

New Species, Varieties and Reductions in *Diospyros* (Ebenaceae) in Borneo and Peninsular Malaysia including Peninsular Thailand

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Abstract

In the genus *Diospyros*, seven new species (*D. beccarioides* Ng, *D. braintii* Ng, *D. crockerensis* Ng, *D. keningauensis* Ng, *D. lunduensis* Ng, *D. multinervis* Ng and *D. parabuxifolia* Ng) and six new varieties (*D. curranii* Merr. var. *kalimantanensis* Ng; *D. ferruginescens* Bakh. var. *rufotomentosa* Ng; *D. lanceifolia* Roxb. var. *iliaspaiei* Ng, var. *renageorgei* Ng, var. *saliciformis* Ng; *D. penibukanensis* Bakh. var. *scalarinervis* Ng) are described. Thirty species or varieties are reduced to synonymy.

Introduction

In revising the genus *Diospyros* for the Tree Flora of Sabah and Sarawak, I took the opportunity to review the genus for Borneo and Peninsular Malaysia. This has resulted in the recognition of seven new species and six new varieties, and the reduction of 30 species or varieties to synonymy.

New Species

1. *Diospyros beccarioides* Ng, sp. nov.

Arbor ad 20 m alta; rami dense rubro-brunnee pubescentes demum glabrescentes. Folia membranacea ad chartacea, glabra, oblonga ad ovato-oblonga 16–30 cm longa 5.5–11 cm lata, basi cuneata leviter attenuata rare rotundata, apice acuminato, costa supra immersa plana vel 'marginibus' elevatis provisa, infra nervis lateralibus prominentibus paribus 7–13 incurvatis ante margines anastomosantibus venam intra-marginalem plus minusve distinctam formantibus, venatione intercostali prominula laxe scalariformi; petiolus 0.8–1.5 cm longus. Inflorescentia mascula cymis subsessilis condensatis floribus ut videtur 3 vel plus sed ignotis. Fructus 1–3 pedicellis 0.3–0.8 cm longis suffulti, globosi ad 2.5 cm diam. glabri, calyce in lobis 4 vel 5 erectis folioso-coriaceis plicatis accrescentibus ad c. 2 cm longis 1.5 cm latis diviso. **Typus:** *Yii et al.* S 50325, Sarawak (KEP holo, SAR iso).

Figure 1

Tree to 20 m tall. *Twigs* densely reddish brown pubescent, becoming glabrous with age. *Leaves* membranaceous to chartaceous, glabrous; oblong or oblong-obovate, 16–30 x 5.5–11 cm, base cuneate and slightly attenuate, rarely rounded, apex acuminate; midrib above sunken, flat, or sunken with raised sides; lateral veins prominent below, 7–13 pairs, inarching and anastomosing at the margins to form a more-or-less distinct intramarginal vein; intercostal venation prominulous below, laxly scalariform; petiole 8–15 mm long. *Male inflorescences* subsessile condensed cymes of 3 or more flowers. *Flowers* unknown. *Fruits* 1–3, on 3–8 mm long stalks, globose, to c. 2.5 cm diam., glabrous. *Fruit calyx* divided into 4–5 valvate lobes, the lobes erect, leafy-coriaceous, plicate, accrescent, to c. 2 x 1.5 cm.

Distribution and habitat: Sumatra (Jacobs 8341, Lampung Prov.); Borneo, Sarawak (S 8633, S 16177, S 31817, S 32625, S 50325, S 65187; Chew CWL 1100, 1141); Kalimantan (Endert 5164, 5380; Kessler et al. 824, 969); Sulawesi (Vogel & Vermuelen 6981). In Sarawak, the species is found on limestone hills, up to 200 m altitude.

Notes: Bakhuizen in Bull. Jard. Bot. Btz. Ser. iii. 15 (1938) 239 had included specimens of three species under *Diospyros beccarii* Hiern. The two syntypes of *D. beccarii* Hiern belong to *D. sumatrana* Miq., hence *D. beccarii* has to be reduced to *D. sumatrana*. At least two other of his cited specimens, *bb.* 12051 and *bb.* 14750, belong to *D. daemona* Bakh.. The third element, represented by, for example, *Endert* 5164 belongs to this new species, *D. beccarioides*, which can be distinguished from *D. sumatrana* by its larger fruits with accrescent calyx lobes up to 2 cm long, and larger leaves, with a stronger tendency to form an intramarginal vein.

2. *Diospyros brainii* Ng, sp. nov.

Arbores mediocres ad 29 m altae. Folia mediocra ad magna, oblongo-ovata, 11.5–19.5 x 2.5–6 cm, apice acuminata, basi cuneata, lamina chartacea, glabra, costa supra immersa; nervi secundarii infra prominuli ad prominentes 8–10 pares intus curvati in nervo intramarginali inconspicuo ad circa tertiam spatiam inter marginem costamque anastomosantes; nervi tertiarum inconspicui reticulati; petiolus 0.5–1 cm. Flores ignoti. Fructus solitarius, sessilis, globosus ad 4.5 cm diam., glaber, in sicco valde rugosus. Calyx accrescens, in lobis 4 vel 5 coriaceis valvatis 1.5 cm longis profunde divisus, in quoque axe principali sursum curvato fructus curvaturam secundo sed marginibus inter se deorsum curvatis. **Typus:** *Brain anak Tada*, S 15932,



Figure 1. *Diospyros beccarioides* Ng. A. leafy twig; and B. fruit. (A–B from S 50325).



Figure 2. *Diospyros brainii* Ng. A. leafy twig and B. fruit. (A–B from S 15932).

Borneo, Sarawak (SAR holo, SAN, SING iso).

Figure 2

Medium trees to 29 m tall. *Leaves* medium-sized to large, oblong-obovate, 11.5–19.5 x 2.5–6 cm, apex acuminate, base cuneate; lamina chartaceous, glabrous; midrib sunken above; lateral veins prominulous to prominent below, 8–10 pairs, inarching and anastomosing to form a faint looping intramarginal vein at one third of the distance from the margin to the midrib; intercostal venation faint, reticulate; petiole 5–10 mm long. *Flowers* unknown. *Fruit* solitary, sessile, globose, to 4.5 cm diam., drying much wrinkled and shrivelled, glabrous. *Fruit calyx* accrescent, divided deeply into 4–5 coriaceous valvate lobes, 1.5 cm long, the main axis of each lobe curved upwards following the curvature of the fruit base, but the sides bent backwards towards each other.

Distribution and habitat: Endemic to Borneo: Sarawak (*S* 15932 and *S* 27961). Lowland forest at Bintulu.

Notes: The location of the intramarginal vein at some distance from the margin is reminiscent of *Diospyros neurosepala* Bakh., which differs in having leafy calyx lobes. The fruiting calyx recalls that of *D. sulcata* Kosterm., which differs in the absence of an intramarginal vein in the leaf.

3. *Diospyros crockerensis* Ng, sp. nov.

