



Tribe Shoreae (Dipterocarpaceae subfamily Dipterocarpoideae) Finally Dissected

P. S. Ashton^{1,2} & J. Heckenhauer³

Summary. The dipterocarp tribe Shoreae, perhaps more than any other members of this elegant family of often giant emergent trees, is familiar to all who visit the once ubiquitous lowland forests of tropical Asia. Timbers of the genus *Shorea* comprised the bulk of hardwood traded on international markets for thirty years, since the nineteen seventies. Distinct species groups came to be recognised by taxonomists: for their characteristic androecia, and sometimes differences in bark and wood anatomy, while generic status for some was then proposed on embryological evidence. A new molecular phylogeny of the family, and this tribe, substantially confirms the embryological case. This paper formalises resultant nomenclatural changes. Those of us who recall the majestic forested former landscapes of the Sunda lands may regret this decision. But now, with landscapes irretrievably changed by serried ranks of oil palm and forest degradation, the case for recognition of the proposed new entities can guide conservation planners in recognising and making the case for permanently conserving surviving undisturbed stands of exceptional composition or diversity.

Key Words. Conservation, nomenclature, phylogenetics, *Shorea*, taxonomy.

Introduction

Linnaeus (1753, 1771) was the first to document genera in our family, the South Asian *Vatica* and *Vateria*, both trees of moderate stature and persistent but unremarkable calyces. The great German botanist of the Indies, K. L. Blume (1825), recognised a new family, Dipterocarpaceae, for the first of the emergent-crowned forest giants whose large fruit spiral down on sepals expanded into two oar-like wings, *Dipterocarpus* C.F.Gaertn. Further generic descriptions also relied on characters of the fruit calyx, whether the winged sepals are equal (*Dryobalanops* C.F.Gaertn.), unequal with three longer (*Parashorea* Kurz, *Shorea* Roxb. ex C.F.Gaertn., *Doona* Thwaites, *Pentacme* A.DC.; or three shorter therefore wingless (*Anisoptera* Korth., *Upuna* Symington, *Cotylelobium* Pierre, many *Vatica* L., *Hopea* Roxb.); or with all five shorter than the ripe nut (*Vatica*, *Vateria*, *Vateriopsis* F.Heim). Species were found which conformed to characters of winged genera but whose fruit lacked wings, and on that basis alone were identified as novel genera (*Balanocarpus* Bedd., *Isoptera* Scheff. ex Burck). F. Heim (1892) was first to discriminate supraspecific taxa on multiple characters (stamens, embryo, petiole anatomy), and to define distinct genera sharing the fruit calyx of *Shorea*, and sections within *Shorea* itself (*Brachypterae*, *Pachycarpae*), which Brandis (1895) expanded in his comprehensive revision of then known Asian taxa.

The number of known species expanded thereafter, notably from the work of D. F. van Slooten at the then Netherland Indies herbarium at Buitenzorg, Java (Bogor, Indonesia). Forestry botanical researchers were first to describe dipterocarps as living organisms, differentiating taxa on stature, and form including bark and buttresses and sometimes juveniles: first in the Philippines and later peninsular Malaya (peninsular Malaysia) Foxworthy (1911, 1938), then comprehensively expanded and rigorously researched by C. F. Symington (1939, 1943), focusing on Malayan species. Symington, aided by comparative wood anatomical research by Desch (1936, 1941), recognised three major timbers among botanically heterogeneous Malayan *Shorea*, botanically defined by bark morphology and wood anatomy as well as floral especially stamen characters: balau, comprising species with the characters of the Indian type species, *S. robusta* C.F.Gaertn., meranti pa'ang (white meranti), meranti damar hitam (yellow meranti) and the large but more heterogeneous group red meranti. Ashton (1963, 1967, 1972, 1978, 1980, 1982) accepted Symington's criteria, reducing *Pentacme* (Ashton 1978) and *Doona* (Ashton 1980), which share the fruit calyx of *Shorea*, to sections within it, and providing formal botanical status to the timber groups (Ashton 1963) while adding two not occurring in Peninsular Malaysia: *Pachycarpae* F.Heim and *Rubella* P.S.Ashton. Full diagnoses of supraspecific taxa are provided in Ashton 1982.

