

REVISION OF THE BURSERACEAE OF THE MALAYSIAN AREA IN A WIDER SENSE

Vb. *Haplolobus*, a revised revision

by

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GENERAL PART

On studying newly received material of *Haplolobus*, mostly from New Guinea, the key in Husson & Lam 1953¹⁾ proved to be far from satisfactory in several respects. This is why all material now available has been given a critical consideration or reconsideration, as the case may be, and from this originated a new revision with a new key, which is presented here.

Since the flowers of the various *Haplolobus* species are of the same type and very uniform, and since they are wanting in so many specimens either in one of the sexes or in both, it appeared, for the time being at least, unfeasible to use them for differential characteristics in the key. The same holds true for the fruits. Only when abundant flowering and fruiting material will be available is there a chance (but no certainty) that good differential characters will be detected in flowers and (or) fruits.

This is why the new key has been primarily constructed on the basis of vegetative characters in addition to those presented by the anatomy of the petioles (resiniferous vascular bundles in the pith; r.b.) and by the structure and disposition of the inflorescences (infructescences).

¹⁾ The most frequently used literature has been quoted in the following abbreviations (chronological arrangement):

Lauterbach 1920	= C. Lauterbach, Engl. bot. Jahrb. 56, 317 s. s.
Lam 1931	= H. J. Lam, Ann. Jard. bot. Buitenz. 42, 23 s. s.
Lam 1932a	= H. J. Lam, Ann. Jard. bot. Buitenz. 42, 207 s. s.
Lam 1932b	= H. J. Lam, Bull. Jard. bot. Buitenz. III, 12, 404 s. s.
Lam 1938a	= H. J. Lam, Blumea 3 (1), 111 s. s.
Lam 1938b	= H. J. Lam, Blumea 3 (1), 129 s. s.
Husson and Lam 1953	= A. M. Husson & H. J. Lam, Blumea 7 (2), 413 s. s.
Lam 1955	= H. J. Lam, Blumea 8 (1), 175 s. s.
Leenhouts 1956	= P. Leenhouts, Flora Malesiana I, 5 (2), 238 s. s.

Most of the older literature may be found quoted in Lam 1932b and Husson & Lam 1953.

It is clear, however, that, though the new key is hoped to be a better guide to the differentiation of this puzzling genus than the previous one proved to be, it cannot be but far from final. Of some of the species now accepted, the material available is so scanty that nothing can be said about their variability. In other groups the extremely vague delimitations made us combine several species hitherto considered separate ones and transfer certain specimens from one species to some other one on account of the fact that specific limits had to be altered with the increase of our insight on account of more material.

The following changes have been made as compared to Husson & Lam 1953 and Lam 1955 unless otherwise indicated (synonyms in *italics*):

- H. acuminatus* (Schum.) H. J. Lam — Some specimens removed and now described as *H. pubescens* H. J. Lam, nova spec.
 var. *glabrior* H. J. Lam (Lam 1955) = *H. floribundus* (Schum.) H. J. Lam.
- H. aneityensis* (Guill.) Huss. (incl. Lam 1955) = *H. floribundus* (Schum.) H. J. Lam.
- H. anisander* (Laut.) H. J. Lam = *H. leeifolius* (Laut.) H. J. Lam var. *anisander*; in addition several sterile specimens from the Moluccas were transferred to *H. celebicus* H. J. Lam.
- H. borneensis* H. J. Lam (incl. Lam 1955) = *Santiria apiculata* Benn.
- H. celebicus* H. J. Lam — sterile specimens from the Moluccas (and Palau?; Lam 1955) transferred to *H. leeifolius* (Laut.) H. J. Lam var. *anisander*.
- H. clementium* Huss. — type = *H. leeifolius* (Laut.) H. J. Lam var. *anisander*; other specimens (incl. Lam 1955) = *H. leeifolius* (Laut.) H. J. Lam var. *leeifolius*.
- H. floribundus* (Schum.) H. J. Lam — several specimens transferred to *H. leeifolius* (Laut.) H. J. Lam var. *anisander*, others to *H. decipiens* H. J. Lam, nova spec.
- H. hussonii* H. J. Lam — type = *H. leeifolius* (Laut.) H. J. Lam var. *leeifolius*; other specimens = *H. floribundus* (Schum.) H. J. Lam.
- H. maluensis* (Laut.) H. J. Lam (incl. Lam 1955) = *H. floribundus* (Schum.) H. J. Lam.
- H. megacarpus* H. J. Lam — ♀ type = *H. leeifolius* (Laut.) H. J. Lam var. *leeifolius*; ♂ type (Lam 1955) = *H. floribundus* (Schum.) H. J. Lam.
- H. monticola* Huss. = *H. glandulosus* Huss. var. *monticola*.
- H. nubigenus* (Laut.) H. J. Lam has been split up into its two original components, resulting in the new combination *H. triphyllus* (Laut.) H. J. Lam. One specimen was transferred to *H. glandulosus*.
- H. versteeghii* H. J. Lam = *H. floribundus* (Schum.) H. J. Lam.

Three new species have been recognised, of which one based on fresh material, viz *H. lanceolatus*, the two others being *H. decipiens* (formerly under *H. floribundus*), and *H. pubescens* (formerly under *H. acuminatus*). There is one new combination: *H. triphyllus* (Laut.) H. J. Lam (formerly under *H. nubigenus*).

Thus, of the 22 species dealt with in Husson & Lam 1953 and Lam 1955 no less than 9 were reduced to synonymy (of which two in the status of varieties, viz *H. anisander* and *H. monticola*), and one (*H. borneensis*) was transferred to another genus (*Santiria*). Consequently the total number is now 17.

In a previous paper (Lam 1938b) it was pointed out that *Haplolobus* is one of the four¹⁾ closely allied genera of the *Canarieae* and that, though all these genera were reticulately connected regarding most characters, *Haplolobus* stands clearly apart by its peculiar fruit and seed characters viz thin dry pericarp, papery pyrene walls, and entire, flat cotyledons. These characters are perfectly correlated and I know of no transitional or intermediate conditions to other genera in this respect. They seem to call for a "large (system) mutation" and if this should have been the case it could hardly be expected to have occurred more than once independently. In this connection we might have a look at the distribution pattern of the *Canarieae* according to the most recent data²⁾:

	Trop. Am.	Trop. Afr.	Masc. & Madag.	Trop. Asia-Polynesia					
				Cont.	W. Mal.	E. Mal.	N.G.	Pol.	Austr.
<i>Dacryodes</i> (54 spec.)	15 ³⁾	22	—	(11)	(16)	17 (1)	(1)	—	—
<i>Santiria</i> (23 spec.)	—	6	—	(11)	(15)	17 (1)	(1—2)	—	—
<i>Canarium</i> (75 spec.)	—	2	2	(11)	(34)	72 (12)	(21)	(14)	(3)
<i>Haplolobus</i> (17 spec.)	—	—	—	—	(1)	17 (4—5)	(12)	(2)	—

As to fruit and inflorescence characters *Haplolobus* is evidently closest to *Dacryodes* and *Santiria*, much less so to *Canarium*. From the above statement it appears that

- Dacryodes* is more or less equally represented in all tropical countries except Polynesia; in Malaysia its centre is clearly west of Wallace's line;
- Santiria* is represented in both the African and Asiatic tropics, with a distribution in Malaysia almost exactly like that of *Dacryodes*;
- Canarium* is represented both in Africa (and Madagascar and the

¹⁾ Originally five, but I agree with Leenhouts (Nova Guinea new ser. 8 (2), 1957, 177) that *Scutinanthe* belongs to the *Protieae* rather than the *Canarieae*.

²⁾ Cf. for *Dacryodes* and *Santiria*: C. Kalkman, *Blumea* 7 (3), 1954, 500—546 and Leenhouts 1956, 219—238; and for *Canarium*: Leenhouts 1956, 249—296 and MS to be published in *Blumea* 9 (2), 1958.

³⁾ Cf. J. Cuatrecasas in *Tropical Woods* n. 106, 1957, 46—65. In the American *Dacryodes* species the ovary (and the fruit) is 2—3-celled!

Mascarenes) and in Asia, with a heavy preponderance in Malaysia and a good representation in W. Polynesia, a poor one in Australia;

- d) *Haplolobus* is almost exclusively East Malaysian with a marked preponderance in New Guinea.

Although *Haplolobus* and *Dacryodes* are united by a terminal style (as has *Canarium*), there is little or no evidence of a relationship with *Dacryodes*, except perhaps by means of the only papuan *Dacryodes* species (*D. papuana* Huss.), which shows some resemblance with *H. glandulosus*.

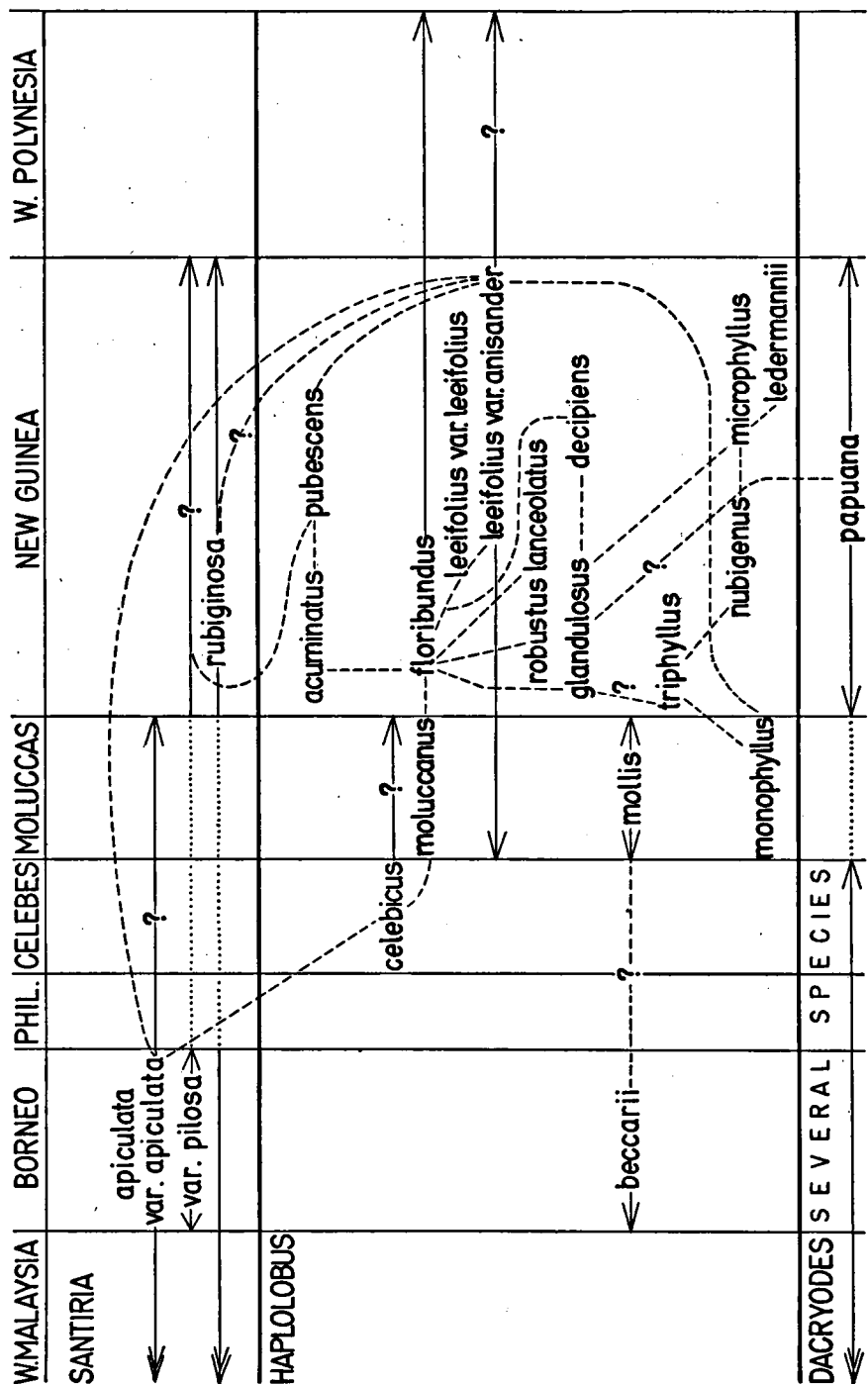
In *Santiria*, however, there are two species that somehow seem to be allied to certain species of *Haplolobus* (cf. diagram on p. 241) even to the extent that sterile material may be hard to be identified generically. The most important of these species is *S. apiculata* Benn. (with which *H. borneensis* had to be combined), with certainty (fruits!) known from Malaya, W. Malaysia as far east as the Philippines (Celebes?), and the Moluccas, while some doubtful (sterile) specimens of its var. *pilosa* (Engl.) Kalkm. (for the rest only known from Borneo) have been collected in New Guinea. The second species is *S. rubiginosa* Bl., known to occur in Malaya and Sumatra to Borneo (not in the Philippines, Celebes, and the Moluccas), and of which 5 specimens have been collected in New Guinea (Geelvink Bay islands and Sepik area; cf. Kalkman in *Blumea* 7 (3), 1954, 544), but their resemblance with *Haplolobus* species is less confusing than in the case of *S. apiculata*. The generic disjunction is even more marked here than in *Dacryodes*.

In our paper on the phylogeny of *Haplolobus* (Lam 1938b) it was suggested that that genus roots in *Santiria*-like ancestors and that it originated biphyletically. The first part of this thesis still stands but I hesitate to maintain a possible biphyly on account of the grounds given above: the improbability that the well-correlated and sharp characters of fruit and seed should have been brought about more than once.

The most puzzling species in this respect is *H. beccarii* (Sarawak), the only one known from the Sunda-land. Next to being isolated in a geographical sense, it is also isolated taxonomically, since *H. beccarii* is the only species which does not show clear relations with others, the only possible (geographical and taxonomical) link being *H. mollis* (Halmahera) which has similar almost cauliflorous inflorescences, but is otherwise quite different, though this species, too, shows little affinity to the rest of the genus. Even so, however, it presents the only possibility to maintain the obvious assumption that the present centre, New Guinea, is also the original centre of dispersal, the alternative (supported by the relations to *Dacryodes* and *Santiria* just mentioned) being a bi- or polytopic origin, which is still harder to assume than a westward migration from New Guinea. Remains the problem how *Haplolobus*-potentialities managed to cross Macassar Strait and thus reach (western!) Borneo.

All other *Haplolobus* species are interrelated in some way or other and the following diagram shows our present ideas in this respect (see p. 241).

The following remarks may serve both as a more detailed description of the specific interrelationships pictured in the above-mentioned diagram



and as a justification of the key which may be found in the Taxonomical Part of the present paper.

The key which of course primarily serves a practical purpose is constructed on: 1. pubescence; 2. nectaries; 3. size and shape of leaflets; 4. number of jugae in the leaf; 5. number of r.b.¹⁾ in the petioles; 6. shape of the base of the leaflets; 7. size of the inflorescences (infructescences; 8. number of secondary nerves; 9. domatia; 10. diameter of branchlets.

Hardly any of these characters provides full specific constance and in the majority of cases a number of characters is required to draw the line between species. Again, only few of these characters are of sufficient use for distinguishing groups of allied species. This can only be stated to a limited extent for the size of the leaflets, the size of the inflorescences, and the number of r.b. in the petioles. There is, for instance, a group of more or less mountain-dwelling species which have mostly small leaflets (*monophyllus*, *triphyllus*, *nubigenus*, *microphyllus*, *ledermannii*). There are a number of species which combine short inflorescences with a small number (1—5) of r.b. (the above-mentioned small-leaved species and also the mountain species *glandulosus* and *decipiens*, and the preponderantly lowland species *leeifolius* var. *anisander*). There seems to be some correlation between the size of leaflets and inflorescences on the one hand and the number of r.b. on the other, the latter being mostly elevated (10 or more) in such species as *moluccanus*, *acuminatus*, *robustus*, and *lanceolatus*. But *beccarii* and *mollis* with 15—20 and 8—10 r.b., respectively, have large leaves and very short inflorescences and *celebicus* with large panicles has only (1—)4—8 r.b. The polymorphous *H. floribundus* takes an intermediate position in this respect; its leaflets are neither large nor small, there are (1—)3—7(—12) r.b., and the inflorescences are of moderate size (♂ 5—24, ♀ 1.5—11).

