovato-orbicular, 4.5-5.5 mm long, long clawed, deflexed ; wings oblong, distinctly clawed, auricled ; keels boat-shaped, clawed. *Stamens* 10, monadelphous, sheath 5.5-6.0 mm long, split open dorsally, filaments free on their upper fourth. *Ovary* 5-6 mm long, stipitate, glabrous, ovules 2, style slender, stigma minute. *Pod* not known.

Type : Myitkyina, Kachin hills, Upper Burma, Nov. 1897 *Shaik Mokim* s.n. (Holotype, CAL).

Distribution : BURMA (Kachin hills) and CHINA (Yunnan) (Map-5).

Flower : November.

A. *Etymology* : The species has been named after George King who collected the plant from Upper Burma through Shaik Mokim.

B. *Taxonomic notes* : Prain (l.c) placed this species under the series 'Rubiginosae' near *D. rubiginosa* Roxb. but the size of the leaflets suggests that it should better be placed under the series 'Rimosae' under section 'Sissoa'. Unfortunately the pods of this species are not known so far as to give fuller evidence on its systematic position.

C. *Critical notes* : *D. kingiana* described by Prain (1897) from Kachin hills, Burma was never collected and reported from Burma after the type collection. A collection of Kingdon Ward from North Burma in 1953 is only recent collection of this species and is suggestive of its rarity. Prain's original description could be improved on the basis of this specimen. The plant is a large scrambling shrub covered with rusty tomentum and velvety panicles.

11. *Dalbergia travancorica* Thoth. in *Reinwardtia* 8 : 329. 1972 ; Nayar & Ramamurthy in *Bull. bot. Surv. India* 15 : 213. 1973 (1976) ; Nair & Henry, *Fl. Tam. Nad* (Ser. 1) 1 : 1983.

D. travancorica Thoth. is allied to *D. rubiginosa* Roxb. but differs in the elliptic, rounded leaflets and conspicuous, persistent bracts which remain even after fruiting.

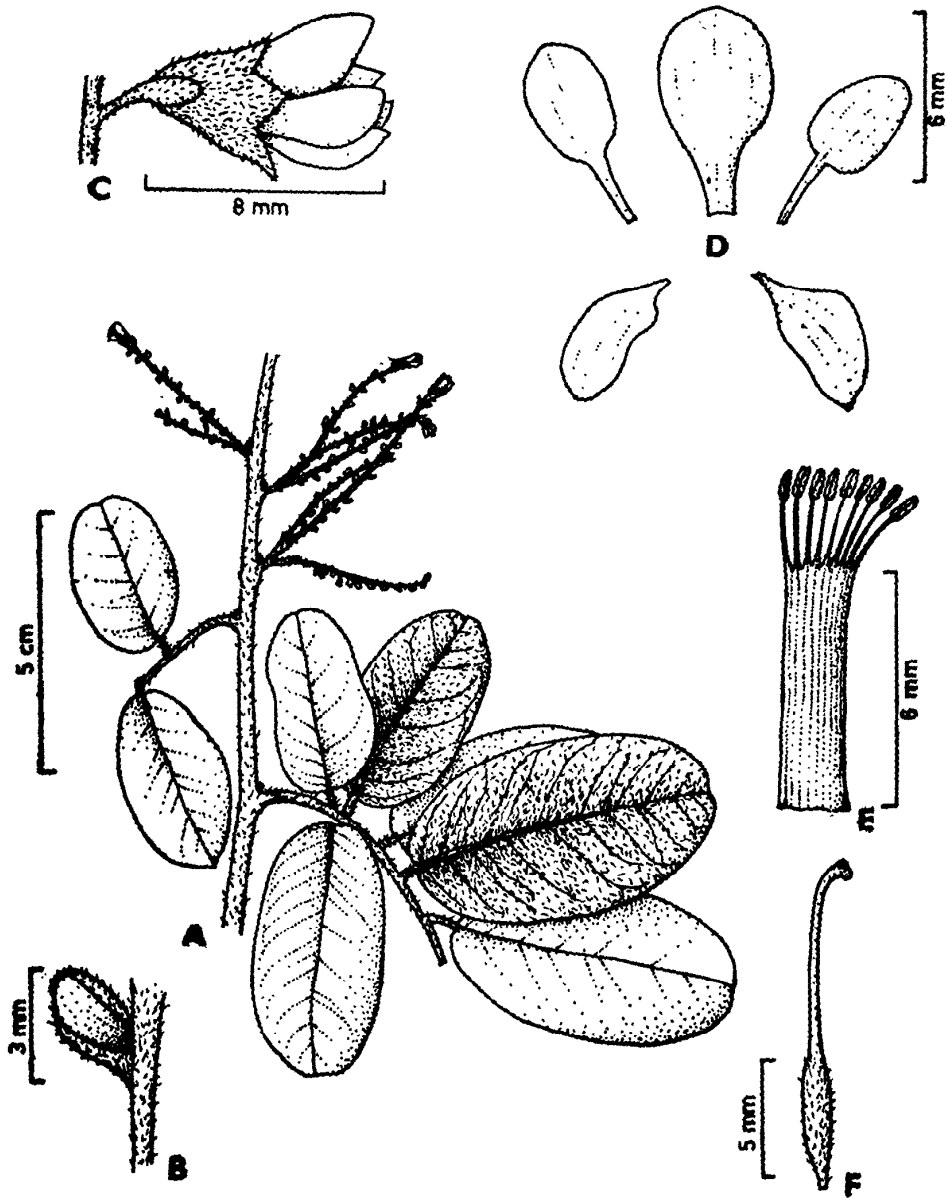


Fig. 4. *Dalbergia travancorica* Thoth.

- A. A branch with flowers ; B. Persistent bract ; C. A flower ;
 D. Corolla with vexillum, wings and keels spread open ; E. Staminal sheath ; F. Pistil.

Scandent shrubs ; branchlets puberulous, younger parts rusty pubescent. *Leaves* imparipinnate, alternate, stipulate, 8-11 cm long, rachis puberulous ; leaflets mostly 5, rarely 7, elliptic, 4-6 × 2.0-3.5 cm, lower leaflets always smaller than the upper larger ones, entire, coriaceous, rounded at base, mostly obtuse to retuse at apex, rarely acute, glabrous above, brown puberulous to pubescent beneath, lateral veins 8-10 pairs, petiolules silky pubescent, 2-4 mm long ; stipules prominent, oblong, 7-9 mm. long, shortly acuminate, brown pubescent. *Inflorescence* short, axillary panicle, 2.5-5.0 cm long, 2-3 cm wide, rachis and branchlets pubescent. *Flowers* 7-8 mm long, pedicellate ; bracts very conspicuous, persistent even after fruiting, ovate-triangular, 2-3 mm long, gibbous, pubescent without, bracteoles 2, ovato-oblong, on either side of calyx cup and embracing the same, pubescent without ; pedicels short, 2-3 mm long, pubescent. *Calyx* campanulate, 4-5 mm long, pubescent without, 5-toothed, anterior 3 triangular-ovate, smaller, posterior 2 ovate-rounded, bigger than anterior teeth. *Corolla* vexillum ovato-orbicular to ovato-oblong, 6-7 mm long, deflexed, retuse at apex, distinctly clawed ; wings ovato-oblong, clawed, blade auricled below ; keels boat-shaped, clawed, connate above at their apex, all petals glabrous. *Stamens* 9, monadelphous, sheath 6-7 mm long, split open dorsally, filaments free on their upper fourth. *Ovary* oblong, 5.0-6.5 mm long, distinctly stipitate, glabrous except the pubescent dorsal suture, 3-ovuled, style slender, stigma minute. *Pod* oblong, 3.0 × 0.7 cm, flat, glabrous and smooth, long-stalked, 8-seeded.

Type : Travancore hills (without definite locality) *Collector* ? s.n. accession no. 17025 (Holotype MH).

Distribution : INDIA (Travancore). (Map-4)

A. *Etymology* : The plant has been named after Travancore, the type locality.

12. *Dalbergia gardneriana* Benth. in Journ. Linn. Soc. 4 (Suppl.) : 42. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 232. 1876 ; Prain in Journ. Asiat. Soc. Beng. 66 : 444. 1897 et Ibid. 70 : 47. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 66. 1904 ; Gamble, Fl. P.ess. Madras 2 : 383. 1918 ; Nair & Henry in Fl. Tam. Nad. (Ses. 1) 1 : 102. 1983.

Amerimnon gardnerianum (Benth.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A climbing shrub ; branches rusty-tomentose. *Leaves* imparipinnate, alternate, 5-11 cm long ; leaflets 7-11, alternate, elliptic-oblong, 2.5-4.0 × 1.2-2.0 cm, entire, obtuse to retuse at apex, at times mucronate, rounded at base, glabrous above, densely rusty-tomentose beneath ; petiolules short.

1-2 mm long, petiolule and rachis rusty-tomentose. *Inflorescence* axillary panicles [not cymes as reported by Bentham (1860), Prain (1904)], 2-5 cm long, rusty-tomentose. *Flowers* white to whitish yellow, 5-6 mm long, shortly pedicellate; bracts ovate, pubescent, bracteoles 2. ovato-oblong, rusty-pubescent, one larger than the other. *Calyx* campanulate, 4-5 mm long, rusty pubescent without, 5-toothed, teeth subequal. *Corolla* vexillum ovato-orbicular, distinctly clawed, 4-5 mm long; wings oblong; keels boat-shaped. *Stamens* 9, monadelphous, sheath 4-5 mm long, split open dorsally. *Ovary* stipitate, 4-6 mm long, villous, style slender, stigma minute, ovules-2. *Pod* oblong, thin and samaroid, indehiscent, 3.5 4.2 × 1.2 1.4 cm, subcoriaceous, glabrous and brown-shining, reticulate especially against the seeds, 1-seeded, stalked; seeds black, compressed, oval, 8 × 4 mm.

Type : Nilgherries – *Hohenacker* 1591 (Lectotype designated, K; Isolectotype CAL).

Flower : November to March. *Fruit* : April to May.

Distribution : INDIA (Nilgiris in Western Ghats). (Map-4)

Specimens examined :

Western Ghats : Nilgiris, Coonoor, 1666 m, Oct. 1910-*Meebold* 11872 (CAL); Coonoor, 2333 m, Mar. 1870 *Clarke* 11129 B (CAL); Coonoor, 2000 m, Nov. 1883 *Gamble* 13176, 14501 (CAL); Kathatly *Collector?* s.n. (MH); Segun ghat, Oct. 1884 *Collector?* s.n. (MH); Upper Tiger shola, 2000 m, Mar. 1957 *Sebastine* 2664 (MH); Maryland forest, 1600 m, May 1889 - *Gamble* 20687 (DD); Pen. Ind. Or. Wight 824 (CAL); Nilgherries, 1847 *Gardner* s.n. (Syntype CAL, K); Nilgherries, 1851 - *Thomson* s.n. (Syntype K, CAL); Kateri Kundah road, Nilgiris, Aug. 1972 - *Vajravelu* 41933 (MH); Pakkasura hills, Nilgiris, Feb. 1973 - *Vajravelu* 43554 (MH); Sholurmattam, Nilgiris, May, 1971 *Vajravelu* 38255 (MH); Nilgiri district, Mar. 1889, Oct. 1884, *Collector?* Acc. No. 17037, 17028 (MH).

A. *Etymology* : The plant has been named after the original collector *Gardner*.

B. *Ecology* : The species is a climber with densely, rusty, tomentose branches and white flowers. It grows in the Western ghats between 1700-2300 metres and is endemic in Nilgiris, South India.

C. *Typification* : Bentham (l.c 1860) described the plants on the basis of three different collections such as Nilgherries - *Gardner*, Nilagiri - *Hohenacker* 1591 and Nilgherries - *Thomson*, all the three being syntypes.

Out of these, *Hohenacker's* 1591 from Nilagiri has been selected as the lectotype of this taxon.

D. Distribution : The plant is a very rare species, reported so far from Nilgiris only. From a consideration of the exsiccates in the herbarium as well as its distribution, it is probably an endemic species from the above area.

E. Critical notes : Bentham (1860) and Prain (1904) described the inflorescence as axillary cymes as the specimens, examined by them possessed only young flowers, all being condensed due to pressing. The author examined Clarke's collection from Coonoor where the inflorescence is a distinct, axillary panicles.

The pod was not described by Bentham (1860) as he failed to notice the same in one of the syntypes namely, Nilagiri - *Hohenacker* 1591. Further a young pod was also present in the other syntype (Nilgherries *Gardner*) which Bentham again did not notice. The characters of the pod were given later by Prain in 1904, based on the collection of Gamble. The shape of the pod is oblong and not ovate as reported by Gamble (l.c. 1918).

F. Systematic position : The species was considered by Gardner as only a form of *D. rubiginosa* Roxb. as it resembles closely the former in pod and flower characters. But the leaflets of this species differ markedly in having a dense, rusty tomentum beneath. Bentham (1860) therefore raised this to a separate species. It approaches more towards *D. rubiginosa* Roxb. in pod characters rather than *D. congesta* Grah. ex Wt. Arn. as was supposed by Baker (1876) who reduced it under *D. congesta* Wt. & Arn. Prain (1904) and Gamble (1918) considered it to be quite a distinct and the author holds a similar opinion.

13. *Dalbergia beddomei* Thoth. in Proc. Indian Acad. Sci. (Pl. Sci.) 92 : 23. 1983 ; K.K.N. Nair in Journ Econ. Tax. 8 : 242. 1986. (Fig. 5)

Scandent shrubs upto 6 m high climbing on small trees, at times creeping ; stems cylindrical, branches brown pubescent when young. *Leaves* imparipinnate, 5-20 cm long ; leaflets 5-14 ovate, elliptic or obovate, 2.0-6.5 × 1.0-3.5 cm, entire rounded at base, obtuse to acute at apex, coriaceous, glabrous above, yellowish brown pubescent beneath ; petiolules 2-5 mm long ; stipules ovate to ovato-oblong, 4-8 mm long, prominent, pubescent, caducous. Panicles axillary and terminal, much branched, 2.5-4.5 cm, rachis pubescent. Bracts ovate, 2-4 × 1 mm, pubescent, bracteoles 2, ovate, 2-3 × 1 mm, adpressed to the flowers ; pedicels 2-6 mm long, pubescent. *Calyx* campanulate, 3.5-8.0 mm, pubescent, 5-toothed, upper 2 connate, lower 3 distinct. Vexillum ovate, 6 × 4.6

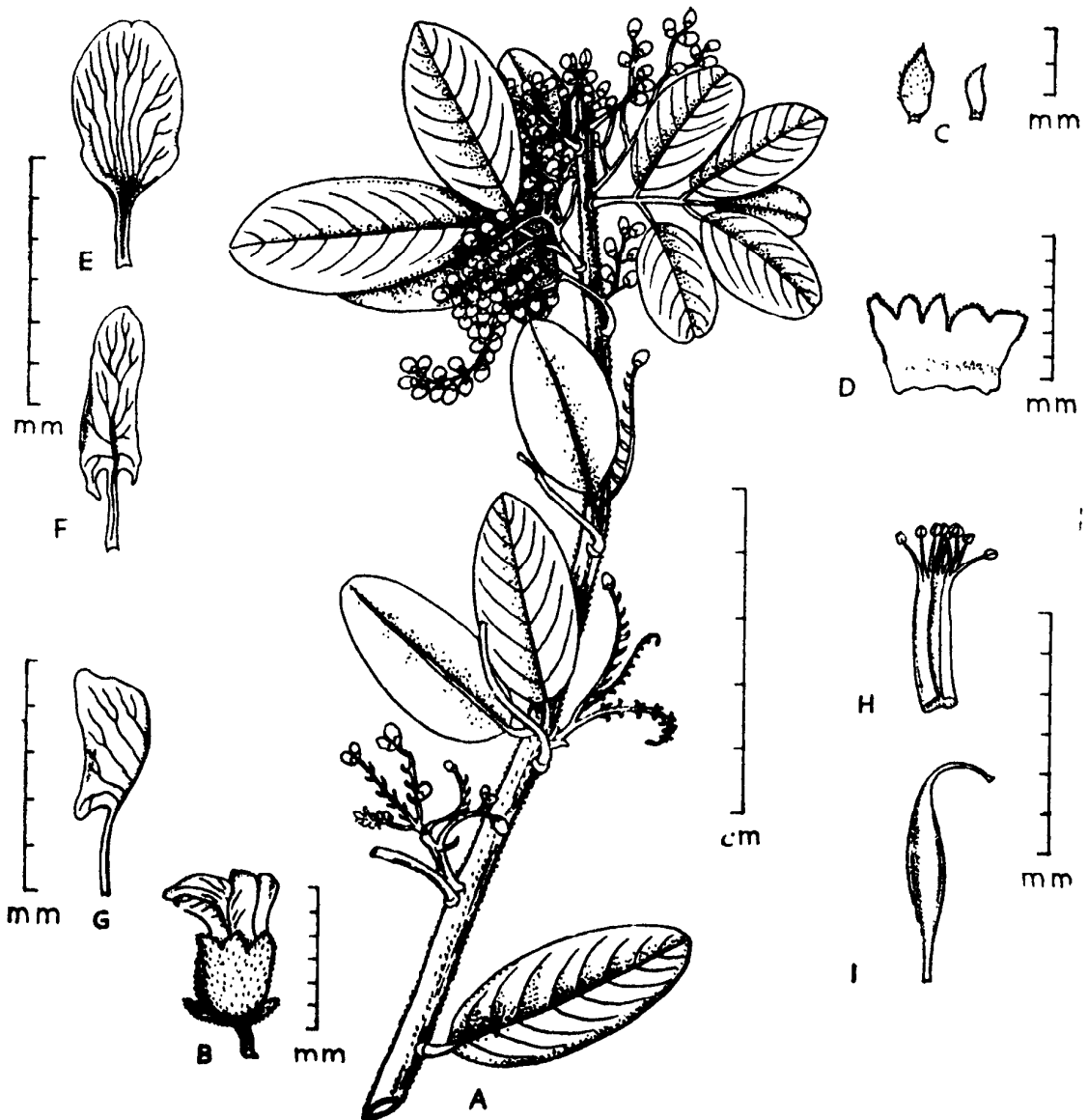


Fig. 5. *Dalbergia beddomei* Thoth.

A. A branch with flowers ; B. A flower ; C. Bracteoles ; D. Calyxcup split open ; E. Vexillum ; F. Wing petal ; G. Keel petal ; H. Staminal sheath ; I. Pistil.

mm, clawed ; wings 5-9 mm long, oblong, auricled, keels connate, 5-7 mm long. *Stamens* 9, monadelphous, sheath 5-7 mm long, split on the dorsal side ; anthers 4 lobed. *Pistil* 8 mm long, ovary stipitate, style slender, stigma minute. *Pod* oblong, 4-6 × 1.2-1.8 cm, reddish brown. 1-2 seeded, shortly stalked, glabrous, acute at apex, narrowed at base, reticulately veined.

Type : India : Silent Valley (Malabar), Kerala, 1000 m, *Beddome* 2459 A (Holotype, BM) ; *Beddome* 2460 (Paratype, BM).

Flower and Fruit : January to March.

Distribution : INDIA ; Endemic to Silent Valley, Palghat district, Kerala.

Specimen examined : Kerala : Mlappara Estate, Idukki district, February, 1981 - *Nair* 70119 (MH).

A. *Etymology* : The species has been named after the famous collector cum forest botanist Col. Beddome.

B. *Critical Notes* : The species is rare, and endemic in the dense, tropical, evergreen forests of Silent Valley, Western Ghats, Kerala. It is an undergrowth, often climbing on small trees along sides of hills stream.

14. *Dalbergia rubiginosa* Roxb. Corom. Pl. 2 : 9, t. 115. 1798 ; Willd. Sp. Pl. 3 : 902. 1800 ; Roxb. Hort. Beng. 98. 1814 ; Roth, Nov. Sp. Pl. 332. 1821 ; DC. Prodr. 2 : 416. 1825 ; Roxb. Fl. Ind. 2 : 231. 1832 ; Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 265. 1834 ; Benth. in Pl. Jungh. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 43. 1860 ; Watt, Dict. Econ. Prod. India 3 : 12. 1890 ; Talbot, Bomby List 75. 1894 ; Prain in Journ. Asiat. Soc. Beng. 66 : 443. 1897 et Ibid. 70 : 47. 1901 ; Talbot, Tr. Shr. Woody Climb. Bombay Pres. 137. 1902 (ed. 2) ; Prain in Ann. Roy. bot. Gard. 10(1) : 63. 1904 ; Brandis, Indian Tr. 234. 1907 (ed. 2) ; Talbot, For. Fl. Bombay Pres. & Sind 1 : 425. 1909 ; Ramarao, Flow. Pl. Travancore 129. 1914 ; Cooke, Fl. Pres Bombay 1 (2) : 397. 1902 ; Gamble, Fl. Pres. Madras 2 : 382. 1918 ; Haines, Bot. Bihar Or. 3 : 294. 1922 ; Nair et Henry, Fl. Tam. Nad (Ser. 1) 1 : 103. 1983 ; Mathew, Fl. Tam. Nad. Carn. 3 (1) : 386. 1983 ; Sharma et al. Fl. Karnat. Analysis 70-1984 ; Saldanha, Fl. Karnat. 1 : 446. 1984.

Amerimnon rubiginosum (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A large woody climber, at times a scandent shrub ; stem up to 10 cm in girth ; branches puberulous, often twisted into thickened hooks ; bark rust-coloured, smooth. *Leaves* imparipinnate, alternate, stipulate, 7.0-13.2

cm long ; leaflets 3-7, alternate, ovate to elliptic-oblong, 2-8 × 1.0-3.8 cm, terminal one always largest, obtuse at apex, narrowed at base, subcoriaceous, glabrous and shining above, pale and minutely puberulous below, lateral veins parallel, inconspicuous, rachis puberulous to rarely pubescent; petiolules short, 1.5-3.0 mm long, puberulous, at times leaflets sessile (Orissa *Haines*); stipule ovate, inconspicuous. *Inflorescence* short, axillary racemes or panicles, 2-3 cm long, rachis pubescent. *Flowers* shortly pedicellate, 4-7 mm long; bract and bracteoles distinct, bracts ovate, rusty tomentose, bracteoles 2, ovate-cordate, rusty tomentose; pedicels 0.5-1.0 mm long, rusty tomentose. *Calyx* campanulate, slightly gibbous below, 3.0-3.5 mm long, 5 toothed, pubescent without, teeth subequal, upper 2 rounded and larger than lower 3. *Corolla* white, vexillum ovato-orbicular, emarginate, 4-6 mm long, clawed; wings oblong, clawed; keels boat-shaped, auricled (no callosities present in the vexillum as reported by *Haines* l.c. 1961). *Stamens* 9-11, monadelphous, sheath 5-6 mm long, split open on the dorsal side, filaments free on their upper third, anthers distinct. *Ovary* 5-7 mm long, linear-oblong, glabrous, shortly stipitate, style bent upwards, stigma minute, ovules 1-3. *Pod* oblong, 3.0-5.7 × 1.0-1.8 cm, thin and light, long-stalked, acute to rounded at apex, narrowed below into a long stalk, netted veined especially against the seeds, glabrous, mostly 1 seeded, rarely 2 seeded; seeds black, reniform, 12 × 7 mm, compressed.

Type : Roxb. Corom. Pl. t. 115. 1798 (Lectotype).

Flower : March to May. *Fruit* : April to June.

Distribution : INDIA (South and Western India, Orissa) (Map-5).

Specimens examined

Andhra Pradesh : Vizagpatnam, Simhachallam, Mar. 1853 *Collector* ? 60 (MH); Raghupaliem, May 1900 *Barber* 15300 (MH); Anantagiri, 910 m, May 1964 *Subbarao* 19482 (MH); Vishakapalnam *Collector* ? Acc. no. 17023 (MH).

Goa : Caranzol hills, May 1963 - *Kanodia* 88475 (BSI).

Kerala : Malabar, Near Waterfall, Beringe, Kasaragod, Feb. 1913 - *Barber* 8821 (MH).

Karnataka : Tirthagalli, Tunga forests, Mysore district, Mar. 1964 - *Sundararaghavan* 96971 (BSI, MO); North Kanara, Guddshalli, 500 m,

Karwar, Mar, 1919 *Bell* 5724 (CAL); Dodmune, 600 m, Mar. 1896 *Talbot* 3594 (CAL, BSI); Nakund, Mar. 1889 *Talbot* 1867 (CAL); Ainshi ghat, May 1885, *Talbot* 1182 (CAL, BSI); Ainshi forest, Mar. 1951 *J. Fernandez* 2273 (CAL); Without any definite locality (N. Kanara), 1881 *Talbot* 70 (CAL); Tissari, Feb. 1889 *Talbot* s.n. (BSI); Castle rock, Devilli, Nov. 1957 *Jain* 29194 A (BSI); Castle rock, Jun, 1905 *Cooke* s.n. (BSI); Honawar, May 1911 *Chibber* s.n. (BSI); Garsappa road, May 1911 *Garade* s.n. (BSI); Haltikeri, Oct. 1919 *Hallberg & Mc Cann* 34414 (BLAT); Castle rock, Apr. 1956 *Irani* 1857 (BLAT); South Kanara, Charmachi, Feb. 1962 *Arora* 708 (CAL); Byndoor, Mar. 1961 *Arora* 716 (CAL); No definite locality *Law, Stock* s.n. Acc. no. 17010, 17018 (MH).

Orissa : Puri, Angul forest, May 1917 *Haines* 4698 (CAL); Champagarh forest, Apr. 1916 *D.F.O.* 18491 (DD); Kuhuri forest, Apr. 1916 *D.F.O.* 15133 (DD); Forest near Puri, Apr. 1917 *Haines* 4115, 3920 (CAL).

Tamil Nadu : Sengattupatty, Pachaimalai, Tiruchi district 950 m, Mar. 1978 - *Matthew* 12494 (CAL); Sholapatti, 1300 m, Coimbatore district, Mar. 1906 - *Fischer* 953 (CAL); Kollimalai, Trichinopoly district, Oct. 1914 *Collector* ? 11247 (MH); Ongi halla, 1000 m, Hassanur, Salem district *Cherian Jacob* 181 (MH); Pen. Ind. Or. *Wight* 24 (CAL, MH), *Wight* 823 (CAL, LE); Without definite locality (S. India) 1873 *Beddome* s.n. (MH); Kottadi, Coimbatore district, Mar. 1931 *Cherian Jacob* 81406 (MH); No definite locality, 1877 *Beddome* s.n. Acc. no. 17029 (MH); *Wight* s.n. Acc. no 17016 (MH).

A. Etymology : The specific epithet '*rubiginosa*' was given by Roxburgh owing to the rusty, pubescent, young shoots and rust coloured bark of this plant.

B. Ecology : The species is an extensive woody climber, attaining great heights in the evergreen forests of western ghats. The same plant grows into a dwarf, bushy or scandent shrub in the forests of Angul and Puri in Orissa.

C. Distribution : Bentham (l.c.) remarked that the species has also been found in South China (Hongkong). Prain (l.c. 1901) pointed out that the Honkong plant, regarded by Bentham as *D. rubiginosa* represented another distinct species and hence gave a new name *D. benthamii*. Cooke (1902) on the other hand mentioned China too under distribution of this species which was erroneous. The species is restricted to South and Western India only.

D. *Typification* : As no Roxburghian specimen could be traced in any of the Herbaria, the plate 115 in his Corom. Pl. 1798 has been selected as lectotype of this species.

E. *Critical notes* : The range of variation in the number of stamens is worth mentioning. Normally the flowers have 10 stamens and occasionally 9 also. Peculiarly a few flowers are found to have 11 stamens, all united to form a sheath.

Haines (l.c. 1922) reported the presence of two, fleshy callosities in the vexillum. The author has carefully examined a lot of flowers but could not conform to Haines findings.

15. *Dalbergia congesta* Grah. (Wall. Cat. 5872, 1832, nomen) ex Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 265. 1834 ; Walpers, Repert. Bot. Syst. 1 : 799. 1842 ; Benth. in Miq. Pl. Jungh. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl.) 43. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 232. 1867 (excl. *D. gardneriana* Benth.) ; Prain in Journ. Asiat. Soc. 67 : 444. 1897 et in Ann. Roy. bot. Gard. 10(1) : 66. 1904 ; Ramarao, Flow. Pl. Travencore 129. 1914 ; Gamble, Fl. Pres. Madras 2 : 382. 1918 ; Nair & Henry, Fl. Tam. Nad. (Ser. 1) 1 : 102. 1983 ; Thoth. in Bull. bot. Surv. India 25 : 173. 1983 (1985).

Amerimnon congestum (Grah.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A woody, climbing shrub with spreading branches. *Leaf* imparipinnate, alternate, stipulate, 11.0-14.5 cm long ; leaflets 5-11, alternate, cuneate-ovate, 2.0-5.6 × 1-3 cm, entire, emarginate at apex, glabrous above except midrib which is puberulous, pubescent below when young but puberulous to glabrous when mature, lateral veins 12-14 pairs, distinct ; petiolules short, 1-2 mm long, petiolule and rachis puberulous to pubescent ; stipules lanceolate, subulate, 6 × 2 mm, pubescent without, deciduous. *Inflorescence* axillary, congested panicle, 2.0-5.2 cm long. *Flowers* white, 8 mm long ; bracts small, ovate, puberulous, bracteoles 2, ovato-oblong, 2-3 mm long, puberulous. *Calyx* campanulate, slightly gibbous below, 5.0-5.5 mm long, glabrous to puberulous without, 5-toothed, teeth subequal, lower 2 longer than rest. *Corolla* vexillum ovato-orbicular, 6-7 mm long, distinctly clawed, emarginate ; wings auricled and keels boat-shaped. *Stamens* 9, monadelphous, sheath 5-6 mm long, sheath split open dorsally, filaments free on their upper third, longer ones alternating with shorter. *Ovary* 6 mm long, stipitate, glabrous, style bent, stigma minute, ovule-1. *Pod* oblong, 5.0-7.5 × 1.4-1.5 cm, reddish brown, thin and flat,

entire, rounded at apex and mucronulate, shortly but distinctly stalked, glabrous, reticulated against the seeds, 1-2-seeded; seeds reniform, brownish-black.

Type : Neelgherries *Noton*, Wall. Cat. 5872 (Holotype, K).

Flower : May June. *Fruit* : June.

Distribution : INDIA (Nilgiris) (Map-6)

Specimens examined :

South India : Nilgiris, Forest below Kotagiri, 1333 m Jun. 1916 *Sedgewick* 1343 (BLAT); Coonoor ghats, May 1883 - *Collector* ? s.n. (MH); Coonoor, 1864 *Beddome* s.n. (MH); Coonoor, Feb. 1899 - *Prain* s.n. (CAL); Coonoor ghat, 1666 m, May 1883 *Gamble*. 11694 (CAL). Coonoor, 2000 m, May 1882 - *Brandis* s.n. (CAL).

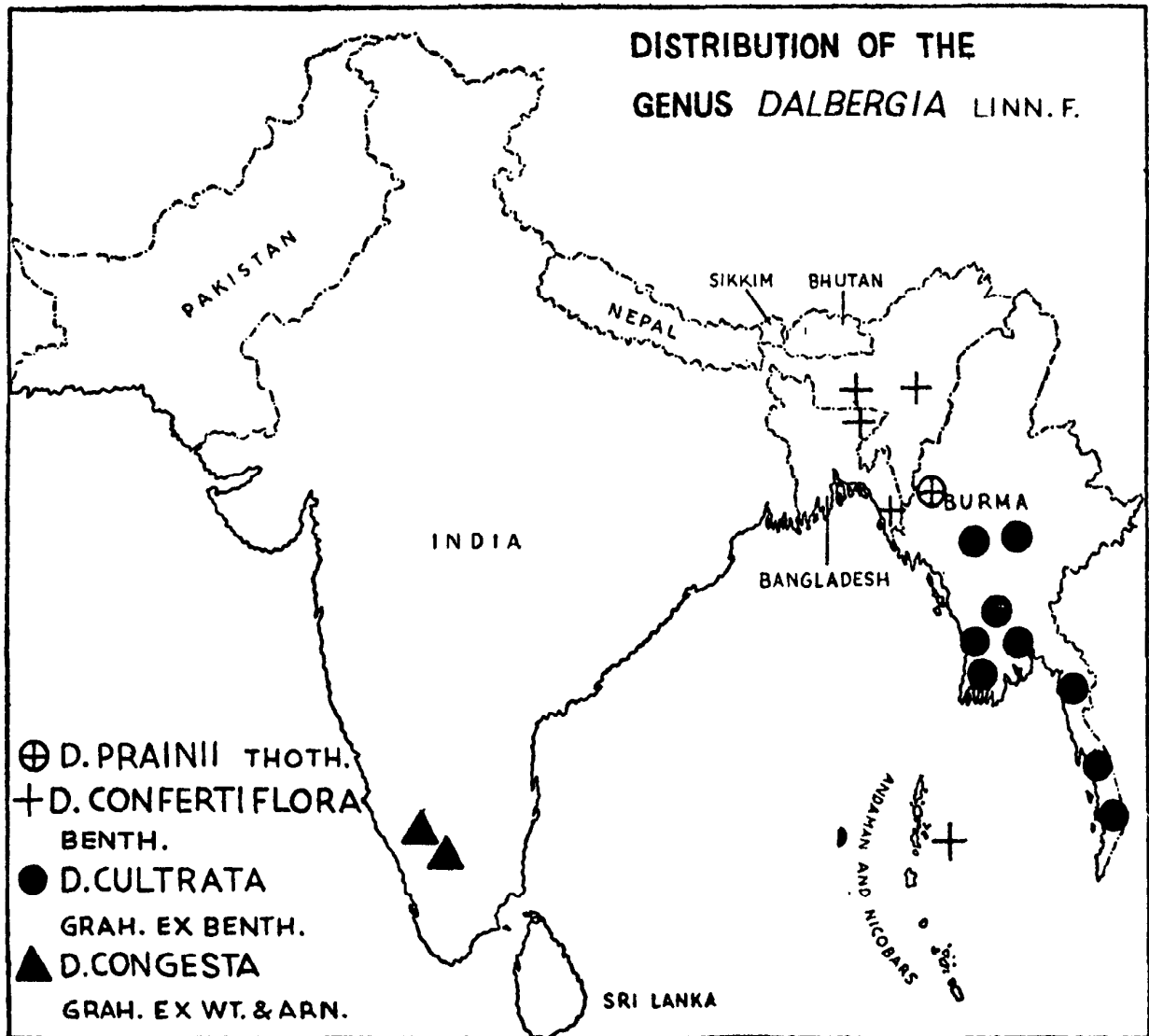
A. Etymology : The specific epithet '*congesta*' denotes the crowded arrangement of flowers in short, axillary, congested panicles.

B. Ecology : The plant is a climbing shrub with white flowers growing at elevations between 1700-2300 m in the Nilgiri forests of Western ghats.

C. Distribution : It is interesting to mention that this species as well as that of *D. gardneriana* Benth. with which it is closely related have so far been reported from only Nilgiris at elevations between 1700-2300 m. Both of them are probably endemic species from that area. The occurrence of these 2 species at the same locality has led many earlier workers like Baker (1876) to treat them as representing one and the same species. The plant does not occur in Burma as was reported by Prain (1904). The identification of specimens from Burma as *D. congesta* by Prain is erroneous as these represent yet an undescribed species.

D. Critical notes : *D. congesta* Grah. ex Wt. & Arn. is a distinct species and can never be confused with its allied species, *D. rubiginosa* Roxb. and *D. gardneriana* Benth. It differs from both in the oblong pod and ovate-cuneate leaflets.

Prain (l.c. 1904) described the pods from the Burmese collections (Kalay and Chin hills *Prazer*), stating that the species did occur both in India and Burma. The pods of the Burmese specimens were ovate, coriaceous, 1-seeded and reticulate against the seed. According to *Prazer* (collector) the species was an erect tree, 10 m high and was found at very low elevations. The author had the opportunity to examine pods from a



Map 6

collection of Sedgewick 1343 from Nilgiris wherein they are distinctly oblong, thin, 2-seeded and quite different from the Burmese specimen. Further true *D. congesta* is climbing shrub as against the Burmese specimen which is an erect tree. These facts clearly point out that Prazer's collections from Burma were quite different from true *D. congesta* Wt. & Arn. and did represent yet an undescribed species. The characters of the pod of *D. congesta* are given here for the first time.

16. *Dalbergia cultrata* Grah. (Wall. Cat. 5861. 1832, nomen) ex Benth. in Miq. Pl. Jungh. 1 : 254. 1852 et in Journ. Linn. Soc. 4 (Suppl.) 39. 1860 ; Baker in Hook. f. Fl. Britt. India 2 : 233. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1877 et For. Fl. Brit. Burma 1 : 342. 1877 ; Coll. & Hemsl. in Journ. Linn. Soc. 28 : 50. 1891 ; Prain in Journ. Asiat. Soc. Beng. 70 : 45. 1901 ; Gage in Rec. bot. Surv. India 3 : 49. 1904 ; Prain in Ann. Roy. Bot. Gard. 10(1) : 55. 1904 ; Brandis, Indian Tr. 234. 1907 (ed. 2) : Troup, Silviculture Indian Tr. 1 : 326. 1921.

Dalbergia zeylancia Wall. Cat. 5847 B. 1832, nomen. (non Roxb.).
Amerimnon cultratum (Grah.) O. Kurtze, Rev. Gen. Pl. 1 : 159. 1891.

A deciduous tree, 10-20 m high ; trunk 0.75-1.0 m in diameter ; young shoots adpressed silky pubescent ; branches lenticelled and glabrous ; bark smooth with transverse streaks. *Leaves* imparipinnate, alternate, stipulate, 12.3-25.5 cm long ; leaflets 7-11, alternate, obovate, at times widely elliptic, 2.5-6.4 × 1.8-3.7 cm, terminal one always largest, entire, retuse to emarginate at apex, pubescent below when young and puberulous to glabrous when mature, glabrous above, lateral veins 7-10 pairs, ascending ; stipules minute, pubescent, caducous ; petiolules 2-5 mm long rachis and petiolules glabrous. *Inflorescence* axillary, fasciculate panicles, 5-11 × 2-3 cm, glabrous to puberulous. *Flowers* white to pale rose, 4-6 mm long ; bracts minute, lanceolate, caducous, bracteole one, just at the base of calyxcup, 3-4 mm long *Calyx* campanulate, 2.5-4.0 mm long, glabrous without, 5-toothed, teeth subequal ovate, acute, upper 2 subconnate and longer than rest. *Corolla* vexillum ovato-orbicular to orbicular, clawed, 4-6 mm long, emarginate at apex ; wings and keels oblong, distinctly clawed. *Stamens* 9, monadelphous, sheath 3.5-4.0 mm long, split open dorsally, filaments free above, subequal, anthers with subapical slits. *Ovary* 3.5-4.5 mm long, glabrous, stipitate, style stout, stigma minute, ovules 3. *Pod* oblong, flat, 3.5-8.0 × 1-2 cm, stalked, coriaceous, glabrous, obtuse to acute at apex, narrow to rounded at base, faintly reticulated against the seeds, 1-2-seeded ; seeds reniform, compressed, 1.0—1.2 × 0.6-0.8 cm.

Type : Prome, 1826 - Wall. Cat. 5861 A (Lectotype designated, CAL ; Isolectotype, LE).

Flower : March to May. *Fruit* : July to December.

Distribution : BURMA (Pegu, Shan hills and Tenasserim) (Map-6).

Specimens examined :

Burma : Minbu, Arracan Yomah, Mar. 1903 *Aubert & Gage* s.n. (CAL) ; Minbu, Nov. 1902 *Shaik Mokim* 515 (BSI) ; Zhembu, Jan. 1903 *Shaik Mokim* 1122 (BSI) ; Nuva madaung hills, Mar. 1903 *Aubert & Gage* s.n. (CAL, BSI) ; Shan hills, Taungyi, 1894 *Abdul Khalil* s.n. (CAL) ; Terai, 1878 *Collett* 406 (CAL) ; King Tung, 1333 m, Dec. 1909 *MacGregor* 1276 (CAL) ; Tenasserim, Chu-Ku Plains, Apr. 1877-*Geo Gallatly* 914 (CAL) ; Paratoba, 800 m, Jan. 1877 *Gallatly* 178 (CAL, BSI) ; Tachpo, 1666 m, Apr. 1877 *Geo Gallatly* 747 (LE, CAL) ; Pegu, Toukyeghat *Kurz* 1787 (CAL) ; Moulmein, 1912 *Meebold* 17219 (CAL) ; Pegu, Jan. 1876 *Kurz* 2609, 1706 (CAL) ; Henzada, Yebo road, Mar. 1903 *Shaik Mokim* 1533 (CAL) ; Myinwadaug, Mar. 1905 - *Lace* 2804 (CAL) ; Amherst, Kawkareik forest, Kyondo to summit of Dawna hills, Mar. 1908 *Burkill* 30381 (ISIM) ; Taungcheyin, Dawanas, Feb. 1927 - *Parkinson* 85261 (CAL) ; Myaimgbinkwin, 300 m, Magrol district, Mar. 1915 *Gilbert Rogers* 950 (CAL) ; Waing, Tharawaddy district, May 1914 *Gilbert Rogers* 296 (CAL) ; Yenauma to Lechla, Theyetungo district, Dec. 1904 *Lace* 2689 (CAL) ; Thaungyin valley, Thaton district, Mar. 1909 *Lace* 4696 (CAL) ; Myaumgmya, Feb. 1938 *Dickason* 6930 (LE) ; Maymyo, Upper Burma, Jan. 1888 - *J.C. Prazer* s.n. (CAL, ISIM) ; Zwegabin, Feb. 1938 *Dickason* 7033 (LE) ; Maymyo hill, Jun. 1888 *Badul Khan* 8 (CAL) ; Without definite locality (Burma) - *Parkinson* 5261 (CAL), *Brandie* s.n. (CAL), *Prazer* 24 (ISIM) ; Salween, Phanoë, 1827 - *Wall. Cat.* 5861 B (Syntype, CAL).

HBC : Cultivated in Royal Botanic Garden, Sibpur, Howrah, Nov. 1900. *Prain* s.n. (CAL).

KEY TO THE VARIETIES AND FORMA

- 1a. Leaflets 7-11, larger (2.5-6.4 × 1.8-3.7 cm)
- 2a. Pods oblong, obtuse to retuse at apex, narrow to rounded at base var. *cultrata*
- 3a. Leaflets larger, puberulous to glabrous below va. *cultrata* f. *cultrata*
- 3b. Leaflets smaller with adpressed pubescence below var. *cultrata* f. *fusca*
- 2b. Pods narrow at both ends, mucronate at apex, reticulately veined against the seeds var. *tavoyensis*
- 1b. Leaflets 11-13, smaller (1.8-3.0 × 0.7-1.4 cm), narrowly elliptic var. *maymyensis*

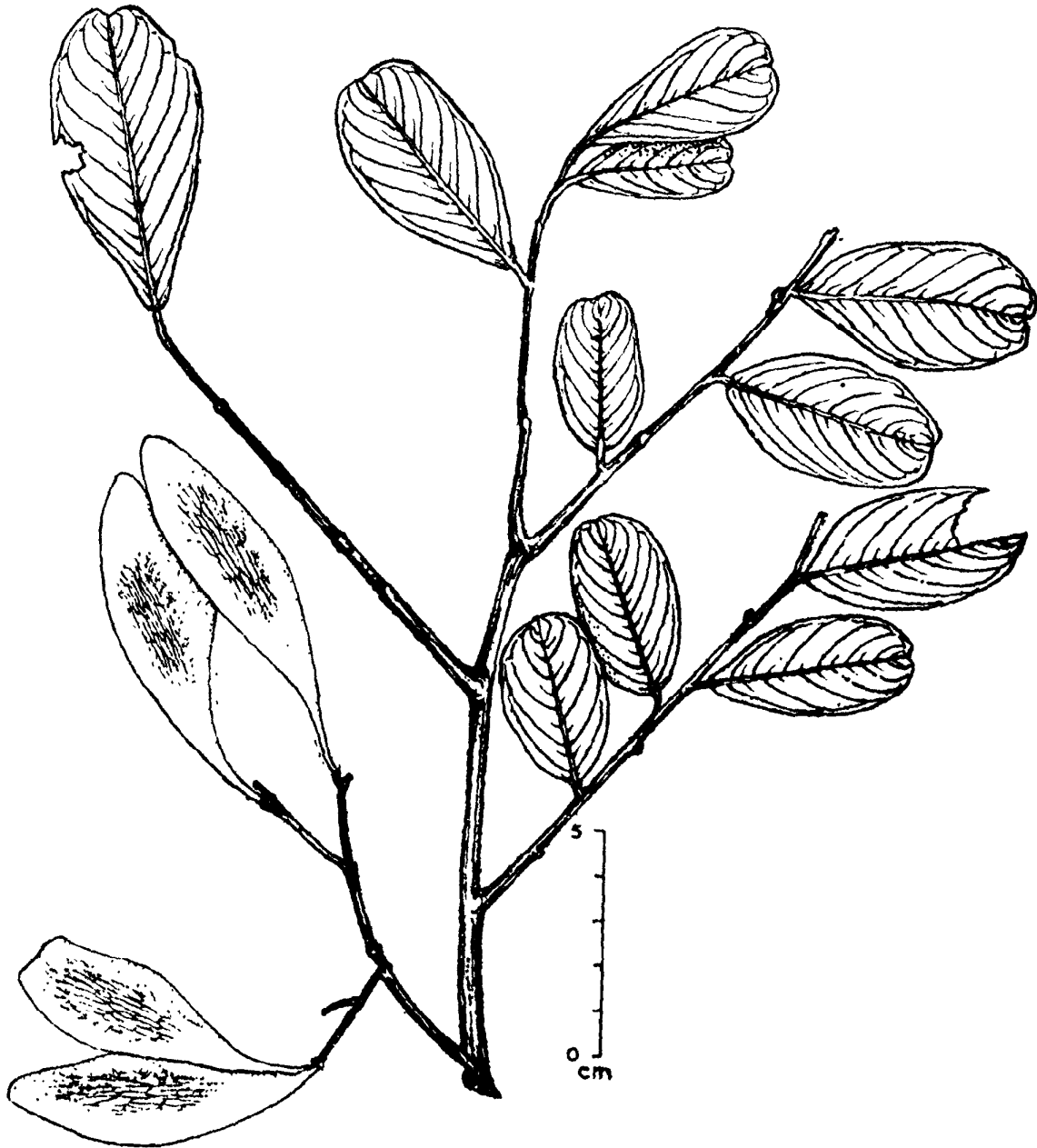


Fig. 6. *Dalbergia cultrata* Benth. var. *tavoyensis* Thoth.

Dalbergia cultrata Grah. ex Benth. var. ***cultrata*** form. ***fusca*** (Pierre ex Prain) Thoth. stat. et comb. nov.

Dalbergia fusca Pierre ex Prain [in Ann. Roy. bot. Gard. 10(1) : 56. 1904.

This differs from the typical form in having smaller leaflets with adpressed, brown pubescence below.

Prain (l.c. 1904) described the above plant on Pierre's collection from Cochin China, stating that it is very closely related to *D. cultrata*, the difference being the smaller leaflets with adpressed pubescence below. These two characters are not trustworthy as there are specimens from Burma, showing intermediate stages. The pubescent under surface of leaflets somewhat differentiates this plant from true *D. cultrata*. Hence it has been reduced to a forma.

Type : Cochin-China, Baochinah, Bin hoa, 1879 *Pierre* 1706 (Holotype, CAL).

Distribution : COCHIN-CHINA AND BURMA.

Specimen examined :

Burma : Pinmona, Aug. 1890 *Abdul Huk* s.n. (CAL).

In Burma it is reported to grow as a tree of 10-15 m in hills.

Dalbergia cultrata Grah. ex Benth. var. ***tavoyensis*** Thoth. in Bull. bot. Surv. India 17 : 65. 1975 (1978). (Fig. 6)

This variety differs from the typical in possessing pods, narrowed at both ends especially below, mucronate at apex and reticulately veined against the seeds.

Leaves imparipinnate, alternate, 12-21 cm long ; leaflets 7, ovate-elliptic to obovate, alternate, 3.5-6.0 × 1.7-3.4 cm, entire, retuse at apex, cuneate at base, glabrous above, glabrous to puberulous below, lateral veins 8-13 pairs ; petiolules 2-3 mm. long, glabrous. *Infructescence* axillary, 15.5-16.5 cm long. *Pods* oblong, 6.0-8.5 × 1.5-1.6 cm, stalked, narrow at both ends especially below, slightly mucronate, 1-2-seeded, reticulately veined against the seeds.

Type : Tavoy, Tenasserim, Burma, Sept. 1901 *Manson* 71 (Holotype, CAL).

Fruit : September to December.



Fig. 7. *Dalbergia cultrata* Benth. var. *maymyensis* Thoth.

Distribution : BURMA (Tavoy).

Specimen examined :

Burma : Calyon village, Tavoy, Jan. 1901 *Shaik Mokim* 253 (CAL).

Dalbergia cultrata Grah. ex. Benth. var. *maymyensis* Thoth. in Bull. bot. Surv. India 17 : 65. 1975 (1978). (Fig. 7).

This variety differs from the typical plant in having 11-13, smaller, narrowly elliptic leaflets.

Branches lenticellate, glabrous. *Leaf* imparipinnate, alternate, 10-15 cm long, rachis glabrous ; leaflets 11-13, narrowly elliptic, 1.8-3.0×0.7-1.4 cm, entire, obtuse at apex, narrow to rounded at base, chartaceous, glabrous ; petiolules 2 mm long, glabrous. *Infructescence* axillary, short panicle, 4-6 cm long, rachis and branchlets glabrous. *Pods* indehiscent, flat, narrowly oblong, 3.0-4.5×1.0-1.2 cm, stalked, glabrous, more or less smooth, 1-seeded.

Type : Maymyo plateau, 1240 m, Upper Burma, July 1938 - *J.H. Lace* 4141 (Holotype, CAL.).

General notes for the species :

A. *Etymology* : The origin of specific epithet deserves a word. In latin 'culturis' means a knife. Since the wood of this plant has been widely used for making handles of dahs, plough and spears, the epithet '*cultrata*' was chosen by Graham for this species.

B. *Ecology* : The species is a deciduous tree, commonly met in all leaf-shedding forest, especially in the Upper mixed Savannah forests. It grows from plains to hills up to an elevation of 1000 metres.

C. *Cytology* : n=10 (Mehra & Hans, 1969).

D. *Typification* : Wallichian catalogue 5861 on which the species was erected consists of 2 independent collections namely, 5861 A from Prome, Burma and 5861 B from Salween, Phanoë district. Of these 2 collections, the former has been selected as lectotype of the species.

E. *Distribution* : The plant has so far been known only from Burma. In the Calcutta herbarium there is one specimen (Bengal, 1836-38 - *Helfer* s.n.). The specimen is in flowers only and is without definite locality. It is highly doubtful whether Helfer had ever made any collections from Bengal as most of his collections were from Tenasserim or Andamans. It is possible that a wrong label has been pasted during mounting.

F. *Economic importance* : According to Kurz (1877) the tree exudes a red resin. The local people Karens use the plant for propagation of lac. The heart-wood is black, ebony like and extremely durable. It is, therefore, employed in making wheels, handles of knives, dahs, spears, agricultural implements and for carving.

17. *Dalbergia prainii* Thoth. in Journ. Jap. Bot. 50(2) : 52.1975.
(Fig. 8).

Dalbergia prainii Thoth. is related to *D. cultrata* Grah. ex Benth. but differs in the puberulous leaflets and distinctly ovate, 1-seeded pods which are reticulated opposite the seeds. It is placed in the section 'Sissoa' unde the series 'Congestae'.

A tree, 10 m high ; branchlets lenticellate, glabrous. *Leaves* imparipinnate, alternate, 4.5-9.5 cm long ; leaflets 11, elliptic to obovate, 2.0-3.5×0.9-2.0 cm, alternate, entire, retuse to emarginate at apex, coriaceous, glabrous above, puberulous below, reticulately veined, rachis puberulous to pubescent ; petiolules 1.5-2.0 mm long, puberulous to pubescent. *Flowers* not known. *Inflorescence* axillary, short, paniculate, 2.5-5.0 cm long, rachis puberulous. *Pods* indehiscent, ovate, samaroid, 3.5-4.7×1.8-2.1 cm, shortly stalked, narrowed at both ends, glabrous, reticulately veined opposite the single seed ; seed reniform black.

Type : Kalay and Chin hills, Upper Burma, Jun. 1894 J.C. Prazer 39 (Holotype, CAL).

Fruit : June.

Distribution : BURMA (Map-6).

A. *Etymology* : The species has been named in honour of David Prain who made a valuable contribution to our knowledge on the genus *Dalbergia* in South-east Asia.

B. *Critical notes* : It is to be pointed out here that the above collection of Prazer from Burma was named as *D. congesta* Grah. ex Benth by Prain. He at first considered this plant to be a variety of *D. cultrata* Grah. ex Benth. but later changed his opinion stating that the puberulous leaflets and the pods were quite different from the said species. He named (l.c. 1904) the burmese plant, as *D. congesta* and described the pod characters of true *D. congesta*, based on this plant as the pod of the former was till then unknown.

The author examined the pods of true *D. congesta* from a collection of Sedgewick from Nilgiris, the type locality. Critical studies revealed that the burmese plant could never be true *D. congesta* but did represent yet an

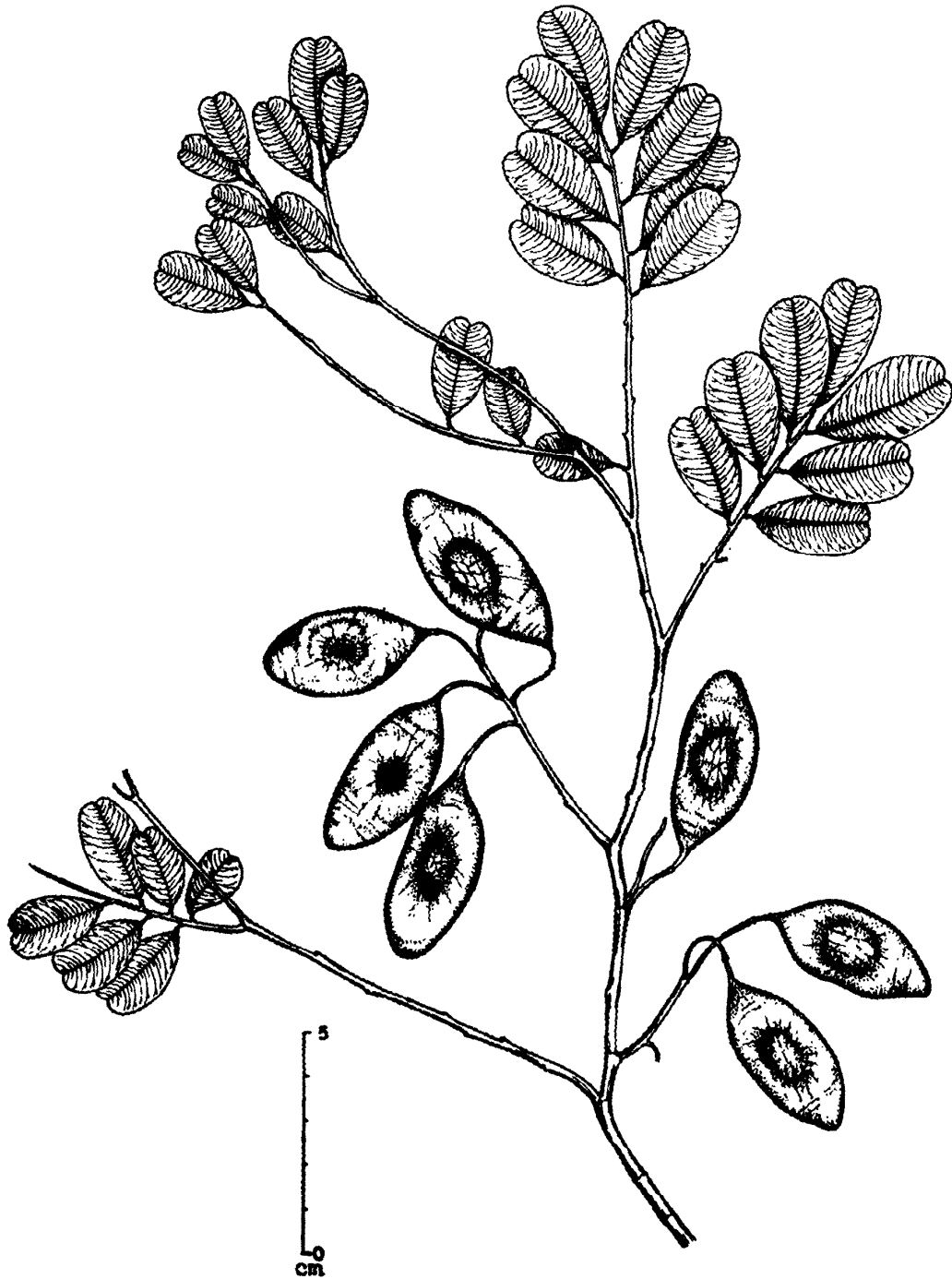


Fig. 8. *Dalbergia prainii* Thoth.

undescribed species. It is a tree in habit while *D. congesta* is a climber. Further *D. congesta* is an endemic species to Nilgiris, South India, growing at an altitude of 2000 m. The pod in both the cases differ markedly. The Burmese plant of Prazer was therefore described as a new species.

C. Distribution : The plant has so far been known only from Upper Burma and most probably represents an endemic species.

18. *Dalbergia velutina* Benth. in Miq. Pl. Jungh. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 43. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 233. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 281. 1877 et For. Fl. Brit. Burma 1 : 348. 1877 ; Prain in Journ. Asiat. Soc. Beng. 66 : 116, 445 1897 et Ibid. 70 : 43. 1901 et in Ann. Roy. bot. Gard. 10(1) : 74. 1904 ; Brandis, Indian Tr. 234. 1907 ; Ridley, Fl. Mal. Penin. 1 : 592. 1922 ; Kanjilal et al. Fl. Assam 2 : 105. 1938 ; Thoth. in Bull. bot. Surv. India 17 : 70. 1975 (1978).

