

## *Stemonoporus* Thw. (*Dipterocarpaceæ*) : a monograph (part 1)

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**Summary** : The genus *Stemonoporus* comprises 26 species and is entirely restricted to Ceylon. Two subgenera are recognized : subg. *Stemonoporus* with 15 (rarely 10-13) stamens and subg. *Monoporandra* with 5 stamens. A description is presented of the peculiar anthers, resembling those of *Vatica*, but never have a connectival appendage and wrongly described as having an apical pore ; the tip of the larger valve is either acute, apiculate or obtuse. *S. wightii*, called by ALSTON *S. ceylanicus*, is renamed *S. wightii*. The status of *S. moonii*, considered by ASHTON to belong to *Sterculiaceæ* or *Euphorbiaceæ*, is discussed ; the species represents real *Stemonoporus*, which was confirmed by the rediscovery of the tree. The status of *S. lewisianus*, referred to *Vatica* by LIVERA, and by ASHTON to *Cotylelobium*, is discussed and the species referred back to *Vatica*. Of the 15 species, known in TRIMEN's time, 4 have so far not been recollected. New species : *S. angustisepalum*, *S. gilimalensis*, *S. gracilis*, *S. lævifolius*, *S. marginalis* and *S. scalarinervis*.

**Résumé** : Le genre *Stemonoporus*, endémique de Ceylan, comprend 26 espèces. On y reconnaît 2 sous-genres : subg. *Stemonoporus*, avec 15 (rarement 10-13) étamines et subg. *Monoporandra*, avec 5 étamines. Description des anthères, particulières et ressemblant à celles de *Vatica*, mais qui n'ont jamais de connectif stérile et ont été à tort décrites comme ayant un pore apical ; le sommet de la plus grande valve est aigu, apiculé ou obtus. *S. wightii*, appelé par ALSTON *S. ceylanicus*, est réhabilité. Bien que considéré par ASHTON comme appartenant aux *Sterculiacées* ou aux *Euphorbiacées*, *S. moonii* est bien un *Stemonoporus*, comme le prouve la redécouverte de l'arbre. *S. lewisianus*, placé par LIVERA dans le genre *Vatica* et par ASHTON dans le genre *Cotylelobium*, est considéré ici comme étant un *Vatica*. 4 des 15 espèces connues du temps de TRIMEN n'ont jamais été recollectées. 6 espèces nouvelles sont décrites : *S. angustisepalum*, *S. gilimalensis*, *S. gracilis*, *S. lævifolius*, *S. marginalis* et *S. scalarinervis*.

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### INTRODUCTION AND ACKNOWLEDGMENTS

A prolonged stay in Sri Lanka (Ceylon) as a visiting professor of the Department of Botany, University of Peradeniya, enabled me to bring together in my spare time and at my own expense a large collection (so far ca. 5000 field numbers) of herbarium specimens, the largest collection so far brought together by a single person in Ceylon.



During 1978 and 1979 I have restricted myself to exploring the wet, evergreen lowland forests, that are left in S.W. Ceylon, the Adam's Peak jungle and the Knuckles Mts., as these have been least explored and were shunned by the greater part of visiting botanists because of adverse conditions (camping, rain, leeches, etc.).

As I have during a lifetime studied mostly "tree" families, I have focussed most of my attention in Ceylon on trees (which were very much under-collected, because they are difficult) and prepared for the Flora of Ceylon Project (a revision of Trimen's Flora, sponsored by the Smithsonian Institution, Washington, the University of Peradeniya and the Ceylon Department of Agriculture) revisions of *Lauraceæ*, *Guttiferæ*, *Mimosaceæ*, *Ebenaceæ* and *Celastraceæ* (in progress). Other families which need thorough revisional treatment are *Anacardiaceæ*, *Meliaceæ*, *Myrtaceæ*, *Dipterocarpaceæ* and *Sapotaceæ*.

During field work in collaboration with Doctors Mr. and Mrs. GUNATILLEKE, Dr. BALASUBRAMANIAM and Dr. SULTANBAWA (Chemistry Department), several novelties have been found and numerous species described by THWAITES, but not rediscovered by TRIMEN, were re-located.

The discovery of two *Stemonoporus* species in the Kanneliya forest near Hiniduma, Galle District (in a forest logged by the Ceylon Plywood Corporation with aid of Rumania), which Dr. P. ASHTON (in his recent papers) had included in exsisting species, but which we considered to be different, led ultimately to a complete revision of the entire genus. Inevitably our results had to be compared with those of ASHTON's, whose name consequently turns up many times in this paper.

We herewith express our gratitude to Mr. and Mrs. Dr. I.A.U.N. GUNATILLEKE and C. V. S. GUNATILLEKE-PEERIS for their cooperation and their help during camping periods in the forest. They both, have placed their (mostly sterile) collections at my disposal, which made it possible to study interesting numbered trees; to Professor S. BALASUBRAMANIAM, whose knowledge of trees was very helpful; to Professor M. U. S. SULTANBAWA, who enabled me to join in his trips to collect material of endemic species for chemical analysis and for his cooperation in informing me of his unpublished results.

The first 3 months (May-August 1978) I could collect material under the auspices of the Flora of Ceylon Project. I express my gratitude to Dr. F. R. FOSBERG, the leader of the project, for letting me partake.

We also express our gratitude to Mrs. Dr. Géma MAURY (Paris), who has sent us a copy of her recent thesis on blastogenesis of *Dipterocarpaceæ*.

Professor Dr. C. KALKMAN, Director of the Rijksherbarium, Leiden (Netherlands) has sent me copies of papers not available here, for which our sincere thanks.

A handicap was the poor curing and mounting of the specimens collected under the Flora of Ceylon Project, the greater part of the important parts, flowers and/or fruit, are missing, although indicated on the labels. Another handicap was that the project has been less geared to the interest of Botany than to money saving and safe guarding salaries and per diems, a result partly due to long-distance overseeing, as the project was run from Washington, but locally by an Administrator, who could hardly know what was important or not from a botanical standpoint, and this being one of the many reasons, why the results of 7 years project are so poor and TRIMEN's Flora is in many cases still superior.

### STEMONOPORUS Thwaites

In HOOKER's Kew J. Bot. 6 : 67 (1854); Enum. Pl. Zeyl. : 37 (1858); *ibid.* : 403 (1864), as a synonym of *Vateria*; BENTHAM, in BENTH. & HOOK., Gen. Pl. 1 : 194 (1867), as a synonym of *Vateria*; A. DC., Prodr. 16 (2) : 620-623 (1868), as a synonym of *Vatica*; THISELTON-DYER, in HOOKER f., Fl. Brit. Ind. 1 : 313 (1874), as a synonym of *Vateria*; TRIMEN, Syst. Catal. Pl. Ceylon : 9-10 (1885); Handb. Fl. Ceylon 1 : 132 (1893); *id.* 5 (HOOKER f.) : 382-384 (1900); HEIM, Recherches Diptér. : 88 (1892); ALSTON, Handb. Fl. Ceylon 6 (Suppl.) : 25-27 (1931); LEWIS, Veget. Prod. Ceylon : 44 (1934); ASHTON, Blumea 20 : 363 (1972), and in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 187 (1977) and 1 : 404-418 (1980).



- *Monoporandra* THWAITES, in HOOKER's Kew J. Bot. 6 : 69 (1854); Enum., l.c. : 39 (1854); *ibid.* : 404 (1864), as a synon. of *Vateria*; BENTHAM, l.c. : 194; A. DC., l.c. : 636; DYER, l.c. : 316; TRIMEN, Cat., l.c. : 10; Handb., l.c. : 137; *id.* 5 (Hooker f.) : 383-384 (1900), excl. *S. Lewisianus*; LEWIS, l.c. : 51; ALSTON, l.c. : 21, as a synon. of *Stemonoporus*; ASHTON, ll.cc., as a synon. of *Stemonoporus*. — Lectotype species : *Monoporandra cordifolia* Thw.
- *Vesquella* HEIM, Recherches Diptér. : 90 (1892); Bull. Soc. Bot. France 39 : 153 (1892); BRANDIS, J. Linn. Soc. 31 : 139 (1895); HOOKER f., in TRIMEN, Handb., l.c. : 383 (1900); ASHTON, ll.cc. — Type species : *Vesquella acuminata* (Thw.) Heim.
- *Sunapteopsis* HEIM, Recherches Diptér. : 92 (1892); BRANDIS, l.c. : 139; HOOKER f., l.c.; ASHTON, ll.cc. — Type species : *Sunapteopsis jucunda* (Thw.) Heim, combination not printed.
- *Kunckelia* HEIM, Bull. Soc. Bot. France 39 : 153 (1892); Recherches Diptér. : 92 (1892) « *Kunckelia* »; BRANDIS, l.c. : 139; HOOKER f., l.c.; ASHTON, ll.cc. — Type species : *Kunckelia reticulata* (Thw.) Heim.
- *Vateria* (*non* L.) THWAITES, Enum., l.c. : 403 (1864), excl. *V. disticha* and *V. scabriuscula* Thw.

LECTOTYPE SPECIES : *Stemonoporus gardneri* Thwaites.

Resinous trees, the majority small, rarely reaching timber size (*S. acuminatus* and *S. gardneri*). Crown open. Bark smooth, grey, hoop-ringed. No buttresses. Branchlets and terminal buds in a young stage as a rule covered by a microscopical fugaceous pubescence (except *S. moonii* long hairs), hairs simple, sometimes microscopical flat scales (cf. MAURY, Thesis). Buds small. Stipules small (except in *S. moonii*), caducous (except in *S. moonii*). Leaves penninerved (very rarely triplinerved) with distinct or indistinct scalariform secondary nerves on the lower surface. Midrib thin, prominulous or impressed on the upper surface, prominent and often initially puberulous on the lower one, lateral nerves near the margin usually rather abruptly arcuately ascendent, unconnected or connected into a marginal vein; lower leaf surface in flush sometimes very sparsely puberulous. Petioles with thickened apical part, geniculate or not, very variable in length in the same species.

Inflorescences axillary and extra-axillary, paniculate in principle, but the main peduncle usually very short, the inflorescences seemingly in bundles, the branches often so short, that the panicle becomes a few-flowered raceme, sometimes the whole reduced to a single flower. Branchlets and base of main peduncle with caducous bracts, base of pedicel bracteolate, caducous, except in *S. moonii*. Flowers hermaphroditic; sepals 5, imbricate in bud or almost so, patent, usually puberulous outside, large, compared with the petals. Pedicels usually short. Petals 5, imbricate at the base in expanded flower, usually longer than sepals, glabrous, pale yellow or white, rotate, falling as a whole. Stamens 5 or 15 (rarely 10-13), in one or two whorls, 10 external, 5 internal slightly shorter, forming a cone-like structure around the style; filaments coalescent, very short, narrowly triangular; anthers long, very narrowly triangular, usually densely puberulous, the two valves much different in length, the larger one with incurved margins, touching in one place (rarely over the entire length), where the margin bulges, forming a long oblique orifice apically and a straight one below the bulges, very rarely flat and open (*S. lancifolius*); no connective appendage; the tip of the oblique aperture apiculate, acute or obtuse; the small valve with a central, longitudinal rib. Ovary globose to conical, usually ribbed, puberulous or glabrous; style longer, tapering, stigma minute, acute, exserted or not from the staminal cone (style articulate with ovary in some species, BRANDIS, 1895). Ovules pendulous, anatropous.



Fruit one-seeded by abortion, as a rule spherical of depressed spherical, rarely conical (*S. kanneliyensis*) or pointed (*S. reticulatus*), roughish because of a pattern of minute, polygonal areas; sepals persistent, either unaltered, adpressed to the base of the fruit or patent or hardened and slightly enlarged, pointing downward, in *S. kanneliyensis* and *S. reticulatus* much thickened and pointing downward. Cotyledons small and simple or large, lobed, dissected and folded, green or red. No albumen. Germination: the fruit with thick pericarp (*S. kanneliyensis*, *S. reticulatus*, perhaps *S. wightii*) dehisce by valves, along the depressions; the thin or thinner skinned fruit crack irregularly, even when they are ribbed in immature stage. The hypocotyledon lengthens considerably and lifts the cots above the ground; they either remain in the pericarp (*S. kanneliyensis*) or unfold, become horizontal, fleshy, large, thick, wrinkled and incised, red or green. Cots equal or unequal. In some species at the base inside of the pericarp a fleshy cup with lacinate margins; sometimes a fibrous mass between the cots (HEIM, BRANDIS). The first leaves are, as in *Vatica*, whorled.

DISTRIBUTION: Wet zone in the S.W. parts of the island, in the Adam's Peak jungle and in the Knuckles Mts. at altitudes from sea level to 1700 m.