Pubescence occurs in *H. beccarii*, *mollis*, *acuminatus*, *pubescens*, and *robustus*. Of these *beccarii* and *mollis* on the one hand and *acuminatus* and *pubescens* on the other are probably related two and two, but *robustus* is clearly allied to *floribundus*. In some of these species showing pubescence, the character is rather variable, perhaps in connection with the age of the parts in question.

Another character of dubious value and vague limits is the occurrence of "nectaries", glandlike pits in the axils of the nerves underneath. In some species, such as *microphyllus* and *glandulosus*, they are quite constant, but in others (or in specimens of doubtful identity) they are rare or not distinct or not confined to the nerve axils. In some cases there are hairtufts (domatia) in their stead, e.g. in *monophyllus*, and these are also occasionally found in *H. leeifolius* (both varieties). Structures which seem intermediate between nectaries and domatia have been occasionally observed in specimens ascribed to *H. glandulosus* (= *H. monticola*, cf. Husson & Lam 1953, 414—415). *H. ledermannii* is very much like *H. microphyllus* but lacks the nectaries of the latter.

The core of the genus, so to speak, is a group of related species which

¹⁾ r. b. = resiniferous vascular bundles in the pith of the petioles.

may be arranged in a linear way, as has been more circumstantially discussed in Husson & Lam 1953, 433—434. In this arrangement the leaflets become narrower and their base more acute, their size and that of the inflorescences decrease, as does the number of r.b., all more or less correspondingly from west to east. These species are: *moluccanus-celebicus-floribundus-leeifolius* (var. *leeifolius*-var. *anisander*).

H. floribundus and *H. leeifolius* are both variable species, including several taxa, most of which were previously considered to represent separate species. They have also by far the widest distribution of all *Haplolobus* species and in some cases it is impossible to identify sterile specimens with any satisfactory degree of certainty (*celebicus* vs *moluccanus*, *celebicus* vs *leeifolius-anisander*, *floribundus* vs *leeifolius-leeifolius*).

Some species are clearly peripheral to this *floribundus-leeifolius* group, such as *robustus* which is hairy, and *lanceolatus* which is distinguished by the shape and size of its leaflets and its larger female inflorescences. *H. decipiens* is a mountain species which shows characters of both *floribundus* and *leeifolius* and though nectaries are wanting, it seems to be allied to *H. glandulosus* in one way or another. The last-named species shows some resemblance with *Dacryodes papuana* which also lacks nectaries, and seems to be the only imaginable living link between *Dacryodes* and *Haplolobus*.

H. leeifolius var. *anisander* is clearly allied to *H. monophyllus* on the one hand, and to *H. pubescens* on the other. Both ends of the chain just mentioned are somehow connected with *Santiria*, *H. celebicus* with *S. apiculata* and *H. leeifolius* var. *anisander* with both *S. apiculata* and, though less distinctly, *S. rubiginosa*.

Finally *H. acuminatus* seems somewhat akin to the *floribundus*-complex and the certainly allied *pubescens* suggests connections both with *H. leeifolius* var. *anisander* and with *Santiria apiculata* var. *pilosa*.

TAXONOMICAL PART

Haplolobus H. J. Lam in Lam 1931, 2; id. 1932a, 207; id. 1932b, 404; Husson & Lam 1953, 419. — Forest trees of moderate height. Branchlets mostly without resiniferous vascular bundles (r.b.) in the pith. Leaves imparipinnate, more rarely unifoliolate, petioles always with r.b. in the pith, exstipulate. Inflorescences paniculate, axillary or pseudoterminal (with a more or less obsolete terminal bud), mostly short-peduncled, ♂ ones mostly larger and more-floriferous than ♀ ones. Flowers small and though functionally probably always unisexual, organs of the other sex always extant and sometimes only little reduced in size; sepals 3, mostly connate for at least halfway up; petals 3, free, with inflected tip; stamens 6, inserted outside the annular disk or the filaments slightly connate to it at base; ovary 3-celled, each cell with two collateral descendent axile epitropous ovules; stigma 3-lobed to subglobular. Fruit small, ovoid to subglobular with spreading calyx and terminal stigma; pericarp dry and thin, smooth; pyrenes connate with very thin papery walls, mostly 1-seeded, the two sterile cells very small, rarely 2-seeded (*H. leeifolius* var. *anisander*) and then either the two seeds in one cell or with two one-seeded cells

and one sterile cell; seeds subglobular, with a very thin testa and without albumen (endosperm), the cotyledons entire and thick, plano-convex, unfolded, the flat plane between them (in one-seeded fruits) in the plane of the septum between the sterile cells, the hilum above the middle of the cell; radicle minute, superior. — Some 17 species from Borneo and Celebes through the Moluccas and New Guinea to western Polynesia, from sea-level to about 1800 m alt.

Type species: *H. moluccanus* H. J. Lam (1932).

Key to the species

Note. A question mark behind the generic symbol (*H.*?) indicates that mature fruits are so far unknown and that accordingly the generic identification is not entirely beyond doubt. The resiniferous vascular bundles in the pith of the petiole are abbreviated to r. b. When the size and shape of the leaflets and petiolules are mentioned, reference is exclusively made to the lateral ones, unless otherwise stated.

- 1 a. Branchlets, inflorescences (infructescences), and leaves (at least on midrib and nerves underneath) more or less pubescent or hairy 2
- b. All parts entirely glabrous but for occasional terminal buds and hair tufts (domatia) in the nerve axils underneath 6
- 2 a. Inflorescences (infructescences) along stout branchlets (1—2 cm in diam.) or on very short lateral shoots along same 3
- b. Inflorescences (infructescences) axillary near tips of more slender branchlets or, if branchlets thick, then ♀ inflorescences over 10 cm long 4
- 3 a. Leaflets lanceolate, 21—36 cm long and 7.5—10 cm wide, secondary nerves 25—30, petioles about 23 cm long, with 15—20 r. b.; leaves up to 6½-jugate, branchlets 1.7—2.2 cm in diam.; infructescences 4—7 cm long — *W. Borneo*
2. *H. beccarii* Huss.
- b. Leaflets (ob)ovate to elliptic, more or less bullate, 7—19 by 5—11.5 cm, secondary nerves 8—15; petioles 3.5—8 cm long with 8—10 r. b.; leaves 1½—3½-jugate; branchlets about 1 cm in diam.; ♀ inflorescences (infructescences) only up to 2 cm long along short lateral shoots — *Moluccas (Halmahera)*
11. *H.?* *mollis* H. J. Lam
- 4 a. Leaflets with 12—18 secondary nerves; petioles with 16—17 r. b.; branchlets 0.5—2.2 in diam. 5
- b. Leaflets with 7—10 secondary nerves, petioles with 1—9 r. b.; branchlets not over 0.5 cm in diam.; leaves up to 4½-jugate, petioles 4—7.5 cm long, with 4—9 r. b.; leaflets oblong to oblong-lanceolate, 6.5—13.5 by 2—5 cm, petiolules 0.4—0.9 cm long; inflorescences of both sexes up to 8 cm long, rather lax, with straight ramifications — *New Guinea* 15. *H. pubescens* H. J. Lam
- 5 a. Leaflets ovate to obovate-oblong with curved margins and tapering apex, rather thin; ♀ inflorescences (infructescences) 2.5—5 cm long, slender, with more or less tortuous ramifications — *New Guinea* 1. *H. acuminatus* (Schum.) H. J. Lam
- b. Leaflets oblong with more or less parallel margins and abruptly acuminate apex, rigid; infructescences stout and stiff, 10—13 cm long — *New Guinea*
16. *H. robustus* H. J. Lam
- 6 a. Leaflets with glandular pits (nectaries) in the nerve axils underneath, mostly small, secondary nerves 4—12, r. b. 1—3; mountain species (400—1800 m alt.) 7
- b. No such nectaries extant, but sometimes hair tufts (domatia) in their stead 9
- 7 a. Secondary nerves 4—5; leaflets 3.7—7 by 1.4—2.4 cm, with a long tapering acumen — *New Guinea* 10. *H.?* *microphyllus* Huss.
- b. Secondary nerves 6—12 8
- 8 a. Proportion of length and width of leaflets 1.7—2; leaves 1½—2½-jugate, leaflets ovate, 5—10.5 by 3—5.5 cm; petiolules 1—1.5 cm long; secondary nerves 6—9, not or hardly prominent underneath — *New Guinea*
6. *H.?* *glandulosus* Huss. var. *glandulosus*

- b. Proportion of length and width of leaflets about 3; leaves $2\frac{1}{2}$ – $3\frac{1}{2}$ -jugate, leaflets oblong-lanceolate, 10–16.5 by 4.5–5.5 cm; petiolules 1.5–2.5 cm long; secondary nerves 10–12, distinctly prominent underneath — *New Guinea*
6. *H.?* *glandulosus* Huss. var. *monticola* (Huss.) H. J. Lam
- 9 a. Leaflets small to very small, rarely over 13 by 6 cm; r. b. 1–3(–5) . . . 10
- b. Leaflets mostly larger than 13 by 6 cm; r. b. (1–)3–10(–40) . . . 15
- 10 a. Leaves 1–3-foliolate, r. b. 1; ♂ inflorescences up to 5 cm long; mountain species (200–1000 m) . . . 11
- b. Leaves ($\frac{1}{2}$ –) $1\frac{1}{2}$ – $4\frac{1}{2}$ -jugate, r. b. 1–5 . . . 12
- 11 a. Leaflets very rigid, nervation hardly to little conspicuous particularly on upper side, no domatia — *New Guinea* . . . 17. *H.?* *triphyllus* (Laut.) H. J. Lam
- b. Leaflets not very rigid, reticulation minute and clearly conspicuous; domatia in the nerve axils underneath extant¹⁾ — *Moluccas (Morotai)*
13. *H.?* *monophyllus* H. J. Lam
- 12 a. Male inflorescences 10–17 cm long, not very slender, widely branched, flowers not very small; leaves $2\frac{1}{2}$ – $3\frac{1}{2}$ -jugate, leaflets 7–13 by 4.5–5.5 cm, base acute to subrotundate; r. b. about 4; in the hills (450–900 m) — *New Guinea*
4. *H.?* *decipiens* H. J. Lam
- b. Male inflorescences not over 4 cm long, mostly slender . . . 13
- 13 a. Leaflets ovate to ovate-lanceolate, 4–12(–15.5) by (1.5–)2–6(–7) cm, with 7–11(–14) secondary nerves and 1–3(–5) r. b. in the petioles; inflorescences of both sexes up to 4 cm long, the male ones very slender, flowers very small — *Moluccas, New Guinea, New Britain, Palau?*, mostly in the lowland
9. *H.?* *leefolius* (Laut.) H. J. Lam
- var. *anisander* (Laut.) H. J. Lam
- b. Leaflets lanceolate, up to 8 by 3 cm, with 5–8(–10) secondary nerves; mountain species (850–1000 m) . . . 14
- 14 a. Greatest width of leaflets at the middle; apex subabruptly acuminate, leaflets 3.7–8 by 1.8–2.8 cm; leaves ($1\frac{1}{2}$ –) $2\frac{1}{2}$ – $3\frac{1}{2}$ -jugate; ♂ inflorescences 2–3 cm long — *New Guinea* . . . 14. *H.?* *nubigenus* (Laut.) H. J. Lam
- b. Greatest width of leaflets below the middle, leaflets 1.6–6 by 0.4–2.5 cm, with a long tapering apex; leaves $2\frac{1}{2}$ – $4\frac{1}{2}$ -jugate; inflorescences of both sexes 1.5–2 cm long — *New Guinea*
8. *H.?* *ledermannii* (Laut.) H. J. Lam
- 15 a. Petioles with 16–40 r. b.; inflorescences large, ♀ 7–19, ♂ 23–32 cm long, widely branched; leaves large, up to $4\frac{1}{2}$ -jugate, leaflets 12–38 by 7–18 cm, broad ovate or elliptic; secondary nerves (9–)12–18 — *Moluccas (Halmahera, Morotai)*
12. *H.?* *moluccanus* H. J. Lam
- b. Petioles with 1–14 r. b.; inflorescences and leaflets mostly smaller and the leaflets narrower . . . 16
- 16 a. Base of leaflets generally acute (angle 90° or less) and sometimes more or less abruptly decurrent; branchlets fairly slender, mostly not over 0.5 cm in diam. . . 17
- b. Base of leaflets rounded (angle 90°–180°), sometimes minutely decurrent; branchlets stout (about 1 cm in diam.), often verrucose . . . 20
- 17 a. Male inflorescences widely branched, (5–)10–22(–24) cm long, many together in the axils of successive leaves . . . 18
- b. Male (and female) inflorescences not widely branched, slender to very slender, 2–7(–10) cm long, not always many together . . . 19
- 18 a. Petioles (2–)6.5–9.5 cm long with (1–)4–8 r. b.; leaflets (6–)9–21 by (2.5–)4–8.5 cm, mostly narrowly oblong, with 7–11 secondary nerves, base mostly acute; inflorescences ♀ stiff, few-florous, about 10 cm long, ♂ mostly large and widely branched, 5–22 cm long, many-florous, flowers small — *Celebes*
3. *H.?* *celebicus* H. J. Lam
- b. Petioles 3.5–6 cm long with 1–4 r. b.; leaflets 6–13 by 3.3–5.5 cm, coriaceous, oblong to elliptic, base rounded to acute; ♂ inflorescences 4–16 cm long (♀ ones and fruits unknown) — *New Guinea, in the hills (450–900 m)*
4. *H.?* *decipiens* H. J. Lam
- 19 a. Leaflets (8.5–)11–22 by 3.5–8.5 cm, petioles 4–5(–12) cm with (1–)3–6(–10) r. b. — *New Guinea* . . . 9. *H.?* *leefolius* (Laut.) H. J. Lam var. *leefolius*

¹⁾ Domatia are occasionally also found in *H. leefolius* (both varieties), but there the number of secondary nerves is 6–14 and that of the r. b. 1–6(–12).

- b. Leaflets (3.5—)4—12(—15.5) by (1.5—)2—6(—7) cm, petioles 1.5—3.5(—6.5) cm with 1—3(—5) r.b. — *Moluccas, New Guinea, New Britain, Palau?*, mostly in the lowland.
9. *H. leefolius* (Laut.) H. J. Lam var. *anisander* (Laut.) H. J. Lam
- 20 a. Leaves ($\frac{1}{2}$ —)2 $\frac{1}{2}$ —3 $\frac{1}{2}$ (—4 $\frac{1}{2}$)-jugate; leaflets elliptic to lanceolate, base broadly rounded to acute; female inflorescences not over 10 cm long 21
- b. Leaves 3 $\frac{1}{2}$ —7 $\frac{1}{2}$ -jugate, petioles 6.5—20 cm long with (3—)6—11(—13) r.b.; leaflets oblong-lanceolate, with narrowly rounded (or sub-acute) base, (9—)15—20 (—26.5) by (3.5—)5.5—8(—9) cm, petiolules 0.5—1 cm long; inflorescences of both sexes many together, very stout and widely branched, the female ones 10—26, the male ones 18—21 cm long — *New Guinea (Cycloop Ra.)*
7. *H. lanceolatus* H. J. Lam
- 21 a. Branchlets mostly over 0.5 cm thick, often verrucose, leaflets broadly elliptic with rounded basis, (5—)12—17(—33) by (2—)4—7(—9) cm, petiolules (0.5—) 1—3 cm; female inflorescences (1.5—)3—7(—11) cm long, male ones (5—)8—16 (—24) cm, both stout; variable species — *New Guinea to Fiji, from sea level to about 1800 m alt.* 5. *H. floribundus* (Schum.) H. J. Lam
- b. Branchlets slender, mostly not over 0.5 cm in diam.; leaflets 6—14 by 3.3—6 cm, petiolules slender, 0.8—1.8 cm; female inflorescences unknown, male ones 5—17 cm, slender — *New Guinea, in the hills (450—900 m)* 4. *H. ? decipiens* H. J. Lam

Enumeration of the species

In the following enumeration only those data have been incorporated which were deemed essential for the up to date insight in the taxonomy of the genus. This is based on the material now available, which means that some specimens that have after our last review (Husson & Lam 1953) been returned to their owners, have not been re-examined; only in a few cases in which the specimens were essential for reviewing the genus again were they requested on loan again (B, FI). It is a pleasure here to tender my thanks to the directors of the institutions concerned for their kind cooperation.