Dalbergia stipulata Wall. Cat. 5868, 1831-32. (nomen) non Benth. *Amerimnon stipulatum* (Wall.) O. Kuntze. Rev. Gen. Pl. 1 : 159. 1981.

A climbing shrub ; branches rusty pubescent. *Leaves* imparipinnate, alternate, stipulate, 14-24 cm long ; leaflets 13-19, elliptic to oblong, 3-6×2.5-2.2 cm, alternate, entire, obtuse at apex, rounded at base, membranous, puberulous to glabrescent above, rusty and velvety pubescent below, lateral veins not distinct ; stipule large, obovate, ovate to linear-lanceolate, 0.8-2.0×0.2-0.5 cm long, persistent, pale rusty pubescent ; petiolules 2-4 mm long, rachis and petiolules velvety pubescent. *Inflorescence* a dense panicle, mostly axillary, 5.0-14.5 cm long, branches of the panicle corymbose, entire inflorescence velvety pubescent. *Flowers* white to pink, 6-8 mm long, shortly pedicelled ; bract ovate, rusty pubescent, bracteoles 2, ovate, just at the base of the calyxcup, rusty pubescent ; pedicels 1.0-1.5 mm long, pubescent. *Calyx* campanulate, 3-4 mm long, velvety pubescent without, 5-toothed. upper 2 connate, lowest one longer than the lateral 2 teeth. *Corolla* vexillum ovato-orbicular, 5-6 mm. long, reflexed, long-clawed ; wings oblong, clawed ; keels boat-shaped, auricled, clawed. *Stamens* 10, monadelphous, sheath 5-6 mm long, split open dorsally, filaments free on their upper fourth. *Ovary* 5.5-7.5 mm long, stipitate glabrous except the sutures and stipe which are pubescent, style slender, bent, stigma minute, ovules 2-3. *Pods* oblong, 4.5-5.7×1.5-1.7 cm, thin and membranous, rounded at base, rounded to acute at apex, glabrous, reticulately veined, especially opposite the seeds ; seeds 1, oblong, 2.0×0.5 cm, deep-brown.

Type : Sylhet - Wall. Cat. 5868 B (Lectotype designated, K; Isolectotype, CAL, LE).

Flower : February to April. *Fruit* : April to May.

Distribution : INDIA (Assam), BANGLADESH, BURMA, MALAYA and BORNEO. (Map-7).

Specimens examined :

Bangladesh : Sylhet, *Hooker. f. & Thomson* s.n. (CAL.).

Burma : Mergui, Maliwun, Mar. 1930 *Collector ?* 10993 (DD) ; Mergui, Mar. 1911 *Meebold* 14229 (CAL) ; Kenn-Tung, 1333 m., S. Shan states - *Mac Gregor* 1267 (CAL) ; Bookee hill *Kurz* 1758 (CAL) ; Keng-Tung, 1000 m, 1909 *Mac Gregor* 809 (CAL) ; Tenasserim, Moulmein *Falconer* 606 (CAL) ; Hill south east of Moulmein, Mar. 1908 *Rep. Econ. Prod. Govt. India* 30409 (ISIM) ; Pegu Yomah *Kurz* s.n. (CAL) ; Amherst. Apr. 1380-*Brandis* s.n. (CAL).

HBC : Cultivated in Royal Botanic Garden, Howrah *Collector ?* s.n. (CAL).

Wall Cat : Moolmyne, 1827 5868 A (Syntype, CAL, LE).

KEY TO THE VARIETIES AND FORMS

- | | |
|---|----------------------|
| 1a. Leaflets velvety pubescent below ; stipules large and prominent | var. <i>velutina</i> |
| 2a. Leaves 14-24 cm long ; leaflets smaller, 3-6 × 1.5-2.2 cm | f. <i>velutina</i> |
| 2b. Leaves 21-33 cm long ; leaflets larger, 4.5-8.7 × 2-3 cm | f. <i>burmanica</i> |
| 1b. Leaflets glabrous to puberulous below ; stipules small | var. <i>maingayi</i> |

Dalbergia velutina Benth. var. ***maingayi*** Prain in Journ. Asiat. Soc. Beng. 66 : 117. 1897 et Ibid. 70 : 44. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 75. 1904 ; Ridley, Fl. Malay Penin. 1 : 592 1922.

This variety differs from the typical plant in leaflets being glaucous-cent, glabrous to puberulous above, glabrous to rusty puberulous below, smaller stipules, rachis and branches of inflorescence being rusty puberulous and calyx cup being less velvety pubescent.

Leaves imparipinnate, alternate, stipulate, 14-27 cm long ; leaflets 11-19, oblong, 2-6 × 1.5-2 cm, alternate, obtuse to retuse at apex, narrow

to rounded at base, glaucouscent, glabrous to puberulous above, glabrous to rusty puberulous below ; rachis and petioles rusty puberulous ; stipule 6-10 mm long. *Inflorescence* as in the typical plant but rusty puberulous. *Flowers* same as in typical form. *Calyx* as in typical form except being less velvety pubescent.

Type : Malacca, 1867-68, Malaya *Maingay* 612 (Lectotype designated, CAL).

Distribution : BURMA, MALAYAN PENINSULA AND BORNEO.

Specimens examined :

Burma : Mergui *Griffith* 1798 (CAL) ; Tavoy, Mar. 1901 *Shaik Mokim* 447 (CAL) ; Tenasserim, Yahudan, Mar. 1911 - *Meebold* 14780 (CAL) ; Wagon, Apr. 1911 *Meebold* 15040 (CAL) ; Pagaye, Apr. 1911 - *Meebold* 15003 (CAL) ; Tenasserim, 1838 *Dr. Helfer* K.D. No. 1804 (K).

Singapore, Malaya. 1894 *Ridley* 5923, 6086 (Syntypes, CAL).

Dalbergia velutina var. *velutina* f. *burmanica* Thoth. in Bull. bot. Surv India 17 : 70. 1975 (1978).

The plant differs from the typical in the longer leaves and larger leaflets.

Leaves 21-33 cm long, comparatively longer than in the typical form ; leaflets 13-20, larger than the typical form, 4.5-8.7 × 2-3 cm.

Type : Mergui, Burma, Apr. 1909 *Lace* 4789 (Holotype, CAL).

Specimens examined :

Burma : Rangoon, May 1911 *Meebold* 15535 (CAL).

General Notes :

A. *Etymology* : The specific epithet '*velutina*' refers to the rusty velvety nature of the leaves, rachis, inflorescence and calyx.

B. *Ecology* : The species is a large climbing shrub, frequent in tropical forests as well as drier hill forests up to an elevation of 1300 m.

C. *Critical notes* : In Calcutta herbarium there is a collection of Helfer from Bengal but he never made any botanical collections from Bengal as all his collections came from Tenasserim or Andamans, Evidently it had been wrongly labelled as true *D. velutina* never occurs in Bengal.

This was confirmed by Prain (l.c. 1904) when he stated that Helfer's collection of *D. velutina* was from Tenasserim

D. Typification : Wallichian specimens 5868 on which Bentham described this species consist of 5868 A from Moolmyne and 5868B from Sylhet. The latter has therefore been chosen as lectotype, after critical study.

19. *Dalbergia confertiflora* Benth. in Miq. Pl. Jungh. 1 : 255. 1852 et Journ. Linn. Soc. 4 (Suppl.) : 41. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 233. 1876 ; Prain in Journ. Asiat. Soc. Beng. 66 : 114. 1897 et Ibid. 70 : 56. 1901 et Beng Pl. 1 : 411. 1903 et in Ann. Roy. bot. Gard. 10 (1) : 52. 1904 ; Brandis, Indian Tr. 234. 1907 (ed. 2) ; Parkinson, For. Fl. Andamans 149. 1923 ; Heinig, List. Pl. Chittagong 21. 1925 ; Kanjilal et al. Fl. Assam 2 : 104. 1938 ; Balak. Fl. Jowai 1 : 168. 1981.

Dalbergia paniculata Wall. Cat. 5848 in part. non Roxb. *Amerimnon confertiflorum* (Benth.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

An extensive woody climber ; branches lenticelled, black. *Leaves* imparipinnate, alternate, stipulate, 9-18 cm long ; leaflets 9-15, mostly elliptic-oblong, obovate at times, 3.0-5.3 × 1.8-3.0 cm, alternate, rarely opposite (Andamans-Prain), entire, obtuse to retuse at apex, rounded to cuneate at base, glabrous above, puberulous to glabrescent below, lateral veins 6-9 pairs, not distinct ; stipules oblong, prominent, caducous ; petioles 2-3 mm long, glabrous. *Inflorescence* axillary and terminal panicle, 7.5-32.5 cm. long branches of the panicle ending in corymbosely or subcapitately crowded cymes, rachis and branches of panicle rusty-tomentose. *Flowers* pale white, 6-7 mm long, sessile to shortly pedicellate ; bracts deciduous ; bracteoles 2, just at the base of the calyx cup and embracing the same. *Calyx* narrowly campanulate, 3 mm long, 5-toothed, teeth obtuse, upper, 2 longer, acute, calyx cup puberulous without. *Corolla* vexillum ovato-orbicular, 6 mm long, emarginate at apex, shortly clawed ; wings and keels oblong, distinctly clawed. *Stamens* 9, monadelphous sheath 5 mm long, split open dorsally, filaments free above. *Ovary* 5.0-5.5 mm long, stipitate, hairy along one suture, style short, stigma minutely capitate. *Ovules* 2-4. *Pods* oblong, indehiscent, 4-14 × 1.5-2.5 cm, thinly coriaceous, acute at apex, rounded at base, glabrous, shortly stalked faintly veined opposite the seed, 1-2 or rarely 3 - seeded ; seeds reniform, compressed, 7 × 4 mm.

Type : Sylhet - Wall. Cat. 5448 I (Lectotype designated K ; Isolectotype CAL, LE).

Distribution : INDIA (Assam and Andaman Islands). BANGLADESH (Sylhet and Chittagong). (Map - 6).

Flower : January to March. *Fruit* : March to April.

Specimens examined :

Andamans : South Andaman, Bom-Lungta creek, Feb. 1916 - *Parkinson* 916 (CAL) ; Rutland Island, Jan. 1916 *Parkinson* 872 (CAL) ; Namuk Bhatta, Mar. 1884 *King's collector* s. n. (CAL) ; Hobdypore hill jungle, Dec. 1893 *King's collector* s. n. (CAL) ; Anikhet hill jungle, Mar. 1893 *King's collector* s. n. (LE, CAL, BSI) ; North Bay hill jungle, Jan. 1895 *King's collector* s. n. (CAL) ; Tusanobad hill jungle, Dec. 1893 *King's collector* s. n. (CAL) ; Port Mouat hill jungle, Jan. 1891 *Dr. King* s. n. (CAL) ; Dhanikari, Jan. 1893 *King's collector* s. n. (CAL) ; South Andaman, Mar. 1901 *Heinig* 567 (CAL) ; Without definite locality (Andamans), 1899 *Prain's Collector* s. n. (CAL).

Assam : Duphla hills, Feb. 1875 *Lister* 244 (CAL) ; Khasi hills - *Kurz* s. n. (CAL).

Bangladesh : Thandacheri hill, Jan. 1897, Chittagong *Badul Khan* 245 (CAL) ; Ichabil T. E., Sylhet, Dec. 1914 - *Kanjilal* 4953 (ASSAM).

Wall. Cat : Oudh - *Wall. Cat.* 5848 E (Syntype, K, CAL).

***Dalbergia confertiflora* Benth. var. *listeri* Thoth. in Bull. bot Surv. India 17 : 66 1975 (1978). (Fig. 9)**

The variety differs from the typical plant in the calyx being densely ferruginous.

A climber. *Leaves* imparinnate, alternate, 9-11 cm long ; leaflets 9, elliptic-oblong, 2.0-3.8 × 1.5-2.0 cm, alternate, entire, obtuse at apex, rounded at base, glabrous ; petiolules 2 mm long. *Inflorescence* axillary and terminal panicle, 5.0-13.5 cm long, branches of the panicle ferruginous. *Flowers* 6-8 mm long, sessile to minutely pedicelled ; bracts and bracteoles as in typical form. *Calyx* campanulate, 5 toothed, densely ferruginous, 3-4 mm long. *Corolla* vexillum obovate, 5.5-6.5 mm long, clawed ; wings and keels oblong, clawed. *Stamens* 9, monadelphous, sheath 4-5 mm long. *Ovary* 5 mm long, stipitate, style short, stigma minute, ovules 4.

Type : Kasalong, Chittagong, Feb. 1876 *Lister* 8 (Holotype, CAL).

This variety occurs only in BANGLADESH.

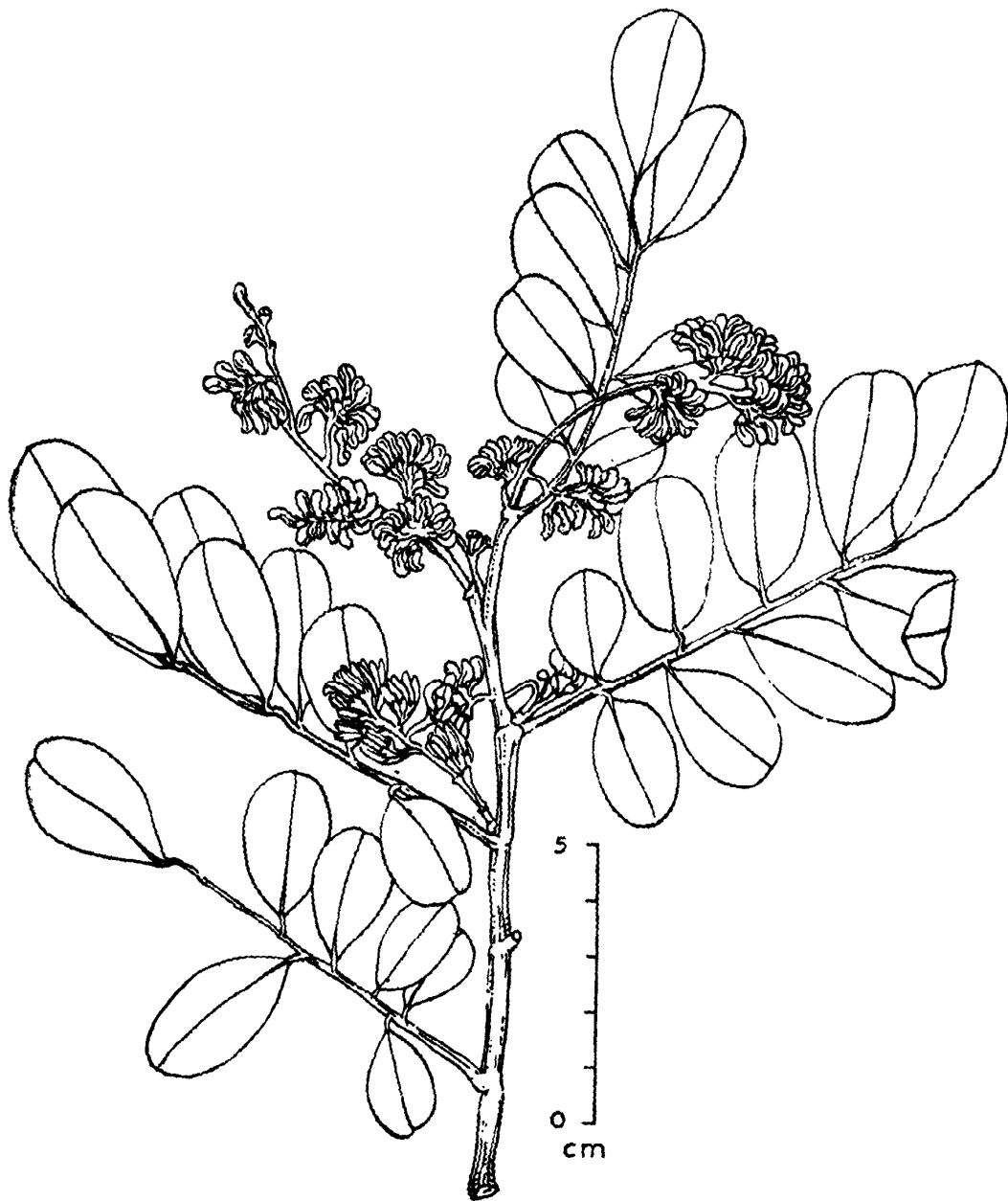


Fig. 9. *Dalbergia confertiflora* Benth. var. *listeri* Thoth.

A. *Etymology* : The specific epithet *confertiflora* signifies the dense and compact arrangement of the flowers in the inflorescence.

B. *Ecology* : The species is an extensive climber. In Andamans it is found usually in the beach forests.

C. *Distribution* : Kurz at first thought that his collection 2619 (Journ. Asiat. Soc. Beng. 45 : 481. 1876) from the tropical forests of Pegu as *D. rubiginosa* Roxb. but changed his opinion, saying that the plant under 2619 represented *D. thomsonii* Benth. Prain (Journ. Asiat. Soc. Beng. 66 : 110. 1897) pointed out that Kurz's 2619 was neither *D. rubiginosa* Roxb. nor *D. thomsonii* Benth. but was only *D. confertiflora*. The above specimen, (Kurz 2619) present in the Calcutta herbarium was critically studied and as a result the author came to the conclusion that it is neither *D. thomsonii* as concluded by Kurz nor *D. confertiflora* as thought by Prain. The specimen is neither with flowers nor with pods and hence its exact identity could not be established. But it is certain that *D. confertiflora* does not occur in Burma.

The reported occurrence of this species in Concan, Western ghats (Baker 1876, Dalzell 1861) is erroneous as pointed out by Prain (*l.c.* 1897). The collections of Hook. f. & Thomson as well as Dalzell from Concan on which the above statement was made belonged to *D. volubilis* Roxb.

D. *Typification* : Bentham based his description (*l.c.* 1852) on Wallichian catalogue 5848. This consisted of 2 collections, namely 5848 I from Sylhet and 5848 E from Oudh, both thus constituting the syntypes. Among the syntypes, Wall. Cat. 5848 I from Sylhet has been chosen as lectotype.

E. *Critical notes* : The pods are not at all narrowed to a point as stated by Baker in his flora (1876).

20. *Dalbergia horrida* (Dennst.) Mabblerly in Taxon 25 : 538. 1977 ; Thoth in Taxon 30 : 46. 1981 ; Matthew, Fl. Tam. Nad. Car. 3(1) : 392. 1983.

Ana-mullu Rheede, Hort. Malab. 8 : t. 40. 1688. *Amerimnom horridum* Dennst. Schul. Hort. Malab, 34. 1818. *Dalbergia sympathetica* Nimmo in Grah. Cat. Bombay Pl. 55. 1839 ; Voigt, Hort. Suburb. Calcutt. 241. 1845 ; Benth. in Miq. Pl. Jung. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 42. 1860 ; Dalz. et Gibs. Bombay Fl. 78. 1861 ; Baker in Hook. f. Fl. Brit. India 2 : 234. 1876 ; Watt. Dict. Econ. Prod. India 3 : 16. 1890 ; Talbot, Bombay List 75. 1894 ; Woodr. in Journ. Bombay nat; Hist. Soc. 11 : 426. 1897 ; Prain in Journ. Asiat. Soc. Beng. 66 : 446. 1897 ; Talbot, Tr. Shr. Climb. Bombay Pres. 137. 1902 (ed. 2).

Cooke, Fl. Pres. Bombay 1 (2) : 398. 1902 ; Talbot, For. Fl. Bombay Pres. Sind 1 : 426. 1909 ; Ramarao, Flow. Pl. Travancore 129. 1914 ; Santapau in Rec. bot. Surv. India 16 (1) : 74. 1967 (ed. 3) ; Venkatareddi in Bull. bot. Surv. India 11 : 145. 1969 (1971) ; Sharma et al. in Bull. bot. Surv. India 15 : 56. 1973 (1976) ; Shah, Fl. Gujarat 2 : 202 1978 ; Saldanha et Nicolson, Fl. Hassan District, Karnat. 246. 1978 (ed. 2) ; Sharma et al. Fl. Karnat. 70. 1984 ; R. S. Rao, Fl. Goa, Diu, Dam. & Nagar 1 : 111. 1985.

D. multiflora Heyne in Wall. Cat. 5848 B 1832 (nomen) ; Prain in Journ. Asiat. Soc. Beng. 70 : 59. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 43. 1904 ; Brandis, Indian Tr. 235. 1907 (ed. 2) ; Gamble, Fl. Pres. Madras 2 : 381. 1918. *Amerimnon sympatheticum* (Nimmo) Kuntze. Rev. Gen. Pl. 1 : 159. 1891.

A large scandent shrub or a climber running over tall trees, and in the absence of support growing into a large, straggling shrub ; trunk armed with strong and blunt thorns which are either straight or variously curved, younger branches puberulous. *Leaves* imparipinnate, alternate, stipulate, 8-13 cm long, rachis puberulous ; leaflets 11-19, alternate, elliptic-oblong, 1.0-2.2 × 0.5-1.5 cm, entire, obtuse to retuse at apex, rounded at base, subcoriaceous, pubescent on both surfaces at first but ultimately glabrous above and sparsely pubescent beneath, lateral veins not distinct ; stipules ovate, pubescent, deciduous ; petiolules short, pubescent, 0.5-1.0 mm long. *Inflorescence* a short, axillary panicle, 2.5-6.5 cm long, peduncle, branches and pedicels brown pubescent, flowers secund. *Flowers* creamy white, 4-5 mm long ; bracts small, ovate, bracteoles 2, ovate-obtuse, situated at base of calyxcup and embracing the same, pedicels, 1 mm long. *Calyx* campanulate, 2.5-3.0 mm long, 5-toothed, teeth subequal, lowest longest, calyx cup puberulous without. *Corolla* vexillum obovate, 4.0-5.5 mm long, shortly clawed ; wings and keels oblong, clawed. *Stamens* 9, monadelphous, sheath 3.5-4.0 mm long, split open dorsally, filaments of varying lengths, middle ones longer. *Ovary* 3-4 mm long, puberulous, style short, bent, stigma minute, ovules up to 3. *Pods* oblong, 4.0-7.2 × 1.3-1.5 cm, indehiscent, thih, shortly stalked, acute at apex, suddenly narrowed at base, puberulous to pubescent, mostly 1-seeded, rarely 2-3 seeded ; seeds reniform, compressed, 0.6-1.0 × 0.3-0.5 cm.

Type : Rheede Hort. Malabar. 8 : t. 40. 1688 (Lectotype),

Flower : November to January. *Fruit* : January to February.

Distribution : INDIA (Western Ghats)

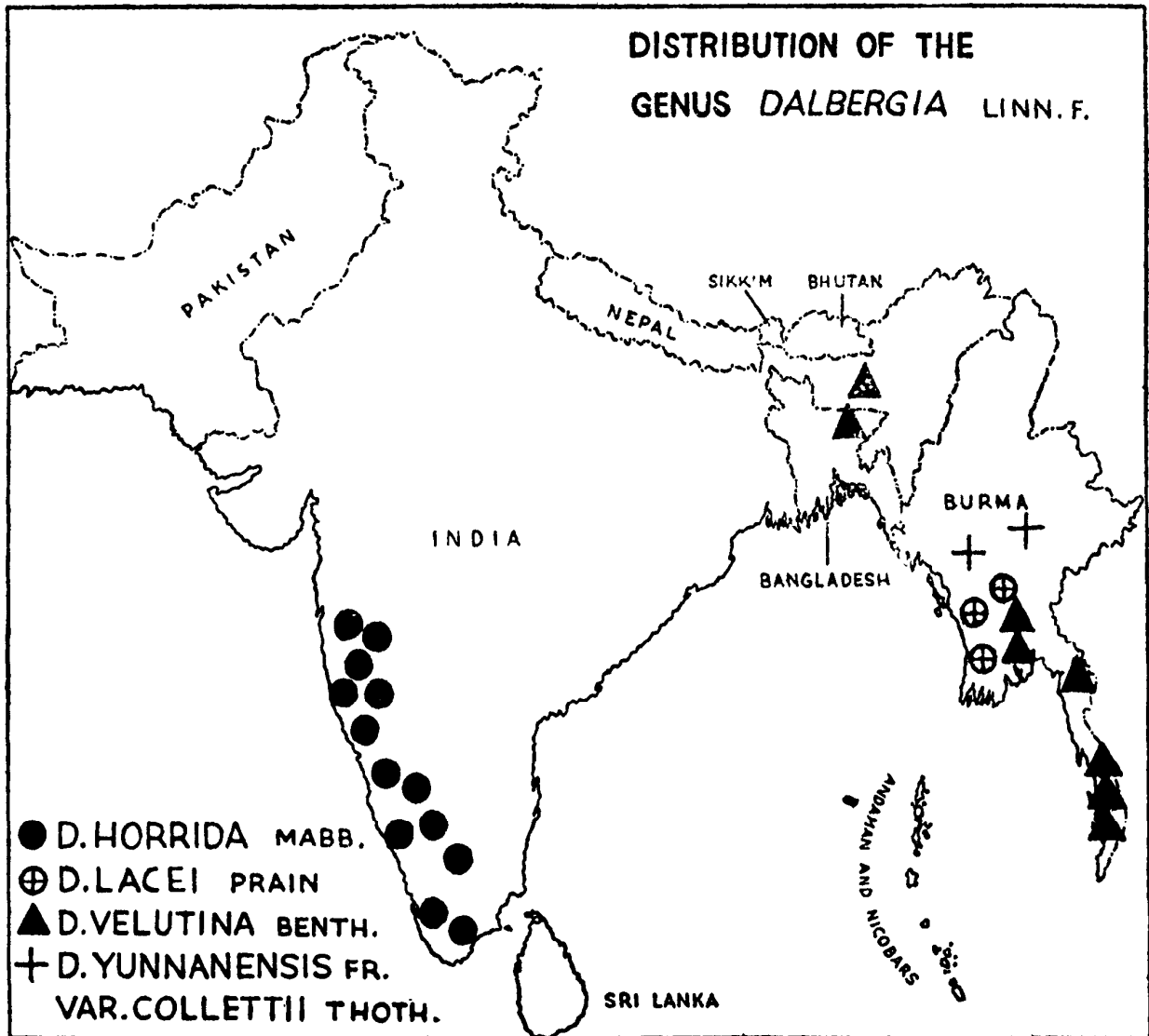
(Map-7).

Specimens examined :

Kerala : Malabar, Palghat, Dec. 1916 *Collector* 14201 (MH) ; Kannothe, Dec. 1913 *Collector* ? s. n. (MH) ; Kannothe, Malabar district, Dec. 1913 - *Barber* 8761 (MH) ; Makkuli, Palghat district, Jan. 1980 *Bhargavan* 65753 (MH).

Maharashtra ; Khandala, Bhoma hill, Nov. 1962 - *Raghavan* 85140 (BSI) ; Echo point ravine, Jan. 1904 *Santapau* 3594 (BLAT) ; St. Xavier's ravine, Nov. 1945 & May 1946 *Santapau* 8287, 8861 (BLAT) ; Echo point, Dec. 1942 *Santapu* 1420 (BLAT) ; Battery hill plateau, Dec. 1942 & Dec. 1949 *Santapau* 1473, 10659 (BLAT) Kune Stream, Mar. 1943 *Santapau* 1698 (BLAT) ; Khandala Mar. 1903 *Gammie* 16109 (BLAT) ; St Xaviers Ravine, Khandala, Jan. 1945 *Santapau* 5791 (BLAT) ; Talao, Dec. 1948, *Santapu* 9781 (BLAT) ; Karanjwadi, Koyana, Feb. 1979 *Kochar* 158262 (BSD), Kaziwada, Ratnagiri district, Feb. 1970 *Kulkarni* 120267 (BSI) ; Radhangiri, Kolhapur district, Feb. 1978 *Nayar* 152278 (BSI) ; Sawan Village, Kolhapur district, Feb. 1978 *Nayar* 152426 (BSI) ; Kune plateau, Jan 1954 *Santapu* 17973 (BLAT) ; Khandala, Jun. 1943 - *Santapau* 2076 (BLAT) ; Khandala village, Dec. 1949 *Santapau* 10571 (BLAT) ; Canvaescence home, Jan. 1945 *Santapau* 5857 (BLAT) ; Hills, 200 m, Nov. 1941 *Santapau* 102.93 (BLAT) ; Khandala, Mar. 1903 *Gammie* 16109 (BSI, BLAT) ; Khandala, Jan. 1955 *Bole* 1303 (BLAT) ; Khandala, Mar. 1917 *Blatter* 11131 (BLAT) ; Fitzgerald ghat, Mahabaleshwar, Feb. 1954 *Bole* 1293 (BLAT) ; Noundel village, Kajrat district, Feb. 1949 *Fernandez* 102 (BLAT) ; Dapoli, Bombay, Dec. 1921 - *Acland* 405 (BLAT) ; Matheran, Jummapatti, Dec. 1958 *Irani* 2622 (BLAT) ; Matheran, Nov. 1958 *Irani* 2483 (BLAT) ; Parula, West of Malkapur, May 1904 *Bhide* s. n. (BLAT) ; Ambowne, Dec. 1902 *Gammie* 15966 (BSI, BLAT) ; Ratagiri, Nanapani, Ambolighat, Nov. 1965 *Kulkarni* 107979 (BSI) ; Sangamezwar Asurde, May 1958 *Jain* 34924 (BSI) ; Bombay, 1878 - *Dalzell* s. n. (CAL) ; Ambola, Bombay, Feb. 1950 - *Dhruna* 71 (CAL) ; Nagothna, Bombay, Mar. 1960 *Balamani* 618-19 (BLAT) ; Ganeshkhind garden, Poona *Collector* s. n. (BSI) ; Goa, Bhati forests, Aug. 1963 *Kanodia* 89575 (BSI) ; Mapuca, Mar. 1965 - *Pallithanam* 75 (BSI) ; Deleur forests, Dec. 1963 - *Pallithanam* 17 (BSI) ; Parvorim, Dec. 1965 *Pallithanam* 454 (BSI) ; Acoi Dec. 1965 - *Pallithanam* 491 (BSI) ; Maharashtra (without definite locality) *R. Wight* s. n. (MH).

Mysore : North Kanara, Kalabe Kumpta, Feb. 1962 - *Raghavan* 79404 (BSI) ; Ancola road, Karwar, Mar. 1957 - *Jain* 16485 (BSI) ; Jazlepet *Talbot* 1571 (BSI) ; Balemune, Jan. 1892 *Talbot* s. n. (BSI) ; Without definite locality (N. Kanara), Jan. 1885 - *Talbot* 3621 (BSI) ; Goobale, below ghat, 1881 - *Talbot* 153 (CAL) ; Gerosoppa, Nov. 1950 - *Fernandez* 2003 (CAL) ; Ramanguli to Hegar village, Jan. 1951 *Fernandez* 2090 (CAL) ; Hattikeri, Jan. 1951 - *Fernandez* 2115 (CAL) ; Yellapur, Dec. 1955 - *Panthaki* 2493 (BLAT) ; Karwar, 1921 *Bell* 102.57 (BLAT) ;



Map 7

Yellapur Haliyal, Dec. 1155 *Bole* 1507 (BLAT); Castle rocks, Dec 1953 *Santapau* 17792 (BLAT); South Kanara, Nukiadi, Baindoor reserve, Jan. 1947 *Raizada* 21081 (DD); Wondse & Baindoor, Mar. 1916 *Collector* ? 12813, 12888 (MH); Concan *Stocks, Law* s. n. (CAL, LE, KW, MH); Mysore, 1847 *Cleghorn* s. n. (KW); Without any details (N. Kanara) *Collector* ? 276 (MH); Kempuhole, Harsan district, Dec. 1969 *Saldanha* 15856 (MO); Shirondi Ghat, Hassan district, 700 m, Dec. 1978 *Saldanha et al.* 5501 (CAL); Guruvayana Kere, 100 m, S. Kanara district, Dec 1979 *Saldanha* 10629 (CAL).

Tamil Nadu : Pen. Ind. Or. *Wight* 918 (CAL); Without definite locality, Oct. 1875 *O. Kuntze* s. n. (CAL); Nagerkoil, Kanyakumari district, Dec. 1893 *Collector* ? 218 (MH); Mount Stuart, 700 m, Anamalay, Mar. 1931 *Narayanaswamy* 5503 (MH); Courtallam hills, Tinnevely district, Nov. 1901 *Collector* ? s. n. (MH); Salem, 1873 *Beddome* s. n. (MH); Panagudi, Kanyakumari district, Feb. 1972 - *Karthikeyan* 40113 (MH); Nadugani forest, Nilgiri district, Mar. 1973 *Vajravelu* 43782 (MH).

HBC : Cultivated in R. B.G. Sibpur *Kurz* s.n. (CAL).

Wall Cat : Courtallam *Heyne* 5848-B (Isotype of *D. multiflora* Heyne ex Prain, CAL).

KEY TO THE VARIETIES

- | | |
|--|-------------------------|
| 1a. Leaflets pubescent below and above | |
| 2a. Pods narrow and oblong | var. <i>horrida</i> |
| 2b. Pods ovate and wider | var. <i>concanensis</i> |
| 1b. Leaflets glabrous above, glabrescent beneath | var. <i>glabrescens</i> |

***Dalbergia horrida* (Dennst.) Thoth. var. *glabrescens* (Prain) Thoth. et Nair in Taxon 30 : 46. 1981.**

D. multiflora Heyne ex Prain var. *glabrescens* Prain in Journ. Asiat. Beng. 70 : 59. 1901 et in Ann. Roy. bot. Gard. 10(1) 44. 1904.

This variety differs from the typical plant in the leaflets being glabrous to glabrescent beneath and quite glabrous above.

Leaves imparipinnate, 9-13 cm long, stipulate, rachis puberulous; leaflets 11-15, elliptic, 1-2 × 0.5-1.2 cm, entire, obtuse at apex, rarely

retuse, rounded at base, glabrous to glabrescent beneath, quite glabrous above, lateral veins indistinct; petiolules 1 mm long. *Inflorescence* and *flowers* as in the typical plant.

Type : Nagercoil, S. India, Nov. 1893 *Lawson* 218 (Lectotype designated, CAL).

Distribution : SOUTHERN INDIA.

Specimens examined : Maisor & Carnatic *Thomson* s.n. (CAL, LE, KW); Carnatic - *Wight* 819 (CAL); Courtallam - *Wight* 267 (CAL); Without definite locality (South India) *Lawson* 205 (CAL).

Dalbergia horrida (Dennst.) Thoth. var *concanensis* Thoth. var. nov.
(Fig. 10).

A varietate *horrida* leguminibus ovatis et latioribus differt.

This variety differ from the typical plant in having ovate pods which are wider as compared to the consistently narrow, oblong pods in the latter.

Leaves imparipinnate, 5-11 cm long, stipulate, rachis puberulous; leaflets 11-13, elliptic-oblong, 1.4-2.0 × 0.8-1.2 cm, entire, obtuse to retuse at apex, rounded at base, pubescent on both sides, lateral veins indistinct; petiolules short, 0.5-1.0 mm long; pubescent. *Infructescence* 3-4 cm long. *Pods* ovate, 5.5-6.0 × 2.6-3.0 cm, compressed, shortly stalked, acute at apex, rounded at base, puberulous to pubescent, 1-seeded; seeds black, reniform, compressed, 1.0 × 0.5 cm.

Type : Concan, Mysore *Collector* ? s.n. (Acc. no. 130711, Holotype, CAL).

Distribution : SOUTHERN AND WESTERN INDIA.

Specimens examined : Peninsular India *Kurz* s.n. (CAL).

A. *Etymology* : The specific epithet '*horrida*' is an allusion to the frightening, large thorns of this species.

B. *Ecology* : The plant is a large, scandent shrub but grows into a straggler in the absence of any support. If there are tall trees nearby it grows into a woody climber. It is one of the constituents of the deciduous forests in western ghats.

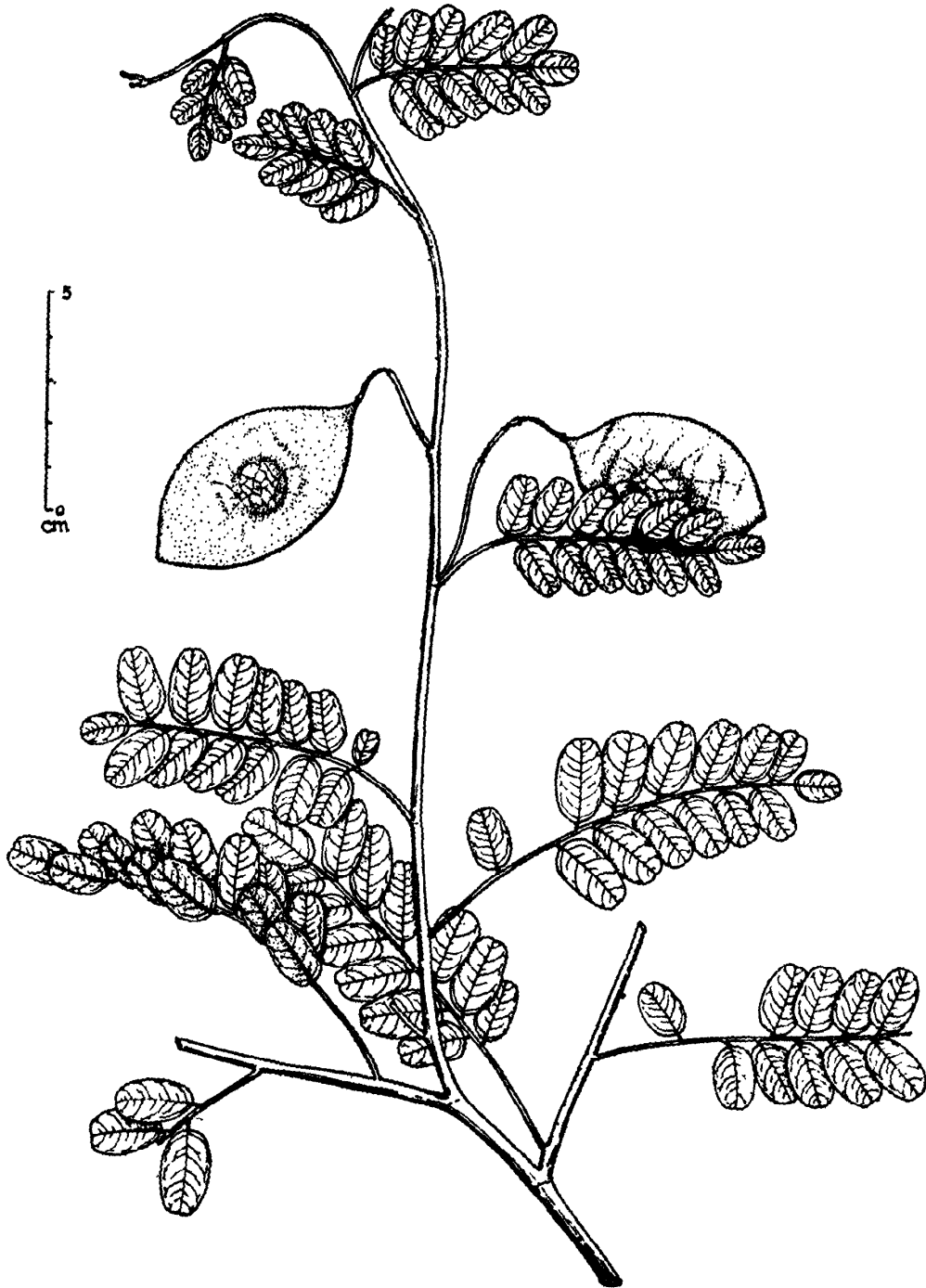


Fig. 10. *Dalbergia horrida* (Dennst) Mabb. var. *concanensis* Thoth.

C. *Nomenclature* : The nomenclatural history of this species is quite interesting. The plant is commonly known under the name *D. sympathetica* Nimmo in all our floras. Prain (l.c. 1901) replaced the above name with *D. multiflora* of Heyne in Wall. Cat. 5848 B. Wallich wrongly identified the above collection of Heyne as *D. paniculata* Roxb. and hence Prain not only pointed out this defect but also preferred the manuscript name of Heyne (*D. multiflora*) in Wall. Cat 5848 B as the specimen was really *D. sympathetica*. Prain's argument was that Wall. Cat 5848 B (1831-32) was an earlier name to *D. sympathetica* Nimmo (1839). The above conception of Prain was erroneous as *D. multiflora* Heyne in Wall. Cat. 5848 B was a nomen in 1831-32 and hence had no priority over the validly published *D. sympathetica* Nimmo (1839). Again there was an earlier name available to this species namely *Amerimnon horridum* Dennst. (1816), based on 'Ana-mullu' of Rheed. Hort. Malab. 8. t. 40. 1688. Though Dennstaedt had given only the botanical name, his publication of *Amerimnon horridum* was perfectly valid with an indirect reference to Rheed's 'Ana-mullu' which is the same plant as our present day *D. sympathetica*. There is a well illustrated plate, accompanied with a description in Rheede's above work which has been chosen as lectotype of this species. *Amerimnon horridum* Dennst. was therefore an earlier, valid name and a new combination *Dalbergia horrida* (Dennst.) based on the above epithet has been therefore chosen for this plant by Mabberly (1977). It is a equally interesting to state that there existed one *Dalbergia horrida* Grah. in Wall. Cat. 5877, 1832 which is both a nomen as well as a taxonomic synonym of *Dalbergia spinosa* Roxb. Graham's *D. horrida* can, therefore, cause no rejection of *D. horrida* (Dennst.) Mabberly.

D. *Critical notes* : An abnormality has been observed in some specimens of Southern India where the stamens exceed the number 10 into 12 and there are 3 wing petals in the place of 2. Of the 12 stamens, one appears to be a staminode. The colour of the flower too varies from creamy white to whitish violet.

E. *Economic Importance* : The plant is medicinally useful. The leaves are alterative and in Goa the bark is used as a 'lep' to remove pimples. Foliage is eaten by cattle.

21. *Dalbergia yunnanensis* Franch. var. *collettii* (Prain) Thoth. in Bull. bot. Surv. India 25 : 171. 1983 (1985).

Dalbergia collettii Prain in Journ. Asiat. Soc. Beng. 66 : 445. 1897 (in part) et Ibid. 70 : 56. 1901 et in Ann. Roy. bot. Gard. 10(1) : 53. 1904 ; Brandis, Indian Tr. 234. 1901 (ed. 2). *Dalbergia* sp. Coll. & Hemsl. in Journ. Linn. Soc. 28 : 50. 1891.

An extensive woody climber, sometimes shrubby, branchlets glabrous, lenticellate. *Leaves* imparipinnate, alternate, stipulate, 11-17 cm long; leaflets 13-15, narrowly elliptic to oblong, 2.0-3.5 × 1.0-1.5 cm, obtuse to subacute at apex, rounded at base, entire, subcoriaceous, glabrescent above, pubescent below, especially along the nerves, lateral veins 8-10 pairs, distinct; rachis and petiolules pubescent when young and puberulous when mature, petiolules 1-2 mm long; stipules caducous, membranous. *Inflorescence* a dense, corymbose panicle axillary and terminal, 5.0-10.5 cm long, puberulous to pubescent. *Flowers* 4-5 mm long; bracts ovate, bracteoles 2, 1.5-2.0 mm long, membranous; pedicels short, 1 mm long. *Calyx* campanulate, 2.5-3.0 mm long, puberulous without, 5-toothed, upper 2 oblong, obtuse, slightly connate, lateral ones shorter, acute, lower most lanceolate, and longest. *Corolla* vexillum white, obovate, 3.5-4.5 mm long, truncate above, shortly clawed below; wings oblong; keels somewhat boat-shaped, clawed. *Stamens* 9, monadelphous, sheath 4 mm long, split open dorsally. *Ovary* 4.0-4.5 mm long, stipitate, glabrous except the puberulous sutures, style short, stout, stigma minutely capitate, ovules 2. *Pods* ovato-oblong, indehiscent, 6.0 × 2.2 cm, shortly stalked, acute, narrowed at base, glabrous, 1-seeded, distinctly reticulated just opposite the seed, (characters of the pod given for the first time).

Type : Kawlo, 1666 m, Shan hills, April 1888 *Collett* 591 (Lectotype designated, CAL).

Distribution : BURMA (Shan hills); an endemic plant. (Map-7).

Flower : April-May. *Fruit* : May-July.

Specimens examined :

Burma : Maymyo plateau, 1200 m, May 1912 *Lace* 5808 (CAL); Maymyo, 1200 m, Apr. 1914 *Rodger* 47 (CAL).

A. *Etymology* : The epithet '*collettii*' is after the collector Dr. Henry Collett who made extensive collections in Upper Burma.

B. *Ecology* : The species is a woody climber but at times grows into a shrub. It grows in hills at elevations between 1200-1666 metres.

C. *Taxonomic status* : Prain (l.c. 1897) described this plant as a distinct species, based on Collett's collections from Shan hills. A critical examination of the types of *D. collettii* and *D. yunnanensis* Franch., a species described earlier from Yunnan, South China revealed that both are very much alike except in the leaf and flower characters. Prain later (l.c. 1904) remarked that *D. collettii* is closely related to *D. yunnanensis*,

differing mainly in the smaller flowers and leaflets. Further Prain's description of Collett's plant was without pod. A later collection of this species with the pod by Lace (5808) from Maymo plateau confirms the above opinion. Hence the Burmese species (*D. collettii*) is reduced to a variety of Yunnan plant (*D. yunnanensis* Franch.).

D. Typification : 3 collections have been cited by Prain (l.c. 1897) under the original description such as Kawlo, Shan hills *Collett* 591 ; Ywangan, Shan hills *Collett* 723 ; Laikaw, Shan state *Abdul Khalil* s.n. without clearly assigning the type. Of the 3, the last one by Abdul Khalil differs from the rest in habit, leaf and pod characters and evidently Prain's description of the pod based on this specimen has been erroneous. Prain, realising his mistake later (l.c. 1904) furnished an amended description without the pod characters. Incidentally this collection from Laikaw is now referable to *D. hemsleyi* Prain. Of the remaining 2 collections *Collett* 591 from Kawlo, Shan hills has been selected as lectotype of this taxon.

E. Critical notes : The description of the pod is given for the first time, based on *Lace* 5808 from Maymyo plateau.

22 *Dalbergia clarkei* Thoth. in Journ. Jap. Bot. 46 (3) : 73. 1971 ; Nayar & Ramamurthy in Bull. bot. Surv. India 15 : 213. 1973 (1976).
(Fig. 11).

A climbing shrubs ; branchlets lenticellate, glabrous. *Leaves* imparipinnate, alternate, stipulate, 7.0-10.5 cm long ; leaflets 19-28, elliptic-oblong, 1.2-1.5 × 0.5-0.7 cm, alternate to subopposite, shortly petiolulate, entire, obtuse to retuse at apex, rounded at base, dark green above, glabrous on both surfaces, rarely with a few, scattered, adpressed hairs below, finely reticulately veined ; rachis glabrous, petiolules 0.5-1.0 mm long, minutely puberulous ; stipules deciduous. *Infructescence* axillary, shortly paniculate, 4-5 cm long. *Flowers* not known. *Pods* indehiscent, ovato-oblong, 3.4-5.0 × 1.6-2.2 cm, flat, thin and membranous, shortly stalked, obtuse to shortly acute at apex, narrowed at base, glabrous and more or less smooth, 1-seeded ; *seeds* reniform, black, compressed, 1.0 × 0.6 cm.

Type : Maoksandram, 1333 m, Khasia hills, Assam, Jan. 1886
Clarke 42875 B (Holotype, LE ; Isotype, CAL).

Fruit : January.

Distribution : INDIA (Arunachal Pradesh, Assam). (Map-8).

Specimen examined : Above Jamini, Kameng district, 1400 m, Oct. 1978 - *Sahni & Naithani* 910 (CAL, DD).

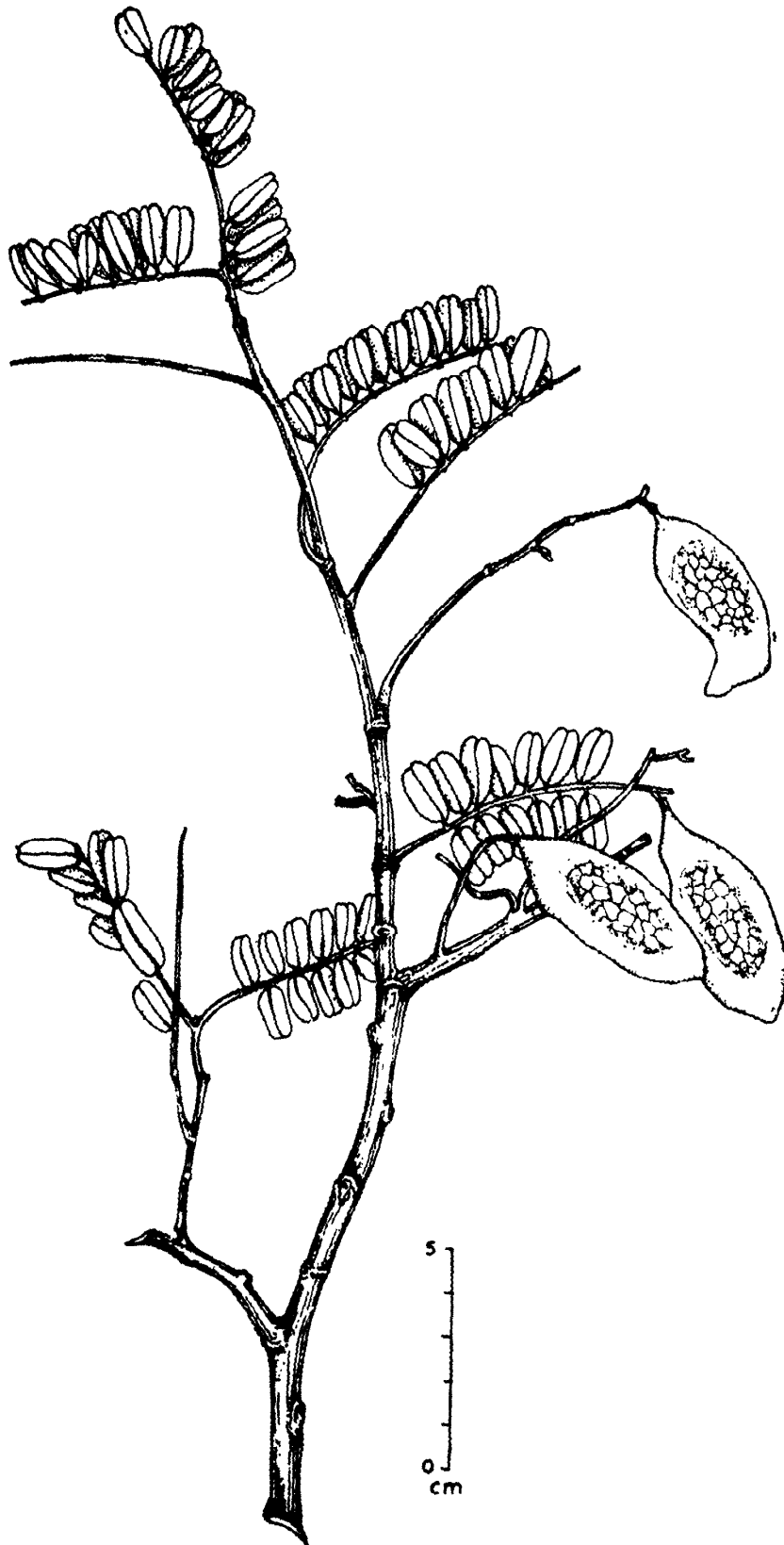


Fig. 11. *Dalbergia clarkei* Thoth.

A. *Etymology* : The species has been named in honour of the late Dr. C.B. Clarke for not only to the collection of this interesting species but also for his contributions to Indian Botany.

This new species was described by the author (1971) during a preliminary study of the genus in India.

23. *Dalbergia millettii* Benth. var. *mimosoides* (Franch.) Thoth. in Bull. bot. Surv. India 25 : 170. 1983 (1985).

Dalbergia mimosoides Franch. Pl. Delavay, 187. 1890 ; Prain in Journ. Asiat. Soc. Beng. 70 : 56. 1901 et in Ann. Roy. bot. Gard. 10(1) : 49. 1904 ; Brandis, Indian Tr. 235. 1907 (ed. 2) : Cowan et al, Tr. N. Beng. 52. 1929 ; Kanjilal et al. Fl. Assam 2 : 106. 1908 ; Thoth. in Journ. Bombay nat. Hist. Soc. 81 : 242. 1984. *D. millettii* Prain in Journ. Asiat. Soc. Beng. 66 : 446. 1897 non Benth. 1860 ; Nayar & Ramamurthy in Bull. bot. Surv. India 15 : 213. 1973 (1976).

Scrambling shrubs to climbers, 8 m ; branches lenticellate, pubescent when young but glabrous when old, at times curved into hooks for climbing. *Leaves* imparipinnate, alternate, stipulate, 6.5-10.5 cm long ; leaflets 15-30, elliptic to linear-oblong, alternate to subopposite, 1-2 × 0.5-0.6 cm, entire, obtuse to retuse at apex, obliquely rounded at base, pubescent when young but soon become glabrous, reticulately veined ; petiolules short, 0.5-1.0 mm long, stipules ovate, pubescent, deciduous. *Inflorescence* axillary and terminal panicles, 3.0-5.5 cm long, rachis and branches pubescent, flowers secund. *Flowers* small, white, 3-4 mm long ; bracts ovato-oblong, pubescent, bracteoles 2, oblong, pubescent, embracing the calyxcup, deciduous, pedicels 0.5-1.0 mm long, pubescent. *Calyx* campanulate, 2.0-2.5 mm long, sparsely puberulous without, 5-toothed, all teeth more or less equal except the lowest which is longer. *Corolla* vexillum ovato-orbicular, 3-4 mm. long, shortly clawed ; wings oblong ; keels falcately oblong, both clawed. *Stamens* 9, monadelphous, sheath 2.0-2.5 mm long, split open dorsally, filaments unequal in length, middle ones longer than the lateral ones. *Ovary* stipitate, 2.0-2.5 mm long, glabrous except the puberulous dorsal suture, style short, stigma minute, ovules 1-2. *Pods* 3.5-5.0—1.0-1.2 cm, oblong, stalked, coriaceous, acute at apex, narrowed at base, mostly 1-seeded, rarely 2-seeded, smooth and glabrous, seeds reniform, compressed.

Type : Tapin-tze, Yunnan, China, 1885-Delavay 1982 (P).

Flower ; April to June. *Fruit* : October to January.

Distribution : INDIA (Assam, Sikkim). CHINA, BURMA. (Map-10).

Specimens examined :

ASSAM : Khasia & Jaintia, Cherrapunji, 1333 m, June. 1911-*Burkill & Banerjee* 193, (CAL) ; Sohra, Aug. 1877-*Clarke* 18845 A (CAL); Nongkla to Mawsynrang, Dec. 1915 *U. Kanjilal* 6376 (ASSAM); Mamloo, Nov. 1930-*P. C. Kanjilal* 8815 (ASSAM) ; Khasi hills, 330-660 m, *Kurz* s. n. (CAL); Khasi hills, May 1890-*Collett* s. n. (CAL) ; without definite locality, 1877 *C. Mann* s. n. (CAL).

Burma : Tsangpo Gorge (Gerupa Le), 1500-2000 m, Dec. 1924-*Kingdon Ward* 6375 (K).

A. Etymology : The specific epithet is after George Millett and the varietal epithet '*mimosoides*' refers to the superficial resemblance of this variety to mimosaceous plants.

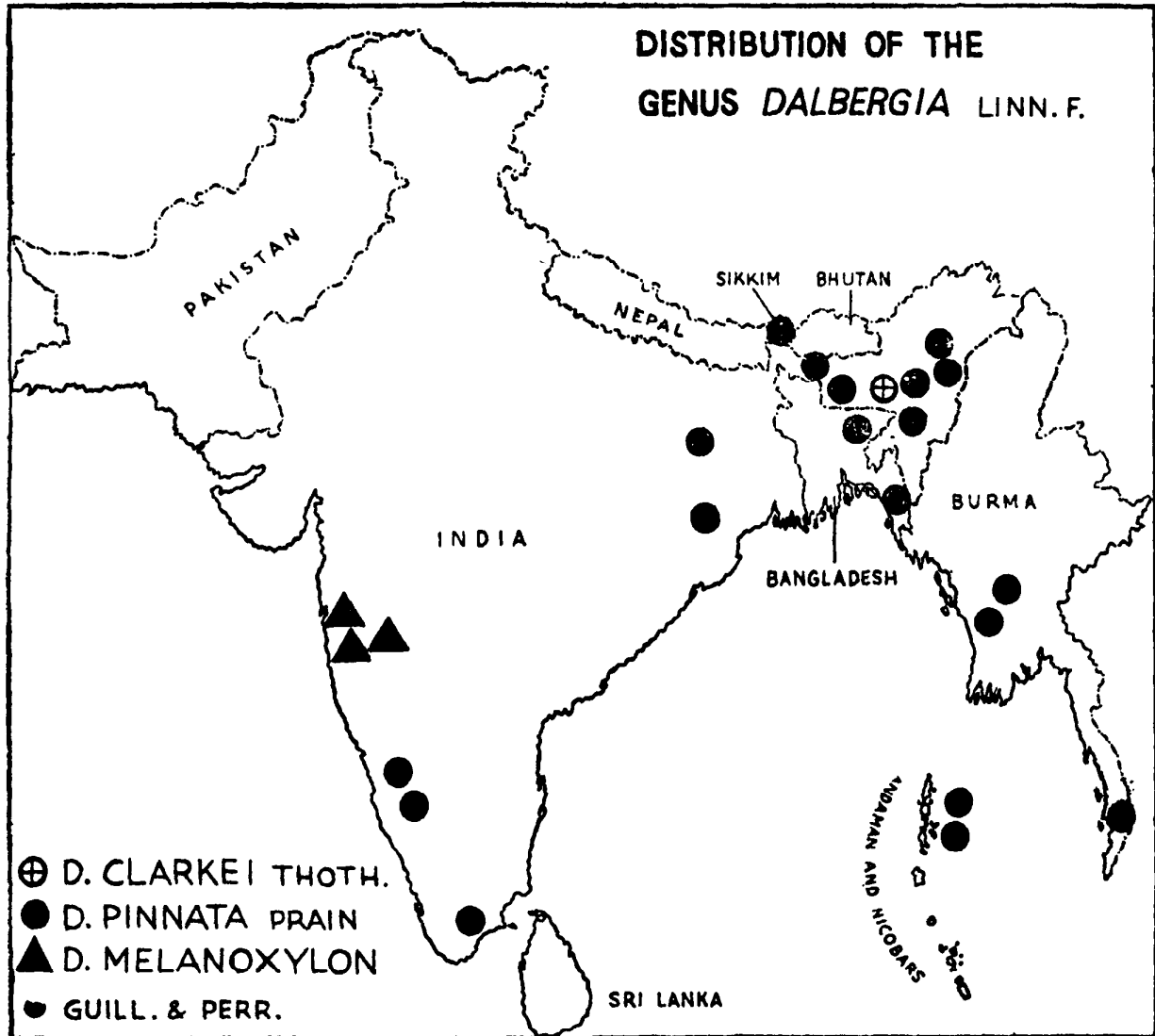
B. Ecology : The plant grows in the thick forests of Eastern Himalayas and Khasia hills at elevations between 300-1200 meters. A collection of this species from by Kingdon Ward has the following field observation. A shrub 25 feet in forests and in open sunny slopes. A scrambler with long and thick stems growing in thickets among which it finds support. The branches are also sensitive to contact and appear to grow in a curve forming a hook even without a stimulus of contact. If they come in contact with a support, they form real woody tendrils.