Arbores parvae ad 11 m altae; ramuli dense velutini. Folia mediocra, elliptica, 7–17 x 2.5–8.3 cm, apice acuminata, basi cuneata, lamina chartacea infra dense pubescentia, costa supra immersa sulco puberulo; nervi secundarii subtus prominentes 6–9 pares; nervi tertiarium subtus prominuli laxe scalariformes; petioli c. 0.5 cm longi dense velutini. Flores masculi 3–9 vel plus ad extremos cymarum elongatarum 2–4.5 cm dispositi, calyx in lobis 4 anguste oblongis imbricatis profunde divisus, corolla salveriformis ad 0.8 cm longa. Flores feminei c. 3-floris ad extremos cymarum elongatarum 0.8–2.8 cm dispositi, calyx in lobis 4 imbricatis profunde divisus. Pedicellus in fructu 0.8–2.8 cm. Calyx non-acrescens, lobis c. 0.2 x 0.1 cm. Fructus plerumque solitarii, oblongo-ovoidei ad 3.5 x 1.5 cm, velutini, apice in acumine acuto gradatim contracto, pericarpio tenui lignoso. **Typus**: *Dewol & Karim SAN 78389*, Borneo, Sabah, Crocker Range (SAN holo, SING iso).

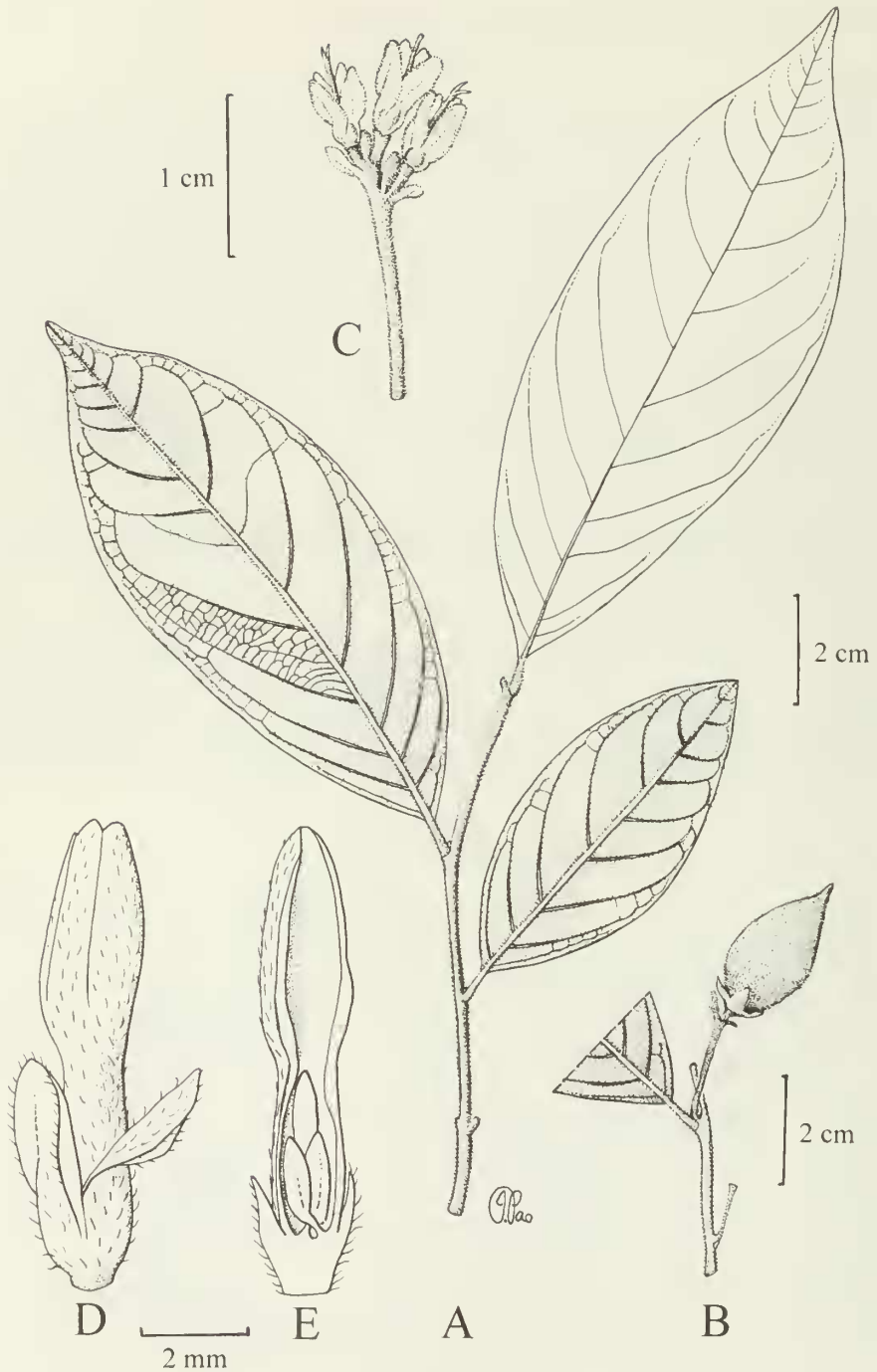


Figure 3. *Diospyros crockerensis* Ng. A. leafy twig; B. fruit; C. female flowers after shedding of corollas; D. male flower bud; E. male flower bud in longitudinal section. (A–C from SAN 78389, D–E from S 25273).

Figure 3

Small trees to 11 m tall. *Twigs* densely velvety. *Leaves* medium-sized, elliptic, 7–17 x 2.5–8.3 cm, apex acuminate, base cuneate; lamina chartaceous, densely hairy below; midrib sunken above, the groove covered with short hairs; lateral veins prominent below, 6–9 pairs; intercostal venation prominulous below, laxly scalariform; petiole c. 5 mm long, densely velvety. *Male flowers* in clusters of 3–9 or more, at the ends of elongated 2–4.5 cm long cymes; calyx divided deeply into 4 narrowly oblong imbricate lobes; corolla salverform, to 8 mm long. *Female flowers* in clusters of about 3, at the ends of elongated 8–28 mm cymes; calyx divided deeply into 4 imbricate lobes. *Fruits* usually solitary, on 8–28 mm stalks, oblong-ovoid, with the apex gradually tapered to a sharp point, to 3.5 x 1.5 cm, velvety, with thinly woody wall. *Fruit calyx* non-accrecent, the lobes c. 2 x 1 mm.

Distribution and habitat: Endemic to Borneo: Sabah (SAN 78389, SAN 11589, SAN 130109) and Sarawak (S 25273). In hill forests.

4. *Diospyros keningauensis* Ng, sp. nov.

Arbores mediocres ad magnae, ad 40 m altae. Folia minuta ad mediocra, anguste elliptica ad ovata 3.5–13 x 1.5–4 cm, apice acuminata, basi cuneata ad rotundata, lamina chartacea glabra ad infra sparse appresse pubescentia, proprie rugosa in sicco, costa supra prominula in juventute appresse pubescens; nervi secundarii subtus prominentes 5–8 pares; nervi tertiarum subtus prominuli scalariformes; petioli 0.5–1 cm. Flores masculi 3–5 in cymis 0.5–1.5 cm dispositi, quae in quoque nodo 2 vel plus glomeratae possunt; calyx in lobis 4 valvatis divisus; corolla salveriformis 1.4 cm longa. Flos femineus solitarius pedunculo 0.5–1 cm; calyx lobis valvatis 4 (5) divisus. Pedicellus in fructu 0.5–1 cm. Calyx non-accrecens, lobi c. 0.5 x 0.5 cm. Fructus solitarius, globosus ad 4.5 cm diam., in juventute dense pubescens, in sicco pericarpio crasso irregulariter rugosus. **Typus**: *Leopold & Saikah* SAN 74495, Borneo, Sabah (KEP holo, SAN, SING iso).

