

Taxonomic Notes on the Tree Flora of Brunei: 1

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Abstract

As a precursor to *The Field Guide to the Trees of Brunei Darussalam*, the following taxonomic changes and novelties are presented: *Gluta wallichii* (Hook.f.) Ding Hou subsp. *lafrankiei* P.S.Ashton subsp. nov. and *Parishia coriacea* P.S.Ashton, sp. nov. (Anacardiaceae); *Canarium latistipulatum* Ridley subsp. *mitus* P.S.Ashton subsp. nov. and *Dacryodes patentinervia* (Leenh.) P.S.Ashton, stat. nov. (Burseraceae); *Hopea rugifolia* P.S.Ashton, sp. nov. and *Vatica patentinervia* P.S.Ashton sp. nov. (Dipterocarpaceae).

Introduction

Brunei Darussalam has become the most intensively collected region, for its area, of Borneo. The tree flora is particularly well collected. Some 7,600 tree collections are cited in Kirkup (1996). This checklist, however, omitted some 300 old collections in the herbaria of the Sarawak Forest Department (SAR) and Forest Research Institute Malaysia (KEP), as well as most of the c. 3,000 ecological voucher specimens collected during the course of the Universiti Brunei Darussalam (UBD)-Royal Geographical Society (RGS) Rainforest Project 1991-1992; by Japanese scientists associated with the Brunei Forest Department's Sungei Liang Research Station supported by the Japan International Collaboration Agency (JICA); by S.J. Davies in the course of establishing permanent plots on behalf of UBD during 1994-1995, and by myself during ecological research on behalf of the Brunei Forest Department during 1958-1959. With these and recent Forest Department collections included, Brunei has achieved a collecting intensity, for trees alone, of almost 30 numbers per 100 km².

Brunei is estimated to have a tree flora of almost 3,000 species, roughly equal to the whole of Peninsular Malaysia and Singapore. Brunei is not a formal participant in the Tree Flora of Sabah and Sarawak project (Soepadmo, 1995), but the occurrence of species in Brunei is noted in that Flora. Initiated in 2001, a ten-year project sponsored by the Brunei Shell Petroleum Company, Universiti Brunei Darussalam, and the Brunei Forest Department under the leadership of Dr Kamariah Abu Salim aims to complete a comprehensive field guide to the tree flora of Brunei based on

the format of the Audubon Guides to U.S. Wildlife and the Collins Guides in Europe. This project is planned to move in tandem with and to complement the Tree Flora of Sabah and Sarawak project. All species recorded from Brunei, and those expected owing to their presence in adjacent regions, will be included in field keys and provided with short field diagnostic descriptions and line illustrations. About one third of the 1,100 species recorded in the 52 ha tree demography plot in nearby Lambir National Park, Miri, Sarawak, for instance, have yet to be found in Brunei, and these will be included, either as descriptions or in footnotes to recorded species.

This enterprise provides an opportunity to observe and collate more detailed information on the natural history of individual species than is possible in floras of larger, less intensively collected regions such as Sabah and Sarawak. It is, therefore, providing opportunity for identification of discontinuities in variation within currently recognised species, meriting specific or infraspecific recognition. In a few cases, novel species are being discovered. This communication will be the first in a series, in which these new entities and taxonomic changes, will be discussed and formalised prior to publication of the volumes of the guide. Mark Coode is thanked for assisting with the Latin.

New Taxa and Status Changes

Anacardiaceae

1. *Gluta wallichii* (Hook, f.) Ding Hou subsp. *lafrankiei* P.S.Ashton, *subsp.nov.*

A *Gluta wallichii* subspecie typica petiolo et foliorum nervis subtus badio-puberulentibus lamina subtiliter coriacea margine tenui revoluta basi cuneata costis utrinsecus 13—18 satis distincta. Typus: *Awang Yakup S 8903* Borneo, Sarawak, Semengoh Forest Reserve (holo K, flowers).