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Ashton divided Dipterocarpoideae into two tribes: Dipterocarpeae, which included *Dipterocarpus*, with imbricate fruit calyx, and Shoreae, which included *Dryobalanops*, with fruit calyx imbricate at base where sepals become incrassate and concave.

Meanwhile Maury (1978; Maury-Lechon 1979; Maury-Lechon & Curtet 1998) had proposed a novel reclassification within what Ashton (1982) recognises as Tribe Shoreae, principally based on examination of embryology within ripe fruits of forty species within it, raising Ashton's infrageneric taxa, or returning them back to generic rank. The two classifications are compared by Ashton *et al.* (2021, Table 1). Maury recognised three subtribes within tribe Shoreae: a heterogeneous type subtribe including *Hopea*, *Neobalanocarpus* P.S.Ashton, *Shorea*, *Richetia* F.Heim and *Rubroshorea* as genera; monotypic Parashorineae; and Anthoshorineae including *Anthoshorea* Pierre, *Doona* and *Pentacme* as genera. The monotypic section *Neohopea* P.S.Ashton was not included in the study. Maury was unable to detect embryological characters diagnostic of Symington's Red Meranti subgroup of his *Shorea*, for which she accepted Meijer's subgenus *Rubroshorea* which is based solely on the pink to red-brown inner bark and wood, characters absent in a few species where they are yellow-brown, yet present in *S. guiso* (Blanco) Blume, section *Shorea*, subsection *Shorea*.

Ashton remained reluctant to accept the substantial name changes and recombinations implied: first because they need confirmation from more than the forty studied out of the c. 200 now recognised before embryological characters are confirmed as consistent within supraspecific taxa, including those now recognised within the heterogeneous red merantis; that they are correlated with other diagnostic characters; and lastly but importantly, because during the quarter century, 1970–2000, when dipterocarp timber dominated the international timber trade, and when there was still hope that dipterocarp forests could still be managed sustainably, nomenclatural fragmentation of the most widely known timber genus would have led to confusion among that wide community of foresters, silviculturists, loggers, and business interests who relied on easy and reliable identification of field groups and often species.

Thanks now to the ubiquitous replacement of mixed dipterocarp forest by oil palm in the aseasonal wet lowlands of tropical Asia, the world in which we live has changed immeasurably. Advances in molecular systematics have provided solid confirmation of much of Géma Maury's pioneering work.

In a recent study on three plastid regions (*rbcl*, *trnK-matK-trnK*, *trnT-trnL-trnF*; Heckenbauer *et al.* 2017), *Dipterocarpus* is placed as sister to tribe Shoreae (Fig. 1). Although this relationship is only moderately supported in this study, it clearly separates *Dipterocarpus* from the remaining genera of tribe Dipterocarpeae containing the following genera: *Anisoptera*, *Cotylelobium*, *Stemonoporus*,

Upuna, *Vateria*, *Vateriopsis* and *Vatica*. This was observed in earlier molecular studies (e.g. Kajita *et al.* 1998; Yulita *et al.* 2005; Gamage *et al.* 2006) and has been recently resolved with support based on the analyses of plastome and nuclear cistron (NRC) data (Cvetković *et al.* 2022).

Interestingly, while most members of Dipterocarpaceae are pollinated by pollenivores (bees, thrips (Ashton 2014)), *Dipterocarpus* is mainly, perhaps solely, pollinated by nectarivorous Lepidoptera (Ghazoul 1997; Harrison 2005; Ashton 2014).