Figure 4

Medium and big trees to 40 m tall. *Leaves* small to medium-sized, narrowly elliptic to ovate, 3.5–13 x 1.5–4 cm, apex acuminate, base cuneate to rounded; lamina chartaceous, glabrous to sparsely appressed hairy below, drying characteristically wrinkled; midrib prominulous above, appressed hairy when young; lateral veins prominent below, 5–8 pairs; intercostal veins prominulous below, scalariform; petiole 5–10 mm long. *Male flowers*

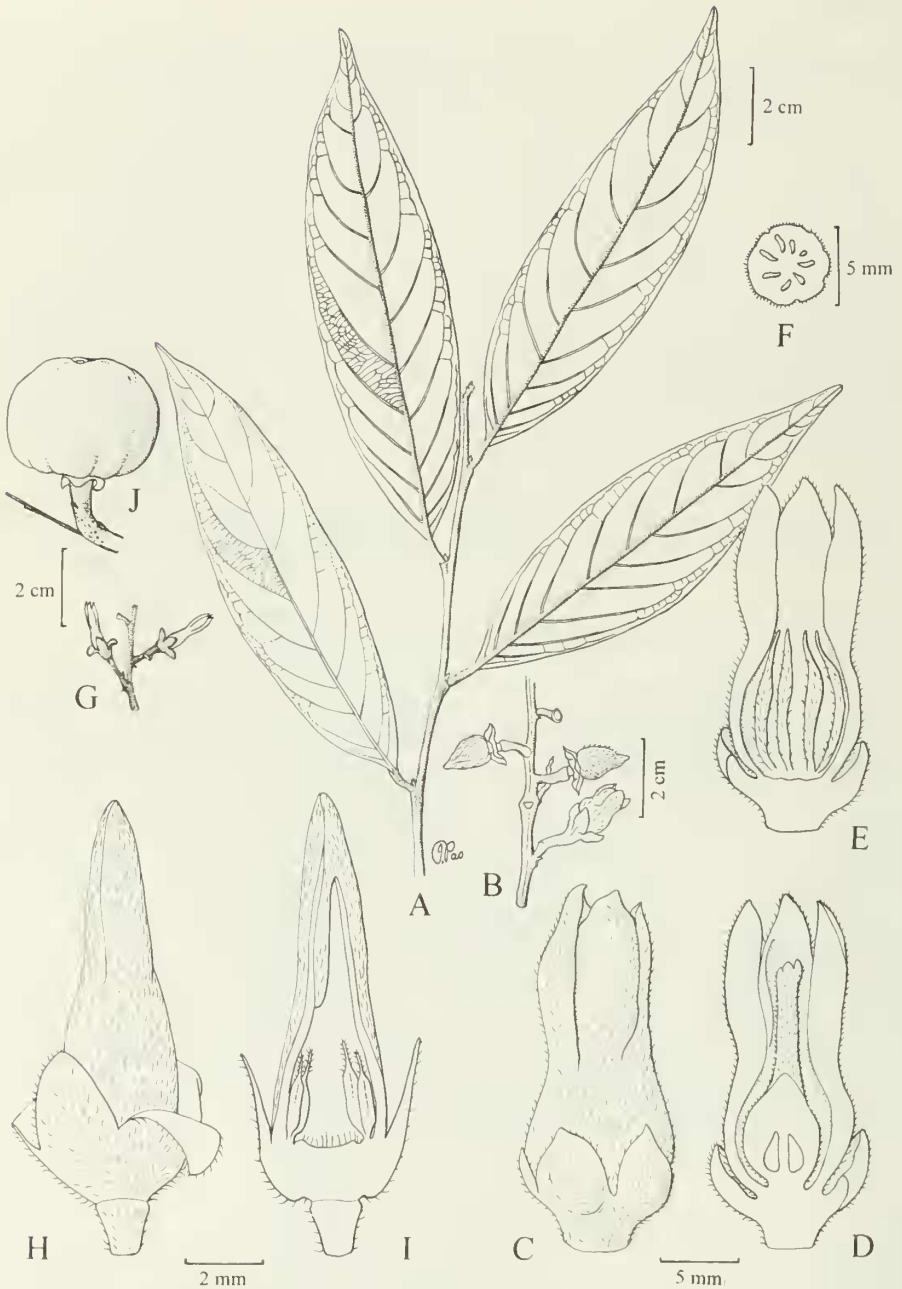


Figure 4. *Diospyros keningauensis* Ng. A. leafy twig; B. female inflorescence; C. female flower; D. female flower in longitudinal section; E. as D but after removal of ovary to show staminodes; F. ovary in transverse section. G. male inflorescence; H. male flower bud; I. male flower bud in longitudinal section; J. fruit. (A–F from SAN 26704, B–D from SFN 27136, G–I from SFN 27136, J from SAN 74495).

in clusters of 3–5 on 5–15 mm long cymes, which may be clustered in 2 or more to each node; calyx divided into 4 valvate lobes; corolla salverform, c. 1.4 cm long. *Female flowers* solitary on a 5–10 mm peduncle; calyx divided into 4(–5) valvate lobes; corolla 4(–5)-lobed; staminodes 8; ovary bearing 8 ovules. *Fruits* solitary, on 5–10 mm long stalks, globose, irregularly wrinkled on drying, thick-walled, to 4.5 cm diam., densely hairy when young. *Fruit calyx* not accrescent, the lobes about 5 x 5 mm.

Distribution and habitat: Endemic to Borneo: Sabah (Carr SFN 27136; SAN 26704, SAN 33783, SAN 71930, SAN 74495). Lower montane and montane forests at 1300–1500 m in the vicinity of Mt Kinabalu (Keningau, Ranau).

5. *Diospyros lunduensis* Ng, sp. nov.

Arbores mediocres ad 25 m altae. Folia mediocra, elliptica ad oblongo-elliptica 5.6–14 x 2.8–6 cm, apice breviter acuminata vel acuta, basi rotundata ad subcordata, lamina coriacea, glabra, supra in sicco ad nigra vergentia, costa supra immersa; nervi secundarii subtus prominentes 5–7 pares; nervi tertiarii supra prominuli laxe reticulati; petioli 0.5–0.8 cm. Flores masculi ignoti, feminei solitarii pedicellis 0.2–0.4 cm longis suffulti, calyce in lobis 4 rotundatis imbricatis pubescentibus profunde diviso. Pedicelli in fructu 0.2–0.4 cm longi. Calyx non-acrescens, lobis ad 0.6 x 0.6 cm patentibus ad reflexis. Fructus solitarius, globosus ad 2 cm diam., glaber vel sparse appresse pubescens. **Typus:** *Othuman S 49996*, Borneo, Sarawak, Lundu, G. Pueh (KEP holo, SAN iso).