ECOLOGY: Always in the wettest parts, many along streams and streamlets in the wet zone. Occurrence independent of depth of soil or kind of soil. Often in small populations far apart. Only a few reach timber size. They flower in definite periods after rainfall, once or twice a year. Flowers few. Fruit setting is rare to very rare (hence the trees are rare). Pollination by beetles, bees, butterflies.

#### HISTORY

Since the inception of the genus *Stemonoporus* by THWAITES in 1854, it has moved through *Vateria* and *Vatica* and has nowadays been re-established as a proper genus. This implies that the generic delimitations, especially in the *Vatica* group (*Vatica*, *Stemonoporus*, *Cotylelobium*) are not satisfactorily solved. The trees of the three genera look much alike, and are in Ceylon known under one collective vernacular name: Mendora. Whereas in *Shorea* and *Hopea* all genera with more or less similar fruit characters are combined, this is not the case in the *Vatica* group and this inconsistency is one of the reasons of the unsatisfactory situation.

THWAITES originally recognized 11 species under *Stemonoporus* and 3 under *Monoporandra*. Under the influence of BENTHAM, he referred them all to *Vateria* in the Addendum of his book in 1864, even quoting BENTHAM as the author of the new combinations (this is under the latest Rules not admissible, the combinations should be printed to be valid and not only suggested, as BENTHAM did). THWAITES even went one step further than BENTHAM and moved also *Monoporandra* to *Vateria*. THISELTON-DYER followed suit, but meanwhile A. DE CANDOLLE had reduced *Stemonoporus* to *Vatica*, but — like all other botanists — up to ALSTON, kept *Monoporandra* separate.

In his Addendum THWAITES added (under *Vateria*) 3 new species, of which *Vateria*



(*Stemonoporus*) *acuminata* belongs, but *Vateria* (*Stemonoporus*) *scabriuscula* and *V. disticha* are respectively *Cotylelobium* and *Doona*. This makes a total of 15 proper *Stemonoporus* species. The same number is enumerated by DE CANDOLLE under *Vatica*.

DYER has a total of 14 species, because he reduced *Monoporandra lancifolia* to a variety of *Vateria* (*Stemonoporus*) *nitida*.

TRIMEN described 13 species in *Stemonoporus* and 2 in the reinstated genus *Monoporandra*.

HOOKEER added in the 5th volume of TRIMEN's Flora in 1900 two more species, of which one (*S. lewisianus*) was referred by ALSTON to *Vateria*, by LIVERA to *Vatica*, by ASHTON to *Cotylelobium* and by me (cf. under that species) reinstated as a *Vatica*, which brings the number to 16 species.

ALSTON reduced *Monoporandra* to *Stemonoporus* and has the same 15 species.

ASHTON ultimately restored *S. lancifolius*, but excluded *S. moonii* and hence has still only 15 species.

The reason, why there were no additional species described was the cessation of collecting in the lowland ever-green forests, which had already been neglected under TRIMEN.

After a dormant period of almost 80 years the resumption of collecting in the above mentioned areas, of which HOOKEER already predicted, that they should yield many novelties, yielded a surprising number of 8 new species, and the chances are big, that this is not the end.

Of the 15 species known to THWAITES, so far 4 have not been recollected.

HEIM (1892) included *Stemonoporus* (subdivided into *Eu-stemonoporus* and *Monoporandra*, as accepted in this paper) in *Stemonoporées*, together with *Vesquella* and the doubtful genus *Sunapteopsis* (the same year reduced by him to *Vesquella*); there is a subseries of *Kunckelia*.

The *Stemonoporées* are kept separate from the *Vateriées* and the *Vaticées*.

GUÉRIN (Compt. Rend. Acad. Sci., Paris, 140 : 520 (1905); *ibid.*, 142 : 102 (1906); *ibid.*, 53 : 186 (1906); *ibid.*, 58 : 9 (1911), n.v., added to the generic descriptions characters of the secretorial organs, muscilage cells, anatomy, of flowers fruit and leaves (cf. MAURY, Thèse, vol. 1 A : 22 (1978).

GILG, in ENGL. & PRANTL, Nat. Pflanzenfam., ed. 2, 21 : 589 (1925), n.v., included *Stemonoporus* and *Monoporandra*, together with *Vateria* in *Vateriæ* (cf. MAURY, l.c.).

CHROMOSOME NUMBER : *Stemonoporus* :  $n = 11$ ; also of *Dipterocarpus*, *Anisoptera*, *Vatica*, *Vateria* (K. JONG and others, n.v., cf. MAURY, l.c. : 28).

POLLEN : *Dipterocarpaceæ* have no endexine, the tricolpate pollen have a wall of only two strata (cf. MAURY, l.c. : 31, 32, and plates vol. II : p. 23, 27 and 29).

ENBRYO AND SEEDLING : MAURY (I A : 92) recognises several types and subtypes according to the implantation, inclination, position and folding. Seedlings are discussed on p. 124.



## MORPHOLOGY

Salient morphological characters may be found in the general generic description. A few are discussed here. Trichomes are always simple hairs, extremely short, thickish, conical, half adpressed; in some specimens microscopical flat round scales were observed (resin?). All trichomes are fugaceous, except in *S. moonii* where the hairs are very long and persistent (cf. MAURY, Thesis, vol. I A).

“In *S. wightii*, *S. petiolaris* and *S. reticulatus*, there is a considerable number (25-50) of resin ducts in the circumference of the pith, the ducts are somewhat unequal in size, the largest have a diameter of 10-15 times that of average pith cells, and they are filled with a solid whitish resinous substance. In the lower half of the internode three of those ducts prepare to enter the wood, which may be seen by a fan-shaped arrangement of the medullary rays. One of these is at the apex of the pith, under the petiole at the top of the internode, the other two are lateral. Contrary to the general rule, the apical duct precedes the two lateral ducts; in the upper half of the internode the apical leaf trace has separated from the central cylinder and has entered the bark, while the two lateral leaf traces have not yet been formed. The apical leaf trace very soon separates, first into 3, and afterwards into 5 distinct vascular bundles, one at the apex and two at each side opposite to each other, thus resembling an imparipinnate leaf. Eventually the petiole is formed exclusively by the apical leaf trace. At the node the two lateral leaf traces have arrived in the bark, and enter the stipules. I have also found branches separating from the apical leaf trace entering the stipules. It will be of interest to know whether this peculiar arrangement is found in other species.” (BRANDIS, 1895).

The petiole length is very variable in the same tree and cannot be used as a distinctive character. “The petiole of *S. wightii* at the base of the blade has an outer horseshoe of vascular bundles with 16, an inner semicircle with 6, and a central mass with 11, total 33 ducts; that of *S. rigidus* and *S. acuminatus* has 9-11 ducts in the outer semicircle and 2 in the central mass (PIERRE); while *S. reticulatus* has 13 ducts in the outer semicircle and none in the central mass” (BRANDIS, J. Linnean Soc. 31 : 138, 1895).

In 2 species (*S. moonii* and *S. lancifolius*) the leaves are triplinerved or subtriplinerved.

The lateral nerves, always more pronounced on the lower surface, have usually a very characteristic abrupt bend upwards near the margin; only in a few cases a real marginal vein is present, formed by the ends of the lateral nerves. The secondary nerves (intercostals) are always scalariform and fairly numerous, those near the midrib are perpendicular to the midrib, towards the margin they become perpendicular to the lateral nerves. In some species they are lacking completely and these leaves resemble strongly those of the 3 endemic *Vatica* species.

The petiole may be geniculate or straight, even in the same specimen and this character has no diagnostic value.

Inflorescences, axillary and extra-axillary, are in principle panicles, showing reduction to racemes and single flowers, but their paniculate origin is always indicated. They are contrarily to those of *Vatica*, *Shorea* and *Hopea* few to very few flowered, except in *S. wightii*. Deciduous bracts and bracteoles are present, persistent in *S. moonii*.



The flowers are not more nodding than those of *Vatica*, *Shorea* or *Hopea* species. The corolla lobes fall as a whole ; fully expanded they are hardly imbricate. The characteristic anthers have been misinterpreted by ASHTON. In one case the outer large valve had no involute margins and did not have a tubular aperture. BRANDIS states that some species have an articulate style (to the ovary), others not. The stigma is acute, punctiform, inconspicuous.

Fruit : MAURY (Diptérocarpacées, du fruit à la plantule, Thèse, 1978) recognized (vol. I A : 66 ; vol. I B : 367) in *Stemonoporus* two types of fruit, which according to her are important enough to create two subgenera : “ *Stemonoporus ronds* ” and “ *Stemonoporus ovoïdes* ”. These two subgenera, named *Sphæræ* and *Ovoïdes* in vol. I B, p. 371 bis, are not properly described according to the rules of taxonomy.

Of the “ *Stemonoporus ronds* ” she could study 3 species : *S. affinis*, *S. lanceolatus* and *S. oblongifolius*. They are characterised by globose fruit which at germination crack irregularly, a thin pericarp, encircling cotyledons and a typical anatomy of the radicle. As HEIM created for *S. oblongifolius* the genus *Vesquella*, the correct name for the subgenus should be *Vesquella* Heim.

Of the “ *Stemonoporus ovoïdes* ” she could study *Stemonoporus canaliculatus* and *S. reticulatus*. They are characterized by the thick-skinned, ovoid, pointed fruit, 6-lobed, at germination dehiscing by valves, and different anatomy of the radicle. As *S. reticulatus* is the base of *Kunckelia* Heim, the correct name of this subgenus is *Kunckelia* Heim.

In general I agree, that there are apparently two kinds of fruit, characterised by their dehiscence during germination, probably correlated with the thickness of the pericarp and the shape of the fruit. At this stage I am not inclined to create for these subgenera, as most of the mature fruit of *Stemonoporus* species are still unknown.

My own findings are, that there are moreover other fruit groups, characterised by simple plan-convex cotyledons and others by folded, encircling, much lobed and dissected, large cotyledons.

Of the conical, pointed, thick-skinned fruit, dehiscent by valves I know only *S. kanneliyensis* and *S. reticulatus*. MAURY mentions also *S. canaliculatus*, which is apparently a misidentification for *S. kanneliyensis* as true *S. canaliculatus* has thin-skinned, globose fruit, cracking irregularly during germination. In *S. kanneliyensis* the dehiscence is between each pair of ribs, in *S. reticulatus* along the grooves.

The species with round, thin-skinned fruit form the greater part of the species. From the few cases available it seems that the originally ribbed and grooved fruit, becomes smooth at maturity. Furthermore there are thin-skinned and less thin-skinned fruit in different species.

MAURY could study only 5 species, and I have not seen many mature fruit of all species, I prefer to postpone sub-division according to fruit (which then should be called series, as there are already two subgenera).

The remarkable fleshy cup with lacinate margin at the inner base of the perianth, is not mentioned by ASHTON. It was the base of HEIM's genus *Vesquella*. As BRANDIS said : “ these are of utmost importance and should be studied in other species ”.

The cotyledons are either equal or unequal ; albumen was found in a very young stage. They are usually very fleshy, folded and lobed, an exception is *S. angustisepalum*.



## ECOLOGY

The reason, why most species are so rare, is that the fruit setting is often poor to very poor. Moreover the seedlings are extremely sensitive to drought and a week of no rain will cause death, as I could observe with cultivated specimens. Hence they are restricted to extremely wet parts, even on exposed rocks they grow only when these are wet. They very easily detach and drop immature. Maturing takes a long time and augments the hazards. Fruit are often attacked (galls).

They usually grow in small populations, which expand only slowly because of their poor fruiting abilities and sensitiveness to drying out. As far as I could see there is no connection with the type or depth of soil as imagined by ASHTON. No animal eats the fruit.

## TAXONOMY

There is no doubt that *Stemonoporus* belongs in *Vateriæ*. It is distinguished mainly by the peculiar anthers, although these resemble those of *Vatica*. There is never a real connectival appendage. Two groups of fruit can be distinguished, one has spreading, not hardened sepals under the fruit, the other has the sepals hardened and enlarged and pointing downward, like in part of *Vatica*. Epigeal and hypogeal seed development both occur; but in all cases the lengthening of the hypocotyledon, lifts the cotyledons far above the ground.

If the system of combining all smaller genera in one large one as in *Shorea* and *Hopea* is advocated with their subgenera, it would be for the sake of consistency also advisable to combine all *Vateriæ* into *Vatica*, as was done by A. DE CANDOLLE.