Regarding the tribe Shoreae, molecular analyses based on three plastid markers (Heckenbauer *et al.* 2017) found the monophyletic genera *Hopea*, *Neobalanocarpus* and *Parashorea* to be nested within the genus *Shorea* sensu Ashton, in broad agreement with Maury-Lechon. This also has been reported in earlier molecular analyses (e.g. Yulita *et al.* 2005; Gamage *et al.* 2006) and is strongly supported by next-generation sequencing plastome (whole plastid genomes, Heckenbauer *et al.* 2019; Cvetković *et al.* 2022) and nuclear data (RADseq-derived SNP data set, Heckenbauer *et al.* 2018; NRC data Cvetkovic *et al.* 2022). Thus, the genus *Shorea* sensu Ashton is polyphyletic in its current circumscription. Specifically, according to these molecular studies, the tribe Shoreae is divided into two highly supported major clades consisting of (1) *Shorea* section *Doona*, *Shorea* section *Anthoshorea*, *Neobalanocarpus* and *Hopea* and (2) of *Shorea* section *Richetia*, *Shorea* section *Shorea*, *Parashorea* and *Shorea* section *Rubroshorea* (Fig. 1); each as distinct microclades. Thus, molecular evidence divides genus *Shorea* sensu Ashton into five groups corresponding to Ashton's section *Doona*, *Anthoshorea*, *Rubroshorea*, *Shorea* balau (selangan batu) and *Richetia*. These studies did not include Ashton's sections *Pentacme* and *Neohopea*. The position of *Parashorea* within the major clade (2) remains unclear: In the plastome trees, *Parashorea* is sister to *Shorea* section *Rubroshorea* and *Shorea* section *Shorea*, whereas it forms a clade with *Richetia* in the RADseq trees (Fig. 1). This suggests that the origin of this genus may be associated with ancient hybridisation. Further, *Neobalanocarpus* was recovered as nested in *Hopea* based on analysis of NRC data (Cvetković *et al.* 2022). This is incongruent with the position retrieved using plastid data, where it is sister to *Hopea* (Fig. 1, Heckenbauer *et al.* 2017, 2019; Cvetković *et al.* 2022)

Molecular analyses support subgenus *Rubroshorea* Meijer as the largest microclade within the Shoreae clade, but lack consistent support for sections in *Rubroshorea* recognised by Symington and Ashton. The analysis reveals that, within *Rubroshorea*, the sections *Brachypterae* and *Mutica* especially fail to form monophyletic groups. This has also been observed for sect. *Pachycarpae* and sect. *Shorea* within *Shorea* s.str (Cvetkovic *et al.* 2022). Future molecular studies could shed light into these sectional classifications, as well as resolve the position of *Neohopea*, *Pentacme* and *Parashorea*.