Notes: J.V. LaFrankie, in the course of identifying the trees of the 52-ha tree demographic plot within Lambir National Park recognised two distinct entities within the range of variation in *Gluta wallichii* described by Kochummen (1996). In one entity, conforming to the typical subspecies, the bark is pale brown, shallowly cracked and flaking, the leaf glabrescent, the lamina thinly coriaceous, wavy on drying, with shortly tapering base, hardly revolute at the margin (visible by lens only), and with at least 19 pairs of secondary veins. In the other, the bark is red-brown and fissured, the leaf venation beneath and petiole brownish puberulent, the lamina

coriaceous, drying flat, with straight visibly revolute margin, strictly cuneate base and 13-18 secondary pairs of veins. Further, the typical subspecies mostly occurred on clay and sandy clay soils, while the new subspecies occurred on humic yellow sands, and we have found this to be the case in Brunei and elsewhere in the region. Nevertheless, the distinctly narrowed leaves with glaucous undersurface and slender petioles, as well as flower and fruit characters of *G. wallichii* are shared by both entities, so I chose to recognise them as subspecies until more is known about patterns of variation throughout the range of *G. wallichii*.

Other specimens examined: BRUNEI - Bukit Patoi Wood *et al.* SAN 17147 (BRUN, fruit). SARAWAK - Bidi, Bau *Burley & Lee* 330 (A, K, SAR), Semengoh Forest Reserve *Asah Unyong Tree No. 156* (K, SAR, young flowers), *Rosli S 15774* (K, SAR, young fruit), *Rosli S 15746* (K, SAR, fruit), *Anderson S 14932* (K, SAR, flowers), *S 9387* (K, SAR, flowers).

2. *Parishia coriacea* P.S.Ashton, *sp. nov.*

Parishiae maingayi Hook. /. *affinis*, sed sepalis in fructu brevioribus, foliis utrinsecus 3 costis lateralibus prominentibus distinguitur. Typus: *Niga Ningkat* AW 230, Borneo, Brunei, Bukit Besong, Ukong, (holo, K iso BRUN fruit).

Tree to 30 m tall, 80 cm diam.; bark pale grey-brown, shallowly powdery flaking. Young parts shortly rust-brown hairy, the hairs caducous except on panicle, calyx and nut. Twigs stout c. 1 cm diam., rugose. Leaf rachis up to 40 cm long, petiole up to 18 cm long; leaflets c. 3 pairs, opposite, lamina elliptic, 7.5-20 x 4.5-7 cm, coriaceous, drying grey-brown; base obtuse or cuneate, margin slightly revolute, apex acuminate, acumen to 1 cm long; midrib prominent beneath, narrowly elevated and furrowed above; secondary veins 12-25 pairs with many shorter intermediate veins, slender but prominent beneath, evident but hardly elevated above; the reticulate tertiary veins likewise; petiolules 5-10 mm long, stout. Panicle up to 60 cm long, terminal. Flower bud up to 6 mm diam. Male flower: perianth 4-merous, sepals pubescent, c.1 mm long, petals glabrous, c.2 mm long, stamens 4, surrounding the densely pubescent ovary vestige. Female flower unknown. Fruit: sepals to 5.5 x 1 cm, lorate; nut ovoid, up to 2 x 1 cm, shortly beaked, dark chestnut-brown velutinate.

Distribution and habitat: Endemic to mixed dipterocarp forests on deep yellow coastal sands of the Neogene coastal hills of Brunei and north-east Sarawak, a habitat of exceptional richness and endemism.

Notes: This species is easily distinguished by its relatively short fruit sepals,

at first shorter than the ripening nut, and by its 3 pairs of coriaceous leaflets drying distinctly pale grey-brown, with slender but prominent venation beneath..