## KEY TO THE SPECIES

1. Stamens 5. Ovary 2-(rarely 3-) celled.
2. Lateral nerves very obscure on the lower leaf surface. . . . . 24. *S. elegans*
- 2'. Lateral nerves very conspicuous, prominent on the lower leaf surface.
3. Leaves elliptic, 15-25 × 5-9 cm, strongly concave and pendulous. . . . . 26. *S. scaphifolius*
- 3'. Leaves elliptic, 5-15(-17) × 3-8 cm; acumen 4-10 mm long; lateral nerves 8-11 pairs. Pedicel thickish, 2-3 mm long. Sepals narrowly lanceolate. . . . . 25. *S. angustisepalum*
- 3". Leaves ovate to oblong-ovate, 3-11 × 1-5.5 cm; acumen 1-3 cm long. Lateral nerves 6-7 pairs. Pedicel filiform, 10 mm long. Sepals narrowly ovate-lanceolate. . . . . 23. *S. cordifolius*
- 1'. Stamens 15 (rarely 10-13). Ovary 3-celled.
4. Leaves triplinerved or sub-triplinerved.
5. Stipules very long, slender, persistent. Branchlets thick, apically with long, rufous hairs. . . . . 22. *S. moonii*
- 5'. Stipules minute, caducous. Branchlets slender or rather slender with fugaceous, microscopical indumentum. . . . . 1. *S. lancifolius*



- 4'. Leaves penninerved.
6. Distinct marginal nerve present. Leaves bullate above (cf. also *S. canaliculatus*).
7. Leaves 35-41 × 14.5-17 cm. Lateral nerves 20-26 pairs..... 2. *S. marginalis*
- 7'. Leaves 20-35 × 7-12 cm. Lateral nerves 16-18 pairs..... 3. *S. bullatus*
- 6'. Lateral nerves (at least in the lower part of the lamina) not connected or not all connected into a conspicuous marginal vein.
8. Midrib impressed on the upper leaf surface.
9. Fruit ovoid-acute, or conical-acute, large, thick-skinned, dehiscent by valves.
10. Leaves subovate-elliptic, rarely elliptic, 11-23 × 5-8 cm; lateral nerves 10-18 pairs. Secondary nerves on lower leaf surface conspicuous, scalariform. Fruit conical, up to 4.5 cm high..... 4. *S. kanneliyensis*
- 10'. Leaves elliptic, more rarely subovate-elliptic, 6-15 × 3-5 cm; lateral nerves 10-11 pairs. No secondary nerves on the lower leaf surface (not differentiated from the reticulation). Fruit ovoid, acute, 3.5 cm high..... 11. *S. reticulatus*
- 9'. Fruit globose or subglobose, obtuse, thin or rather thin-skinned, dehiscent by irregular cracks.
11. Leaves obtuse, sometimes slightly emarginate..... 5. *S. revolutus*
- 11'. Leaves acuminate.
12. Leaves caudate-acuminate with slender, 1-3 cm long acumen. Small trees, up to 4 m tall..... 6. *S. gracilis*
- 12'. Leaves broadly, abruptly acuminate, acumen 5-20 mm long. Trees up to 15 m tall.
13. Leaves rigidly coriaceous, ovate to ovate-oblong, the basal lateral nerves often proximate. Pedicel fleshy, 3-6 mm long. Tree up to 70 cm diam..... 7. *S. gardneri*
- 13'. Leaves thinly coriaceous, elliptic-lanceolate, basal lateral nerves aequidistant. Flowers sessile. Tree bole up to 10 cm diam. 8. *S. canaliculatus*
- 8' Midrib on the upper leaf surface prominulous or prominulous in a groove.
14. Secondary nerves (intercostals) invisible on the lower leaf surface.
15. Lateral nerves 4-6 pairs..... 9. *S. nitidus*
- 15'. Lateral nerves 12-16 pairs..... 10. *S. laevifolius*
- 14'. Secondary nerves (intercostals) conspicuous on the lower leaf surface.
16. Inflorescences a large, broad, up to 15 cm long, many-flowered panicle..... 15. *S. wightii*
- 16'. Inflorescences very few flowered, short (up to 5 cm long), pseudo-racemes, or flowers sessile.
17. Leaves obtuse (very rarely very shortly apiculate) or emarginate.
18. Leaves 22-35 × 10-15 cm..... 16. *S. gilimalensis*
- 18'. Leaves up to 14 × 5 cm.
19. Extremely rigid leaves. Lateral nerves impressed on the upper leaf surface..... 12. *S. rigidus*
- 19'. Leaves rigidly coriaceous. Lateral nerves prominulous on the upper leaf surface..... 13. *S. oblongifolius*
- 17'. Leaves broadly and shortly to long and slender acuminate.
20. Leaves chartaceous. Acumen very slender, with parallel margins, up to 2 cm long. Petiole slender, (2-)7.5 cm long. 14. *S. petiolaris*
- 20'. Leaves sub-coriaceous to stiffly coriaceous. Acumen broad, short (except in *S. lanceolatus*, where it may be up to 2.5 cm long, but then the petiole thick and only up to 2.5 cm long).
21. Flowers sessile..... 17. *S. scalarinervis*
- 21'. Flowers pedicellate.



22. Inflorescence a raceme, 1-5 cm long.  
 23. Raceme peduncles very slender. Leaves with slender acumen..... 21. *S. acuminatus*  
 23'. Raceme peduncles thickish. Acumen short, very broad..... 19. *S. latisepalum*  
 22'. Flowers glomerulate, 1-2 together.  
 24. Leaves sub-coriaceous, lanceolate to narrowly elliptic. Sepals lanceolate-linear ..... 18. *S. lanceolatus*  
 24'. Leaves stiffly coriaceous, elliptic to subovate-elliptic. Sepals narrowly oblong to subovate-oblong..... 20. *S. affinis*

### Subgenus *Stemonoporus*

— *Eustemonoporus* HEIM, Recherches Diptér. : 89 (1892).

Stamens 15 (rarely 10-13). Ovary 3-celled.

#### 1. *Stemonoporus lancifolius* (Thw.) Ashton. — Pl. 1.

Blumea 20 (2) : 365 (1972); in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 191 (1977), p.p. (excl. Ashton 2003 & Balakrishnan 343, quoad *S. gracilis*); KOSTERMANS, in Liber gratulat. de Wit : 216, Wageningen (1980).

- *Monoporandra lancifolia* THW., Enum. Pl. Ceyl. : 39 (1858); A. DC., Prodr. 16 (2) : 637 (1868); TRIMEN, Handb. Fl. Ceylon 1 : 137 (1893); ASHTON, l.c.  
 — *Vateria lancifolia* (THW.) THW., Enum., l.c. : 404 (1864); A. DC., l.c. : 637; TRIMEN, l.c.; ASHTON, l.c.  
 — *Vateria nitida* var. *lancifolia* (THW.) DYER, in HOOKER f., Fl. Brit. Ind. 1 : 316 (1874); TRIMEN, Syst. Catal. : 10 (1885); Handb., l.c.  
 — *Stemonoporus nitidus* var. *lancifolius* (THW.) TRIMEN, Handb., l.c. : 136 (auctor sphalm. : Dyer); ASHTON, l.c.  
 — *Stemonoporus nitidus* subsp. *lancifolius* (THW.) ASHTON, l.c. : 139 (sphalm. for variety).  
 — *Vateria lanceæfolia* (THW.) A. DC., Prodr. 16 (2) : 625 (1864), sphalm. (= *Vateria lancifolia* Thw.).  
 — *Monoporandra lanceæfolia* (THW.) A. DC., Prodr., l.c. : 625 (1864), sphalm. (= *Monoporandra lancifolia* Thw.).  
 — *Stemonoporus nervosus* THW. ex TRIMEN, J. of Bot. 23 : 206 (1885); Syst. Cat. : 10 (1885); Handb., l.c. : 136; BRANDIS, J. Linn. Soc. 31 : 142 (1895); ASHTON, ll.cc., as a synonym. of *S. lancifolius*.  
 — *Vateria nervosa* THW. ex TRIMEN, J. of Bot., l.c.; Typus : C.P. 3885, Hewesse, ster., 1865 (PDA); quoted erroneously as 3815 by TRIMEN in 1885.

Typus : C.P. 3412, Pasdun Korale, Hellesee, fl., Apr. 1855 (PDA, 2 sheets).

Probably small tree, glabrous in all its parts (except anthers). Branchlets and thin, smooth, glossy, terminal bud small, glossy. Leaves sub-coriaceous, glossy and obscurely reticulate on both surfaces, lanceolate, 5-13 × 1-4 cm, long-acuminate (acumen obtuse, 5-20 mm long), base obtuse, very rarely acutish; above midrib thin, prominulous, below slender, slightly prominent, laterals distinct below, 3-6 pairs, prominulous, thin, erect-patent, near the margin abruptly almost erectly ascendent, the lowest pair arcuate, more ascendent (triplinerved), secondary nerves thin, parallel, horizontal, numerous. Petiole thin, 5-13 mm long, not geniculate.





Pl. 1. — *Stemonoporus lancifolius* (Thw.) Ashton.



Inflorescences axillary with one flower, rarely with 2. Peduncle very thin, up to 10 mm long. Pedicel very thin, up to 15 mm long. Sepals ca. 4 mm long (after anthesis 10 mm), narrowly ovate-oblong, acute, concave, glossy. Petals oblong, acutish, 7 mm long. Stamens 15. Anthers microscopically pubescent. The large valve more than twice the small one, acute, its margins hardly recurved (not "end porus").

Fruit (according to DYER) ovoid,  $25 \times 19$  mm, pale brown, minutely mottled. Sepals long, pointing downward (according to plate in PDA).

DISTRIBUTION : Only known from the type locality, lowland evergreen forest in S.W. Ceylon.

NOTES : TRIMEN erroneously quoted THISELTON-DYER for *Stemonoporus nitidus* var. *lancifolius*; actually DYER made the variety under *Vateria nitida*. ASHTON apparently did not check this and repeated the mistake.

ASHTON moreover erroneously quoted it as a subspecies, which hence represents a new combination, although unintentionally made.

ASHTON mixed two entirely different species. I have segregated part as *S. gracilis*, which even in sterile condition can easily be separated by the impressed midrib on the upper leaf surface and the non-triplinerved leaves.

In the type material at Peradeniya there is a package with a complete flower, which apparently ASHTON did not examine, as he failed to note that the anthers are not so-called end-porus.

Only DE CANDOLLE commented on the irregular lateral nerves. The triplinervy, mentioned by TRIMEN in *Vateria nervosa* in 1885, was completely overlooked by others, although it is quite distinct, the subbasal nerves being also different in shape from the other ones.

DYER described a fruit; I have seen none. I have copied his description. The plate in PDA shows this fruit with reflexed sepals.

The species was originally included in *Monoporandra*; DYER moved it to *Vateria* because of the 15 stamens.

MATERIAL STUDIED : C.P. 3412, S.W. Ceylon, wet, evergreen lowland forest, fl., Apr. 1855 (PDA, 2 sheets); C.P. 3885, Hewesse, ster., Sept. 1865 (PDA).