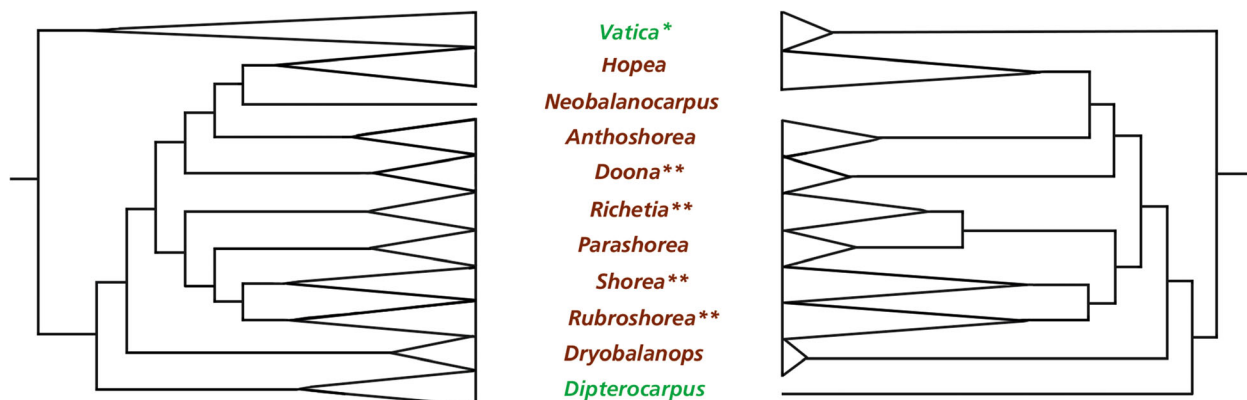


Fig. 1. Schematic presentation of molecular phylogenetic trees obtained from plastid (left) and nuclear (right) data. Species were collapsed to major clades. *Neobalanocarpus* was not included in the nuclear data set. green: tribe Dipterocarpeae, red: tribe Shoreae; *: the plastid data set included not only *Vatica* but also *Anisoptera*, *Cotylelobium*, *Stemonoporus*, *Upuna*, *Vateria*, *Vateriopsis* and *Vatica*; **: genus *Shorea* sensu Ashton. For detailed non-collapsed phylogenetic trees including support values for each clade see: Heckenhauer *et al.* 2017, 2018, 2019.

TAXONOMIC IMPLICATIONS. The inconsistency of placement of *Dipterocarpus* in molecular phylogenies is consistent with its unique morphology, and we agree with Cvetković *et al.* (2022) to isolate it in a monotypic tribe, requiring the renaming of the former Tribe Dipterocarpeae:

Tribe **Dipterocarpeae**

Buds, stipules, flowers and often leaves exceptionally large; stipule scars amplexicaul; leaf vernation plicate leaving opened leaves corrugate between veins; petiole vascular bundles in one or more complex rings; flower ovary and androecium enclosed but free from sepals united at base into a tube; petals large, lorate, not concave at base; ovary imbedded in receptacle at base; pollen gaping tricolporate, at least three times as large as in other Dipterocarpoideae, margins absent or much reduced, exine tilioid; vessels solitary, resin canals large, scattered, fibres with bordered pits. n = 11.

Tribe **Vaticeae**

Sepals free to an unswollen base and or united around a partially inferior ovary. Corolla free or loosely connate at base, spreading, not cupped or prominently overlapping forming a vase-like chamber at base. Vessels solitary, resin canals scattered, fibres with bordered pits. n = 11.

Tribe **Shoreae**

Fruit sepals expanded and imbricate at the incassate cupped base, sepal vasculature more or less overlap-

ping at margin in flower; petals at anthesis more or less strongly imbricate, cupped forming a vase-like chamber and contorted at base. Vessels grouped, resin canals in tangential bands. N = 7.

Published taxonomic subtribes of the tribe Shoreae are not consistently supported in the molecular phylogenies. Heckenhauer *et al.* (2017, 2019) did consistently recognise two major clades within *Shorea* sensu Ashton (1980, 1982); but we know of no morphological or anatomical criteria by which these two clades can be grouped separately as diagnosable taxonomic entities. One of these clades also includes the established genera *Hopea* and *Neobalanocarpus* together with Ashton's sections *Doona*, *Anthoshorea* and *Pentacme* on Maury-Lechon's embryological evidence; while the other bifurcates as Ashton's section *Richetioides* (Symington's yellow meranti timber group, earlier recognised as a genus, *Richetia* (Heim 1892)); and as a second minor clade which includes the type section of *Shorea*, and Ashton's five sections within Symington's red meranti timber group already published as the genus *Rubroshorea* Meijer.