C. Taxonomic status : *Dalberiga mimosoides* Franch. has so far been regarded as a distinct species in all Indian floras. A critical study of this species with that of *D. millettii* Benth. has enabled the author to conclude that the two species differ on very slender characters. *D. mimosoides* Franch. as a result cannot stand as a separate species and hence has been reduced to a variety of *D. millettii* Benth.

***Dalberiga millettii* Benth. var. *oldhamii* Thoth.** in Journ. Jap. Bot. 46.75 1971.

D. millettii Benth. var. *oldhamii* differs from *D. millettii* var. *millettii* in having thin, membranous pods which are narrowly oblong, 1-2 seeded and without any reticulations.

Branches lenticellate, glabrous. *Leaves* alternate, imparipinnate, 6-9 cm long ; leaflets 25-32, elliptic-oblong, alternate, 1.2-1.3 × 0.4-0.5 cm, obtuse at apex, rounded at base, glabrous ; rachis puberulous, petiolules minute, 0.5 cm long. *Infructescence* a short, axillary, panicle with cymose branches. *Flowers* not known. *Pods* indehiscent, narrowly oblong, thin and membranous, 3.0-5.5 × 0.8-1.3 cm, shortly stalked, obtuse to retuse at



Map 8

apex, completely smooth without any reticulations, 1-2-seeded ; *seeds* reniform, compressed, black, 0.8-1.0×0.4-0.5 cm.

Type : Khasia hills (without definite locality), Assam-Oldham s. n. (Holotype, LE).

This new variety was published by the author (1971) during a preliminary study of the genus in India.

24. *Dalbergia pinnata* (Lour.) Prain in Ann. Roy. Bot. Gard. 10 (1) : 48. 1904 ; Merr. in Philip. Journ. Sci. (Bot.) 5 : 96. 1910 et Enum. Philip. Flow. Pl. 2 : 296. 1923 ; Cowan et al, Tr. N. Beng. 52. 1929 ; Merr. in Trans. Amer. Phil. Soc. 24 (N. S.) : 205. 1935 ; Wealth Ind. 3 : 12. 1952 ; Backer et Bakhuizen van Den Brink, Fl. Java 1 : 614. 1963 ; Rao & Verma in Bull. Bot. Surv. India 11 : 407. 1969 (1971) ; Hara et al. Enum Fl. Pl. Nep. 2 : 105. 1979 ; Balak, Fl. Jowai 1 : 168. 1981 ; Haridasan & Rao. For. Fl. Megh. 1 : 287. 1985.

Derris pinnata Lour. Fl. Cochinch. 432. 1790. *Dalbergia tamarindifolia* Roxb, (Hort. Beng. 53. 1814, nomen) Fl. Ind. 3 : 233. 1832 ; Wight, Ic. t. 242. 1840 (exclude fruit) ; Walpers, Repert. Bot. Syst. 1 : 800. 1842 ; Voigt, Hort. Suburb. Calcutt. 241. 1845 ; Benth. in Miq. Pl. Jungh. 1 : 256. 1852 ; Miq. Fl. Ind. Bat. 1 : 131. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl) : 44. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 234. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 281. 1876 et For. Fl. Brit. Burma 1 : 348. 1877 ; Watt, Dict. Econ. Prod. India 3 : 16. 1890 ; Gamble, List Tr. Shr. Climb. 29. 1896 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Prain in Journ. Asiat. Soc. Beng. 66 : 118, 448. 1897 et Ibid. 70 : 49. 1901 ; Cooke, Fl. Press. Bombay 1 (2) : 399. 1902 ; Prain, Beng. Pl. 1 : 411. 1903 et in Ann. Roy. Bot. Gard. 10 (1) : 69. 1904 ; Brandis, Indian Tr. 234. (ed. 2) ; Talbot, For. Fl. Bombay Press. Sind 1 : 427. 1909 ; Haines, For. Fl. Chotangpur 337. 1910 ; Ramarao, Flow. Pl. Travancore 130. 1914 ; Ridley, Fl. Malay Pan. 1 : 591. 1922 ; Haines, Bot. Bih. Or. 3 : 295. 1922. Parkinson, For. Fl. Andaman Isl. 149. 1923 ; Heinig, List Pl. Chittagong 21. 1925 ; Kanjilal et al. Fl. Assam 2 : 105. 1938 ; Biswas in Indian For. Rec. (N. S.) 3 : 16. 1941 ; Thothathri in Bull. bot. Surv. India 2 : 364. 1962 ; Rau, Ibid. 3 : 224. 1962 ; Deb, Ibid. 2 : 266. 1962. *D. rufa* Grah. in wall. Cat. 5864. 1832 (nomen). *D. multijuga* Grah. in Wall. Cat. 5865. 1832 (nomen) *D. livida* Wall. Cat. 5866 (in part). 1832 non Grah (nomen). *D. blumei* Hassk. Cat. Hort. Bog. 284. 1844 et Fl. Java Rar. 400. 1848. *Amerimnon pinnatum* (Lour.) D. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A scandent, woody shrub or climber, at times growing into a small tree ; branchlets pubescent when young. *Leaves* imparipinnate, alternate, stipulate, 8-17 cm long ; leaflets 20-41, trapezoid-oblong, 1.0-2.5×0.4-1.1

cm, alternate to opposite, entire, obtuse to retuse at apex, subcoriaceous, puberulous on both sides, almost sessile; rachis and petiolule pubescent, stipules, lanceolate, puberulous. *Inflorescence* axillary panicle with corymbose branches, 3-8 cm long, branches and pedicels densely puberulous. *Flowers* white, 6-7 mm long; bract-ovate to oblong, bracteoles 2, ovato-orbicular, 1.5 × 1.0 mm, distinct, pubescent. *Calyx* campanulate, slightly gibbous, S-toothed 4-5 mm long, puberulous to pubescent without, teeth ovate, lowest one longest, upper 2 subconnate. *Corolla* vexillum 4.5-5.0 mm long, ovato-orbicular, reflexed, blade auricled below; wings long clawed, blade auricled below; keels oblong, clawed, blade auricled below. *Stamens* 9, monadelphous, sheath 4.5-5.5 mm long, split open dorsally. *Ovary* 5 mm long, stipitate, glabrous except the puberulous dorsal suture, style short, stigma minute, ovules 2-3, oblong. *Pods* indehiscent, strap-shaped, narrowly oblong, reddish-brown, 3.0-8.5 × 1.4 cm, stalked, rounded to subacute at apex as well as at base, glabrous, finely reticulated, 1-3-seeded; seeds, 1.8-0.4 cm.

Type : Cochin China-Loureiro s. n. (P, BM).

Flower : March to May. *Fruit* : February to June.

Distribution : COCHIN-CHINA, INDIA, (Assam, Andemans, Arunachal Pradesh, Bihar, Orissa, Sikkim) BANGLADESH, BURMA AND MALAYSIA.

(Map-8).

Specimens examined :

Arunachal Pradesh : Hawa-Camp, Kimun-Ziro road, May 1950-G-D. Pal 78337 (CAL).

Andamans : South Andaman, Balurghat hill jungle, Sept. 1895-King's collector s. n. (CAL); Cadellgung hill jungle, Apr. 1895-King's collector s. n. (CAL, BSI); Anikhet hill jungle, Apr. 1893-King's collector s. n. (LE, CAL); Homfraygunj, Apr. 1964-Ellis et Ramamurthi 18787 (MH); Chaibagan, Mar. 1959-Thothathri 9255 (CAL, MH); Alimusjid hill jungle, Jan. 1894-King's collector s. n. (CAL); North Corbyn's cove, May 1891-King s. n. (CAL); Naben Bak, Apr. 1890-King s. n. (CAL); Hobdaypur hill jungle, Apr. 1892-King's collector s. n. (CAL); Barren Island, Apr. 1891-Prain s. n. (CAL); without definite locality (S. Andaman), Feb 1915-Parkinson 830 (CAL); without definite locality (Andamans), Jun. 1900-Prain's collector 28 (CAL); Middle Andaman, Middle straits-Kurz s. n. (CAL); Tenasserim et Andaman-Helfer 1800 (LE).

Assam : Sibsagar, Methanchowa, Hakrabari, Mar. 1897-*C. Watt* 12406 (ISIM, CAL) ; Gaurisagar, 100 m., Mar. 1913-*Kanjilal* 2134 a (CAL) ; Sibsagar plains, Apr. Feb. 1890-*King's collector* s. n. (CAL) ; Sibsagar, Apr. 1897-*S. L. Peal* s. n. (CAL) ; Near Bhojo, Feb. 1914-*Kanjilal* 4340 (ASSAM) ; Naga hill, Tingale Bam jungle, Apr. 1899-*Prain's collector* 874 (CAL) ; Baligau near Jabocka, Feb. 1899-*Prain's collector* 767 (CAL) ; Daiung valley, 500 m, North Cachar hills, May 1915-*Kanjilal* 5641 (ASSAM) ; Dambu road, Garo hills. Mar. 1915-*Kanjilal* 5362 (ASSAM) ; Lakhimpur, Kheremia, Feb. 1914-*Kanjilal* 3455 (ASSAM) ; Laluka, 100 m, Mar. 1914-*Kanjilal* 3696 (ASSAM) ; Goalpara, Kochogaum, Mar. 1936-*Dina Nath* 12966 (ASSAM) ; Goalpara, 1000 m, Mar. 1886-*Clarke* 43171 C, F (CAL, LE) ; Aka hills, 1934-*Bor* 15707 (ASSAM) ; Bhalagong, Khasia & Jaintia hills, Feb. 1937-*G. K. Deka* 14058 (ASSAM) ; Khasia & Jaintia hills, 1877-*Mann* s. n. (CAL) ; Kebang, 700 m, Abor Expedition, Jan. 1912-*Burkill* 36001 (CAL) ; Khasia hills-*Kurz* s. n. (BSI) ; Ligri Pukri, Mar. 1895-*Watt* 10385 (CAL, ISIM) ; Gowhatti, Mar. 1893-*King's collector* s. n. (CAL) ; Gowhatti hills, Feb. 1839-*collector* ? s. n. (CAL) ; without definite locality (ASSAM) *Jenkins* s. n. (CAL, LE) ; Foot hill camp, 243 m, Mar. 1957-*Panigrahi* 5850 (ASSAM) ; Silghat, Feb. 1957-*Panigrahi* 5394 (ASSAM).

Bihar : North of Banghi, Santhal Parg. district, Jan. 1907-*Haines* 2386 (CAL).

Orissa : Nageswargura, 866 m, Mayurbhanj district, May 1941-*R.H. Kazi* 208 (CAL) ; Simlipal forest, Mar. 1964 *Kapoor* 92944 (MO).

Sikkim : Rishap, Apr. 1902-*Ribu* s. n. (CAL) ; Mongpoo, 1878-*Lister* s. n. (CAL) ; without definite locality (Sikkim), 350-1000 m *J. D. Hooker* s. n. (CAL).

Bangladesh : Sylhet, Tamabil, May 1956-*M.S. Khan* 138 (CAL) ; Longai reserve, Mar. 1935-*Purkayastha* 10983 (CAL) ; Kodla hill, Chittagong hill tracts, Feb. 1886-*Badul Khan* 403, 260 (CAL) ; East Bengal (without definite locality) - *Simons* 1800.

Burma : Tenasserim, Lepakechong, 500 m, Tena district, Feb. 1931-*Biswas* 1024 (CAL) ; without definite locality (Tenasserim) *Helper* 1800 (LE, CAL) ; Sadon, Kachin hills. Mar. 1898-*Shaik Mokim* s. n. (CAL) ; Kalayeik reserve, Myaungmya district, Mar. 1906-*Lace* 2949 (CAL, ISIM).

Wall. Cat : Sylhet, Jan. 1828-Wall. Cat. 5866 B (CAL) ; Nepal-Wall. Cat. 5870 B (LE, CAL) ; Moolmyne, May 1828-Wall. Cat. 5864 (CAL) ; Penang-Wall. Cat. 5865 (LE, CAL).

Dalbergia pinnata (Lour) Prain. var. **acaciaefolia** (Dalz.) Thoth in Bull. bot. Surv. India. 25 : 170. 1983 (1985).

Dalbergia acaciaefolia Dalz. in Kew Journ. Bot. 2 : 37. 1850 ; Benth. in Pl. Jungh. 1 : 256. 1852 ; Prain in Journ. Asiat. Soc. 70 : 48. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 68. 1904 ; Brandis Indian Tr. 235. 1907 (ed. 2) ; Gamble, Fl. Pres. Madras 2 : 382. 1918 ; Saldanha et Nicolson. Fl. Hassan Dist. Karnat. 245. 1978 (2nd. ed.) ; Nair et Henry, Fl. Tam. Nad. (Ser. 1.) 1 : 102. 1983 ; Sharma et al. Fl. Karnat. Anal. 69. 1984 ; Saldanha, Fl. Karnat. 1 : 443. 1984. *D. tamarindifolia* Roxb. var. *acaciaefolia* (Dalz.) Baker in Hook. f. Fl. Brit. India 2 : 235. 1876 ; Cooke, Fl. Pres. Bombay 1 (2) : 399. 1902.

A woody, climbing shrub, rarely a small tree ; branchlets more or less glabrous. *Leaves* imparipinnate, alternate, stipulate, 6.0-12.5 cm long ; leaflets 23-48, linear-oblong, 1.4-2.0 × 0.3-0.5 cm, alternate, midrib and base oblique, retuse at apex, entire, almost sessile, thickly coriaceous, glabrous and dark green above, minutely puberulous and glaucouscent below ; rachis puberulous ; stipules subulate and puberulous. *Inflorescence* axillary panicle with corymbose branches, 2-4 cm long, branches and pedicels shortly pubescent. *Flowers* white, 6 mm long ; bracts ovate, puberulous, bracteoles 2, ovate, larger than bracts, at the base of the calyxcup. *Calyx* campanulate, 3 mm long, 5-toothed, teeth obtuse, lowest longest, upper 2 subconnate. *Corolla* vexillum ovate-oblong, 4.5-6.0 mm long, long-clawed, reflexed ; wings and keels as in typical plant. *Stamens* 10, monadelphous, sheath 6-7 mm long, split open dorsally. *Ovary* 5.0-6.5 mm long, glabrous, long stipitate, style slender, stigma minute. ovules 2-3. *Pods* indehiscent, strap-shaped, oblong, 5.5-8.5 × 1.1-1.4 cm, brownish red in colour, stalked, coriaceous, rounded at base and apex, usually 1-seeded, rarely 2-seeded, reticulately veined just opposite the seeds ; seeds reniform, compressed.

Type : Concan Law s.n. (K, Isotype CAL, KW).

Distribution : WESTERN AND SOUTHERN INDIA.

Specimens examined :

Western India : Dodmune, 800 m, North Kanara district - Talbot 3588 (CAL, BSI) ; Gersoppa falls, Mysore, Oct. 1919 Hallberg & McCann 35163 (BLAT) ; Nagarhole, Coorg, Jan. 1959 Arora 46320 (BSI) ; Gersoppa, May 1911 Chibber s.n. (BSI) ; Poona (Planted) Collector ? s.n. (CAL).

Southern India : Tinnevely, Shevagherry hills, 700 m, Collector ? s.n. (MH) ; Hills, 1808 Cleghorn s.n. (CAL).

A. Etymology : The epithet 'acaciaefolia' refers to the superficial resemblance of the leaves to the species of *Acacia*.

B. *Ecology* The plant grows as a climbing shrub in the wet ever-green forests of Western ghats. It is one of the endemic plants of Western ghats.

C. *Nomenclature* : The plant, originally described as a distinct species from *D. pinnata* Prain, has been reduced to a variety of the latter by Baker (l.c. 1876) while other workers like Prain (1904) etc. maintained it as a distinct species. The author agrees with Baker in treating this as a variety of *Dalbergia pinnata*.

General notes for the species

A. *Etymology* : The specific epithet '*pinnata*' signifies the fine, pinnate arrangement of the leaflets.

B. *Ecology* : Generally the species grows as a climber in forests up to an elevation of 1333 metres. At times it might also grow into a scandent shrub or a small tree.

C. *Nomenclatural notes* : In Hooker's flora (1876) as well as in the regional floras, the plant goes under the name *Dalbergia tamarindifolia* Roxb. Bentham (l.c. 1860) as well as Baker (l.c. 1876) recognised that *Derris pinnata* Lour. was the same as the above plant but treated it as its synonym even though the former was an earlier name. *Derris pinnata* Lour. though described under the genus *Derris* is really a species of *Dalbergia*, and is same as that of Roxburgh's *Dalbergia tamarindifolia*. Hence David Prain (l.c. 1904) proposed the name *Dalbergia pinnate* but with certain doubt and reservation. Merrill (l.c. 1935) later confirmed without doubt that Loureiro's plant was same as that of Roxburgh after an examination of the type of *Derris pinnata* Lour., located in the herbarium of the British Museum, London.

D. *Economic importance* : The leaves of this plant are used as fodder. The roots are used in Vietnam as a mastigatory and anthelmintic. The bark is chewed with betel in Assam.

25. *Dalbergia malabarica* Prain in Journ Asiat. Soc. Beng. 70 : 48. 1901 et in Ann. Roy. bot Gard. Madras 2 : 382. 1918 ; 10(1) : 67. 1904 ; Brandis, Indian Tr. 235. 1907 (ed. 2) ; Gamble, Fl. Press. Sharma et al in Bull bot. Surv. India 15 : 50. 1973 (1976) ; Nair et Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983.

Dalbergia tamarindifolia Roxb. var. *pubescens* Baker in Hook. f. Fl. Brit. India 2 : 235. 1876 ; Cooke, Fl. Pres. Bombay 1(2) : 399. 1902.

A shrubby climber ; younger branches densely rusty pubescent. *Leaves* imparipinnate, alternate, stipulate, 5.0-10.2 cm long ; leaflets 19-21, alter-

nate, elliptic-oblong, 1.2-2.0×0.4-0.9 cm, entire, obtuse at apex with a mucro at time, truncate at base, glabrescent above, rusty pubescent below, especially on the midrib, rachis densely pubescent ; petiolules very short. *Inflorescence* congested, axillary corymbs, 2.0-3.5 cm long, rachis rusty pubescent. *Flowers* white, 6-7 mm long, pedicellate, bracts ovate, persistent, pubescent, bracteoles 2, 1.0-1.5 mm long, at the base of the calyxcup, ovate-lanceolate, glabrous to puberulous, persistent ; pedicels 1.5-4.0 mm long, glabrous. *Calyx* campanulate, 4-5 mm long, glabrous without, 5-toothed, upper 2 connate, obtuse, lower 3 acute. *Corolla* vexillum ovato-oblong, 5.5-6.0 mm long, reflexed, long clawed ; wings and keels oblong, auricled and clawed. *Stamens* 9, monadelphous, sheath 5.0-5.5 mm long, split open above. *Ovary* 4.0-5.5 mm long, stipitate, glabrous except the stipe, style slender, stigma minute, ovules 2. *Pods* indehiscent, strap-shaped, ovato-oblong, 3.0-4.5×1.0-1.5 cm, glabrous, long stalked, reticulately veined just opposite the single seed.

Type : Concan *Stocks* s.n. (Holotype, K).

Flower : April to May. *Fruit* : May.

Distribution : WESTERN AND SOUTHERN INDIA. (Map-10).

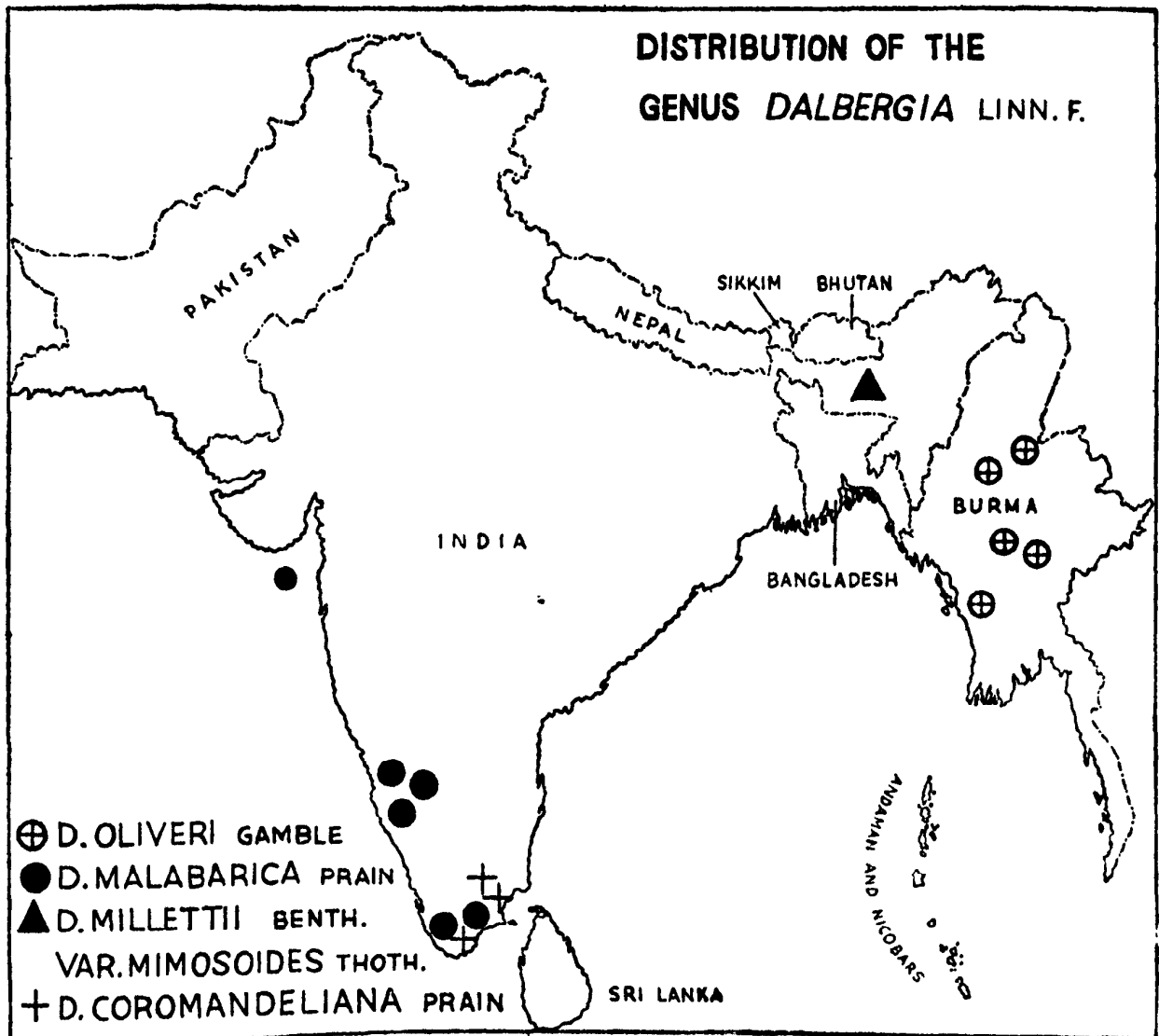
Specimens examined :

Western India : North Kanara, Siddapur, May 1956 *Puri* 1765 (BSI) ; 19 miles from Sirsi on Kumta road, May 1956 *Puri* 2153 (BSI) ; Nilkund, Mar. 1889 *Talbot* 408 (BSI) ; Without definite locality (N. Kanara), May 1896 - *Talbot* 3665 (CAL, BSI) ; Siddapur, Apr. 1886 *Cooke* s.n. (BSI) ; Nilkund, 1889 - *Talbot* 57 (BLAT) ; Sampkhand, Oct. 1919 *Hallberg & Mc Cann* 34523 (BLAT) ; Kali Nadi Daneli, 660 m, May 1917 *Sedgewick* 2605 (CAL) ; Siddapur, Apr. 1883 *Talbot* 408 (CAL) ; Jog falls, May 1939 *Bor* 11335 (DD) ; Bombay (without definite locality) 1878 *Dalzell* s.n. (CAL).

Southern India : Paruthipally, Travancore, Feb. 1913 *Ramarao* 886 (CAL) ; Tinnevely, way to Naterikal, Sept. 1916 *Collector* ? 13282 (MH) ; Hills, 1867 *Beddome* s.n. (MH) ; Shengatheri, 900 m, Sept. 1967 *Vajravelu* 29151 (MH) ; Thirukkarangudi, Thirunelveli district, Aug. 1972 *Sharma* 42134 (MH).

A. *Etymology* : The specific name is after the Malabar coast in Western India from where it was originally collected.

B. *Ecology* : The plant is a rambling climber in the evergreen forests of Western ghats.



Map 10

C. Systematic position : The species was originally described by Baker (l.c. 1876) as a variety under the name *D. tamarindifolia* var. *pubescens*. According to Baker the variety was distinguished by the younger branches, leaves and inflorescence rachis being pubescent. Prain (l.c. 1901) pointed out that the leaflets too differ from the typical plant in being distinctly oblique at base. Hence he raised *D. tamarindifolia* var. *pubescens* Baker to the rank of an independent species with the name *Dalbergia malabarica*. The epithet *pubescens* could not be used in specific rank invariably due to the existence an earlier homonym *D. pubescens* Hook. ex Hook. f. (Niger Pl. 315. 1849). Prain wanted to name the species in honour of J.G. Baker which also was not possible as there existed already *D. bakeri* Welw. ex Baker (Oliver, Fl. Trop. Afr. 2 : 235. 1871).

26. *Dalbergia coromandeliana* Prain in Journ. Asiat. Soc. Beng. 70 : 60. 1901 et in Ann. Roy. bot. Gard. 10(1) : 46. 1904 ; Brandis, Indian Tr. 235. 1907 (ed. 2) ; Gamble, Fl. Pres. Madras 2 : 382. 1918 ; Sharma et al. in Bull. bot. Surv. India 15 : 56. 1973 (1976) ; Nair & Henry, Fl. Tam. Nad. (Ser. 1) 1 : 102. 1983.

Dalbergia spinosa Wight & Arn. Prodr. Fl. Pen. Ind. Or. 266. 1834 non Roxb.

An erect glabrous shrub, ultimate branches bifarious, horizontal, rigid and ending in spines. *Leaves* imparipinnate, 4-9 cm long, stipulate, fascicled on small tubercles ; leaflets 7-11, rarely up to 13, alternate, rarely subopposite, elliptic or cuneate-oblong, 0.6-0.9 × 0.3-0.8 cm, rarely up to 1.8 cm long, entire, obtuse at apex, rounded to cuneate at base, glabrous, lateral veins indistinct ; rachis puberulous, petiolules very short, 0.5 mm long, stipules small, caducous. *Inflorescence* flowers secund in cymose panicles which are fascicled on small tubercles, panicles 2.0-3.5 cm long. *Flowers* white to yellow, 3-4 mm long, distinctly pedicellate ; bract and bracteoles caducous, bracts lanceolate, bracteoles 2, ovate, at the base of the calyxcup ; pedicels 1.5-2.0 mm long. *Calyx* campanulate, 2-3 mm long, glabrous without, 5-toothed, teeth ovate-obtuse except the lowest which is longer and lanceolate. *Corolla* vexillum ovato-orbicular to obovate, retuse to emarginate at apex, 3.0-3.5 mm long, shortly clawed ; wings and keels oblong, distinctly clawed. *Stamens* 9, mostly monadelphous, sheath 3 mm long. *Ovary* 2.0-2.5 mm long, glabrous except the puberulous dorsal suture, stipitate, style stout, stigma minute, ovules 2-3. *Pods* indehiscent, stalked, ovato-oblong, 1.7-3.8 × 1.4-1.5 cm, thin and membranous, subacute to acute at apex, narrowed at base, glabrous, distinctly reticulate against the seed portion, 1-seeded ; seeds large, reniform, 1.2-1.4 × 0.5-0.7 cm, compressed.

Type : Shevagiri Hills, Tinnevelly district. *Wight* 798 (Lectotype CAL; Iso-lectotype, LE).

Distribution : SOUTHERN INDIA. (Map-10).

Specimens examined :

Tamil Nadu : Panagudi, Kanyakumari district, Feb. 1972-*Kartnikayan* 40114 (MH) ; Vellamalai R.F., Ramanathapuram district, June, 1978 *Nair* 57394 (CAL, MH) ; Vasudevanallur, R.F., Thirunelveli district, Mar. 1970 - *Vajravelu* 33968 (MH) ; Tinnevelly, Mundandurai, 250 m., Feb. 1913 *Ramasami* 39435 (CAL) ; Tinnevelly range, 1924 *Forest Ranger* 1924 (DD) ; Sengalteri, Mar. 1917 *Collector* ? 14566 (MH) ; Tinnevelly, Mar. 1902 *Barbar* 4185, 4186 (MH & K) ; Ramnad, Srivilliputhur R.F., (Marudhadi heat), 220 m, Jul. 1965 *Vajravelu* 24712 (MH) ; Madurai, Foot of Alagar hills, 167 m, Jun. 1957 - *Subramanyam* 3362 (MH) ; Courtallam, Tinnevelly district, Jul. 1901 *Barbar* 3376 (MH).

A. *Etymology* : The specific name '*coromandeliana*' refers to the coromandel coast where the plant was collected by Wight.

B. *Ecology* : The plant is an erect shrub, found in the dry forests of Western ghats.

C. *Distribution* : The species is strictly confined to South India where it is endemic.

D. *Critical notes* : This species is closely related to *D. horrida* (Dennst.) Thoth. but can be distinguished by the distinctly pedicellate flowers, erect shrubby habit and ovate, glabrous pods. It has close resemblance to *D. spinosa* Roxb. and in fact was described as such by Wight and Arnott (l.c. 1834). Both look alike in their vegetative stage but the pod is the chief distinguishing character between them.

E. *Typification* : Wight's collection consisted of 2 gatherings (Prain l.c. 1901), one with flower Tuticoreen, May 1836 *Wight* 798 (821 KD) and another with fruit (Shevagiri hill *Wight* 822 (KD). Of the 2, the former with flowers, present in Calcutta and Leningrad herbaria have been chosen as the lecto and isolectotypes of this species.

27. *Dalbergia tinneveli* Thoth. in Ceylon Journ. Sci. (Bio Sci.) 12 : 47. 1970. spec. nov. (Fig. 12).

Dalbergia tinnevellicnsis Thoth. is closely allied to *D. coromandeliana* Prain but differs in the shorter leaves with larger leaflets and elliptic-oblong pods. It is placed in the section 'Sissoa' under the series 'Pinnatae'.

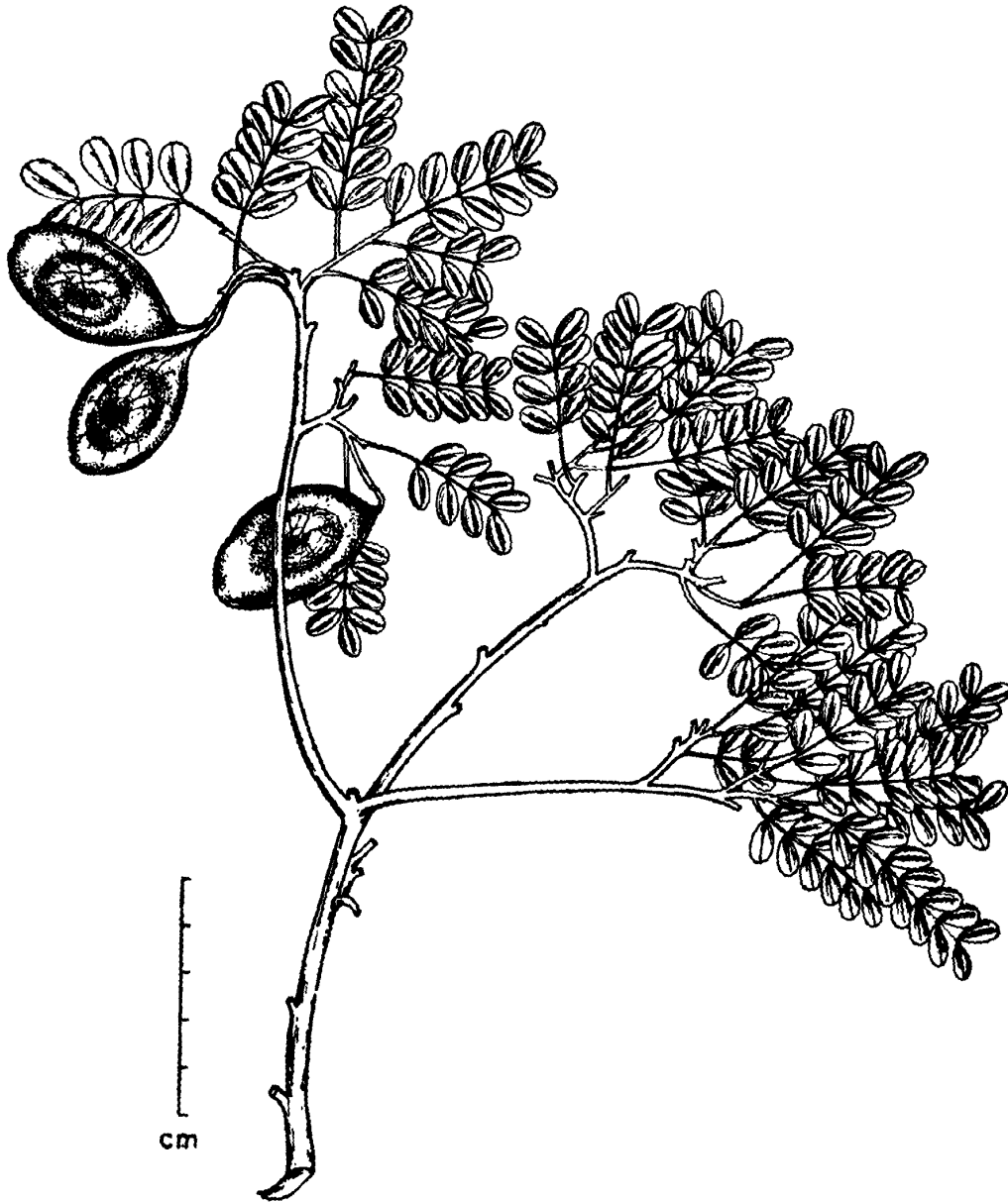


Fig. 12. *Dalbergia tinneveliense* Thoth.

A shrub ; branchlets glabrous, lenticellate with a tendency to form axillary thorns. *Leaves* imparipinnate, fascicled in smaller branches, alternate, stipulate, 3.5-4.5 cm long ; leaflets 7-11, elliptic to rarely obovate, 1.0-1.3 × 0.5-0.8 cm, entire, obtuse to retuse at apex, narrow to rounded at base, subcoriaceous, glabrous, pale-green above, glaucous beneath, lateral veins indistinct ; rachis puberulous, petiolules short, puberulous, 0.5 mm long. *Flower* not known. *Infructescence* axillary, racemose 1.0-1.5 cm long. *Pods* indehiscent, flat, elliptic-oblong, 3-4 × 1.8-2.0 cm, stalked, obtuse at apex, abruptly narrowed at base, glabrous, faintly reticulated, 1-seeded.

Type : Mundanthorai, Tinnevely district, Madras State, Jan. 1917
Fischer 4045 (Holotype, CAL).

Fruit : January.

Distribution : INDIA (Tamil Nadu) (Map-9).

A. *Etymology* : The species has been named after the place of its collection.

B. *Critical notes* : The species is in all probability endemic to South India.

28. *Dalbergia melanoxyton* Guill. & Perr. Fl. Seneg. Tent. 227. t. 33. 1830-33 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 47. 1860 ; Dalz. & Gibs. Bomb. Fl. (Suppl.) 24. 1861 ; Prain in Journ. Asiat. Soc. Beng. 66 : 446. 1897 ; et Ibid. 70 : 59. 1901 ; Cooke, Fl. Press. Bombay, 1 (2) : 396. 1902 ; Prain in Ann. Roy. bot. Gard. 10 (1) : 46. 1904 ; Brandis Indian Tr. 235. 1907 (ed. 2) ; Wealth Ind. 3 : 11. 1952 ; Hutch. et Dalz. Fl. Trop. W. Africa 1 : 515. 1954 (ed. 2) ; Gillett et al. Fl. Trop. East Afr. 96. 1971 ; Henry et Nair, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983 ; Sharma et al. Fl. Karnat. Anal. 70. 1984.

Dalbergia stocksii Benth. in Journ. Linn. Soc. 4 (Suppl.) : 42. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 234. 1876 ; Talbot, Bomb. List. 75. 1894 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Talbot, Tr. Shr. & Climb. Bombay Press. 137. 1902 (ed. 2) et For. Fl. Bombay Press. Sind 1 : 426. 1907 ; Ramarao, Flow. Pl. Travancore 129. 1914. *Amerimnon melanoxyton* (Guill. & Perr.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891. *A. stocksii* (Benth.) O. Kuntze, Rev. Gen. Pl. : 159. 1891.

A small tree, 8 m high ; branches many, spreading and drooping, *Leaves* imparipinnate, alternate, stipulate, 5.0—18.2 cm long ; leaflets 9-13,

alternate, rarely subopposite, obovate to elliptic to ovato-oblong, $1-3 \times 0.5-1.5$ cm, entire, obtuse to retuse at apex, narrow to rounded at base, adpressed puberulous on both surfaces, ultimately glabrous, lateral veins 4-6 pairs; petiolules 1.0-1.5 mm long. *Inflorescence* a terminal and axillary panicles 6.5-17.5 cm long, flowers subsecundly arranged. *Flowers* white, 4-6 mm long; bracts small, lanceolate, bracteoles 2, at the base of the calyx cup, puberulous; pedicels 1-3 mm long, puberulous. *Calyx* campanulate, 3 mm long, 5-toothed, teeth acute to obtuse, lowermost longest, lanceolate, glabrous to puberulous, ciliate. *Corolla* vexillum ovato-orbicular, obovate at times, 4-5 mm long, shortly clawed; wings and keels oblong, clawed. *Stamens* 8-9, monadelphous, sheath 3.0-3.5 mm long, split open dorsally, filaments free above. *Ovary* 3.5-4.0 mm long, glabrous, stipitate, 2-3-seeded, style short, stigma oblique. *Pods* ovate to oblong, $3-4 \times 1.0-1.3$ cm, indehiscent, glabrous, stalked, narrowed at base, acute at apex, mostly 1-seeded, at times 2-seeded; seeds reniform, $1.5-2.0 \times 0.7-1.0$ cm, much compressed.

Type : Senegambia *Collector* ? s.n. (P).

Distribution : TROPICAL AFRICA (Senegal, Aethiopia, Abyssinia, Mossambique), INDIA (mostly cultivated); (Map-8).

Flower : April to May. *Fruit* : July to September.

Specimens examined :

Western India : Bangalore (cultivated), Sep. 1910 *Meebold* 11329 (CAL); Dharwar, 800 m, Apr. 1911 *Sedgewick* 2430 (CAL); Poona, 1882 *Woodrow* 14 (CAL); Without definite locality, May 1883 *Woodrow* s.n. (CAL); Hivre garden, Junnar, May 1958 *Vasavada* 36597 (BSI); Empress garden, Poona, May 1958 *Desmukh* 34226 (BSI); Poona University campus, Aug. 1960 *Sundararaghavan* 64524 (BSI); Hivre garden, Junnar, Jun. 1956 *Puri* 2602 (BSI); North Kanara, 1880 *Collector* ? s.n. (BSI); Dharwar, Aug. 1890 *Talbot* 2420 (BSI); Poona, Jul. 1932 *Acland* 221 (BLAT); Vaithal hill, Poona, Jun. 1959 *Razi* 5136 (BLAT); Ganeshkhind, Poona, May 1954 *Payak & Murthy* s.n. (BLAT); Kolhapur, Jotiba, May 1920 *Acland* 446 (BLAT); Chattarsmyee hill, Poona, May 1917 *Moses Esekiel* 11734 (BLAT); Without definite locality *Collector* s.n. (BLAT); Concan *Stocks* s.n. (Isotype of *Dalbergia stocksti* Benth. CAL, KW); Bombay (Herb. Dalzell) s.n. (K).

South India : Madras (cultivated) Herb. *Krishnaswamy Naidoo* s.n. (CAL); Agri. Horti. garden, Madras, May 1900 *Bourne* 2576 (CAL); Agri. Horti. garden, Madras *Collector* ? s.n. (MH).

Uttar Pradesh : Botanic garden, Saharanpur, May 1922 - *Parker* s.n. (DD) ; Saharanpur garden (cultivated), May 1903 *Gollan* s.n. (ISIM).

HBC : Hort. Bot. Calcutta *Kurz* s.n. (CAL) ; HBC, May 1858 *Collector* 33 (CAL) ; Division 11, Calcutta garden, Jul. 1883 *Collector* s.n. (CAL) ; Indian Botanic garden, Sibpur, Apr. 1963 *Thothathri* 10127 (CAL).

A. *Etymology* : The wood of this species is black (African black wood or chinese black wood) and hence the specific name '*melanoxylon*' (Melane black ; xylon wood).

B. *Ecology* : The plant grows in hill forests and in India it is mostly cultivated in gardens as well as on road sides as an avenue tree.

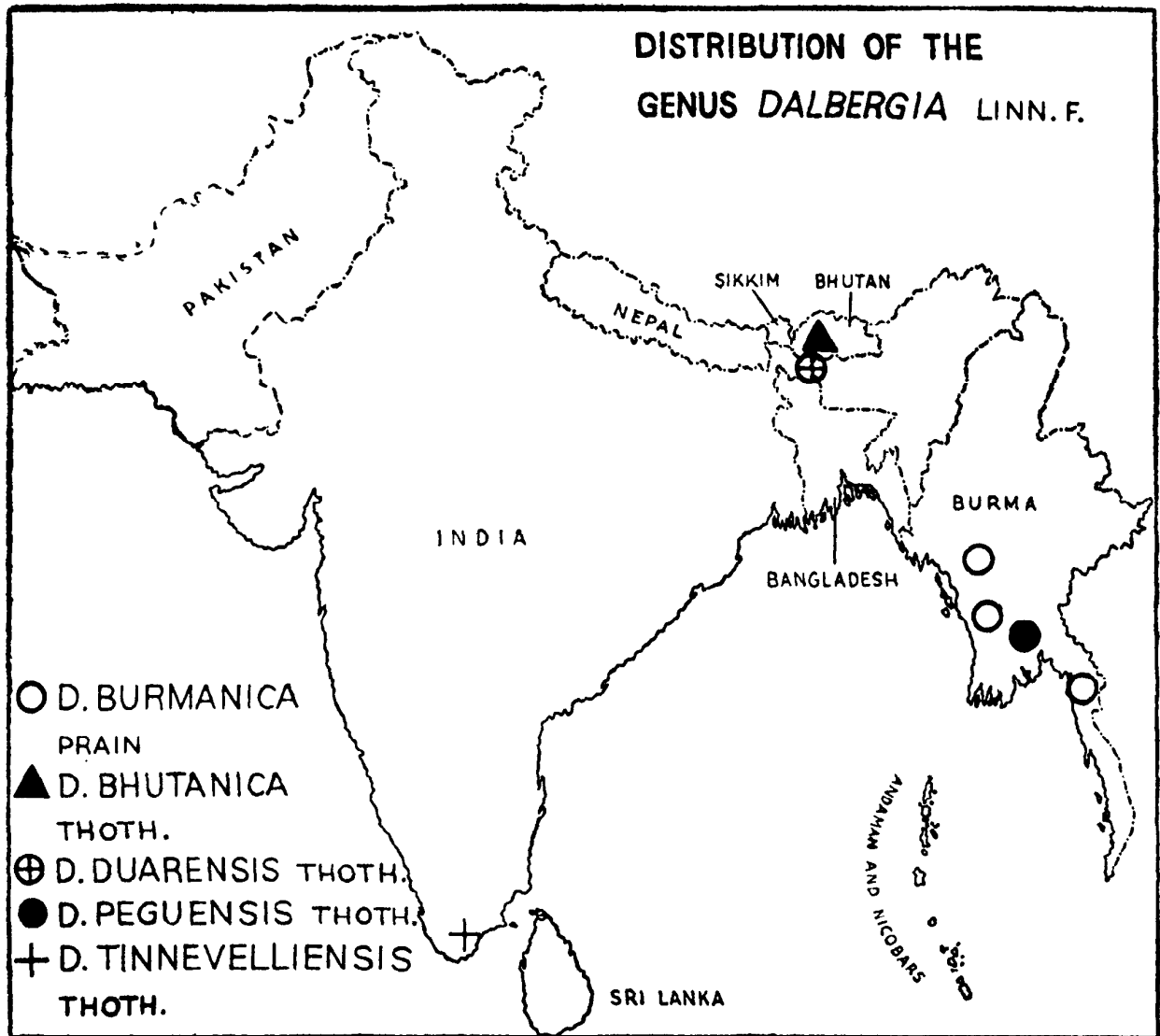
C. *Cytology* : $n = 10$ (Atchinson, 1951).

D. **Critical notes** : *Dalbergia stocksii*, described by Bentham (l.c. 1860) from Concan is conspecific with this species. In India true *D. melanoxylon* occurs only as cultivated while *D. stocksii* has been reported from Concan. It might even be that *D. stocksii*, based on Stocks collection from Concan might have been derived from cultivated *D. melanoxylon*. Dr. Stocks arrived in India only in 1847. Hence it is all the more likely that he might have collected only the cultivated forms of *D. melanoxylon* which by escape was found growing in Concan ghats. In India this plant was raised in Botanic Gardens at Hewra and Dapuri from seeds, furnished by Nimmo.

E. *Economic importance* : The plant is usually known under such names in the commercial world as African black wood, Senegal or Sudan ebony and Chinese black wood. The timber is dark purple to brownish black in colour, hard, close end one grained. It is durable, suitable for tuning and takes a fine polish. The wood is used in Europe for making musical instruments, walking sticks, paper cutter, combs, hairpins and fancy articles. It is esteemed for handles of surgical instruments, pattern making screws etc. It is also the ebony wood of ancient Egypt. According to Guillemin and Perrottet, large quantities of wood were imported into Europe.

29. *Dalbergia burmanica* Prain in Journ. Asiat. Soc. Beng. 66 : 448. 1897 emend. Thoth. ; Prain Ibid. 70 : 47. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 71. 1904 (exclude pod) ; Brandis, Indian Tr. 235. 1907 (ed. 2).

A small tree, 6-8 m high ; branches spreading, younger ones puberulous. *Leaves* imparipinnate, alternate, stipulate, 10.0-15.5 cm long ;



Map-9

leaflets 9-15, oblong, 2.7-5.0 × 1.2-2.0 cm, alternate, entire, obtuse to retuse at apex, a little unequal at base, subcoriaceous, pubescent when young, glabrous to puberulous when mature; stipules lanceolate, caducous; petiolules 1.2-2.0 mm long, glabrous. *Inflorescence* a dense, axillary or terminal panicle with corymbose branches, 3.5-7.0 cm long, rachis and branches pubescent. *Flowers* purple, 5.0-5.5 mm long, pedicellate; bract at the base of the pedicel, bracteoles 2, lanceolate, at the base of the calyxcup. *Calyx* campanulate, 3.5-4.0 mm long, slightly glabrous, puberulous to pubescent without, 5-toothed, teeth sub-equal, acute. *Corolla* vexillum ovato-orbicular, 4-5 mm long, reflexed; wings oblong, clawed; keels somewhat boat-shaped, [clawed. *Stamens* 9, monadelphous, column 4.5-5.0 mm long, split open dorsally. *Ovary* 5 mm long, glabrous, stipitate, style slender, stigma minute, ovules 1-2. *Pods* indehiscent, narrowly oblong, strap-shaped, yellowish brown, 5.0-6.5 × 1.2-1.4 cm, entire, rounded at both ends, smooth and glabrous, 1-2-seeded (Description of the pod given for the first time).

Type: Ruby mines, Upper Burma, March 1892 *Abdul Huk* 7A (Lectotype designated, CAL).

Flower: March.

Distribution: UPPER BURMA (Map 9)

Specimens examined

Upper Burma: Chin hills, 1895 *C.R. Dun* 50 (CAL); Thaungyin valley, 600 m, Amherst district, Mar. 1908-*Lace* 4734 (CAL); Ruby mines, Mar. 1892 *Abdul Huk* 12 (Syntype, CAL).

A. Etymology: The plant has been named after the place of its collection.

B. Ecology: The species is a small tree growing well in the hill forests of Burma and is probably endemic to Upper Burma.

C. Critical notes: The species was described (1897) on the collections of Abdul Huk from Burma which contained only flowers. Later Prain (l.c. 8904) supplemented the pod characters from a different collection (*Yunnan Henry*) which contained only pods. A critical examination of Henry's collection with that of Abdul Huk from Burma showed that the former is not at all *D. burmanica*. A collection of Lace from Amherst, Burma in pods, present in the Calcutta herbarium matched well with the type of *D. burmanica* and so the characters of the pod for this species are given here for the first time. Further there are certain additions and corrections to the original description and hence an amended description is presented here.

A lectotype has been chosen as the original description was based on 2 different collections of Abdul Huk.

30. *Dalbergia oliveri* Gamble ex Prain in Journ. Asiat. Soc. Beng. 66 : 451. 1893 emend. Thoth. ; Prain in Journ. Asiat. Soc. 70 : 53. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 92. 1904 (excl. *D. paniculata* Kurz non Roxb. & *D. purpurea* Baker non wall.) ; Brandis, Indian Tr. 237. 1907 (ed. 2) ; Troup, Silviculture Indian Tr. 1 : 327. 1921.

D. prazeri Prain in Journ. Asiat. Soc. Beng. 66 : 452. 1897 et Ibid 70 : 53. 1901.

A medium sized tree, 10-20 m. high, trunk erect, upto 1 m in diameter ; branches spreading, branchlets glabrous *Leaves* imparipinnate, alternate, stipulate, 14.5-20 cm long, leaflets 9-15, elliptic oblong, at times ovato-oblong, 2.0-5.5 × 1.0-2.5 cm, alternate, entire, mostly rounded at base, rarely narrowed, slightly unequal at base, obtuse to rarely retuse at apex, charactaceous, glabrous above and slightly glaucous beneath ; rachis glabrous, petiolules 3-5 mm long, glabrous, stipules lanceolate, deciduous. *Inflorescence* terminal and axillary panicles with spreading, glabrescent branches, 10.5-15.0 cm long. *Flowers* 8-11 mm long, white ; bract oblong, at the base of pedicel, puberulous, bracteoles 2, at the base of the calyx cup, puberulous, deciduous ; pedicels slender, 2-3 mm long, puberulous. *Calyx* campanulate, 3-4 mm long, 5 toothed, puberulous without, lowest teeth lanceolate and longest, laterals ovate-acute, upper 2 connate and obtuse. *Corolla* vexillum orbicular, 8 mm long, shortly clawed, reflexed, emarginate at apex ; wings oblong, clawed ; keels deeply boat-shaped, curved upwards, shorter than wings. *Stamens* 10, isodiadelphous sheath 4-5 mm long, filaments alternately longer and shorter, free on their upper fourth. *Ovary* 4 mm long, shortly stipitate, glabrous except the pubescent stipe, style slender, stigma capitate, ovules 1-2. *Pods* indehiscent, oblong, 7.5-13.0 × 1.5-3.0 cm, stalked, tapering at both ends. acute at apex, glabrous, faintly to strongly veined, prominently thickened against the seeds, thickening mostly smooth and not veined, 1-2 seeded ; seeds somewhat reniform, compressed, 10 × 6 mm.

Type : Wuntho, Upper Burma, Feb. 1892 *Oliver* s.n. (Lectotype designated, CAL).

Flower : April to May. *Fruit* : October to December.

Distribution : BURMA

(Map 10)

Specimens examined :

Burma : Katha, Naba, Dec. 1908 *Lace* 4446 (CAL, DD) ; Galie to Indaw, Nov. 1908 *Lace* 4441 (CAL) ; Pinwe Sudaw range, 250 m, Nov. 1925 *Collector* 337. (CAL) ; Katha *Rep. Econ. Prod.* I0047 (ISIM) ; Pinioe, Dec. 1908 *Lace* 4444 (CAL) ; Mandalay, Maymyo, 1300 m, Apr. 1917 *G. Rogers* 877 (DD) ; Maymyo, 1300 m, Oct. 1917 - *G. Rogers* 883 (CAL) ; Maymyo Plateau, 1200, Oct. 1912 *Lace* 5974 (CAL) ; Chettiah hill, Upper Burma, Dec. 1900 *Prazer* 38 (CAL) ; Mong Pauri, Loilem road, 1300 m, S. Shan States, Apr. 1926 *Robertson* 2112 (CAL), Bhamo forest, Apr. 1893 *Oliver* s.n. (Syntype, CAL) ; Khoni, Shan, hills, May 1888 *Prazer* s.n. (Type of *D. prazeri*) ; Maymyo Plateau, 166 m, May 1813 *J.H. Lace* 6136 (K).

A. *Etymology* : The species has been named after the collector J.W. Oliver.

B. *Ecology* : The plant is a medium-sized tree, fairly common in the dry, deciduous forests and is plentiful in the upper forests on the east of Meza river. The soil is red laterite and the climate is moist with an annual rainfall of about 120-180 cm. The tree is not gregarious and is often associated with teak and bamboos.

C. *Critical notes* : *D. oliveri* is a distinct species, described by Prain (l.c. 1897). Later Prain included under this species the collections of Kurz from Pegu (1781 & 2604) which he later treated under *D. paniculata* in his flora (l.c. 1877). Baker on the other hand considered Kurz 1781 & 2604 as belonging to *D. purpurea*. A careful examination of Kurz material from Pegu reveals that none of the above authors were correct on the identity of the above material which were neither *D. oliveri* Gamble ex Prain nor *D. purpurea* Baker non Wall. nor *D. paniculata* Kurz non Roxb. In fact they did represent yet an undescribed, species *D. peguensis* Thoth.

D. *Economic importance* : The wood is hard, close-grained and red in colour. On account of its hardness, it is used by Burmese for making the head of mallet like axe and handles for chisels, It is also used in making shafts for dog-carts etc. It is being used in the marine dock-yard, Mandalay for making bushings of propeller shafts in the place of *Lignum vitae*. Heartwood is handsome and suitable for furniture and ordamental work.

31. *Dalbergia lanceolaria* Linn. f. *Suppl. Pl.* 326. 1781.

Dalbergia lanceolaria Linn. f. and *D. paniculata* Roxb. are closely related species with many characters common among them and it is hardly justifiable to keep them as distinct species. *D. assamica* Benth. is merely the eastern himalayan representative of *D. lanceolaria*. Similarly *D. hemsleyi* Prain and *D. maymyensis* are the burmese representatives of *D. paniculata*.

70. 1984 ; Chowdhery et Wadhwa, Fl. Hinachl. 1 : 198. 1984 ; Rao, Fl. Goa, Diu, Dām. Nagar. 1 : 110. 1985.