Other specimens examined: BRUNEI - Andulau Forest Reserve Ashton BRUN3272 (BRUN, K fruit), BRUN 18568 (BRUN sterile), Sungei Liang Dransfield JD 7022 (BRUN, K fruit), Bukit Teraja Coode 6959 (BRUN, K fruit), Loagan Merimbun Suzuki K13400 (BRUN sterile). SARAWAK - Bintulu, Labang Forest Reserve Ilias Pa'ie S 15817 (K, L fruit), Limbang, Ulu Medamit Wright & Othman Ismawi S 32313 (K flowers).

Burseraceae

1. *Canarium latistipulatum* Ridl, subsp. *mitus* P.S.Ashton, *ssp. nov.*

A *Canario latistipulato* typico arbor grandis tomento persistenten scabrido, foliis latoribus, fructibus vastis suave esculentibus differt. **Typus:** Coode 7107 Borneo, Brunei, Bukit Bahak, Rambai (holo K, iso BRUN, young fruit).

An elegant columnar prominently buttressed village tree with dark hemispherical crown. Young twigs, leaflets beneath, leaf stalks and inflorescences sparsely shortly tawny scabrous tomentose. Stipules reniform, up to 15 x 10 mm, attached near the base of the petiole, tardily caducous. Leaflets usually 7, lamina broadly elliptic, c. 11 x 5 cm, appanate, drying dark reddish to greenish brown; base broadly cuneate to obtuse, margin shallowly dentate, apex acuminate, acumen prominent; secondary veins 7-10 pairs, arched, somewhat anastomosing within margin, without intermediate veins, prominent beneath, not so to shallowly depressed above as also the subscalariform tertiary veins. Flowers unknown. Infructescence paniculate. Fruit drupaceous, broadly ellipsoid, up to 8 x 6 cm, lustrous, ripening yellow-brown; mesocarp orange-brown, fleshy and fibrous, resinous; endocarp woody, sharply triangular in cross section.

Notes: It is surprising that this fruit tree, known to Kedayan and Dusun farmers as *mitus*, should have so long remained unrecognised. Admittedly, we only have information of its cultivation in northern Brunei from Bandar Seri Begawan westward to the Tutong valley.

In Kirkup (1996, p. 44), this plant had been mistaken for *Canarium littorale* Blume, but the distinct reniform stipules are placed towards the base of the petiole, which is a distinguishing character of *C. latistipulatum* Ridl., and not on the adjacent twig as in *C. littorale*. The fruits, which have yet to be collected for the herbarium, are the size of a mango. They are buried in order to rot off the highly resinous mesocarp, then the seed within its striking triangular woody endocarp is cleaned and marketed.

The fruit of the typical subspecies, which is said to be a native forest tree of Sabah and Sarawak (Kochummen, 1995), is unknown, but the narrow leaflets, powdery puberulent tomentum and apparently small size serve to distinguish it.

Other specimens examined. BRUNEI - Tutong: Pak Engalau, Tasek Merimbun *Bernstein JHB 394* (BRUN, K sterile), Panchang *KM. Wong s.n.* (BRUN sterile), Kampong Mitus *P.S. Ashton s.n.* (BRUN, K sterile).

2. *Dacryodes patentinervia* (Leenh.) P.S.Ashton, *stat. nov.*

Basynym: *Dacryodes macrocarpa* (King) H.J. Lam var. *patentinervia* Leenh., *Flora Malesiana* 1, 7 (1976) 821; Kochummen, *Tree Flora of Sabah and Sarawak* 1 (1996) 71. **Typus**: *Sinclair & Kadim 10492* Borneo, Brunei, Labi Forest Reserve (holo L, iso K, SAN, SAR fruit).