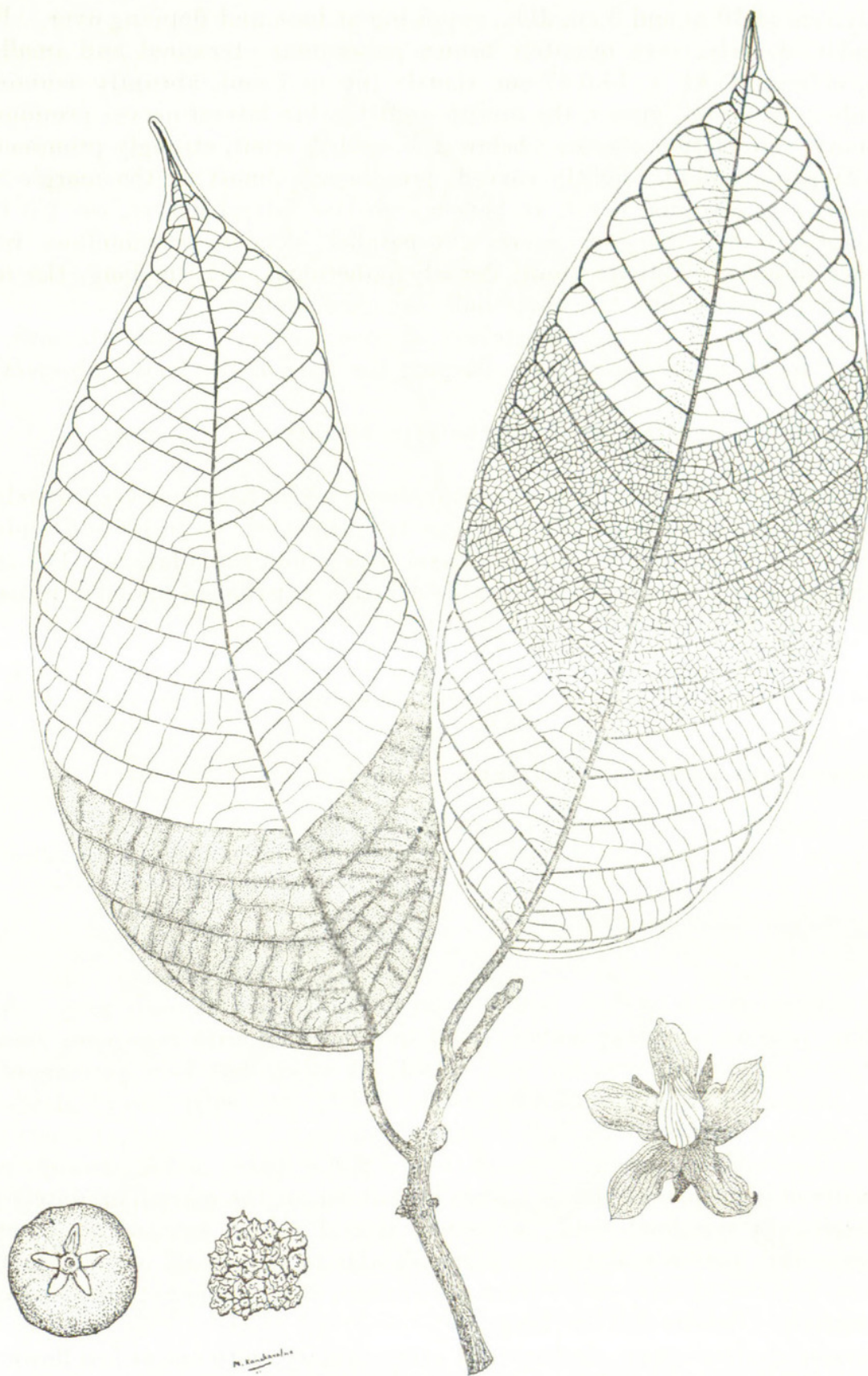
## 2. *Stemonoporus marginalis* Kostermans, sp. nov.

— *Stemonoporus canaliculatus* Auct., non THW., ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 189 (1977), p.p., quoad spec. Ashton 2073.

*Arbor ramulis crassis angulatis dense minutissime puberulis, foliis coriaceis, magnis, oblongis, breve abrupte acuminatis, basi rotundatis, supra nitidis, nervo mediano costisque tenuibus prominulis in sulcis, reticulo obscure, subtus opacis sparse minutissime adpresse puberulis, nervo mediano crasso valde prominenti, nervis lateralibus prominentibus, numerosis, patentibus, sub-arcuatis ad marginem in venis marginalibus conspicuis conjunctis, nervis secundariis sub-parallelis prominulis, reticulo sat obscure, petiolis crassis, longis, puberulis, fructibus immaturis subglobosis, sat rugosis, sepalibus persistentibus, crassis, carinatis, ovato-oblongis acutis, puberulis, suberectis.*

Typus : Ashton 2073 (L).





Pl. 2. — **Stemonoporus bullatus** Kostermans : fruit from below, texture of fruit and flower. (*Balasubramaniam* 2147, G).



Spindly tree of 10 m and 3 cm dbh., coppicing at base and flopping over. Branchlets thick, angular, densely, very minutely brown puberulous; terminal bud small. Leaves coriaceous, oblong, 35-41 × 14.5-17 cm, shortly (up to 1 cm), abruptly acuminate, base rounded; above glabrous, glossy, the midrib and the thin lateral nerves prominulous in a shallow groove, reticulation obscure; below dull, midrib stout, strongly prominent, lateral nerves 20-25 pairs, patent, slightly curved, prominent, almost at the margin connected into a conspicuous marginal nerve, in between shorter lateral nerves, ca. 1/3 the length of the lateral nerves; secondary nerves sub-parallel, slender, prominulous, reticulation dense, rather obscure. Petioles stout, densely puberulous, 5-7 cm long, the upper half often somewhat thicker than the lower half, not geniculate.

Fruit (detached) immature, subglobose, brown, scurvy; sepals thickish, carinate, ovate-oblong, acute, up to 7 mm long, clasping the base of the fruit (sub-erect).

DISTRIBUTION : Only known from the type locality.

NOTES : ASHTON included this in *S. canaliculatus*, which has, however, entirely different leaves which are much smaller with much less lateral nerves, an impressed midrib on the upper surface and a different pattern of lateral nerves and reticulation. The single fruit in the specimen, which was available, was detached. ASHTON on his label remarked that the tree was sporadically flowering and fruiting.

MATERIAL STUDIED : *Ashton 2073*, S.W. Ceylon, Nellowe — Pelawatte new road, gregarious on low broad ridge in mixed Dipterocarp forest, 120 m, April, young fr. (K, L, PDA, US).

### 3. *Stemonoporus bullatus* Kostermans. — Pl. 2, 3.

*In Liber gratulat. de Wit* : 209, fig. 1 (1980).

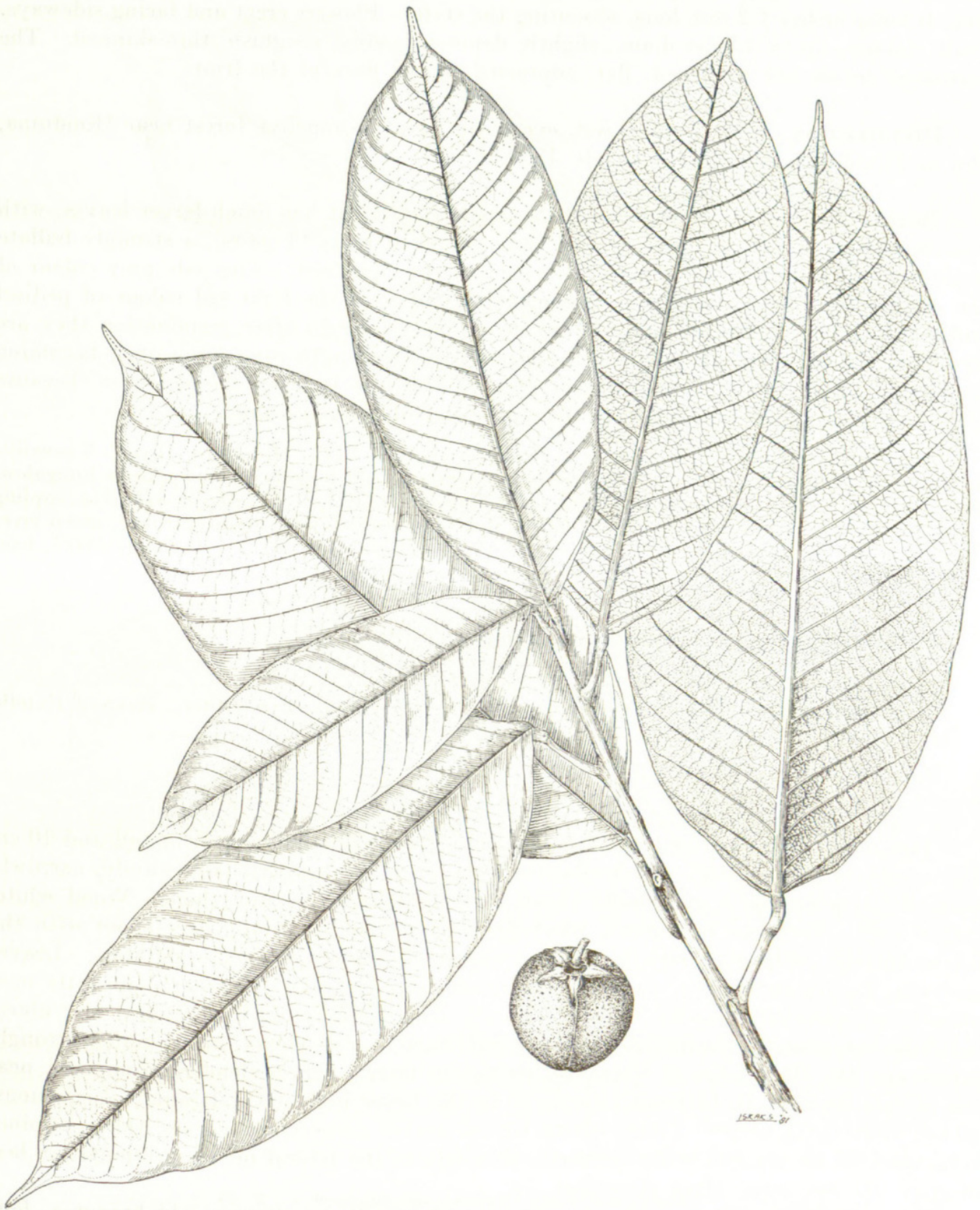
— *Stemonoporus canaliculatus* Auct. (non THW.), ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 189 (1977), p.p., quoad *Ashton 2046* and *Meijer 545*.

TYPE : *Balasubramaniam 2147* (G).

Small tree, up to 3.5 m high, bole 3-4 cm in diam. Bark smooth, grey. Apical part of branchlets, petioles of young leaves, small terminal bud with fugaceous minute indumentum, the same on inflorescence and outside of calyx, but here permanent. Leaves coriaceous, elliptic to subovate-elliptic, 20-35 × 7-12 cm, with abrupt slender, obtuse, 1-2 cm long acumen, base rounded; above glossy, bullate, midrib narrow, strongly impressed, lateral ribs and secondary nerves impressed; below glossy, paler, midrib strongly prominent, the 16-18 pairs of erect-patent lateral nerves prominent, at the margin arcuately connected into a conspicuous marginal vein; accessory lateral nerves horizontal, much shorter, straight; secondary nerves scalariform, perpendicular to the lateral nerves, starting where the accessory, horizontal veins stop; other reticulation of the same pattern, obscure, margin slightly incurved. Petiole 2-5 cm long.

Inflorescences glomerulate, axillary and extra-axillary, with one or few flowers; pedicel thick, 1-2 mm long, obconical, light red (fresh), at the base with tiny bracts, broader than long. Sepals lanceolate-oblong, acute, 5 mm long, light red (fresh). Petals oblong, obtuse,





Pl. 3. — **Stemonoporus bullatus** Kostermans.



ca. 8 mm long, 4 mm diam., glabrous, white. Anthers 15, narrowly lanceolate, up to 5 mm long, tubular orifice 1-2 mm long, obscuring the style. Flowers erect and facing sideways. Fruit globose, up to 3.5 cm diam., slightly depressed, grey, roughish, thin-skinned. The persistent sepals not hardened, flat, adpressed to the base of the fruit.

DISTRIBUTION : S.W. Ceylon, wet, evergreen forest, Kanneliya forest near Hiniduma, also on Hinidumkande (Haycock), alt. 150-800 m.

NOTES : By ASHTON confused with *S. canaliculatus*. It has much larger leaves, with considerably more lateral nerves (16-18 pairs versus at most 11 pairs), a strongly bullate upper surface and narrower sepals, adpressed to the ripe fruit. The pale grey colour of the mature fruit is uncommon in *Stemonoporus* and so is the light red colour of pedicel and sepals. The cotyledons are pale green, strongly folded; after germination they are free from the pericarp, lifted above the ground by the lengthening hypocotyl, becoming horizontal, larger, wrinkled and darker green. The tree is often flopped over, because of its thin bole, quite different from the erect boles of *S. canaliculatus*.

MATERIAL STUDIED : S.W. Ceylon : *Balasubramaniam* 2147, Hiniduma Distr., Kanneliya forest, ca. 150 m, Jan., fl. (G, L); *Balasubramaniam* s.n., old logging road, opposite bungalow, along river, ster. (G, L); *Kostermans* 27642, *ibid.*, May, fl. (AARH, G, L); *Meijer* 545, *ibid.*, sapling of one m (PDA, US); *Kostermans* 27654, along main forest road, near main entrance, steep river slope, May, fl., fr. (AARH, G, L); *Ashton* 2046, steep hillside, ster. (PDA); *Bernardi* 15477, near Hiniduma, Mt. Kalubovitiangala, 888 m, on Dewalagama Rd., fl. (G, PDA).

#### 4. *Stemonoporus kanneliyensis* Kostermans. — Pl. 4.

*In Liber Gratulat. de Wit* : 213, fig. 2, 3 (1980).

— *Stemonoporus reticulatus* Auct. (non THW.) ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 192 (1977), except : *C.P.* 3414 and *Ashton* 2073.

TYPUS : *Kostermans* 24995 (L).