Figure 5

Medium-sized trees to 25 m tall. *Leaves* medium-sized, elliptic to oblong-elliptic, 5.6–14 x 2.8–6 cm, apex shortly acuminate or acute, base rounded to subcordate; lamina coriaceous, glabrous, tending to dry black above; midrib sunken above; lateral veins prominent below, 5–7 pairs; intercostal venation prominulous below, laxly reticulate; petiole 5–8 mm long. *Male flowers* unknown. *Female flowers* solitary, on 2–4 mm long stalks; calyx deeply divided into 4 rounded imbricate hairy lobes; corolla 4-lobed; staminodes 4; ovary with 4 ovules. *Fruits* solitary, on 2–4 mm long stalks, globose, to 2 cm diam., glabrous or sparsely appressed hairy. *Fruit calyx* not accrescent, the lobes to 6 x 6 mm, spreading to reflexed.

Distribution: Endemic to Borneo: Sarawak (*S 49996* and *S 25482*).

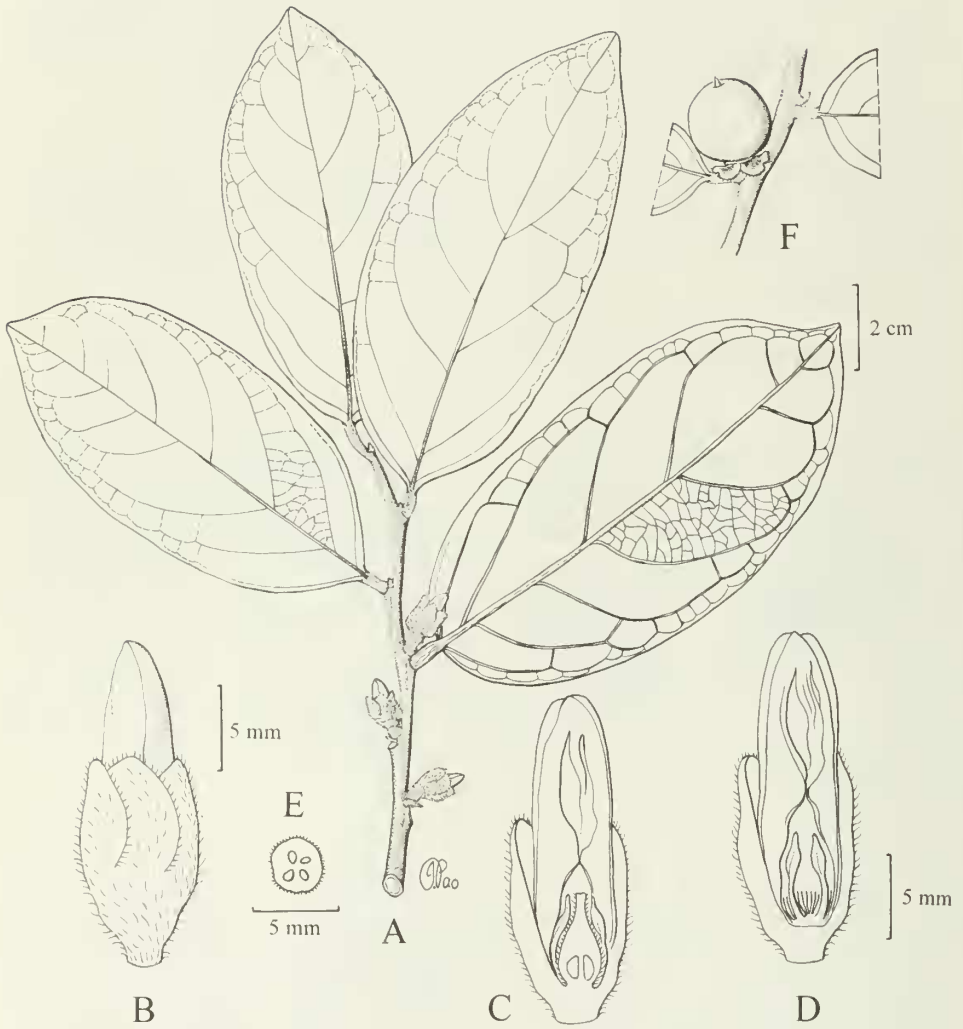


Figure 5. *Diospyros lunduensis* Ng. A. leafy flowering twig; B. female flower bud; C. female flower bud in longitudinal section; D. as C but with ovary removed to show staminodes; E. ovary in transverse section; F. fruit. (A–E from S 25482, F from S 49996).

6. *Diospyros multinervis* Ng. sp. nov.

Arbores mediocres ad 20 m altae. Folia magna, oblongo-lanceolata 21–32 x 5.8–9.2 cm, apice acuminata, basi subcordata, lamina chartacea glabra, costa supra immersa; nervi secundarii subtus prominentes 15–17 pares; nervi tertiarum subtus prominentes incerte scalariformes; petioli 0.8–1 cm. Flores ignoti. Cymae in fructu laxae ramosae 2.5–3.5 cm longae; pedicelli 1–1.5 cm. Calyx patelliformis, 4-radiatus, in lobis 4 valvatis divisus marginibus coriaceis reflexis c. 2 cm diam. Fructus 3–5, globosi 2–3 cm diam., glabri. **Typus:** *Burley et al.* 2726, Borneo, Kalimantan (KEP holo).

Figure 6

Medium-sized trees to 20 m tall. *Leaves* large, oblong lanceolate, 21–32 x 5.8–9.2 cm, apex acuminate, base subcordate; lamina chartaceous, glabrous; midrib sunken above; lateral veins prominent below, 15–17 pairs; intercostal venation prominent below, vaguely scalariform; petiole 8–10 mm long. *Flowers* unknown. *Fruits* 3–5, with 1–1.5 cm pedicels on laxly branched cymes 2.5–3.5 cm long, globose to elliptic, 2–3 cm diam., glabrous, puckered on drying. *Fruit calyx* c. 2 cm diameter divided into 4 valvate lobes, forming a 4-pointed plate, with the sides of the lobes coriaceous and reflexed.

Distribution and habitat: Endemic to Borneo: Kalimantan (*Burley et al.* 2472 and 2726, G. Bentuang area of W. Kalimantan). Lowland forest.

Notes: This species is very close to *Diospyros wallichii* King & Gamble, differing in the glabrous fruits borne on individual pedicels 1–1.5 cm long, which arise from peduncles 1–2 cm long (adding up to an infructescence c. 3.5 cm long excluding the fruits). Overall, the inflorescence/infructescence is much longer than that of *D. wallichii*.

The local Malay name *tuba monyet* (monkey tuba) indicates that the fruits are used as a kind of fish poison.

7. *Diospyros parabuxifolia* Ng. sp. nov.

Arbores mediocres, ad 15 m altae. Folia minuta, obovata 1.5–2 x 0.8–1.5 cm, apice rotundata acuta vel breviter acuminata, basi cuneata ad attenuata, lamina chartacea glabra, costa supra immersa ad prominens; nervi secundarii et tertiarum invisibiles; petioli 0.1–0.2 cm. Flores ignoti. Pedicelli in fructu elongati 1.5–2 cm. Calyx non-accrecens, in lobis 4 imbricatis rotundatis 0.2 x 0.2 cm profunde divisus. Fructus solitarius, ellipsoideus c. 2 x 1 cm, pericarpio angusto in sicco corrugato fere glabro. **Typus:** *Ilias Paie S 33017*.