In order to present the user with a well-balanced survey, all species have been treated on the basis of a more or less strict scheme, as far as the data available permitted and the specific characters demanded. This includes record of first publications and of papers containing additional information; full synonymy with quotation of literature and type specimens; full iconography of the species in the delimitation here accepted; ♀ and ♂ specimens have, as far as available, been mentioned separately, a measure of whose necessity I became convinced since I came across cases in which it is very difficult to decide upon conspecificity of ♀ and ♂ specimens (cf. *H. megacarpus* H. J. Lam).

In the specific diagnoses only essential characters have been described. Detailed description of flowers has been mostly omitted, except in the cases of new species, and in some particular instances.

The enumeration of the collections is restricted to specimens now available. In cases in which their quotation may be found in earlier papers, it is here confined to collector and number. The enumeration has been arranged in three groups: ♀ specimens, ♂ specimens, and sterile ones; of some of the latter the identification may be dubious. At the end of each species those specimens have been quoted which were excluded from the species in question as compared to earlier papers (Husson & Lam 1953,

and Lam 1955) and the species to which they have been transferred are indicated. Finally a survey is given of the distribution and remarks of an enlightening nature have been added whenever this seemed necessary or desirable.

Abbreviations applied are:

- FRI = Forest Research Institute, Bogor (BO);
 NGBW = Forestry Service of Netherlands New Guinea, formerly at Hollandia (HOLL), now at Manokwari (MAN);
 NGF = Forestry Service of the Territory of New Guinea and Papua, Lae (LAE);
 NIFS = Netherlands Indies Forestry Service, Bogor (BO).
 r. b. = resiniferous vascular bundles in the pith of the petioles.

1. *H. acuminatus* (Schum.) H. J. Lam in Lam 1932a, 207; id. 1932b, 410; Husson & Lam 1953, 427; Leenhouts 1956, 242.

Type specimens — ♀ neotype: *Ledermann 10390* (L); ♂ type: *Hollrung 737* (K; dupl. in L, MEL).

Iconography: Lam 1931, tab. VII, fig. 46 (vase. supply of ♂ flow.); Lam 1932b, 413, fig. 43 (♂ infl., leafl., ♂ and ♀ flow., fr.) and fig. 44 (leafl., anat. branchl. and pet., ♂ infl. and flow.); Husson & Lam 1953, 428, fig. 5 (infr. and fr.); Leenhouts 1956, 242, fig. 16 (habit with leaf, anat. of pet., ♂ and ♀ flow., infr.).

Synonyms:

- 1889 — *Santiria acuminata* Schum. in Schumann & Hollrung, Fl. Kais. Wilh. land 1889, 64 — type specimen: *Hollrung 737* (♂) (K).
 1920 — *Canarium pachypodum* Laut. in Lauterbach 1920, 324 — type specimen: *Ledermann 9724* (♂) (type lost, dupl. in K, L).
 1932 — *Haplobolus pachypodus* (Laut.) H. J. Lam in Lam 1932a, 207; id. 1932b, 411.

Branchlets 0.5–1.0 cm in diam., pubescent as are petioles, leaflets underneath, and inflorescences, pith occasionally with some tiny r. b. Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ –($3\frac{1}{2}$)-jugate, petioles 2–8 cm long with 6–17 r. b.; leaflets obovate to oblong with broad and rounded to broadly acute base and a short abrupt narrow acumen, older ones glabrescent, 9–21 by 4–10 cm; secondary nerves 12–18, tertiary ones transverse, near midrib often some perpendicular to it; petiolules 0.5–2.5 cm long. Inflorescences with short peduncles, if any, ♀ 2.5–4.5 cm long, ♂ 6–12 cm long; ramifications tortuous, particularly in ♂ inflorescences. Fruits ovoid, bluntly pointed, 1.3–1.9 by 0.8–1.2 cm.

Collections (already previously quoted):

- ♀: *Beccari P. P. 876* (*Herb. Fir. 2223, 2223 A, 2223 B*); *Lam 705*; *Ledermann 10390* — all from New Guinea.
 ♂: *Hollrung 737*; *Ledermann 9724* — both from New Guinea.
 Sterile: *NGBW 1773*; *NGF 3754* — both from New Guinea.

Excluded (all from New Guinea).

Transferred to *H. floribundus* (Schum.) H. J. Lam: *NGBW 1573* (*H. acuminata*, var. *glabrior* in Lam 1955, 175).

Transferred to *H. pubescens* H. J. Lam: *Beccari P. P. 542*; *NIFS bb 30470*.

Distribution: West to East New Guinea, lowland.

Remarks: The sterile specimens match the fertile ones in pubescence, shape and size of leaflets, and number of r. b., but differ from them in the colour of the dried specimens, which is dark reddish brown in the fertile ones, greenish brown in the sterile ones. Intermediate positions in this respect are occupied by *Lam* 705 and *NGBW* 1773.

2. *H. beccarii* Husson, in Husson & Lam 1953, 431.

Type specimens — ♀ (fr): *Beccari P. B. 1803* (FI); ♂: unknown.

Iconography: Husson & Lam 1953, 432, fig. 7 (habit, leaf, anat. of pet., fr.).

Branchlets more or less pubescent, very stout, 1.7–2.2 cm in diam., verrucose. Leaf (only one known) $6\frac{1}{2}$ -jugate, petiole stout, about 23 cm long, r. b. 15–20; leaflets lanceolate with acute base and with a long and narrow gradually contracted acumen, 21–36 by 7.5–10 cm, secondary nerves 25–30 much prominent below and pubescent as is midrib and sometimes the transverse tertiary nerves; petiolules about 2 cm long. Inflorescences densely and minutely pubescent, 4–7 cm long, peduncles very short or none; fruits ovoid to subglobular, about 1.3–1.5 by 1.2 cm. — Flowers of both sexes as yet unknown.

Collections:

The type specimen is the only one known.

Distribution: Borneo (Sarawak).

3. *H. celebicus* H. J. Lam, in Lam 1938, 111; Husson & Lam 1953, 435; Lam 1955, 177 (excl.); Leenhouts 1956, 243.

Type specimens — ♀ (fr.) lectotype: *FRI Cel./V-312* (BO; dupl. L); ♂: *FRI Cel./V-208* (L; dupl. BO).

Iconography: Lam 1938, 112, fig. (habit, anat. branchl. and pet., ♂ and ♀ infl., ♂ flow. with diag., fr. with cross-sect.).

Glabrous. Branchlets rather thin 0.4–0.7 cm in diam. Leaves ($1\frac{1}{2}$ – $2\frac{1}{2}$ – $3\frac{1}{2}$ – $4\frac{1}{2}$)-jugate, petioles 5–8 cm dark brown to black when dry, r. b. 1–4 (♀)–7 (♂); leaflets chartaceous, greenish to light brown when dry, oblong with acute basis and apex (which is shortly acuminate), 9–21 by 3.5–8.5 cm, secondary nerves (6–)8–11, tertiary nerves rather laxely reticulate, more or less transverse near the margin, perpendicular to the midrib near this; petiolules 1.2–2.1 cm. Inflorescences ♂ laxely branched, black when dry, 10–22 cm long; peduncle very short; pedicels 0.2–0.3 cm; ♀ (infructescences only) about 10 cm long, on a very short peduncle, much less branched than the ♂ ones, rather stiff. Fruits ovoid, a little pointed, 1.2–1.6 by 0.7–1.1 cm.

Collections (already previously quoted):

♀: *FRI Cel. V/312*.

♂: *FRI Cel. V/208*.

Sterile: *NIFS* bb 24500, 31850, 31878* (ex *H. anis.*), 31901, 32598, 32604.

All from Central Celebes, one specimen from Banggai (*).

Transferred with doubt from *H. leefolius* (Laut.) H. J. Lam var. *anisander* (= *H. anisander* (Laut.) H. J. Lam):

♂: *NIFS* bb 24852? (infl. 2.5–7 cm) and 24882? (infl. 4 cm).

Sterile: *NIFS* bb 16456?, 22832?, 24939?, 25841?, 25878?

All from the Moluccas.

Excluded.

Transferred to *H. leeifolius* (Laut.) H. J. Lam, var. *anisander* (Laut.) H. J. Lam: Sterile: *Main* & *Aden* 1417, *NIFS* bb 23182, 28840, and 28871, all from Moluccas; *Kanehira* 1874? (cf. Lam 1955, 177), from Palau.

Distribution: Central Celebes, ? Moluccas (Ternate, Halmahera, Ceram, Buru).

Remarks: There are two species with which the present one can be easily confused when sterile material only is available. One of them is *Santiria apiculata* Benn., in which, however, the secondary nerves are mostly archingly joined near the margin at some distance from it, while in *H. celebicus* (and *H. leeifolius*) these nerves are mostly diminishing towards the margin without distinctly joining.

The second species with which confusion is possible, is *H. leeifolius* var. *anisander* and the distinction between the two is more arbitrary, as has already been circumstantially explained in Husson & Lam 1953, 433—435. In *H. leeifolius* var. *anisander* the leaflets are mostly smaller viz (3.5—)5—12(—15.5) by (1.5—)2.5—6 and the number of r. b. is only rarely more than 3. The inflorescences in the last-named species (var.) are only up to 4 cm long and very slender, particularly the male ones. The above-mentioned male specimens from Halmahera (*NIFS* bb 24852 and 24882) are therefore more or less intermediate between *H. celebicus* and *H. leeifolius* var. *anisander*.

Of the above-mentioned sterile specimens those from Celebes tally with the type specimens; they have 5—8 r. b. in the petioles and the size of their leaflets leaves little doubt as to their identity, except in the case of the specimen from Banggai (*NIFS* bb 31878), the two leaves of which are young ones, the leaflets very thin, rather small and very acute at base.

The sterile specimens from the Moluccas have generally leaves of the type of *H. celebicus* but they have only 1—5 r. b.

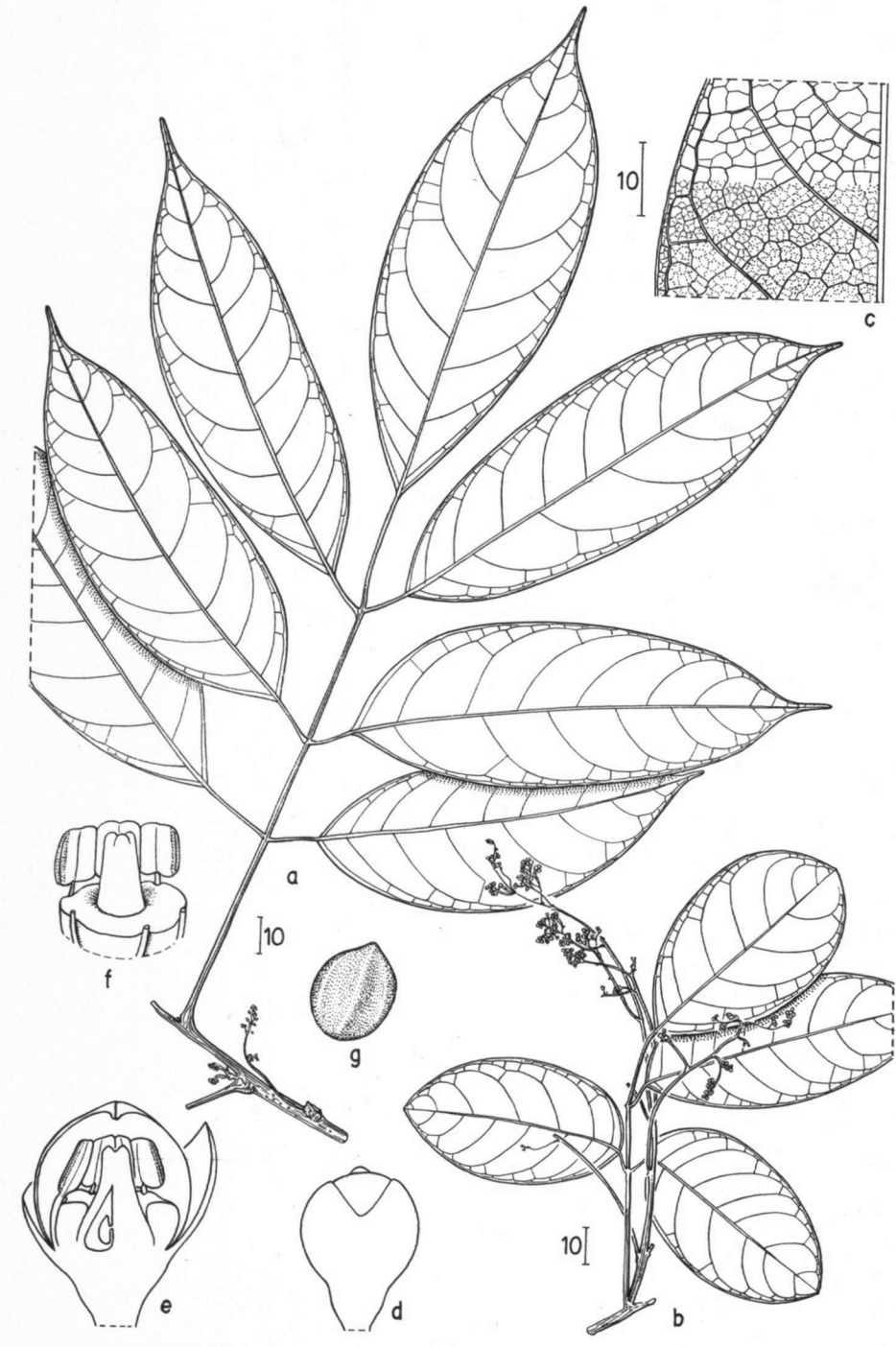
There is also an evident relation with *H. moluccanus* from the Moluccas, both regarding the leaf type and the inflorescences, but in *H. moluccanus* the leaflets are much larger and wider and there are 10—40 r. b. in the pith of the petioles.

4. *H. ? decipiens* H. J. Lam, nova spec.

Iconography: the present paper, *fig. 1* (habit and ♂ infl., nerv., ♂ flow. and long. section; pollen grain).

Description of ♂ type specimen (♀ unknown): *Clemens* 1752.

Arbor (?) glabra. **Ramuli** teretes 0.3—0.4 cm diam., leaves. **Folia** 2½—3½-jugata, petioli 3.5—6 cm longi, basi plus minusve sulcati, medulla vascularis resiniferis c. 4 percursa; foliola subcoriacea, ovata ad oblonga vel oblongo-lanceolata, 6—13 cm longa, 3.3—5.5 cm lata, basi paulo obliqua subrotundata ad acuta, apice plerumque subabrupte longiuscule acute acuminata, petioluli laterales 0.5—1.2 cm, terminales 1.6—3 cm longi; costa subtus prominens; nervi secundarii graciles, curvati, angulo c. 75° de costa adscendentes, subtus vix, supra haud prominuli, margines versus indistincte arcuatim conjuncti, 6—8, tertiarii pergraciles, transversim reticulati reticulatione minuta conjuncti. Inflorescentiae paniculatae, brevi-



pedunculatae, late ramosae, graciles, 5—17 cm longae. Flores parvi, in alabastro globoso 0.1 cm alti et diametro, sepalis 3 deltoideis acutis, petalis 3 orbicularibus apice inflexis. Stamina 6, filamentis extra discum annularem in disci sulcis insertis, antheris (juvenilibus) plano-quadrangularibus adjunctis ovarii rudimentum paulo superantibus, pollinis granis fertilibus. Ovarii rudimentum parvum, ovulis (sterilibus?) includens.