Tree, up to 15 m tall and up to 35 cm dbh., flowering when only 4 m tall and 10 cm dbh.; bole up to 8 m long. Bark smooth, hard, grey, very superficially wavy, narrowly fissured, hoop-ringed, 1 mm thick. Live bark light brown, 4 mm thick. Wood white, rather hard. Terminal bud small, when developing forming a long bare shoot with the leaves apically, both obscurely densely very minutely puberulous, soon glabrous. Leaves glabrous, rigidly coriaceous, elliptic to subovate-elliptic, 11-23 × 5-8 cm, abruptly acuminate, acumen very slender, sharp, 1-2.5 cm long, base rounded or almost so; above (adult leaves) smooth, the midrib shallowly impressed; below glossy, paler, midrib strongly prominent, the 10-18 pairs of lateral rather patent lateral nerves slender, prominent, near the margin arcuate, in between (especially in the lower half of the lamina) conspicuous, almost horizontal, shorter intermediate lateral nerves; secondary nerves thin prominulous, towards the margin scalariformous, obliquely to the lateral nerves; reticulation lax. Petioles 3-7 mm long, often geniculate.

Racemes 3-7 cm long, or flower solitary, extra-axillary, often on old branches, few-flowered, densely, very minutely puberulous. Pedicels thickish, 3-4 mm long. Sepals 5,





Pl. 4. — *Stemonoporus kanneliyensis* Kostermans.



sometimes 6, lanceolate, acute, stiff, patent, 1 cm long, yellowish green inside, brown outside (fresh). Petals ovate, acute, patent, fleshy, yellow, somewhat longer than the sepals. Anthers 15, adpressed against the silvery puberulous, pyramidal, ribbed ovary, shorter than the style, lanceolate, acute, the 10 outer ones longer than the inner 5, which are opposite the 5 outer ones; filaments very short.

Fruit conical, acute, thick-skinned, roughish rusty brown, up to 4.5 cm high, and 4 cm diam. at the rounded base, distinctly, broadly 6-ribbed; the hardened, up to 1 cm long sepals pointing downward. At germination the pericarp splits into 3 valves (each valve 2-ribbed). The cotyledons remain in the fruit, when the seedling has already 4 normal (but smaller) leaves and the fruit is above the ground, lifted by the lengthening hypocotyledon.

*Ashton 2073*, which I was unable to place formerly, is here described as *S. marginalis*.

MATERIAL STUDIED : S.W. Ceylon : *Kostermans 24995*, Galle Prov., Hiniduma Distr., Kanneliya forest, 150 m, wet, evergreen, June, fl. (K, L, PDA, US); *Cramer 3071*, same tree (PDA, US); *Jayasuriya & Kostermans 2352*, same tree near Bungalow on river, July, fl. (PDA, US); *Kostermans 27653*, along main forest road, sapling (AARH, G); *Kostermans 27650, 27651, 27655, ibid.*, May, fl. (AARH, G, L); *Balasubramaniam 179*, along river near Bungalow, ster. (PDA); *Meijer 510 & 990, ibid.*, ster. (PDA, US); *Ashton 2048, 2092, ibid.*, ster. (PDA).

##### 5. *Stemonoporus revolutus* Trimen ex Hooker f. — Pl. 5.

In TRIMEN & HOOKER f., Handb. Fl. Ceylon 5 : 384 (1900); LIVERA, in Ann. Roy. Bot. Gard. Peradeniya 9 : 98 (1924); LEWIS, Veget. Prod. Ceylon : 48 (1934); ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 193 (1977); KOSTERMANS, in Liber gratulat. de Wit : 217 (1980).

TYPUS : *Lewis s.n.*, Jan. 1893, over-looking Kukul Korale, ridge 3000 ft., ster. (K).

Treelet, 4-5 m tall. Branchlets stout, angular, apical part glabrous or almost so. Terminal bud small. Leaves glabrous, stiffly coriaceous, elliptic to oblong,  $3-11 \times 1.5-5$  cm, margin revolute, apex rounded, rarely slightly emarginate, base rounded, very rarely shortly subcuneate, above glossy, midrib thin, impressed, lateral nerves very thin, prominulous in a depression; below paler, midrib strongly prominent, the 7-14 pairs of rather patent to erect-patent slender lateral nerves prominent, near the margin strongly arcuate over a short distance, reticulation dense, obscure, the secondary nerves hardly or not differentiated from the reticulation. Petioles stout, 5-15 mm long, straight.

Inflorescences racemiform, axillary, slightly, sparsely minutely puberulous, main peduncle 1-3 cm long, bearing the apically aggregate 1-5 flowers. Pedicels rather slender, up to 6 mm long. Sepals thin, oblong, acute, sparsely puberulous to glabrous, up to 6 mm, acute. Petals yellow, spatulate to ovate-oblong, obtuse, up to 6 mm long. Stamens 15.

Fruit globose, 3 cm diam., scabrous, brown, rather thin-skinned, sepals not enlarged, patent-recurved (angle of 45 degrees).

DISTRIBUTION : Only known from one ridge overlooking Sinharaja forest, rocky.





Pl. 5. — *Stemonoporus revolutus* Trimen ex Hooker f.



NOTES : As elucidated in my former paper the type specimen, as described by HOOKER, is sterile and hence HOOKER added a question mark to the genus. This type specimen, which is at Kew, where HOOKER described it and not in Peradeniya, is the specimen of LEWIS collected in the Kukul Korale, collected in Jan. 1893, an isotype is in Peradeniya. The flower bearing specimen was collected by LEWIS in Dec. 1893 on Walankande.

ASHTON overlooked the note on the type sheet of LEWIS which reads : tree 15 ft. and is hence no canopy tree as he pretends. He overlooked furthermore a note, that the fruit was depicted in the collection of colour plates in Peradeniya.

The leaves are not strongly revolute, but only slightly at the margin. ASHTON was misled by the badly dried sterile specimen of LEWIS.

ASHTON's remark, that the tree apparently flowers sporadically at all times, is not based on any fact ; he saw only one flowering herbarium specimen.

MATERIAL STUDIED : *Waas 1770*, S. of Sinharaja forest, entrance from Deniyaya, 1300 m, June, fl. (PDA) ; *Lewis s.n.*, Walankande (Panills), Dec. 1893, fl. (PDA) ; *Lewis s.n.*, steep rocky ridge, 100 m, overlooking Kukul Korale, Jan. 1893, ster. (PDA, K) ; *Livera s.n.*, Kiribatgala near Kahawatte, sapling (PDA), leaves up to  $16 \times 6$  cm, not revolute ; petiole up to 2.5 cm.

#### 6. *Stemonoporus gracilis* Kostermans, *sp. nov.* — Pl. 6.

— *Stemonoporus lancifolius* Auct. (non ALSTON), ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 191 (1977), *p.p.*, quoad Ashton 2003 & Balakrishnan 343.

*Arbor parva in omnibus partibus glabra, foliis chartaceis vel subcoriaceis subovato-oblongis caudato-acuminatis basi obtusis, supra nitidis laevibus, nervo mediano sulcato, subtus pallidioribus nitidis, nervo mediano prominenti, costis tenuibus prominulis sat patentibus versus marginem arcuatis, nervis caeteribus obscuris laxe reticulatis, petiolis tenuibus, longis, supra sulcatis, floribus solitariis, pedunculis tenuibus non ramificatis impositis, pedicellis gracilibus, longis, gemmis acutis, sepalis sat longis, anguste oblongis acutis, petalis ovato-oblongis acutis, flavis, staminibus 12-13, ovario glabro, stylo longo, stigmate punctato, fructibus subglobosis, sub-acutis, sepalis persistentibus reflexis vix induratis, longis.*

TYPE : Ashton 2003 (G).

Tree, up to 4 m tall, glabrous in all its parts, stem up to 5 cm diam. Bark pale, smooth. Branches pendant. Branchlets slender, glabrous, terminal bud in rest-stage short, globose. Leaves chartaceous to sub-coriaceous, subovate-oblong,  $7-15 \times 2.5-5$  cm, caudate-acuminate (acumen very slender, 1-3 cm long, obtuse), base rounded ; above glossy, smooth, midrib deeply channelled, sometimes lateral nerves faintly visible, below paler, glossy, midrib strongly prominent, lateral nerves thin, prominulous, rather patent, towards the margin arcuate, 10-12 pairs, in between much shorter lateral veins, other veins forming a lax, obscure reticulation. Petiole thin, 1-3 cm long, slit-like channeled above.

Flowers solitary on thin, up to 2 cm long unbranched axillary peduncle, often microscopically adpressed pseudo-scaly. Pedicel thin, up to 8 mm long. Sepals narrowly oblong, rather fleshy, up to 12 mm long ; petals yellow, ovate-oblong, acutish, slightly longer. Stamens 12-13 (two flowers dissected), narrowly triangular, acute, 5-6 mm long, ca. 1 mm wide at the base, 1-1.5 mm of the apical part a laterally slightly open tube. Ovary glabrous, sub-globose with long, slender style, slightly shorter than the stamens and inconspicuous stigma.





Pl. 6. — *Stemonoporus gracilis* Kostermans.



Fruit sub-globose, acutish, rather thin-skinned, 15 mm diam., outside divided into minute, polygonal fields. The persistent sepals not hardened, pointing downward. Fruit cracking irregularly at germination.

DISTRIBUTION : Only known from an area along a tributary of the Kelani R., ca. 0.5 mile S. of Kitulgalle.

NOTE : The shape (not the size) of the acumen, and reticulation resembles strongly that of *S. elegans*, but our species differs by the larger leaves, the larger number of stamens, the much broader sepals and the larger fruit.

It is rather remote from *S. lancifolius*, with which it has been confused by ASHTON and from which, in sterile condition, it can be readily distinguished by the pinnately veined leaves (triplinerved in *S. lancifolius*) and the channeled midrib on the upper surface (midrib prominulous in *S. lancifolius*). The number of stamens, however, brings it nearer to *S. lancifolius*, then to *S. elegans*.

MATERIAL STUDIED : *Bremer 940*, Kegalle Distr., shore and forest along tributary of Kelani R., 0.5 mile S. of Kitulgalle, ca. 80°24' E, 6°59' N, 70 m, wet, evergreen forest, March, fl., fr. (PDA, S, US) ; *Balakrishnan 343*, *ibid.*, Aug., fl. (PDA) ; *Ashton 2003*, *ibid.*, March, fl. (G, PDA, US) ; *Kostermans s.n.*, *ibid.*, March, fl., fr. (L).

#### 7. *Stemonoporus gardneri* Thwaites. — Pl. 7.

In HOOKER'S Kew J. Bot. 6 : 69, *tab. 2 A* (1854) ; Enum. Pl. Zeyl. : 38 (1858) and 403 (1864), as a synonym of *Vateria gardneri* Benth. ; BEDDOME, Fl. sylv. : *tab. 99* (1870) ; PIERRE, Fl. for. Cochinch. 17 : *tab. 258 H* (1892) ; HEIM, Bull. Soc. Bot. France 39 : 153 (1892) ; TRIMEN, Handb. Fl. Ceylon 1 : 133 (1893) ; ALSTON, *in id.* 6 (Suppl.) : 26 (1931), *excl. Lewis s.n.*, Wallankande ; BRANDIS, J. Linn. Soc. 31 : 139 (1895) ; ASHTON, *in* DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 190 (1977), *excl. Lewis s.n.*, Wallankande ; LEWIS, Trees & fl. Pl. W. & Sabaragamuwa Prov. : 36 (1902) ; Veget. Prod. Ceylon : 145 (1934), *quoad nomen tantum*.

— *Vateria gardneri* (THW.) BENTH. *ex* THW., Enum., *l.c.* : 403 (1864) ; DYER, *in* HOOKER f., Pl. Brit. Ind. 1 : 314 (1874) ; TRIMEN, Syst. Catal. : 9 (1885) ; Handb., *l.c.*

— *Vatica gardneri* (THW.) A. DC., Prodr. 16 (2) : 622 (1868) ; DYER, *l.c.*

LECTOTYPUS PROPOSITUM : *Gardner s.n.*, C.P. 1920, *p.p.*, Adam's Peak (PDA).

Tree, up to 20 m tall and 70 cm dbh. No buttresses. Bark smooth, grey, ca. 0.5-1 mm thick, hoop-ringed ; live bark 5 mm, white. Crown rather open (in Adam's Peak specimens). Branchlets thick, angled, often sulcate, glabrous to sparsely, microscopically puberulous with large protruding leaf scars. Terminal bud small. Stipules carinate, thick, acute, caducous, up to 5 mm long. Leaves glabrous, sub-coriaceous to stiffly, thickly coriaceous, oblong-ovate to ovate, 7-15 × 4-8 cm, rather abruptly acuminate (acumen short to long and rather slender, 5-20 mm), base rounded or truncate or obscurely sub-cordate ; above smooth (rarely obscurely densely reticulate), glossy, midrib slightly sunk in broad groove, lateral nerves very thin, slightly impressed ; below the stout midrib strongly prominent, the 5-13 pairs of lateral nerves erect-patent, prominent, near the margin strongly ascendently arcuate, not connected at the margin, the lower 2 or 3 pairs often proximate and more patent (pseudo-quintuplinerved) ; secondary nerves slender, prominulous, scalari-





Pl. 7. — *Stemonoporus gardneri* Thwaites.



formous, sometimes hardly distinguishable from the dense reticulation. Petiole 6-40 (-60) mm long, rather slender to thickish, geniculate or straight, apical part slightly swollen.