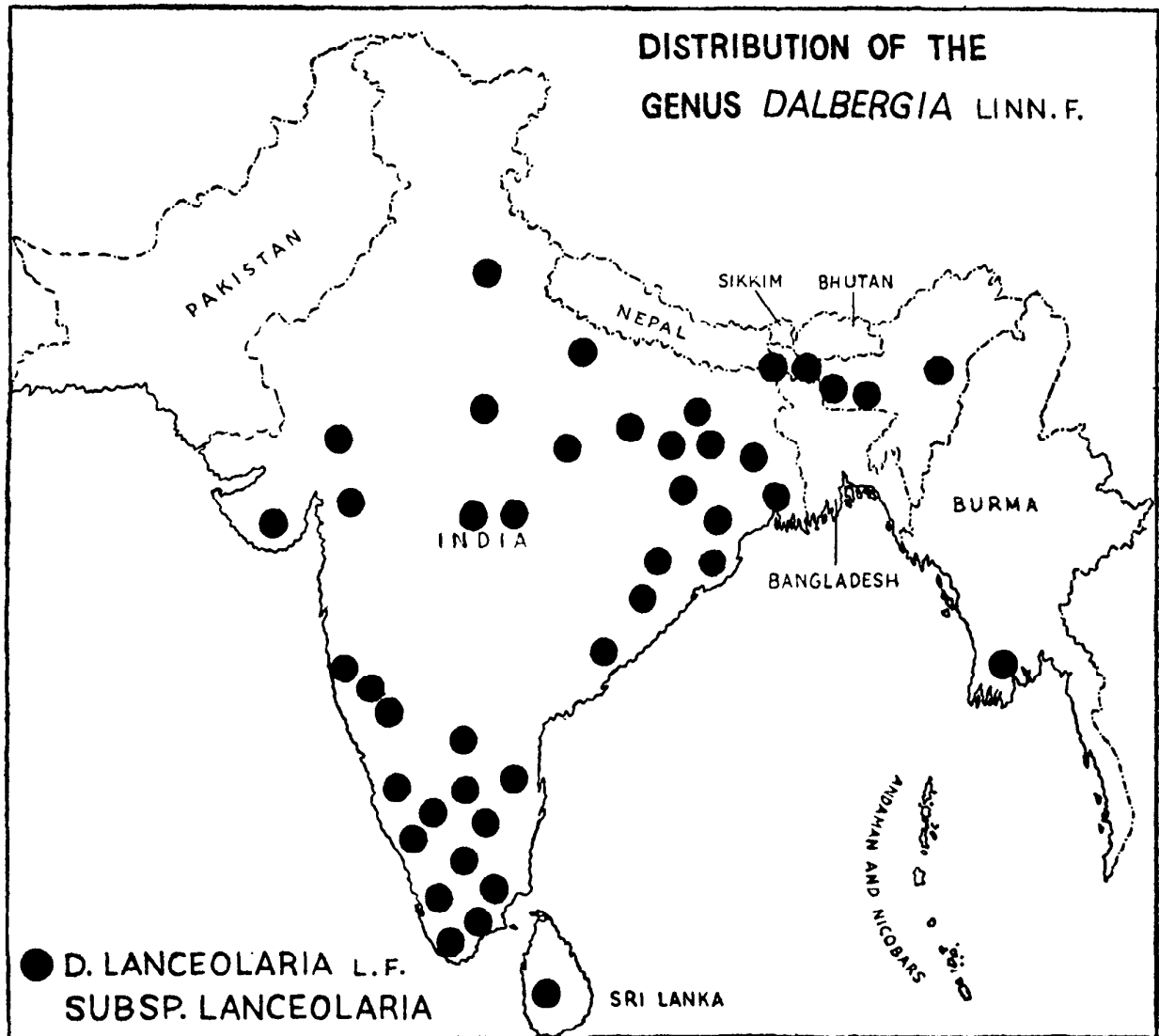
Dalbergia frondosa Roxb. (Hort. Beng. 53. 1814. nomen) ex DC. Prodr. 2 : 417. 1825 ; Roxb. Fl. Ind. 3 : 226. 1832 ; Wight & Arn. Prodr. Fl. Pen. Ind. Or. 266. 1834 ; Grah, Cat. Pl. Bombay 54. 1839 ; Voigt, Hort. Suburb, Calcutt. 241. 1845 ; Wight, Ic. t. 266. 1850 ; Benth. in Miq. Pl. Jungh 1 ; 256. 1851 ; Thw. Enum. Pl. Zeyl. 94. 1859. *D. zeylanica* Roxb. (Hort. Beng. 53. 1814. nomen) Fl. Ind. 3 : 228. 1832 ; Voigt, Hort. Suburb. Calcutt. 241. 1845. *D. arborea* Heyne in Roth Nov. Sp. 330. 1821 ; DC. Prodr. 2 : 417. 1825 non Willd. *D. hircina* Ham. in Wall. Cat. 5871 A. 1831-32 (nomen). *Amerimnon lanceolarium* (Linn. f.) O. Kuntze, Rev. Gen. Pl. 1 : 152. 1891.

A large tree, 15-20 m high with a straight trunk and spreading branches. *Leaves* imparipinnate, stipulate, 10-25 cm long, rachis puberulous at first but glabrous later ; leaflets normally 7-13, rarely 11-16, 9-6 × 1.5-3.5 cm, alternate, elliptic-oblong, obovate, rarely orbicular, entire, obtuse to retuse or even emarginate at apex, narrow to cuneate at base, coriaceous, puberulous when young, glabrous when mature, lateral veins 8-10 pairs, finely reticulately veined ; petiolule 3-7 mm long ; stipule subfalcate to lanceolate, deciduous, 1.0-1.4 cm long. *Inflorescence* terminal and axillary, lax panicle, 5-18 cm long, rachis and pedicels pubescent when young, glabrous later. *Flowers* pinkish to bluishwhite, 0.8-1.0 cm long ; bract lanceolate, bracteoles minute, oblong, deciduous ; pedicels 1.5-2.0 mm long. *Calyx* campanulate, 4-5 mm long, 5 toothed, pubescent without, upper 2 teeth subconnate, obtuse, lateral 2 acute and lowest one longest. *Corolla* vexillum 6-8 mm long, ovato-orbicular to orbicular at times, clawed, blade thickened into a callosite just above the claw, retuse to emarginate at apex ; wings somewhat trapezoid, clawed, larger than keels ; keels boat-shaped, clawed. *Stamens* 10, isodiadelphous, staminal sheaths 5-6 mm long, filaments alternately longer and shorter. *Ovary* 5.0-6.5 mm long, shortly stipitate, pubescent on the stipe as well as on sutures, style slender, bent, stigma minute, ovules 3. *Pods* indehiscent, oblong-lanceolate, 5.0-12.5 × 1.0-2.5 cm, rarely up to 14.5 cm long (Parasnath - Clarke 24916), stalked, narrowed at both ends, glabrous, coriaceous, reticulately veined especially opposite the seeds, 1-2 seeded, rarely 3-4 seeded ; seeds reniform, compressed, 1.2 × 0.6 cm.

Type : Ceylon Koenig s.n. (BM).

Flower : March to July. *Fruit* : April to December.

Distribution : INDIA (Throughout all States), BURMA and SRI LANKA (Map - 11)



Map 11

*Specimens examined :***INDIA :**

Andhra Pradesh : Nellore, Kadirinayanapalle, Jul. 1914 *Ramaswami* 1233 (CAL); Urlakonda, Jul. 1914 *Ramaswami* 1297 (CAL); Stibearkota, Jul. 1883 *Gamble* 12812 (CAL); Kurnool Dhone, 166 m, Mar. 1883 *Gamble* 10966 (CAL, MH); Way to Vishnundi Mahanandi, 340 m, Aug. 1965 *Ellis* 25441 (MH); Way to Pathalaganga, 380 m, Srisailam, Nallamalais, Mar. 1965 *Ellis* 23765 (MH); Srisailam, 453 m, Jul. 1963 *Ellis* 16820 (MH); Way to Pathalaganga, Srisailam, 425 m, Oct. 1964 *Ellis* - 22089 (MH), Ganjam, Pachidya, Aug. 1931 *Narayanaswami* 5853 (MH); Boragharo, Aug. 1931 *Narayanaswami* 5987 (MH); Kodur, red sanders plantation, 190 m, Cuddapah district, Jul. 1962 *Ellis* 14352 (MH); Anantagiri, 910 m, Vizagapatnam district, May & Oct. 1964 *Subbarao* 19554, 21769 (MH); Between Pansalaliam and Royapalli, Rampa district, Jan. 1921 *Narayanaswami* 676 (MH).

Assam : Makum range, Lakhimpur district *Kanjilal* 6875 (ASSAM).

Bihar : Chotanagpur, Cheerkee, 250 m, Hazaribagh, Apr. 1844 *Clarke* 34791 H (CAL); Jushpore, 666 m, Nov. 1883 *Clarke* 34061 B (CAL); Baragao, May 1878 *J.J. Wood* s. n. (CAL); Hazaribagh, Sept. 1896 *Prain* s. n. (CAL); Parasnath, 500 m, Nov. 1874 *Clarke* 24916 E (CAL); Thimira, Saranda, Jan. 1881 *Gamble* 9096 (CAL); Santali Chapot, Pokhuria, Manbhum district *J. Campbell* s. n. (CAL); Rajmahal hills, near Sahibgunj, Sept. 1868 *Kurz* s. n. (CAL); Singhbhum, W. Duars, Sept. 1899 *Haines* 229 (CAL); Koderma, Hazaribagh district, Mar. 1976 *Banerjee* 3303 (CAL);

Gujarat : Pavagadh hill, Baroda, Dec. 1954 *Panthaki* 2186 (BLAT); Kapuria forest, Sasangir, Dec. 1959 *Ansari* 61077 (BSI); Park, Baroda (cultivated), Apr. 1955 *Shah* 4117-19 (BLAT); Julsi-Shyam, Gir forest, Apr. 1964 *Bole* s. n. (BLAT).

Kerala : Malabar, Talimparamba May 1906 - *Barber* 7750 (MH, CAL); Walliyar, 1850 *Collector* ? s. n. (CAL); Chindaki forest, Palghat district, Jun. 1966 *Vajravelu* 27759 (MH); Dhoni reserve forest, 75 m, Palghat district, Jul. 1963 *Joseph* 17235 (MH); Walayar, Palghat district, May 1964 *Vajravelu* 19057 (MH); Airapalli reserve forest, Trichur district, Mar. 1966 - *Ramamurthy* 27012 (MH); Thanantody, Wyanaad, Mar. 1888 *Collector* ? s. n. (MH); Travancore, Kovachal, Feb. 1957 - *Puri* 15750 (BSI); Karivara, Palghat district, Mar. 1975 *Vajravelu* 46280 (MH); Ayyapan Koil, Palghat district, Apr. 1977 *Vajravelu* 49715 (MH); Chindakki forest, Palghat district, Oct. 1979 *Nair* 64679 (MH); Wada-

kkancherry, Trichur district, Sept. 1976 *Ramamurthy* 48434 (MH) ; Neyyar dam, Trivandrum district, Apr. 1973 *Joseph* 44169 (MH).

Madhya Pradesh : Lozor village, 475 m, Jubbulpore district, Dec. 1962 *Sebastine* 15508 (MH) ; Devgarh forest, Jul. 1959 *Wadhwa* 60301 (BSI); Dhaba, Bahadi, Sept. 1957 *Puri* 26501 (BSI) ; Bhopawar *G. Watt* s.n. (ISIM) ; Runasa reserve, Nimar Aug. 1907 *Witt* 638 (DD) ; Amar-kantatak, Apr. 1965 *Panigrahi* 9008 (BSA) ; Dhupgarh, Pachmari, Jul. 1964 *Panigrahi & Singh* 4520 (BSA) ; Gwalior, May 1916 *Cavanajh* s.n. (CAL) ; Without definite locality (Central Province), Apr. 1902 *R.S. Hole* 109 (CAL) ; Without definite locality (C. Province) *Jerdan* s.n. (CAL) ; Kuvdaur pondi road, Sidhi district, Feb. 1975 *Sen Gupta* 14280 (MH) Siang, Bilaspur district, Feb. 1972 *Panigrahi* 16842 (CAL) ; Ambi Kapur, Nov. 1972 *Sen Gupta* 17178 (BSA) ; Seoni, Mar. 1978 *Banerjee* 28416 (BSA).

Maharashtra : Khandala, Battery hill Plateau, May 1944, 1950, 1953 *Santapau* 4251-56, 10954-67, 15599, 15602 (BLAT) ; Monkey hill Plateau, Apr. May 1946 *Santapau* 8814-16, 8884 - 89 (BLAT) ; Near Bor Ghat, Apr. 1956 *Jain* 531 (BSI) ; Khandala, May 1909 *Bhide* s.n. (BSI) ; Bombay, Sewri cementry, Nov. 1956 *Fernandez* 3356, 3363 & 4253 (BLAT) ; National Park, Borivli, Oct. 1954, Mar. 1955, Aug. 1956 - *Herbert* 255, 631, 1918 (BLAT); Aarey milk colony, Goregaon, Dec. 1957 *Tavakari* 290 (BLAT) ; Borivli, Mar. 1955 *Herbert* 2214 (BLAT) ; Tungar, Shivansi, Jul. 1960 *Das* 1464 (BLAT) ; Parol, Jan. 1962 *Das* 6625 (BLAT) ; Chandip, Aug. 1960 *Das* 1839 (BLAT) ; Mandrin, Dec. 1960 - 2908 (BLAT) ; Neral, Jummapatti, Matheran distric, Jun. 1960 4990 (BLAT) ; Purandhar, Jan. 1918 *Santapau* 11679 (BLAT) ; Katrej ghat, Aug. 1955 *Irani* 1065 (BLAT) ; Poona, Collage of Science, May 1893 *Collector* s.n. (BLAT) ; Law College hill, Apr. 1956 *Jain & Vartak* 608 (BSI) ; National defence Academy, Sept. 1960 *Sundararahavan* 64704 (BSI) ; Law College hill, Apr. 1956 *S.D.M.* 440 (BSI) ; Katraj, Jun. 1956 *Puri* 2335 (BSI) ; Shalipur hill range, Jan. 1962 *R.S. Rao* 81468 (BSI) ; Palasdhar forest, Nov. 1955 *Ansari* 4427 (BSI) ; Pratapgarh road; 10 miles from Mahabaleshwar, May 1961 *Seshagiri Rao* 71725 (BSI) ; Khed Foot of Kondeswar hill, Apr. 1961 *Janardhanan* 72188 (BSI) ; Ketownia Cha Mal, Vandra, Dec. 1961 *Janardhanan* 76414 (BSI)- Awhat, Dec. 1960 *Janardhanan* 70015 (BSI) ; Amberuvani, May 1957 ; *K.B.G.* 18299 (BSI) ; Radhanagri, Kolhapur, Dec. 1958 *Ahuja* 47381 (BSI) ; Point, Nasik district, Jul. 1967 *John Cherian* 111131 (BSI) ; Bassein, Thana district, May 1903 *Revan* 840 (BSI) ; Rajawalee, Bassein range, Nov. 1902 *Revan* 23 (BSI) ; Vani forest, Nasik district, Jun. 1920 *Almeida* s.n. (BLAT) ; Pangri, Chandrapur district, May 1971 *Malhotra* 135238 (BSI) ; Yawal, Jalgaon district, Aug. 1982 *Rao* 163424 (BSI);

Nana Randha, Nagarhaveli, Nov. 1970 *Ansari* 122116 (BSI) Borivili National Park, Feb. 1985 *Sharma* 167868 (BSI); Tapola, Satara district, Nov. 1983 *Despande* 162590 (BSI); Chikhalwal, Akola district, Feb. 1978 *Kamble* 152677 (BSI); Markendey, Nasik district, Apr. 1984 *Narasimhan* 166815 (BSI).

Karnataka : North Kanara, Dharwar, Nov. 1949 *Fernandez* 401 (BLT); Sulebhavi forest, Apr. 1951 *Fernandez* 2396 (CAL); Mundgod, 1883 - *Talbot* 365 (BSI, CAL); Above ghats, 1880 *Talbot* s.n. (BSI); Sutgulle, Belgaum, Aug. 1897 *Talbot* 3868 (BSI, CAL); Dharwar, Apr. 1890 *Talbot* 3649 (BSI); without definite locality (Kanara), Mar. 1890 *Talbot* 3565 (BSI); Without definite locality (N. Kanara), Apr. 1883 *Talbot* 365 (CAL); Mysore, Somnathpur, Apr. 1905 - *Barber* 6851, 6863 (CAL, MH); Lingad valley, 850 m, Sept. 1870 *Talbot* 3075 (BSI); Maisor & Carnatic *Thomson* (KW, CAL); Gopalaswamy hill, 1600 m, Bandipur, Apr. 1965 *Naithani* 23916 (MH); Way to Gundlupet, 676 m, Aug. 1964 *Naithani* 21288 (MH); Bangalore, 1857 *Cleghorn* s.n. (MH); South Kanara (without definite locality) *Collector* ? s.n. (MH); Concan - *Stocks, Law* (KW, CAL); Shimoga, 600 m, Apr. 1979 *Saldanha et al.* 6816 (CAL).

Orissa : Gunpur, 800 m, Kalahandi, Apr. 1944 *Mooney* 2475 (DD); Bhatipathar, *Panigrahi* 20809 (ASSAM); Ramogiri surrounding, Dec. 1962 *Subbarao* 30312 (ASSAM); Mayurbhanj *R.H. Khazi* s.n. (CAL).

Rajasthan : Mount Aboo, 1000 m *King* s.n. (CAL); Chang Remia, Ajmeer, Dec. 1878 - *Dr. Brandis* s.n. (CAL); Dungarpur, Marwar, Apr. 1963 *Verma* 151 (BSA); Jhalawar Akle, Sept. 1964 *Wadhwa* 5382 (BSA), Dungarpur, Apr. 1963 *Verma* 151 (LE); Sarah Mandir, 500 m, Jalore district, Oct. 1977, May 1978 *Vyas* 5127, 5880 (BSJO); Sanda Hill, Jalore district, May 1978 *Vyas* 5834 (BSJO); Vagha Chati, Chanarao R.F., Pali district, Apr. 1977, 800 m *Pandey* 4653 (BSJO).

Tamil Nadu : Tirunelveli, Kalakkadu R.F. 330 m, Nov. 1962 *Joseph* 15276 (MH); Thekkumalai, 600 m, Courtallam, Apr. 1957 - *Subramanyam* 2892 (MH); Tiger falls, 300 m, on way to Mancholai, Jun. 1957 *Sebastine* 3715 (MH); on way to Puliyaaruvi, Courtallam 400 m, Jul. 1957 *Subramanyam* 3883 (MH); Courtallam, Jan. 1901 *Barber* 3249 (MH); Papanasam, Jul- 1907 - *Barber* 8376 (MH); Coimbatore, Periar, Siruvani, 1963 61 - *Henry* 242, 1534 (MH, BLAT); Vellingiri hills, 667 m, Apr. 1957 *Sebastine* 3105 (MH); Hassanur, Aug. 1914 *Collector* ? 10556 (MH); Anamallais, 1972 *Beddome* s.n. (CAL); Anamallay, Aug. 1850 - *Collector* ? s.n. (CAL); Bolampatti Valley, May 1911 - *Fischer*

2730 (CAL) ; Tunacadaon, Anamalai hills, 700 m, Oct. 1913 *Fischer* 3652 (CAL) ; Peninsulae Indiae Orientalis, Coimbatore, May 1848 *Herb Wight* 830 (K) ; Ramnad, Melakadu, Sivaganga, 100 m, Sept. 1965-*Ramamurthy* 25803 (MH) ; Alagarkovil forest, 300 m, Jul. 1965 *Vajravelu* 25302 (MH) ; Salem, Chinnar bank, Hogainakkal, 275 m, Jul. 1964 *Vajravelu* 20634 (MH) ; Hogainakkal, 260 m, May 1965 *Vajravelu* 24141 (MH) ; Krishnagiri, Aug. 1918 *Collector ?* 15497 (MH) ; Shevaroi hills, *Perottet* 483 ; Madurai, Nupuraganga, 167 m, Alagar hills, Jun. 1957 *Subramanyam* 3394 (MH) ; Kodaikanal ghat, Pulneys, Dec. 1898 *Bourne* 1294 (CAL) ; Without definite locality, 1873 *Beddome* s.n. (MH) ; Herb. Ind. Orient. *Wight* 820 (LE, MH) ; Cultivated in Agri. Horti. Garden, Madras, Jul. 1893 *Devaraju* s.n. (ISIM) ; Marakkanam R. F. South Arcot district, Sept. 1979 *Ramamurthy* 64178 (MH) ; Kunthukotai, July, 1978, Dharmapuri district *Vajravelu* 57895 (MH) ; Karandamalai, Madurai district, Oct 1977 *Chandra Bose* 51717 (MH) ; Bokkapuram R.F., Nilgiri district, Aug. 1970 *Sharma* 35441 (MH) ; Sirur, Nilgiri district, Sept. 1970 *Subbarao* 36500 (MH) ; Koipatti, Nilgiri district, Mar. 1972 *Subbarao* 40253 (MH) ; Aiyandar Koil forest, Ramanathapuram district, Mar. 1970 *Vajravelu* 33868 (MH) ; Sept. 1971 *Vajravelu* 38602, 38609 (MH) ; Vasudevanallur R.F., Thirunelveli district, Sept. 1971 *Vajravelu* 38797 (MH).

Uttar Pradesh : Bahraich, Oudh district, Apr. 1900 *Inayat* 23607 (LE, CAL) ; Along Nepal frontier, May 1900 *Inayat* 23608 (CAL) ; Gonda, Jun. 1898 *Harsukh* 22963 (CAL) ; Saharanpur, Jun. 1903 *Gollam* 19611 (ISIM, CAL) ; Hardwar, Dehradun, 1879 *King* s.n. (CAL) ; Gharwal, 1871 *King* s.n. (CAL) ; Houson · *Brandis* s.n. (CAL) ; Kotdwar, Garhwal, 700 m, Jun. 1960 *T.A. Rao* 11484 (BSD) ; Dhar.dharaul, Mirzapur district, Jul. 1965 *Misra* 9817 (BSA) ; on way to Naugarh. Mirzapur district, Jul. 1966 *Panigrahi* 11107 (BSA) ; Zoological garden, Lucknow, Jul. 1956 *Patil* 271 (BSA) ; Hurdwar, Jan. 1845 *T. Thomson* 796 (K) ; Mirzapur, Dec. 1970 *Panigrahi* 13522 (BSA) ; Corbett National Park, Kalagarh Forest Rest House, Feb. 1972 *Janardhanan* 51510 (BSD).

West Bengal : Bancoora - *Bell* s.n. (CAL) ; Howrah district (without definite locality) *Kurz* s.n. (CAL) ; Pachete *Bell* s.n. (CAL).

HBC : Indian Botanic Garden, Sibpur, Jun. 1964 *Thothathri* 10131 (CAL) ; HBC *Collector ?* s.n. (CAL) ; HBC, May 1958 *Collector ?* s.n. (CAL) ; HBC *Collector ?* 1785 (CAL).

Sri Lanka : Central Province *Thwaites* 1496 (LE, CAL).

Burma : Taungnyo, Maguibin village, 65 m, Tharawaddy district *G. Rogers* 285 (CAL) ; Without definite locality *Kurz* s.n. (CAL) ;

Pakhran, Landsdowne division, 300 m, Apr. 1928 *Osmaston* 1359 (DD).

Wall. Cat. Travancore *Heyne* in Wall. Cat. 5855 D (LE, CAL) ;
 Duhora Wall. Cat. 5871 A (LE) ; Troglā, Burma Wall. Cat. 5861 B
 (LE) ; HBC Wall. Cat. 5847 A (CAL, LE) ; Coonoor jungle, Sept. 1824
 Wall. Cat. 5848 C (CAL) ; Cultivated in Hort, Bot. Calcutt. Wall. Cat.
 5855 A (CAL)

A. Etymology : The specific epithet '*lanceolaria*' refers to the lancet-like pods.

B. Ecology : The species is a large, pretty, deciduous tree, growing in hill forests up to an elevation of 1000 metres. In Western ghats it grows either in the monsoon forests or in grass lands at lower elevations.

C. Cytology : $n=10$ (Atchison, 1951).

D. Economic importance : The timber of this plant is not of much economic importance. Still the wood is used for making tool-handles, agricultural implements etc. The wood is also useful in carving, rafting and packing cases etc. The decoction of the bark is useful in intermittent fever and Dyspepsia and increases digestion, The seed oil is used in rheumatic affections. Leaves reduced to charcoal and then powdered are used in open wounds and sores. Fresh leaves are used as an antidote to poison and in Leporsy.

KEY TO THE VARIETIES

Flowers bluish white to pink ; pods lanceolate, 5.0 - 14.5 cm long, 1 - 4 seeded

var. *lanceolaria*

Flowers white ; pods oblong, 4.0 - 7.5 cm. long, 1 - 2 seeded

var. *assamica*

Dalbergia lanceolaria Linn. f. subsp. ***lanceolaria*** var. ***assamica*** (Benth.) Thoth. in Bull. bot. Surv. India 25 : 171. 1983 (1985).

Dalbergia assamica Benth. in Miq. Pl. Jungh. 1 : 256 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 45. 1860 (in part) ; Baker in Hook. f. Fl. Brit. India 2 : 235. 1876 ; Prain in Journ. Asiat. Soc. Beng. 66 : 449. 1897 et Ibid. 70 : 52. 1901 et in Ann. Roy. bot. G. rd. 10 (1) : 89. 1904 ; Brandis, Indian Tr. 236. 1907 (ed. 2) ; Cowan, A.M. et J.N. Tr. North Beng. 52. 1929 ; Kanjilal et al. Fl. Assam 2 : 102. 1938 ; Biswas, Ind. For. Rec. (N.S.) 3(1) : 16. 1941 ; Deb in Bull. bot. Surv. India 3 : 266. 1962 ; Rao et al. Ibid. 8 : 299. 1966 ; H. Ohashi in Hara's Fl. East. Himalaya 148. 1966 ; Thoth. in Rec. bot. Surv. India 20(3) : 70. 1973 ; Bal. Fl. Jowai 1 : 168. 1981. *Amerimnon assamicum* (Benth.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A tree with spreading branches ; branchlets glabrous. *Leaves* imparipinnate, alternate, stipulate, 14.5–26.5 cm long ; leaflets 13–17, oblong elliptic, rarely suborbicular, 3.0–5.5 x 2–3 cm, alternate, entire, obtuse to retuse at apex, rounded at base, chartaceous, sparsely puberulous above but soon glabrous, sparingly adpressed puberulous below, lateral veins 8–10 pairs, not prominent, finely reticulated ; rachis glabrous, petiolules 2–4 mm long ; stipules prominent, subfalcate to lanceolate, 1.2–1.5 cm long, deciduous. *Inflorescence* axillary, lax, panicle, 7–16 cm long, usually shorter than leaves, sparsely puberulous. *Flowers* white, 6–9 mm long ; bract and bracteoles ovate, puberulous, deciduous ; pedicels 2–3 mm. long. *Calyx* campanulate, 3–4 mm long, puberulous without, 5-toothed, lowest one lanceolate, longest, laterals ovate. *Corolla* vexillum ovate orbicular, 5–7 mm long, emarginate at apex, clawed, blade thickened into a callosity just above the claw ; wings somewhat trapezoid, clawed ; keels boat-shaped. *Stamens* 10, isodiadelphous, sheath 5–6 mm long, split above and below into 2 lateral bundles of 5 stamens each. *Ovary* 4.5–6.0 mm long, stipitate, ferrugineo-pubescent, style slender, stigma minute, 2–3-ovuled. *Pods* indehiscent, oblong, 4.0–7.5 x 1.0–1.5 cm, stalked, acute at apex, narrowed at base, glabrous, faintly veined opposite the seeds, 1–2-seeded, rarely upto 4-seeded ; seeds reniform, 6 x 5 mm, compressed.

Type : Assam (without definite locality) *Griffith* 546 (Lectotype designated, K).

Flower : January to May. *Fruit* : May to July.

Distribution : INDIA (Assam, Bengal, Arunachal Pradesh, Sikkim), BHUTAN HIMALAYAS and BANGLADESH.

Specimens examined :

Assam : Sibsagar, Panbari reserve, Kaziranga, Jun. 1963 *Deb* 34898 (ASSAM) ; Without definite locality (Sibsagar), 1890 *Peal* 266, 311, 277 (CAL, LE) ; Khasia & Jaintia, Mynso forest, November. 1938 *Deka* 17651 (Assam) ; Kachugaon, November. 1981 *Kanjilal* 7433 (ASSAM) ; Without definite locality (Khasia) *Kurz* s.n. (CAL) ; Damra, Garo hills, Jun. 1940 *R.N.De* 19548 (ASSAM) ; Boko, on road to Halim, Kamrup district, Jun. 1964 - *A.S. Rao* 39096 (ASSAM) ; Goalpara District, 1914 *Kanjilal* 6911 (ASSAM) ; Mongsemdì, May 1895 *G. Watt* 11817 (CAL) ; Naharani, April, 1895 *Watt* 11226 (ISIM) ; Phaskowa tea estate, Jul. 1920 *H.R. Cooper* s.n. (ISIM) ; Assam (without definite locality) *Jenkins* 54 (Syntypes K, KW).

West Bengal : Rajabhatkhawa, Buxa division, Dec. 1964 *D.F.O.* 2 (DD) ; Seroke, Kurseong division, Apr. 1915 *Annadanandu Roy* 194 K (DD) ; Kurseong, May 1915 *Modder* 11 (CAL) ; Without definite locality, July 1904 *Haines* 878 (MH).

Sikkim : Choklong, Mar. 1873 *Gamble* 2256 C (CAL) ; Narchu valley, Jan. 1900 *Kari* s.n. (LE, CAL).

Arunachal Pradesh : Tippi, 500 ft, Kameng dt., 6.11.78 *Sahni & Naithani* 963 (DD) ; Khonsa, Tirap district, 9.11.76 *Vaid & Naithani* 273 (DD) ; Itanagar, Ganga lake, Nov. 1978 *G.D. Pal* 70166 (BSI, Itanagar)

Bangladesh : Hatikhira, Sylhet, Nov. 1924 *U. Kanjilal* 7816 (ASSAM).

Bhutan : Phuntsholing, 1963 *Subbarao* 77 (CAL) ; Birti 530 m, Apr. 1964 *Sen Gupta* 1207 (CAL).

A. Etymology : The plant was known only from Assam when Bentham described it (l.c. 1860). Hence he gave the epithet '*assamica*' for this plant.

B. Ecology : The plant is a fairly medium sized tree, growing in ever green forests up to an elevation of 1000 metres. It is favoured as a shade tree in tea gardens of Assam.

C. *Cytology* : $n = 10$ (Mehra & Hans, 1969).

D. *Taxonomic status* : *D. assamica* Benth. is more or less the assam representative of *D. lanceolaria* species complex, differing from the typical plant in the number of leaflets and pod characters. Hence it has been reduced to a variety under the former. Regarding the habit, Bentham mentioned (l.c. 1860) that it was scandant and Baker (l.c. 1876) went a step further to say that it was a twiner. Actually the plant is neither scandent nor twining but is a medium sized tree.

E. *Typification* : Bentham (l.c. 1860) described this species on the basis of 2 collections from Assam namely *Jenkins* 54 and *Griffith* 546, the latter being selected as the Lectotype.

***Dalbergia lanceolaria* Linn. f. subsp. *paniculata* (Roxb.) Thoth.** in Bull. bot. Surv. India 25 1 : 171. 1983 (1985).

Dalbergia paniculata Roxb. Cor. Pl. 2 : 8. t. 114. 1798 et Hort. Beng. 53. 1814; DC. Prodr. 2 : 417. 1825; Spr. Syst. 3 : 193. 1826; Roxb. Fl. Ind. 3 : 227. 1832 ; Wight & Arn. Prodr. Fl. Pen. Ind. Or. 265. 1834 (in part) : Grah. Cat. Bombay Pl. 5. 1839; Benth. in Miq. Pl. Jungh. 1 : 256. 1852, et in Journ. Linn. Soc. 4. (Suppl.) : 45. 1860 ; Dalz. et Gibs. Bombay Fl. 78. 1861 ; Bedd. Fl. Sylvat. t. 88. 1869 ; Brandis, For. Fl. 150. 1874 ; Baker in Hook. f. Fl. Brit. India 2 : 236. 1876 ; Watt, Dict. Econ. Prod. India 3 : 11. 1890 ; Talbot, Bombay List 75. 1894 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Prain in Journ. Asiat. Soc. Beng. 66 : 449. 1897 et Ibid. 70 : 51. 1901 ; Talbot, Tr. Shr. Clim. 137. 1902 (ed. 2) ; Cooke, Fl. Pres. Bombay 1 (2) : 399. 1902 ; Duthie, Fl. Upper Gang. Pl. 1 (1) : 265. 1903. Gage in Rec. bot. Surv. India 3 (1) : 49. 1904; Prain in Ann. Roy. bot. Gard. 10(1) : 87. 1904; Brandis, Indian Tr. 236. 1907 (ed. 2) ; Bourdillon, For. Fl. Travancore 134. 1908 ; Talbot, For. Fl. Bombay Pres. Sind 1 : 429. 1909 ; Ramarao, Flow. Pl. Travancore 130. 1914 ; Witt, Tr. Shr. Clim. & Herb. Berar 83. 1914 ; Gamble, Fl. Pres. Madras 2 : 383. 1918 ; Haines, Bot. Bit. Or. 3 : 295. 1922 ; Wealth India 3 : 12. 1952 ; Bor, Man. Indian For. Bot. 89. 1953 ; Subramanyam in Bull. bot. Surv India 1 : 130. 1959 ; Sebastine et al. Ibid. 2 : 278. 1961 ; Rao et Kumari, Ibid. 9 : 101. 1968 ; Vajravelu et al. Ibid. 9 : 36. 1968 ; Ellis, Ibid. 10 : 154. 1968. Kausik in Bull. bot. Surv. India 11 : 56. 1969 (1971) ; Shah & Patel, Ibid. 12 : 22. 1970 (1972) ; Mazumder, Ibid. 13 : 126. 1971 (1973) ; Saxena, Ibid. 13 : 81. 1971 (1973) ; Kapoor et al. Ibid. 15 : 79. 1973 (1976) ; Omachen, Fl. Bhopal 1 : 118. 1977 ; Shah, Fl.

Gujarat 2 : 201. 1978 ; Rao et Razi, Fl. Mysore dist. 433. 1981 ; Vajravelu in Bull. bot. Surv. India. 23 : 147. 1981 (1983) ; Matthew, Fl. Tam. Nad. Car. 3(1) : 385. 1983 ; Nair et Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983 ; Mukherjee, Fl. Pachmari & Bori 82. 1984 ; Verma et al. Fl. Raipur, Durg, Rajnand. 98. 1985 ; Rao, Fl. Goa, Diu, Dam. Nagar. 1 : 111. 1985. *D. nigrescens* Kurz, Pegu Rep. App. A. 48. 8. 45. 1875 et in Journ. Asiat. Soc. Beng. 45 : 279. 1876 et For. Fl. Brit. Burma 1 : 346. 1877. *Amerimnon paniculatum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A medium sized tree, 15 -20 m high ; branchlets pubescent, turning black as do leaves after drying. *Leaves* imparipinnate, alternate, stipulate, 11 -21 cm long ; leaflets 7 -13, elliptic to oblong, rarely obovate, 2.3 -5.0 x 1.5 -4.0 cm, alternate, entire, rounded to truncate at base, obtuse at apex, coriaceous, glabrous, lateral veins 5 pairs ; rachis mostly glabrous, rarely puberulous to pubescent, petiolules 2 -5 mm long, glabrous to puberulous. *Inflorescence* panicle, 8-20 cm long rachis and branches brown pubescent. *Flowers* white with a tinge of blue, 6 -9 mm long, bract and bracteoles pubescent, deciduous. *Calyx* campanulate, 3 -4 mm long 5 toothed, pubescent without, teeth acute, subequal, lowest one longest. *Corolla* vexillum ovate oblong to obovate, 6 -9 mm long, cuneate below, clawed, callosities absent ; wings oblong, clawed ; keels boat shaped. *Stamens* 10, isodiadelphous, sheath of each bundle 5 -6 mm long ; longer filaments alternating with shorter ones. *Ovary* 4 -5 mm long, shortly stipitate, glabrous, style bent, stigma minute, ovary 3-ovuled. *Pods* indehiscent, ovate oblong to oblong, 4-7 x 1.5-2.5 cm, black, tapering at both ends, glabrous, indurated and at times reticulated against the seed, 1 -2 seeded ; seeds reniform, compressed, 10 x 5 mm.

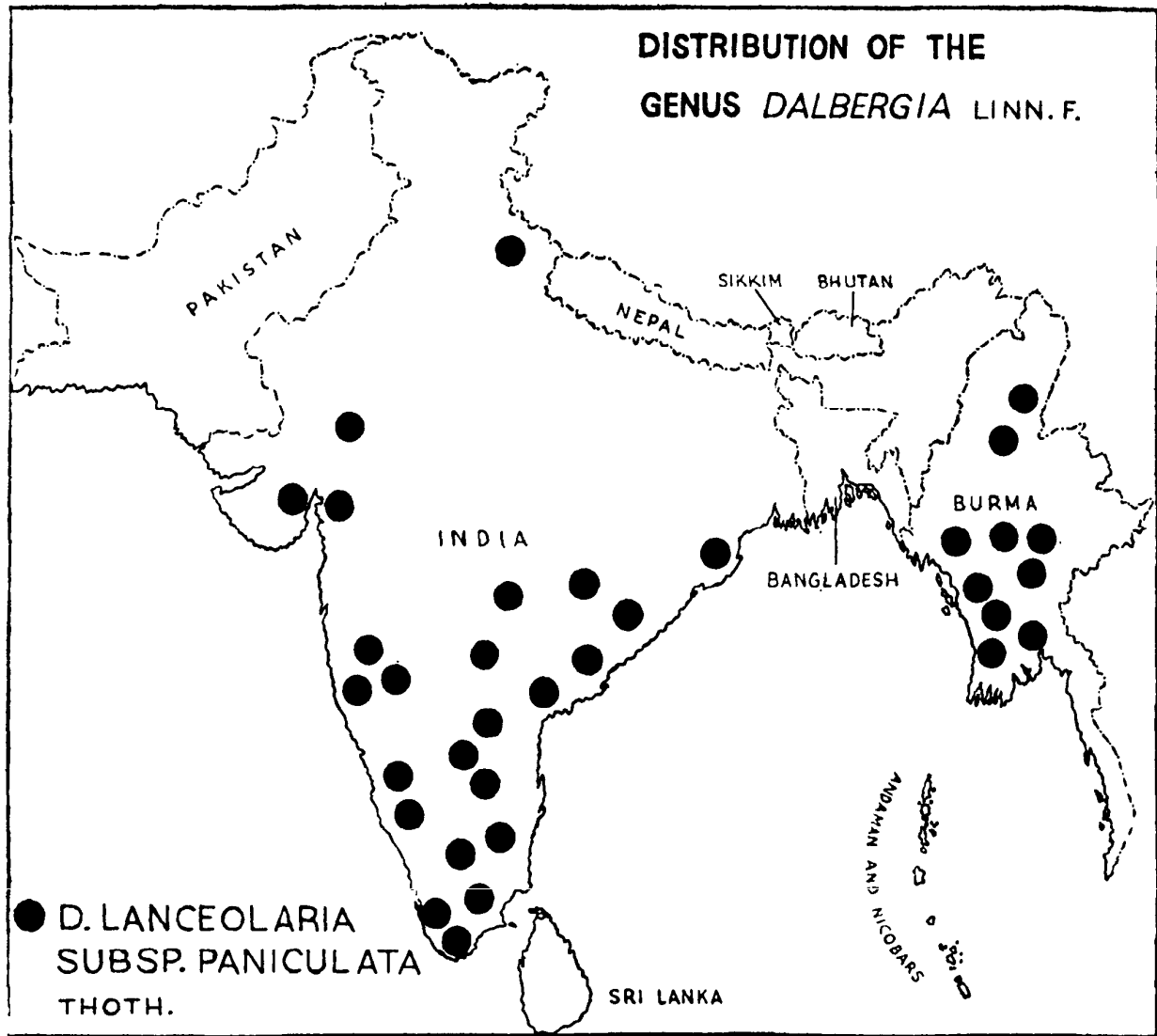
Type : Roxb. Corom. Pl. 2 : 8. t. 114 (Lectotype, designated, CAL).

Flower : April to June. *Fruit* : July to October.

Distribution : INDIA (Andhra Pradesh, Madhya Pradesh, Karnataka, N.W. Province, Rajasthan and Tamil Nadu) and BURMA. (Map 12)

Specimens examined :

Andhra Pradesh : Vizagapatnam, Lakshipuram, Jun. 1900 *Barber* 1773 (MH) ; Anantagiri, Sept. 1960 *Balakrishnan* 10964 (MH) ; Anantagiri, May 1956 *Santapau* 20651 (BLAT) ; Chelama, 365 m, Kurnool district, Jul. 1963 *Ellis* 16775 (MH) ; Narasapur forest, 720 m,



Map 12

Medak district, Apr. 1959 *Sebastine* 7950 (MH) ; Mamandur, Chittoor district, Feb. 1914 *Collector* 10139 (MH) ; Rampa Chodavaram, 300 m, East Godavari district, Jun. 1965 *Subbarao* 24474 (MH) ; Sidhout, 200 m, Guddapah district, Feb. 1883 *Gamble* 10867 (CAL) ; Udayagiri, Nellore district, Jul. 1957 *Wagh* 6688 (BLAT) ; Kondapalli, Krishna district, Aug. 1956 *Wagh* 3224 25 (BLAT) ; Dora Jammu, Srikakulam district, May 1979 *Subbarao* 62478 (CAL) ; Raivudu R.F. May. 1979 *Subbaro* 62397 (CAL, MH) Gundumala R.F., Anantapur district, Sept. 1982 *Pulliah & Yesoda* 10139 (MH) ; Jammalakonda, Chittor district, Sept. 1974 *Subbarao* 45823 (MH).

Madhya Pradesh : Bastar, Kanger Valley, Kutumsar. Feb. 1963 *Panigrahi* 1146 (BSA) ; Narayanpur, Kusamtari forest, Nov. 1961 *Hanfi* 3158 (BSA) ; Saugar, Jul. 1964 *Panigrahi & Singh* 4208 (BSA) ; Jhabua, Sept. 1964 *Arora* 5738 (BSA); Central Province *Donald* 1266 (DD); Bali to Katghora, Bilaspur district, Oct. 1970 *Panigrahi* 12868 (CAL, BSA) ; Ambikapur Nov. 1972 *Panigrahi* 15562 (BSA) ; Bilaspur, July 1973 *Murti* 19337 (BSA) ; Raipur, Jun. 1972 *Verma* 17677 (BSA) ; Durg, Apr. 1974 - *Pant* 20221 (BSA) ; Raigarh, Sept. 1974 *Radhakrishnan* 21236 (BSA) ; Seoni, Mar. 1978 *Banerjee* 28330 (BSA) ; Damoh, Sept. 1979 *Shukla* 29617 (BSA)

Maharashtra : Dangs, Pimpree, Oct. 1955 2406 07 (BLAT) ; Waghai, Sept. 1954 *Santapau* 19109 (BLAT) ; Hills west of Pimpri, Oct. 1955 *Santapau* 20260 (BLAT); Kolhapur, May 1922-*Acland* 407 (BLAT); Katraj, Poona, Aug. 1956 *Puri* 2901 (BSI) ; 9 miles before Pusad, Dhancola reserve forest, Pusad Wasim road, Sept. 1983 *Seshagiri Rao* 90998 (BSI) ; Without definite locality (Bombay) *Dalzell* s.n. (CAL) ; Narnala, Akola district, Jun. 1978 *Kamble* 153772 (BSI) ; Bittergaon, Yeotmal district, Dec. 1976 *Karthikeyan* 148536 ; Deogad, Ratnagiri district, Feb. 1970 - *Kulkarni* 120309 (BSI); Varoda, Jalgaon district, May 1982 *Rao* 160599 (BSI) ; Jari, Chandrapur district, May 1971 *Wadhwa* 133874 (BSI).

Karnataka : Namadachilume forest, Aug. 1961 *Seshagiri Rao* 73463 (BSI) ; Balavahall, Jun. 1957 *G.S.P.* 19883 (BSI) ; North Kanara, Yellapur, Hubli road, Jun. 1958 *Puri* 37976 (BSI) ; Devikope. Dharwar, 1879 *Collector* ? s.n. (BSI) ; Concan *Soteks* s.n. (CAL, KW) ; Maisor and Karnatic *Thomson* s.n. (KW) ; Biligiri Rangan Hills Mysore district, 700 m, Sept. 1978 *Saldanha & Ramesh* 2561 (CAL) ; Tumkur district, Namadachilume forest, Apr. 1980 *Sreenath & Ramesh* 1166 (CAL).

N.W. Province : Kumaon *Hobart & Hampden* s.n. (CAL) ; North West India (without definite locality) *J.L. Stewart* s.n. (LE).

Orissa : Gotamunda, Kalahandi Estate, Apr. 1941 *Mooney* 1730 (DD).

Rajasthan : Anandsagar, Banswara, Nov. 1957 *J.A.V.* 29212 (BSI).

Tamil Nadu : Kunjapanai, Nilgiri district, May 1971 *Vajravelu* 38337 (MH) ; Moyar R.F., Nilgiri district, Aug. 1970 *Sharma* 35569 (MH) ; Coimbatore, Adnamallays, 1871 *Beddome* s.n. (MH) ; Without definite locality (Coimbatore), May 1855 *Cleghorn* s.n. (MH) ; Tinakadu Anamalai hills, 900 m, May 1912 *Fischer* 3421 (CAL) ; Sirumalai, Madurai district, Aug. 1913 *Collector ?* 9101 (MH) ; Salem, 1873 *Beddome* s.n. (MH) ; Mundanthurai, Tinnevelly district, Jun. 1901 - *Barber* 3211 (CAL, MH) ; Shanikolam, South Arcot district, Sept. 1899 *Barber* 795 (MH) ; Lower Pulneys, 1000 m, May 1918 *Rodriguez* s.n. (MH) ; Without definite locality (Madras) *Collector ?* (Herb. Krishnaswamy Naidoo, CAL) ; Pen. Ind. Or. *Wight* 926 (CAL, MH) ; Yercaud, Shevaroy Hills, 800 m, Jun. 1979 *Mathew* 23291 (CAL) ; 700 m, May 1978 *Mohan* 13360 (CAL) ; Kolli hills, Namakkal, 900 m, Apr. 1979 *Mathew and Mohanen* 22791 (CAL) ; Karumandhuri, Thirthagiri Malai, 800 m, Jun. 1978 *Venugopal* 14416, 14415 (CAL) Kundu Kottai R.F. 650 m, Dec. 1978 *Mathew & Venugopal* 20387 (CAL) ; Marakkanam, Gomukhi Vellimalai, South Arcot district, Sept. 1977, Feb. 1983 *Ramanurthy* 51140 & 77338 (CAL, MH) ; Coimbatore, Jun. 1967 *Chandra Bose* 29907 (MH) ; Perumalmudi, Manguliposumani, Coimbatore district, Apr May 1970 - *Viswanathan* 537, 591 ; Attappadi, Nilgiri district, Jun. 1974 *Vajravelu* 44986 (MH) ; Avarihalla R.F., Nilgiri district Apr. 1971 *Radhakrishnan* 38014 (MH).

Kerala : Travancore (without definite locality) *M.A. Lawson* 229 (CAL) ; Palghat *Watt* 21985 (ISIM).

Gujarat : Khandesh, Chaukli pan, Akrani Plateau, Oct. 1909 *Burkill* 33361 (ISIM) ; Apison hill, Haripur Jul. 1957 *Mahajan* 20258 (BSI) ; Chalisgaon, Outram ghat, Jul. 1957 *Mahajan* 20360 (BSI).

Burma : South Shawgan reserve, Meiktila district, Aug. 1919 *Gilbertt Rogers* 517 (CAL) ; Minbu, Salin, Oct. 1902 *Shaik Mokim* 292 (CAL) ; Myaungk reserve, 120 m, Apr. 1915 *C.B. Snales* 106 (CAL) ; Without definite locality (Minbu), Dec. 1902 *Shaik Mokim* 951 (CAL) ; Kanni to Tatkou, 200 m, Yamethin district, Oct. 1909 - *Lace* 4957 (CAL) ; Seittein to Taungbaw, Myingyan district, Aug. 1909 *Lace* 4886 (CAL) ; Pegu, 1857 *Eyre* s.n. (CAL) ; Pegu *Kurz* 2618 ('Type of *D. nigrescens* Kurz, CAL) ; Mandalay, Jun. 1890 *Abdul Huk* s.n. (CAL) ; Shan hills, Upper Burma, 1892 *Abdul Huk* 119 (CAL) ; Kyankse, Upper Burma,

1890 *Abdul Huk* s.n. (CAL) ; Shan, Jun. 1890 *Abdul Huk* s.n. (CAL) ;
Nghah Khyum, Jan. 1868 *Anderson* s.n. (CAL) ; Tobadawa, Upper
Burma, Jul. 1891 *Abdul Huk* 17 (CAL) ; Kyoukmyong, Jul. 1891 *Abdul
Huk* s.n. (CAL) ; Without any details (Birma) *Griffith* 1810 (CAL).

Wall Cat. : Herb Madras *Wall. Cat.* 5848H (LE).

A. Etymology : The epithet '*paniculata*' refers to the distinct, paniculate inflorescence of the subspecies.

B. Ecology : The plant is primarily a deciduous tree, growing well in mixed forests. In Travancore it occurs scattered in the deciduous forests up to 500 metres.

C. Cytology : $n = 10$ (Atchison, 1951).

D. Taxonomic status : *D. paniculata* Roxb. has so far been treated as a distinct species in all the Indian and Burmese floras. A critical evaluation of the characters of this species with that of *D. lanceolaria* Linn. f. has led the author to conclude that the former cannot stand as a distinct species but can best be regarded as a subspecies of the latter. *D. lanceolaria* Linn.f. subspecies *paniculata* is distinguished from the typical plant in the pubescent inflorescence, vexillum without callosities, and leaf characters. *D. nigrescens*. Kurz, described from Burma is again conspecific with this subspecies and hence reduced to its synonymy.

E. Typification : Roxburgh in his protologue (l.c. 1798) states that the plant is a native of Circar mountains without giving any other information. Failing to find out any collection of Roxburgh, the illustration, contained in the original description (Corom. Pl. 2 : 8.t. 114) is selected as the lectotype of this taxon.

F. Distribution : The occurrence of this plant in Madhya Pradesh, Gujarat, Rajasthan and N.W. India as evidenced from the above collections constitutes new records for this taxon and thereby extends its range of distribution to Central, Western and North western India.

G. Economic importance : The wood of this plant is not of much economic value. It is used only in house building as well as fire wood. The wood according to J. Cameron (Før. Tr. Mysore & Coorg 95. 1894) is employed for making musical instruments.

KEY TO THE VARIETIES

- 1a. Leaflets 7 - 13, turning black after drying ; pods ovate to ovato - oblong, 4 - 7 cm long ... var. *paniculata*
- 1b. Leaflets 3 - 10, not turning black after drying ; pods oblong to lanceolate, up to 10 cm long.
- 2a Leaflets 5 - 9; pods oblong ... var. *hemsleyi*
- 2b Leaflets 3 - 10; pods lanceolate ... var. *maymyensis*

* *Dalbergia lanceolaria* Linn.f. subsp. *paniculata* var. *hemsleyi* (Prain) Thoth. in Bull. bot. Surv. India 25 : 172. 1983 (1985).

Dalbergia hemsleyi Prain in Journ. Asiat. Soc. Beng. 66 : 450. 1897 et Ibid. 70 : 54. 1901 et in Ann. Roy. bot. Gard. 10(1) : 94. 1904 ; Brandis, Indian Tr. 237. 1907 (ed. 2).

A small tree with spreading branches, 7 m high. *Leaves* imparipinnate, alternate, stipulate, 10 - 21 cm long ; leaflets 5 - 9, mostly ovate elliptic, rarely ovate lanceolate, 3.5 - 5.2 x 1.4 - 2.8 cm, alternate, entire, obtuse to retuse at apex, narrow to truncate below, glabrescent above, puberulous to pubescent below, sub coriaceous, reticulately veined ; rachis and petiolule silky pubescent, petiolules 6 - 7 mm long. *Inflorescence* an axillary panicle, 10 cm long, rachis and pedicels silky pubescent. *Flowers* 7 - 9 mm long ; bract and bracteoles present ; pedicels 2 - 4 mm long. *Calyx* campanulate 3.5 mm long, silky, pubescent without 5 toothed, teeth acute, lowest one longer than rest. *Corolla* vexillum orbicular, 8 mm long, clawed, emarginate at apex, not callose at base ; wing petals oblong, clawed ; keel petals boat shaped, clawed, *Stamens* 10, isodiadelphous, sheath 6.5 mm long, filaments free on their upper third. *Ovary* not seen. *Pods* indehiscent, oblong lanceolate, 4.5 - 10.2 x 1.2-2.0 cm, entire, tapering at both ends, stalked, glabrous, coriaceous, reticulately veined especially opposite the seeds, mostly 1-2-seeded, rarely up to 4-seeded ; seeds reniform, brownish black, 10 x 6 mm.

Type : Myingyin, Burma, Nov. 1890 - Prazar s.n. (Lectotype designated, CAL).

Fruit : November to May.

Distribution : BURMA (Shan hills) and CAMBODIA.

Specimens examined :

Burma : Shan hills, Laikaw, 1893 *Abdul Khalil* s.n. (CAL) ; Fort Stedman, May 1888 *Collett* 682 (Syntype, CAL) ; Indine, 1893 *Abdul Khalil* s.n. (Syntype, CAL) ; Pinwe, Katha district, Dec. 1908 *Lace* 4445(CAL) ; Myitkyina, 200 m, Apr. 1909 *Buchman* 23 B (CAL).

A. *Etymology* : The epithet '*hemsleyi*' has been chosen by Prain to honour Hemsley who made valuable collections of plants in Upper Burma.

B. *Ecology* : The plant grows well in the mixed forests of Burma.

C. *Typification* : Prain named the following collections while describing *D. hemsleyi* (l.c. 1897), 'Shan hills' *Collett* 682 ; Myingyin *Prazer* s.n. ; Southern Shan State *Abdul Khalil* s.n. All the 3 are therefore syntypes of this taxon. Out of these, Myingyin *Prazer* s.n. has been chosen as lectotype as it matches well with the original description.

D. *Taxonomic status* : Though described as a distinct species by Prain (l.c. 1897), *D. hemsleyi* cannot be regarded as such as its characters are more or less similar to *D. lanceolaria* Linn. f. subsp. *paniculata*. However it differs from the former in leaflets not turning black after drying and in the pods being oblong and up to 10 cm in length. Hence it has been reduced to a variety of the subspecies *paniculata*.

Dalbergia lanceolaria Linn. f. subsp. ***paniculata*** var. ***maymyensis*** (Craib) Thoth. in Bull bot. Surv, India 25 : 172, 1983 (1985).

Dalbergia maymyensis Craib in Kew Bull. 390. 1912.

A medium sized tree, 15-16 m high ; younger branches pubescent. *Leaves* imparipinnate, alternate, stipulate, 9-19 cm long ; leaflets usually 3-10, rarely 14-16, ovate elliptic to elliptic oblong, 3.5-6.6 x 2.0-4.5 cm, alternate, entire, obtuse to retuse at apex, unequal and narrowly truncate at base, puberulous to silky pubescent when young but glabrous when mature, subcoriaceous, reticulately veined ; rachis and petiolule tomentose, petiolules 3-5 mm long ; stipules falcate to lanceolate, 5-10 mm long, prominent and tomentose. *Inflorescence* an axillary panicle, 5-12 cm long, rachis and branches of the inflorescence brown tomentose. *Flowers* 9-10 mm long, white to light yellow, pedicellate ; bract linear to spatulate, 5 mm long, bracteoles linear, deciduous ; pedicels 3 mm long, brown tomentose. *Calyx* campanulate, 3-4 mm long, brown silky without, 5-toothed, lowermost lanceolate, longer than others, lateral 2 oblong and obtuse, upper 2 connate. *Corolla* vexillum reflexed, suborbicular, 7-8 mm long, clawed ; wings ovato-

oblong, clawed ; keels deeply boat shaped, clawed and connate on the back. *Stamens* 10, isodiadelphous into 2 lateral bundles of 5 each, sheath of each bundle 6 mm long, of the 5 in each bundle 3 longer alternating with 2 shorter ones, filaments free on their upper third. *Ovary* 6 mm long, shortly stipitate, glabrous except the pubescent sutures. style short, stigma capitate, ovules 2. *Pods* indehiscent, narrowly oblong, at times lanceolate, 6.0-9.5 x 1.2-1.5 cm long, acute at apex, attenuate below, glabrous, 1-2 seeded, reticulated against the seeds; seeds reniform.

Type : Maymyo plateau, 1200 m, Jul. 1908 *Lace* 4134 (Lectotype selected, CAL).

Flower : March to April. *Fruit* : July to August.

Distribution : Burma (Maymyo plateau).

Specimens examined :

Burma : Maymyo, Mandalay road, 1200 m, Apr. 1915 *Rodger* 282 (CAL) ; Thondaung to Anisakan, 1000 m, Aug. 1912 *Lace* 5931 (CAL) ; Elephant point, Mandalay, Apr. 1917 *C. Rogers* 880 (CAL) ; Golf course near the 13th green, 1100 m *Maung Kan* 13769 (CAL) ; Mawlaik, Paung byin reserve, 220 m, Jun. 1926 *F.R. Chin* 3273 (DD) ; Masein stream. 166 m, May 1926 *Pochin* s.n. (DD) ; Natmauk Kyagan, 200 m, Magwe district, Mar. 1915 *G. Rogers* 964 (CAL, DD) ; Pyinmana, Mar. 1918 *Butterwick* 1 (CAL) ; Maymyo plateau, 1200 m *Lace* 5793 (Apr. 1912), 5848 (Jul. 1912), 3113 (Apr. 1908) (all syntypes, CAL).

A. Etymology : The plant has been named after the place of its collection 'Maymyo plateau' where it is probably endemic.

B. Ecology : The plant is a moderate sized tree with a clear bole. The flowering starts after the leaf shedding. It grows in mixed forests up to an elevation of 1500 metres.

C. Typification : The description of this taxon by Craib (l.c. 1912) was based on 4 collections, made at different periods from Maymyo plateau. Hence a lectotype (Maymyo plateau, 1200 m, Jul. 1908 *Lace* 4134) has been chosen among the syntypes.

D. Taxonomic status : Craib described this plant as a good species, closely allied to *D. assamica* Benth. A critical study of this taxon has led the author to conclude that it is close to subsp. *paniculata* of *D. lanceolaria* Linn. f. and can best be regarded only as a variety of the above subspecies.