Collections:

EAST NEW GUINEA. Morobe distr., Sattelberg-Heldsbach 600—900 m: *Clemens* 1752 ♂ (type specimen, L); same loc., 450—600 m: *Clemens* 846 ♂ (A, B, L); both ex *H. floribundus*.

Distribution: East New Guinea.

Remarks: The second specimen is practically identic with the type. The present species seems to belong to the *floribundus-leeifolius* group. It occupies a sort of intermediate position between these two species in that the base of the leaflets may be rotundate as well as acute, but their size is markedly smaller than in *H. floribundus* and *H. leeifolius* var. *leeifolius* and the ♂ inflorescences are much larger than those of the last-named variety. From the small-leaved *H. leeifolius* var. *anisander* it differs moreover in the often broad basis of the leaflets.

Another ally seems to be *H. glandulosus* (incl. *monticola*) which has been collected higher up in the mountains, but in *H. decipiens* there is no trace whatsoever of the glandular pits. Unfortunately there is no way of comparing ♂ inflorescences, since these are unknown in *H. glandulosus*, whereas ♀ ones are lacking in *H. decipiens*.

5. *H. floribundus* (Schum.) H. J. Lam, in Lam 1932a, 207; Lam 1932b, 412; Husson & Lam 1953, 436; Lam 1955, 177; Leenhouts 1956, 244.

Type specimens — ♀ neotype: NGBW 1573 (L); ♂ lectotype: *Hollrung* 543 (K; dupl. in MEL, P).

Iconography: Lam 1932a tab. XI, fig. 62 (♂ flow., *H. sepik.*); id. fig. 63 (♀ flow., *H. furf.*); id. fig. 97 (♂ and ♀ flow., *H. maluensis*); Lam 1932b, 413, fig. 42 (leafl., ♂ infl., ♂ and ♀ flow., *H. furf.*), fig. 45 (habit, ♀ flow., *H. florib.*), and fig. 48 (leafl., infruct. and fr., ♂ flow., *H. sepik.*); Husson & Lam 1953, 437, fig. 8 (habit, anat. of branchl. and id. fig. 63 (♀ flow., *H. furf.*); id. fig. 97 (♂ and ♀ flow., *H. maluensis*); id. 441, fig. 9 (leaf, infruct. and fr., *H. versteeghii*); id. 450, fig. 14 (habit, anat. of pet., ♂ infl. and flow., infruct., *H. aneityensis*); Leenhouts 1956, 212, fig. 2f (cross-sect. fr. without embryo) and 16e (infruct.).

Synonyms.

- 1889 — *Santiria floribunda* Schum., in Schumann & Hollrung, Fl. Kais. Wilh. land, 1889, 63 — type specimen: *Hollrung* 543 (♂) (lectotype K; dupl. in MEL, P).
 1920 — *Canarium furfuraceum* Laut., in Lauterbach 1920, 325 — type specimen: *Ledermann* 9796 (♂) (type lost, dupl. in L).
 1920 — *Santiria sepikensis* Laut., in Lauterbach 1920, 333 — type specimen: *Ledermann* 10455 (fr.) (type lost, dupl. in L).

Fig. 1 — *Haplolobus decipiens* H. J. Lam, nova spec. — a. leaf and young ♂ inflorescences; b. ditto; c. nervation; d. ♂ flower bud; e. ♂ flower, longitudinal section; f. ditto, stamens and disc; g. pollen grain; dimensions in mm — a, c-g. after *Clemens* 1752, b. after *Clemens* 846.

- 1920 — *Santiria maluensis* Laut., in Lauterbach 1920, 334 — type specimen: (type lost, neotype plate in L).
 1932 — *Haplolobus sepikensis* (Laut.) H. J. Lam, in Lam 1932a, 208.
 1932 — *Haplolobus maluensis* (Laut.) H. J. Lam in Lam 1932a, 208; Husson & Lam 1953, 436; Lam 1955, 177; Leenhouts 1956, 244.
 1933 — *Canarium aneityense* Guillaumin, J. Arn. Arb. 14, 1933, 51 — type specimen: *Kajewski 943* (♂) (A; dupl. P).
 1950 — *Haplolobus salomonensis* C. T. White, J. Arn. Arb. 31, 1950, 92 — type specimen: *Walker 242* (♂) (BRI; dupl. in L).
 1953 — *Haplolobus versteeghii* H. J. Lam, in Husson & Lam 1953, 440; Leenhouts 1956, 244 — type specimen: *Brass & Versteegh 12546* (L; dupl. in A).
 1953 — *Haplolobus aneityensis* (Guill.) Husson, in Husson & Lam 1953, 449; Lam 1955, 179.
 1955 — *Haplolobus acuminatus* (Schum.) H. J. Lam, fa *glabrior* in Lam 1955, 175 — type specimen: *NGBW 1573* (♀) (L; dupl. MAN).
 1955 — *Haplolobus megacarpus* H. J. Lam quoad spec. ♂ in Lam 1955, 178 — type specimen: *NGBW 1015* (♂) (L; dupl. MAN).

Glabrous, variable in most characters. Branchlets more or less angular, the older ones 0.5–1.0 cm in diam. and often verrucose. Leaves (1½–)2½–3½(–4½)-jugate, petioles 3–9 cm long, with (1–)3–6(–12) r. b.; leaflets rather stiff, ovate or obovate to oblong, base mostly broad and more or less oblique, more rarely broadly acute, apex mostly subabruptly narrowed, more rarely rounded, often bluntly acuminate, (6–)12–15(–33) by 4–7(–9) cm, secondary nerves (7–)10–13, tertiary ones obscurely transverse, all venation between the secondary nerves more or less minutely reticulate, the more conspicuously so as more rigid leaflets are examined, often some perpendicular to midrib near it. Inflorescences ♀ 5.5–11 cm long, little branched, stiff, with rather large flowers; ♂ more profusely branched, (5–)8–24 cm long, rather coarse with subsessile rather large flowers. Infructescences (2.5–)5–9, very coarse and crooked; fruits variable in shape and size, ovoid to subglobular, sometimes pointed, 1.7–2.2 by 0.8–1.4 cm.

Collections. (* indicates new material, *vide infra*):

- ♀ — New Guinea: *Brass & Versteegh 12546*, fr. (ex *H. versteeghii*); *Carr 12247*, fr.; *Hoogland 3723* (ex *H. maluensis*, Lam 1955, 177); *Hoogland & Womersley 3258* (err. 3258 in Lam 1955, 177); *NGBW 1573* (ex *H. acum.*, fa *glabrior* in Lam 1955, 175); *NGF 1312**, fr., 1564.
 Polynesia: *A. C. Smith 5858*, fr., and *6160*, fr. (both ex *H. aneityensis*).
 ♂ — New Guinea: *Brass 25432**; *Ledermann 9796*; *NGBW 1015* (ex *H. megac.* in Lam 1955, 178).
 Polynesia: *Kajewski 574* (♀) and *943*; *Walker 242* (all ex *H. aneit.*).
 Sterile — New Guinea: *Brass & Versteegh 12544* (ex *H. verst.*); *NGBW 444**, 610*, 1004 (ex *H. megac.* in Lam 1955, 178), 1014*, 1217*, 1556*, 1630*, 1634*, 1890*, 1892*, 1903*; *NIFS* bb 14536, 30371 (ex *H. hussonii*), 30515 (ex *H. huss.*), 30694, 30840, 31471 (ex *H. huss.*), 33437, 33468.

New material (sterile unless indicated otherwise).

NEW GUINEA. West New Guinea, Manokwari, Prafi, 150 m, old forest: *NGBW 444* (*Brouwer*) (L, MAN), tree 31 m, nat. (Manikiong) n.: seriga; Oransbari, low alt.: *NGBW 1890*, 1898, 1903 (all coll. by *Schram*) (L, MAN), all with nat. (Manikiong) n.: bowwie; same local.: *NGBW 1556* (*Schram*) (L, MAN), tree 25 m, nat. (Manikiong) n.: hoddjai; Numfore Isl. in Geelvink Bay, 50 m: *NGBW 610* (*Jarissetouw*) (L, MAN), tree 35 m, nat. n.: nas; same local. 7 m: *NGBW 1014* (*Koster*) (L, MAN), tree 20 m, same nat. n.; Meoswaar Isl. in Geelvink Bay, 7 m alt., old forest: *NGBW 1217* (*Koster*), tree, 16 m, very young (♂ ♀) flow. in June 1956, nat. (Manikiong) n.: bowie; Hollandia,

Tami, old for., 2 m alt.: *NGBW 1630* and *1634* (both by Schram) (L, MAN), tree of 30 and 32 m resp., nat. (Skou) n.: djaato, kenari. — East New Guinea, Papua, Milne Bay area, swampy, 10 m alt., ½ mile S. of Waigami Plantation: *NGF 1312* (L. J. Smith), tree 36 m, bole 24 m, fr. blackish, in March 1945, nat. (upper Waria) n.: ratitunga; Normanby Island, Waikaiuna, rain forest, 20 m alt.: *Brass 25432* (A, K, LAE, L, PNH, S, US), tree 35 m, ♂ flow. cream coloured, in April 1956.

Excluded.

Transferred to *H. lanceolatus* H. J. Lam: *NIFS bb 25088*, from New Guinea.

Transferred to *H. lecifolius* (Laut.) H. J. Lam var. *anisander*: *NIFS bb 25015* (♀), *28970*, *30692*, *30722*, *30764* (♂?), *30777*, *31079*; all from New Guinea.

Transferred to *H. decipiens* H. J. Lam: *Clemens 846*, *1752* (both Sattelberg, 450—900 m).

Distribution: New Guinea from the Manokwari area eastward to Milne Bay and Normanby Isl., Solomons (Guadalcanal), New Hebrides (Aneityum, Vanikoro), Fiji (Viti Levu), Samoa (Savaii), mostly in the lowlands from sea level upwards into the hills (Milne Bay 450 m, Fiji 700—800 m), some specimens known from the Central Range at an altitude of 1170 m.

Remarks: *H. floribundus* is a fairly variable species. It is a rather lofty tree with coarse branchlets and relatively broad and often rigid leaflets. From its nearest relative *H. lecifolius* it is different by its mostly larger and more rigid leaflets with a broad sometimes rounded basis and the much stouter and (♂) longer inflorescences. It is also related to *H. lanceolatus* which has, however, narrow, lanceolate leaflets and much larger inflorescences (♀!). Another relative is *H. decipiens*, which is different from *H. floribundus* by its more slender ♂ inflorescences and smaller and narrower leaflets with acute to subrotundate base.

A rather striking contrast is to be observed between the (♀) flowers of *Hoogland & Womersley 3238* and of *NGBW 1573*. In the first-named specimen the flowers are beyond anthesis and up to 0.4 cm long with oblong, exsert (loosening) petals, and short filaments, the anthers not surpassing the ovary; in the second one the flowers are in bud, in those just open the total length is somewhat over 0.2 cm and the stamens possess long filaments which are only slightly shorter than the petals. There is, however, no essential difference in the structure of the two types. In *Hoogland & Womersley 3238* some flowers are 4-merous (cf. Lam 1931, 25—54 where pleiomery and meiomery of certain *Canarium* species have been discussed).

The sterile specimens present little doubt as to their conspecificity with the types.

In spite of its variability regarding most characters (shape of leaflets, size of inflorescences, flowers, and fruits) there is no reason and even no possibility to distinguish any varieties or formae. Even the Polynesian types which were formerly comprised in *H. aneityensis* (Guill.) Huss. and which are characterised by the more or less poplar-like leaflets, show no constance in this respect.

6. *H.? glandulosus* Huss., in Husson & Lam 1953, 423; Leenhouts 1956, 241.

Type specimen (sex uncertain): *Clemens 4988* (B).

Iconography: Husson & Lam 1953, 424, fig. 3 (habit, glandular pits, anat. of pet.) and 426, fig. 4 (leaf, ♀ infl. and flow., glandular pits, anat. of pet.; *H. monticola*).

Synonym:

1953 — *H. monticola* Huss., in Husson & Lam 1953, 425; Leenhouts 1956, 241 — type specimen: *Clemens* 1924.

Glabrous trees of moderate height. Branchlets slender to fairly stout, 0.3–0.7 cm in diam. Leaves $1\frac{1}{2}$ – $3\frac{1}{2}$ -jugate, petioles flattened at base, 2.5–5 cm long with 1–3 r. b. in the pith; leaflets chartaceous to coriaceous, ovate to oblong-lanceolate, 5–16.5 by 3–5.5 cm; secondary nerves 6–12, with nectaries in their axils underneath; tertiary nerves generally transverse, reticulate. Inflorescences ♀ axillary, 1.5–7.5 cm long, ♂ unknown. Fruits unknown.

Distribution of the species: New Guinea, in the mountains (1000–1750 m alt.).

Var. glandulosus.

Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ -jugate; leaflets ovate, twice as long as broad or less, 5–10.5 by 3–5.5 cm, with 6–9 not or hardly prominent secondary nerves; petiolules 1–1.5 cm long.

Collections (already previously quoted):

Clemens 4988; *Carr* 13338 ♂ ♀ (ex *H. nubig.*).

Distribution of the variety: East New Guinea, in the mountains (1500–1750 m alt.).

Var. monticola (Huss.) H. J. Lam, nov. stat. — **Synonym:** *H. monticola* Husson — **Type specimen:** *Clemens* 1924 ♀ (B).

Leaves $2\frac{1}{2}$ – $3\frac{1}{2}$ -jugate; leaflets oblong-lanceolate, broadly to narrowly acute at base, thrice as long as wide, 10–16.5 by 4.5–5.5 cm, with 10–12 prominent secondary nerves; petiolules 1.5–2.5 cm long.

Collections (already previously quoted):

Clemens 1924 ♀; *Brass* 13152, ster.

Distribution of the variety: West and East New Guinea, in the mountains (about 1000 m alt.).

Remarks: This is an incompletely known species. The types of *H. glandulosus* and *monticola* do not differ so much as to justify maintaining specific rank. They have been combined under the name of *glandulosus* which has page priority. Only in the type of var. *monticola* (♀) flowers are known; fruits are so far unknown as are ♂ flowers.

The specimens *Carr* 13338 and *Brass* 13152 are not very convincing members of the species, but if they belong to *Haplobolus* at all they would fit into no other species but the present one. In *Carr* 13338 (type variety) the nectaries are small but extant in almost every nerve axil. They are still less distinct (and very shallow) in *Brass* 13152 (var. *monticola*) and the leaflets are almost subrotundate at base; this specimen would certainly have to be inserted in *H. floribundus* but for the nectaries which are unknown in that species.

As far as can be judged from the very scanty and heterogeneous material the alliance of the present species is with *H. decipiens* and

H. floribundus, particularly the former, which has the same type of leaf and inflorescence but is entirely devoid of nectaries.

7. *H. lanceolatus* H. J. Lam, nova spec.

Iconography: the present paper, *fig. 2* (habit, ♀ and ♂ infl., leaflets, ♀ and ♂ flow., fr. with cross-section).

Description of ♀ type specimen: *NGBW 4040 (Van der Sijde)*.