Figure 6. *Diospyros multinervis* Ng. A. leafy twig and B. fruit. (A–B from Burley et al. 2726).

Borneo, Sarawak, Lawas, Bukit Batanga (KEP holo; SAN, SAR iso).

Figure 7

Medium-sized trees to 15 m tall. *Leaves* small, obovate, 1.5–2 x 0.8–1.5 cm, apex rounded, acute or shortly acuminate, base cuneate to attenuate; lamina chartaceous, glabrous; midrib sunken to raised above; lateral veins invisible; intercostal venation pattern invisible; petiole 1–2 mm long. *Flowers* unknown. *Fruits* solitary, on elongated 1.5–2 cm long stalks, ellipsoid, c. 2 x 1 cm, thin-walled and puckered on drying, almost glabrous. *Fruiting calyx* not accrescent, divided deeply into 4 imbricate rounded lobes, c. 2 x 2 mm.

Distribution and habitat: Endemic to Borneo: Sarawak, Lawas and Kapit (S 33017, S 60062). Lower montane forests at 1030–1500 m altitude.

Notes: This species differs from *Diospyros buxifolia* (Blume) Hiern mainly in its elongated fruit stalk. From *D. graciliflora* Hiern, which also has an elongated fruit stalk, it differs in the fruit, which is ellipsoid (not globose). In addition, the fruit stalk of *D. graciliflora* is much more slender.

New Varieties

1. *Diospyros curranii* Merr., Phil. J. Sc. Bot. 4 (1909) 306.

var. *curranii*

Synonym: *D. curraniopsis* Bakh., Gard. Bull. S. S. 7 (1933) 168, **syn. nov.**; types: *Endert 4883*, Borneo, Kalimantan (BO), *Elmer 21464*, Borneo, Sabah (BO).

var. *kalimantanensis* Ng, **var. nov.**

A varietate typica in calyce frutescenti patenti nec reflexo multo amplificato quo fundibulum fructu centrali formanti differt. **Typus:** *Veldkamp 8148*, Borneo, Kalimantan, Tumbang Tubus S of Bukit Raya (KEP holo, BO, L iso).

Distribution: Borneo, Kalimantan, at Bukit Raya (*Mogea 3569, 3585, 3621; Veldkamp 8148*).

Notes: This differs from the typical variety in the fruiting calyx being outstretched instead of reflexed, and much enlarged, so that the calyx

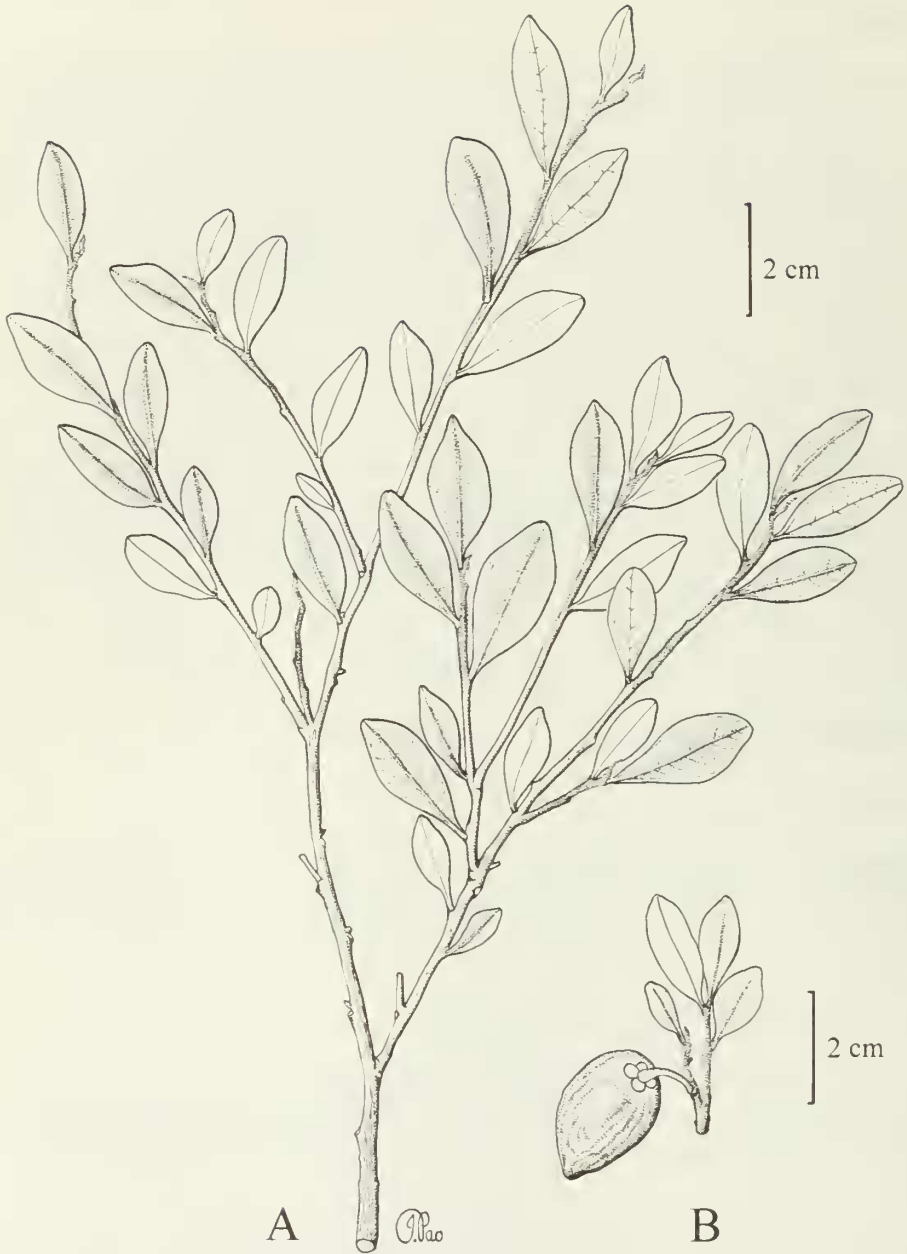


Figure 7. *Diospyros parabuxifolia*. A. leafy twig and B. fruit. (A–B from S 33017)

forms a 5-lobed funnel with the fruit in the centre. This variety appears to replace var. *curranii* in the vicinity of Bukit Raya, so male and sterile collections from Bukit Raya can be assumed to belong to this variety rather than the type variety.

2. *Diospyros ferruginescens* Bakh., Bull. Jard. Bot. Btz. Ser. iii, 15 (1941) 409.

var. *rufotomentosa* Ng, var. nov.

A varietate typica praecipue in foliis infra dense rufe tomentosiss differt; folia etiam latiora (ad 5.5 cm lata) possunt, nervis secundariis prominentioribus distincte incurvatis. **Typus:** *Maikin et al. SAN 132942*, Borneo, Sabah, Lumaku FR (SAN holotype).