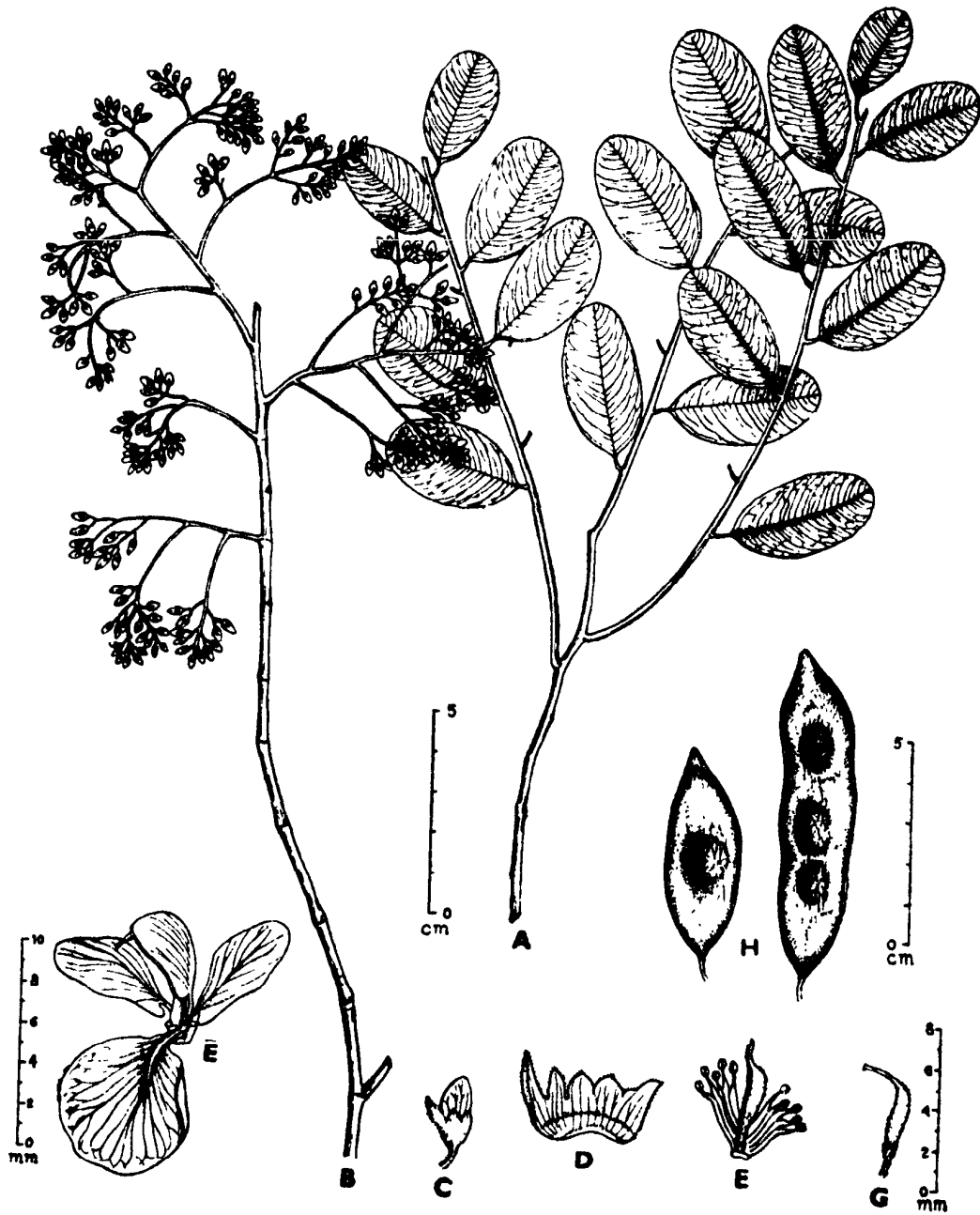


Fig. 13. *Dalbergia peguensis* Thoth.

- A. branch with leaves ; B. Much branched panicle ;
- C. A flower bud ; D. Calyxcup split open ;
- E. Corolla with vexillum, keels and wings spread ;
- F. Staminal sheath showing isodiadelphous condition; H. Pods.

Later collections from Burma has enabled the author to amend the description of this taxon to a considerable extent.

32. ***Dalbergia peguensis*** Thoth. in Journ. Jap. Bot. 50(2) : 55. 1975.
(Fig. 13).

Dalbergia peguensis Thoth. is related to *D. paniculata* Roxb. but differs from the latter in the longer and slender petiolules, keels much shorter than wings and narrowly oblong pods which are thickened and reticulated against the seeds. It is placed in the section 'Dalbergia' under the series 'Dalbergieae'.

An erect tree, 20-25 m high; branchlets glabrous. *Leaf* imparipinnate, alternate, 14-20 cm long; leaflets 9-13, alternate, elliptic-oblong to rarely ovate, entire, obtuse to retuse at apex, rounded at base, glabrous, pale green above, glaucous below; rachis glabrous, petiolules 6-9 mm long, slender, glabrous. *Inflorescence* a much branched panicle, axillary and terminal, 7-9 x 6-9 cm, main rachis glabrous but branchlets puberulous. *Flowers* 7-10 mm long, pedicellate; bract and 2 bracteoles minute, deciduous; pedicels puberulous to pubescent, 1.5-2.5 mm long. *Calyx* campanulate, 3.5-4.0 mm long, mostly pubescent without, rarely puberulous, 5-toothed, teeth ovate-acute except the lowest which is lanceolate and longest. *Corolla* vexillum ovate-orbicular to orbicular, 8-9 mm long, deflexed, clawed, reticulately veined, obtuse at apex; wings falcately oblong, clawed, auricled at base, 7 mm long; keels boat-shaped, connate on the ventral suture, shorter than wings, 5 mm long. *Stamens* 10, isodiadelphous, sheath 5.0-5.5 mm long, filaments free on their upper fourth, longer ones alternating with shorter ones. *Ovary* 4-6 mm long, stipitate, glabrous except the pubescent stipitate as well as puberulous sutures, style slender, stigma minute, ovules 3. *Pods* indehiscent, flat, oblong, 4-8 x 1.5-2.0 cm, stalked, obtuse to acute at apex, glabrous, 1-3 seeded, much reticulated opposite the seeds; *seeds* reniform, compressed, 7 x 4 mm.

Type: Pegu Yomah, Mar. 1871, Burma *Kurz* 2604 (Holotype, CAL); Pegu Yomah, Jan. 1868, Burma *Kurz* 1781 (Paratype, CAL).

Flower: January. *Fruit*: March

Distribution: BURMA. (Map 9)

A. *Etymology*: The epithet 'peguensis' has been given after the place of collection.

B. *Critical notes*: The collections of Kurz from Pegu which formed the basis for this new taxon have been variously interpreted by earlier

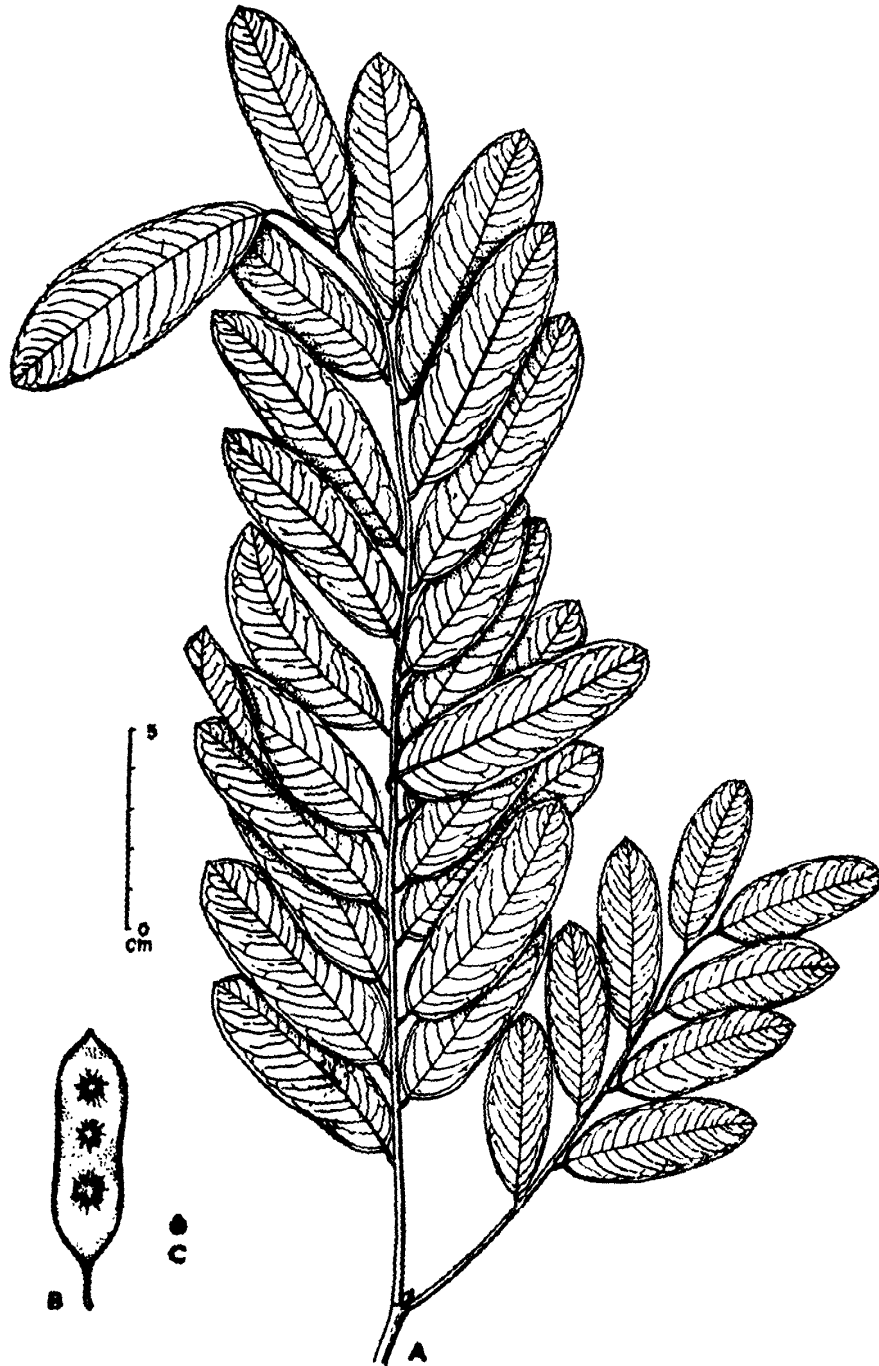


Fig. 14. *Dalbergia bhutanica* Thoth.
 A. A branch with leaves ; B. A pod ; C. A seed.

workers. Kurz (l.c. 1877) identified his collections 2604 & 1781 as *Dalbergia paniculata* Roxb., while Baker (l.c. 1876) considered them to be *D. purpurea* Wall. Prain, who described *D. oliveri* from Burma, treated Kurz's collections to be same. In reality, all these identifications are unfortunately wrong as the above collections really represent yet an undescribed species.

33. ***Dalbergia bhutanica*** Thoth. in Bull. bot. Surv. India 10(1-4); 189. 1972(1979); Nayer & Ramamunthy in Bull. bot. Surv. India 15: 213. 1973 (1976). (Fig. 14)

D. bhutanica Thoth. is allied to *D. assamica* Benth. (now reduced to *D. lanceolaria* var. *assamica*) but differs in the leaf and pod characters. It is placed in the section 'Dalbergia' under the series 'Lanceolarieae'

A tree; branches glabrous. *Leaves* imparipinnate, alternate, stipulate, 34.5-39.5 cm long, rachis glabrous; leaflets 23-27, oblong, 6.5-9.2 x 2.2-2.5 cm, alternate, entire, acute at apex, rounded at base, glabrous on both surfaces, lateral veins 12-14 pairs; petiolules 4-6 mm long, glabrous. *Flowers* not known. *Pods* indehiscent, oblong, brownish yellow, 3.5-6.0 x 1.3-1.7 cm, stalked, acute at apex, narrowed at base, glabrous, uniformly smooth without reticulations, 1-3 seeded; *seeds* brownish black, 5-8 x 3-4 mm, compressed.

Type: Narchu valley, Engo forest, Nov. 1898, Bhutan Prain s.n. (Holotype CAL, Isotype, CAL, LE).

Fruit: November.

Distribution: BHUTAN HIMALAYAS. (Map 9)

A. *Etymology*: The specific epithet is after Bhutan where it is most probably an endemic species.

B. *Critical notes*: Prain at first considered the above collection, distinct from *D. assamica* Benth. Hence he named it as *Dalbergia pantlingiana* on the specimen but did not describe it. Prain's manuscript name could not be used as it had no bearing either with the collector or place of collection. A more appropriate name '*bhutanica*' was therefore given to this species.

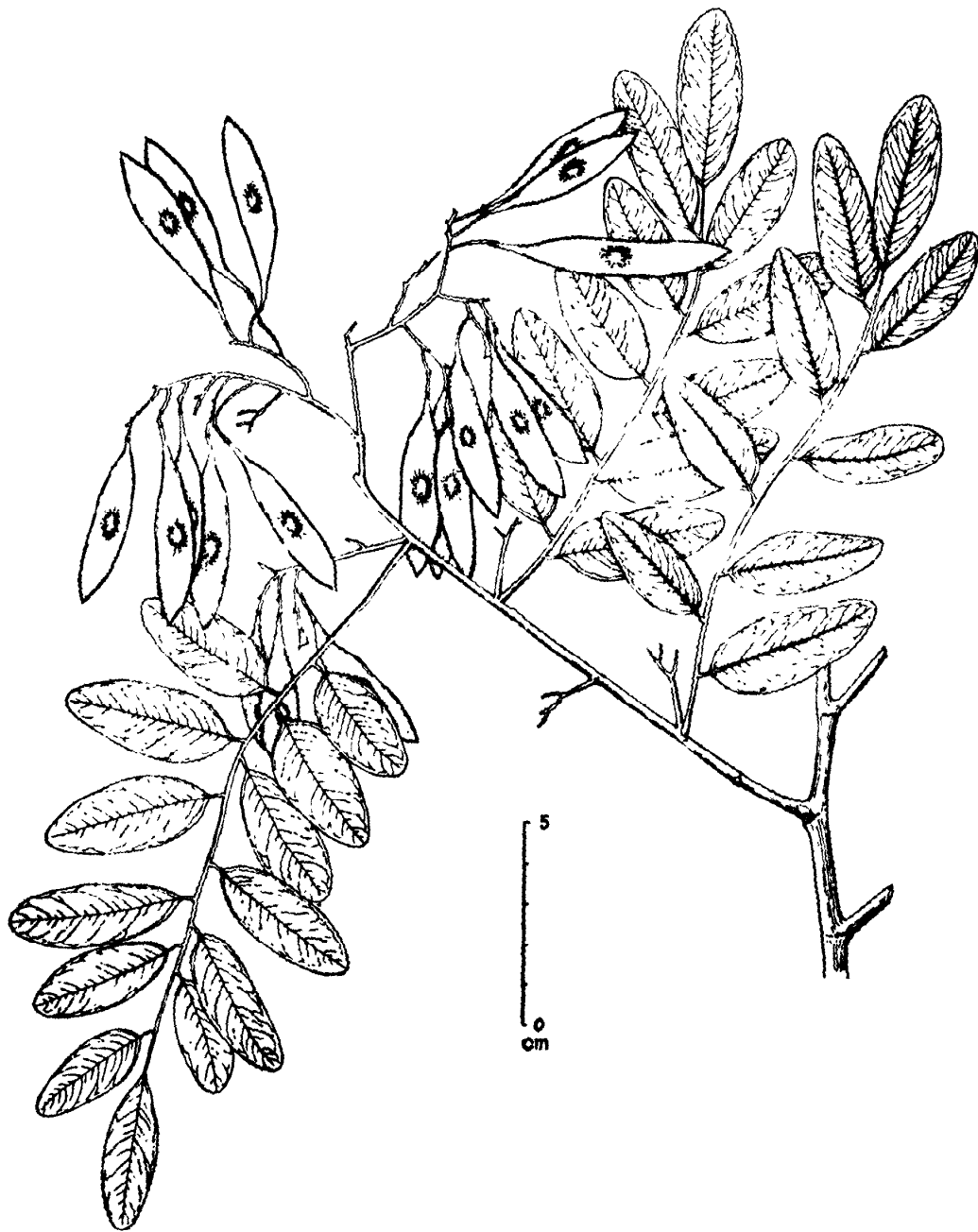


Fig. 15. *Dalbergia duarensis* Thoth.

34. **Dalbergia duarensis** Thoth. in Bull. bot. Surv. India 14(1-4) : 192. 1972 (1975); Nayar & Ramamurthy in Bull. bot. Surv. India 15 : 213. 1973 (1976). Fig. 15

D. duarensis Thoth. is related to *D. sericea* G. Don but differs in the glabrous, young shoots, and leaves, oblong leaflets, perfectly glabrous inflorescence and larger, linear-oblong pods. It is placed in the section *Dalbergia* under the series 'Dalbergia'.

A large tree, branches glabrous. *Leaf* imparipinnate, alternate, stipulate, 17-18 cm long; leaflets 13-17, oblong, 2.5-4.5 x 1.2-1.7 cm, alternate, entire, obtuse at apex, narrow to rounded at base, glabrous coriaceous, lateral veins 8-10 pairs; rachis and petiolule glabrous, petiolules 2-3 mm long, stipule deciduous. *Flowers* not known. *Infructescence* 4.5-6.0 cm long, rachis and branches perfectly glabrous. *Pods* indehiscent, linear-oblong, flat, 4.5-6.0 x 0.9-1.0 cm, stalked, acute at apex, abruptly narrowed below, glabrous, 1-2 seeded, reticulated opposite the seeds; seeds reniform, 3.0-3.5 x 2.0 mm, compressed.

Type : Mahakalaguri, Alipore Duars, North Bengal, Oct. 1891
Herbarium 104 (Holotype, CAL).

Fruit : October.

Distribution : INDIA (W. Bengal). (Map 9)

A. *Etymology* : The species has been named after the place of its collection namely, Duars.

B. *Ecology* : According to field information, recorded in the specimen, the plant is a large tree in Duar jungles. It is leafless during the beginning of hot season.

35. **Dalbergia sericea** G. Don. Syst. 2 : 375. 1832; Prain in Journ. Asiat. Soc. Beng. 70 : 51. 1901; Duthie, Fl. Upper Gang. Pl. 1(1) : 265. 1903; Prain, Beng. Pl. 1 : 410. 1903 et in Ann. Roy. Bot. Gard. 10 (1) : 85. 1904; Brandis, Indian Tr. 237. 1907(ed. 2); Cowan et al. Tr. North Bengal 52. 1929; Kanjilal et al. Fl. Assam 2 : 103. 1938; Ohashi in Hara's Fl. East. Himalaya 2 : 64. 1971; Malhotra in Bull. bot. Surv. India 13 : 262. 1971 (1974); Jain & Hazra Ibid. 17 : 82. 1975 (1978); Raizada & Saxena, Fl. Muss. 1 : 167. 1978; Maheshwari et al. in Bull. bot. Surv. India 18 : 157. 1976 (1979); Hara et al. Enum. Flow. Pl. Nep. 1 : 105. 1979; Naithani, Fl. Chamoli 154. 1984.

Dalbergia hircina Ham. [in Wall. Cat. 5871 B. 1832 (nomen)] ex Benth. in Miq. Pl. Jungh. 1 : 256. 1852 et in Journ. Linn. Soc. 4 (Suppl.) :

46. 1860 ; Brandis, For. Fl. 151. 1874 ; Baker in Hook. f. Fl. Brit. India 2 : 236. 1876 ; Watt. Dict. Econ. Prod. India 3 : 6. 1890 ; Gamble, Darjeeling List 29. 1896 ; Prain in Journ. Asiat. Soc. Beng. 66 : 449. 1897 ; Biswas in Indian For. Rec. (N. Ser.) 3 : 16. 1941 ; T.A. Rao in Bull. bot. Surv. India 1 : 106. 1959 ; M.A. Rao, Ibid. 3 : 224. 1962 ; T.A. Rao, Ibid. 6 : 52. 1965. *Dalbergia stenocarpa* Kurz in Journ. Asiat. Soc. Beng. 44 : 205. 1875 ; Baker in Hook. f. Fl. Brit. India 2 : 238. 1876 ; Gamble, Darjeeling List 29. 1878. *Amerimnon hircinum* (Ham.) O.Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A medium sized tree ; young shoots bifarious, silky tomentose. *Leaves* imparipinnate, alternate, stipulate, 13.0 - 32.5 cm long ; leaflets 13-21, ovate, ovato-elliptic to oblong, 3 - 5 x 2.0 - 3.5 cm, alternate, rarely subopposite, entire, obtuse to slightly retuse at apex, rounded to cuneate at base, chartaceous, glabrescent above, puberulous to pubescent below, lateral veins 8-10 pairs, not distinct ; rachis and petiolule silky pubescent, petiolules 2-5 mm long ; stipules lanceolate to subfalcate, 7 - 10 mm long, silky pubescent. *Inflorescence* short, rather dense, axillary panicles, densely silky pubescent, 2 - 4 cm long. *Flowers* white to purple, 5 - 6 mm long ; bract and bracteoles lanceolate, pubescent. *Calyx* campanulate, densely pubescent without, 2 - 3 mm long, 5-toothed, teeth ovate, acute to obtuse except the lowest which is longer and lanceolate. *Corolla* vexillum ovato-orbicular, 4.5 - 6.0 mm long, clawed, blade thickened near the claw ; wings oblong, clawed ; keels boat-shaped, connate above. *Stamens* 10, diadelphous, sheath 3 - 4 mm long, filaments free on their upper fourth, longer, ones alternating with shorter ones. *Ovary* 3.0 - 3.5 mm, shortly stipitate, densely pubescent, style bent upwards, stigma minute, ovules up to 4. *Pods* indehiscent, flat, narrowly ligulate, 2.5 - 6.0 x 0.5 - 0.7 cm, entire, acute above, tapering below into the short stalk, coriaceous, glabrous, generally 1 - 2-seeded, rarely 3 - 4-seeded, reticulated against the seeds ; seeds compressed, reniform. 5 x 2 mm.

Type : Cheria ghaut hills, Nepal, Mar. 1802 *Hamilton* s.n. (Holotype, BM).

Flower : April to May. *Fruit* : June to September.

Distribution : INDIA (Arunachal Pradesh, N.W. Himalaya, Uttar Pradesh, Sikkim, W. Bengal), BHUTAN. (Map-14)

Specimens examined :

Arunachal Pradesh : Aka hills, 1934 *Bor* 15711 (ASSAM) ; Nefa,

Kalaktang, Kameng F.D., May 1958 *Panigrahi* 15483 (ASSAM);
Rahury, 2073 m., Kameng F.D., May 1957 *R.S. Rao* 7443 (ASSAM).

N.W. Himalaya : Without definite locality, Apr. 1898 *Mackinnon* s.n. (CAL); Shaimal, 1870 *King* s.n. (CAL); Without definite locality, Aug. 1882 *Duthie's collector* 2322 (CAL).

Uttar Pradesh : Kumaun, near Khairna, 1000 1400 m, Aug. 1884 *Duthie* 2386 (DD); Sariatal, 1333 m, Aug. 1913 *N. Gill* 646 (LWG); From Seriya ghat on the Marwa family, Aug. 1950 *Awasthi* 1442 (LWG); Jamuna Chatti, Jun. 1951 *Awasthi* 2433 (LWG); Samadura, Almora district, 2000 m, May 1965 *Nair* 35710 (BSD); Tanakpur, 450 m, Jun. 1960 *T.A. Rao* 11542 (CAL, BSD); Samadura Tejum, 1615 1350 m, Jun. 1958 *T.A. Rao* 6586 (BSD); Baram, 1200 m, Apr. 1962 *Bhattacharyya* 21198 (BSD); Sarju valley, 1000 1200 m, Jul. 1886 *Duthie* 5485 (BSI); Jeolikote, 1500 m, Apr. 1913 *N. Gill* 576 (CAL); Rasuguna river, 1333 m *Strachey and Winterbottom* 3 (LE); Garhwal, Birchi Gohna, 1500 m, *M.A. Rau* 10026 (BSD); Near Bhajuri, 1200 m, Aug. 1882 *Duthie* 2545 (LE, DD); Ganges valley, 1500 2000 m, Jun. 1883 *Duthie* 1001 (CAL, LE); Garhwal (without definite locality) *King* s.n. (CAL); Mussouri, Jharipani, Apr. 1957 *T.A. Rao et Y.K. Sarin* 2447 (BSD); Kamptes falls, 1898 *Mackinnon* s.n. (CAL); Near Mussorie, Apr. 1898 *Collector ?* s.n. (DD); Mussorie, 1869 *King* s.n. (CAL); Shaimala, Nainital, Jul. 1900 *Inayat* 24318 (CAL, DD); Sahstradhara, Dehradun, May 1963 *Malhotra* 27693 (BSD); Rajpur, Apr. 1961 *Bhattacharyya* 14808 (DD); New forest, Dehradun, Apr. 1935 - *Raizada* s.n. (DD); Sahastradhara, Dehradun, Apr. 1902 *Kanjilal* 1171 (DD); Sajgadisot, Corbett National Park, Oct. 1980 *Pant* 72432 (BSD).

W. Bengal : Darjeeling, Kalimpong, 1333 m, Dec. 1879 *Gamble* 7536 (CAL); Mungpoo, May 1900 *Prain's collector* s.n. (CAL); Mungpoo, 1000 m, May 1884 *Clarke* 28099 E (CAL); Garidoora, 166 m, May 1884 *Clarke* 35535 C, E (CAL, LE); Without definite locality (Darjeeling), Apr. 1900 *Prain* s.n. (CAL); Jukvar, Jun. 1906 *Mann* s.n. (ISIM); Mechi Bank, near Nepal border, Jan 1875 *Gamble* 596 (LE); Jalpaiguri, Murichon, 1500 m, May 1949 *Narayanaswami* 2789 (CAL).

Bhutan : Without definite locality (Bhutan Himalayas) *Griffith* 1812 (LE, CAL); Birti, 530 m, Apr. 1964 *Sen Gupta* 1207 (CAL).

Sikkim : Rilok, Nunghoo, Jun. 1903 *Kasi* s.n. (CAL); Mahanuddy, May 1873 *Gamble* 2253 C (CAL); Ryang valley, Apr. 1878 - *Lister* s.n. (CAL); Sivoke, Terai, Apr. 1875 *Gamble* s.n. (CAL); Sivoke, Apr.

1878 *Gamble* 2245 B (CAL); Chueebaki, 700 m, Apr. 1876 *Gamble* 469 D (CAL).

Nepal and Deyara Dhoon, 1825 *Wall. Cat.* 5871 B (Isotype of *D. hircina* Ham. ex Benth., CAL); Punkaparee, Sikkim, Aug. 1873 *Gamble* s.n. (Holotype of *D. Stenocarpa* Kurz, CAL).

A. *Etymology* : The specific epithet 'sericea' refers to the silky, pubescent young shoots of the plant.

B. *Ecology* : *D. sericea* is a medium sized tree, growing in mixed dry forests up to an elevation of 1000 m in the Eastern Himalayas. In Western and North western Himalayas it grows up to an elevation of 1500 m.

C. *Critical notes* : The plant was known under the name *D. hircina* Wall. ex Benth. in Hooker's Flora of British India (l.c. 1876) as well as in other regional floras. Prain (l.c. 1901) pointed out that the plants, known under the names *D. hircina* and *D. sericea* were both identical. Since *D. sericea* was followed with a good description (G. Con, 1832) it has priority over *D. hircina* Ham. (1832) which was then a nomen nudam. *D. stenocarpa* Kurz was again the same as *D. sericea* G. Don and hence reduced to its synonymy.

D. *Distribution* : The occurrence of this species in Arunachal Pradesh as evidenced by the above collections constitutes new record and has thus extended its range of distribution to the extreme east of Himalayas.

36. *Dalbergia volubilis* Roxb. Corom. Pl. 2 : 48. t. 191. 1805 et Hort. Beng. 53. 1814; DC. Prodr. 2 : 417. 1825; Spr. Syst. 3 : 193. 1826; Roxb. Fl. Ind. 3 : 231. 1832 ; Wight & Arnott, Prodr. Fl. Pen. Ind. Or. 265. 1834 ; Grah. Cat. Pl. Bombay, 55. 1839 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) ; 46. 1860 ; Dalz. et Gibs. Bomay, Fl. (Suppl.) 78. 1861 ; Brandis, For. Fl. 152. 1874 ; Baker in Hook.f. Fl. Brit. India 2 : 235. 1876 ; Kurz, For. Fl. Brit. Burma 1 : 346. 1877 ; Watt, Dict. Econ. Prod. India 3 : 16 1890 ; Collett & Hemsley in Journ. Linn. Soc. 28 : 50. 1890 ; Talbot, Bombay List 75. 1894 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Prain in Journ. Asiat. Soc. Beng. 66 : 114. 1897 et Ibid. 70 : 54. 1901 ; Talbot, Tr. Shr. Clim. Bombay Pres. 138. 1902 (ed. 2) ; Cooke, Fl. Pres. Bombay 1 (2) : 400. 1902 ; Prain, Beng. Pl. 1 : 410. 1903 ; Duthie Fl. Upper Gang. Pl. 1 (1) : 265. 1903 ; Prain in Ann. Roy. bot. Gard. 10(1) : 100. 1904 ; Brandis, Indian Tr. 237. 1907 (ed. 2) ; Talbot, For. Fl. Bombay Pres. Sind 1 : 429. 1909 ; Burkill in Rec. bot. Surv. India 4 : 106. 1910 ; Haines, For. Fl. Chotanagpur, 337. 1910 ; Ramarao, Flow Pl. Travancore 130. 1914 ; Witt, Tr. Shr. Clim. Herb. Berar 84. 1916 ;

Gamble, Fl. Pres. Madras 2 : 384. 1918 ; Haines, Bot. Bih. Or. 3 : 295. 1922 ; Parkinson, For. Fl. Andaman Isls. 149. 1923 ; Heinig, List. Pl. Chittagong, 21. 1926 ; Cown, A.M. et J.M. Tr. North Bengal 52 : 1929 ; Kanjilal et al. Fl. Assam 2 : 107. 1938 ; Wealth India 3 : 12. 1952 ; Sebastine in Bull. Bot. Surv. India 1 : 93. 1959 ; Subramanyam, Ibid. 1 : 130. 1959 ; Thothathri Ibid. 2 : 364. 1962 ; Panigrahi et al. Ibid. 6 : 247. 1965 ; Subramanyam et Henry Ibid. 8 : 210. 1966 ; Santapau in Rec. bot. Surv. India 16 : 75. 1967 (ed. 3) ; Panigrahi et Saren in Bull. bot. Surv. India 9 : 253. 1968 ; Ellis, Ibid. 10 : 154. 1968 ; Venkatareddi in Bull. bot. Surv. India 11 : 145. 1969 (1971) ; Shah & Patel, Ibid. 12 : 22. 1970 (1972) ; Singh & Dixit, Ibid. 13 : 183. 1971 (1973) ; Kapoor et al. Ibid. 15 : 81. 1973 (1976) ; Saldanha et Nicolson, Fl. Hassan Karnat. 247. 1978 ; Shah, Fl. Gujarat 2 : 203. 1978 ; Hara et al. Enum. Flow. Pl, Nep. 2 : 115. 1979 ; Deb, Fl. Tripura 1 : 157. 1981 ; Nair et Henry, Fl. Tam. Nad. (Ser. 3) 1 : 104. 1983 ; Mukherjee Fl. Pachmari and Bori 82. 1984 ; Sharma et al. Fl. Karnat Anal. 70. 1984 ; Saldanha, Fl. Karnat. 1 : 446. 1984 ; Tribedi et al in Bull. bot. Surv. India 24 : 117. 1982 (1984) ; Haridasan et Rao, Fl. Mysore 1 : 289. 1985 ; Verma et al. Fl. Raipur, Durg & Rajnand. 98. 1985 ; Rao, Fl. Goa, Diu Dam. and Nagar. 1 : 112. 1985.

Amerimnon volubile (Roxb.) O. Kuntze, Rev. Cen. Pl. 1 : 159. 1981.

A large, woody climber, growing up to 15-20 m high, at times a scandent shrub in the absence of any support ; branches glabrescent, twining or twisted into spiral hooks, branchlets puberulous, striated. *Leaves* imparipinnate, alternate, stipulate, 10-22 cm long ; leaflets 9-13, mostly alternate, rarely subopposite, obovate to ovate elliptic, 2.5-7.0 x 1.6-3.0 cm, entire, obtuse and mucronulate at apex, narrowed at base, glabrous, faintly glaucous beneath, lateral veins 8-10 pairs, faint, reticulations on the abaxial side fine ; rachis glabrous. *Petiolules* 2-4 mm long ; *stipules* ovato lanceolate, distinct, caducous. *Inflorescence* a terminal panicle, rarely axillary, copiously branched, 13.5-30.0 cm long, glabrous. *Flowers* blue to lilac, 6-8 mm long ; bract lanceolate, hairy, just at the base of the calyxcup. *Calyx* campanulate, 3-4 mm long, 5-toothed, puberulous without, lower one lanceolate, much longer than rest, upper 2 subconnate. *Corolla* vexillum orbicular, 6-7 mm long, emarginate, shortly clawed, reflexed ; wings obliquely oblong, clawed ; keels boat-shaped, clawed, much smaller than wings. *Stamens* 10 isodiadelphous, staminal sheath 4.5-5.5 mm long, filaments free on their upper third. *Ovary* 4-5 mm long, stipitate pubescent at the sutures and stipe, style slender, stigma minute, ovules 2. *Pods* indehiscent, oblong, rarely ovato-oblong, 5-9 x 1.6-2.3 cm, stalked, obtuse to mucronate at apex, narrowed at base, glabrous, uniformly reticulated ; *seeds* reniform, compressed, 7 x 5 mm.

Type : Roxb. Corom. Pl. 2 : 48. t. 191 (Lectotype selected, CAL).

Distribution : INDIA (Andamans, Andhra Pradesh, Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra, Karnataka, Orissa, Tamil Nadu, Uttar Pradesh, Sikkim and W. Bengal), BURMA, SRI LANKA and BANGLADESH. (Map 13)

Flower : January to May. *Fruit* : March to May.

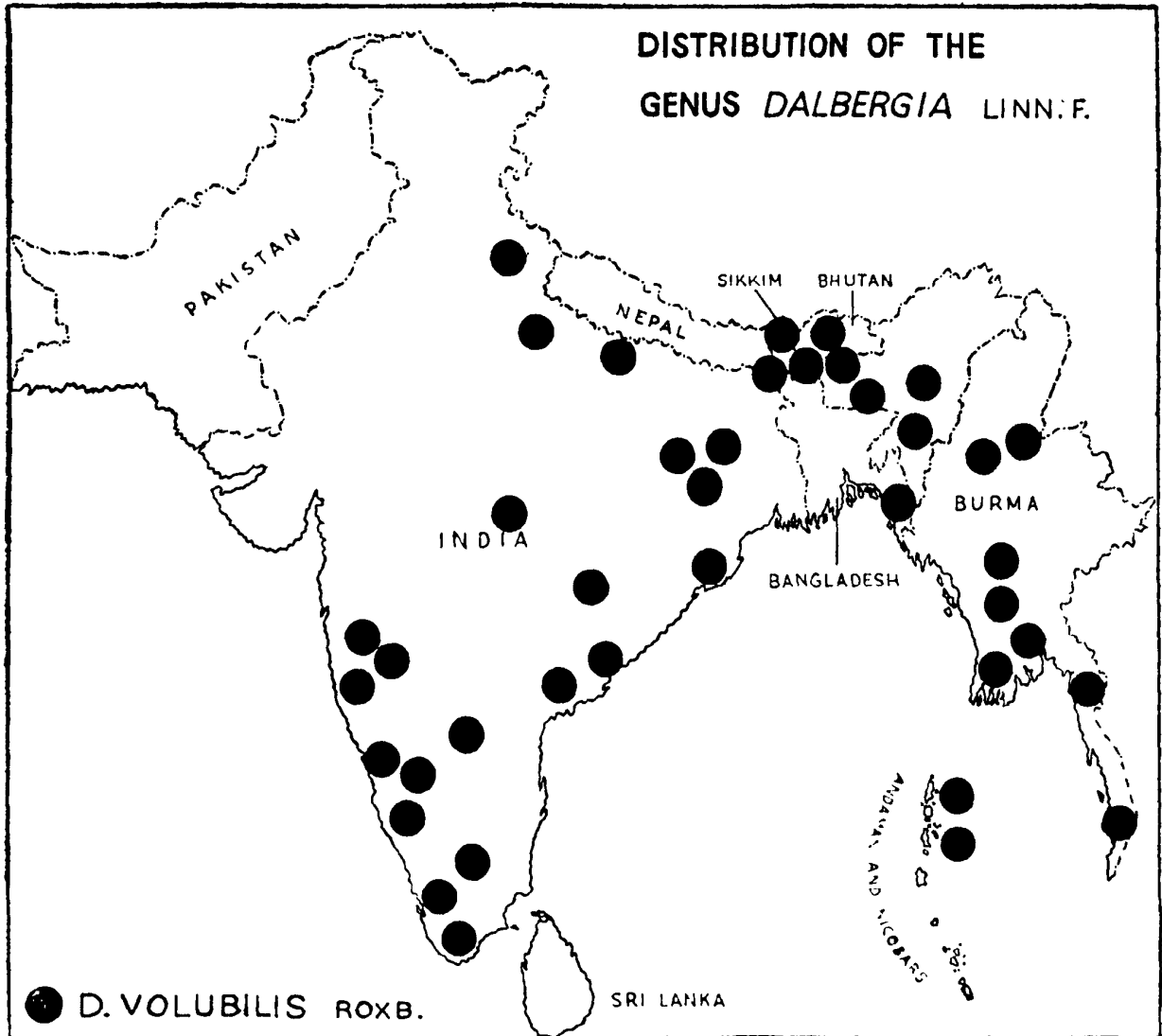
Specimens examined :

Andamans : South Andaman, Gopalakabang hill jungle, Mar. 1892 *King's collector* s.n. (CAL) ; North Bay hill jungle, Jan. 1895 *King's collector* s.n. (LE, CAL) ; Port Blair, Jan. 1891 *Kings collector* s.n. (CAL) ; Anikhet hill jungle, Mar. 1892 *King's collector* s.n. (CAL) ; Kadakachang hill jungle, Feb. 1895 *King's collector* s.n. (CAL) ; Rangachoong, Jan. 1893 *Kings collector* s.n. (CAL) ; Gopalakabang valley, Jan. 1897 *Heinig* s.n. (LE, CAL) ; Without definite locality (S. Andaman), Mar. 1901 *Heinig* 452, 546 (CAL) ; North Andaman, Austin II, Feb. 1959 *Thothathri* 9153 (MH, CAL) ; Without any locality (Andamans), Mar. 1899 *Prain's collector* ; Wandur, South Andaman, July 1974 *Balakrihnan* 1660 (Pot Blair, CAL).

Andhra Pradesh : Ganjam, Digi, Jan. 1900 *Barber* 1301 (MH) ; Saurakota, 200 m, Mar. 1884 *Gamble* 14214 (CAL) ; Kalingia ghat, 330 m, Jan. 1884 *Gamble* 13708 (CAL) ; Visakapatnam, way to Dharakonda. 666 m, Feb. 1947 *Narayanaswami* 408 (CAL) ; Paderu, Mar. 1956 *Wagh* 2311 (BLAT) ; Kilagada, 900 m, Mar. 1965 *Subbarao* 22593 (MH) ; Kurnool, Nallamalais, 330 m, Mar. 1883 *Gamble* 10931 (CAL, MH) ; Way to Ramanapenta, 650 m, Mar. 1965 *Ellis* 23813 (MH) ; Ladodi, Godhavari district, Feb. 1916 *Collector* ? 12798 (MH) ; Near Sovakota Base, Mar. 1959 *Saran & Party* 59169 (LWG) ; Tanjavanam R F. Vishakapatnam district, Apr. 1976 *Subbarao* 47292 (MH, CAL).

Assam : Fort Lungleh, South Lushai hills, 1000 1333 m, Apr. 1899 *Gage* 196 (CAL) ; Goalpara, 100 m, Mar. 1886 *Clarke* 43169 C & D (LE, CAL) ; Garo hills, Feb. 1897 *C. Watt* 12173 (CAL, ISIM).

Bihar : Manbhum *Campbell* 9415, 9412 (CAL) ; Singhbhum, Feb. 1901 *Haines* 410 (CAL, K) ; Base of Parasnath, Nov. 1858 *Collector* ? s.n. (CAL) ; Manboom, Mar. 1867 *Kurz* s.n. (CAL) ; Without definite locality (Bihar) *Kurz* s.n. (CAL) ; Chotanagpur, Dalbhum, W. Ghatsila, Jan. 1881 *Gamble* 9202 (CAL) ; Chotanagpur town, May 1878 *J.J.*



Map 13

Wood s.n. (CAL) ; Mudhobun, Hazaribagh, Apr. 1884 *Clarke* 34624 (CAL).

Kerala : Tolpetty forest, Cannanore district, 775 m, Feb. 1978 *Ramachandran* 53806 (CAL) ; Malabar, Wyanad *Beddome* s.n. (MH) ; Taliparamba, Feb. 1913 *Barber* 8731 (MH) ; Parambikulam, 600 m, Trichur district, Feb. 1963 *Sebastine* 15650 (MH) ; Shoranur, Mar. 1957 *Janaki ammal* 7442 (BSA) ; Thunakadavu, 667 m, Trichur district, Mar. 1965 *Sebastine* 22866 (MH) ; Chindaki forest, 650 m, Palghat district, Jun. 1966 *Vajravelu* 27755 (MH) ; Travancore, Colatoorpolay, 667 m, Nov. 1893 *Lawson* 282 (CAL, MH) ; Madathwei 133 m, Feb. 1904 *Bourdillon* 1486 (CAL) ; Peechi Dam, Trichur district, Mar. 1980 *Ramamurthy* 66225 (MH) ; Ranni R.F., Quilon district, Apr. 1980 *Mohanan* 68345 (MH) ; Mukkali slopes, Palghat district, Feb. 1979 *Vajravelu* 60561 (MH) ; Panthenthode, Palghat district, Jan. 1980 *Bhargavan* 65652 (MH).

Madhya Pradesh : Bastar, Dharbe ghat, 570 m, Feb. 1961 *Balakrishanan & Henry* 12075 (MH) ; Dantewara, Feb. 1963 *Panigrahi & Arora* 6701 (BSA) ; Gidam - Tumnar, Feb. 1963 *Panigrahi & Arora* 1103 (BSA) ; Half way between Roright and Dhupgarh road, Dec. 1962 *Panigrahi* 6550 (BSA) ; Barda, on way to Chittarangi, Sidhi district, Jan. 1964 *Panigrahi* 2423 (BSA) ; Patalkol, Jan. 1961 *Jain* 2962 (BSA) ; Jubbalpore, Mar. 1992 *R.S. Hole* 215 (CAL) ; Chanda, Jan. 1890 - *Duthie* 9463 (CAL) ; Without definite locality (C. India) *Jerdon* s.n. (CAL) ; Sidhi, Mar. 1971 *Sen Gupta* 14750 (BSA) ; Bilaspur, Feb. 1972 *Panigrahi* 16755 (BSA) ; Raigarh, Apr. 1976 *Radhakrishanan* 24479 (BSA) ; Balaghat, Feb. 1976 *V.J. Nair* 22969 (BSA) ; Seoni, Mar. 1978 *Banerjee* 28226 (BSA).

Maharashtra : Khandala, Battery hill Plateau, Mar. 1944 *Santapau* 3842 - 44 (BLAT) ; Echo point ravine, Feb. 1942 *Santapau* 102, 113 (BLAT) ; Khandala, Apr. 1918 *Collector* ? 28472 (BLAT) ; Way to Khandala, Mar. 1962 *Seshagiri Rao* 77689 (BSI) ; Khandala, Mar. 1903 *Gammie* 16139 (BSI) ; Bombay, Mulgaon, Salsette Isl. Mar. 1943 *D' Almeida* 1605 (BLAT) ; Vihar, Feb. 1919 *Collector* ? 30601 (BLAT) ; National Park, Borivli, Feb. 1955 71 *Herbert* 539 (BLAT) ; Mumbra, Salsette, Feb. 1945 *Santnpau* 5969 -71 (BLAT) ; Malad, Apr. 1958 *Shah* 9801 (BLAT) ; Near Quarry hills, Malad, Feb. 1955 *Shah* 1674 (BLAT) ; Central diary, Aarey milk colony, Goregaon, Feb. 1958 *Tavakari* 664 (BLAT) ; Atgaon, Mar. 1893 *Bomb. Nat. Hist. Collector* s.n. (BLAT) ; Tungar, Parol, Feb. 1962 *Das* 6966, 6677, 7233 (BLAT) ; Chandip, Feb. 1961 *Das* 3097 3100 (BLAT) ; Uргаone, Jan. 1961 *Das* 2983 84 (BLAT) ; Badalpur, Kalyan, Feb. 1954 *Santapau* 18130 (BLAT) ; Kajrat, Feb. 1941 *Santapau* 102.6 (BLAT) ; Hill sides, South of Kajrat, Feb.

1949 *Fernandez* 92 (BLAT); Unai, Dangs forest, Mar. 1954 *Santapau* 18311 (BLAT); Neral to Jummapatti, Feb. 1960 *Irani* 4865 (BLAT); Nanta, Dapoli, Feb. 1922 *Acland* 414 (BLAT); Radhanagar, Kolhapur district, Aug. 1959 *Ahuja* 47439 (BSI); Vizhapur, Mar. 1962 *Seshagiri Rao* 33100 (BSI); Mathern *Collector?* s.n. (BSI); Without any details regarding locality or collector (Deccan) (BSI); Bombay - *Dalzell* s.n. (CAL); Naga Koyana, Satara district, Apr. 1929 *Kochar* 154758 (BSI); Vasota Koyana, Satara district, Apr. 1978 *Nayar* 153094 (BSI); Choffelli, Ratnagiri district, Apr. 1971 *Kulkarni* 128754 (BSI); Dugarwadi, Nasik district, Mar. 1984 *Narasimhan* 166332 (BSI).

Karnataka : Coorg, Tittimatti, Mar. 1960 *Arora* 61708 (BSI); Koynad, Sambajee road, Mar. 1959 *Wadhwa* 48863 (BSI); Kallahala Mar. 1958 *Puri* 32493 (BSI); North Kanara, Anmod jungle, Feb. 1950 *Fernandez* 923 (BLAT); Anshi village, Mar. 1951 *Fernandez* 2275 (CAL); Hartuga village, Feb. 1951 *Fernandez* 2152 (CAL); Without definite locality, Apr. 1883 *Talbot* s.n. (BSI, CAL); Arbaughat, Feb. 1884 *Talbot* s.n. (BSI); Mundgode, Mar. 1883 *Talbot* 361 (BSI); Someshwar, South Kanara, Feb. 1940 *Raja* 584 (MH); Concan *Stocks, Law* (KW, CAL); Shiradi Ghat, Hassan district, Jan. 1969 *Saldanha* 12616 (MO).

Orissa : Kachudahan, Feb. 1958 *Panihrah* 22833 (ASSAM); Between Cuttack and Puri, Mar. 1961 *Srivatsava & Party* 99793 (LWG); Kiapader village, Jerka reserved forest, Mar. 1964 *Kapoor & Party* 71358 (LWG).

Tamil Nadu : Coimbatore, Vellingiri hills, 667 m, Feb. 1957 *Sebastine* 2372 (MH); Mount Stuart, 730 m, Anamalai, Mar. 1931 *Narayanaswamy* 5495 A (MH); Boluvampatty valley, Mar. 1916 *Collector?* 13043 (MH); Chinnar river, Siruveni *Henry* 1180 (BLAT, MH); Adivaram, Siruvani, Jan. 1961 *Henry* 1093 (MH, BLAT); Gudalur Killur, Nilagiri district, Feb. 1973 *Vajravelu* 43696 (MH); Yercaud, Salem dist, Feb. 1969 *Deb.* 31463; Singara R.F. Nilagiri dist., Feb. 1972 *Sharma* 39832 (MH).

Uttar Pradesh : Gorakpur, Mar. 1898 *Harsukh* 21485 (CAL); Without definite locality (U. Province), May 1916 *R.S. Hole* 725 (CAL); Fort, Kheri, Mar. 1920 *Sri Ram* s.n. (DD); Chakrata range, Feb. 1914 *Shankarmani* 5 (DD); Kheri division *Dy. Cons. For* - 17032 (ISIM); Bhabar, Kumaon, 330 m *Strachey & Winterbottom* 2 (LE); Mirzapur, Mar. 1970 *Panigrahi* 12633 (BSA).

W. Bengal : Kuntimari, Jalpaiguri district, Feb. 1903 *J.H. Lace*

2651 (CAL) ; Siligori, Feb. 1876 *Clarke* 27007 D (CAL) ; Ranoshai hat, W. Duars, Feb. 1879 *Gamble* 6683 D (CAL) ; Without clear locality, (Bengal), Dec. 1866 *Kurz* s.n. (CAL) ; Durgapur, Burdwan district, Feb. 1973 *Mukherjee* 10505 (CAL).

Sikkim : Terai, Feb. *Anderson* s.n. (CAL).

Bangladesh : Chittagong, Behind Kelatuli, Cox,s bazar, Feb. 1945 *Sinclair* 3957 (CAL) ; Chittagong *Hooker & Thomson* s.n. (CAL) ; Kodla hill, Jan. 1886 *Badul Khan* 332 (CAL) ; Kaptai, Mar. 1180 *Gamble* 7826 ; Thunachery hill, Jan. 1886 *Badul Khan* 242 (CAL) ; Deinajere Mar. 1876 *Lister* 210 (CAL) ; Kaptai Lake, Chittagong district, Mar. 1979 *van der Maeson* 3731 (CAL).

Burma : Kyauktaing forest, 166 m, Youngoo district, Jan. 1927 *Collector ?* 4434 (CAL) ; Without definite locality (Burma) *Parkinson* 69 (CAL) ; Satha, 333 m, Katha district Feb. 1910 *Lace* 5138 (CAL) ; Makhayl hill, Mar. 1893 *King's collector* 329 (CAL) ; Kendal, 1891 *Prazer* s.n. (CAL) ; Pegu *Brandis* s.n. (CAL) ; Fort Stedman, Jan. 1893 *Abdul Huk* s.n. (CAL) ; Sway Koo, Jan. 1868 *Anderson* s.n. (CAL) ; Kachin hills, May 1898 *Shaik Mokim* s.n. (CAL) ; Khampi long mission collection, 1911 12 *Topin* 3368 (CAL) ; Puye to Thagahte, Amherst district, Jan. 1912 *Lace* 5590 (CAL) ; Rangoon, Mar. 1911 *Meebold* 14002 (CAL) ; Toukyeahat, Pegu *Kurz* 1782 (CAL, LE) ; Pegu *Kurz* 2595 (CAL) ; Moulmein, Tenasserim *Kurz* s.n. (CAL) ; Rangoon 1857 *Cleghorn* 23 (CAL) ; Tenasserim, Jan. 1877 *G. Gallatly* 128 (CAL) ; Rangoon, Feb. 1938 *Dickason* 6963 (LE) ; Moulmein hill, Feb. 1931 *Biswas* s.n. (CAL) ; Zwegobin, Feb. 1938 *Dickason* 7909 (LE) ; Shan State, Terai hills, 666 m, Feb. 1888 *Collett* 345 (CAL) ; Keng tung, 1333 m, Dec. 1909 *Mac Gregor* 1281, 1278 (CAL) ; Shan State *Mac Gregor* 810 (CAL) ; Henzada, Tegyigon, Mar. 1905 - *Lace* 2797 (CAL) ; Myanaung, Feb. 1903 *Shaik Mokim* 1282 (CAL) ; Yebo road, Mar. 1903 *Shaik Mokim* 1258 (CAL) ; Gnapyoge, Mar. 1903 *Shaik Mokim* 1656 (CAL) ; Bhamo divison - *Cubitt* 28847 (CAL).

***Dalbergia volubilis* Roxb. var. *assamica* Thoth. in Bull. bot. Surv. India 17 : 67. 1975 (1978). (Fig. 16)**

D. volubilis var. *assamica* differs from the typical plant in having widely oblong pods without any reticulations on in surface.

A large woody climber. *Leaf* imparipinnate, alternate, 13.0 - 18.5 cm long ; leaflets 9,3.5 - 5.2 x 1.7 3.2 cm, alternate, elliptic-oblong, entire, retuse at apex, narrow to rounded at at base, glabrous ; rachis glabrous,

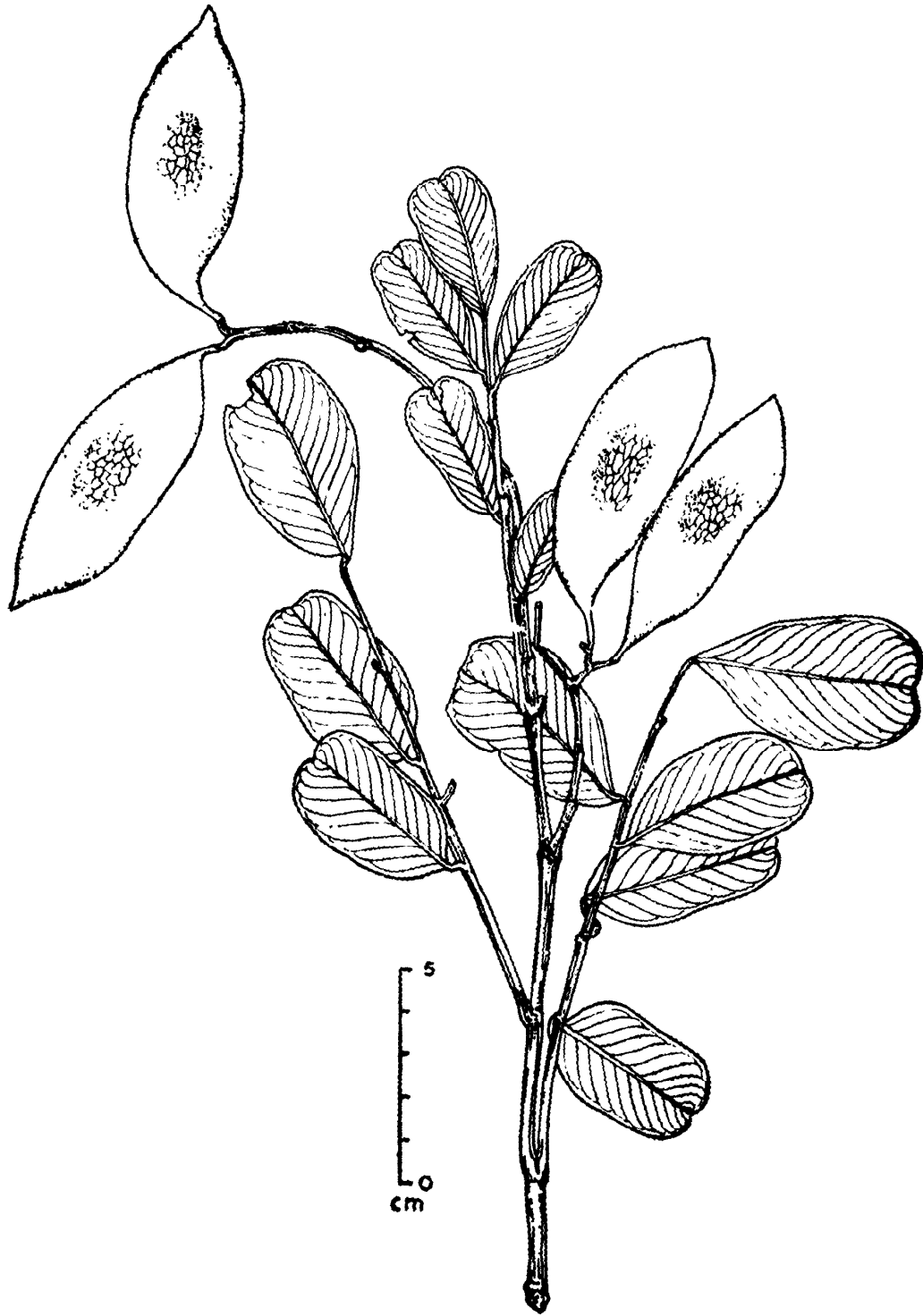


Fig. 16. *Dalbergia volubilis* Roxb. var. *assamica* Thoth.

petiolules 2–3 mm long. *Flower* not known. *Infructescence* terminal and axillary panicle, 6.0–14.5 cm long. *Pods* indehiscent, elliptic-oblong, 6.6–7.0 x 2.0–2.5 cm, acute at apex, narrowed at base, glabrous, uniformly smooth without any reticulations, 1-seeded; seeds reniform.

Type : Myantang valley, Khasia & Jaintia hills, Assam, Jan. 1916
U. Kanjilal 6574 (Holotype, CAL).

Distribution : Assam.

Specimens examined :

Assam : Fort Lungleh, 1000–3000 m, South Lushai hills, Apr. 1899 *Gage* 196 (CAL).

A. Etymology : The specific epithet '*volubilis*' has been chosen by Roxburgh to stress the climbing habit of this plant.

B. Ecology : *D. volubilis* is a large climber, growing in deciduous forests up to an elevation of 1000 metres. It can also grow well along streams and nallahs in open forests at lower elevations.

C. Typification : In the absence of any authentic sheet of Roxburgh, his plate t. 191 published in 1805 has been selected as lectotype of this species.

D. Economic importance : The plant is not of much economic importance. The leaves of the plant are used as fodder for cattle and goats. The juice of the leaves is applied in apathae and used as gargle in sorethroat. The root juice, mixed with cumin and sugar is given in gonorrhoea.