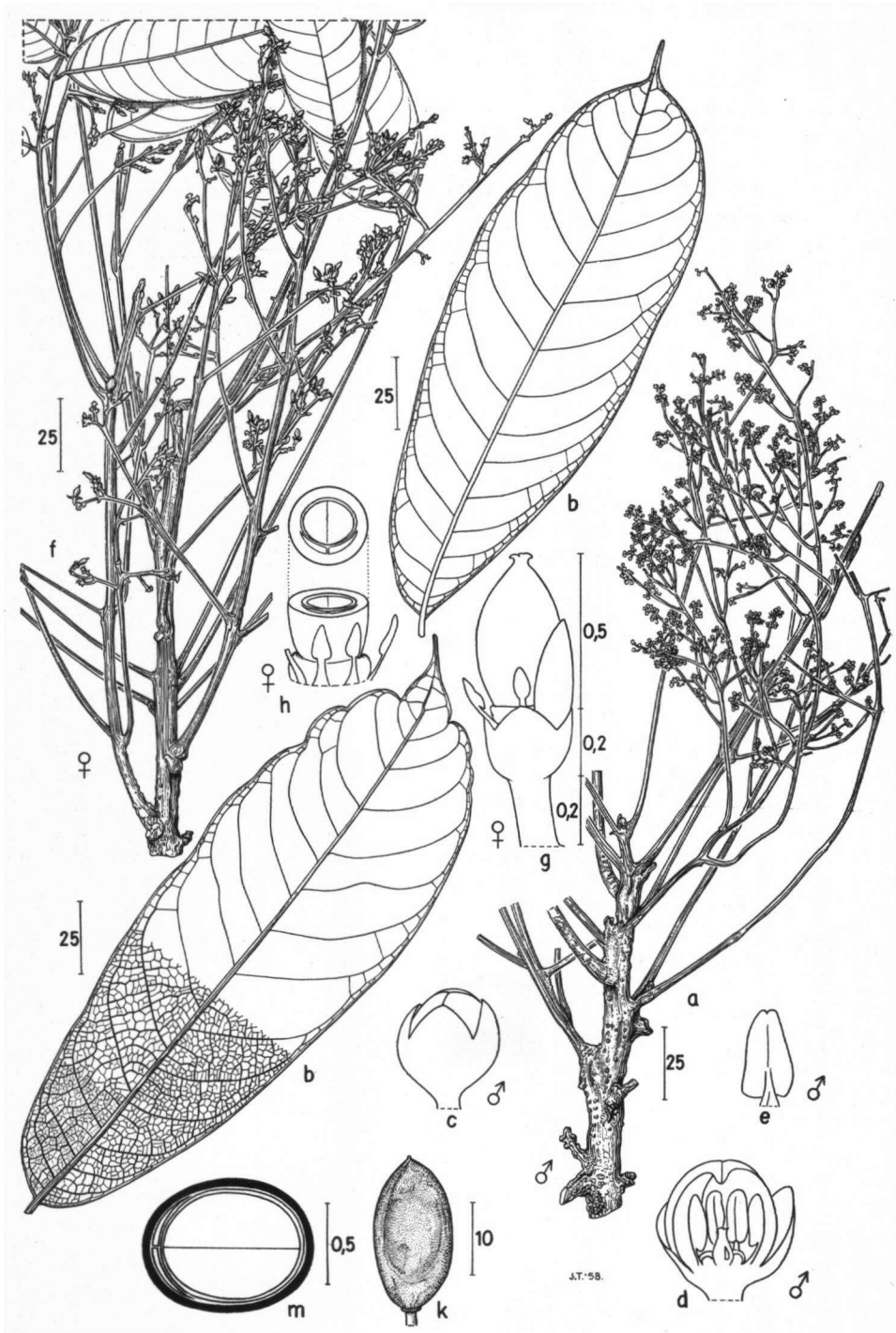
Arbor parva glabra. Ramuli crassi verrucosi vel sublaeves, plus minusve angulati, 0.9—1.3 cm diam., medulla aresinosa. Folia glabra, $3\frac{1}{2}$ — $7\frac{1}{2}$ -jugata, petioli 6.5—20 cm longi, 0.3—0.6 cm diam., ima basi interdum excepta teretes, in sicco striati, medulla vasculis resiniferis 6—11 percursa; partes rhochidis interjugales 2—5 cm longae; foliola brevipetiolulata lanceolata ad lanceolato-oblonga, basi paulo vel vix obliqua, variabilia, anguste rotundata ad acuta, apice acuta vel breviter acute acuminata, rigide chartacea, in sicco virescentia, (9—)15—20(—26.5) cm longa, (3.5—)5.5—8(—9) cm lata, latitudine maxima plerumque supra medium; petioluli laterales breves 0.5—1 cm, terminales 1.7—2 cm longi; nervi subtus prominuli, secundarii (12—)16—18, sensim curvati, angulo 70°—80° de costa adscendentes, prope marginem haud confluentes, tertiarii pauci transversim marginem versus secundariis, prope costam ea perpendicularares, reticulatione sublaxa. Inflorescentiae multae in axillis foliorum superiorum vel incipientium ortae paniculatae; paniculae pedunculatae 10—26 cm longae, ramificationes laterales usque ad 8 cm longae, haud multiflorae; pedunculi 2—9 cm longae cum axibus florigeris in sicco striati plus minusve angulati vel bicarinati. Florum post anthesin pedicelli 0.1—0.2 cm longi; calyx trifidus, 0.2 cm in diam. et altus, sepalis deltoideis acutis; petala 3 oblonga acuta 0.3 cm longa 0.15 cm lata; stamina parva sterilia 6, 0.1 cm longa vel paulo longiora gracilia, filamentis anguste deltoideis extus discum annularem insertis; ovarium (fructus juvenilis) stylo terminali in sicco atrum, triloculare. Fructus maturi desunt.

Description of ♂ type: *NGBW 2659 (Brouwer)*.

Partes vegetativae eis typi ♀ similes; vasc. resinif. 7—9. Inflorescentiae ut in typo ♀ positae, paniculae multiflorae, 18—21 cm longae, ramificationibus lateralibus usque ad 10 cm longis. Flores (alabastra) parvi brevipedicellati, subglobosi, c. 0.15 cm diam.; sepala 3 deltoidea, dimidio altitudinis connata, petala 3 ovata, apice distincte inflexa; stamina 6, extra discum minutum annularem inserta; ovarii rudimentum staminibus c. duplo brevis.

Collections:

- ♀ — NEW GUINEA. West New Guinea, near Hollandia, 10 m alt. on slope in old forest: *NGBW 4040 (Van der Sijde)*, ♀ type specimen (L; dupl. in MAN), tree 12 m high, bole 8 m, very young fr. in Aug. 1956; same locality, 50 m alt.: *NIFS bb 25088* (BO, L), fr. in July 1938; same locality, alt. 80 m: *NGBW 4092 (Van der Sijde)* (L, MAN), fr. black, in Oct. 1956.
- ♂ — NEW GUINEA. West New Guinea, Cycloop Range, 500 m alt. on steep slope in second growth forest: *NGBW 2659 (Brouwer)*, ♂ type specimen (L; dupl. MAN), tree 21 m high, bole 19 m, straight, diam. breast high 0.21 m, bark grey, 0.1 cm thick, slightly grooved, peeling off in small flakes, resin translucent white; wood white (spint) to grey (centre), flow. in bud yellowish green, in Nov. 1955.



Sterile — NEW GUINEA, Cycloop Range, 500 m, on steep slope in second growth forest: NGBW 2656 (Brouwer) (L, MAN), tree 17 m high, bole 12.50 m, straight, same characters as no 2659.

Comprehensive description of all specimens (there is no doubt whatever about their conspecificity):

Moderate-sized glabrous tree. Branchlets 0.5—1.5 cm thick, pustular, pith without resiniferous ducts. Leaves ($2\frac{1}{2}$ —) $3\frac{1}{2}$ — $7\frac{1}{2}$ -jugate, petioles 6.5—20 cm long, 0.3—0.6 cm thick, r. b. 3—13; leaflets lanceolate to lanceolate-oblong, base somewhat oblique, narrowly rounded to acute, apex acute to acutely acuminate, (8—)15—20(—32) by (3.5—)5.5—8(—9) cm, petiolules 0.5—1 cm; secondary nerves (10—)12—18, more or less prominent below. Inflorescences paniculate, together in the axils of the uppermost leaves or their primordia, in both sexes large, 10—26 cm long, lateral branchlets up to 10 cm, ♀ inflorescences fewer-florous than ♂ ones. Flowers 3-merous with 6 stamens inserted outside an annular disk. Fruits ovoid, smooth, black, 1.6—2.1 by 0.8—1.2 cm, one-seeded.

Distribution: Only known from the Cycloop Range near Hollandia, 10—500 m alt.

Remarks: This species is undoubtedly akin to *H. floribundus* but again there is no doubt that it is markedly different by several important characters and it seems not very likely that more material will be able to shake this opinion. Not only are the leaves in the material so far available much larger (except in *NIFS* bb 25088, *vide infra*), the leaflets much longer and narrower, and the petiolules shorter than in *H. floribundus*, but the inflorescences are in both sexes of approximately the same size. Its area is so far very much restricted.

Only one specimen (*NIFS* bb 25088) was so far known. It has previously been identified as *H. floribundus* (Husson & Lam 1955, 438) and it is, indeed, the only specimen which somewhat tends to that species by its smaller leaves ($2\frac{1}{2}$ — $3\frac{1}{2}$ -jugate), shorter ♀ panicles (10—14 cm), and fewer r. b. (3—5). In the texture and shape of the leaflets and the short petiolules it is exactly matching the types of *H. lanceolatus*. Moreover NGBW 4040 shows small leaves next to large ones.

8. *H. ledermannii* (Laut.) H. J. Lam, in Lam 1932a, 207; id. 1932b, 408; Husson & Lam 1953, 427; Leenhouts 1956, 241.

Type specimens — ♀ lectotype dupl.: *Ledermann 9013* (K), with fr.; ♂: *Ledermann 12506a* (lectotype dupl. of *S. caudata*, if still in existence; if not, it is proposed to use the plate in the Icones-collection of the Rijksherbarium as a neotype, until a neotype can be selected from fresh material).

Iconography: Lam 1932b, 413, fig. 41 (habit with ♂ infl., ♂ flow., old ♀ flow., fr. with cross-section).

Fig. 2 — *Haplolobus lanceolatus* H. J. Lam, nova spec. — a. branchlet with ♂ inflorescences; b. leaflets; c, d, e. ♂ flower with longitudinal section and stamen; f. branchlet with ♀ inflorescences; g. old ♀ flower; h. base of same with androecium, disc and cross-section of young fruit; k, m. fruit and cross-section; dimensions in mm — a-e. after NGBW 2659; f-h. after NGBW 4040; k and m. after *NIFS* bb 25088.

Synonyms:

- 1920 — *Santiria ledermanni* Laut., in Lauterbach 1920, 334 — type specimen: *Ledermann 9013* ♀ (K).
 1920 — *Santiria caudata* Laut., in Lauterbach 1920, 336 — lectotype specimen: *Ledermann 9877* ♀ (K, dupl.).

Glabrous tree of moderate height. Branchlets slender, 0.1—0.5 cm in diam. Leaves $1\frac{1}{2}$ — $3\frac{1}{2}$ (— $4\frac{1}{2}$)-jugate, in total up to 14 cm long, petioles 0.9—3.6 cm long, pith with 1 (—2) r. b.; leaflets thin-coriaceous, ovate-lanceolate with a rounded or broadly acute base and a long and narrow, blunt acumen, 1.6—6 by 0.4—2.5 cm, acumen 0.5—1.5 cm, petiolules (0.1—)0.3—0.6 cm long; midrib prominulous below, secondary nerves delicate, (6—)8—10, tertiary ones hardly conspicuous, indistinctly transverse, generally reticulate. Inflorescences of both sexes 1.5—2 cm long; flowers of the usual type, stamens inserted outside the disc, ovary in the ♂ flower hardly exserting from disc. Fruits ovoid, 0.7—0.9 by 0.5—0.6 cm.

Collections (already previously quoted):

♀: New Guinea: *Ledermann 9915*.

Distribution: East New Guinea, in the mountains, 850—1400 m alt.

Remarks: Most probably a near ally to *H. microphyllus* Huss. from West New Guinea (1780 m) which, however, differs by its fewer-jugate leaves ($1\frac{1}{2}$ — $2\frac{1}{2}$), fewer secondary nerves (4—5) and the presence of glandular pits in the nerve axils underneath.

9. *H. leeifolius* (Laut.) H. J. Lam, in Lam 1932a, 208; id. 1932b, 417; Husson & Lam 1953, 454; Leenhouts 1956, 246.

Type specimens — ♀: New Guinea: *Beccari P.P. 862* (*Herb. Fir. 2222*) (FI, neotype, fr.); ♂: New Guinea: *Ledermann 9760* (ster. in L, lectotype; plate with ♂ infl. and flow., neotype).

Iconography: Lauterbach 1930, 339, fig. 4 (habit, ♂ infl. and flow.; stamens incorrect; *Sant. anis.*); Engler & Prantl, Nat. Pflfam. ed. 2, 19a, 1931, 454, fig. 218 (same as Lauterbach 1920); Lam 1932b, 413, fig. 46 (leafl., ♂ flow.; *H. anis.*) and 50 (leafl., ♂ infl. and flow.; *H. leeif.*); Husson & Lam 1953, 442, fig. 10 (habit, infr., fruit, anat. pet., nervation; *H. huss.*), 444, fig. 11 (habit, anat. pet., nervation, fr.; *H. megac.* ♀), 448, fig. 13 (habit, ♀ infl. and flow., infr., fr., anat. pet.; *H. clem.*), and 445, fig. 15 (leafl., infr., fr. with cross-section; *H. leeif.*); the present paper: fig. 3 (fruit types in cross-section).

Synonyms:

- 1920 — *Santiria leaeifolia* Laut., in Lauterbach 1920, 335 — lectotype (ster.): *Ledermann 9760* (L), neotype: plate ♂ (L).
 1920 — *Santiria anisandra* Laut., in Lauterbach 1920, 339 — lectotype: *Ledermann 7719* ♂ (K).
 1953 — *Haplolobus hussonii* H. J. Lam, in Husson & Lam 1953, 443; Leenhouts 1956, 245 — type specimen: *Beccari Herb. Fir. 2224* ♂ (and *2224A*, dupl.) (FI).
 1953 — *Haplolobus megacarpus* H. J. Lam, quoad spec. ♀ in Husson & Lam 1953, 443; Leenhouts 1956, 245 — type specimen: *Beccari 2225B*, fr. (and *2225, 2225A*, dupl.) (FI).
 1953 — *Haplolobus clementium* Husson, in Husson & Lam 1953, 449; Lam 1955, 179; Leenhouts 1956, 245 — type specimen: *Clemens 1768* ♀ (B; dupl. in A).

1933 — *Haplolobus anisander* (Laut.) H. J. Lam, in Lam 1932a, 207; id. 1932b, 414; Husson & Lam 1953, 452; Leenhouts 1956, 246.

Glabrous. Variable species. Branchlets smooth, 0.25–0.7 cm in diam.. Leaves ($\frac{1}{2}$ —) $1\frac{1}{2}$ — $3\frac{1}{2}$ (— $4\frac{1}{2}$)-jugate, petioles 1.5–10 cm long with 1–14 r. b.; leaflets variable in size and shape, ovate to ovate-lanceolate, base mostly acute, rarely subrotundate, apex subabruptly acuminate, 3.5–22 by 1.5–8.5 cm; secondary nerves 6–14, occasionally with hair tufts (domatia) in their axils, petiolules 0.5–3 cm long. Inflorescences small and slender, particularly the ♂ ones; ♂ ones 1.5–7.5 cm long, ♀ ones 1–6 cm. Fruits sometimes 2-seeded (only species of *Haplolobus* in which this is known, cf. fig. 3), variable in size and shape, 1.1–2.8 by 0.7–1.8 cm, ellipsoid or ovoid to subglobular.