Medium-sized trees to 20 m tall. *Twigs* densely rusty hairy. *Leaves* medium-sized, oblong-elliptic, 6.5–11.5 x 3–5.5 cm, apex acuminate, base acute; lamina chartaceous, densely rusty hairy below, tending to dry black above; midrib sunken above, the groove often filled with hairs; lateral veins prominent below, 6–10 pairs, inarching strongly at the margins; intercostal veins prominent below, reticulate; petiole c. 5 mm long. *Male flowers* in clusters of 3–9, shortly pedicelled, sharing a common 5–7 mm peduncle; calyx divided into 4 small triangular valvate teeth; corolla salverform, 5–7 mm long. *Female flowers* not known. *Fruits* solitary, on 1–2 mm long stalks, ovoid to globose, to 1.5 cm diam., densely rusty hairy. *Fruit calyx* accrescent, divided deeply into 4–5 triangular valvate lobes, forming a 4–5 pointed star, each lobe c. 5 x 4 mm.

Distribution and habitat: Endemic to Borneo: Sabah (*SAN 55535*, *SAN 66013*, *SAN 102122*, *SAN 113977*, *SAN 132942*, *SAN 139235*), Kalimantan (*Kostermans 8778*). Lowland and hill forests up to 700 m.

Notes: This differs from the typical variety mainly in the underside of the leaves, which is densely rusty-hairy. The leaves may also be broader (to 5.5 cm wide) with the lateral veins more prominent and distinctly inarching.

3. *Diospyros lanceifolia* Roxb., Hort. Beng. (1814) 93.

var. *iliaspaiei* Ng, var. nov.

Arbores mediocres ad 27 m altae; ramuli dense ferrugineo-pubescentes.

Folia mediocra ad magna, oblonga ad oblongo-lanceolata 13.5–35 x 3.5–14 cm, apice acuminata ad acuta, basi cuneata ad rotundata interdum fovearum glandulosarum pare uno instructa, lamina coriacea infra dense ferrugineo-pubescentia inter venas bullata, costa supra immersa; nervi secundarii subtus prominentes, supra immersi, 15–24 paribus incurvatis ad marginem in nervo intramarginali conspicuo anastomosantibus; nervi tertiarum subtus prominentes supra immersi transverse reticulati; petioli 1–2.4 cm. Flores feminei c. 3, in cymis brevibus 0.2–0.5 cm dispositi. Pedunculi in fructu breves, 0.2–0.5 cm longi. Calyx lobis c. 1 x 0.8 cm marginibus reflexis. Fructus 1–3, globosi nitide nigri, ad 2 cm diam, in juventute velutini. A var. *consanguinea* in nervis secundariis laminae quoque latere in nervo intramarginali valde evoluto anastomosantibus differt. **Typus:** *Ilias Paie S 50180*, Borneo, Sarawak (KEP holo, SAN, SAR iso).

Medium-sized trees to 27 m tall. *Twigs* densely rusty hairy. *Leaves* medium-sized to large, oblong to oblong-lanceolate, 13.5–35 x 3.5–14 cm, apex acuminate to acute, base cuneate to rounded, sometimes bearing a pair of pit-glands; lamina coriaceous, densely rusty hairy below, bullate between the veins; midrib sunken above; lateral veins sunken above, prominent below, 15–24 pairs, inarching and joining at the margins to form a prominent intramarginal vein; intercostal venation sunken above, prominent below, reticulo-transverse; petiole 1–2.4 cm long. *Female flowers* in clusters of c. 3 on short 2–5 mm long cymes. *Fruits* 1–3, on short 2–5 mm long stalks, globose, shiny black, to 2 cm diam., velvety when young. *Fruit calyx:* lobes c. 10 x 8 mm, with sides reflexed.

Distribution and habitat: Endemic to Borneo: Sarawak (*S 24803, S 39109, S 41224, S 50180, AZ 5671*). Lowland forests.

var. *renewgeorgei* Ng, var. nov.

Arbores mediocres ad 21 m altae. Folia mediocra, elliptica ad ovata 6–19.5 x 4–8.5 cm, apice acuminata, basi rotundata paullo attenuata saepe fovearum glandulosarum pare uno provisa, lamina chartacea glabra supra plerumque subtus interdum nitentia, inter venas paullo bullatum, costa supra immersa; nervi secundarii supra immersi, subtus prominentes 6–12 pares; nervi tertiarum supra immersi subtus prominuli transverse reticulati; petioli 0.8–1.5 cm. Flores feminei 1–5 in cymis ad 0.6 cm longis dispositi. Pedicelli in fructu 0.3–0.6 cm. Calyx lobis ad 1 x 1 saltem marginibus reflexis. Fructus circa 3, globosi 1.3 cm diam., velutini. A var. *lanceifolia* in laminae basi rotundata nec cuneata differt. **Typus:** *Rena George S 43068*, Borneo, Sarawak, Limbang (KEP holo, SAN iso).

Medium-sized trees to 21 m tall. *Leaves* medium-sized, elliptic to ovate, 6–19.5 x 4–8.5 cm, apex acuminate, base rounded, slightly attenuate, and often bearing a pair of pitted glands; lamina chartaceous, glabrous, usually shiny on the upper surface and sometimes on the lower surface, slightly bullate between the veins; midrib sunken above; lateral veins sunken above, prominent below, 6–12 pairs; intercostal venation sunken above, prominent below, reticulo-transverse; petiole 8–15 mm long. *Female flowers* in clusters of 1–5 on cymes up to 6 mm long. *Fruits* about 3, on 3–6 mm long stalks, globose, c. 1.3 cm diam., velvety. *Fruit calyx* with lobes up to 1 x 1 cm, the lobes or at least their sides reflexed.

Distribution and habitat: Endemic to Borneo: Sabah (SAN 99668), Sarawak (S 17862, S 17897, S 42254, S 43068, S 47134) and Brunei (Coode 7050). Lowland forests.

Notes: Named in honour of Rena George, 1956–1994, botanist of the Sarawak Forestry Department, who sacrificed her life for the sake of advancing botanical knowledge.

Specimen S 36348 from Kapit at 950 m altitude is placed here with some doubt: its leaves are not shiny like the others.

var. *saliciformis* Ng, var. nov.

Arbores mediocres ad 20 m altae. Folia elongata, saliciformia 5.5–11.5 x 1–3.2 cm, apice gradatim contracta, basi gradatim contracta et attenuata (glandes desunt), lamina chartacea glabra, costa supra immersa; nervi secundarii prominuli ad fere invisibiles 5–7 pares; nervi tertiarii subtus fere invisibiles; petioli 0.3–0.5 cm. Flores ignoti. Pedicelli in fructu 0.1–0.2 cm. Calyx stellae 4-radiatae similis, lobis ad 0.6 x 0.4 cm. Fructus solitarius, subsessilis, globosus ad 1.5 cm diam., velutinus glabrescens ad glaber. A varietatibus ceteris in laminis angustis saliciformibus differt. **Typus**: Coode 7826, Borneo, Brunei (KEP holo, BRUN, SAN, SING iso).

Medium-sized trees to 20 m tall. *Leaves* elongated, willow-like, 5.5–11.5 x 1–3.2 cm, apex gradually tapered, base gradually tapered and attenuate, without pit-glands; lamina chartaceous, glabrous; midrib sunken above; lateral veins prominulous to almost invisible, 5–7 pairs; intercostal venation practically invisible below; petiole 3–5 mm long. *Flowers* unknown. *Fruits* solitary, subsessile on 1–2 mm stalks, globose, velvety becoming glabrous, to 1.5 cm diam. *Fruit calyx* a 4-pointed woody star with the lobes up to 6 x 4 mm.