37. *Dalbergia thomsonii* Benth. in Journ. Linn. Soc. 4 (Suppl.) : 33. 1860; Baker in Hook. f. Fl. Brit. India 2 : 236. 1876; Prain in Journ. Asiat. Beng. 70 : 57. 1901 et in Ann. Roy. bot. Gard. 10(1) : 39. 1904; Brandis, Indian Tr. 288. 1907 (ed. 2); Kanjilal et al. Fl. Assam 2 : 106. 1938; Deb, Fl. Tripura 1 : 157. 1981.

Amerimnon thomsonii (Benth.) O. Kuntze. Rev. Gen. Pl. 1 : 159. 1891.

A woody climber; branchlets lenticelled, glabrous. *Leaf* imparipinnate, alternate, stipulate, 4.0–10.5 cm long; leaflets 9–11, obovate, oblong to elliptic, 2.0–3.4 x 1–2 cm, lowest pair always smaller than others, alternate to subopposite, entire, obtuse to retuse at apex, mostly cuneate at base, rarely rounded, glabrous, chartaceous, lateral veins 8 pairs; rachis and petiolule glabrous, petiolules 1–2 mm long;

stipules early deciduous. *Inflorescence* ample panicle, terminal and axillary, 9-18 cm long, ultimate branches secund, cymose. *Flowers* small, 2-3 mm long, bract ovate acute, ciliate, bracteoles 2, ovate, just at the base of the calyx cup, ciliate, pedicels of flower short, 1 mm long. *Calyx* campanulate, 1.5-2.0 mm long, glabrous, 5-toothed, upper pair round, laterals acute, lowermost longest, lanceolate. *Corolla* vexillum suborbicular, emarginate, 2 mm long, shortly clawed; wings oblong, clawed; keels boat-shaped, shortly clawed. *Stamens* 9, monadelphous, sheath 2 mm long, split open dorsally, longer filaments alternating with shorter. *Ovary* 1.5 mm long, shortly stipitate, sparingly puberulous, style short, stigma capitate, ovules 3. *Pods* indehiscent, oblong, 6 x 2 cm, strap-shaped, narrowed from the middle to the short stalk below as well to the acute apex above, glabrous, 1-seeded.

Type : Khasia, 600-1250 m - *Hooker & Thomson* s.n. (Lectotype designated, CAL; Isolectotypes LE, KW).

Flower : October.

Distribution : INDIA (Assam). (Map - 14)

Specimens examined :

Assam : Khasia and Jaintia, Nongkla to Mawsynrang, Dec. 1915 *U. Kanjilal* 6376 (BSA); Mamloo, Nov. 1930 *P.C. Kanjilal* 8815 (BSA); Without definite locality, (Khasia), 660 m, Oct. 1986 *Clarke* 45153 A (CAL); Upper Assam *Griffith* s.n. (Syntype, CAL, LE).

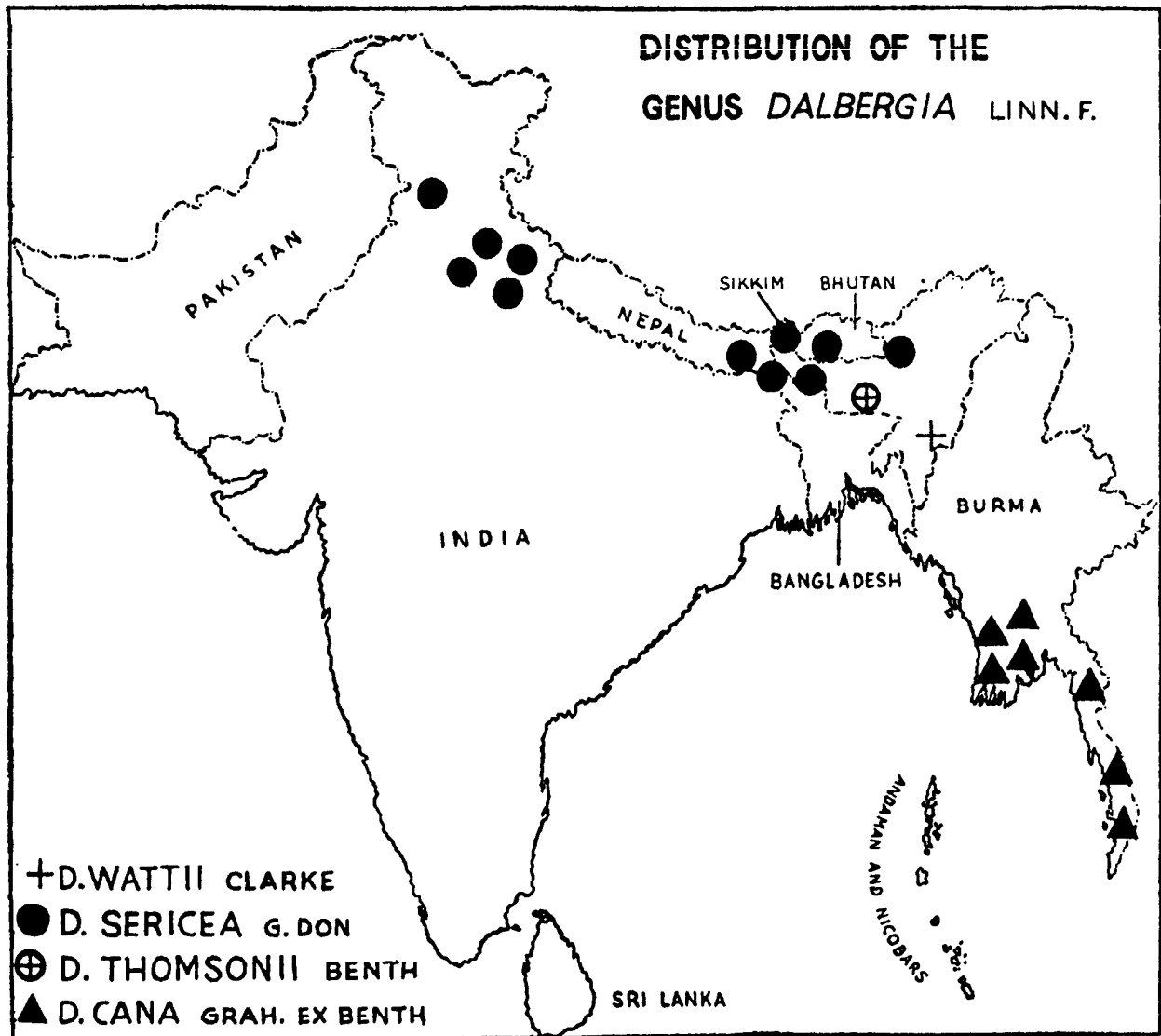
A. *Etymology* : The species was named in honour of T. Thomson who along with Hooker collected this plant in Khasia hills.

B. *Ecology* : The plant is a large, woody climber of the rain forest.

C. *Critical notes* ; *D. thomsonii* is an endemic species, strictly confined to the Khasia and Jaintia hills of Assam.

When Bentham published this species in honour of T. Thomson, he used the epithet '*thomsoni*'. According to modern rules of botanical nomenclature, the spelling of the epithet should be '*thomsonii*' which is hereby adopted.

38. ***Dalbergia cana*** Grah. (Wall. Cat. 5859. 1832, nomen) ex Kurz in Journ. Asiat. Soc. Beng. 42 : 70, 1873; Baker in Hook. f. Fl. Brit. India 2 : 237. 1876; Kurz in Journ. Asiat. Soc. Beng. 45 : 279. 1876 et For. Fl. Brit. Burma 1 : 344. 1877; Watt, Dict. Econ. Prod. 3 : 5. 1890; Prain in



Map 14

in Journ. Asiat. Soc. Beng. 66 : 450. 1897 et Ibid. 70 : 50. 1901 et in Ann. Roy. bot. Gard. 10(1) : 99. 1904 ; Brandis, Indian Tr. 237. 1907 (ed. 2).

A tree, 15–20 m high ; young branches at first puberulous but soon glabrous. *Leaves* imparipinnate, alternate, stipulate, 16.5–41.0 cm long ; leaflets 14–19, oblong to oblong lanceolate, 4.5–12.0 x 1.7–3.0 cm, alternate, rarely subopposite, entire, narrowed at base, shortly and abruptly acuminate at apex, chartaceous, glabrous above, glabrous to faintly puberulous below, lateral veins 9–10 pairs, indistinct ; rachis glabrous to puberulous, petiolule 3–6 mm long ; glabrous ; stipule lanceolate, deciduous. *Inflorescence* an axillary, corymbose panicle, 8.5–12.5 cm long ; rachis and branches puberulous at first but soon glabrous. *Flowers* 6–9 mm long, bract lanceolate, bracteoles 2, at the base of the calyxcup, puberulous ; pedicels slender, 3–5 mm long, glabrous. *Calyxcup* campanulate, purple, faintly 5 ribbed, 3–5 mm long, glabrescent, 5 toothed, teeth subequal, triangular, acute, upper 2 subconnate, lowermost slightly longer than rest. *Corolla* vexillum purple, ovate, to ovato-oblong, 6 mm long, reflexed, clawed ; wings oblong, slightly auricled at base ; keels boat shaped, connate above, clawed below. *Stamens* 10, iso diadelphous, sheath 6 mm long, filaments free on their upper fourth. *Ovary* 5–6 mm long ; stipitate, pubescent, style short, stigma minute, ovules 2–3. *Pods* indehiscent, flat, oblong to linear-oblong, 6.5–11.5 x 1.2–2.3 cm. shortly stalked, coriaceous, obtuse at apex, narrow to rounded at base, finely velvety, faintly veined opposite the seeds, 1–3 seeded ; seeds reniform, compressed.

Type : Moulmein, 1827 Wall. Cat. 5859 (Isotype CAL, LE).

Flower : March to April onwards. *Fruit* : up to January and February.

Distribution : BURMA (Pegu and Tenasserim). (Map - 14)

Specimens examined :

Burma : Pyinmadaw, Insein district, Feb. 1925 Parkinson 88 (CAL, DD) ; We, Tharawaddy district, Mar. 1925 Parkinson 642 (CAL) ; Pyu Kun reserve, Tougoo district, 100 m, Apr. 1914 G. Rogers 252 (CAL) ; Kyauksalitgon, Insein district, Feb. 1925 Parkinson 58 (CAL, DD) ; Metaket reserve, 60 m, Amherst district, Jan. 1912 Lace 5583 (CAL) ; Kadaingli, 1912 Meebold 17220 (CAL) ; Kyauktalon, Tenasserim, Mar. 1911 Meebold 14631 (CAL) ; Kuseik, 1912 Meebold 17221 (CAL) ; Pegu Kurz s.n. (CAL) ; Pegu, 1871 Kurz 2601 (CAL) ; Toukyeghat, Pegu Kurz 1779 (CAL) ; Choungmen, Pegu Kurz 2598 (CAL) ; Pegu,

1858 *Brandis* s.n. (CAL) ; Taungcheyin, Amherst district, Feb. 1927 *Parkinson* 5260 (CAL) ; Paya rocks, Tavoy, Jan. 1901 *Shaik Mokim* 264 (CAL) ; Dacona range, 300 m, Feb. 1909 *Lace* 4592 (CAL) ; Paletwa, Kaladau river, N. Arrakkan district, May 1914 *G. Rogers* 143 (CAL) ; Between Mudou and Moulmein, Mar. 1904 *I.H. Burkill* 24506 (ISIM).

A. *Etymology* : The specific epithet '*cana*' refers to the tawny or velvety nature of the pods of this species.

B. *Ecology* : The plant is a deciduous tree in tropical forests especially along choungs of the eastern slopes of Pegu-Yomah, Martaban and Tenasserim.

C. *Critical notes* : Baker (l.c. 1876) stated that this species is scandent but actually it is a medium sized tree, growing up to 20 metres tall. The species has so far been reported from Burma only. The wood is rather heavy and hence not useful.

39. *Dalbergia kurzii* Prain in Journ. Asiat. Soc. Beng. 66 : 450. 1897 et Ibid. 70 : 50. 1901 et in Ann. Roy. bot. Gard. 10(1) : 99. 1904 ; Gage in Rec. bot. Surv. India 3 : 49. 1904 ; *Brandia*, Indian Tr. 236. 1907 (ed. 2).

Dalbergia purpurea Kurz in Journ. Asiat. Soc. Beng. 45 : 279. 1877 (excl. Wall Cat. 5869) et For. Fl. Brit. Burma 1 : 344. 1877 non Wall. 1832.

A tree, 15-20 m high, branches, glabrous. *Leaves* imparipinnate, alternate, 18.5-43.5 cm long, stipulate; leaflets 7-11, mostly obovate oblong, at times oblong, 7.0-12.5 x 3.0-5.5 cm, entire, obtuse to shortly acuminate at apex, cuneate at base, chartaceous, glabrous on both sides, lateral veins 9-11 pairs; rachis glabrous ; petiolule 3-4 mm long, rarely up to 6 mm long, glabrous ; stipule small, deciduous. *Inflorescence* an axillary, lax, corymbose panicle, 12 - 24 cm long, rachis glabrous but branches glabrescent. *Flower* 6 - 8 mm long, pedicellate, pedicels 3-4 mm long, minutely puberulous ; bract and bracteoles lanceolate, puberulous, bracteoles at the base of the calyxcup. *Calyx* campanulate, 4 - 5 mm long, purple, glabrous to puberulous without, 5 toothed, teeth subequal, upper 2 slightly connate, laterals triangular and lowest longer and lanceolate, *Corolla* vexillum ovate oblong, 6 - 7 mm long reflexed, clawed, emarginate at apex, wings oblong, clawed, keels boat shaped, connate above. *Stamens* 10, isodiadelphous, sheath 6 mm long, filaments free on their upper fourth, alternately longer and shorter. *Ovary* 5 mm long, stipitate, pubescent, style slender, stigma minute, mostly 1 ovuled, rarely 2 ovuled. *Pods* indehiscent, flat, oblong, 7.0 - 13.5 x 2.0 - 3.5 cm, rarely up to 15 cm long, obtuse to acute at apex, narrowed at base into a short stalk, coriaceous, glabrous, 1 seeded, rarely reniform, compressed.

Type : Pegu, Burma Kurz 2603 (Lectotype designated, CAL).

Flower : January to February. *Fruit* : February to March.

Distribution : BURMA (Pegu, Martaban and Tenasserim). (Map 16)

Specimens examined :

Burma : Henzada, Myedaung, Feb. 1903 *Shaik Mokim* 1363, 1368 (CAL) ; Yenandaung, Chin hill, Feb. 1903 *Shaik Mokim* 1325 (CAL) ; Yebo road, Mar. 1903 *Shaik Mokim* 1539 (CAL) ; Ruby mines, Mar. 1892 *Abdul Huk* 14 (CAL) ; Nwamadaung, hills, Minbu district, Mar. 1903 *Aubert & Gage* s.n. (CAL) ; Kyatkyi reserve, Tharawaddy district, Mar. 1905 *Lace* 2793 (CAL) ; Thaungyin valley, Thaton district, Mar. 1909 *Lace* 4693 (CAL) ; Thambwek to Sinina W. Coast, Apr. 1906 *Lace* 3020 (DD) ; Pyinmaua - *Rep. Econ. Prod.* 25841 (ISIM) ; Pegu Kurz 2608 (Syntype, CAL) ; Pegu Yomah Kurz 1780, 1783 (Syntype, CAL) ; Pegu *Maclelland* s.n. (Syntype, CAL) ; Thykkulah *Brandis* 1170 (Syntype, CAL) ; Upper Burma, 1894 *Prazer* s.n. (Syntype, CAL) ; Shan State, Nov. Dec. 1887 *Alpin* s.n. (Syntype, CAL).

A. *Etymology* : The species has been named after Sulphiz Kurz, the famous botanist for his valuable contributions to the Burmese flora.

B. *Ecology* : The species is a medium sized, deciduous tree, growing in open mixed forests up to 1200 metres.

C. *Typification* : Prain (l.c. 1897) while describing this plant as a new taxon, quoted 8 independent collections, made at various places by different collectors. Hence out of these syntypes, Kurz 2603 from Pegu has been selected as the lectotype.

D. *Critical notes* : This is the plant which Kurz (l.c. 1877) thought as *Dalbergia purpurea* Wall. Before proceeding to clarify the identity of Kurz's *D. purpurea*, the status and identity of Wallich's *D. purpurea* need elaboration.

D. purpurea Wall. based on Wall. Cat. 5869 (1832) from Moulmein was a nomen. Later Bentham validated it (l.c. 1860), stating that the Wallichian specimens were imperfect and appeared to connect the arborescent *D. lenceolaria* L.f. with the climbing *D. volubilis* He was also doubtful as to its habit, remarking 'scandent?'. Wallich 5869 was really a mixture of different taxa and as usual he distributed these under one

number 5869 with the name *D. purpurea*. The specimens at Kew herbarium under this number were a mixture of *D. cana* and *D. volubilis* while in Calcutta and other European herbaria the specimen under this number was *D. cana*. Baker (l.c. 1876) while treating this species included Kurz's collections from Pegu (*D. paniculata* Kurz non Roxb.) which later on proved to be quite a different species.

Kurz's collection from Pegu on which the present taxon was described was closely related to *D. cana* Grah. and he named them as *D. purpurea* Wall. Prain (l.c. 1897) realising this mistake pointed out that Kurz's *D. purpurea* was really different from Wallich's *D. purpurea* (= *D. cana* Grah. and *D. volubilis* Roxb.). At first Prain was inclined to describe this as a variety of *D. cana* Grah. but later convinced by the pod characters. changed his opinion and described it as a distinct species, *D. kurzii*.

40. *Dalbergia wattii* Clarke in Journ. Linn. Soc. 25 : 17. 1889 ; Prain in Journ. Asiat. Soc. Beng. 66 : 451. 1897 et Ibid. 70 : 53. 1901 et in Ann. Roy. bot. Gard. 10(1) : 95. 1904 ; Brandis, Indian Tr. 237. 1907 (ed. 2) ; Deb in Bull. bot. Surv. India 3 : 266. 1962.

A small tree, 10 m high ; branches glabrous, spreading. *Leaves* imparipinnate, alternate, stipulate, 12.5 - 17.0 cm long ; leaflets 9 - 11, lanceolate, 4 - 7 x 1.0 - 1.5 cm, alternate to subopposite, at times opposite, involute, acute at apex, narrowed at base, glabrous above, puberulous below especially the midrib, subcoriaceous, reticulately veined ; petiolules short, 1 - 2 mm long ; stipules ovate lanceolate, deciduous. *Inflorescence* axillary panicle, 3.5 - 5.5 cm long, rachis and branches sparsely pilose. *Flowers* white, 6 - 8 mm long ; bract lanceolate, subulate at base, bracteoles 2, ovate acute, at the base of the calyxcup on either side ; pedicels slender, 2 - 3 mm long, sparsely pilose. *Calyx* campanulate, 3 - 4 mm long, 5 toothed, lowest one lanceolate, longest, laterals ovate acute, upper 2 subconnate, ciliate. *Corolla* vexillum orbicular, 5 - 6 mm long, clawed, emarginate ; wings obliquely oblong, clawed, auricled at base ; keels boat shaped, clawed. *Stamens* 10, isodiadelphous, staminal sheath 5.0 - 5.5 mm long, shorter filaments alternating with longer ones, free on their upper fourth. *Ovary* 4 - 5 mm long, stipitate, glabrous except the pubescent stipe, style slender, stigma minute, ovules 1 - 4. *Pods* indehiscent, oblong, 6 - 7 x 1.6 - 1.7 cm, obtuse above, narrow to rounded below, shortly stalked, glabrous, 1-seeded, smooth but veined opposite the seed ; compressed, black, 9 x 5 mm.

Type : Mayung, 1200 m, Muneypoor, Nov. 1885 C.B. Clarke 42034 (Holotype, CAL).

Flower : May. *Fruit* : November.

Distribution : INDIA (Manipur).

(Map 14)

Specimens examined : Meitaphum, 1666 m, Manipur, May 1882
Watt 6830 (CAL).

A. *Etymology* : The species has been named after George, Watt, the renowned Economic Botanist who in fact first collected this rare plant from Manipur.

B. *Ecology* : The plant is a small tree, found in the mixed forests of Manipur between 1200 1670 metres.

C. *Critical notes* : The species is endemic to Manipur State and is very distinct from other species in its lanceolate, subopposite leaflets.

41. *Dalbergia stipulacea* Roxb. (Hort. Beng. 53. 1814, nomen.) Fl. Ind. 3 : 233. 1832 ; Wight, Ic. t. 243. 1840 ; Walp. Repert. Bot. Syst. 1 : 800. 1842 ; Voigt, Hort. Suburb. Calcutt. 241. 1845 ; Benth. in Miq. Pl. Jungh 1 : 256. 1852 ; Miq. Fl. Ind. Bat. 1 : 133. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 47. 1860 ; Baker in Hook.f. Fl. Brit. India 2 : 237. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 280. 1877 et For. Fl. Brit. Burma 1 : 346. 1877 ; Watt, Dict. Econ. Prod. India 3 : 16. 1890 ; Prain Journ. Asiat. Soc. Beng. 66 : 451. 1897 et Ibid. 70 : 55. 1901 et Beng. Pl. 1 : 410. 1903 et in Ann. Roy. bot. Gard. 10(1) : 102. 1904 ; Brandis, Indian Tr. 238. 1907 (ed. 2) ; Heinig, List Pl. Chittagong 21. 1925 ; Cowan et al. Tr. North Bengal 52. 1929 ; Kanjilal et al. Fl. Assam 2 : 107. 1938 ; Deb in Bull. bot. Surv. India 3 : 266. 1962 ; Rao et al. Ibid. 8 : 299. 1966 ; H. Ohashi in Hara's Fl. East. Himalaya 148. 1966 ; Thothathri in Indian For. 96 : 15. 1970 ; Banerjee in Bull. bot. Soc. Beng. 23 : 158. 1970. Hara et al. Enum. Flow. Pl. Nep. 2 : 115. 1979 ; Deb, Fl. Tripura 1 : 157. 1981.

Dalberia tingens Ham. in Wall. Cat. 5860. 1832, nomen. *D. cassioides* Wall. Cat. 5863. 1832, nomen *D. livida* Grah. in Wall. Cat. 5866 (in part). 1832, nomen.

A small tree with spreading branches, 12 16 m high, at times a scandent shrub or even a climber in interior forests, a very variable species as regards habit ; branches sub-bifarious, glabrous to puberulous. *Leaf* imparipinnate, alternate, stipulate, 11 20 cm long ; leaflets 17 23, elliptic oblong, 2.0 4.5 x 0.8 1.7 cm, alternate to opposite, entire, obtuse at apex, rounded to cuneate at base, membranous, glabrous above, at times puberulous below when young but soon glabrous ; rachis glabrous, petiolules, 1 3 mm long, glabrous ; stipule ovate lanceolate, promin-

ent, membranous, 7-9 x 1-2 mm. *Inflorescence* an axillary panicle, 6-8 cm long, conspicuous by the prominent, obovate to oblanceolate, empty bracts in the peduncle and its branches, rarely puberulous. *Flowers* pale blue, 8-10 mm long, bracteoles to 3, obovate to oblong, 3-4 mm long, glabrous, just at the base of the calyxcup. *Calyx* campanulate, 3-4 mm long, mostly glabrous without, rarely puberulous, 5-toothed, teeth unequal, lowermost lanceolate, longest, laterals ovate, obtuse, upper 2 slightly longer than laterals, *Corolla* vexillum wide, orbicular, 6-8 mm long, reflexed, retuse at apex; wings oblong, curved, auricled at base, keels deeply boat-shaped, shortly clawed, auricled. *Stamens* 10, isodiadelphous, sheath 6 mm long, filaments free on their upper third, unequal in length. *Ovary* 5-6 mm long, prominently stipitate, glabrous except the stipe and at times the sutures which are puberulous, style slender, stigma minute, 1-ovuled. *Pods* indehiscent, oblong, 6-12 x 1.8-3.2 cm, entire, rounded at base, obtuse at apex, firmly coriaceous, glabrous, mostly 1-seeded, at times 2-seeded, reticulated at times and thickened opposite the seeds; seed reniform, compressed.

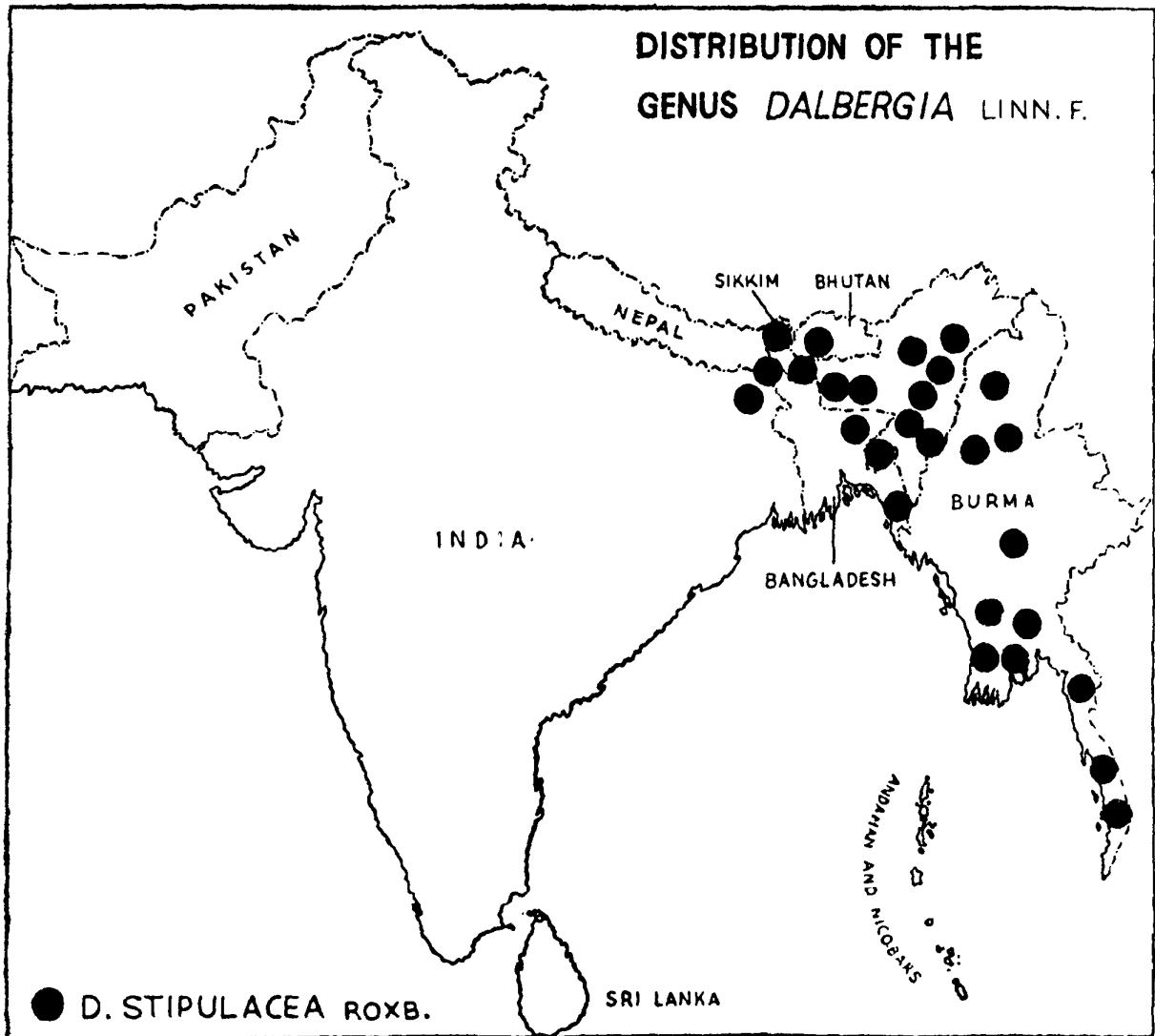
Type : Roxburgh Icones t. 2539 (Wight Ic. t. 243. 1840) (Lectotype designated, CAL).

Flower : April to June. *Fruit* : December to February.

Distribution : INDIA (Assam, Naga hills, W. Bengal, Sikkim), BHUTAN, NEPAL, BURMA, (Pegu, Martaban and Tenasserim), BANGLADESH (Chittagong), VIETNAM AND CHINA. (Map 15)

Specimens examined :

Assam : Kamrup. Jarsat reserve, May 1957 *Pangrahi* 9475 (ASSAM); Sukrubaria, Apr. 1915 *Kanjilal* 5455 (ASSAM); Without definite locality (Kamrup), Nov. 1890 *King's collector* s.n. (CAL); Lushai hills, Sialsuk to Aizal, Jan. 1963 *Deb* 30860 (ASSAM); Aizal to Champhai, 1100-1700 m, Jan. 1963 *Deb* 33900 (ASSAM); Methiyawngtah, Kulosib, Aug. 1953 *Godfrey* 563 (CAL); Cachar, Roopacherra, Aug. 1903 *Gage* s.n. (LE, CAL, ISIM); Haflong, 800 m, Aug. 1908 *Craib* 412 (CAL); Alnee on the Barak river, Aug. 1903 *Gage* s.n. (CAL); Khasia, Thesia, 330 m, Jan. 1886 *Clarke* 42754 F (LE, CAL); Mont Khasia, 300-1300 m *Hooker & Thomson* s.n. (CAL, LE, KW); Nowgong, Kholaghat reserve forest, 200 m, Aug. 1904 *Balakrishnan* 39539 (ASSAM); Lumding, Non. 1913 *U. Kanjilal* 2915 (ASSAM); Jhaklabandha, 50 m, Nov. 1912 *Kanjilal* 1976 (ASSAM); Turatop, Dec. 1960 *Panigrahi* 22488 (ASSAM); On way to Gauhati, Apr. 1961 *Panigrahi*



Map 15

24151 (ASSAM) ; Raja barrie and Amgori, Apr. 1895 *Watt* 11151 & 11162 (ISIM) ; Monier Khal on the Sonai river, Aug. 1903 *Gage* s.n. (CAL) ; Gowhatty hills, Oct. 1800 *Simons* s.n. (CAL) ; Sibasagar, Mar. 1884 *Peal* s.n. (CAL) ; Umsaw forest, 1000 m, Oct. 1938 *Biswas* 3718 (CAL) ; Tezpur, 80 m, Durrang, Mar. 1883 *Clarke* 37687 E & G (LE, CAL) ; Tura, 330 m, Garo hills, Feb. 1886 *Clarke* 43119 A, B (LE, CAL) ; Zoo Botanical garden, Gawhati, June 1970 *Deka* 49008 (ASSAM) ; Naga (Kala) hills, May 1889 *Prazer* 6 (CAL) ; Tengali bam garden, Jaboca, Oct. 1898 *M.A. Hock* 110 (CAL) ; Tingali bam Jungle, Apr. 1889 *Prain's collector* 991 (CAL) ; Bhati Machmara, Tippera, Mar. 1941 *Biswas* 138 (CAL) ; Manipur, Konpra, 1333 m, Apr. 1882 *G. Watt* 7256 (CAL) ; Tripura, Pratapgarh, South Agartala, 200 300 m, Dec. 1914 *Debbarman* 458 (CAL) ; Kanglatongtu, 1200 m, Nov. 1945 *Bullock* 808 (LE) ; Damcherra to Visam, 388 m, Jan. 1962 *Deb* 26918 (ASSAM) ; Vaughmun, 750 m, Jan. 1962 *Deb* 26076 (ASSAM) ; Without any definite locality (ASSAM) *Jenkin's* s.n. ; *Kurz* 123 ; *Peal* s.n. ; *Kurz* 109 (CAL).

W. Bengal : Darjeeling, Panchkilla, 330 m, Feb. 1876 *Clarke* 27076 A & D (LE) ; Sookna, Dec. 1876 *Clarke* 31707 C & D (LE, CAL) ; Kurseong, May 1915 *Modder* 89 (CAL) ; Mungpoo, 1000 m, May 1901 *A.C. Hartless* s.n. (CAL) ; Panchkilla, 330 m, Jan. 1875 *Clarke* 26535 E & F (CAL, LE) ; Darjeeling terai, 120 m, Jun 1870 *Clarke* 12062 C (CAL) ; Mungpoo, 1000 m, Jul. 1871 *Collector ?* s.n. (CAL) ; Mungpoo, Apr. 1902 *Ribu* s.n. (CAL) ; Mungpoo, Mar. 1910 *Kari* s.n. (LE) ; Mungpoo, 1000 m, Jul. 1871 *Collector ?* s.n. (CAL) ; Kurseong, May 1915 *Modder* 89 (CAL) ; Kurseong, may 1901 *Dy. Cons. Forests* 31092 (ISIM) ; Birik, Tista valley, Kurseong division, 1000 m. *F.C. Panda* 224 (DD) ; Titalaya along Mahanudde, Spet. 1868 *Kurz* s.n. (CAL) ; Buxa, 330 m, Santrabari, Jalpaigru district, May 1949 *Narayanaswami* 2921 (CAL) ; Rajabhatkhawa, Buxa division, Dec. 1964 *D.F.O.* 1 (DD) ; West Duars, Apr. 1896 *Haines* 646 (CAL).

Sikkim : Panighatta, Feb. 1914 - *Ribu & Rhomoo* s.n. (CAL) ; Teesta, 1878 *Lister* s.n. (CAL) ; Teesta, Apr. 1908 *Ribu* 783 (CAL) ; Gaudha Haga Terai, Apr. 1876 *Gamble* 472 B (LE, CAL) ; Terai, Jul. 1867 *Anderson* s.n. (CAL) ; Sivoke, Feb. 1876 *Gamble* 440 B (CAL) ; Without definite locality (Sikkim), 800 m *King* 314 (CAL) ; Punkabarry, Aug. 1873 *Gamble* 2253 C (CAL) ; Besaibutty, 330 m, Apr. 1875 *Gamble* s.n. (CAL) ; Without any locality (Sikkim) *King* s.n. (CAL) ; Birch hill, 2240 m, May 1940 *Biswas* 4832 (CAL) ; Without any definite locality (Sikkim), 1000 m, Apr. 1876 *King* s.n. (CAL) ; Terai (Sikkim) - *Kurz* s.n. (LE) ; Sikkim, 600 1330 m *J.D. Hooker* s.n. (KW).

Bhutan : Thoribhadi, Samchi, 350 m, Jan. 1964 *Thothathri* 10631 (CAL).

Bangladesh : Chittagong, Kodla hill, Jul. 1885 *Badul Khan* 8 (CAL) ; Kodla hill, 1887 *Badul Khan* 371 (CAL) ; Kodla hill, May 1887 *Badul Kan* 470 (CAL) ; Chittagong, Feb. 1906 *Collector* ? s.n. (CAL) ; Chittagong, 0 330 m - *Hooker & Thomson* s.n. (KW) ; Cox's Bazar, Signal hill, May 1945 *Sinclair* 4308 (CAL) ; Kelatuli, Jan. 1945 *Sinclair* 3897 (CAL) ; Sylhet Station, Nov. 1872 & May 1868 *Clarke* 17989 & 7135 (CAL, LE) ; East Bengal (without definite locality) *Criffith* 1794 (LE).

Burma : Tenasserim, Moltar Plains, Apr. 1877 *Geo Gallatly* 900 (CAL) ; Haunyanau river, Kaukenet district, Jan. 1877 *Geo Gallatly* 45 (CAL) ; Younyzalee river, Mar. 1877 *Geo Gallatly* 486 (CAL) ; Wagon, 500 600 m, Apr. 1911 *Meebold* 15483 (CAL) ; Tavoy, Apr. 1911 *Meebold* 14957 (CAL) ; Tavoy, Mar. 1901 *Shaik Mokim* 466 & 122 (CAL) ; Kanbank, Tavoy district, Jan. 1919 *G. Rogers* 357 (CAL) ; Comla hills, Tavoy, Apr. 1901 *Shaik Mokim* 582 (CAL) ; Upper Burma, Kachin hills, 1897 *Shaik Mokim* s.n. (CAL) ; Bhamo, Jul. 1892 *Abdul Huk* s.n. (BSI, CAL) ; Madoe hill, Feb. 1893 *King's collector* s.n. (CAL) ; Pintha East hill, Jan. 1888 *Prazer* 41 (CAL) ; Kalay hills, Jul. 1894 *Prazer* 92 (CAL) ; Without definite locality (U. Burma), Jan. 1892 *Abdul Huk* s.n. (CAL) ; Pegu *Kurz* 2619 (CAL) ; Pegu Yomah *Kurz* 1782 (CAL) ; Pegu *Mcleans* s.n. (CAL, KW) ; Caaunga. Henzada, Mar. 1903 *Shaik Mokim* 1566 (CAL) ; Toukyeghat, Feb. 1868 *Kurz* 1775 (CAL) ; Pasun, Salween district, Jan. 1912 - *Meebold* 16773 (CAL) ; Kyauktaung, 1100 m, Maymyo district *Mgkan* 566 (CAL) ; Salween, 660 m, Mar. 1880 *Brandis* s.n. (CAL) ; Kuseik, 1912 *Meebold* 17218 (CAL) ; Kyauksayit, Insein district Feb. 1925 *Parkinson* 77 (CAL) ; Between Amherst and Gyaw, Mar. 1908 *Burkill* 30422 (CAL) ; Moulmein, Jan. 1912 *Meebold* 16772 (CAL) ; Rangoon, Mar. 1911 *Meebold* 14065 (CAL) ; Rangoon, Jan. 1857 *Cleghorn* 24 (CAL) ; Without definite locality (Burma) *Brandis* s.n. (CAL) ; Mangang near Hsipaw, N. Shan states, Jan. 1904 *Burkill* 24167 (ISIM) ; Thingan nyinawng to Kawkareik, between Kyondo and Myawadi, 700 m, Amherst district *Burkill* 24469 (CAL).

Wall. Cat. : Tavoy - *Wallich* 5856 - E (CAL) ; Sylhet *Wallich* 5866 A (in part) (Type of *D. livida* Grah. LE, CAL) ; Goalpara, Sept. 1803 - *Wallich* 5860 (Type of *D. tingens* Ham. CAL) ; Moolmyne. Mar. 1827 *Wallich* 5863 (Type of *D. cassioides* Wall. CAL).

KEY TO THE VARIETIES AND FORMS

- 1a. Leaflets 9 - 11, wider and longer, 4.5 - 6.5 x 1.8 - 2.5 cm ... var. *kurzii*
- 1b. Leaflets 13 - 17, narrower, 2.5 - 4.5 x 0.8 - 1.7 cm
 - 2a. Pods turgid against the seeds; leaflets more than 15 ... var. *stipulacea*
 - 3a. Rachis, branches and pedicels of panicle glabrous f. *stipulacea*
 - 3b. Rachis, branches and pedicels of panicle puberulous to pubescent. ... f. *puberula*
 - 2b. Pods not turgid against the seeds; leaflets 13 - 15 ... var. *mogkokensis*

Dalbergia stipulacea Roxb. var. *kurzii* Thoth. in Bull. bot. Surv. India 17 : 67. 1975 (1978).

D. stipulacea Roxb. var. *kurzii* Thoth. differs from the typical plant in having 9 - 11 leaflets which are always wider and longer.

Branchlets glabrous, striate. *Leaves* imparipinnate, alternate, stipulate, 17 - 23 cm long ; leaflets 9 - 11, elliptic - oblong to obovate - oblong, 4.5 - 6.5 x 1.8 - 2.5 cm, entire obtuse to slightly retuse at apex, mostly narrowed at base, rarely rounded, subcoriaceous, glabrous, lateral veins indistinct ; rachis glabrous, petiolules glabrous, 3 - 4 mm long ; stipules deciduous. *Pods* olong, 8 - 10 x 2 - 2.5 cm, glabrous, smooth, 1 seeded much thickened against the seed.

Type : Martaban, Burma Kurz 1774 (Holotype, CAL).

Specimens examined

Burma : Bookee ridges, Pegu Kurz 1774 (CAL) ; Tenasserim Kurz s.n. (CAL).

Dalbergia stipulacea Roxb. var. *mogkokensis* Thoth. in Bull. Bot. Surv. India 17 : 68. 1975 (1978). (Fig. 17)

D. stipulacea var. *mogkokensis* Thoth. differs from the typical plant in the number of leaflets, rachis, pedicels and leaflets below being puberulous to pubescent and the pods not being turgid against the seed.

A small tree ; branchlets glabrous. *Leaves* imparipinnate, alternate, stipulate, 12 - 17 cm long ; leaflets 13 - 15, elliptic - oblong, 1.5 - 3.4 x 0.8 - 1.2 cm, mostly alternate, rarely opposite, subcoriaceous, entire, obtuse at apex, cuneate at base, sparingly pilose above, puberulous to



Fig. 17. *Dalbergia stipulacea* Roxb. var. *mogkokensis* Thoth.

pubescent below ; rachis puberulous to pubescent, petiolules 1 2 mm long, pubescent. *Infructescence* axillary panicle, 10 cm long, rachis and branches puberulous to pubescent. *Pods* indehiscent, flat, oblong, 6.5 9.0 x 2.2 2.7 cm, entire, obtuse at apex, narrowed at base, stalked, glabrous, 1 2 seeded, reticulated especially against the seed, not turgid or thickened against the seeds ; seeds reniform, compressed.

Type : Mogkok, 1334 m, Ruby mines division, Burma, May 1910
A. Rodger 332 (Holotype, CAL).

Distribution : BURMA.

***Dalbergia stipulacea* Roxb. f. *puberula* Thoth.** in Bull. bot. Surv. India 17 : 68. 1975 (1978).

D. stipulacea Roxb. f. *puberula* Thoth. differs from the typical plant in the rachis, branches of the panicle and pedicels of the flowers being puberulous to pubescent at times.

Inflorescence an axillary panicle, 6 9 cm long, rachis and branches of the panicle brown puberulous. *Flowers* pedicellate ; pedicels 2.5 3.5 mm long, brown puberulous ; bract and bracteoles too puberulous.

Type : Mandalay district, 1200 m, Burma, May 1915 *G. Rogers* 968 (Holotype, CAL).

Distribution : BURMA and INDIA (Eastern Himalayas).

Specimens examined :

India : Mungpoo, 800 m, Jul. 1914 *Cousins* 45 (CAL) ; Ryang valley, Sikkim, Mar. 1878 *Lister* s.n. (CAL).

Burma : Maymyo plateau, 1200 m, Apr. 1908 *Lace* 3108 & 3138 (CAL) ; Upper Chindwin, 1665 m, Apr. 1915 *Mackenzie* 20 (CAL).

General notes for the species :

A. *Etymology* : The specific epithet '*stipulacea*' was given by Roxburgh due to the characteristic, prominent, oblong to oblanceolate stipules, not met in other species of *Dalbergia*.

B. *Ecology and habit* : In Eastern Himalayas the plant grows in Sissoo - khair forest associations and also in mixed forests up to an elevation of 1000 metres. In Burma it grows well not only in tropical

mixed forests but extends in to the drier hill forests up an elevation of 1500 metres.

Regarding the habit of this species, a short note is worth mentioning. Roxburgh in his original description (l.c. 1832) said that this species was an elegant, bushy shrub. Bentham (l.c. 1860) considered it to be a bushy shrub while Baker in Hooker's flora (l.c. 1876) attributed a scandent habit. According to Kurz (l.c. 1876) the plant was growing as a large, climbing shrub in Burma. Many of the specimens, recorded from Eastern Himalayas by Gamble and others were found to be climbers. Plant collectors from Burma like Shaik Mokim, Prazer etc. had observed this species as medium sized tree of about 20-22 metres. Prain (l.c. 1897) pointed out that both Roxburgh and Baker were correct in their observations on the habit of this plant and remarked that in open land or along streams it was growing as a shrub or a small bushy tree, attaining 6-7 metres in height while in the interior thick forest it tends to grow as a strong climber. The author's own observations, recorded during a botanical tour to Bhutan Himalayas in 1963-64 were that the plant grows into a tree of 10 metres with spreading branches in open forests,

There are thus varied reports on the habit of *D. stipulacea* ranging a from bushy shrub to a small tree and finally to large, climbing shrub. Evidently it can be safely concluded that the species grows first as a scandent shrub which in open forests adopts a tree habit for want of any support, and takes to climbing in dense forests where it gets easily some support.

C. *Cytology* : $n = 10$ (Mehra & Hans, 1969).

D. *Distribution* : Baker in his flora (l.c. 1876) mentioned 'Malay Isles' under distribution but this is erroneous as this species does not occur there at all. Baker has assumed this on the basis of *Dalbergia ferruginea* Roxb. which was treated synonymous with *D. stipulacea* Roxb. and which has been reported from Malay peninsula. Prain (l.c. 1904) actually separated *D. ferruginea* Roxb. from *D. stipulacea* Roxb. stating that both were distinct species.

This species has so far been recorded from India (Assam, W. Bengal Sikkim), Nepal, East Pakistan (Chittagong,) Burma, Malaysia and W. China but has never been reported from Bhutan Himalayas. Ohashi (l.c. 1966) reported this species as common in Eastern Himalayas (Nepal to Bhutan) but so far no specimen has actually been collected from Bhutan nor has there been any mention of the same in any earlier work, on the flora of Bhutan. The recent collection of this plant from Samchi, lower Bhutan by Thothathri (l.c. 1970) constituted a new record for Bhutan. The

species was recently collected from 'Bhitre Mades' of Nepal by M.L. Banerji (l.c. 1970).

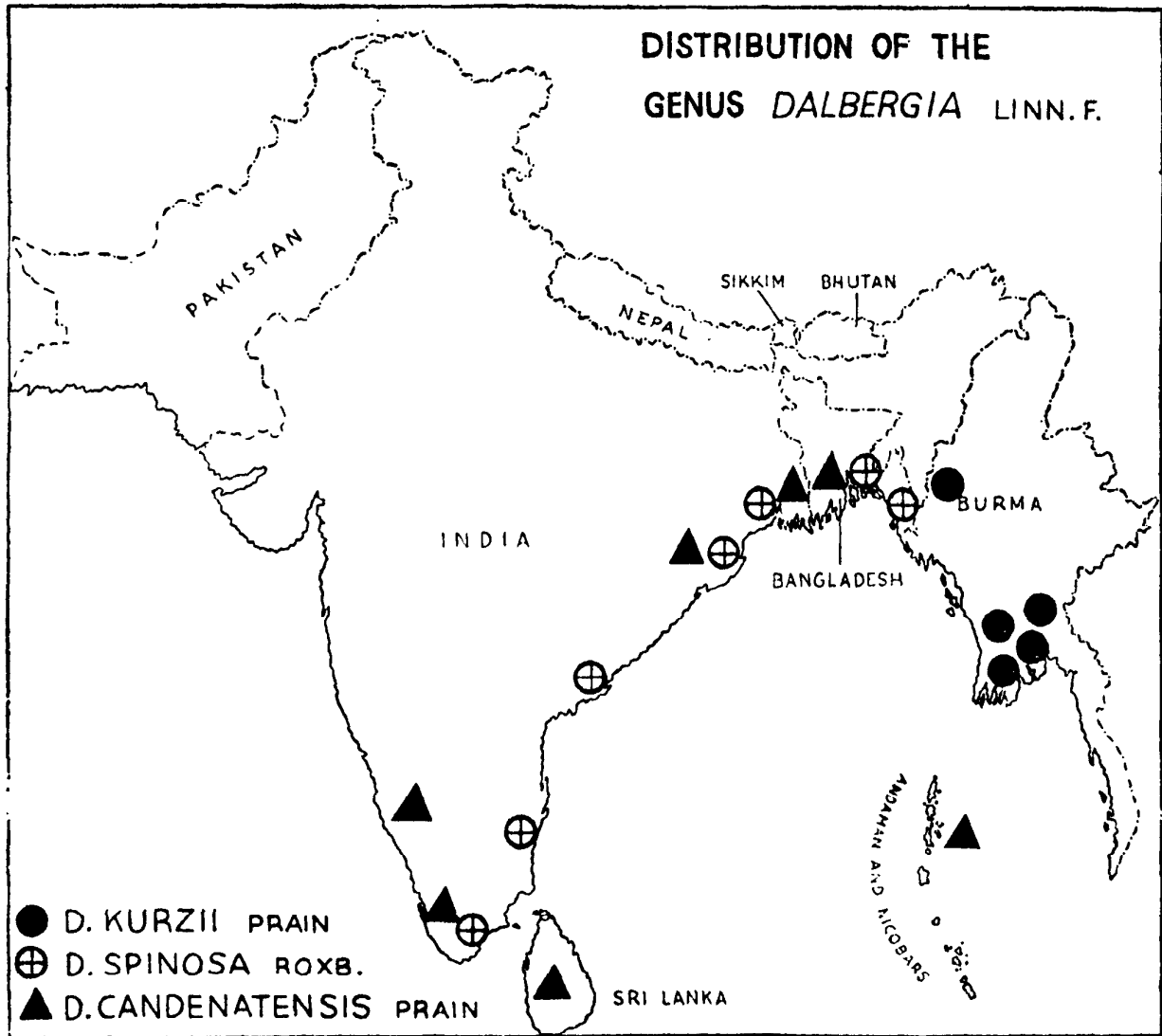
E. *Typification* : The seedlings of the species were brought to the East India Company garden at Calcutta (present Sibpur garden) by M.R. Smith in 1811 (Roxburgh, 1814) when it was planted. Roxburgh made his coloured illustration (t. 2539) based upon this cultivated plant in the garden. In the absence of any herbarium specimen, his plate t. 2539 which was also reproduced in Wight Icones (t. 243. 1840) is treated as the lectotype of the species.

F. *Economic importance* : The wood is not of economic importance. The bark and roots can be used as fish poison.

42. ***Dalbergia candenatensis*** (Dennst.) Prain in Journ. Asiat. Soc. Beng. 70 : 49. 1901 et Beng. Pl. 1 : 411. 1903 ; Gamble, Fl. Pres. Madras 383. 1918 ; Haines, Bot. Bih. Or. 3 : 294. 1922 ; Merr. Enum. Philip. Flow. Pl. 2 : 294. 1923 ; Alston, Suppl. Trim. Fl. Ceyl. 6 : 86. 1931 ; Backer et Bakhuizen van den Brink, Fl. Java 1 : 614. 1963.

Karin Tagera Rheede Hort. Malabar. 6 : 25. 1686. *Cassia candenatensis* Dennst. Sch. Zum. Hort. Malabar. 12. 1818. *Dalbergia monosperma* Dalz. in Hook. Journ. Bot. 2 : 36. 1850 ; Benth. in Miq. Pl. Jungh. 256. 1852 ; Miq. Fl. Ind. Bat. 1 : 132. 1855 ; Thw. Enum. Pl. Zeyl. 94. 1859 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 48. 1860, et Fl. Hongkong. 93. 1861 ; Dalz. et Gibbs. Bombay Fl. 78. 1861 ; Baker in Hook.f. Fl. Brit. India 2 : 237. 1876 ; Watt, Dict. Econ. Prod. 3 : 10. 1890 ; Trim. Ceyl. Fl. 2 : 89. 1894 ; Talbot, Bombay List 75. 1894 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Talbot, Tr. Shr. Climb. Bombay Pres. 138. 1902 (ed. 2) ; Brandis, Indian tr. 238. 1907 (ed. 2) ; Ramarao, Flow. Pl. Travancore, 130. 1914 ; Parkinson, For. Fl. Andamans 149. 1923. *D. torta* Grah. in Wall. Cat. 5873. 1832. nomen ex A. Gray Bot. Wilkes Exped. 1 : 458. 1854 ; Prain in Journ. Asiat. Soc. Beng. 66 : 120, 452, 1897 ; Volkens in Engl. Bot. Jahrb. 31 : 464. 1901 ; Cooke, Fl. Pres. Bombay 1 (2) : 397. 1902 ; Prain in Rec. bot. Surv. India 2 : 300. 1903 et in Ann. Roy. bot. Gard. 10(1) : 64. 1904 ; Talbot, For. Fl. Bombay Pres. Sind 1 : 426. 1909 ; Ridley, Fl. Malay Pen. 1 : 591. 1922 ; *Drepanocarpus monospermus* Kurz in Journ. Asiat. Soc. Beng. 45 : 281. 1877 et For. Fl. Brit. Burma 1 : 337. 1877. *Amerimnon tortum* (Grah.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

An unarmed climber ; branches vining, glabrous, often twisted into spiral hooks. *Leaves* imparipinnate, alternate, 4.0 - 12.5 cm long ; leaflets 5, rarely 3 or 7, obovate to obovate oblong, 1.7 - 5.0 x 1.0 - 2.6 cm, entire, mostly obtuse at apex, rarely retuse, cuneate at base, subcoriaceous,



Map 16

glabrous above, glabrous to puberulous beneath, lateral veins indistinct ; rachis glabrous, petiolules 1.5 2.0 mm long, glabrous. *Inflorescence* a short, axillary, congested panicle with racemose branches, 3 6 cm long, rachis glabrous to puberulous. *Flowers* white, 6 8 mm long, pedicellate ; pedicels 1 2 mm long, glabrous ; bract ovate, at the base of the of the pedicel, bracteoles 2, ovate to ovato orbicular, 1.0 1.5 x 1.0 1.5 mm, gibbose, glabrous, one on either side of the calyxcup. *Calyx* campanulate, 3.5 5.0 mm long, 5 toothed, glabrous without, teeth ovate obtuse, upper 2 slightly connate, all more or less equal. *Corolla* vexillum ovate to ovato oblong, 5 6 mm long, reflexed, long clawed ; wings oblong long clawed, blade unequal at base, auricled ; keels deeply boat shaped, clawed. *Stamens* 10, monadelphous, sheath 5 6 mm long, split open dorsally, filaments free on their upper third. *Ovary* 5.0 6.5 mm long, long stipitate, glabrous, style subulate, stigma minute, ovule solitary. *Pods* indehiscent, flat, falcately recurved along the dorsal suture, 2.0 2.7 x 0.9 1.2 cm long, shortly stalked, mucronate at apex, smooth and glabrous, 1 seeded, rarely 2 seeded ; seed reniform, compressed.

Type : Malabar Rheede Hort. Malab. 6 : t. 25. (Lectotype selected, CAL).

Flower : May to September. *Fruit* : June to November.

Distribution : INDIA (Andamans, Sundarbans, Mahanadi delta, Southern & Western India), SRI LANKA, BURMA, BANGLADESH, MALAYSIA, NORTH AUSTRALIA and CHINA. (Map 16)

Specimens Examined :

Andamans : South Andaman, Manpur hill jungle, Jun. 1892 *King's collector* s.n. (CAL) ; Dhanikari hill jungle, Jun. 1892 *King's collector* s.n. (CAL) ; Chuldari hill Jungle, Jun. 1893 *King's collector* s.n. (CAL) ; Anikhet hill jungle, Jul. 1891 *Dr. King* s.n. (CAL) ; Baloo ghat hill jungle, Sept. 1894 *King's collector* s.n. (CAL) ; Hobdaypur hill jungle, Jun. 1891 *Dr. King* s.n. (CAL) ; Manglutan hill jungle, Jul. 1892 *Dr. King's collector* s.n. (CAL) ; Dhani leaf creek, Jun. 1890 *Dr. King's collector* s.n. (CAL) ; Tea garden hill jungle, Jun. 1894 *King's collector* s.n. (CAL) ; Narcondam Island, Mar. 1891 *Prain* s.n. (CAL).

West Bengal : Sundarbans, Ambaria river, Aug. 1902 *Prain* s.n. (CAL) ; Kakdwip, Aug. 1902 *Prain* s.n. (CAL) ; Tiger point, Nov. 1892 *R.L. Heninig* s.n. (CAL) ; Jewdhara, Oct. 1898 *Watt* 12508 (ISIM).

Orissa : Barkuda, Chilka lake, Apr. 1920 *H.G. Carter* 1510, 1518 (ISIM).

Kerala : Quilon, 1835 *Wight* 820 (CAL, LE) ; Quilon, Nov. 1910 *Meebold* 12752 (CAL) ; Quilon, Nov. 1893 *Collector* ? s.n. (MH).

Karnataka : Coorg *Collector* s.n. (MH) ; Concan *Law* s.n. (CAL, KW).

Sri Lanka : Central Province *Thwaites* 243 (CAL).

Burma : Amherst, Mar. 1849 *Falconer* s.n. (CAL).

Bangladesh : Khulna, May 1883 *Clarke* 33423 (CAL).

Wall. Cat : Penang et Singapore, 1832 *Wall. Cat.* 5873 A (Type of *Dalbergia torta* Grah. CAL)

A. *Ecology* : The plant is a littoral climber, often found in the tidal forests. It is one of the characteristic species of the Mangrove forests in the Andaman Islands.

B. *Nomenclatural notes* : The species is usually known under the name *Dalbergia monosperma* Dalz. in Hooker's flora of British India (1876). Later Prain (1903), Gamble (1918), Haines (1922) in their regional floras of Bengal, Madras and Bihar & Orissa respectively adopted the name *D. candenatensis* Prain, based on an earlier valid name *Cassia candenatensis* Dennst. (1818). Again Prain changed his opinion and called the same species as *D. torta* Grah. stating that this was the earliest name. He was this time followed by Cooke (1902) and Ridley (1922) in their respective floras of Bombay Presidency and Malayan Peninsula. Thus there existed 3 different names for the same plant.

Dr. August Wildhem Dennstett proposed the name *Cassia candenatensis* in 1818, based on 'Karin tagera' of Rheede in Hortus Malabaricus (1786). The plant, figured in Rheede's above work is the same as the present plant. The earliest specific epithet available for this plant is therefore *Cassia candenatensis* and its validity is perfect as it was based on 'Karin tagera' a well described and illustrated species even though it was prelinnaean. *Dalbergia candenatensis* based on *Cassia candenatensis* thus becomes the correct and valid name for this species. *D. monosperma* Dalz., described later (1850) is the same as this and hence has been reduced. *D. torta* Grah. originally a nomen when proposed (1832) was later validated by Wilkes (l.c. 1854) and is the same as *D. monosperma* Dalz. and hence reduced to the synonymy under *D. candenatensis*.