Inflorescences with fugaceous, very minute puberulence, rather numerous, attached slightly above the axils of the apical leaves, either racemiformous or forming few and very shortly (apically) branched panicles, each with one to 7 flowers, up to 8 cm long. Buds before anthesis ovoid, pointed. Pedicel thickish, curved, 3-6 mm long or slender, straight, 10-15 mm long. Sepals glabrous, greenish yellow to yellowish white (fresh), subovate-elliptic to broadly oblong, up to  $8 \times 5$  mm, acutish, longitudinally veined. Petals pale lemon yellow, broadly ovate-elliptic, up to 6-8 mm long. Stamens 15, 3 mm long, densely grey puberulous. Style 5 mm long, included in the cone of stamens.

Fruit globose (initially mucronate), rather thick-skinned, fielded-roughish, brown, up to 3.5 cm in diam., the persistent sepals not enlarged, stiff, pointing more or less downward. "Embryo thick, fleshy, lobed" (BRANDIS). Pericarp cracking irregularly at germination; cotyledons large, fleshy, lobed and wrinkled, red.

DISTRIBUTION : S. and E. slopes of Adam's Peak, between 1500 and 1800 m altitude and in the higher areas of Sinharaja forest near Enselwatte.

NOTES : The leaves of the specimens enumerated here differ considerably in shape from pure ovate with few (5-7 pairs) of lateral nerves to ovate-oblong with up to 13 pairs of lateral nerves, and in consistency, those of the Adam's Peak being very stiffly, rigidly coriaceous, those from Sinharaja sub-coriaceous. Also the petioles differ considerably in length and thickness, those from Adam's Peak being thickish, 6-40 mm long, those from Enselwatte up to 6 cm long, slender. The flowers of all specimens seem to be the same, but the pedicels are either thickish and curved (Adam's Peak) and up to 4 mm long, those from Enselwatte straight, slender, up to 15 mm long. Although the above are rather striking differences, I am not in the position with the scanty material available, to separate them in entities.

DYER and ASHTON called the inflorescences paniculate, TRIMEN and DE CANDOLLE racemiformous. Actually both are represented, the racemes being actually pseudo-racemes, reduced panicles. That they are not exactly axillary, has been nowhere mentioned.

I have not seen specimens below 1500 m alt. on Adam's Peak, those on Enselwatte are from 1000 m alt.

LEWIS's *S. gardneri* was based on a specimen from Wallankande, which TRIMEN identified as *S. gardneri*. ASHTON made the same mistake. It is quite different and here enumerated under *S. scalarinervis*.

ASHTON (*l.c.* : 190) erroneously quoted BEDDOME's plate as *Vateria gardneri*; it is *Stemonoporus gardneri*.

The note in LEWIS, Veg. Prod., *l.c.*, that it is found near Badulla is misplaced and belongs under the foregoing *S. acuminatus*.

MATERIAL STUDIED : Ashton 2109, Adam's Peak, S. slopes, common between 1200 and 1600 m, ster. (PDA), labelled as 20 m tall and 70 cm dbh.; Kostermans 27018, above Moray Estate, Maskeliya Distr., canopy tree with *Palaquium rubiginosum*, Nov., young fr. (G, L, PDA); Kostermans 27234, *ibid.*, Jan., young fr. (G, L, PDA); Ashton 2110, *ibid.*, April, mature fr. (K, L, P, PDA, US); Sohmer & Waas 8687, *ibid.*, Dec., young fr. (PDA); Ashton 2912, *ibid.*, Apr., after anthesis





Pl. 8. — *Stemonoporus canaliculatus* Thwaites.



(K, L, P, PDA, US), quoted as 2112; *Bernardi* 15788, from Carney to Adam's Peak, Dec., buds (G, PDA); *Thwaites C.P.* 1920, Gongals near Adam's Peak, March 1852, fl. (PDA); *Trimen s.n.*, Maskeliya, March, buds (PDA); *Gardner s.n.*, *C.P.* 1920, Adam's Peak, fl. (PDA), type; *Sohmer & Waas* 10435, 10460, Sinharaja forest, N. Enselwatte, along Madaelle stream, 100 m, entry Army Camp, Nov., after anthesis (PDA); *Waas* 1479, *ibid.*, Febr., young fr. (PDA); *Huber* 613, *ibid.*, Nov., after anthesis (PDA).

8. *Stemonoporus canaliculatus* Thwaites. — Pl. 8,

Enum. Pl. Zeyl. : 38 (1858) and 403 (1864), as a synon. of *Vateria canaliculata* Benth. ; A. DC., Prodr. 16 (2) : 621 (1868), as a synon. of *Vatica canaliculata* ; DYER, in HOOKER f., Fl. Brit. Ind. 1 : 315 (1874), as a synon. of *Vateria canaliculata* ; TRIMEN, Handb. Fl. Ceylon 1 : 135 (1893) ; BRANDIS, J. Linn. Soc. 31 : 140 (1895) ; LEWIS, Veget. Prod. Ceylon : 47 (1934) ; ASHTON, in DAS-SANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 192 (1977), *pro minime parte*, only *C.P.* 3413 ; KOSTERMANS, in Liber gratulat. de Wit : 216 (1980).

— *Vateria canaliculata* (THW.) BENTH. ex THW., Enum., *l.c.* : 403 (1864) ; DYER, *l.c.* ; TRIMEN, System. Catal. : 10 (1885) ; Handb., *l.c.* (as *Stemonoporus canaliculata*) ; ASHTON, *l.c.* ; KOSTERMANS, *l.c.*

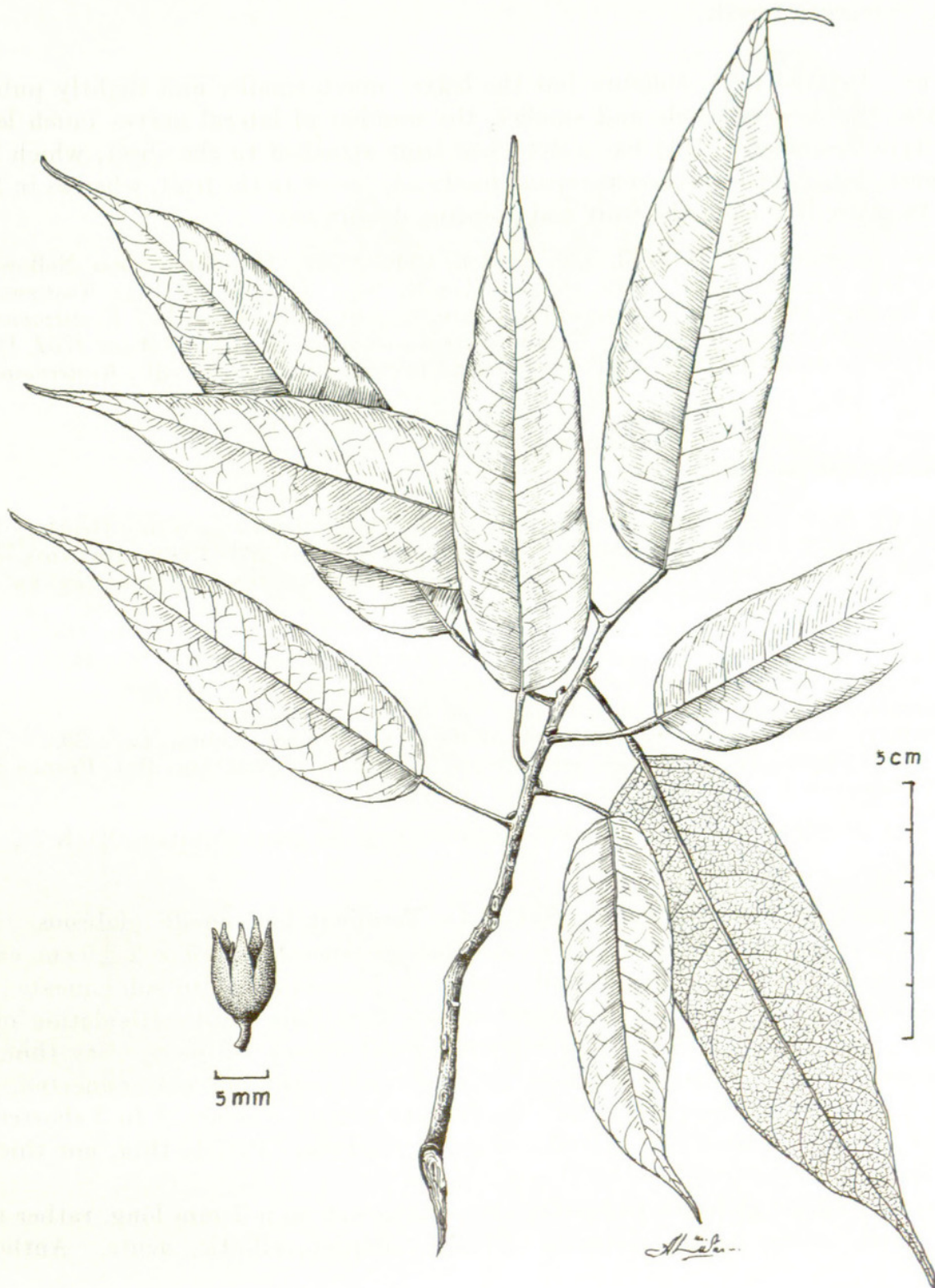
— *Vatica canaliculata* (THW.) A. DC., Prodr. 16 (2) : 621 (1868) ; DYER, *l.c.*

LECTOTYPUS PROPOSITUM : *C.P.* 3413, Hinidoon Korle (= Hiniduma Korale), April 1855, fl., *excl.* detached fruit (PDA).

Tree, up to 5 m tall and dbh. 10 cm. Bark smooth, grey, hoop-ringed. Branchlets patent, terminal part sub-angular, rather thin, densely microscopically brown puberulous. Terminal bud small with similar indumentum. Leaves thinly coriaceous, rather stiff, elliptic to lanceolate, 6-15 × 2-6 cm, rather broadly, obtusely acuminate (acumen 6-12 mm long), base obtuse or shortly acutish ; above glossy, glabrous, sub-bullate, midrib slender, deeply impressed, lateral nerves thin, impressed, sometimes secondary impressed veins visible ; below paler, initially midrib and lateral nerves microscopically puberulous, midrib strongly prominent, lateral nerves prominent, erect-patent, 9-12 pairs, some of them at 1-2 cm from the margin arcuately connected, secondary nerves scalariformous, slender, prominent ; reticulation none or obscure. Petiole slender, densely puberulous, 1-4 cm long, straight or geniculate.

Inflorescences consisting of 1-2 axillary or usually extra-axillary sessile flowers on an inconspicuous, up to 2 mm long, thick, puberulous peduncle ; at the flower base a number of minute, ovate, acute bracts. Sepals ovate-oblong, acute, 5-6 mm long, densely puberulous outside. Petals thinner, ovate, obtuse, 7 mm long. Stamens 15, puberulous. Fruit greyish brown, depressed globose, up to 3.5 cm diam. and 2.5-3 cm high with thin pericarp and folded, dark red cotyledons, pericarp roughish, brown, divided into polygonal areas. Sepals not hardened, pointed downwards. "Cotyledons thick, fleshy, both bifid to the base ; the cells filled with starch. At the base of the fruit, the inner surface of the pericarp is lined by a flat membranous cup, the rim of which is divided into 10 linear lacinate, upright lobes, which penetrate in between the lobes of the cotyledons" (BRANDIS). The pericarp cracks irregularly at germination. The cotyledons are fleshy, red, lobed and wrinkled, spreading. The thick radicle has below its tip a collar of thin, adpressed, silky hairs.





Pl. 9. — *Stemonoporus laevifolius* Kostermans.



DISTRIBUTION : S.W. Ceylon. Hinduma and Sinharaja, lowland to 1200 m alt., very wet, evergreen forest.

NOTES : Related to *S. bullatus*, but the leaves much smaller and slightly puberulous underneath, the flowers sessile and smaller, the number of lateral nerves much less.