Distribution and habitat: Endemic to Borneo: Sarawak (*Chew 1170, S 49201*) and Brunei (*Coode 7826*). Lowland forest.

Notes: The leaves of *Diospyros lanceifolia* var. *saliciformis* are superficially similar to those of *D. eucalyptifolia* Bakh. and the narrow-leafed riverine form of *D. andamanica* (Kurz) Bakh.

3. *Diospyros penibukanensis* Bakh., Bull. Jard. Bot. Btz. Ser. iii, 15 (1937) 124.

var. *scalarinervis* Ng, var. nov.

A var. *penibukanensi* in foliis subtus glabris nec dense pubescentibus, nervis tertiariis scalariformibus remotioribus, ramulorum et foliorum pilis tenuibus appressis nec patentibus differt. Varietates etiam geographicaliter disjunctae prima Sarawak secunda Sabah incola. **Typus:** *S 56607*, Borneo, Sarawak (KEP holo, SAN, SAR iso).

Small trees to 10 m tall, rarely to 25 m. Twigs velvety on young parts. Leaves medium-sized to large, elliptic to broadly obovate or oblong-obovate, 11–38 x 4–15 cm, apex acuminate, base subcordate, rarely only rounded; lamina chartaceous, glabrous except the veins; midrib sunken above; lateral veins prominulous below and finely appressed hairy, 5–24 pairs; intercostal venation prominent below, scalariform; petiole 8–5 mm long. Male flowers up to 10 in a condensed cyme c. 5 mm long; calyx with 4 imbricate triangular lobes. Female flowers up to 10 in a condensed cyme c. 5 mm long; calyx with 4 imbricate semicircular lobes. Fruits in clusters of 1–3, on c. 5 mm long stalks, globose, to 2.5 cm diam., velvety. Fruit calyx not accrescent, the calyx lobes rounded, coriaceous, 4–6 x 5–8 mm.

Distribution and habitat: Endemic to Borneo: Sarawak (*S 13586, S 13681, S 13702, S 18639, S 34482, S 34935, S 34962, S 35271, S 41850, S 49997, S 56607*). Lowland, hill and heath forests.

Notes: Variety *scalarinervis* differs from var. *penibukanensis* in its leaves, which are glabrous below (instead of densely hairy), the scalariform intercostal venation being spaced further apart, and the hairs on its twigs and leaves being fine and appressed (instead of spreading). They are also geographically disjunct, the former in Sarawak and the latter in Sabah.

Reductions

1. *Diospyros andamanica* (Kurz) Bakh., Bull. Jard. Bot. Btz. Ser. iii, 15 (1937) 74, (1941) 382.

Synonyms: *D. tahanensis* Bakh., Gard. Bull. S.S. 7 (1933) 163, **syn. nov.;** type: *Ridley s.n.*, Peninsular Malaysia, Pahang (SING). *D. longepedunculata* Kosterm., Blumea 23 (1977) 462, **syn. nov.;** type: *SAN 29807*, Borneo, Sabah (KEP, SAN, SAR, SING).

2. *Diospyros areolata* King & Gamble, J. As. Soc. Beng. 74, 2 (1905) 228.

Synonyms: *D. bantamensis* Koord. et Valetton ex Bakh., Gard. Bull. S.S. 7 (1933) 165, **syn. nov.;** type: *Koorders 1718*, Java (BO). *D. malam* Bakh., Gard. Bull. S.S. 7 (1933) 176, **syn. nov.;** types: *bb. 6335, bb. 8037*, Borneo, Kalimantan (BO).

3. *Diospyros blancoi* A.DC., Prod. 8 (1844) 151.

Synonym: *D. durionoides* Bakh., Gard. Bull. S.S. 7 (1933) 169, **syn. nov.;** types: *bb. 7978, 10050 and 12456*, Borneo, Kalimantan (BO).

4. *Diospyros buxifolia* (Blume) Hiern, Trans. Camb. Phil. Soc. 12, 2 (1873) 218.

Synonym: *D. elegantissima* Bakh., Gard. Bull. S.S. 7 (1933) 169, **syn. nov.;** type: *Ridley 16349*, Peninsular Malaysia, Pahang (SING).

5. *Diospyros elliptifolia* Merr., Phil. J. Sci. 30 (1926) 247.

Synonym: *D. kinabaluensis* (Bakh.) Kosterm., Blumea 23 (1977) 460, **syn. nov.** [basionym: *D. elliptifolia* forma *kinabaluensis* Bakh., Bull. Jard. Bot. Btz. Ser. iii, 15 (1935) 233]; types: *DeVoogd 1486*, Sumatra (BO); *Haviland 1322*, Borneo, Sabah (SING, SAR).

6. *Diospyros foxworthyi* Bakh., Gard. Bull. S.S. 7 (1933) 171.

Synonyms: *D. levigata* Bakh., Gard. Bull. S.S. 7 (1933) 175, **syn. nov.;** types: *bb. 8053, 11089, 11255*, Borneo, West Kalimantan (all at BO). *D. cylindrocarpa* Kosterm., Blumea 23 (1977) 456, **syn. nov.;** type: *SAN 7119*, Borneo, Sabah (SAN, SING).

7. *Diospyros korthalsiana* Hiern, Trans. Camb. Phil. Soc. 12, 2 (1873) 168.

Synonym: *D. myrmecocalyx* (Hiern) Bakh., Gard. Bull. S.S. 7 (1933) 178, **syn. nov.** [basionym: *Maba myrmecocalyx* Hiern, Trans. Camb. Phil. Soc. 12, 2 (1873) 139]; type: *Beccari 3568*, Borneo, Sarawak (K).

8. *Diospyros lateralis* Hiern, Trans. Cambr. Phil. Soc. 12, 2 (1873) 167.

Synonym: *D. crassipes* Bakh., Gard. Bull. S.S. 7 (1933) 167, **syn. nov.;** type: *Beccari 2041*, Borneo (K).

9. *Diospyros mindanaensis* Merr., Phil. J. Sci. 4 (1909) 309.

Synonym: *D. endertii* Bakh., Gard. Bull. S.S. 7 (1933) 169, **syn. nov.;** type: *Enderi 4017*, Borneo, Kalimantan (BO).

10. *Diospyros montana* Roxb., Pl. Corom. 1 (1795) 37.

Synonym: *D. pubicalix* Bakh., Gard. Bull. S.S. 7 (1933) 182, Bull. Jard. Bot. Btz. 15 (1955) Plate 39, **syn. nov.;** type: *Hamid C.F. 3827*, Peninsular Thailand (BKF, BO, KEP, SING).

Notes: *Diospyros pubicalix* has been an enigmatic species known only from its type specimen. It is well illustrated by Bakhuizen (1955). The shoots grow in flushes from resting buds, with the leaves exhibiting a characteristic sequence of changes. The first leaves are small and have cordate to subcordate bases. They are followed by larger leaves with rounded bases and finally leaves with cuneate bases. On some specimens, only parts of the sequence are evident, misleading authors not aware of this source of variation to create new species.