C. *Critical notes* : Baker (l.c. 1876) in his flora was not fully justified in placing this species under the subgenus 'Selenolobium' which was characterised by diadelphous stamens whereas the present species has only monadelphous stamens.

According to Kurz and later followed by G. Watt (1890), the plant is the source of dyewood and yields 'Kayu lakka' of commerce.

43. *Dalbergia parviflora* Roxb. (Hort. Beng. 98. 1814, nomen) Fl. Ind. 3 : 225. 1832 ; Benth. in Miq. Pl. Jungh. 1 : 255. 1852 ; Miq. Fl. Ind. Bat. 1 : 132. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 33. 1860 ; Baker in Hook.f. Fl. Brit. India 2 : 233. 1876 ; Prain in Journ. Asiat. Soc. Beng. 66 : 121, 452, 1897, et Ibid. 70 : 63. 1901 et in Ann. Roy. bot. Gard. 10 (1) : 34. 1904 ; Brandis, Indian Tr. 239. 1907 (ed. 2); Ridley, Fl. Malay. Pen. 1 : 589. 1922 ; Wealth India 3 : 12. 1952.

Dalbergia cumingii Benth. in Miq. Pl. Jung. 1 : 255. 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 33. 1860. *Drepanocarpus cumingii* Kurz in Journ. Asiat. Soc. Beng. 45 : 282. 1877 et For. Fl. Brit. Burma 1 : 336. 1877. *Amerimnon parviflorum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891. *A. cumingii* (Benth.) O. Kuntze, Ibid. 1 : 159. 1891.

A climber, 10–25 m tall, branches lenticelled, woody, at times ending in spines, glabrous. *Leaves* imparinnate, alternate, stipulate, 11.5–15.5 cm long ; leaflets 5–9, ovate lanceolate, at times obovate, 4–6 x 2.3–3.6 cm, alternate, entire, cuneate at base, obtuse to emarginate at apex, glabrous, lateral veins 7–9 pairs, faint, midrib puberulous above ; stipules minute, pubescent, caducous ; petiolules 2–3 mm long, glabrous to puberulous. *Inflorescence* a corymbiform panicle, terminal and axillary, 5–10 cm long, puberulous. *Flowers* comparatively smaller than other species, white, 3.0–3.5 mm long ; bract ovate, persistent, bracteoles 2, ovate, just at the base of the calyxcup, persistent ; pedicels short, 1.0–1.5 mm long. *Calyx* campanulate 2 mm long, deeply 5-toothed, upper 2 slightly connate, calyxcup glabrous without. *Corolla* vexillum obovate, 3 mm long, shortly clawed ; wings and keels oblong, clawed. *Stamens* 10, monadelphous, sheath 2–3 mm long, split open dorsally, filaments free on their upper fourth. *Ovary* 2.5–3.0 mm long, glabrous, but ciliate on one suture, stipitate, style short, stigma minute, ovules 2–3. *Pods* oblong, curved, 2–5 x 1.5 cm, turgid, glabrous, 1–3 seeded, torulose when more than 1 seeded ; seeds wide reniform, 1.0–1.5 x 0.8–1.0 cm [Description of pod after Prain (1904) as there are no pods in the Burmese specimens].

Type : Moluccas Roxburgh s.n. (G).

Distribution : BURMA, MALAYAN PENINSULA, SUMATRA, JAVA, MOLUCCAS, BORNEO and CELEBES. (Map 17)

Flower : March to April. *Fruit* : May to July.

Specimens examined :

Burma : Tennasserim, Singkawn, 50 m, Jun. 1932 *A.G. Kerr* 21663 (DD) ; Komoungyi, Tenasserim river, Mar. 1926 *Parkinson* 1974 (DD) ; Without definite locality (Tenasserim), March 1911 *Meebold* 14436 (CAL) ; Without definite locality (Tenasserim) *Helper* 1808 (CAL) ; Pyo aing forest, Mergui, 250 350 m, Mar. 1915 *Maung Polu* s.n. (CAL) ; Kyauktablau, Mar. 1911 *Meebold* 14603 (CAL) ; Thata, Mar. 1911 *Meebold* 14779 (CAL) ; Munglow, Mar. 1911 *Meebold* 14292 (CAL).

A. *Etymology* : The specific epithet '*parviflora*' means small flowers as the species has comparatively smaller flowers when compared with the rest of the species of *Dalbergia*.

B. *Ecology* : The plant is a strong woody climber, growing at times 30 metres high in open forests.

C. *Systematic position* : Bentham (l.c.) 1860) expressed that he had not seen any specimen and basing on Roxburgh's description doubted that it might be same as his *D. junghuhnii*. Baker (l.c. 1876) doubtfully treated this species under *D. junghuhnii*. It was Prain (l.c. 1897) who pointed out that both these species were quite distinct from one another.

44. ***Dalbergia spinosa*** Roxb. (Hort. Beng. 98. 1914, nomen) Fl. Ind. 3 : 233. 1832 ; Wight & Arn. Prodr. Fl. Pen. Ind. Or. 266. 1834 ; Walp. Repert. Bot. Syst. 1 : 799. 1842 ; Voigt. Hort. Suburb. Calcutta 241. 1845 ; Benth. in Miq. Pl. Jungh. 256. 1852 et in Journ. Linn. Soc. 4 (Suppl.) : 49. 1860 ; Baker in Hook. f. Fl. Brit. India 2 : 238. 1876 ; Watt, Dict. Econ. Prod. India 3 : 15. 1890 ; Talbot, Bombay List 75. 1894 ; Prain in Journ. Asiat. Soc. Beng. 70 : 64. 1901 ; Tablot, Tr. Shr. Climb. Bombay Pres. 138. 1902 (ed. 2) ; Cooke, Fl. Pres. Bombay 1 (2) : 400. 1902 ; Prain in Rcc. bot. Surv. India 2 : 300. 1903 et Beng. Pl. 1 : 411. 1903 et in Ann. Roy. bot. Gard. 10(1) : 35. 1904 ; Brandis, Indian Tr. 238. 1907 (ed. 2) ; Ramarao. Flow. Pl. Travancore 130. 1914 ; Gamble, Fl. Pres. Madras 2 : 381. 1918 ; Haines, Bot. Bih. Or. 3 : 296. 1922 ; Heinig, List. Pl. Chittagong 21. 1925 ; Biswas in Indian For. Rec. (N.S.) 3 : 16. 1941 ; Wealth India 3 : 12. 1952 ; Sebastine & Henry in Bull. bot. Surv. India 2 : 33. 1960 ; Ramamurthy, Ibid. 5 : 263. 1964 ; Rao et Sastry in Bull. bot. Surv. India 16 : 106. 1974 (1977) ; Krishnamurthy et al. Ibid. 23 : 115. 1981

(1983) ; Nair et Henry, Fl. Tam. Nad. (Ser. 1) 1 : 103. 1983 ; Thoth. in Bull. bot. Surv. India 23 : 152. 1981 (1983) ; Guhahakshi, Fl. Mursh. 104.1984.

Dalbergia horrida Grah. in Wall. Cat. 5817. 1832 (nomen) non *Amerimnum horsidum* Dennst. (1818). *Drepanocarpus spinosus* Kurz in Journ. Asiat. Soc. Beng. 45 : 281. 1877 et For. Fl. Brit. Burma 1 : 37. 1877. *Amerimnon spinosum* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A shrub, often climbing with the help of smaller branches which are either converted into straight thorns or twisted into hooks, branchlets glabrous, striate. *Leaves* imparipinnate, alternate, stipulate, 3-7 cm long ; leaflets 5-9, obovate to widely elliptic, alternate, 1-2 x 0.5-1.2 cm, entire, obtuse to retuse at apex, cuneate at base when obovate and rounded when elliptic, subcoriaceous, glabrous ; rachis glabrous, slender, petiolules 1 mm long, glabrous. *Inflorescence* a short, axillary raceme or panicle, 2.5-3.5 cm long, rachis glabrous, *Flowers* small, white, pedicellate, 4-5 mm long ; pedicels slender, 1 mm long, glabrous, bract oblong, deciduous, bracteoles 2, at the base of the calyxcup, deciduous. *Calyx* campanulate, 2.0-2.5 mm long, 5-toothed, teeth ovate, obtuse except the lowest, which is lanceolate, longest, calyxcup and teeth glabrous without. *Corolla* vexillum obovate, retuse, 3-4 mm long, shortly clawed ; wings and keels oblong, clawed. *Stamens* 10, isodiadelphous, sheath 3 mm long, filaments free on their upper fourth. *Ovary* 2.5-3.5 mm long, sparingly pilose, stipitate, style short and stigma capitate. *Pods* indehiscent, flat, reniform falcate, 2.0-2.7 x 1.4-1.6 cm, coriaceous, long stalked, mucronate at apex, smooth and glabrous, 1-seeded ; seed rather reniform, compressed.

Type : Chittagong Roxburgh s.n. (CAL).

Flowers : May to June. *Fruit* : August to October.

Distribution : INDIA (Bengal, Orissa, Andhra Pradesh, Tamil Nadu), BANGLADESH BURMA and MALAYSIA. (Map 16)

Specimens examined :

W. Bengal : Sundarbans, Isodhara, Jul. 1902 Prain s.n. (CAL) ; Kagdip, Jul. 1904 Ismail s.n. (CAL) ; Without clear locality (Sundarbans), 1894 Heinig s.n. ; Griffith 1811 ; Apr. 1883 Clarke 33355 ; 1894 Heinig s.n. (CAL) ; Calcutta, Salt lakes, Oct. 1866 Bell s.n. (CAL) ; Salt Lake near Sealdah, Nov. 1866 Kurz s.n. (CAL) ; Matlah, Oct. 1898 Shaik Mokim s.n. (CAL) ; Matlah, Lower Bengal Kurz s.n. (CAL).

Orissa : Paradip, Cuttack, Jan. 1962 *Sidhi* 465 (BSA); Jambu, Mahanadi delta, Jun. 1949 *Mooney* 3358 (DD).

Andhra Pradesh : Coringe, East Godavari district, Feb. 1956 *Wagh* 1490 (BLAT).

Tamil Nadu : Tinnevely, Nazareth, Jul. 1899 *Barber* 677 (MH); Kudiramala teri, Sep. 1943 - *D. Sundararaj* 20453 (MH); Valliyur R.F., 225 m, Mar. 1963 *Joseph* 15989 (MH); Near Tiger falls, way to Mancholai, 333 m, Mar. 1958 *Sebastine* 5579 (MH); Mundanthorai, 200 m, Nov. 1959 *Sebastine* 9557 (MH); South Arcot, Necheltai, Oct. 1886 *Chamberlain* s.n. (MH); Without exact locality (S. Arcot), Oct. 1886 *Gamble* 18212 (CAL); Pudupatti, Ramanathapuram district, Dec. 1979 *Nair* 61037 (CAL, MH).

Bangladesh : Kholna, Jessore, 1874 *Clarke* 21767 A (CAL); Chakaria, Chittagong district, Dec. 1905 *R.L. Heinig* 26268 a (ISIM).

Burma : Rangoon *Kurz* 1762 (CAL).

A. *Etymology* : The specific epithet '*spinosa*' according to Roxburgh refers to the spinescent axillary branchlets which help in the climbing habit of the species.

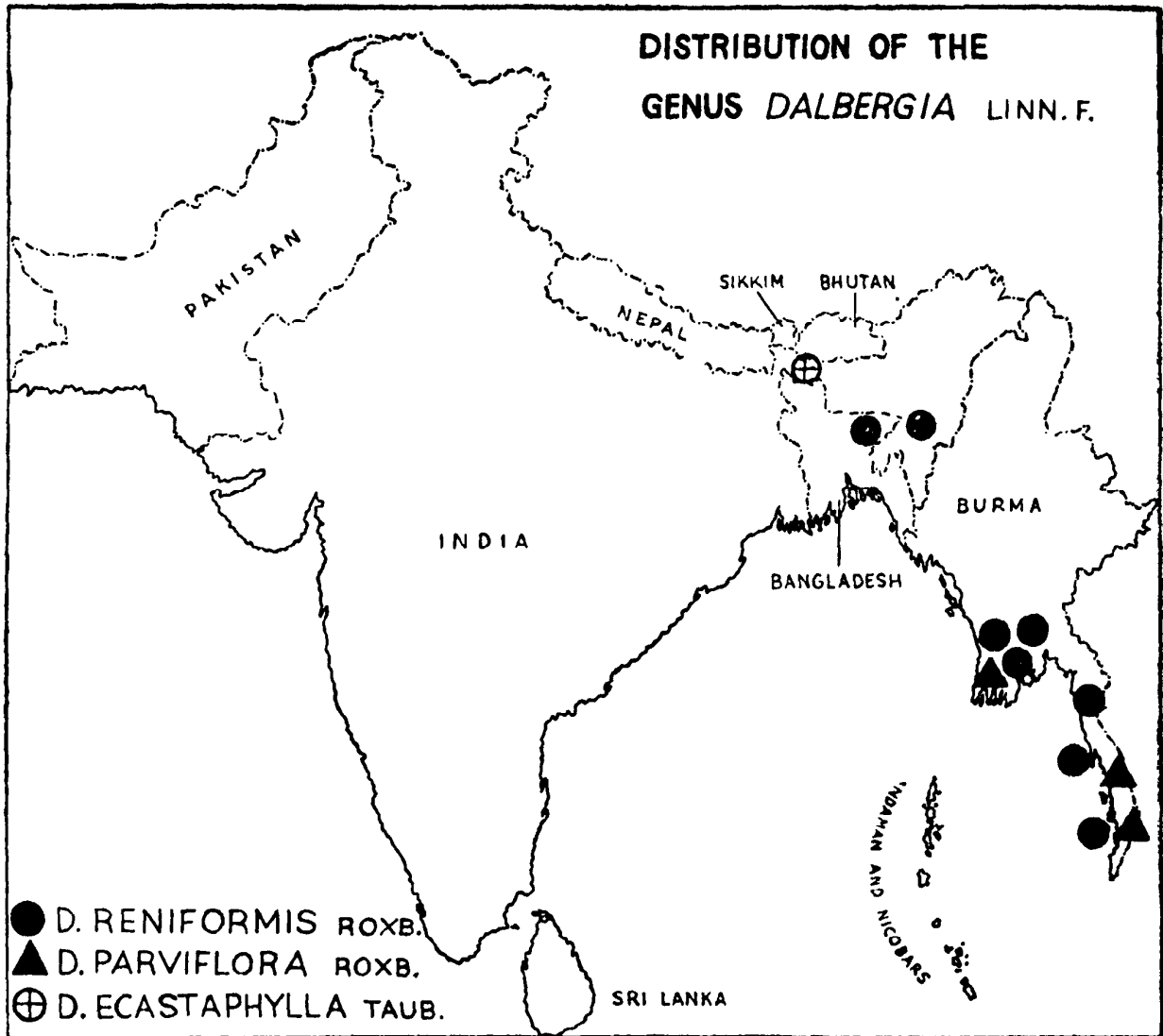
B. *Ecology* : The plant is very common in the tidal forest and in coasts.

C. *Cytology* : $n = 10$ (Mallick & Ghosh, 1968).

D. *Economic importance* : The wood is soft, silvery white and close grained but economically not useful. According to Kurz (1877) the powdered roots absorb alcohol and so a spoonful of powder in a glass of water is said to be sufficient to destroy in less than half an hour the effects of alcohol, even in cases bordering on delirium tremens. Evidently Kurz came to know this from the local inhabitants of Tenasserim but this requires verification and confirmation.

45. *Dalbergia reniformis* Roxb. (Hort. Beng. 53. 1814, nomen) Fl. Ind. 3 : 226. 1832; Wight, Ic. t. 261. 1840; Walp. Repert. Bot. Syst. 1 : 800. 1842; Voigt, Hort. Suburb. Calcutt. 241. 1845; Baker in Hook. f. Fl. Brit. India 2 : 238. 1876; Watt. Dict. Econ. Prod. India 3 : 12. 1890; Prain in Journ. Asiat. Soc. Beng. 70 : 64. 1901 et in Ann. Roy. bot. Gard. 10(1) : 105. 1904; Brandis, Indian Tr. 239. 1907 (ed. 2); Wealth India 3 : 12. 1952.

Dalbergia flexuosa Grah. (in Wall. Cat. 5875 1832, nomen) ex Benth.



Map 17

in Miq. Pl. Jungh. 1 : 256. 1852 et in Joun. Linn. Soc. 4 (Suppl.) : 48. 1860. *Drepanocarpus reniformis* Kurz, Pegu Rep. App. A. 49 & B. 45. 1875. et in Journ. Asiat. Soc. Beng. 45 (2) : 282. 1877 et For. Fl. Brit. Burma 1 : 336. 1877. *Amerimnon reniforme* (Roxb.) O. Kuntze, Rev. Gen. Pl. 1 : 159. 1891.

A tree with spreading branches, 10–12 m high ; younger branches pubescent but soon glabrescent. *Leaves* imparipinnate, alternate, stipulate, 16–32 cm long ; leaflets 7–11, ovate to elliptic-oblong, 4.5–11.0 x 2.5–5.3 cm, alternate to subopposite, entire, rounded at base, acuminate at apex but the tip is obtuse to retuse, chartaceous, sparingly pilose when young but quite glabrous when mature, lateral veins 6–8 pairs, not distinct ; rachis puberulous at first but soon glabrous, petiolules 5–7 mm long, puberulous at first but soon glabrous ; stipule ovate-lanceolate, pubescent, deciduous. *Inflorescence* axillary panicle, 9–13 cm long, rachis and branches brown pubescent. *Flowers* white, 7–8 mm long ; pedicels very short, pubescent ; bracts and bracteoles ovate-oblong, deciduous. *Calyx* campanulate, 3–4.5 mm long, rusty pubescent without, 5-toothed, teeth ovate-obtuse except the lowest longest acute one. *Corolla* vexillum ovate-orbicular to orbicular, 6–7 mm long, clawed, emarginate at apex ; wings oblong, cuneate, auriculate at base, clawed ; keels deeply boat-shaped, long clawed. *Stamens* 10 isodiadelphous, sheath 5–6 mm long, filaments free on their upper third, unequal, middle ones of each bundle longer than lateral ones. *Ovary* 5–6 mm long, pubescent, long-stipitate, style subulate, stigma minute, ovules 1–2. *Pods* indehiscent, subfalcate, 1.7–3.0 x 1.3–1.8 cm in 1-seeded ones and 3.8–5.0 x 1.5–2.0 cm in 2-seeded ones, flat and velvety when young, but prominently turgid and glabrous when mature, stalked, laterally pointed at apex, mostly 1-seeded, rarely 2-seeded ; seed reniform.

Type : Roxburgh Icones t. 2319 (Wight Ic. t. 261. 1840) (Lectotype designated, CAL).

Flower : February to March. *Fruit* : March to May (at times up to December).

Distribution : INDIA (Assam), BANGLADESH, BURMA (Pegu Martaban and Tenasserim). (Map 17)

Specimens examined :

India : Barak, Cachar, Assam, May 1889 J.C. Prazer 149 (CAL).

Burma : Pegu, Toukyeghat Kurz 1785 (CAL) ; Pegu Brandis s.n. (CAL) ; Tapun to Kyawkwa, Tharawaddy, Feb. 1912 Lace 5709 (CAL, DD) ; Rangoon, 1857 Cleghron 166 (CAL) ; Tenasserim, Near Gying

river, Moulmein, Mar. 1908 *Kalka Prashad* 30391 (CAL) ; Moulmein, 1849 *Falconer* s.n. (CAL) ; Without any definite locality (Tenasserim), 1877 *G. Gallatly* 983 (CAL); Karen Country and hills, 1871 *Kurz* 2608 (CAL) ; Caaungyn watery place, Henzeda, Mar. 1903 *Shaik Mokim* 1540 (CAL) ; Kalayeik reserve, Myaungmya district, Mar. 1906 *Lace* 2951, 2968 (CAL, DD) ; Without definite locality, 1877 *G. Gallatly* 919 (LE, CAL) ; Zwegabin. Feb. 1938 *Dickason* 7039 (LE).

Bangladesh : Sylhet, Jan. 1886 *Clarke* 48711 C (CAL).

Wall. Cat : Sylhet, 1832 *Wall. Cat* 5875 (CAL, LE, Type of *Dalbergia flexuosa* Grah.).

A. Etymology The specific epithet '*reniformis*' refers to the reniform shape of the pods. Actually the pods are not typically reniform and are at the most subfalcate. The pods are reniform only in *D. candenatensis* Prain while they are falcate to reniform in *D. spinosa* Roxb. So the specific epithet '*reniformis*' applied to this species by Roxburgh is a misnomer.

B. Ecology : The plant is one of the common element in marshy places and swampy forest. It also grows along the marshy river banks.

C. Economic uses : According to Roxburgh, the wood yields a greenish flame and is reckoned the best for burning limestone. In Sylhet the wood is used as fuel.

D. Typification : The seedling of the species was brought to East India Company garden, Calcutta (Sibpur garden) by M.R. Smith in 1811 (Roxburgh, 1814) when it was planted. Roxburgh made his coloured illustration (t. 2319), based upon the cultivated plant in the garden.

In the absence of any herbarium specimen, his plate t. 2319 which was also reproduced in Wight's *Icones* (t. 261. 1840) can be treated as the lectotype of this species.

46. *Dalbergia ecastaphylla* (Linn.) Taub. in Engl. & Prantl, *Nat. Pflanz.* 3 (3) : 335. 1894 ; Henriq. *Bot. Soc. Brot.* 27 : 188. 1917 ; Fawcett & Rendle, *Fl. Jam.* 4 : 77. 1920 ; Excell, *Cat. Vas. Pl. Tome 164.* 1944 ; Hutch. & Dalz. *Fl. Trop. W. Africa* 1 : 51. 1954 (ed. 2) ; Dwyer in *Ann. Miss. Bot. Gdn.* 52 : 7. 1965. (Fig. 18).

Hedysarum ecastaphyllum Linn. *Syst. Nat.* 2 : 1169. 1759 (ed. 10). *Pterocarpus ecastaphyllum* Linn. *Ibid.* 533. 1774 (ed. 13). *Ecastaphyllum brownei* Pers. *Syn. Pl.* 277. 1807 ; DC. *Prodr.* 2 : 420. 1825 ; Hook. *Niger Fl.* 314. 1849 ; Baker in Oliver *Fl. Trop. Africa* 2 : 236. 1871 ; O. Kuntze,



Fig. 18. *Dalbergia ecastaphylla* (Linn.) Taub.

Rev. Gen. Pl. 1 : 180. 1891 ; Pulle. Enum. Vas. Pl. Surinam 277. 1906 ; Hutch. & Dalz. Fl. Trop. W. Africa 1 : 375. 1928 (ed. 1) et Pl. Trop. W. Africa 241. 1937. *Hecastophyllum brownei* H.B. et K. Nov. Gen. Amer. 6 : 387. 1823 ; Kunth, Syn. Pl. 4 : 76. 1825 ; Walters, Repert Bot. Syst. 1 : 292. 1842. *Ecastaphyllum ecastaphyllum* (Linn.) Britton in Mem. Brook. Bot. Gdn. 1 : 55. 1918. *Amerimnon ecastaphyllum* (Linn.) Standley in Journ. Wash. Acad. Sci. 15 : 459. 1925.

A shrub to a small tree, 6–7 m high. *Leaves* 1 foliolate, alternate, stipulate, leaflet ovate-oblong to oblong, 10.5–17.0 x 6–9 cm, entire, obtuse to acute to shortly acuminate at apex, coriaceous, glabrous above, puberulous below, lateral veins 7–8 pairs, reticulation prominent on the lower surface ; petiolules puberulous, 9–12 mm long, stipules early caducous. *Inflorescence* an axillary, congested raceme, 2–3 cm long, the slender rachis ferrugineo-pubescent. *Flowers* white, 7–8 mm. long, pedicellate ; bract ovate, bracteoles 2, rotund, puberulous, adpressing the base of the calyxcup ; pedicels 2–3 mm long. *Calyx* campanulate 3–4 mm long, puberulous with ferruginous hairs, 5-toothed, teeth triangular, posterior, being the longest. *Corolla* vexillum suborbicular, 7–8 mm. long, retuse at apex, clawed ; wings narrowly oblong, clawed ; keels oblong, gibbous, clawed. *Stamens* 10, diadelphous (5 + 5), sheath 7–8 mm long, filaments free on their upper one-fourth, anthers versatile. *Ovary* 6–7 mm. long, oblong, long-stipitate, pubescent, stipe 2–3 mm long, style slender, curved, stigma minute, ovules 1–2. *Pods* indehiscent, elliptic to oblong-rotund, 2.0–2.6 x 2.0–2.3 cm, stalked, flat, faintly reticulated, obtuse at apex, truncate below, puberulous when young and glabrous when mature, 1-seeded ; seed flat, oblong (pod characters from American and African specimens as there are no pods in Indian specimens).

Type : Herb. *Linnaeus* (Linn. Soc. Lond.).

Flower : July to August. *Fruit* : September to October.

Distribution : Tropical and Central America (Florida, West Indies, Mexico and Brazil), Tropical West Africa (Senegal, Zambia, Nigeria, British Cameroons, Sierra Leone, Port Guinea, French Guinea, Liberia) and India (Cooch Behar and Assam—a new record for not only India but the whole of Asia). (Map 17)

Specimens examined :

India : Cooch Behar, West Bengal, 1881 *Dr King* s.n. (CAL); HBC, cultivated in Calcutta Botanic Garden (brought and introduced from Assam) *Collector* ? s.n. (CAL).

A. *Ecology* : In America and Africa the plant grows into either a big shrub or a small tree, usually in swamps by the side of sea. The white flowers in crowded, short, axillary panicles are fragrant. The species is a characteristic element of the tropical flora.

B. *Cytology* : $n = 10$ (Mangenot et al., 1962).

C. *New record for Asia* : This is for the first time that *D. ecastaphylla* has been recorded from the Asian continent, its previous occurrences being tropical America and Africa. The discovery of this plant from India has thus assumed greater significance in the geographical pattern of distribution. In India the plant was collected by *Dr. King* from Cooch Behar as early as 1881 but its correct identity could not be established till now. The specimens were tentatively placed in the genus *Ecastaphyllum* with the remark that they might belong to *E. brownei* Pers. The specimens have been carefully examined and compared with authentic collections from America and Africa. They proved beyond doubt to be *D. ecastaphylla*. Hence the occurrence of this rare plant constitutes a new, record for not only India but whole of Asia. The species is essentially a native of New World but has in recent times migrated to the old world through Africa. More intensive explorations in future may further reveal the possible occurrence of this species in Andaman and Malaysian islands.

Regarding its distribution in India it is reported from Cooch Behar in West Bengal as evidenced by the collections of *Dr. King*. There is one more specimen in Calcutta Herbarium, bearing the remarks 'Introduced from Assam, HBC'. This evidently suggests that the plant must have been growing wild in Assam. However the report of its occurrence from Cooch Behar, W. Bengal and Assam is being recorded now for the first time, and so it constitutes a new record not only for India but the whole of Asian continent.

PTEROCARPUS JACQUIN

A RESUME OF EARLIER WORKS

The name *Pterocarpus* was first proposed by Linnaeus in his *Flora Zeylanica* (1747) for a plant from Ceylon which later on proved to be a species of *Derris* Lour. Linnaeus had later changed his opinion but proposed the same generic name (1754) for a South American plant whose pod was winged around the seed and called this plant *Pterocarpus*. O. Kuntze (1891) was of the opinion that Linnaeus' *Pterocarpus* of 1747 should be the legitimate generic name for the present day *Derris* as it represented only a species of *Derris*, namely *D. trifoliata* Lour. He therefore transferred all the known species of *Derris* to *Pterocarpus* Linn. f. (1747) and consequently substituted another name *Lingoum*, used by Rumphius (1742) for *Pterocarpus* of Linnaeus (1754).

Rothmaler (1944) proposed that *Pterocarpus* Jacquin (1763) should be conserved against *Pterocarpus* Linnaeus (1754) with *P. officinalis* Jacq. as type species. According to him the original *Pterocarpus* Linn., though applied to a Rumphian plant was validated by a reference to Linnaeus's former description in his *Flora Zeylanica* (1747) which is a synonym of *Derris* Lour. as pointed out earlier. The first author to publish a binomial under *Pterocarpus* was N.J. Jacquin who described and figured an American species (*P. officinalis*). So conservation of *Pterocarpus* from Jacquin's work would preserve the current usage of generic as well as specific names. Rothmaler's above proposal, made in 1944 was again revived under *nomina generica conservanda*, published in *Taxon* (18 : 471. 1969). After discussion in the nomenclatural committee, the above proposal was finally accepted (*Taxon* 19 : 818. 1970).

The second species to be added was *P. santalinus* Linn. (1781) from India. It was followed by *P. marsupium* Roxb. (1793) again from India. Willdenow (1802) described *P. indicus* from Malaysia. Person (1807) enumerated 3 Asiatic species, mentioned above. The genus was extensively dealt by Decandolle (1825) both in his *Memories Sur La Des Legumineuses* and *Prodromus Systematic Naturalis*. According to him *Pterocarpus* was a primitive genus of the tribe Dalbergieae and Linnaeus's concept of the genus included species belonging to *Ecastaphyllum* P. Br. with its orbicular fruit, *Amerimnum* P. Br. where stamens are monadelphous and finally *Brya* P. Br. where the fruitlets are articulated. Because of this, Decandolle had to redefine the limitations of the genus with well set out characters. According to him the genus was characterised by the fruit, bordered around with a wing, dentate calyxcup, papilionaceous corolla, indehiscent fruit, imparipinnate leaves and arborescent habit. It was divided into 5 sections, namely 1) *Moutochia* Aubl. 2) *Amphymentium* Kunth 3) *Echinodiscus* DC. 4) *Santalaria* DC. 5) *Ateleia* DC. The first 2 sections were independent genera, now reduced to sections while the

remaining 3 were new sections, erected by him. Of the 19 species, recognised by him, 10 were American, 5 Asiatic, and 4 African. He also validated Roxburgh's *P. dalbergioides*.

Roxburgh (1832) gave elaborate descriptions of 3 Indian species. According to him *P. indicus* Willd. was a native of China and Malaysia. Wight and Arnott (1834) added 1 more species *P. wallichii* from South India. Endlicher (1836-40) differed from Bentham in treating *Echinodiscus* DC., *Amphymenium* Kunth and *Ateleia* DC. as independent genera, distinct from *Pterocarpus* and in this treatment he was followed by Walpers (1842). Miquel's treatment of the genus (1855) contained 3 species, confined to Indonesia. *Echinodiscus* DC. was treated as an independent genus.

Bentham's (1860) treatise of the genus was the most critical work as it comprised all the species, known at that time. 15 species were recorded from America, Africa and Asia, the 3 principal centres of distribution. *Amphymenium*, *Euhinodiscus*, *Moutouchia*, *Phellocarpus* Benth. and *Ancylocalyx* Tul. were all reduced to *Pterocarpus*. 3 species were reported from the area under our study, namely *P. santalinus* Linn. f., *P. marsupium* Roxb. and *P. indicus* Willd. *P. dalbergioides* Roxb. and *P. wallichii* Wt. & Arn. were reduced to *P. indicus* Willd. Of the 15 species, 5 were strictly African, 7 American and 3 Asiatic. These were placed under 2 artificial heads. 1. Ovaris stipitato 2. Ovario sessili. All the Asiatic species fall under the first category. Bentham and Hooker's (1865) treatment of the genus was more or less similar to that of the above work, but they reduced *Vatairea* Aubl. also under *Pterocarpus*. An interesting new *Pterocarpus* was discovered from Burma by Kurz (1874), namely *P. macrocarpus*. Baker (1876) enumerated 4 species for the then British India. Like Bentham, he reduced *P. dalbergioides* and *P. Wallichii* to *P. indicus* and reported this species from Eastern and Western Peninsula. This is highly doubtful as no wild collection has so far been reported from these areas except under cultivation.

As mentioned earlier Kuntze (1891) adopted the generic name *Lingoum* and transferred all the species under this name. Taubert (1894) accepted *Pterocarpus* Linn. as the valid name and followed Bentham in the treatment of the species. He recognised 20 species and they were grouped under 2 sections 1. Stipitati. 2. Sessiles. The 3 Asiatic species were placed under the first section.

David Prain (1897) clarified and amply justified the status of *P. dalbergioides* as a distinct species. Though Roxburgh described this as a good species from the Andamans, later workers like Bentham (1860) and Baker (1876) reduced it under *P. indicus*. Secondly *P. wallichii* of Wight which was reduced to *P. indicus* by Bentham (1860) etc. was proved to be a form of *P. marsupium* with less obtuse leaflets and wider pods. Subsequent to this Prain was asked by the Inspector General of Forest to

prepare a critical account of the genus (1900) which from the forester's point of view was very important. The forest officers all over India and Burma sent large number of specimens to the Calcutta Herbarium. Prain not only studied these specimens in greater detail but also utilised his visits to British Herbaria (Kew, British Museum and Linnaean Society) to make authentic studies on the collections, available there. These studies resulted in the publication (1900) of 'A report on the Indian species of *Pterocarpus*. Though this report added little additional information, it presented a complete picture of the genus in India in a compact form. The distribution of the species was ably defined both for *P. marsupium* and *P. indicus* and the different forms were clearly described. It further settled the source of true Padouk and set at rest the relationships of the Burmese padouk with Andaman padouk, otherwise called Andaman redwood.

The regional floras Cooke (1902) ; Duthie (1903) ; Prain (1903) ; Gamble (1918) ; Haines (1922) did not add any new information except 1 new variety *P. marsupium* var. *incanus*, described by Gamble. Rojo in his monograph (1972) on the genus recognised 20 species, distributed in the tropics of both the hemispheres.

In the present work, 5 species are recognised from the area under study. *P. dalbergioides* is regarded as a distinct species. *P. marsupium* is treated as a species complex with varied forms. *P. marsupium* var. *acuminata* Prain has been raised to a subspecies.

PTEROCARPUS JACQUIN (nom. gen. conserv.)

Pterocarpus Jacquin, Select. Stirp. Amer. Hist. 283. 1763 ; Linn. Suppl. Pl. 318. 1781 ; Juss. Gen. Pl. 362. 1789 ; Lour. Fl. Cochinch. 2 : 431. 1790 ; Gaertn. Fruct. Sem. Pl. 351. 1791 ; Roxb. Pl. Corom. 2 : 9. 1793 ; Lamk. III. Gen. 2 t. 602. 1796 ; Willd. Sp. Pl. 3 : 904. 1802 ; Pers. Syn. Pl. 277. 1807 ; Roxb. Hort. Beng. 53. 1814 ; DC. Prodr. 2 : 419 1825 et Mem. Des Legum. 388. 1825 ; Guill. Perr. et Rich. Fl. Senegamb. 228. 1830 33 ; Roxb. Fl. Ind. 3 : 234. 1832 ; Wight et Arnott, Prodr. Fl. Pen. Ind. Or. 266. 1834 ; Lindl. Nat. Syst. Bot. 156. 1836 ; Grah. Cat. Bombay Pl. 56. 1839 ; Endlicher, Gen. Pl. 854. 1839 et Ench. Bot. 672. 1841 ; Walp. Repert. Bot. Syst. 1 : 793. 1842 ; Voigt, Hort. Suburb. Calcutt. 242. 1845 ; J. Lindley, Veg. Kingdom 555. 1853 ; Miq. Fl. Ind. Bat. 1 : 134. 1855 ; Thw. Enum. Pl. Zeyl. 92. 1859 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 74. 1860 ; Dalz. et Gibs. Bombay Fl. 76. 1861 ; Benth. in Mart. Fl. Brasil 15(1) : 266. 1862 ; Benth. et Hook.f. Gen. Pl. 1 : 547. 1865 ; Baker in Oliver Fl. Trop. Afr. 2 : 237. 1871 ; Bedd. Fl. Sylvat. 2 : 88. t. 21. 1871 ; Brandis, For. Fl. 152. 1874 ; Baker in Hook.f. Fl. Brit. India 2 : 238. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 278. 1877 et For. Fl. Brit. Burma 1 : 349. 1877 ; Watt, Dict. Econ. Prod. 6(1) : 355.

1892 ; Trim. Fl. Ceyl. 2 : 90. 1894 ; Taubert in Engl. & Prantl. Die Nat. Pfl. fam. 3(3) : 340. 1894 ; Prain in Journ. Asiat. Soc. Beng. 66 : 123, 453. 1897 et Indian For. 26 (Suppl.) : 3. 1900 ; Talbot, Tr. Shr. Clim. Bombay Pres. 138. 1902 ; Cooke, Fl. Pres. Bombay 1(2) : 401. 1902 ; Duthie, Fl. Upp. Gang. Pl. 1(1) : 266. 1903 ; Prain, Beng. Pl. 1 : 411. 1903 ; Brandis, Indian Tr. 239. 1907 (ed. 2) ; Bourdillon, For. Fl. Travancore 135. 1908 ; Talbot, For. Fl. Bombay Pres. Sind 1 : 430. 1909 ; Merr. in Philip. Journ. Sci. 5 : 99. 1910 ; Haines, For. Fl. Chotanagpur 334. 1910 ; Ramarao, Flow. Pl. Travancore 131. 1914 ; Troup, Silviculture Indian Tr. 266. 1921 ; Ridley, Fl. Malay Pen. 1 : 492. 1922 ; Parkinson, For. Fl. Andamans 152. 1923 ; Merr. Enum. Philip. Flow. Pl. 2 : 297. 1923 ; Rothmaler in Fedde Rep. 53 : 21. 1944 ; Benthall, Tr. Calcutta 151. 1946 ; Hutch. et Dalz. Fl. Trop. W. Afr. 1 : 517. 1954 (ed. 2) ; Baker et Bakhui-zen van den Brink, Fl. Java 1 : 615. 1963 ; Hutch. Gen. Flow. Pl. 1 : 388. 1964 ; Engler, Syll. Der Pfl. fam. 2 : 232. 1964 ; Santapau in Rec. bot. Surv. India 16(1) : 75. 1967 (ed. 3) ; Wealth India 8 : 300. 1969 ; Taxon 18 : 471. 1969 ; Ibid. 19 : 818. 1970 ; Gillett et al. Fl. Trop. East. Africa 81. 1971 ; Rojo Phaner. Monogr. 5 : 1 119. 1972 ; Saldanha et Nicolson Fl. Hassan Karnat. 261. 1978 ; Nack, Fl. Osman. 113. 1979 ; Polhill in Polhill et Raven Adv. Leg. Syst. Pt. 1 : 242. 1981 ; Matthew, Fl. Tam. Nad, Car. 3 (1) : 444. 1983 ; Saldanha Fl. Karnat. 1 : 483, 1984.

Lingoum Rumph. Herb. Amboin. 2 : 294. t. 70. 1742 ; Adan. Fam. 2 : 319. 1763 ; Kuntze, Rev. Gen. Pl. 1 : 193. 1891. *Moutouchia* Aubl. Pl. Gui. 2 : 748. 1775. *Amphymenium* H.B.K. Nov. Gen. et Sp. 6 : 380. 1823. *Echinodiscus* Benth. in Ann. Wien. Mus. 2 : 94. 1838. *Phellocarpus* Benth. Ibid. 2 : 106. 1938. *Ancylocalyx* Tul. in Ann. Sci. Nat. (Ser. 2) 20 : 136. 1843. *Nephraea* Nor. ex Hassk. Cat. Hort. Bog. Alt. 283. 1844.

Tall trees, mostly deciduous in character ; branches spreading, glabrous to pubescent. *Leaves* alternate, imparipinnate, stipulate ; leaflets 5 or more, rarely 3, mostly alternate, rarely subopposite, exstipellate, entire, narrow to rounded at base, retuse to acuminate at apex, coriaceous, glabrous to pubescent. *Inflorescence* a simple raceme to lax, terminal or axillary panicle. *Flowers* yellow, bract and bracteoles minute, caducous, pedicels articulated. *Calyx* turbinate, often incurved, 5 toothed, teeth short, upper 2 more or less connate. *Corolla* papilionaceous, vexillum ovate to orbicular, distinctly clawed, crisped ; wings and keels obliquely oblong to oblong, clawed. *Stamens* 10, monadelphous to diadelphous, primarily monadelphous but due to swelling of ovary become diadelphous later (5 + 5 or 9 + 1), staminal sheath split open dorsally, anthers versatile. *Ovary* shortly stipitate, style incurved, glabrous, stigma terminal, ovules 2-6. *Pods* indehiscent, ovate to orbicular, stilar point turned laterally, pod winged around the seed, 1-2 seeded.

Type species : *Pterocarpus officinalis* Jacquin

Distribution : About 20 species, spread in the tropics of both the hemispheres.

Typification : Rothmaler (1944) proposed that *Pterocarpus* Jacquin (1763) should be conserved against *Pterocarpus* Linnaeus (1754) with *P. officinalis* Jacquin as the type species. According to him the original *Pterocarpus* Linn., though applied to a Rumphian plant was validated by reference to Linnaeus's former description in his *Flora Zeylanica* (1747) which is a synonym of *Derris* Lour. The first author to publish a binomial under *Pterocarpus* was N.N. Jacquin who described and figured an American species (*P. officinalis*). Conservation of *Pterocarpus* from Jacquin's work will preserve the current usage of generic name and of the specific name *P. officinalis*. Rothmaler's above proposal, made in 1944 was again proposed under *nomina generica conservanda*, in *Taxon* (18 : 471. 1969). After discussion in the nomenclatural committee, the above proposal was accepted, (*Taxon* 19 : 818. 1970) with the following reasons. The name *Pterocarpus* Jacq. has been widely used. *Pterocarpus* Linn. was a mixture, based partly on published reference to a species of *Pterocarpus* Jacq. and partly on a specimen of *Derris trifoliata* Lour. The latter may be regarded as the lectotype of the name *Pterocarpus* Linn. The name *Derris* Lour. is already conserved but not against *Pterocarpus* Linn. Therefore unless *Pterocarpus* Jacq. is conserved a new name will have to be found for its genus and *Pterocarpus* Linn. will replace *Derris*. As this would be a most confusing state of affairs the nomenclatural committee of International Botanical Congress has unanimously recommended the conservation of *Pterocarpus* Jacquin.

Distribution Pattern : 5 species of *Pterocarpus* have so far been reported from the area under study namely *P. indicus* Willd., *P. dalbergioides* Roxb. ex DC., *P. macrocarpus* Kurz, *P. santalinus* Linn. f. and *P. marsupium* Roxb. It is interesting to point out that out of the 5 species, *P. dalbergioides* is strictly confined to the Andaman Islands and is endemic while *P. macrocarpus* is strictly a Burmese species. *P. santalinus* is again restricted to Southern India while *P. marsupium* is widely distributed in India and Sri Lanka. *P. indicus*, a widely distributed species in Asia, Malaysia and China occurs wild in Burma whereas it is only cultivated in parts of India. (Refer Tables 3 & 4 and Maps 18-19).

Economic Importance : The genus *Pterocarpus* is very important from the forester's point as its species yield valuable timber of great economic importance. The wood of *P. indicus* (Padauk) and *P. dalbergioides* (Andaman red wood) are used in making fine furniture, for cabinet

TABLE 3
Distribution Pattern of Asiatic Species of *Pterocarpus*

Species	India	Sri Lanka	Burma	Pakistan	Bangladesh	Malaysia	China	Remarks
<i>Pterocarpus dalbergioides</i>	X.....							In India the species occurs only in Andamans where it is an endemic taxon.
<i>P. indicus</i>	X.....		X.....			X.....	X...	In India the species is cultivated.
<i>P. macrocarpus</i>			X.....					A species, restricted to Burma only.
<i>P. marsupium</i>	X.....	X.....						A common species widely distributed in India
<i>P. santalinus</i>	X.....							A species, confined to south India only.

making, gun carriages and wood carving. The 'Gum Kino' of the European materia medica is obtained from *P. marsupium*. More details are furnished under each species.

Cytology : The genus is characterised by 11 basic number of chromosomes. *P. macrocarpus* Kurz has $n = 11$ chromosomes, while *P. marsupium* possesses $n = 22$ chromosomes suggesting thereby tetraploidy (Atchison, 1951).

Palynology : The pollen grains are 3 zonicolporate and exhibit '*Crotalaria vestita*' type in exine pattern as in *P. marsupium* Roxb. and *P. indicus* Willd. The grains here are reticulate, subprolate in shape and lumina devoid of any ornamentation. On the contrary *P. santalinus* Linn. f. differs in having, '*Crotalaria albida*' type of grains which are faintly reticulate, oblate spherical in shape and thinner nexine. (Vishnu Mittre and Sharma, 1962).

TABLE 4

Endemism in the Genus Pterocarpus within the Area Under Study

Area under Study	Total Number of Species Recorded	Number of Endemic Species	Percentage of Endemism
India	3	1	33.3%
Burma	2	1	50%
Sri Lanka	1	Nil	Nil
Pakistan	Nil	Nil	Nil
Bangladesh	Nil	Nil	Nil

KEY TO THE SPECIES

- 1a. Leaflets glabrous beneath when mature ; pods mostly glabrous, rarely puberulous
 - 2a. Leaflets ovate-elliptic; inflorescence mostly axillary raceme or panicle ; edge of the pod between the stalk and stylar point convex ... 1. *P. indicus*
 - 2b. Leaflets ovate - lanceolate, stipule lanceolate ; inflorescence axillary to terminal panicles ; edge of the pod between stalk and stylar point concave ... 2. *P. dalbergioides*
- 1b. Leaflets puberulous to pubescent beneath when mature ; pods puberulous to pubescent.

- 3a. Leaflets 6 - 9 ; pods 4.5 - 7.0 x 4.0 - 6.5 cm, edge of pod between stalk and styler point varying ... 3. *P. macrocarpus*
- 3b. Leaflets 3 - 7 ; pod up to 5 cm long and 4.5 cm wide.
- 4a. Leaflets 3 - 5, ovate to orbicular ; pods 4 - 5 x 4.0 - 4.5 cm, edge of pod between stalk and styler point concave. ... 4. *P. santalinus*
- 4b. Leaflets 5 - 7, elliptic - oblong ; pods 3.5 - 4.5 x 3.5 - 4.5 cm, edge of pod between stalk and styler point convex. ... 5. *P. marsupium*

1. ***Pterocarpus indicus*** Willd. Sp. Pl. 3 : 904. 1802; Roxb. Hort. Beng. 53. 1814 ; DC. Prod. 2 : 419. 1825 ; Roxb. Fl. Ind. 3 : 238. 1832 ; Voigt, Hort. Suburb. Calcutt. 242. 1845 ; Miq. Fl. Ind. Bat. 1 : 135. 1855 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 77. 1860 (Excl. Syn. *P. dalbergioides* Roxb.) ; Baker in Hook. f. Fl. Brit. India 2 : 238. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 278. 1877 (exclude synonyms) et For. Fl. Brit. India 1 : 1877 (in part) ; Forbes & Hemsl. in Journ. Linn. Soc. 23 : 199. 1887 ; Watt, Dict. Econ. Prod. India 6 (1) : 355. 1892 (in part) ; Prain in Journ. Asiat. Soc. Beng. 66 : 123. 454. 1897 et Indian For. 26 (Suppl.) : 7. 1900 et Beng. Pl. 1 : 412. 1903 ; Brandis, Indian Tr. 239. 1907 (ed. 2) ; Ramaro. Flow. Pl. Travancore 131. 1914 ; Troup, Silviculture Indian Tr. 1 : 292. 1921 ; Ridley, Fl. Malay. Pen. 1 : 593. 1922 Merr. Enum. Philip. Flow. Pl. 2 : 297. 1923 ; Parkinson. For Fl. Andaman 153. 1923 ; Burk ill, Dict. Econ. Prod. Mal. Pen. 2 : 1829. 1935 ; Bor, Man. Indian Tr. 90. 1953 ; Blatter & Millard, Indian Tr. 119. 1954 (ed. 2) ; Backer et Bakhuizen, Fl. Java 1 : 615. 1963 ; Wealth India 8 : 302. 1969 ; Nair et Henry Fl. Tam. Nad. (Ser. 1) 1 : 188. 1983 ; Sharma et al Fl. Karnat. 80. 1984.

Lingoum saxatile Rumph. Herb. Amboin. 2 : 210. 70. 1750. *Pterocarpus wallichii* Wight & Arn. Prod. Fl. Pen. Ind. Or. 264. 1834 ; Walpers, Repert. Bot. Syst. 1 : 793. 1842. *P. zollingeri* Miq. Fl. Ind. Bst. 1 : 136. 1855. *Lingoum indicum* (Willd.) O. Ktze. Rev. Gen. Pl. 1 : 193. 1891.

A handsome tree, 15 - 25 m high ; branches spreading. *Leaf* imparipinnate, alternate, stipulate, 15 - 31 cm long, leaflets mostly 5 - 7, rarely 9 - 11, ovate - elliptic, 5 - 11 x 3.5 - 5.5 cm, alternate, at times subopposite, entire, truncate at base, shortly bluntish acuminate at apex, glabrous, thin chartaceous, lateral veins 6 - 8 pairs ; stipule early caducous ; petioles 4 - 7 mm long, rachis and petiolule glabrous. *Inflorescence* a raceme, or panicle, mostly axillary, rarely terminal, 10 - 18 cm long, puberulous. *Flowers* yellow, pedicellate, 1.0 - 1.5 cm long ; bract small, bracteoles 2, linear - oblong, at the base of the calyxcup ; pedicels slender, 7 - 9 mm

long, jointed. *Calyx* turbinate, distinctly 5 toothed, 4-6 mm long, puberulous without, teeth rounded, posterior 2 larger than the rest. *Corolla* vexillum ovate orbicular to oblong, distinctly clawed, veined, crisped at the margin; wings oblong, as long as the vexillum, clawed; keels narrowly oblong, clawed, smaller than wings. *Stamens* 10, diadelphous (9 + 1), sheath 8-9 mm long, split open dorsally, vexillary filament free up to the base, filaments in varying heights; anthers versatile. *Ovary* oblong, 7-8 mm long, nonstipitate, pubescent, style bent, stigma minute, ovules 2. *Pods* orbicular, 4.5 x 3.5-4.2 cm, shortly stalked, flat and indehiscent, winged allround, silky puberulous to glabrescent, styler point laterally disposed and pointing outwards, edge of the pod between stalk and styler point convex, 1 seeded, reticulately veined against the seeds; seed narrow and oblique, kidneyshaped, brownish.

Flower : March to April. *Fruit* : April to May.

Distribution : INDIA (mostly cultivated), BURMA AND MALAYSIA (Malayan Peninsula, Java, Sumatra, Borneo, Philippines, New Guinea) and CHINA. (Map 18)

Specimens examined :

South India : Peninsula Indiae Orientalis : *Wight* 409 (cultivated one LE, CAL); S. India *Krishnaswamy Naidoo* s.n. (cultivated one CAL).

Calcutta : HBC (Cultivated), Apr. 1898 *Lane* s.n. (CAL); Botanic Garden, Apr. 1894 *Collector* ? s.n. (CAL); HBC, Calcutta, May 1890 *Proudlock* s.n. (CAL); HBC, Calcutta, Jul. 1871 *Clarke* 14117 (LE).

Bombay : Victoria garden, Apr. 1957 *Fernandez* 3941 (BLAT); Malabar hill, Apr. 1957 *Fernandez* 3977 (BLAT); University garden, Aug. 1917 *Collector* ? 10708 (BLAT); Vihar, Thana district, Feb. 1919 *Collector* 30609 (BLAT); Malabar hill, Sept. 1919 *Blatter* 12655 (BLAT); Victoria garden, Jan. 1917 *Collector* 1470 (BLAT).

Burma : Tenasserim, Tavoy, Feb. 1901 *Shaik Mokim* 433 (CAL); Moulmein *Collector* ? s.n. (CAL); Tavoy, Apr. 1885 *Badul Khan* 242 (CAL); Without definite locality, (Tenasserim), Mar. 1911 *Meebold* 14792 (CAL); Tharrawaddy, 133 m Apr. 1901, *Collector* ? s.n. (CAL); Pegu *Brandis* 1188 (CAL); Amherst, Apr. 1849 *Falconer* s.n. (CAL); Rangoon *Kurz* 1771 (CAL).

Wall. Cat. : Penang *Wall. Cat.* 58430 (CAL) ; Herb. Wight *Wall. Cat.* 5843 D (LE).

A. *Etymology* : The specific epithet 'indicus' denotes East Indies by which name the present Malayan Archipelago was known earlier.

B. *Ecology* : In Malayan peninsula the tree grows in rocky places near sea and rivers as in Malacca (Ridley l.c. 1922). It is essentially a deciduous tree and is one of the dominant species in semi deciduous forests. It grows upto 16 m with a spreading crown of dark green foliage and drooping branches. The tree prefers a rainfall of more than 150 cm and well drained soil. Young plants seem to demand rather more light than the heavy forest canopy to penetrate and therefore interruption of the surface by rocks and rivers is beneficial to them.

C. *Distribution* : The tree is indigenous to Malayan Archipelago from where it has been introduced in to Burma and has been largely planted in gardens and along road sides as an avenue tree. It has also been planted to a small extent in Calcutta, Madras and Bombay. This is the correct distribution of this species. But Baker in the flora of British India (1876) mentioned 'Eastern and Western Peninsula' under distribution which is confusing. All the collections of this species in India are all from cultivated plants. Similarly it never grows wild in Burma. Prain (l.c. 1900) pointed out that he had not met any true *P. indicus* in Burma when a survey was conducted by the various forest officers.

D. *Economic importance* : The timber is highly valuable and it is hard, moderately heavy, yellow to red and fragrant with rose like odour. It is, therefore, used in furniture industry. It ranks next to *P. dalbergioides* Roxb. (Andaman red wood ; padouk). The bark is well known in Malayan medicine (Burkill, 1935). Extraction from bark is used as an application in sores but more often fresh bark is used. According to Holmes, the juice of the root is applied in syphilitic sores.

2. *Pterocarpus dalbergioides* Roxb. (Hort. Beng. 53. 1814, nomen) ex DC. Prod. 2 : 418. 1825 ; Roxb. Fl. Ind. 3 : 236. 1832 ; Wight & Arn. Prod. Fl. Pen. Ind. Or. 267. 1834 ; Wight, Ic. t. 246. 1840 ; Walp. Repert. Bot. 1 : 793. 1842 ; Voigt, Hort. Suburb. Calcutt. 242. 1845 ; Kurz Rep. Veg. And. 36. 1870 ; Prain in Journ. Asiat. Soc. Beng. 66 : 124, 454. 1897 et Indian For. 26 (Suppl.) : 4. 1900 et Beng. Pl. 1 : 412. 1903 ; Brandis, Indian Tr. 239. 1907 (ed. 2) ; Troup, Silviculture Indian Tr. 277. 1921 ; Parkinson, For. Fl. Andaman 152. 1923 ; Burkill, Dict. Econ. Prod. Mal. Pen. 2 : 1829. 1935 ; Bor, Man. Indian Tr. 90. 1953 ; Thothathri in Bull. bot. Surv. India 4 : 290. 1962 ; Wealth India 8 : 300. 1969.

Pterocarpus indicus Benth. in Journ. Linn. Soc. 4 (Suppl.) : 77. 1860 (in part) non Willd. ; Bedd. Fl. Sylvat. t. 23. 1869 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 278. 1877 et For. Fl. Brit. India 2 : 238. 1876 (in part) non Willd. ; Watt, Dict. Econ. Prod. India 5 : 255. 1892.

A large deciduous tree, 25–40 m high with a clear, straight bole and a crown of spreading branches at the top ; trunk with large buttresses. *Leaves* imparipinnate, stipulate, 13.5–26.5 cm long ; leaflets 5–9, 4.5–11.0 x 3–6 cm, alternate, basal leaflets smaller, ovate, leaflets above ovate-oblong to ovate-lanceolate, terminal one largest, all petiolulate, entire, base rounded to deltoid, apex narrowly acuminate, coriaceous, glabrous, lateral veins 5–8 pairs, distinct and raised beneath ; petiolules 3–6 mm long ; stipule lanceolate, caducous. *Inflorescence* axillary and terminal panicles, 13.0–19.5 x 10–16 cm, rachis and branches puberulous to glabrescent. *Flowers* fragrant yellow, 1.2–1.3 cm long ; bracteoles 2, ovate, pubescent, caducous ; pedicels 4–5 mm long, puberulous. *Calyx* turbinate, somewhat curved below, 5–6 mm long, puberulous without and glabrous within, teeth deltoid, posterior 2 distinctly largest, conspicuous, remaining 3 smaller and triangular. *Corolla* vexillum ovate-orbicular, obovate, 1.2–1.3 cm long, margin reflexed back and beautifully curled, distinctly clawed ; wings obovate, clawed, as long as vexillum, margin curled ; keels much smaller than wings, clawed, somewhat boat-shaped, connate below in the middle. *Stamens* 10, isodiadelphous, sheath 6–7 mm long, filaments free on their upper fourth, longer ones alternating with shorter ones. *Ovary* 6 mm long, oblong, non-stipitate, pubescent, style lateral, glabrous, stigma minute, ovules 2–3. *Pods* indehiscent, flat, suborbicular to orbicular, 4.0–7.5 x 4–7 cm, stalked, 2-celled, 1–2 seeded, stylar point laterally disposed and pointing downwards, entire, pod surrounded with a wide, membranous wing, glabrous to puberulous, rigid, and reticulated against seeds, edge of the pod between stalk and stylar point concave and usually with a median lobe, stalk of pod 2.5–3.0 cm long ; seed 1–2, reniform, one in each cell.

Type : Roxburgh Ic. 9 : t. 1587 (Lectotype, CAL).