We therefore propose not to recognise Heckenhauer *et al.*'s two clades as taxonomically definable entities. Based on recent phylogenomic analyses of Cvetković *et al.* (2022), *Hopea* Roxb. and *Neobalanocarpus* P.S.Ashton are retained as established genera. The former genera *Doona* Thwaites, *Pentacme* A.DC., *Richetia* F.Heim (1892) are resurrected. Symington's and Ashton's *Shorea* section *Anthoshorea* F.Heim is raised to generic rank. We suggest to retain *Neohopea* P.S.Ashton as a distinct section within *Shorea* Roxb. ex C.F.Gaertn. which otherwise retains only the type section. *Rubroshorea* Meijer is here recognised as a genus as a stimulus for others to identify morphological or anatomical characters by which it can be diagnosed in addition to

the molecular findings; the five sections within it are retained as such, with their species awarded new binomials.

The following species are now recognised in *Shorea* sensu Ashton (1982), with new binomial combinations where required. Full citations are provided in Ashton 1980 (for Malesia), 1982 (for Sri Lanka) and 2004 (for Borneo post-1982).

Species which retain their present binomial:

Shorea *Roxb. ex C.F.Gaertn.* (Gaertner 1805: 47, t. 186, f. 1). Type species: *Shorea robusta* C.F.Gaertn. (Gaertner 1805: 48, t. 186, f. 1).

VERNACULAR NAMES. Sal (India), balau (Peninsular Malaysia), selangan batu (Borneo Malay), tekam (Iban).

Section *Shorea*

- Shorea astylosa** *Foxw.* (Foxworthy 1918: 188).
Shorea atrinervosa *Symington* (1939: 363).
Shorea brunnescens *P.S.Ashton* (1967: 283).
Shorea calcicola *P.S.Ashton* (2004: 239 – 240).
Shorea ciliata *King* (1893: 118).
Shorea collina *Ridl.* (Ridley 1910: 182).
Shorea crassa *P.S.Ashton* (1962: 271).
Shorea domatiosa *P.S.Ashton* (1962: 285).
Shorea dyerii *Thwaites* (1885: 204).
Shorea exelliptica *Meijer* (1963: 323).
Shorea falcata *J.E.Vidal* (1962: 325).
Shorea falcifera *Dyer ex Brandis* (1895: 86).
Shorea falciferoides *Foxw.* (Foxworthy 1918: 189).
Shorea geniculata *Symington ex P.S.Ashton* (1962: 291).
Shorea guiso (*Blanco*) *Blume* (1856: 34).
Shorea havilandii *Brandis* (1895: 82).
Shorea hypoleuca *Meijer* (1963: 329).
Shorea inappendiculata *Burck* (1887: 206).
Shorea leptoderma *Meijer* (1963: 331).
Shorea lissophylla *Thwaites* (1864: 402).
Shorea lumutensis *Symington* (1939: 364).
Shorea lunduensis *P.S.Ashton* (1967: 284).
Shorea malibato *Foxw.* (Foxworthy 1913: 1955).
Shorea materialis *Ridl.* (Ridley 1910: 183).
Shorea oblongifolia *Thwaites* (1858: 36).
Shorea obscura *Meijer* (1963: 333).
Shorea obtusa *Wall. ex Blume* (1856: 32, t. 8).
Shorea ochrophloia *Strugnell ex Symington* (1935: 268).
Shorea pallescens *P.S.Ashton* (1972, publ. 1973: 360).
Shorea robusta *C.F.Gaertn.* (Gaertner 1805: 48, t. 186, f. 1).
Shorea scrobiculata *Burck* (1887: 207).
Shorea seminis (*de Vriese*) *Slooten* (1929: 204).

- Shorea submontana** *Symington* (1939: 368).
Shorea sumatrana (*Slooten*) *Desch* (1934: 201).
Shorea superba *Symington* (1960: 491).
Shorea thorelii *Pierre ex Laness.* (Lanessan 1886: 302).
Shorea tumbuggaia *Roxb.* (Roxburgh 1814).

Shorea section **Barbata** (*Symington ex P.S.Ashton*) *P.-S.Ashton & J.Heck. stat. nov.*

<http://www.ipni.org/urn:lsid:ipni.org:names:77217905-1>

Shorea section *Shorea* subsection *Barbata* *Symington ex P.S.Ashton* (1963: 266).