Tree to 35 m tall, 80 cm diam., with narrow buttresses and pale yellow-brown thinly flaky bark. Bud and young shoots puberulent, other parts glabrous. Leaves: rachis up to 23 cm long and 2 mm diam., slender, terete or somewhat angular towards base; leaflets 5-7; lamina narrowly elliptic to lanceolate, 7-14 x 4-7 cm, drying bright coppery brown with the midrib darker beneath, equal to subfalcate, base cuneate, margin slightly revolute, apex acuminate, acumen tapering, slender, c. 1 cm long; midrib slender beneath, applanate above; secondary veins 10-16 pairs, patent, hardly raised below, evident but applanate above as also the many short intermediate veins and densely reticulate tertiary veins; petiolules 12-35 mm long on lateral, up to 6 cm long on terminal leaflets, adaxially flattened at base otherwise terete, prominently swollen at each end. Inflorescence up to 24 cm long, laxly paniculate, shortly branched, glabrous. Male flower: perianth 3-merous, glabrous; sepals united into a basal cup; stamens 6, anther deltoid; ovary vestige columnar, tapering. Female flower unknown. Fruit broadly ellipsoid, up to 5 x 3 cm, asymmetric with eccentric stigma, ripening lustrous apple red.

Distribution and habitat: Endemic to northwest Borneo from the Rejang valley eastwards, where it is among the most abundant Burseraceae in its chosen habitat, in mixed dipterocarp forest on the deep yellow sands of the Neogene coastal hills; it also occurs in upper dipterocarp forest on shale ridges at 650-800 m, and on ultramafic substrates at Bukit Hampuan, Sabah at 1500 m.

Vernacular names: *Dacryodes patentinervia* is known as *sabal* (Brunei, Iban),

sibut (Tutong, Dusun), and *seladah* (Sarawak).

Uses: The fruit is collected from the forest and eaten as a popular laxative.

Notes: This entity has been confused with *Dacryodes expansa* (Ridl.) HJ. Lam - holotype *Haviland 2271* Sarawak, Kuching (K) - and was formally described as a variety of the well-known *D. macrocarpa* (King) H. J. Lam - holotype *King's Collector 7298* Peninsular Malaysia, Perak (K). All three taxa share a distinctive coppery brown tinge to the dry leaf. Leenhouts (1956) considered *D. macrocarpa*, with the present entity as a subspecies, to differ from *D. expansa* in petal shape, filaments united with the disc, and 6—10(—13) of secondary veins as opposed to 10—13 pairs in *D. expansa*. Later, in 1972, he distinguished the two species according to whether the petiole is terete except for the flattened base (*D. expansa*), or prominently flattened at base (*D. macrocarpa*), and only in 1976 did he redefine variation within *D. macrocarpa* adding var. *patentinervia*, and drew up a new description of *D. expansa*.

Dacryodes macrocarpa, sometimes a large tree of the mixed peat swamp forest, is here distinguished by fruits ripening dull green; leaflets unequal, broadly ovate, of often markedly irregular shape, shortly abruptly acuminate; midrib prominent on both surfaces; secondary veins 7—9 pairs; and inflorescence up to 20 cm long, much branched and stout.

Dacryodes expansa, with which the present entity was originally confused by Hasan and Ashton (1962) and Ashton (1964) seems to be known only from the type from west Sarawak. It differs from *D. patentinervia* in having larger, ellipsoid flower buds up to 4 x 3 mm; 3—4 (not 2) pairs of thinly coriaceous leaflets with 10—13 pairs of ascending secondary veins prominent beneath, and remote tertiary veins; and a flattened, sharp edged, adaxial side to the stout petiole, which is up to 4 mm diam. The fruit is unknown.

Other specimens examined: BRUNEI - Bukit Teraja *Dransfield JD 6867* (BRUN, K fruit), *Coode 6892* (K fruit); Andulau Forest Reserve *Ashton BRUN253* (BRUN, K fruit), *BRUN 15671* (BRUN sterile), *BRUN 15272* (BRUN sterile), *BRUN 16193* (BRUN fruit), *Wyatt-Smith KEP 80093* (K fruit), *Wood et al. SAN 17487* (BRUN fruit), *ecological specimen Ashton PS 3966* (BRUN sterile), (K); Bukit Kukub *BRUN 16781* (BRUN fruit); Sukang *BRUN 18665* (BRUN fruit); Luagan Lalak, Labi *Niga Ningkat NN 185* (K fruit); Merangkling-Buau, Belait *BRUN 16220* (BRUN fruit), Bukit Batu Patam, Ulu Ingei, Belait *Wong WKM 1038* (BRUN, K flowers); Bukit Biang *Wood et al. SAN 17123* (BRUN fruit); Bukit Belalong west ridge *Wong WKM 1534* (BRUN, K fruit); Bukit Belalong south ridge