Distribution of the species: Moluccas through New Guinea to New Britain (and Palau?).

Var. *leefolius* — Synonyms: *Santiria leaeifolia* Laut.; *Haplolobus hussonii* H. J. Lam quoad spec. ♀; for literature see above.

Leaves ($\frac{1}{2}$ —) $2\frac{1}{2}$ — $3\frac{1}{2}$ -jugate; petioles 4–5(–12) cm long with (1–)3–6(–12) r. b.; leaflets rather large, chartaceous, (8.5–)11–17(–22) by 3.5–8.5 cm, petiolules 0.5–2 cm long; secondary nerves (7–)9–14. Inflorescences ♀ 2.5–6 cm long, ♂ ones 5.5–7.5 cm.

Collections (already previously quoted):

♀ — New Guinea: *Beccari P.P.* (Herb. Fir. 2222); *Beccari Herb. Fir.* 2224 and 2224A (ex *H. huss.*); *Beccari Herb. Fir.* 2225, 2225A, 2225B, and 2226 (all ex *H. megac.* ♀); *Docters van Leeuwen* 10800 (ex *H. clem.*).

♂ — New Guinea: *Beccari P.P.* 918 (Herb. Fir. 2221) ♂!; *Ledermann* 9760.

Sterile — New Guinea: *NIFS* bb 30462? (ex *H. huss.*).

New material (sterile):

NEW GUINEA. West New Guinea: Manokwari, fairly frequent in old forest on coral limestone, 135 m alt.: *NGBW* 3695 (*Kalkman*) (L, MAN), tree, 24 m, nat. (Manikiong) n.: bowwie; domatia!, r. b. 1(–2).

Distribution of the variety: Northern New Guinea from Arfak to Sepik, including Japen Isl. (Geelvink Bay), from the lower hills up to 1000 m in the Central Range.

Var. *anisander* (Laut.) H. J. Lam, nov. stat. — Synonyms: *Santiria anisander* Laut.; *Haplolobus clementium* Huss.; *Haplolobus anisander* (Laut.) H. J. Lam; for literature see above. — Type specimens, ♂: *Ledermann* 7719 (K, lectotype); ♀: *Clemens* 1768 (type of *H. clementium* Huss.; neotype of *H. leefolius* (Laut.) H. J. Lam var. *anisander* (Laut.) H. J. Lam).

Leaves ($\frac{1}{2}$ —) $1\frac{1}{2}$ — $3\frac{1}{2}$ -jugate, petioles 1.5–4(–6.5) cm long, with 1–3(–5) r. b.; leaflets rather small and often narrow, thin to subcoriaceous, (3.5–)4–12(–15.5) by (1.5–)2–6(–7) cm, occasionally with some hair tufts in the nerve axils underneath, petiolules 1–2(–3) cm long, secondary nerves (6–)7–11(–14). Inflorescences of both sexes 1–4 cm long, the ♀ ones few-florous and rather stiff, the ♂ ones very slender. Fruits sometimes 2-seeded, and then somewhat broader.

Collections:

An asterisk * indicates new material (description *vide infra*).

♀ — New Guinea: *Clemens* 1768 (ex *H. clem.*); *NGBW* 935 (*Verst.*) (ex *H. clem.*)

and 2660* (*Brouwer*); *NGF* 7259*; *NIFS* bb 25015, 30692 ♀, 30764 ♀ (all three ex *H. florib.*); *Van Royen* 3782 (ex *H. clem.*).

♂ — Moluccas: *Main & Aden* (*Kostermans*) 1253 (ex *H. anis.*).

New Guinea: *Ledermann* 7719 (ex *H. anis.*, plate); *NGBW* 3948* (*Verst.*); *NIFS* bb 30973 (ster. in L, ♂ in A) (ex *H. anis.*).

Sterile — Moluccas: *Main & Aden* (*Kostermans*) 1417 (ex *H. oel.*); *NIFS* bb 23182, 28840, 28871 (all three ex *H. oel.*).

New Guinea: *NGBW* 2602 (*Brouwer*)*, 2707 (*Brouwer*)*, and 4317 (*Koster*)*; *NGF* 162 (ex *H. anis.*; New Brit.); *NIFS* bb 28970 (ex *H. florib.*), 30306 (ex *H. anis.*), 30722 and 30777 (both ex *H. florib.*), 30824 (ex *H. anis.*), and 31079 (ex *H. florib.*).

Palau: *Kanehira* 1874? (ex *H. celeb.*, in Lam 1955, 177).

New material (sterile unless indicated otherwise):

NEW GUINEA. West New Guinea: Sorong, Sausapor, old forest on slope, sandy clay, 15 m, scattered: *NGBW* 3948 (*Versteegh*) (L, MAN), tree, 20 m, diam. 0.35 m, buttresses to 1.1 m high, buds in October 1956, nat. n.: imlolee (Manikiong), gwal (Karooon), dulok (Mooi); Manokwari dist., Oransbari, rather frequent in second growth forest on slope: *NGBW* 2602 (*Brouwer*), tree 26 m (L, MAN), nat. (Manikiong) n.: bowwie; Hollandia, Cycloop Range in old forest on slope, 380 m alt.: *NGBW* 4317 (*Koster*) (L, MAN), tree, 17 m, bark brown peeling off in flakes, resin little, whitish; same locality, about 500 m alt., rather frequent in young forest: *NGBW* 2660 (*Brouwer*) (L, MAN), tree, 15 m, ♀ flow. buds in December 1955; Hollandia, near mouth of Tami river, old forest on flat, fairly frequent: *NGBW* 2707 (*Schram*) (L, MAN), tree, 21 m, nat. (Sko) n.: djong. — East New Guinea: Morobe distr., Buang track along ridge above Gabensis, 570 m alt.: *NGF* 7259 (*Floyd*) (LAE, L), tree, 18 m, old ♀ flow., fr., in May 1955, fr. ovoid, black, borne in great abundance (1- and 2-seeded).

Excluded.

Transferred with doubt to *H. celebicus* H. J. Lam:

Moluccas: *NIFS* bb 16456, 22832, 24852, 24882, 24939, 25841, 25878, 31878 (all ex *H. anis.*).

Distribution of the variety: Moluccas (Sula, Batjan, Morotai), New Guinea (northern part incl. islands in Geelvink Bay) from Sorong to Morobe dist. (incl. New Britain), Palau?; from sea level to 1000 m (Morotai).

Remarks: Although the two varieties are connected by some intermediate specimens (e.g. *Clemens* 1768, the type of *H. clementium*), the majority of the specimens are well distinguishable as belonging to one of the two varieties, which are particularly characterised by the size of their leaflets and inflorescences. Also the distribution of the two varieties is fairly markedly different, var. *anisander* having the wider one. All these facts made us choose the rank of varieties rather than forms, but their difference appeared to be insufficient to justify to keep them apart as species.

Some specimens of var. *anisander* show some traces of hair tufts (domatia) in the nerve axils underneath and it is striking that two of these (*Main & Aden* 1253 and 1417) have been collected in Morotai, and that the altitude of one of these (1253) is indicated as 1000 m. The point is that *Main & Aden* 1316, the type of *H. monophyllus* H. J. Lam, was collected at the same locality (Mt Pare-Pare) and the same altitude. It should well fit in *H. leeiifolius* var. *anisander* but for the fact that the leaves are only 1—3-foliate and that there are domatia in all nerve axils. The above-mentioned specimen *Main & Aden* 1253 has 5—7 leaflets and 3 r.b. in the petioles (*H. monophyllus*: 1).

Another specimen (of var. *anisander*) with some traces of domatia

is *NIFS* bb 30973 from New Guinea (Isl. of Meosnum, 200 m); it shows the usual *anisander*-type with 5—7 leaflets and 3—4 r. b. Very recently domatia were also found in the type variety (*NGBW* 3695).

There are only two sterile specimens with extraordinarily large leaves and leaflets, viz *NIFS* bb 30462 (var. *leeifolius*?), of which the oblong-lanceolate leaflets measure up to 26 by 5.5 cm with petiolules up to 2.5 cm and about 19 secondary nerves, r. b. 1—4; and *Main & Aden* 1253 (var. *anisander*) with oblong leaflets of about 19 × 7 cm, petiolules about 2.5 cm long, number of secondary nerves normal, r. b. 3. The other sheet of this number is normal and ♂. Both specimens are considered suckers.

Two-seeded fruits (the first ones detected in the genus) are found, next to one-seeded ones in a proportion of about fifty-fifty, in *NGF* 7259, both with the two seeds in one cell of the fruit and each in a separate cell (fig. 3).

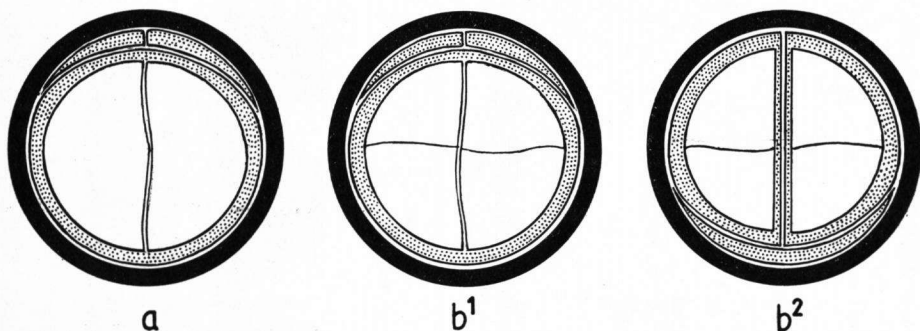


Fig. 3 — *Haplolobus leeifolius* (Laut.) H. J. Lam, var. *anisander* (Laut.) H. J. Lam — diagrams of 1- and 2-seeded fruits — a. one-seeded; b¹. two-seeded, one cell; b². two-seeded, two cells — after *NGF* 7259.

H. leeifolius is undoubtedly related to *H. floribundus*, from which it is distinguished by the generally acute base of its leaflets which, particularly in var. *anisander*, are also considerably smaller than in *H. floribundus*, in which the inflorescences, and particularly the male ones, are considerably longer than in *H. leeifolius*.

Sterile specimens, or rather specimens without fruits, of var. *anisander* may be easily confused with those of *Santiria apiculata* Benn., and, to a lesser extent, with *S. rubiginosa* Bl., which are both known to overlap the generic area of *Haplolobus* though with a gap in the Moluccas (cf. diagram on p. 241). In fact, they can only be identified with doubt on the basis of some characters which are fairly variable.

In var. *anisander* the secondary nerves are mostly not clearly archingly joined near the margin, and if so, the distance to the margin is very small, and the tertiary nervation is distinctly transverse. In *Santiria rubiginosa* the tertiary venation is generally longitudinal (parallel to the secondary nerves), and in *S. apiculata* the latter are often distinctly archingly joined at a considerable distance from the margin, while the tertiary venation is transverse but farther apart than in *Haplolobus leeifolius* var. *anisander*.

The leaflets of the latter are mostly rather rigid. Tender ones may be still young and in regard to their identification the line against *Santiria apiculata* has been on account of the nervation. On this ground the only (sterile and therefore doubtful) specimen of *Santiria apiculata* from Celebes was identified as such. On the other hand *Main & Aden 1253* could as well be regarded as a representative of *Santiria apiculata* but for its occasional domatia. For further remarks see under *H. borneensis* (excluded).

10. *H.?* *microphyllus* Huss., in Husson & Lam 1953, 423; Leenhouts 1956, 240.

Type specimens — ♀: *Brass & Versteegh 11198* (L; dupl. in A); ♂: unknown, as are fruits.

Iconography: Husson & Lam 1953, 422, fig. 2 (habit, nervation and glands, ♀ flow. and cross-section of ovary).

Glabrous tree of moderate height. Branchlets slender, 0.15–0.3(–0.5) cm in diam. Leaves $1\frac{1}{2}$ – $2\frac{1}{2}$ -jugate, petioles 2.5–3.5 cm long, pith with 1(–3) r. b.; leaflets lanceolate with subrotundate base and long protracted blunt acumen, coriaceous, 3.7–7 by 1.4–2.4 cm, acumen 0.9–1.2 cm, petiolules 0.9–1.3 cm long; secondary nerves 4–5, curved, near margins archedly connected, with above bullate glandular pits in their axils. Inflorescences ♀ few-florous, about 5 cm long; ♂ flowers and fruits unknown.

Collections:

The type specimen is the only one thus far known.

Distribution: West New Guinea, in the Central Range, 1780 m alt.

Remarks: Probably related to *H. ledermannii* (Laut.) H. J. Lam, from East New Guinea (850–1000 m), which shows the same type of leaflets though somewhat smaller and with more secondary nerves (8–10) without glandular pits and shorter inflorescences (1.5–2 cm long in both sexes).

11. *H.?* *mollis* H. J. Lam, in Lam 1955, 177; Leenhouts 1956, 242.

Type specimens — ♀: *Pleyte 345* (L; dupl. in BO); ♂: unknown, as are fruits.

Iconography: Lam 1955, 176, fig. 1 (habit, nervation, ♀ infl. and flow.).

A tree of moderate size with pubescence on smaller branchlets, petioles and leaflets underneath. Branchlets stout, about 1 cm thick, verrucose. Leaves $1\frac{1}{2}$ – $3\frac{1}{2}$ -jugate, petioles 3.5–8 cm long with 8–10 r. b.; leaflets ovate with a broad rounded more or less oblique base and a short abrupt acumen, sparsely pubescent underneath, 7–19 by 5–11.5 cm, petiolules 1–2.2 cm long, secondary nerves 8–15, tertiary ones transverse, wide apart. Inflorescences ♀ lateral on short shoots, branched from base, only 1.5–2 cm long; ♀ flowers small, glabrous, ♂ ones and fruits unknown.

Collections:

The type specimen is the only one known.

Distribution: Moluccas; Halmahera, 600 m.

Remarks: There is no clear relationship with other species but both the hairiness and the short lateral inflorescences link *H. mollis* somewhat up with *H. beccarii* from Sarawak, which is, however, very different by its long and narrow leaflets.

12. *H. moluccanus* H. J. Lam, in Lam 1932a, 270 and in 1932b, 407; Husson & Lam 1953, 433; Leenhouts 1956, 243.

Type specimens — ♀ lectotype: *Beguín 1902* (BO), with fr.; ♂: *Beguín 2225* (L; dupl. in BO). — Both from Halmahera.

Iconography: Lam 1931, tab. VII, fig. 45 (vase. supply of ♂ flow.); id. 1932a, tab. XI, fig. 60 (♂ flow. and diagram); id. 1932b, 413, fig. 40 (leaf, ♂ infl., anat. of pet., longit. sect. of fr.).

Glabrous tree of moderate size. Branchlets stout, 1–1.5 cm in diam., verrucose, striate as are petioles. Leaves $3\frac{1}{2}$ – $5\frac{1}{2}$ -jugate, petioles 8–16 cm long, about 0.7 cm thick, adaxial side flattened, pith with (10–)16–25 (–40) r. b.; leaflets chartaceous, broad-ovate to oblong, with broadly acute to rounded or subcordate, slightly oblique base and blunt or shortly acuminate apex, 12–38 by 7–18 cm, petiolules 1.5–3.8 cm long, secondary nerves (9–)12–18, tertiary ones transverse and wide apart. Inflorescences widely branched, in the upper leaf axils, ♀ ones (infruct.) 7–19 cm long, rather stiff, ♂ ones very slender with small flowers, 23–32 cm long. Fruits ovoid to ellipsoid, 1.7–2.2 by 0.8–1.2 cm.

Collections (already previously quoted):

♀: *Beguín 1902*.

♂: *Beguín 2225*; *NIFS bb 24847*.

Sterile: *Beguín 2301*; *Lam 3583* and *3653*; *NIFS bb 23153* and *33782*.