- Shorea asahi** *P.S.Ashton* (1962: 279).
Shorea biawak *P.S.Ashton* (1962: 281).
Shorea glauca *King* (1893: 117).
Shorea ladiana *P.S.Ashton* (1962: 295).
Shorea laevis *Ridl.* (Ridley 1922: 232).
Shorea maxwelliana *King* (1893: 114).
Shorea micans *P.S.Ashton* (1978: 38).

Species returned to an earlier generic status, or designated a new one:

Pentacme *A.DC.* (De Candolle 1868: 626). *Shorea* section *Pentacme* (A.DC.) *P.S.Ashton* (1978: 36). Type species: *Pentacme siamensis* (Miq.) Kurz (1870: 66).

VERNACULAR NAME. Temak batu (Peninsular Malaysia).

Pentacme siamensis (Miq.) Kurz (1870: 66). *Shorea siamensis* Miq. (Miquel 1864: 214).

Pentacme paucinervis *Brandis* (1895: 73).

Shorea contorta *S.Vidal* (1883: 15). Holotype: Philippines, Luzon, Rizal Province, *Vidal* 987 (K, designated here).

Neohoepa (*P.S.Ashton*) *P.S.Ashton, stat. nov.* Type species: **Shorea isoptera** *P.S.Ashton, Gard. Bull. Sing.* 19: 273 (1962).

<http://www.ipni.org/urn:lsid:ipni.org:names:77217906-1>

Shorea section *Neohoepa* *P.S.Ashton, Gard. Bull. Singapore* 20: 266 (1963).

VERNACULAR NAME. Selangan batu main bulu ayam.

Neohopea isoptera (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217907-1>

Shorea isoptera *P.S.Ashton*, *Gard. Bull. Singapore* 19: 293 (1962).

Doona *Thwaites* (1858: 35). *Shorea* section *Doona* (*Thwaites*) *P.S.Ashton* (1972: 360). Type species *Doona congestiflora* *Thwaites* (1858: 35).

VERNACULAR NAME. Dun (Sri Lanka).

Doona affinis *Thwaites* (1858: 35). *Shorea affinis* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 361).

Doona congestiflora *Thwaites* (1858: 35). *Shorea congestiflora* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 362).

Doona cordifolia *Thwaites* (1858: 35). *Shorea cordifolia* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 362).

Doona disticha (*Thwaites*) *Pierre* (1890: t. 237). *Shorea disticha* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 362). Basionym: *Vateria disticha* *Thwaites* (1864: 404).

Doona gardneri *Thwaites* (1858: 35). *Shorea gardneri* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 362).

Doona macrophylla *Thwaites* (1864: 402). *Shorea megistophylla* *P.S.Ashton* (1972, publ. 1973: 362) nom. nov.

Doona ovalifolia *Thwaites* (1864: 404). *Shorea ovalifolia* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 363).

Doona trapezifolia *Thwaites* (1858: 35). *Shorea trapezifolia* (*Thwaites*) *P.S.Ashton* (1972, publ. 1973: 363).

Doona venulosa *Thwaites* (1864: 402). *Shorea worthingtonii* *P.S.Ashton* (1972, publ. 1973: 363).

Doona zeylanica *Thwaites* (1851: t. 12; 1852: 7). *Shorea zeylanica* (*Thwaites*) *P.S.Ashton*. (1972, publ. 1973: 363).

Anthoshorea *Pierre*, *Fl. Forest. Cochinchine* (1891) ante t. 250; *Pierre* ex *F.Heim*, *Rech. Dipterocarp.* (1892: 41) nom. illeg. suppl. (nomen in syn. sub *Shorea henryana*). Type: *Anthoshorea harmandii* *Pierre*.

VERNACULAR NAMES. Meranti pa'ang (Peninsular Malaysia), raruk (Iban).