11. *Diospyros pilosanthera* Blanco, Fl. Filip. Ed. 1 (1837) 304.

var. *pilosanthera*

Synonym: *D. cubica* Bakh., Gard. Bull. S.S. 7 (1933) 168, **syn. nov.;** type: *Beccari 830*, Borneo, Sarawak (K)

var. *elmeri* (Merr.) Ng, Malay. Forester 40 (1977) 238.

Synonym: *D. nidus-avis* Kosterm., Blumea 23 (1977) 464, **syn. nov.;** type: *S 32181*, Borneo, Sarawak (SAN, SAR, SING).

12. *Diospyros plectosepala* Hiern, Trans. Cambr. Phil. Soc. 12, 2 (1873) 201.

Synonyms: *D. poiensis* Bakh., Gard. Bull. S.S. 7 (1933) 181, **syn. nov.;** type: *Clemens 20304* (BO, SAR). *D. setosa* Bakh., Gard. Bull. S.S. 7 (1933) 184, **syn. nov.;** type: *Haviland 2324*, Borneo (K).

13. *Diospyros ridleyi* Bakh., Gard. Bull. S.S. 7 (1933) 354.

Synonym: *D. dajakensis* Bakh., Gard. Bull. S.S. 7 (1933) 168, **syn. nov.;** type: *bb. 10490*, Borneo, Kalimantan (BO).

14. *Diospyros rufa* King & Gamble, J. As. Soc. Beng. 74, 2 (1905) 228.

Synonym: *D. swingleri* Kosterm., Blumea 23 (1977) 172. **syn. nov.:** type: S 26969, Borneo, Sarawak (SAR, SING).

15. *Diospyros simaloerensis* Bakh., Gard. Bull. S.S. 7 (1933) 185.

Synonym: *D. paraoesi* Bakh., Gard. Bull. S.S. 7 (1933) 180. **syn. nov.:** type: bb. 10162, Borneo, Kalimantan (BO).

16. *Diospyros styraciformis* King & Gamble, J. As. Soc. Beng. 74, 2 (1905) 216.

Synonyms: *D. styraciformis* var. *sarawakana* (Bakh.) Ng, Malay. Forester 40 (1977) 241. **syn. nov.** [basionym: *Diospyros sarawakana* Bakh., Gard. Bull. S.S. 7 (1933) 184]; type: Haviland 2316, Borneo, Kuching (K, SAR, SING). *D. clavipes* Bakh., Gard. Bull. S.S. 7 (1933) 166. **syn. nov.:** type: Teysmann 11397, Borneo, Kalimantan (BO).

17. *Diospyros subrhomboidea* King & Gamble, J. As. Soc. Beng. 74, 2 (1905) 209.

Synonyms: *D. confusa* Bakh., Gard. Bull. S.S. 7 (1933) 167. **syn. nov.:** type: Baker s.n., Singapore (KEP, SING). *D. jaheri* Bakh., Gard. Bull. S.S. 7 (1933) 173. **syn. nov.:** type: Jaheri 128, Borneo, Kalimantan (BO).

18. *Diospyros sumatrana* Miq., Pl. Jungh. (1851–55) 203.

Synonyms: *D. monticola* Kosterm., Blumea 23 (1977) 463. **syn. nov.:** type: Clemens 32541, Borneo, Sabah (BO). *D. beccarii* Hiern, Trans. Camb. Phil. Soc. 12, 2 (1873) 204. **syn. nov.:** types: Beccari 2492 and 2591, Borneo (K).

19. *Diospyros venosa* Wall. ex A. DC., Prod. Syst. Nat. 8 (1844) 233.

var. *venosa*

Synonym: *D. bintuluensis* Kosterm., Blumea 23 (1977) 453. **syn. nov.:** type: S 15912, Borneo, Sarawak (SAN, SAR).

var. *olivacea* (King & Gamble) Ng, Malay. Forester 40 (1977) 246.

Synonym: *D. olivacea* (King & Gamble) Kosterm., Blumea 23 (1977) 465. **syn. and stat. nov.** [basionym: *Maba olivacea* King & Gamble in Williams, Bull. Herb. Boiss. II, 5 (1905) 227]; type: King's Collector 7877, Peninsular Malaysia, Perak, Batang Padang (K, SING).

20. *Diospyros wallichii* King & Gamble in Williams, Bull. Herb. Boiss. 2.5 (1905) 429.

Synonym: *D. pulchrinervia* Kosterm., Blumea 23 (1977) 460. **syn. nov.:**

type: *Kostermans 21583*, Borneo, Kalimantan (KEP, SAR, SING).

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Alphabetic List of *Diospyros* Species and Varieties Reduced

- D. bantamensis* Koord. et Valetton ex Bakh. to *D. areolata* King & Gamble
D. beccarii Hiern to *D. sumatrana* Miq.
D. bintuluensis Kosterm. to *D. venosa* Wall. ex A.DC. var. *venosa*
D. clavipes Bakh. to *D. styraciformis* King & Gamble
D. confusa Bakh. to *D. subrhomboidea* King & Gamble
D. crassipes Bakh. to *D. lateralis* Hiern
D. cubica Bakh. to *D. pilosanthera* Blanco. var. *pilosanthera*
D. curraniopsis Bakh. to *D. curranii* Merr. var. *curranii*
D. cylindrocarpa Kosterm. to *D. foxworthyi* Bakh.
D. dajakensis Bakh. to *D. ridleyi* Bakh.
D. durionoides Bakh. to *D. blancoi* A.DC.
D. elegantissima Bakh. to *D. buxifolia* (Bl.) Hiern
D. endertii Bakh. to *D. mindanaensis* Merr.
D. jaheri Bakh. to *D. subrhomboidea* King & Gamble
D. kinabaluensis (Bakh.) Kosterm. [Basionym: *D. elliptifolia* forma *kinabaluensis* Bakh.] to *D. elliptifolia* Merr.
D. levigata Bakh. to *D. foxworthyi* Bakh.
D. longepedunculata Kosterm. to *D. andamanica* (Kurz) Bakh.
D. malam Bakh. to *D. areolata* King & Gamble
D. monticola Kosterm. to *D. sumatrana* Miq.
D. myrmecocalyx (Hiern) Bakh. [Basionym: *Maba myrmecocalyx* Hiern] to *D. korthalsiana* Hiern
D. nidus-avis Kosterm. to *D. pilosanthera* Blanco var. *elmeri* (Merr.) Ng
D. olivacea (King & Gamble) Kosterm. [Basionym: *Maba olivacea* King & Gamble] to *D. venosa* Wall. ex A.DC. var. *olivacea* (King & Gamble) Ng

- D. paraoesi* Bakh. to *D. simaloerensis* Bakh.
D. poiensis Bakh. to *D. plectosepala* Hiern
D. pubicalix Bakh. to *D. montana* Roxb.
D. pulchrinervia Kosterm. to *D. wallichii* King & Gamble
D. setosa Bakh. to *D. plectosepala* Hiern
D. styraciformis var. *sarawakana* (Bakh.) Ng [Basionym: *D. sarawakana* Bakh.] to *D. styraciformis* King & Gamble
D. swingleri Kosterm. to *D. rufa* King & Gamble
D. tahanensis Bakh. to *D. andamanica* (Kurz) Bakh.