Distribution: Moluccas (Halmahera, Morotai, Batjan).

Remarks: As has been explained in Husson & Lam 1953, 434 there is a clear relation with *H. celebicus* in which, however, the number of r. b. is much smaller (1–7) and the leaflets both smaller and narrower. Clearly intermediate types have so far not turned up.

13. *H.? monophyllus* H. J. Lam, in Husson & Lam 1953, 445; Leenhouts 1956, 245.

Type specimens — ♀: unknown; ♂: *Main & Aden (Kostermans) 1316*.

Iconography: Husson & Lam 1953, 446, fig. 12 (habit, ♂ infl. and flow., nervation).

Small tree, glabrous but for the domatia on the lower side of the leaflets. Branchlets slender, 0.2–0.4 cm in diam.. Leaves $\frac{1}{2}$ – $1\frac{1}{2}$ -jugate (1–3-foliate), petioles 2.7–3.3 cm long, pith with 1 r. b.; leaflets ovate, fairly rigid, 6–12.5 by 2.5–5.7 cm, base broadly acute, apex shortly and bluntly acuminate, lower side with conspicuous hair tufts (domatia) in the nerve axils, secondary nerves 6–9, tertiary ones transverse and few, merging into the minute reticulation; petiolules 1.5–1.7 cm long. Inflorescences ♀ unknown, ♂ 0.7–5 cm long, very slender. Fruits unknown.

Collections:

The type specimen is the only one known.

Distribution: Moluccas (Morotai, 1000 m).

Remarks: As has been explained under *H. leefolius* var. *anisander*, the relation of the present species is most probably with that variety. It differs from it by the characteristics of the leaf (1–3-foliate, domatia) which are occasionally also found in *H. leefolius* (both varieties), but the latter never possesses the combination of characters characterising *H. mono-*

phyllus and it never has the very minute reticulation of *H. monophyllus*. As to the reticulation and some other characters there seems to be also some relationship with the equally mountainous *H. nubigenus* from New Guinea, in which the leaflets are still more rigid and also smaller, lacking the domatia.

14. *H.?* *nubigenus* (Laut.) H. J. Lam, in Lam 1932a, 208, p.p., id. 1932b, 415, p.p.; Husson & Lam 1953, 447, p.p.; Leenhouts 1956, 245, p.p.

Type specimens — ♀: unknown; ♂: *Ledermann* 9989, neotype (L).

Iconography: Lam 1932a, tab. 11, fig. 61 (♂ flow. exc. perianth); Lam 1932b, 413, fig. 47b (♀ flow.; the other figures represent *H. triphyllus*); the present paper, fig. 4 (habit, ♂ infl., nerv., ♀ flow. with long. sect., ♂ flow. bud in long. sect.).

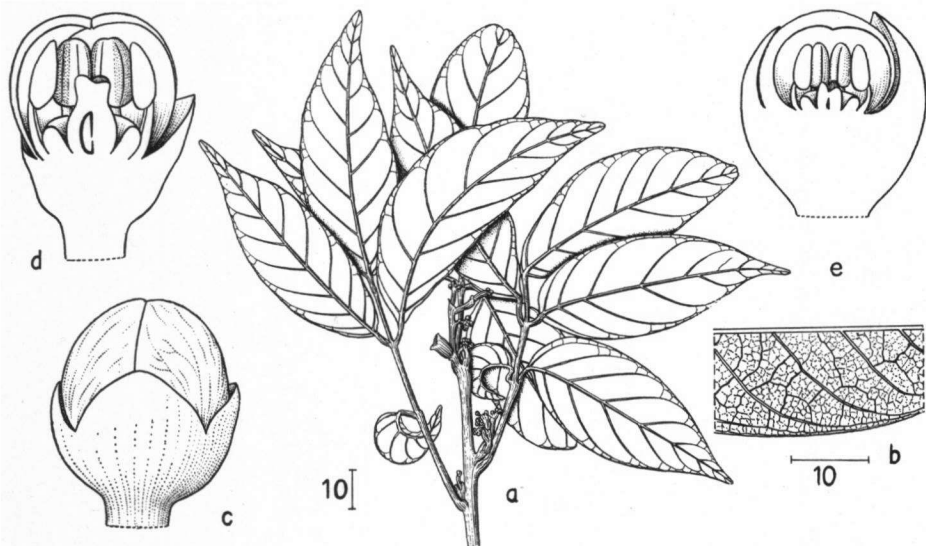


Fig. 4 — *Haplobolus nubigenus* (Laut.) H. J. Lam — a. habit with ♂ inflorescences; b. nervation; c-d. ♀ flower with longitudinal section; e. ♂ flower bud, longitudinal section; dimensions in mm — a, b, c. after *Ledermann* 9989; c-d. after *Ledermann* 10323 (orig. type, lost).

Synonym:

1920 — *Santiria nubigena* Laut., in Lauterbach 1920, 335.

Reconstruction of the description after notes by the author on and Lauterbach's description of the lost type (*Ledermann* 10323 ♀), and the accepted neotype (*Ledermann* 9989 ♂, cf. Husson & Lam 1953, 447); data from the neotype between brackets.

A small to moderate-sized glabrous tree. Branchlets slender, 0.5 cm (0.2—0.3 cm) in diam., the innovations furfuraceous. Leaves ($1\frac{1}{2}$ — $2\frac{1}{2}$ — $3\frac{1}{2}$ -jugate, 10—17(5—15) cm long, petioles (slender) subcanaliculate (somewhat flattened at base, 0.8—3.2 cm long, with 1 r. b.); leaflets coriaceous, elliptic with subrotundate base, bluntly acuminate, margins revolute (lan-

ceolate with subrotundate to acute base and gradually acuminate apex, 3.7—8 by 1.8—2.8 cm), midrib and the 6—8(7—10) secondary nerves (more or less) prominent underneath, (reticulation conspicuous on either side); lateral petiolules 0.3—0.8, terminal ones 1.2—2.5(1.2—1.8) cm long. Inflorescences ♀ paniculate, shorter than the leaves, 2—3 cm long, lateral ramifications 0.2—0.3 cm (♂?, very young), flowerbuds 0.2 cm. Fruits unknown.

Collections:

The neotype is the only specimen known: East New Guinea, Sepik area.

Excluded.

Transferred to *H. triphyllus* (Laut.) H. J. Lam: *Ledermann 9703* ♀ and *9565* ster. Transferred to *H. glandulosus* Huss.: *Carr 13338* (♂♀).

Distribution: East New Guinea, 1000 m.

Remarks: Lam 1932b considered *Santiria nubigena* and *S. triphylla* conspecific, and Husson & Lam 1953 maintained this opinion. On second consideration, however, it seems preferable to keep the two apart as separate species until more material gives us an opportunity for a better founded decision. Unfortunately Lauterbach's description of the type specimen (*Ledermann 10323* ♀) is rather poor and the neotype from the same locality, referred to by Lauterbach as probably related to *Santiria nubigena* differs in some points, e.g. the shape of the leaflets, and is, moreover, from a ♂ plant. The only remainder of the type (*Ledermann 10323*) is a figure of a longitudinal section of the ♀ flower, made by me when examining the type before it was lost in the Berlin herbarium fire, and this figure helps us very little. It is a pity that in my paper of 1932 (b) I gave a description based on all specimens then considered to constitute the species (including the specimens now reconsidered to represent *H. triphyllus*) and the only comment given was that *Ledermann 9989* ♂ differed "from the other specimens by its more minute venation". As a matter of fact, its leaflets show much resemblance with those of *H. microphyllus* Huss. as to the venation type but they are much shorter acuminate and lack the very characteristic glandular pits in the nerve axils. I am afraid that this puzzle will prove to remain unsolvable unless a duplicate of the type (*Ledermann 10323*) turns up.

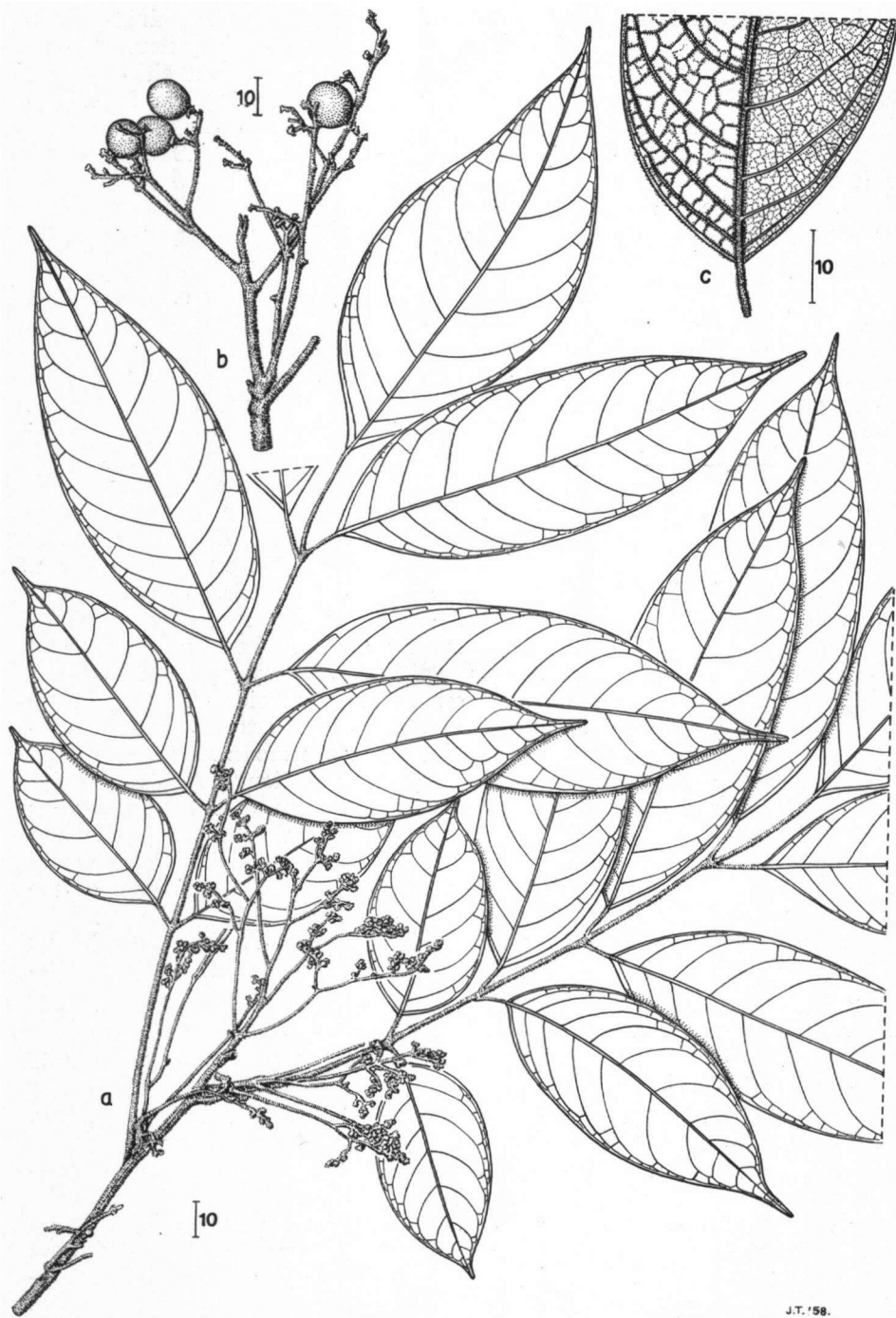
H. nubigenus as here interpreted differs from *H. triphyllus* by its conspicuous reticulation, its narrower and less rigid leaflets and its 1½—3½-jugate leaves.

15. *H. pubescens* H. J. Lam, nova spec.

Iconography: the present paper, *fig. 5* (habit with ♂ infl., nerv., infr.).

Description of ♀ type specimen (*Beccari P.P. 542*, *Herb. Fir. 2220 & 2230A*) (FI).

Arbor? Innovationes cum foliis inflorescentisque lanuginoso-pubesces. Ramuli teretes pubescentes 0.3—0.4 cm diam., medulla aresinosa. Folia (?—)3½—4½-jugata, foliolorum facie superiore excepta pubescentia, petioli teretes, graciles, 5—6.5 cm longi, medulla fasciculis resiniferis 7—9 percursa; foliola ovata ad oblongo-lanceolata, membranacea vel chartacea, basi rotundata ad late acuta, apice subabrupte obtuse acuminata, 6—13 cm longa,



2—5.8 cm lata, petioluli 0.4—0.9 cm longa; costa media cum nervis secundariis 8—10 marginibus haud conjunctis, angulo c. 75° de costa adscendentibus paulo curvatis cum reticulatione subtus conspicue prominuli, nervis tertiariis transversi prope costam ea perpendicularibus. Flores ignotae. Infructescentiae novellae in axillis foliorum superiorum confertae, pubescentes rigidae e basi ramosae, 4—8 cm longae. Fructus subglobosi vel ovoidei, 1.3—1.4 × 1.2—1.3 cm, cotyledones planae.

Description of ♂ type specimen (NGBW 927 (*Versteegh*)) (L).

Arbor mediocris. Ramuli cum foliis ut in typo ♀ (folia 4½-jugata, petioli 5—6.5 cm longi, fasciculis resiniferis 4—6, foliola 6.5—13.5 cm longa, 3—5 cm lata, nervi secundarii 7—10, petioluli 0.4—1.1 cm longi). Inflorescentiae graciles a basi ramosae dense pubescentes 7—8 cm longae. Flores novelli 3-meri parvi, certe masculi, sepalis extus longe pilosis, intus glabris, petalis glabris, stamina 6.

Collections (already previously quoted, cf. Husson & Lam 1953, 428 and Lam 1955, 175, both under *H. acuminatus*):

♀: *Beccari P.P. 542* (W. New Guinea, Andai).

♂: *NGBW 927* (*Versteegh*) (Cycloop Ra., 680 m).

Sterile: *NIFS bb 30470* (Japan Isl., Geelvink Bay, 370 m alt.).

Distribution: West New Guinea.

Remarks: Formerly included in *H. acuminatus* (Schum.) H. J. Lam but on second consideration regarded as a separate species, differing from *H. acuminatus* by the smaller and particularly narrower leaflets (ac.: 9—21 by 4—10 cm) which are light coloured when dry, the smaller number of r. b. (ac.: 6—17; pub.: 4—9) and secondary nerves (ac.: 12—18; pub.: 7—10). The relation with *H. acuminatus* lies in the pubescence and the short (but not tortuous) inflorescences.

The ♀ and ♂ types are almost certainly conspecific (as far as certainty goes in this genus). The sterile specimen matches the types very well indeed. There is some superficial resemblance with *Santiria apiculata* Benn., var. *pilosa* (Engl.) Kalkm., which has also been collected in some dubious sterile specimens (the type is from Borneo!) in which, however, the leaves are mostly only 2½-jugate (rarely 1½- or 3½-jugate), the pubescence is much less pronounced and the secondary nerves are mostly clearly archingly joined near the margins, the number of r. b. in the petioles being 1—4. The specimens referred to are *NGBW 1131, 1874, 1894, and 4507*, all from the Manokwari-Oransburi region in West New Guinea, and *Saunders 226* from the Ramu Valley, 180 m alt. in East New Guinea.

16. *H. robustus* H. J. Lam, in Husson & Lam 1953, 429; Leenhouts 1956, 243.

Type specimen — ♀: *Brass & Versteegh 13111* (L; dupl. in A), with fr.; ♂: unknown.

Fig. 5 — *Haplolobus pubescens* H. J. Lam, nova spec. — a. habit with ♂ inflorescences; b. infructescences; c. nervation; dimensions in mm — a, c. after *NGBW 927*, b. after *Beccari P.P. 542*.

Iconography: Husson & Lam 1953, 430, fig. 6 (habit, infruct. and fr., nervation).