Anthoshorea agamii (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217908-1>

Shorea agamii *P.S.Ashton*, *Gard. Bull. Singapore* 19: 270 (1962).

Anthoshorea assamica (*Dyer*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217909-1>

Shorea assamica *Dyer*, *Fl. Brit. India* [*J. D. Hooker*] 1: 307 (1874).

Anthoshorea bentongensis (*Foxw.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217910-1>

Shorea bentongensis *Foxw.*, *Malayan Forest Rec.* 10: 169 (Foxworthy 1932).

Anthoshorea bracteolata (*Dyer*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217911-1>

Shorea bracteolata *Dyer*, *Fl. Brit. India* [*J. D. Hooker*] 1 (2): 305 (1874).

Anthoshorea confusa (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217912-1>

Shorea confusa P.S.Ashton, *Gard. Bull. Singapore* 31: 44 (1978).

Anthoshorea cordata (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217913-1>

Shorea cordata P.S.Ashton, *Gard. Bull. Singapore* 22: 285 (1967).

Anthoshorea dealbata (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217914-1>

Shorea dealbata Foxw., *Malayan Forest Rec.* 10: 192 (Foxworthy 1932).

Anthoshorea farinosa (C.E.C.Fisch.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217915-1>

Shorea farinosa C.E.C.Fisch., *Bull. Misc. Inform. Kew.* 1926: 461 (Fischer 1926).

Anthoshorea gratissima (Wall. ex Kurz) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217916-1>

Shorea gratissima (Wall. ex Kurz) Dyer, *Fl. Brit. India* [J. D. Hooker] 1: 307 (1874). *Hopea gratissima* Wall. ex Kurz, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 42 (2): 61 (1873).

Anthoshorea henryana (Pierre ex Laness.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217917-1>

Shorea henryana Pierre ex Laness., *Pl. Util. Col. Franç.* (Lanessan 1886: 302).

Anthoshorea hulanidda (Kosterm.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217918-1>

Shorea hulanidda Kosterm., *Bot. Jahrb. Syst.* 104: 196 (Kostermans 1983).

Anthoshorea hypochra (Hance) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217919-1>

Shorea hypochra Hance, *J. Bot.* 14: 242 (1876).

Anthoshorea javanica (Koord. & Valetton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217920-1>

Shorea javanica Koord. & Valetton, *Bull. Inst. Bot. Buitenzorg* 2: 3 (Koorders & Valetton 1899).

Anthoshorea lamellata (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217921-1>

Shorea lamellata Foxw., *Malayan Forest Rec.* 10: 278 (Foxworthy 1932).

Anthoshorea montigena (Slooten) P.S.Ashton & J.Heck., **comb. nov.** Holotype, designated here: Indonesia, Java, Cult. Hort. Bog. VIII.D25 ex Kajeli, Buru, (BO).

<http://www.ipni.org/urn:lsid:ipni.org:names:77217922-1>

Shorea montigena Slooten, *Reinwardtia* 2: 57 (1952).

Anthoshorea ochracea (Symington) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Malaysia, Sarawak, Kapit Distr., Ulu Balleh, Merirai, *Spurway* S167 (KEP) (Ashton 2004: 298).

<http://www.ipni.org/urn:lsid:ipni.org:names:77217923-1>

Shorea ochracea Symington, *Gard. Bull. Straits Settlem.* 8: 285 (1935).

Anthoshorea polita (S.Vidal) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217924-1>

Shorea polita S.Vidal, *Sin. Gen. Pl. Leños. Filip., Atlas* (1883: xv, t. 15, f. D).

Anthoshorea resinosa (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217925-1>

Shorea resinosa Foxw., *Malayan Forest Rec.* 10: 234 (Foxworthy 1932).

Anthoshorea retinodes (Slooten) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217926-1>

Shorea retinodes Slooten, *Bull. Jard. Bot. Buitenzorg, sér. 3*, 18: 243 (1949).