Wong WKM 1356 (BRUN, K young fruit). SARAWAK - Miri, Lambir National Park: Dan Hj. Bakar S 4370 (K fruit); George S 40503 (K fruit), Sungai Jangkang, Bakam Abang Mohtar S 47111 (K fruit), path to Bukit Lambir Yeo & Jugah Kudi S 38496 (K young fruit), Mount Lambir I lias Pa'ie S 16602 (K young fruit); Gunong Mulu National Park (Camp 3) S 58412 (K young fruit); Jugah Kudi S 23696 (K fruit), Bukit Iju, Balingian Sibat Luang S 23655 (K fruit); Ulu Kenyana, Mukah Ashton S 19494 (K young fruit).

Dipterocarpaceae

1. *Hopea rugifolia* P.S.Ashton, *sp. nov.*

Hopeae mesuoides Ashton, *H. sphaerocarpae* (Heim) Ashton, *H. subalatae* Sym. affinis sed lamina coriacea rugulescenti grisea nervis subtus magis prominentibus basi cuneata, petiolo brevi satis distincta. *Typus*: Wong WKM 1414 Borneo, Brunei, Bukit Belalong south ridge, flowers (holo K, iso BRUN, flowers).

Small monopodial understory tree up to 20 m tall, 20 cm diam., with low buttresses and stilt roots; bark smooth. Young parts densely evenly minutely grey-brown hairy, the hairs persisting sparsely on leaf venation beneath, midrib above at base, and on petiole. Stipules acicular, up to 6 mm long, caducous. Lamina broadly lanceolate, 5-9 x 2-3.5 cm, chartaceous, drying grey-brown and wrinkling; base broadly wedge-shaped to obtuse, apex acuminate, acumen slender, prominent up to 1.5 cm long; midrib slender but elevated beneath, obscure and depressed above; secondary veins c. 10 pairs, slender but distinctly raised beneath, with short intermediate veins; tertiary veins densely scalariform, evident beneath; petiole to 4 mm long, slender. Panicle axillary, up to 4 cm long, slender, when dried up to 0.7 mm diam, at base, terete, glabrous, singly branched; bracteoles deltoid, up to 1 mm long, glabrous, subpersistent. Flower bud to 1.5 mm diam, at anthesis, small, broadly ovoid; calyx sparsely pubescent outside, sepals suborbicular, to 1 x 1 mm diam., outer two subacute or obtuse, inner three mucronate; corolla purple, petals oblong, obtuse, to 3 mm long, puberulent on parts exposed in bud; stamens 15, filaments short, broad at base, tapering, anthers ellipsoid, connectival appendage c. twice length of anther, slender; ovary and stylopodium short, narrowly cylindrical, truncate, medially constricted, glabrous, style conical, short, glabrous. Fruit glabrous; pedicel up to 5 mm long, 0.5 mm diam., very slender; sepals ovate, subequal, up to 8 x 7 mm when ripe, acute, saccate, incrassate and appressed to nut; nut up to 10 x 8 mm, broadly ovoid, with up to 2 mm-long prominent stylopodium remnant.

Distribution and habitat: It occurs, like many dipterocarps with wingless fruits, in dense clusters in the forest understorey, on sandy clay soils at low altitude and also skeletal humic clay soils in upper dipterocarp forest at 600-800 m altitude. At Lambir National Park, north-east Sarawak, it shares the forest with *Hopea mesuoides* P.S.Ashton, which is, however, confined there to yellow humic sandy soils.