The type specimen (PDA) has a detached fruit attached to the sheet, which belongs to *S. bullatus*. It has the pubescent sepals closely adpressed to the fruit, whereas in *S. canaliculatus* they are free from the fruit and pointing downward.

MATERIAL STUDIED : *C.P. 3413*, S.W. Ceylon, Galle Distr., Hiniduma, near Nellowe, April 1855, fl. (PDA, 3 sheets) ; *C.P. 3413*, Reigam Korale, Sept. 1856, fr. (PDA) ; *Kostermans s.n.*, Sinharaja forest, S.W. Ceylon, Weddegale entrance, S. part, July, ster. (L) ; *Kostermans 27876*, *ibid.*, Oct., fr. (AARH, G, L, PDA) ; *Gunatilleke s.n.*, *ibid.*, ster. (PDA) ; *Waas 1754*, Deniyaya entrance, 1200 m, June, fl. (PDA, no flowers present because of bad curating) ; *Kostermans 28112*, March, fr. (G, L).

### 9. *Stemonoporus nitidus* Thwaites

Enum. Pl. Zeyl. : 39 (1858) and 403 (1864), as a synonym of *Vateria nitida* Benth. ; TRIMEN, Handb. Fl. Ceylon 1 : 136 (1893), *excl. var. lancifolius* ; *ibid.* 5 : 383 (1900) ; BRANDIS, J. Linn. Soc. 31 : 141 (1895) ; LEWIS, Veget. Prod. Ceylon : 48 (1934) ; ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 191 (1977).

— *Vateria nitida* (THW.) BENTH. *ex* THW., Enum., *l.c.* : 403 (1864) ; DYER, in HOOKER f., Fl. Brit. Ind. 1 : 316 (1874), *excl. var. lancifolia* ; TRIMEN, System. Catal. : 10 (1885) ; Handb., *l.c.* (as a synonym of *Stemonoporus nitidus*) ; ASHTON, *l.c.*

— *Vatica nitida* (THW.) A. DC., Prodr. 16 (2) : 622 (1868) ; DYER, *l.c.*

— *Stemonoporus lucidus* THW., *mss. in Herb.* Hooker *ex* Thwaites, Enum., *l.c.* : 39.

— *Doona nitida* (THW.) HEIM, Recherches Diptérocs. : 72 (1892) ; Bull. Soc. Bot. France 39 : 153 (1892) ; BRANDIS, *l.c.* ; TRIMEN, *l.c.*, 5 : 383 (1900).

TYPE : *C.P. 3483*, Pasdoon Korle (Pasdum Korale) at no great elevation, fl. (K ?).

Small tree. Branchlets slender, glabrous. Terminal bud small, glabrous. Leaves chartaceous to sub-coriaceous, glabrous, ovate to ovate-lanceolate, 6-9 × 2-3.5 cm, caudate-acuminate (acumen 5-15 mm long, slender, obtuse), base rounded to sub-cuneate ; above glossy, midrib slender, prominulous, lateral nerves very thin, faint, reticulation obscure, below glossy, paler, midrib slender, prominent, lateral nerves 4-6 pairs, very thin, erect-patent, arcuate, near the margin strongly arcuately ascendent but not connected, prominulous ; in between the lateral veins sometimes more patent, obscure, 1 to 3 shorter ones ; reticulation usually distinct ; no parallel secondary nerves. Petiole thin, not thickened, 5-10 mm long.

Axillary very short, glabrous peduncles bear one flower on a 2 mm long, rather slender pedicel. Sepals ovate, acute, glabrous. Petals yellowish, elliptic, acute. Anthers 15, puberulous.

“Fruit nearly globular, ca. 18 mm diam., calyx lobes 7.5 mm, oblong, 12 mm long” (TRIMEN).

DISTRIBUTION : Pasdun Korale, S.W. Ceylon, low, wet, evergreen.





Pl. 10. — *Stemonoporus reticulatus* Thwaites.



NOTES : Only known from one collection, which in Peradeniya has one immature flower. The fruit are described by TRIMEN, but no fruit is available in Peradeniya. DE CANDOLLE described a young fruit.

It is not clear, where the holotype is, as THWAITES mentions Pasdoon Corle, and the Peradeniya material is marked Hinidoon Corle, Sept. 1855. THWAITES mentions a specimen in herbarium HOOKER (K) which he has named *S. lucidus*. This might be the holotype.

The species resembles in reticulation somewhat *S. reticulatus*, but the latter is completely different in all other respects.

I have not seen WORTHINGTON's specimens, quoted by ASHTON. ASHTON says, that it is a tree up to 40 m, which I strongly doubt ; he described the leaves as lanceolate, which is certainly wrong, neither is the base cuneate and the petiole is not geniculate.

MATERIAL STUDIED : C.P. 3483, Hinidoon Corle (Hiniduma Korale), Sept. 1855, fl. (PDA, 2 sheets).

10. *Stemonoporus laevifolius* Kostermans, *sp. nov.* — Pl. 9.

— *Stemonoporus acuminatus*, forma *b* TRIMEN, Handb. Fl. Ceylon 1 : 134 (1893) (C.P. 3595, PDA, 2 sheets ; not the sheet marked Badulla, originally C.P. 3474, later 3595) ; ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 189 (1977) (C.P. 3595, PDA and Ashton 2125 & 2126, PDA).

— *Vateria acuminata* (non HAYNE), THW., Enum. Fl. Zeyl. : 403 (1864), *p.p.*, quoad C.P. 3595 (PDA, excl. the sheet, marked Badulla, originally C.P. 3474, later 3595).

*Arbor parva, ramulis gracilibus glabris, foliis subcoriaceis lanceolatis acuminatis, basi rotundatis, supra sublævibus, nervo mediano tenui prominulo, subtus dense sat obscure reticulatis, nervo mediano prominenti, costis 12-16-jugis, sat patentibus, obscuris, tenuibus, versus marginem breve arcuatis, petiolis tenuibus, longis, inflorescentiis axillaribus, 1-2 floribus, pedunculis communis brevissimis vel nullis, sepalis glabris, ovato-oblongis, acutiusculis, petalis ellipticis acutiusculis, staminibus 15, fructibus immaturis subsulcatis, sepalibus recurvatis.*

TYPUS : Waas 2864 (L).

Tree, 4 m tall, dbh. 15 cm. Branchlets slender, glabrous, smooth. Terminal bud small. Stipules narrow, 1 mm long, caducous. Leaves glabrous, sub-coriaceous, lanceolate, 8-14 × 2.5-4(-4.5) cm (sapling : 24 × 6 cm), conspicuously, but not abruptly acuminate (acumen slender, with broad base, 1-2.5 cm long), base rounded to sub-truncate, margin at base below sub-revolute ; above smooth to obscurely minutely reticulate, midrib prominent, sometimes the thin lateral nerves visible ; below glossy, densely, minutely smooth, rather obscurely reticulate, midrib prominent, lateral nerves 12-16 pairs, rather patent, rather obscure, very thin, near the margin over a short stretch arcuate ; no secondary nerves. Petiole thin, 1.5-3.5 cm long, apical part somewhat thickened.

Inflorescences axillary, 1-2-flowered on an up to 2 mm long main glabrous peduncle. Pedicel thickish, 5 mm. Sepals rather narrowly ovate-oblong, glabrous, acutish, up to 10 mm long. Petals yellow, elliptic, acutish, longer than the sepals, rather fleshy. Stamens 15. Young fruit slightly sulcate, the not enlarged tepals pointing downward. Cotyledons after germination expanded, large, fleshy, wrinkled, incised.

DISTRIBUTION : Ambagamuwa Prov., Kurulagala (Rakwana), Yakinadola (Sinharaja).





Pl. 11. — *Stemonoporus rigidus* Thwaites.



NOTES : The species has been recognized as form *b* by TRIMEN, which was confirmed by ASHTON. The latter thought, that *C.P. 3595* was a mixture of *Stemonoporus acuminatus* and *Vatica obscura*. I disagree, the two sheets in Peradeniya are both *Stemonoporus*, the similarity with *Vatica obscura* leaves is really striking, but *Vatica* can always be differentiated from *Stemonoporus* (in Ceylon), by having stellate hairs on the youngest parts, in *Stemonoporus* there are always simple hairs and hence *C.P. 3595* is not a mixture, but all *Stemonoporus*. The sheet *3595*, marked Badulla in Peradeniya is quoted by TRIMEN as *J. Bailey C.P. 3474*.

The number of lateral nerves in the sapling specimen does not differ from that of the grown up tree, contrarily to ASHTON's statement.

ASHTON's discussion on the site of Medamahanuwara is entirely wrong. Medamahanuwara is in between Urugala and Hunasgiriya and Alutnuwara is at the other side of the Mahaweli Gange of Mahiyangane (ASHTON's interpretation of the locality is wrong : it should be read as : Alutnuwara-at-the-Mahaweli, to distinguish it from other Alutnuwara's = New Towns). The locality is simply on the Kandy-Madugoda-Mahiyangane road and there are some wet areas, near Medamahanuwara, at the Kandy side of Madugoda where this might have occurred).

The species is close to *S. reticulatus*, the latter has broader leaves and less lateral nerves. It is only remotely akin to *S. acuminatus* which has very distinct, less numerous lateral nerves with distinct scalariform secondary nerves, moreover these lateral nerves are more patent and only slightly arcuate near the margin. The glabrous sepals are another difference.

MATERIAL STUDIED : S.W. CEYLON : *Waas 2064*, Yakinodole-Sinharaja, Ratnapura Distr., 200 m, Febr., fl. (L, PDA) ; *C.P. 3595*, Medamahanuwara between Urugala and Hunasgiriya, road Kandy to Mahiyangane, May 1855 and May 1866, young fr. (PDA, 2 sheets, one from the Knuckles : between Medamahanuwara and Alutnuwara, the other sheet a sapling branch and one seedling with expanded cotyledons, locality not indicated) ; *Ashton 2125*, Kurulagala, Rakwana, Apr., fl. (PDA) ; *Ashton 2126*, *ibid.*, sapling (PDA).

#### 11. *Stemonoporus reticulatus* Thwaites. — Pl. 10.

Enum. Pl. Zeyl. : 38 (1858) ; DYER, in HOOKER f., Fl. Brit. Ind. 1 : 316 (1874) ; TRIMEN, Handb. Fl. Ceylon 1 : 136 (1893) ; HOOKER f., in *id.* 5 : 383 (1900) ; BRANDIS, J. Linn. Soc. 31 : 141 (1895) ; LEWIS, Veg. Prod. Ceylon : 48 (1934) ; ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 192 (1977), *pro minime parte*, only *C.P. 3414*, the rest excluded ; MAURY, Thesis 2 : 42, fig. 42 ; 115, fig. 244 ; 54, fig. 112 & 113 (1978) ; KOSTERMANS in Liber granulatus de Wit : 216 (1980).

— *Vateria reticulata* (THW.) BENTH. ex THW., Enum., l.c. : 403 (1864) ; DYER, l.c. ; TRIMEN, System. Catal. : 10 (1885) ; Handb., l.c. (as a synonym of *Stemonoporus reticulatus*) ; ASHTON, l.c.

— *Vatica reticulata* (THW.) A. DC., Prodr. 16 (2) : 620 (1868) ; DYER, l.c.

— *Kunckelia reticulata* (THW.) HEIM, Recherches Diptéroc. : 92 (1892), combination not printed, and in Bull. Soc. Bot. France 39 : 153 (1892) ; BRANDIS, l.c.

LECTOTYPUS PROPOSITUM : *C.P. 3414*, Hinidoon Corle (Hiniduma Korale), fl., April. 1855 (PDA).

Tree, up to 20 m tall, bole 8 m, dbh. 20 cm. Bark light brown to grey, smooth, hoop-ringed. Branchlets rather slender, apically densely, microscopically puberulous, glabrescent.



Terminal bud small. Leaves rigidly coriaceous, glabrous, subovate-elliptic to elliptic, 6-15 × 3-5 cm, conspicuously acuminate (acumen slender, obtuse, 6-20 mm long), base rounded to shortly acute; above glossy, smooth, the very thin midrib prominulous, the lateral nerves faint; below glossy, densely, smoothly reticulate (nervules flattened), midrib prominent, in very young leaves sparsely microscopically puberulous, lateral nerves 10-11 pairs, very thin, prominulous, erect-patent, very close to the margin abruptly, arcuately ascendent, not connected into a marginal vein, secondary nerves absent or not different from the reticulation. Petiole slender, geniculate or not, upper part slightly thickened, 1.5-6 cm long.