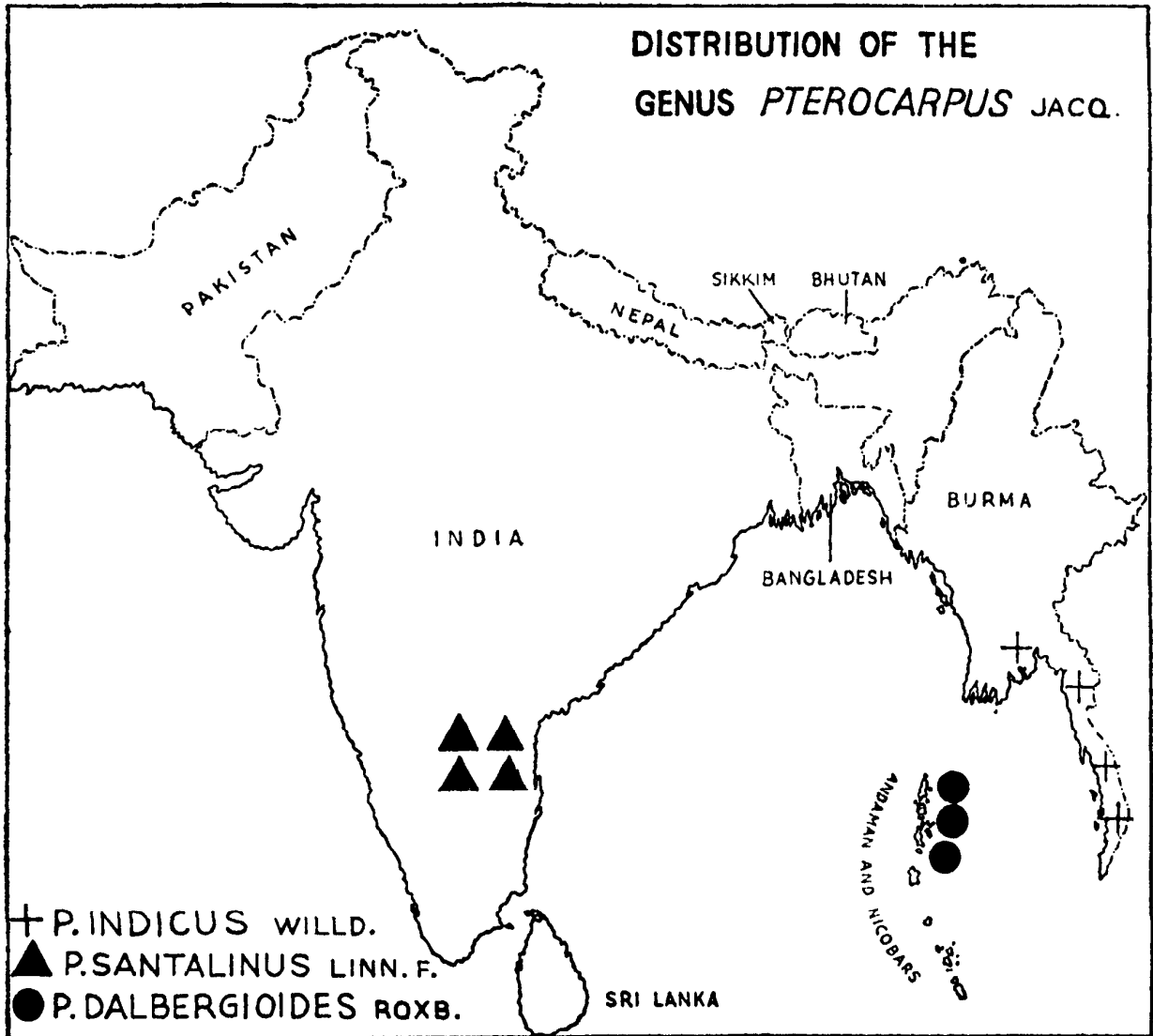
Flower : June to August, rarely in October.

Fruit : December to March, rarely in September.

Distribution : ANDAMAN ISLANDS, and cultivated in other parts of India. (Map 18)

Specimens examined :

Andamans : South Andaman, North Bay hill jungle, Aug. 1891



Map 18

King s.n. (CAL) ; Hills near Port Blair, Aug. 1884 *King's collector* 201 (CAL) ; Hills near Port Blair, Jun. 1884 *King's collector* 292 (CAL, LE) ; Hobdaypur, Sep. 1890 *King's collector* s.n. (CAL) ; Mount Harriet hill jungle, Sept. 1894 *King's collector* s.n. (CAL) ; South point, Port Blair *Kurz* s.n. (CAL) ; Ross Island *Kurz* s.n. (CAL) ; Wimberlygunj, Jul. 1897 *Heinig* 136 (CAL) ; Wimberlygunj, Jun. 1899 *Hussain Ali* 14, 15, 16, 19, 21, 24, 28, 29, 30, 71 (CAL) ; Gopalakabang valley, 1899 *Hussain Ali* 34, 69 (CAL) ; Kodakachang forest, June. 1899 *Hussain Ali* 72, 88, 91, 90, 93, 94 (CAL) ; South Andaman (without definite locality), Dec. 1896 *Heinig* 80H (LE) ; Andamans (without definite locality), Sep. 1900 *Prain's collector* 72 (LE) ; South Andaman (without exact locality), Sep. 1899 *Heinig* 16 (LE) ; Without definite locality (Andamans) Sep. 1900 *Prains collector* 72, 282, 200 (CAL) ; Without definite locality (S. Andaman), Jul. 1897 *Heinig* 135 (CAL) ; Without definite locality (S. Andaman), Dec. 1896 *Hussain Ali* 42 (CAL), Middle Andaman, Long Island, Apr. 1964 *Thothathri* 10783 (CAL) ; Lakimpur, S. Andaman, Nov. 1976 *Nair* 4873 (PB, CAL) ; Rangat, N. Andaman, Nov. 1977 *Bhargava* 6376 (CAL, PB) ; Wright Myo, S. Andaman, June 1974 *Thothathri* 1709 (PB) ; Baratang Island, Oct. 1979 *Basu* 7610 (PB).

South India : Pen. Ind. Or. (cultivated) *Wight* 910 (CAL).

Calcutta : Botanic Garden, Sibpur, Mar. 1884 *Collector* ? s.n. CAL)

Wall. Cat. : HBC *Wall. Cat.* 5843 (CAL, LE) ; 5845 (CAL) ; Herb. Heyne *Wall. Cat.* 5843F (CAL) ; Herb. Madras *Wall. Cat.* 5843C (CAL) ; Ind. Or. 1844 *Wallich* s.n. (CAL).

A. Etymology : According to Roxburgh (l.c. 1832) the name '*dalbergioides*' was given to this species due to the isodiadelphous stamens as in some species of *Dalbergia*.

B. Ecology : The plant is a tree, common in deciduous and semideciduous forests of the Andaman islands. It represents one of the dominant elements in the above forests, often associated with *Terminalia bialata* Steud., *T. procera* Roxb., *Canarium euphyllum* Kurz, *Pterocymbium tinctorium* Merr., and *Dillenia pilosa* Roxb. It forms the famous 'Padauk' forest in the Andaman islands. The plant prefers well drained soil and grows up to an elevation of 650 m. It is leafless during hot summer and comes to bloom in June August. The tree grows to a height of 30-40 m with a clear bole of 10-20 m and the girth of the trunk often reaching 6 m. The trunk is much buttressed at base.

C. Critical notes : Baker (l.c. 1876) followed Bentham (l.c. 1860) in treating this species conspecific with the previous one, *P. indicus* Willd. Kurz too (l.c. 1877) was of the same opinion. Though the two species do

appear similar, yet there are marked characters which keep them well apart. This was ably pointed out by Prain (l.c. 1897 & 1900). The author after a careful study of the 2 species has come to similar conclusion as that of Prain. They differ in the calyxcup, staminal sheath and pod.

The authorship for this species is DeCandolle and not Roxburgh as attributed earlier.

D. Economic importance : The tree is the well known 'Padauk' of the Andaman Islands and is one of the most important timber yielding species. The wood presents various shades of colour, ranging from light brown to deep reddish brown, rich red or gorgeous crimson. Hence it is also, known as the 'Andaman red wood' tree. The wood is used for making fine furniture, carts, gun carriages and for cabinet works. The furniture, made out of the Andaman red wood earned a worldwide reputation in the Paris exhibition, held in 1878. It is one of the important revenue yielding timber trees of the Andaman inlands.

3. ***Pterocarpus macrocarpus*** Kurz in Journ. Assiat. Soc. Beng. 43 : 187. 1874 ; Baker in Hook.f. Fl. Brit. India 2 : 239. 1876 ; Kurz in Journ. Asiat. Soc. Beng. 45 : 278. 1877 et For. Fl. Brit. Burma 1 : 349. 1877 ; Watt. Dict. Econ. Prod. India 6(1) : 357. 1892 ; Prain in Journ. Asiat. Soc. Beng. 66 : 45. 1897 et Indian For. 26 (Suppl.) : 10. 1900 ; Gage in Rec. bot. Surv. India 3 : 49. 1904 ; Brandis, Indian Tr. 239. 1907 (ed. 2) ; Troup, Silviculture Indian Tr. 287. 1921 ; Bor, Man. Indian Tr. 90. 1953. (Fig. 19).

Lingoum macrocarpum (Kurz) O. Ktze. Rev. Gen. Pl. 1 : 103. 1891.

A medium sized tree, 10-20 m high ; young branches pubescent, bark blackish grey. *Leaves* imparinnate, alternate, stipulate, 15-31 cm long ; leaflets 6-9, ovato-oblong lanceolate, 5-11 x 2.5-6.0 cm, alternate, petiolulate, entire, rounded at base, rarely truncate, narrowed to an acute apex or sometimes bluntly acuminate, at times mucronate, coriaceous, glabrous above, pubescent below when young but puberulous to glabrescent when mature, lateral veins 4-6 pairs ; rachis and petiolule rusty pubescent. *Inflorescence* mostly simple, axillary raceme, rarely branched, 11-15 cm long, rachis rusty pubescent. *Flowers* yellow, fragrant, 1.4-1.5 cm long ; bracteole 2, oblong lanceolate, caducous ; pedicels 8-9 mm long, rusty pubescent. *Calyx* campanulate, 5-7 mm long, slightly curved inwards, 5-toothed, teeth ovate to triangular. *Corolla* vexillum ovato-orbicular, 1.3-1.5 cm long, distinctly clawed, veined, margin wavy and crisped ; wings oblong, as long as vexillum, clawed ; keels narrowly oblong, long clawed, more or less equal to wings. *Stamens* 10, isodia-delphous, sheath 8-10 mm long, rarely split three-fourth on



Fig. 19. *Petrocarpus macrocarpus* Kurz.

the ventral side so as to appear monadelphous, filaments vary in length. *Ovary* 6-8 mm long, nonstipitate, densely rusty pubescent, style glabrous to pubescent, stigma minute, ovules 2. *Pods* indehiscent, flat, obliquely orbicular, 4.7-7.0 cm long, 4.0-6.5 cm in diameter, stalked, entire, tawny pubescent when young and puberulous to rarely pubescent when mature, surrounded with a membranous wing around, wing at times folded, edge of pod between stipe and styler base varying from convex to concave, 1-2 seeded, stalk of pod 0.8-1.2 cm long.

Type : Tonkyeghat, at 7 Pagodas, Pegu Kurz 1772 (Lectotype designated, CAL).

Flower : July to August. *Fruit* : August to October.

Distribution : BURMA (Pegu, Martaban and Tenasserim), INDIA ?
(Map 19)

Specimens examined :

Burma : Mandalay, Aug. 1900 *Conservator of Forests* s.n. (LE, CAL) ; Gungaw, Pakokka district, Aug. 1899 *Jenkins* s.n. (CAL) ; Lower Chindwin district, 1899 *Collector?* s.n. (CAL) ; Tavoy, Nov. 1887 *Shaiak Mokim* 87 (CAL) ; Without definite locality, Pegu, 1857 *Eyre* s.n. (CAL) ; Kyuske, 8 miles from Mandalay, Sept. 1890 *Abdul Huk* s.n. (CAL) ; Tobadowa, Jul. 1891 *Abdul Huk* s.n. (LE, CAL) ; Without any details, Pegu *Brandis* s.n. (CAL) ; Kyoukmyoung, Jul. 1891 - *Abdul Huk* s.n. (CAL) ; Satpanaing, 400 m, Meiktila district, Aug. 1914 - *G. Rogers* 520 (CAL) ; Kanni to Myaungmyaik, 166 m, Namethin district, Oct. 1909 *Lace* 959 (CAL) ; Moulmein, May 1911 *Meebold* 15509 (CAL) ; Kyankse, Oct. 1891 *Abdul Huk* s.n. (CAL) ; Yanga, 50 miles from Mandalay, 1892 *Abdul Huk* 114 (CAL) ; Bau Myo, Chin hills, Jul. 1892 *Abdul Huk* s.n. (CAL) ; Karen country *Brandis* 1159 (CAL) ; Nwamadaung hills, 333 m, Minbu district, Mar. 1903 *Aubert & Gage* s.n. (CAL) ; Kyankse subdivision, Mandalay, Oct. 1900 - *Conservator of Forests* s.n. (CAL) ; Upper Chindwin, Aug. 1894 *Karanagh* s.n. (CAL) ; Monywa, Lower Chindwin division, Dec. 1899 *A. Smythier* s.n. (CAL) ; Taungdwingyi, Majwe subdivision, Mar. Apr. 1900 *Jenkins* s.n. (CAL) ; Paunglaung range, May 1899 - *Ranger* s.n. (CAL) ; Momythain range, Mar. 1900 *Conservator of Forests* s.n. (CAL) ; Paunglaung range, May 1899 *Ranger* s.n. (CAL) ; Palan township, Tavoy, Nov. 1899 *Deputy Ranger* s.n. (CAL) ; Northern Circle, Upper Burma, Aug. 1900 *Conservator of Forests* s.n. (CAL) ; Thayetmyo division, Pegu Circle, Jun. 1900 *Conservator of Forests* s.n. (CAL) ; South Tenasserim division, Oct. 1899 - *Asstt. Conservator of Forests* s.n. (CAL) ; Thaungyin division, Tenasserim Circle, Nov. 1899 *Manson* s.n. (CAL) ; Mithikit forests, Atran division,

Jul. 1899 *Manson* s.n. (CAL) ; Prome division, Jul. 1900 *Dy. Conservator of Forests* s.n. (CAL) ; Shan hills, Upper Burma, 1892 *Abdul Huk* s.n. (LE).

Bengal : Champamoor, Tipperah hills, 316 m, Oct. 1915 *Debbarman* 924 (CAL) ; HBC, Calcutta *Collector ?* s.n. (CAL).

A. *Etymology* : The specific epithet '*macrocarpus*' means the presence of larged sized fruits.

B. *Ecology* : The tree grows well in mixed forests of Martaban and Tenasserim and is rare in the dry forest. It is leafless during hot season and sets blooming afterwards. It grows well in undulating hilly regions up to an elevation of 800 m.

C. *Cytology* : $n = 11$ (Atchison, 1951).

D. *Typification* : Kurz (l.c. 1874) cited under description 'Pegu, Burma', thereby not specifying the type. 2 collections (Tonkyeghat, *Kurz* 1770 and *Kurz* 1772), made from Pegu by Kurz are present in the Calcutta herbarium. Of these *Kurz* 1772 has been chosen as the lectotype of this species.

E. *Distribution* : In Calcutta Herbarium there is one collection from Tipperah hills by Debbarman who suggested that it might possibly be this species. Unfortunately the specimens is in the vegetative stage without any flower or fruit. A critical examination of the vegetative characters led the author to conclude that the specimen matches perfectly with *P. macrocarpus*. In such a case the occurrence of this plant in Tipperah constitutes a new record for India and thereby extends its rang of distribution to eastern India.

F. *Economic importance* : The timber of this species has long been konwn under the name 'Padauk' which should not be confused with the Andaman Padauk. Hence, it is better to call it as Burma Padauk. The heart wood is bright yellowish red to brick red, sometimes streakd, strong and durable, Its chief uses are for ordinance work, wheel work, frames, shafts of carriages and agricultural implements.

4. *Pterocarpus santalinus* Linn. f. Suppl. Pl. 318. 1781 ; Willd. Sp. Pl. 3 : 906. 1802 ; Roxb. Hort. Beng. 53. 1814 ; DC. Prod. 2 : 412 1825 ; Spreng. Syst. 3 : 192. 1826 ; Roxb. Fl. Ind. 3 : 234. 1832 ; Wight & Arn. Prod. Fl. Pen. Ind. Or. 266. 1834 ; Voigt, Hort. Suburb. Calcutt. 242. 1845 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) ; 76. 1860 ; Bedd. Fl. Sylvat. t. 22. 1869 ; Baker in Hook.f. Fl. Brit. India 2 : 239. 1876 ; Watt. Dict.

Econ. Prod. India 6(1) : 359. 1892 ; Prain in Indian For. 26 (Suppl.) : 13. 1900 ; Brandis, Indian Tr. 240. 1907 (ed. 2) ; Gamble, Fl. Pres. Madras 2 : 384. 1918 ; Troup, Silviculture Indian Tr. 1 : 272. 1921 ; Bor, Man. Indian Tr. 90. 1953 ; Wealth India 8 : 305. 1969 ; Matthew, Fl. Tam. Nad. Carn. 3 (1) : 445. 1983 ; Nair & Henry, Fl. Tam. Nad. (Ser. 1) 1 : 118. 1983. (Fig. 20)

Lingoum santalinum (Linn. f.) O. Ktze, Rev. Gen. P. 1 : 193. 1891.

A small sized tree, 8 - 10 m high. *Leaves* imparipinnate, alternate, stipulate, 10 - 12 cm long ; leaflets 3, very rarely 4 - 5, subopposite to alternate, rarely opposite, varying in shape from wide ovate to ovato elliptic to rounded, 5.0 - 11.5 x 4 - 10 cm, terminal one largest, entire, rounded at base, obtuse to retuse at apex, firmly coriaceous, adpressed grey silky on the lower surface, glabrous on the upper surface, lateral veins 6 - 8 pairs, distinct on the lower surface ; rachis and petiolule glabrous, petiolules 5 - 7 mm long. *Inflorescence* mostly in simple axillary racemes, at times branched, 5 - 8 cm long, rachis grey silky. *Flowers* 1.5 cm long, pedicellate ; bracteoles 2, oblong, pubescent, at the base of calyxcup, early caducous, pedicels 6 mm long. *Calyx* campanulate, shortly curved at base, 6 - 8 mm long, grey silky without, 5 toothed, teeth ovate, more or less equal or posterior 2 a little larger than rest. *Corolla* vexillum ovato orbicular, 1.4 - 1.5 cm long, prominently clawed, blade darkened in the middle, veined, margin wavy ; wings clawed, as long as vexillum, wide oblong ; keels clawed, shorter than wings, connate on the ventral side. *Stamens* 10, monadelphous in young flowers, sheath split open above and below, 6 - 8 mm long, in mature flowers due to swelling of ovary sheath is split open below so to appear diadelphous, filaments varying in length. *Ovary* 6 - 8 mm long, pubescent with shaggy hairs, nonstipitate, style short, stigma, minute, ovules 2. *Pods* suborbicular, indehiscent, 4.2 - 5.0 cm long, 4.0 - 4.5 cm in diameter, stalked, much turgid against the seeds, narrowly winged around, smooth grey silky, stylar point downwards, edge of pod between stalk and stylar point mostly concave and at times slightly convex.

Type : Herb. *Linnaeus* s.n. (K).

Flower : April to June. *Fruit* : July to December.

Distribution : INDIA (Andhra Pradesh, Kerala and Tamil Nadu).

(Map 18)

Specimens examined

Andhra Pradesh : Cuddapah, 500 m, Feb. 1883 *Gamble* 11148

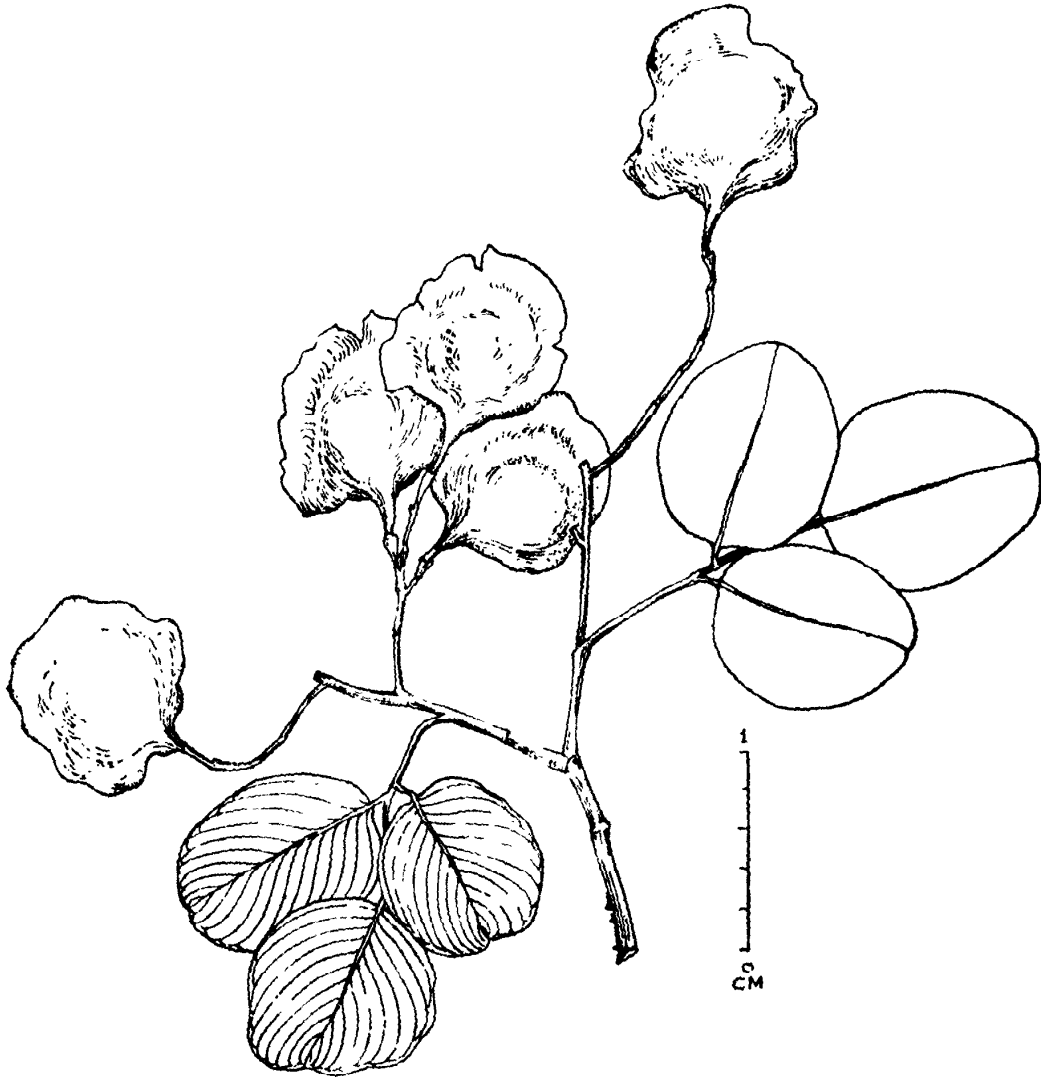


Fig. 20. *Petrocarpus santalinus* Linn.

(CAL) ; Cuddapah, Jul. 1899 *T.S. Scot* s.n. (CAL) ; Cuddapah, 1872 *Herb. Krishnaswamy Naidoo* s.n. (CAL) ; Cuddapah, Dec. 1881 *Brandis* s.n. (CAL) ; Nellore, 1900 *D.F.O.* s.n. (CAL) ; Mullemkonda hills, Veligonda reserve, Aug. 1914 *Ramaswami* 1255 (CAL) ; Chittoor, 500 m, Feb. 1918 *Fischer* 4256 (CAL) ; Akasaganga, Cuddapah district, Dec. 1975 - *Subbarao* 46881 (MH) ; Kodur, Cuddapah district July 1884 - *Gamble* 15005 (MH) ; Balapalle, Cuddapah district, July 1962 *Ellis* 14294 (MH) ; Cuddapah district, Aug. 1889 *Gamble* 21217 (MH).

Tamil Nadu : Salawai tope, Tindivanam, South Arcot district, 1901 *D.F.O.* s.n. (CAL) ; Mamandur, North Arcot District, Dec. 1899 *Forester* s.n. (CAL) Without definite locality (Madras Presidency), Jul. Aug. 1914 *Ramaswami* s.n. (CAL).

Sri Lanka : Cultivated in R.B. Garden, Peradenia, Nov. 1898 *Willis* s.n. (CAL).

HBC : Cultivated in Botanic garden, Sibpur, Jan. 1904 - *Collector ?* 74 (CAL) ; Cultivated in Hort. Bot. Calcutta, Sept. 1900 *Lane* s.n. (CAL).

Wall. Cat. : Herb. Wight *Wall. Cat.* 5844a (CAL).

A. Etymology : Linnaeus gave the epithet '*santalinus*' to this species as the wood of this plant has long been used by the Hindus in a similar manner as that of sandal wood. The tree is known as 'red sanders' and local vernacular names are 'lalchandam or rakthachandan'.

B. Ecology : The plant is a deciduous tree and grows well in dry, rather rocky soil with hot, dry climate. The tree grows up to 12 m in height with an erect bole and dense, rounded crown. It has a very restricted, natural distribution extending over an area of 10000 square km, in southern India (Cuddapah district). It prefers dry hills at elevations between 200-1000 m. It grows in association *Chloroxylon swietenia* DC., *Hardwickia binata* Roxb., *Terminalia* sp., etc.

C. Economic importance : The wood is extremely hard, dark red to near black in colour, and used for house posts and carvings. The price of the wood is high as it is not subject to the attack of white ants. A red colouring matter 'santalin' obtained from the wood, is used as a dye for marking idols and in ceremonies. It is also used for clothes as a red dye.

The wood is described by Hindu physicians as an astringent used in prescriptions for inflammation and headache etc. The wood is rubbed

in stone with water and the resulting paste applied over boils and other inflammatory affections of the skin.

D. *Distribution* : The species is rare with a restricted distribution, extending an area of 10000 square km in Southern India (Cuddapah, Kurnul, Nellore and North Arcot districts). Now a days it is cultivated in other parts of India especially in Maharashtra for the extraction of red dye. It can be assumed that *P. santalinus* is an endemic species of Southern India.

5. ***Pterocarpus marsupium*** Roxb. Corom. Pl. 2 : 9. t. 116. 1793 ; Willd. Sp. Pl. 3 : 95. 1802 ; Roxb. Hort. Beng. 53. 1814 ; DC. Prod. 2 : 418. 1825 ; Spreng. Syst. 3 : 192. 1826 ; Roxb. Fl. Ind. 3 : 234. 1832 ; Wight & Arn. Fl. Pen. Ind. Or. 266. 1834 ; Grah. Cat. Bombay Pl. 56. 1839 ; Walp. Repert. Bot. Syst. 1 : 293. 1842 ; Voigt, Hort. Suburb. Calcutt. 242. 1845 ; Thw. Enum. Pl. Zeyl. 92. 1859 ; Benth. in Journ. Linn. Soc. 4 (Suppl.) : 76. 1860 ; Dalz. & Gibs. Bombay Fl. 152. 1861 ; Bedd. Fl. Sylvat. t. 21. 1869 ; Brandis, For. Fl. 152. 1874 ; Baker in Hook. f. Fl. Brit. India 2 : 239. 1876 ; Gamble, Manual Indian Timb. 261. 1881 ; Watt, Dict. Econ. Prod. India 6 : 367. 1892 ; Trim. Fl. Ceyl. 2 : 90. 1894 ; Prain in Journ. Asiat. Soc. Beng. 66 : 455. 1897 ; Woodr. in Journ. Bombay nat. Hist. Soc. 11 : 426. 1897 ; Prain in Indian For. 26 (Suppl.) : 15. 1900 ; Talbot, Tr. Shr. Clim. Bombay Pres. 138. 1902 ; Cooke, Fl. Pres. Bombay 1 (2) : 401. 1902 ; Duthie, Fl. Upp. Gang. Pl. 1(1) : 266. 1903 ; Prain, Beng. Pl. 1 : 412. 1903 ; Brandis, Indian Tr. 240. 1907 ; Bourdillon, For. Tr. Travancore 135. 1908 ; Talbot. For. Fl. Bombay 431. 1909 ; Haines, For. Fl. Chotanagpur 334. 1910 ; Ramarao, Flow. Pl. Travancore 131. 1914 ; Gamble, Fl. Pres. Madras 2 : 385. 1918 ; Troup, Silviculture Indian Tr. 1 : 266. 1921 ; Haines, Bot. Bih. Or. 3 : 297. 1922 ; Bor, Man. Indian Tr. 90. 1953 ; Maheswari in Bull. bot. Surv. India 5 : 126. 1964 ; Rao et Sastry Ibid. 6 : 162. 1965 ; Bhattacharyya Ibid. 6 : 199. 1965 ; Panigrahi et al. Ibid. 6 : 249. 1965 ; Ellis et al. Ibid. 9 : 7. 1968 ; Kamathy et al. Ibid. 9 : 215. 1968 ; Wealth India 8 : 302. 1969 ; Shah, Fl. Gujarat 2 : 236. 1978 ; Naik, Fl. Csmn. 113. 1979 ; Saldanha & Nicolson, Fl. Hassan Karnat. 261. 1978 ; R.R. Rao, Fl. Mysore 439. 1981 ; Matthew, Fl. Tam. Nad. 3(1) : 444. 1983 ; Nair & Henry, Fl. Tam. Nad. (Ser. 1) 1 : 80. 1983 ; Saldanha, Fl. Karnat. 1 : 483. 1984 ; Mukherjee, Fl. Panh. Bori 93. 1984 ; Rolla Rao, Fl. Goa, Diu, Dam. & Nagar. 1 : 229. 1985 ; Verma, Fl. Raipur, Durg & Rajnand. 113. 1985.

Lingoum marsupium (Roxb.) O. Ktze. Rev. Gen. Pl. 1 : 193.1891.

KEY TO SUBSPECIES AND VARIETIES

- | | |
|---|--------------------------|
| 1a. Leaflets elliptic to oblong, apex slightly obtuse, emarginate to bilobed. ... | subsp. <i>marsupium</i> |
| 2a. Leaflets, branchlets and calyx puberulous ... | var. <i>marsupium</i> |
| 3a. Leaflets not bilobed ... | f. <i>marsupium</i> |
| 3b. Leaflets distinctly bilobed ... | f. <i>bilobus</i> |
| 2b. Leaflets, branchlets and calyx softly white pubescent ... | var. <i>incanus</i> |
| 1b. Leaflets ovate-oblong to oblong, apex acute to acuminate... | subsp. <i>acuminatus</i> |

A. subsp. *marsupium*

Pterocarpus marsupium Roxb. Corom. Pl. 2 : 9. t. 116. 1793.
P. marsupium Roxb. var. a forma *Vera* Prain in Indian For. 26 (Suppl.) : 14. 1900.

A tall deciduous tree ; trunk erect but not always straight, bark brown spongy outside and red inside, fibrous and astringent. *Leaves* imparipinnate, alternate, ex-stipulate, 13.5-35.5 cm long ; leaflets usually 5-7, rarely 3, elliptic-oblong, 6.5-15 x 3-9 cm, alternate to subopposite, petiolulate, entire, obtuse to emarginate or even bilobed at apex, rounded at base, coriaceous, shining and glabrous above, minutely puberulous below, lateral veins usually 10-15 pairs, at times 15-20 pairs, distinct on the dorsal side ; petiolules and rachis mostly glabrous, petiolules 4-9 mm long. *Inflorescence* a terminal panicle, much branched, 10-23 x 10-18 cm, rarely up to 27 cm long, rachis and branches glabrous to minutely puberulous. *Flowers* white with a tinge of yellow, 1.2-1.5 cm long, pedicellate ; pedicels 1-2 mm long, rarely 3-4 mm long (f. *bilobus*) rusty puberulous ; bract small, rusty pubescent, caducous, bracteoles 2, ovate, rusty pubescent, at the base of the calyxcup, caducous. *Calyx* campanulate, 5-6 mm long, 5-toothed, silky puberulous to pubescent without, upper 2 teeth rounded and larger than lower 3 which are triangular. *Corolla* vexillum ovato-orbicular, 1.0-1.3 cm long, distinctly clawed, reflexed backwards ; wings clawed, blade auricled and unequal at base, peculiarly shaped, obovate to at times ovato-orbicular ; keels oblong, clawed, smaller than wings. *Stamens* 10, primarily monadelphous but later due to swelling of ovary isodiadelphous, sheath 8-10 mm long, filaments free on the upper third, longer ones alternating with the shorter ones. *Ovary* oblong, 8 mm long, silky pubescent, nonstipitate, style short, hairy at times, stigma minute, ovules 1-2. *Pods* flat, indehiscent, more or less orbicular, 3.5-4.5 cm long, 3.4-4.5 cm in diameter, stalked, comple-

tely surrounded with a curved, veined, membranaceous wing, rugose and woody in the centre, young pods rusty puberulous, mature ones glabrescent, usually 1 rarely 2 seeded, stalk of the pod 6–10 mm long, space between stipe and style mostly convex ; seed solitary, reniform.

Type : Roxb. Corom. Pl. t. 116. 1793 (Lectotype, CAL).

Flower : April to September. *Fruit* : August to September.

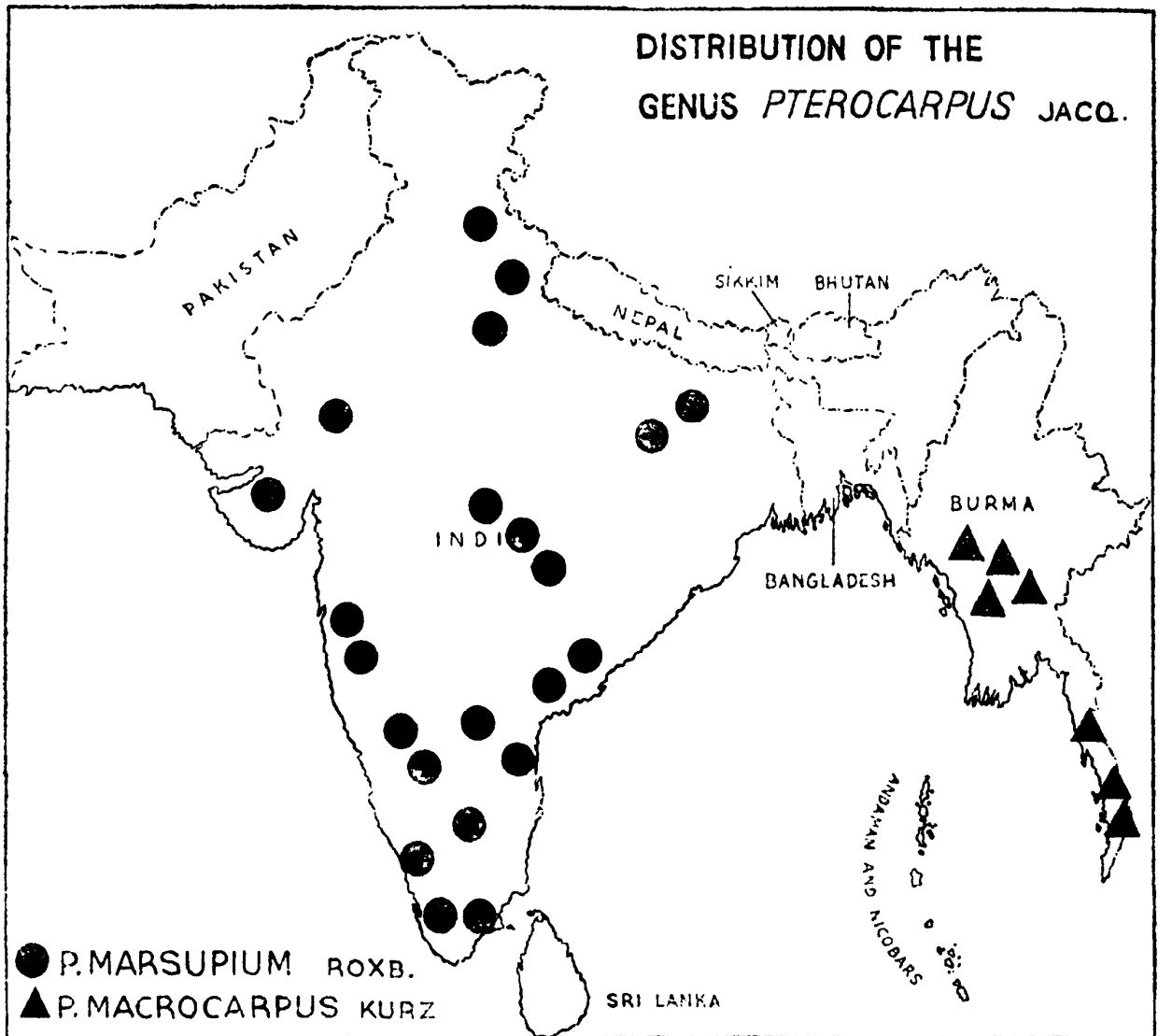
Ditribution : INDIA (Andhra Pradesh, Bihar, Kerala, Madhya Pradesh, Maharashtra, Karnatka, Orissa and Tamil Nadu), SRI LANKA.

(Map 19)

Specimens examined :

Andhra Pradesh : Godavari, Maradumathi, Rampa, 500 m, Sep. 1920 *Narayanaswami* 333 (CAL) ; Bhadrachalam range, Jan. 1900 *F. Range Officer* s.n. (CAL) ; Rampa, Oct. 1899 *F. Range Officer* (LE, CAL) ; Yarnagudam, Sep. 1899 *Newmann* s.n. (CAL) ; Ganjam, Thejogoda range, Jul. 1899 *Range Officer* s.n. (CAL) ; Kukuluba range, Sept. 1899-*Dy. Ranger* s.n. (CAL) ; Without definite locality (Ganjam district) *Fischer* 152 (CAL) ; Krishna, Bolapalli reserve, Vinguonda range, Dec. 1899 *Veeracharloo* s.n. (CAL) ; KandlaKunta reserve, Jul. 1899 *Subramanyam* s.n. (CAL) ; Kondanid reserve, Mar. 1900 *Anantcharloo* s.n. (CAL) ; Kurool, Pecheruva plateau, Nallamalais, Sep. 1899 *Asnatham Naidu* s.n. (CAL) ; Narasaraepet, Cumbum taluq, Nallamalais, Oct. 1899 *Srinivasa Hebbar* s.n. (CAL) ; Kothakota reserve, Anantapur district, Jun. 1899 *D.F.O.* s.n. (CAL) ; Cuddapah, Jul. 1899 *Scott* s.n. (CAL) ; Golugonde Agency, Vizagapatnam district, Jun. 1899 *Laughten* s.n. (CAL) ; Pegoda reserve, Surada range, Aug. 1899 *Thumboo Naidu* s.n. (CAL) ; Sunkarimetta, Vizagapatnam district, Aug. 1957 *Wagh* 7151 (BLAT) ; Udayagiri, Nellore district, Aug. 1957 *Wagh* 7150 (CAL) ; Cuddapah district, 1863 *Spring* s.n. (MH) ; Cuddapah district ; 1863 *Beddome* s.n. (MH) ; Godavari district, Feb. 1885 *Gamble* 15975 (MH) ; Godavari district, Dec. 1902 *Barber* 5082 (MH) ; Aklasapur R.F., Karimnagar district, Dec. 1964 *Subbarao* 22153 (MH) ; Srisilam, Kurnool district, July 1963 *Ellis* 16881 (MH) ; Nallamalais, Kurnool district, Nov. 1969 *Ellis* 32569 (MH) ; Chintapalli, Visakapatnam district, Sept. 1966 *Subbarao* 28238 (MH) ; Anantagiri, Visakapatnam district, Dec. 1969 *Subbarao* 32829 (CAL).

Kerala : Sultan Battery, North Malabar, Nov. 1909 *D.F.O.* s.n. (CAL) ; Travancore, Courtallam, Dec. 1913 *Ramarao* 2019 (CAL) ;



Map 19

Kallar, Sept. 1913 *Ramarao* 1547 (CAL); Chedaleth, Calicut district, Aug. 1964 *Ellis* 20500 (MH); Taliparamba, Cannanore district, Feb. 1913 *Barber* 8700 (MH); Santampari, Kottayam district, Apr. 1964 *Sebastine* 18360 (MH); Thannikuddi, Idukki district, Oct. 1972 *Sharma* 42382 (MH); Attapadi R.F., Palghat district, Oct. 1965 *Vajravelu* 26196 (MH); Mukkali, Palghat district, Nov. 1973 *Vajrvelu* 44853 (MH); Kallar, Travancore, Nov. 1928 *Narayanaswami* 1291 (MH); Ponmudi, Jun. 1976 *Ridsale* s.n. (MO, CAL).

Madhya Pradesh : Sapra, Ghatakura, Murvara tashil, Jubbalpore district, Aug. 1899 *Forest Officer* s.n. (CAL); Mandla, Aug. 1899 *D.F.O.* s.n. (CAL); Dobhi, Mandla tashil, Mandla district, Aug. 1899 *D.F.O.* s.n. (CAL); Without definite locality, 1883 *Dr. Sehlich* s.n. (CAL); Sidhi district, Feb. 1971 *Sen Gupta* 16208 (BSA); Bilaspur district, Feb. 1972 *Panigrahi* 15478 (BSA); Ambikapur district, Nov. 1972 *Sen Gupta* 15667 (BSA); Raigarh district, Sep. 1974 *Radhakrishnan* 21246 (BSA); Rajnandgaon district, Nov. 1974 *Pant* 21558 (BSA); Seoni district, Mar. 1973 *Banerjee* 22004 (BSA); Raipur District, Nov. 1967 *Verma* 25725 (BSA); Balaghat district, Dec. 1976 *Nair* 22391 (BSA); Damoh district *Shukla* 29939 (BSA); Jubbalpore, 1962 *Sebastine* 15471 (MH); Hirapur forest, Saugar district, Mar. 1960 *Subramanyam* 10169 (MH).

Maharashtra : Bombay, Kanery caves, Salsette, Nov. 1918 *Blatter* 11463 (BLAT); Aarey milk colony, Goregaon, Jan. 1958 *Tavakari* 550 (BLAT); National Park, Borivli, Sept. 1956 *Herbert* 2430 (BLAT); Quarrey Hills, Malad district, Oct. 1953 *Shah* 6137 (BLAT); Dungarda road, Dangs, Waghai, Sept. 1954 *Santapau* 19108 (BLAT); Talassari, Thana district, May 1941 *Santapau* 10229 (BLAT); Unai, South Dangs, Nov. 1953 *Collector ?* 17222 (BLAT); Mandvi, Tanager, Oct. 1960 *Das* 2444 (BLAT); Parol, Tungar, Oct. 1967 *Das* 4429 (BLAT); Phona, Ratnagiri district, Mar. 1970 *Kulkarni* 120394 (BSI); Khurtnala, Ratnagiri district, Oct. 1972 *Wadhwa* 130159 (BSI); Khandala, Yeotmal district, Feb. 1977 *Karthikeyan* 48559 (BSI); Morkhal, Nagarhaveli Nov. 1970 *Ansari* 122162 (BSI); Deedonagar, Nasik district, Mar. 1984 *Narasimhan* 166379 (BSI).

Karnataka : Hassan district, Sept. 1969 *Saldanha* 15700 (MO); Bourdalboore, Hassan district, Oct. 1971 *Nicolson et al* 2366 (MO); Sunkadul reserve, Kudligi, Bellary district, Aug. 1899 *Bhoojangarao* s.n. (CAL); Mercara, Coorg, 1900 *Dy. cons. For.* s.n. (CAL); Maisor & Carnatic *Thomson* s.n. (CAL); North Canara, Mar. 1957 *Fernandez* 2291 (BLAT); South Canara, 1900 *Barber* 2097 (MH); Saklasapur, Mysore distrct, Dec. 1903 *Barber* 6313 (MH); Hanuman Koil, Mysore District, Jan. 1965 *Naithani* 23147 (MH); Hassan district, Sept. 1969

Saldanha 15100 (MO) ; Bourdalboore, Hassan dt. Oct. 1971 *Nicolson et al.* 2366 (MO).

Orissa : Khurda, Puri division, 1899 *Watt* s.n (CAL) ; Bandgarh forest, Mar. 1964 *Kapoor & party* 64514 (NWG) ; Narainpur to Dhantry, Mar. 1961 *Srivastva* 95073 (NWG) ; Ganjam, Jan. 1900 *Barber* 1138 (MH).

Tamil Nadu : Coimbatore, Onathithur, 1300 m, Apr. 1906 *Fischer* 243 (CAL) ; Coonoor ghat, Nilgiris, Jun. 1883 *Gamble* 12153 (CAL) ; Northern Devian, Nilgiris, Sept. 1852 *Dr. Cleghorn* s.n. (CAL) ; Neelagherry, 1852 *Herb. Wight* 803 (LE, CAL) ; Velpatti, Boluvampatti Valley, 500 m, July 1910 *Fischer* 2043 (CAL) ; Thalakarai read, Aug., 1929 *Narayanaswami* 18964 (CAL) ; Mamandur, Chittoor district. Nov. 1899 *Subramanyam* s.n. (CAL) ; Without any detail (Madras) *Herb. Krishnaswamy Naidu* s.n. (CAL) ; Without any particulars (Madras) - collector ? s.n. (CAL) ; Pen. Ind. Or. *Wight* 911 (LE) ; Mangikarai, 1200 m, Aug. 1905 *Fischer* 243 (CAL) ; Anamalays, 1861 *Beddome* 17231 (MH) ; Coimbatore district, Mar. 1931 *Jacob* 306 (MH) ; Attakatti, Coimbatore district, July 1961 *Joseph* 12679 (MH) ; Perumalmudi, Coimbatore district, June 1970 *Viswanathan* 647 (MH) ; Panagudi, Kanyakumari district, Sept. 1963 *Shetty* 32313 (MH) ; Kanyakumari, Aug. 1976 *Henry* 48113 (MH) ; Sirumalai, Madurai district, Apr. 1958 *Subramanyam* 5797 (MH) ; Kodaikanal, Madurai district, July 1965 *Sebastine* 25015 (MH) ; Periyar Project, Madurai district, Oct. 1976 *Vivekanandan* 48675 (MH) ; Cherambadi forest, Nilgiri district, Nov. 1972 *Vajravelu* 42882 (MH) ; Moyyar R.F., Aug. 1970 *Sharma* 35548 (MH) ; Sirur, Nilgiri district, Aug. 1970 *Subbarao* 36428 (MH) ; Bokkapuram R.F., Nilgiri district, Nov. 1971 *Rathakrishnan* 38951 (MH) ; Dover Shola, Nilgiri district, July 1960 *Subramanyam* 10525 (MH) ; Ayyanar Koil, Ramanathapuram district, Sept. 1971 *Vajravelu* 38666 (MH) ; Mandaliaruthu, Ramanathapuram district, July 1965 *Vajravelu* 24858 (MH) ; Yercaud, Salem district, July 1965 *Karthikeyan* 26846 (CAL) ; Hognackkal, Salem district, May 1965 *Vajravelu* 24149 (MH) ; Kalakkadu R.F., Thirunelveli district, Sept. 1967 *Vajravelu* 27887 (MH) ; Kodumudy, Thirunelveli district, July 1959 *Sebastine* 8414 (MH) ; Yerdaud, Salem district, Apr. 1966 *Rao* 26974 (MH) ; Courtallam, Thirunelveli district, July 1957 *Subramanyam* 3828 (MH).

HBC : Without any details, Nov. 1860 Collector ? (CAL) ; Cultivated in Hort. Bot. Cal., July 1900 *G.Y. Lam* s.n. (MH).

Wall. Cat. : *Herb. Madras* 5842B (CAL) ; 5842F (CAL),

var. **marsupium** forma **bilobus** (Roxb. ex G. Don) Prain in Indian For. (Suppl.) : 14. 1900.

Pterocarpus bilobus Roxb. ex G. Don, Gen. Syst. 2 : 376. 1802.

Leaflets elliptic to obcordate, apex deeply notched to bilobed.

Type : East Indies *Roxburgh* in Herb. Lamb. (K).

Distribution : INDIA (South India) and SRI LANKA.

Specimens examined

India : Tamil Nadu, Solamalay, 1000 m *Van Malderen* 1452 (CAL) ; Nardkhani, 600 m, Tinnevely district, Feb. 1913 *Hooper & Ramaswami* 38346 (CAL) ; Naterikal, Tinnevely district, 1333 m, Feb. 1913 *Hooper & Ramaswami* 38420 (CAL) ; Pakkam hill, Tindivanam Taluq, South Arcot district, 1901 *D.F.O.* s.n. (CAL) ; Tagarai, Kallakuruchi hill, South Arcot district, 1901 *D.F.O.* s.n. (CAL) ; South Coimbatore, 1899 *Gass* s.n. (CAL) ; Kerala, Konney, Travancore, Aug. 1913 *Calder & Ramaswami* 67 (CAL) ; Bombay, Victoria garden, Sept. 1956 *Fernandez* 2903, 2907, 2908 (BLAT, cultivated).

Sri Lanka : Central Province, 1000 m *Thwaites* 1495 (LE, CAL) ; Mahiyaganga, Nov. 1975, 600 m *Bernardi* 15705 (MO).

This is a distinct geographical form, restricted to Southern India and Sri Lanka.

subsp. **marsupium** var. **incanus** Gamble, Fl. Pres. Madras 2 : 385. 1918.

Branchlets, leaves beneath, calyx and inflorescence rachis white silky pubescent ; leaflets much smaller ; flowers smaller, in shorter racemes.

Type : Hills of Krishna district *Beddome* s.n. (K, MH).

B. subsp. **acuminatus** (Prain) Thoth. stat. et comb. nov.

Pterocarpus marsupium Roxb. var. *acuminata* Prain in Journ. Asiat. Soc. Beng. 66 : 45. 1897 ; Cooke, Fl. Pres. Bombay 1(2) : 402, 1902 ; Haines, For. Fl. Chotanagpur 334. 1910 ; Haines, Bot. Bihar & Or. 3 : 297. 1922 ; Santapau in Rec. bot. Sur. India 16(1) : 75. 1967 (ed. 3) ; Inamdar in Bull. bot. Surv. India 10 : 127. 1968. *P. marsupium* var. B. forma *acuminata* Prain in Indian For. 26 (Suppl.) : 15. 1900 et Beng. Pl. 1 : 412. 1903 ; Talbot, Tr. Shr. Climb. Bombay Pres. & Sind 432. 1909.

P. marsupium var. *B. forma acuta* Prain l.c. 15. 1900 ; Duthie, Fl. Upp. Gang. Pl. 1(1) : 266. 1903. *P. marsupium* Roxb. var. ? Benth. in Journ. Linn. Soc. 4 (Suppl.) : 77. 1860.

Leaves imparipinnate, alternate, stipulate, 17-37 cm long ; leaflets 5-7, ovate-oblong to oblong, at times lanceolate, usually 7.5-12.0 x 2.5-6.0 cm, rarely up to 17.0 x 8.5 cm, mostly alternate, rarely subopposite, petiololate, entire, acute to acuminate at apex, the acumination being distinct in plants of western India (Khandala Santapau 4518), narrowed at base, glabrous above, puberulous below, coriaceous to chartaceous, lateral veins 15-20 pairs ; petiolules 6-13 mm long, longer than in subsp. *marsupium*. *Inflorescence* a terminal, lax panicle, 16.0-23.5 x 14-20 cm, flowers 1.0-1.2 cm long, pedicellate ; bract and bracteolate ; pedicels 2-3 mm long. *Calyx* campanulate, 6-7 mm long, 5-toothed, upper 2 teeth rounded, larger, lateral 2 smaller and lowermost one triangular. *Corolla* vexillum 1.2 cm long, ovate-orbicular ; wings and keels as in subsp. *marsupium*. *Stamens* 10, monadelphous, sheath 7-8 mm long. *Ovary* 6-7 mm long, oblong, stipitate, pubescent, style short, stouter, stigma minute. *Pods* flat, more or less orbicular, 4.5-5.5 cm long, 4.0-5.5 cm in diameter, larger than in subsp. *marsupium* ; stalk of the pod 6-7 mm long, shorter than in subsp. *marsupium*, space between stipe and styler region more or less even, rarely convex.

Type : Yellapore, North Kanara, Mysore, Oct. 1882 Talbot 4 (Letotype designated, CAL).

Flower : August to November. *Fruit* : October to November.

Distribution : INDIA (Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Karnataka, North West India, Rajasthan).

Specimens examined :

Bihar : Near Sahibgunj, Rajmahal hills, Spet. 1868 Kurz s.n. (CAL).

Gujarat : Laloi, Katia, Jamnagar, Oct. 1945 Santapau 7730 (BLAT).

Kerala : North Malabar, Apr. 1899 Rep Econ. Products 11989 (CAL).

Madhya Pradesh : Jubbulpore, Sihora, Nov. 1899 Hole s.n. (CAL) ; Piplad range, Minar division, Nov. 1900 Smythies s.n. (CAL) ; Sapu, Gatakhara, Aug. 1899 D.F.O. s.n. (CAL) ; Gondwana range, Khandwa district, Dec. 1888 Duthie 8277 (CAL) ; Deoli, Mandla district, Jul.

1899 *D.F.O.* s.n. (CAL) ; Balaghat division, Nov. 1899 *D.F.O.* s.n. (CAL) ; Amraoti, Ellichpur forest division, Jan. 1900 - *Dy. Cons. Forests* s.n. (CAL) ; Jhani, Bundelkhand division, 1900 *Conservator of Forests* s.n. (CAL) ; Pachmari, 1168 m, Mar. 1900 *Whuthong* s.n. (CAL) ; Bhowargarh range, Beul division, Dec. 1899 *D.F.O.* s.n. (CAL) ; Narasinghpur division, May, 1909 *Viswanath Survati* s.n. (CAL) ; Damoh, Oct. 1899 *Witt* s.n. (CAL) ; Dhokawan, Betwa dam, Jhansi, Dec. 1954 *Kaul & Party* 17722 (NWG).

Maharashtra : Paral, Tunger, Oct. 1961 *Das* 4430 (BLAT) ; Malad, Quarry hills, Oct. 1955 *Shaw* 6138 (BLAT) ; National Park, Borivli, Bombay, Oct. 1956 *Herbert* 2431 (BLAT) ; South West of Kajrat, Jan. 1949 *Fernandez* 34 (BLAT) ; St. Xavier's Villa, Khandala, Jun. 1944 *Santapau* 4518 (BLAT) ; Thana, Sept. 1800 *D.F.O.* s.n. (CAL).

Karnataka : Coorg, Tithinate, Mercara, May 1900 *Dy. Cons. Forests* 2 8 (CAL) ; Mercara, 1900 *Dy. Cons. Forests* (CAL) ; Goojeh jungle, Concan *Ritchie* 100 (CAL) ; Nandoshi, Jan. 1890 *Tilak* s.n. (CAL) ; Concan *Stocks* s.n. (CAL).

Northwest India : Oudh, Milrain, Kheri division, Nov. 1900 *Dy. Cons. Forests* s.n. (CAL) ; West of Nagra Bhuyan Phanta road, Kheri division, Nov. 1900 *Dy. Cons. Forests* s.n. (CAL) ; Kheri, Aug. 1900, *D.F.O.* s.n. (CAL) ; Gonda division, Aug. 1899 *Asstt. Cons. Forests* s.n. (CAL) ; Gonda, May 1900 *Duthie* 23629 (CAL) ; Pilibhit, Bareilly district, 1899 *D.F.O.* s.n. (CAL) ; Baharaich forest division, Sept. 1900 *Dy. Cons. Forests* s.n. (CAL) ; Nainital, Kumaon division, May 1899 *Dy. Cons. Forests* s.n. (CAL) ; Gorakhpur, 1899 *Forest Ranger* s.n. (CAL) ; National Botanic Garden, Lucknow, Dec. 1962 *Srivastava* 93671 (NWG).

Rajasthan : Mount Aboo, Oct. 1845 *Stocks* 237 (CAL) ; Kota district *Jain* 28826 (BSI) ; Mt. Abu, Sirohi district *McCann* 1852 (BLAT) ; Jaismand, Udaipur *Kanodia* 82283 (BSI) ;

General notes for the species

A. *Ecology* : The plant is a large deciduous tree, attaining a maximum height of 30 m and a girth of 2.5 m. It is found scattered in deciduous forests mainly on hilly ground at elevations up to 1500 m but is most common at 200 - 500 m. According to Beddome (l.c. 1869) its size and growth differs much under different circumstances. It is often poor in growth but attains a fine size in the Western ghats where it grows in ravines and jungles at higher elevations. Talbot (l.c. 1902) has observed that this species is not gregarious and occurs scattered in deciduous monsoon forests. Haines (l.c. 1910) reported that the tree grows well in

valleys on slopes near nallahs in hills. In general the tree does not usually grow in plains. According to Bourdillon (l.c. 1908) the plant prefers a stiff soil and in those forests with a retentive soil from which teak is absent, this appears at its best.

B. *Typification* : As there is no specimen of Roxburgh, the plate 116 in his Coromandel Plants, published in 1793 has been selected as lectotype of the species.

C. *Cytology* : $n = 22$ (Atchison, 1951).

D. *Economic importance* : The tree yields the 'Gum kino' of the European materia medica. The gum as it exudes from the wounds of the bark has the appearance of red current jelly but hardens in a few hours after exposure to air. It has a strong astringent taste, and hence has long been used in European medicines. Indian 'gum kino' has remarkably gained over African kino (*Pterocarpus erianaceus* Poir.) in European markets. A large quantity is now being exported to Europe.

The wood is strong and dark coloured and much priced for building purposes. It is also used for making fine furniture, cart, boat building and agricultural implements. In South India it is considered next to teak and black wood and the timber often fetches the same price.

According to Rumphius the gum can cure diarrhoea and bruised leaves are useful as an external application to boils, sores and skin diseases. In recent years infusion of wood or even drinking water from a cup, made of the wood is a specific for diabetes.

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