Notes: *Hopea rugifolia* is named for its distinctively wrinkled fallen leaf in a family where leaves are generally more coriaceous. This species belongs to a group of closely similar monopodial understorey species comprising *H. mesuoides* (Sarawak north-east of S. Balingian and Brunei), *H. sphaerocarpa* (Heim) P.S.Ashton (with which *H. rugifolia* has heretofore been confused but which is now confirmed only from Sarawak west of Batang Lupar), and *H. subalata* Symington. The last is a point endemic of Kanching Forest Reserve, Selangor, where it is locally gregarious on the Klang Gates quartzite in association with the only known west coast locality of *Dryobalanops aromatica* Gaertn, f. *H. subalata* has been shown to be triploid and likely partially apomictic though adventive embryony (Kaur *et al.*, 1978).

The present species is distinguished from these three species by its chartaceous leaf drying grey-brown and wrinkling, with cuneate rather than obtuse base, prominent secondary veins beneath, and short petiole.

Other specimens examined: SARAWAK - Bukit Mersing, Anap Sibat Luang S 25028 (K fruit), Lambir National Park S 46439 (K fruit).

2. *Vatica patentinervia* P.S.Ashton, **sp. nov.**

Vaticae congestae Ashton similis sed costis foliorum lateralibus utrinsecus 7-8 acumine prominenti tomento piano distinguitur, a *V. endertii* Sloot. inflorescentibus ramifloris brevioribus, fructibus maioribus, ramulis tomentosis, lamina coriacea costis paucioribus differt. **Typus:** *Bias Pa'ie* S 15148 Borneo, Sarawak, Bintulu, Segan Forest Reserve (holo K, iso SAR fruit).

Subcanopy tree, to 30 m tall. Young parts densely evenly buff pubescent, the hairs persistent on twig, petiole and inflorescence. Twig slender, ribbed. Stipule narrowly deltoid, c. 5 x 3 mm. Lamina elliptic-obovate, 7-15 x 3.5v6 cm, thinly coriaceous, appanate to narrowly revolute, drying pale buff-grey; base cuneate to obtuse, apex acuminate, acumen up to 1 cm long, prominent; midrib hardly elevated above, prominent beneath; secondary veins 7-8 (up to 12 in juveniles) pairs, evident above, prominent beneath; tertiary veins reticulate; petiole 1.2-2.5 cm long, rugulose.

Inflorescence axillary to ramiflorous, fascicled, up to 3 cm long, up to 2 mm diam., singly branched. Flowers unknown. Fruit: pedicel up to 4 mm long, slender; sepals unequal, free to base; longer two up to 12 x 2.2 cm, lorate, obtuse, prominently 3-veined; shorter three up to 4.5-1.5 cm, narrowly ovate, acute, recurved. Nut ellipsoid, up to 12 x 8 mm, tapering to 6 mm-long style remnant, glabrous.

Notes: This species, which is only known from clay soil in mixed dipterocarp forest from two localities, shares the large fruit and fascicled ramiflorous inflorescences of *Vatica congesta* P.S.Ashton, but is distinguished by the distinct even buff pubescence of twig, petiole and inflorescence, fewer (7-8) more slender pairs of secondary veins (more in juveniles; 9-11 pairs in *V. congesta*), and prominently acuminate, not obtuse or retuse, less coriaceous lamina. *V. endertii* Slooten differs in having glabrescent young parts, solitary terminal or axillary inflorescences, smaller fruit, and a more coriaceous lamina with 11-13 pairs of secondary veins. Saplings, whose leaves may have up to 12 pairs of secondary veins, can also be confused with those of *V. odorata* (Griff.) Symington subsp. *mindanensis* (Foxw.) P.S.Ashton, but the leaves dry distinct buff-grey, which with the dense even buff pubescence on twigs and petioles serves to distinguish them from all three species.

Other specimens examined: BRUNEI - Kuala Belalong Ashton S 5744 (SAR sterile), Balslev et al. 62, 68, 84, 91, 123, 133, 160, 188, 208, 249, 255, 286, 359, 363, 365, 369, 372, 396, 437 (UBD, sterile ecological specimens).

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