Panicles (pseudo-racemes) axillary, consisting of a 5-15 mm long, slender, puberulous main peduncle, bearing (usually apically) 1-4 flowers on very short lateral branches. Pedicels thickish, puberulous, 2 mm. Buds slender, long and sharply pointed. Sepals thickish, glabrous, ovate-oblong to lanceolate, acutish, 6-8 mm. Petals yellowish (fresh), ovate, 1 cm long. Stamens 15.

Fruit ovoid, acute, its base flattened, pericarp thick, superficially, longitudinally grooved, the ribs very broad, slightly pointed, rusty scabrous, up to 3.5 cm diam., the not enlarged sepals stiff, pointing downward. A fibrous mass between the cotyledons (HEIM). At germination opening by thick valves.

DISTRIBUTION : S.W. Ceylon, wet, evergreen lowland forest, alt. 300 m, near Nelluwa (Hiniduma Province) and S. Sinharaja.

NOTES : ASHTON mixed this with at least two other, quite distinct species. This is one of the 3 species of *Stemonoporus* with a reticulation, exactly like that of the 3 Ceylonese species of *Vatica*.

There are 3 sheets in Peradeniya : one marked in pencil April 1855, near Nellowe, which has a fruiting branch, a flowering one and a sterile large-leaved one; the second one has 2 flowering branches and the pencilled note : near Nellowe, Hinidoon Corle, fr. Apr. 1855, fl. Sept. 1860 and the third has 2 flowering branches and is marked : near Nellowe, Sept. 1860.

HEIM established *Kunckelia* on account of the fruit, the thick pericarp and the plan-convex, unequal cotyledons.

The species has been found again in Sinharaja forest where one tree is marked for observation.

MATERIAL STUDIED : S.W. CEYLON : *C.P. 3414*, Hiniduma Korale, Nellowe, April 1855, fl. (PDA, 2 sheets), type; *C.P. 3414, ibid.*, Sept. 1860, fr. (PDA, part of one sheet); *Gunatilleke B. 741*, Sinharaja forest Weddagala entrance, ster. (PDA); *Kostermans 27840*, same tree, Oct., buds (AARH, G, L, PDA); *Kostermans 27898*, same tree, Nov., fl. (AARH, G, L, PDA).

## 12. *Stemonoporus rigidus* Thwaites. — Pl. 11, 12.

In HOOKER's Kew J. Bot. 6 : 69 (1854); Enum. Pl. Zeyl. : 38 (1858) and 403 (1864), as a synonym of *Vateria rigida* Benth.; TRIMEN, Handb. Fl. Ceylon 1 : 134, *tab. 15, fig. 6-11* (1893); PIERRE, Fl. for. Cochinch. 17 : *tab. 258 J* (1892); HEIM, Recherches Diptérocs. : 89 (1892) and in Bull. Soc. Bot. France 39 : 193 (1892); BRANDIS, J. Linn. Soc. 31 : 140 (1895); LEWIS, Veget. Prod. Ceylon : 46 (1934); ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 193 (1977).



- *Vateria rigida* (Thw.) Benth. ex Thw., Enum., l.c. : 403 (1864); Dyer, in Hooker f., Fl. Brit. Ind. 1 : 315 (1874); Trimen, System. Catal. : 10 (1885); Handb., l.c. (as a synonym of *Stemonoporus rigidus*); Ashton, l.c.  
— *Vatica rigida* (Thw.) A. DC., Prodr. 16 (2) : 621 (1868); Dyer, l.c.

LECTOTYPUS PROPOSITUM : Thwaites, C.P. 2645, Ambagamuwa, 1000 m, Dec. 1852, young fl. (PDA).



Pl. 12. — *Stemonoporus rigidus* Thwaites. (Balasubramaniam 2583, PDA).

Tree ; the very young, thick, angled branches and the small terminal bud sparsely densely pulverulently, minutely puberulous, soon glabrous. Leaves extremely stiff, thickly coriaceous, elliptic to narrowly elliptic to more rarely subobovate-elliptic, 6-14 × 2.5-5 cm, obtuse or shallowly emarginate, base rounded to cuneately rounded ; above glossy, sub-bullate, glabrous, the midrib very thin, prominulous in a deep depression, lateral nerves impressed, sometimes the impressed secondary nerves visible ; below glossy, very sparsely, microscopically pilose, soon glabrous, midrib stoutly prominent ; lateral nerves 8-11 (average 10) pairs, strongly prominent, erect-patent, slightly curved and near the margin strongly curved only over a short distance ; secondary nerves thin prominulous, numerous, parallel, no reticulation visible. Petiole rather thick, 1-2 cm long, hardly thickened apically, usually straight.

Inflorescences usually axillary, densely, minutely puberulous, consisting of one or two congested, very short (5 mm), thick racemes, bearing apically 1-3 flowers. Pedicels (immature) short, thick. Sepals densely, microscopically grey puberulous, thick, ovate,





Pl. 13. — *Stemonoporus oblongifolius* Thwaites.



acute, carinate, up to 6 mm long. Petals (immature) about twice as long, thickish. Stamens 15. Fruit unknown.

DISTRIBUTION : Unknown. Twice collected in 1852 and 1860 in Ambagamuwa, at 1000 m alt. which encompasses Adam's Peak jungle and part of Sinharaja. From the habit of the plant it might be a species growing on rocky places.

NOTES : DE CANDOLLE erroneously described the leaves as puberulous on both sides. The microscopical, stiff, thickish, straight hairs on the lower leaf surface disappear very quickly.

The size of the tree is unknown. From comparison with other species and considering THWAITES' terminology, it might be about 15 m high.

This is a poorly known species, known from two collections only, one in Dec. 1852 (C.P. 2645) in young flower, which I designate as the lectotypus. It is accompanied by a shoot of what I think might be a seedling (not a sapling as ASHTON says) with quite aberrant leaves (oblong, tapered both ends, obscurely shortly, broadly, bluntly acuminate,  $8-14 \times 2-3$  cm); the other collection is marked as Ambagamuwa 1860 (PDA) and equally is a shoot with young flowers.

Whether ASHTON's assumption (based on no facts) that it occurred in mid mountain forests, N. of Maskeliya, is a good or bad guess. I do not know.

What ASHTON means by connate (cuneate?) base and retuse acumen, of the leaves is not clear.

MATERIAL STUDIED : *Thwaites* C.P. 2645, Ambagamuwa, 1000 m, Dec. 1852, young flowers (PDA); *Thwaites* 2645, *ibid.*, Dec. 1860, young flowers (PDA).

### 13. *Stemonoporus oblongifolius* Thwaites. — Pl. 13.

In HOOKER's Kew J. Bot. 6 : 68 (1854); Enum. Pl. Zeyl. : 38 (1858) and 403 (1864), as a synon. of *Vateria oblongifolia* Benth.; TRIMEN, Handb. Fl. Ceylon 1 : 135 (1893); PIERRE, Fl. for. Cochinch. 17 : tab. 258 I (1892); BRANDIS, J. Linn. Soc. 31 : 141 (1895); ASHTON, in DASSANAYAKE (editor), Revised Handb. Fl. Ceylon 1 (2) : 192 (1977); MAURY, Thesis 2 : 42, fig. 41; 54, fig. 111; 115, fig. 245; fig. 478 (hairs) (1978).

— *Vateria oblongifolia* (THW.) BENTH. ex THW., Enum., l.c. : 403 (1864); DYER, in HOOKER f., Fl. Brit. Ind. 1 : 315 (1874); TRIMEN, System. Catal. : 10 (1885); Handb., l.c. (as a synon. of *Stemonoporus oblongifolius*); ASHTON, l.c.

— *Vatica oblonga* A. DC., Prodr. 16 (2) : 621 (1868); DYER, l.c.

— *Vesquella oblongifolia* (THW.) HEIM, Recherches Diptéroec. : 90 (1892), combination not printed, and in Bull. Soc. Bot. France 39 : 153 (1892).

LECTOTYPUS PROPOSITUM : *Thwaites* C.P. 2646, p.p., Ambagamuwa, Dec. 1852, buds (PDA).

Tree, up to 20 m tall and 40 cm dbh., not buttressed. Bark smooth, white, hoop-ringed, 1 mm thick. Live bark 3-6 mm thick, whitish, outside green. Wood yellowish, moderately hard, slightly resinous (resin dries white). Branchlets usually thick, angled, initially densely microscopically rusty puberulous. Terminal buds small, stipules not seen. Leaves rigidly coriaceous, glabrous (indumentum often subpersistent on midrib below), oblong to elliptic, rarely suboblanceolate oblong,  $5-13 \times 2.5-5$  cm, usually rounded or obscure-



rely broadly very shortly, obtusely acuminate, base shortly cuneate, rarely rounded; above rather dull, in mature leaves smooth, in younger ones obscurely veined and reticulate; midrib thin, prominulous, or so in a shallow depression, lateral nerves faint, prominulous, below paler, midrib prominent, the 7-10 pairs of erect-patent or slightly more erect slender lateral nerves prominent, near the margin strongly, arcuately ascendent (but not connected), connected by usually conspicuous, numerous, very slender, parallel secondary nerves with minute reticulation in between. Petiole 1-2 cm long, straight or geniculate, apical part concave above.

Inflorescences puberulous, axillary and extra-axillary, stout, up to 4 cm long, bearing up to 5 flowers on obscure branches (pseudo-racemes). Pedicels stout, densely grey puberulous, 2-3 mm long, subtended by a small, ovate, acute bract. Sepals thin, ovate-elliptic, acute, densely puberulous outside, up to  $8 \times 5$  mm. Petals light yellow (fresh), orbicular to broadly obovate or elliptic, up to 8 mm long, obtuse. Stamens 15, the anthers densely puberulous. Style hardly exsert from the stamens.

Fruit almost globose, rather thick-skinned, rusty verruculous, up to 2-3 cm in diam., only in young stages grooved. Sepals persistent, stiff, not enlarged, pointing downward. Cotyledons small.

DISTRIBUTION : S. slopes of Adam's Peak, from 1300-1700 m, locally not uncommon.

NOTES : Related to *S. gardneri* with similar fruit, but with a much more pronounced pubescence, especially on the sepals and much shorter pedicels.

The leaves — of course — have a different shape, but a similar stiffly coriaceous texture. It seems to occupy the same distributional area, but has not been found so far in the adjacent higher zones of the Sinharaja forest.

This and *S. acuminatus* were considered to represent a different genus (*Vesquella*) by HEIM, because of the chalaza cup or fibrous chalaza expansions in the fruit, the thin, sub-membraneous cotyledons and the abundant endosperm. I had no adequate material to check this.

MATERIAL STUDIED : *Jayasuriya & Sumithraarachchi 1572, 1574*, Adam's Peak above Moray Estate, Maskeliya Distr., 1600 m, dropped fr. (PDA); *1561, ibid.*, 1500 m, unripe fr. (PDA); *Kostermans 24787, ibid.*, May, fl. (L, PDA); *Kostermans 24933, ibid.*, June, fl. (L, PDA); *Kostermans 24259, ibid.*, 1300 m, May, fl. (L, PDA); *Kostermans 27051, ibid.*, Nov., young fr. (G, L, PDA); *Kostermans 24155, 24178, ibid.*, May, young fr. (L, PDA); *Kostermans s.n., ibid.*, May, fl., fallen ripe fr. (L); *Kostermans 27960, ibid.*, Nov., after anthesis (AARH, G, L, PDA); *Ashton 2007*, pilgrims trail from Laxapana, Maskeliya, 1600 m, March, fr. (PDA); *Ashton 2911 (2111), ibid.*, ster. (PDA); *C.P. 2646*, Ambagamuwa, Dec. 1852, buds (PDA, in convolute young fr.); *C.P. 2646*, Centr. Prov., May 1866, fl. (PDA); *sine coll., s.n., C.P. 2646*, sapling, leaves up to  $16 \times 6$  and  $15 \times 7.5$  cm (PDA).

#### ADDITIONAL NOTE

***Stemonoporus rigidus*** : This paper was already in press when I received from Pr. BALASUBRAMANIAM a photograph (Pl. 12) and a voucher specimen : *Balasubramaniam 2583*, along trail from Gartmore Estate to Hapugastenne Estate (Rayhganga Division), about 2 miles from Gart-



more; several hundred trees growing between 1600 to 1800 m along the southern slopes of the Peak Wilderness, forming the main canopy species, together with *Garcinia echinocarpa*; trees 12 m tall, dbh. 25 cm with smooth, greyish black bark; flowers cream, fruits brown, globose, 3 cm diam.; Febr. 1981 (PDA).

(To be continued)





Kostermans, A. J. G.H. 1981. "Stemonoporus Thw. (Dipterocarpaceæ) : a monograph (part 1)." *Bulletin du Muse*

*um National d'Histoire Naturelle Section B, Adansonia, botanique, phytochimie* 3(3), 321–358.

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