A tree of moderate size, with the young parts, petioles, inflorescences and the leaflets on lower side densely pubescent. Branchlets stout, 1 cm in diam. or over, the pith without r.b. Leaves $2\frac{1}{2}$ — $3\frac{1}{2}$ -jugate, petioles stout, about 7 cm long, pith with about 15 r.b.; leaflets rigid, oblong, base rounded to subcordate, hardly oblique, apex abruptly acuminate, 14—21 by 6—9 cm, midrib and the 12—16 secondary nerves strongly prominent underneath, pubescent as are the transverse tertiary nerves, upper side glabrous except on midrib. Inflorescences and flowers unknown; infructescences pubescent, robust and stiff, 10—13 cm long, peduncle 1— $4\frac{1}{2}$ cm long, lateral ramifications 3.5—8.5 cm long. Fruiting calyx pubescent outside. Fruits 1—1.3 by 0.7—1 cm.

Collections (already previously quoted):

Brass & Versteegh 13111; NGBW 1060 (Koster).

Distribution: West New Guinea.

Remarks: Despite its pubescence obviously related to *H. floribundus* from which it also differs by the very stout infructescences and the more numerous r.b. in the pith of the petioles. Its relation with *H. acuminatus* (cf. Husson & Lam 1953, 431) is rather doubtful.

The second specimen (*NGBW 1060*), in spite of the great difference in altitude (850 vs 18 m), matches the type very well in the shape and size of branchlets and leaflets and the number of r.b. (17) but its pubescence is less dense and the resemblance with *H. floribundus* therefore more striking.

17. *H.?* triphyllus (Laut.) H. J. Lam, nov. comb.

Type specimens: ♀: *Ledermann 9703* (L, dupl.); ♂: unknown.

Iconography: Lam 1932b, 413, fig. 47 except b (leaf and ♀ infl., old ♀ flow.); the present paper, fig. 6 (habit with ♀ infl., nerv., ♀ flow. with long. and transv. sect.).

Synonym:

1920 — *Santiria triphylla* Laut., in Lauterbach 1920, 330. Treated as a synonym to *Santiria nubigena* Laut. (= *Haplolobus nubigenus* (Laut.) H. J. Lam) in Lam 1932a, 208; id. 1932b, 415; Husson & Lam 1953, 447; Leenhouts 1956, 245.

Description of ♀ type duplicate; data from Lauterbach between brackets:

A glabrous, small to moderate-sized tree. Branchlets slender, somewhat angular, about 0.3(—0.4—0.5) cm thick, pith without r.b. Leaves $\frac{1}{2}$ — $1\frac{1}{2}$ -jugate (1—3-foliolate), (7—10 cm long), petioles flattened above, 1.2—1.7 cm long, pith with 1 r.b.; leaflets very rigid, ovate to lanceolate (elliptic), with broadly acute base and bluntly acuminate apex and revolute margins, 3.5—9 by 1.5—3.8 cm (5—7 by 2.5—3.5 cm); midrib and the 5—8 (6—7) secondary nerves prominent beneath, reticulation little conspicuous above, hardly so on upper surface, near midrib more or less perpendicular to it; lateral petiolules 0.5—1 cm, terminal ones (or in solitary leaflets) up to 1.8 cm. Inflorescences (♀) 1—2.8 (2—3) cm long, branched from the base (lateral ramifications 0.5—0.8 cm long), flowers about

0.15 cm long, (sepals deltoid 0.07 cm, petals 0.1 cm, stamens 6, 0.1 cm long). Fruits unknown.

Collections (already previously quoted):

New Guinea: East New Guinea, Sepik area, 200–400 m: *Ledermann 9703* ♀ (type dupl., L); same loc., 850 m: *Ledermann 9565* (in Lauterbach 1920, 337 erroneously quoted as 9765).

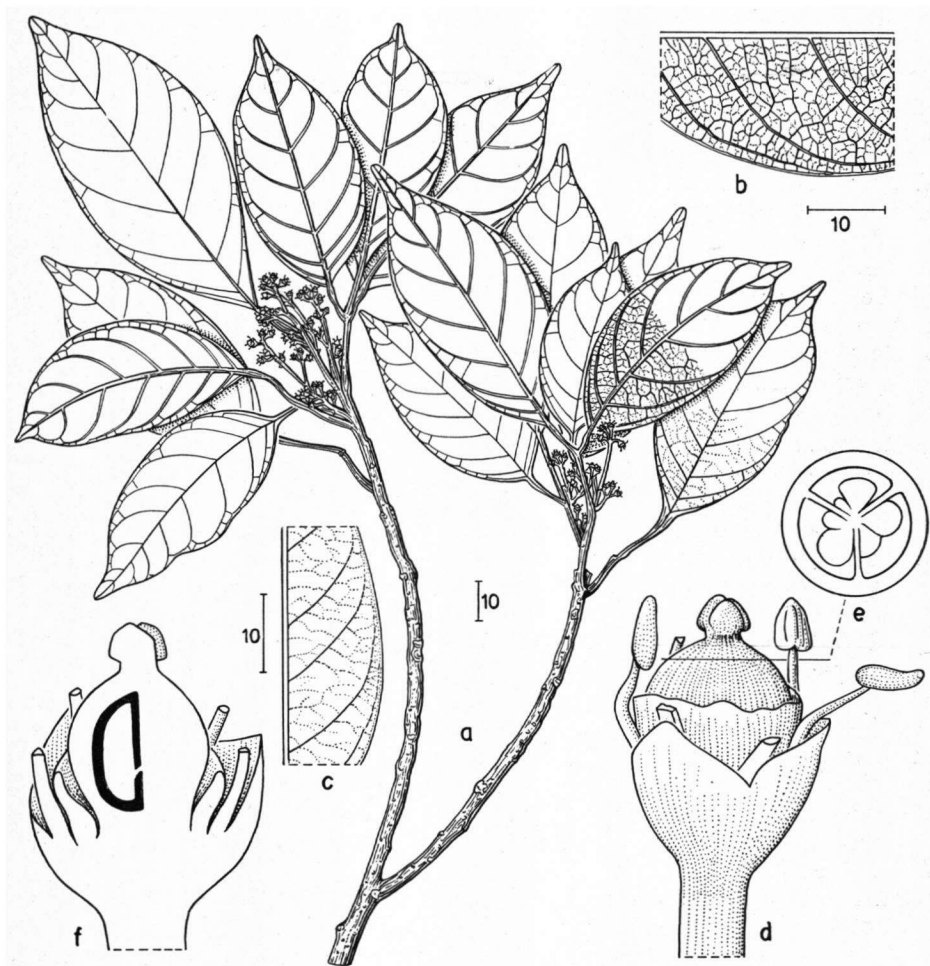


Fig. 6 — *Haplolobus triphyllus* (Laut.) H. J. Lam, nova comb. — a. habit with ♀ inflorescences; b. nervation, lower side; c. ditto, upper side; d-f. ♀ flower with longitudinal section and cross-section of upper part of ovary; dimensions in mm — after *Ledermann 9703*.

Distribution: East New Guinea, 200–800 m.

Remarks: The sterile specimen *Ledermann 9565* fairly well agrees with the type as to leaflet shape, size, colour and stiffness, but the reticul-

ation shows somewhat more distinctly than is the case in the type, whose leaflets are almost smooth above.

The relationship of the present species is not clear. There may be some alliance with *H. nubigenus* (see there), and perhaps with *H. monophyllus* from the Moluccas, as well as with *H. glandulosus*, but it lacks both domatia and nectaries in the nerve axils and in no other species known to me are the leaflets so rigid. The "glandular pits" (outside the nerve axils) referred to in earlier papers may just be the results of insect stings and may have nothing in common with nectaries but their dark colour and their shallow concavity.

Excluded

H. ? borneensis H. J. Lam, in Lam 1932b, 418; Husson & Lam 1953, 452; Lam 1955, 179; Leenhouts 1956, 245 = *Santiria apiculata* Benn.

Type specimens — ♀: *Clemens* 50337 (L; dupl. in BM); ♂: *Clemens* 29338 (L; dupl. in BM).

Iconography: Lam 1932b, 525, fig. 93 (habit, ♂ infl. and flow., anat. of branchlet and pet.); Lam 1955, 179, fig. 3 (leaf and ♀ infl., ♀ flow.); Leenhouts 1956, 235, fig. 13 (habit, ♀ infl., ♀ and ♂ flow., fr.; *Sant. apic.*).

Collections (already previously quoted):

♀: *Clemens* 50337.

♂: *Clemens* 29338, 29338A, 50242, 50441, 50563.

All from Mt Kinabalu, Brit. North Borneo, 1500 m alt.

Remarks: In my previous paper (Lam 1955) I expressed my doubt on the generic identity of the present species in relation to *Santiria apiculata*, also on account of the fact that whereas all specimens known bear flowers (though only one ♀), fruits remained unknown. I am now convinced that the cause of this condition is that any fruit-bearing specimens were never compared with *H. borneensis* because their fruits immediately led to identification with *Santiria apiculata* Benn. On reviewing the material of the last-named species preserved in the Rijksherbarium, I came across specimens, from both Borneo and the Moluccas which on account of their fruit characters belong to *Santiria*, and have, correctly I think, been identified as *S. apiculata*, and which, even apart from the fruit characters, perfectly match the *Haplolobus borneensis* material. In fact, two of the Clemens numbers, quoted above (50441, 50563) have been inserted in *Santiria apiculata* by Kalkman (*Blumea* 7 (3), 1954, 539), who was not particularly familiar with *Haplolobus* species.

The specimens of *Santiria apiculata* which are most important for comparison with *Haplolobus borneensis* material are the following:

NORTH BORNEO. Sipitang, 1050 m alt.: SAN 16271 (Wood), fr.; same loc.:

SAN 16664 (Wood), fr.

MLUCCAS. Morotai, 800 m alt.: Main & Aden (Kostermans) 995, fr.; same loc., 900 m: same coll. 1103, fr.

All these specimens have been identified by Kalkman and/or Leenhouts as *S. apiculata* Benn. var. *apiculata*.

As all of Clemens' specimens mention the flowers to be cream-green

or yellowish, it may be assumed (cf. Leenhouts 1956, 234) that most specimens formerly combined under *Haplobolus borneensis* H. J. Lam actually belong to *Santiria apiculata* Benn. var. *apiculata*.

The identification of *Haplobolus borneensis* with *Santiria borneensis* is, however, not an absolute certainty. The ♂ type is almost certainly *S. apiculata*, and so are the other ♂ specimens. In the ♀ type, however (Clemens 50337), which bears flowers just shedding their petals, the style of the ovary is still perfectly terminal. This need not be conclusive, but it is a fact that even in very young fruits of *Santiria apiculata* the style is already strongly excentric, although in the ♀ flower it is still perfectly terminal. It therefore remains an open question how the ovaries of Clemens 50337 would have developed had they been allowed to do so.

The r. b. in the petioles fail to procure evidence. In both *H. borneensis* and *H. leifolius* var. *anisander* (cf p. 262) there are 1—5 of these, in fruiting specimens of *Santiria apiculata* the majority has 1; 2 and 3 came next, in one specimen there were 6—8 (!) and in another none at all.

It is certainly remarkable that *Santiria apiculata* (incl. *H. borneensis*) and *Haplobolus leifolius* var. *anisander* have a common mountain station in Morotai.

Index to the identity of specimens

The number between brackets behind the specimen quotation is that of the species it is representing. Those which were quoted previously (and in the above text) and do not have their identity changed, are omitted. For particulars about them the earlier papers should be consulted.

A. New specimens.

Brass 25432 (5); NGBW 444 (5), 610 (5), 1014 (5), 1217 (5), 1556 (5), 1634 (5), 1890 (5), 1892 (5), 1903 (5), 2602 (9), 2656 (7), 2659 (7), 2660 (9), 2707 (9), 3695 (9), 3948 (9), 4040 (7), 4092 (7), 4317 (9); NGF 1312 (5), 7259 (9).

B. Specimens with changed identity (previously quoted under a different species).

Brass 13152 (6); Brass & Versteegh 12544 (5), 12546 (5); Beccari Herb. Fir. 2225 (and A & B) (9), 2226 (9); Beccari P.P. 542 (15), 862 (9); Carr 13338 (6); Clemens 846 (4), 1752 (4), 1768 (9), 1924 (6), 29338 (and A) (excl.), 50242 (excl.), 50337 (excl.), 50441 (excl.), 50563 (excl.); Docters van Leeuwen 10800 (9); Hoogland 3723 (5); Hoogland & Womersley 3238 (not 3258, cf. Lam 1955, 177) (5); Kostermans, v. Main & Aden; Ledermann 7719 (9), 9565 (17), 9703 (17); Main & Aden (Kostermans) 1253 (9), 1417 (9); NGBW 927 (15), 935 (9), 1004 (5), 1015 (5), 1573 (5), 2660 (9); NGF 162 (9), 7259 (9); NIFS bb 16456 (3), 22832 (3), 23182 (9), 24852 (3), 24882 (3), 24939 (3), 25015 (9), 25088 (7), 25841 (3), 25878 (3), 28840 (9), 28871 (9), 28970 (9), 30306 (9), 30371 (5), 30462 (9), 30470 (15), 30515 (5), 30692 (9), 30722 (9), 30764 (9), 30777 (9), 30824 (9), 30973 (9), 31079 (9), 31878 (3); Van Royen 3782 (9); Smith 5858 (5), 6160 (5); Walker 242 (5).

C. Specimens previously quoted but no longer available and therefore not considered in the preparation of the present study. The numbers between brackets are those of the species they probably belong to.

Brass 685 (1); Christophersen 3279 (5); Clemens 4941a (6); For. Off. Sol. Isl. letter D. 6299 (5); Gillespie 2314 (5); Hollrung 543 (5); Kajewski 574 (5), 943 (5); Kanehira 1874 (9†); Kanehira & Hatusima 11522 (5); Lam 3550 (12); Ledermann 7483 (9); NIFS bb 25095 (5), 25925 (9).

Index nominum

Note. The numbers in brackets behind the names are those of the species in the above enumeration. New species and new combinations are denoted by an asterisk *. Accepted names in roman, synonyms in italics.

CANARIUM

aneityense Guill. (5), *furfuraceum* Laut. (5), *pachypodum* Laut. (1).

HAPLOLOBUS

acuminatus (Schum.) H. J. Lam (1), idem var. *glabrior* H. J. Lam (5); *aneityensis* (Guill.) Huss. (5); *anisander* (Laut.) H. J. Lam (9); *beccarii* Huss. (2); *borneensis* H. J. Lam (excl.); *celebicus* H. J. Lam (3); *clementium* Huss. (9); **decipiens* H. J. Lam (4); *floribundus* (Schum.) H. J. Lam (5); *glandulosus* Huss. (6); *hussonii* H. J. Lam (9); **lanceolatus* H. J. Lam (7); *ledermannii* (Laut.) H. J. Lam (8); *leefolius* (Laut.) H. J. Lam (9); *maluensis* (Laut.) H. J. Lam (5); *megacarpus* H. J. Lam ♀ (9), idem ♂ (5); *microphyllus* Huss. (10); *mollis* H. J. Lam (11); *moluccanus* H. J. Lam (12); *monophyllus* H. J. Lam (13); *monticola* Huss. (6); *nubigenus* (Laut.) H. J. Lam (14); *pachypodus* (Laut.) H. J. Lam (1); **pubescens* H. J. Lam (15); *robustus* H. J. Lam (16); *salamonensis* C. T. White (5); **triphyllus* (Laut.) H. J. Lam (17); *versteeghii* H. J. Lam (5).

SANTIRIA

acuminata Schum. (1), *anisander* Laut. (9), *caudata* Laut. (8), *floribundus* Schum. (5), *ledermannii* Laut. (8), *leaeifolia* Laut. (9), *maluensis* Laut. (5), *nubigena* Laut. (14), *sepiensis* Laut. (5), *triphylla* Laut. (17).