Anthoshorea roxburghii (G.Don) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217927-1>

Shorea roxburghii G.Don, *Gen. Hist.* 1: 813 (1831).

Anthoshorea stipularis (Thwaites) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217928-1>

Shorea stipularis Thwaites, *Enum. Pl. Zeyl.* (1858: 36).

Anthoshorea symingtonii (G.H.S.Wood) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217929-1>

Shorea symingtonii G.H.S.Wood, *Gard. Bull. Singapore* 17: 493 (1959, publ. 1960).

Anthoshorea virescens (Parijs) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77217930-1>

Shorea virescens Parijs, *Repert. Spec. Nov. Regni Veg.* 33: 244 (1933).

Rubroshorea (Meijer) P.S.Ashton & J.Heck., **stat. nov.**
Type species: *Shorea parvifolia* Dyer (1874: 305).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298305-1>

Shorea subgen. *Rubroshorea* Meijer, *Acta Bot. Neerl.* 12: 322 (1963).

VERNACULAR NAMES. Meranti (general); seraya (Sabah, Kelantan); lop, perawan (Iban); lauan, luan (Tagalog).

Rubroshorea section **Brachyptera** (F.Heim) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298306-1>

Shorea sect. *Brachyptera* F.Heim, *Rech. Dipterocarp.* (1892: 46).

Rubroshorea almon (Foxw.) P.S.Ashton & J.Heck., **comb. nov.** Lectotype: Philippines, Negros Occidental, Cadiz, Whitford F.B.11647 (K, isolectotype L) (Ashton 2004: 223).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298307-1>

Shorea almon Foxw., *Philipp. J. Sci.* 67: 313 (Foxworthy 1938).

Rubroshorea andulensis (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298308-1>

Shorea andulensis P.S.Ashton, *Gard. Bull. Singapore* 19: 275 (1962).

Rubroshorea balangeran (Korth.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298310-1>

Shorea balangeran (Korth.) Burck, *Ann. Jard. Bot. Buitenzorg* 6: 214 (1887). *Hopea balangeran* Korth., *Verh. Nat. Gesch. Ned. Bezitt., Bot.* 2: 74 (Korthals 1841).

Rubroshorea bullata (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298311-1>

Shorea bullata P.S.Ashton, *Gard. Bull. Singapore* 19: 283 (1962).

Rubroshorea carapae (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298312-1>

Shorea carapae P.S.Ashton, *Gard. Bull. Singapore* 22: 294 (1967).

Rubroshorea coriacea (*Burck*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298314-1>

Shorea coriacea Burck, *Ann. Jard. Bot. Buitenzorg* 6: 214 (1887).

Rubroshorea fallax (*Meijer*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Lectotype: Malaysia, Sabah, Beaufort Hill, *G. H. S. Wood* SAN A1734 (hololectotype K; isolectotypes L, KEP) (Ashton 2004: 256).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298315-1>

Shorea fallax Meijer, *Acta Bot. Neerl.* 12: 335 (1963).

Rubroshorea flaviflora (*G.H.S.Wood ex P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298316-1>

Shorea flaviflora G.H.S.Wood ex P.S.Ashton, *Gard. Bull. Singapore* 19: 289 (1962).

Rubroshorea flemmichii (*Symlington*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298317-1>

Shorea flemmichii Symlington, *Gard. Bull. Straits Settlement.* 10: 278 (1939).

Rubroshorea inaequalateralis (*Symlington*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Hololectotype: Brunei, Kuala Belait, Zainal F.M.S. 30351 (KEP) (Ashton 2004: 270).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298318-1>

Shorea inaequalateralis Symlington, *Gard. Bull. Straits Settlement.* 8: 281 (1935).

Rubroshorea johorensis (*Foxw.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298323-1>

Shorea johorensis Foxw., *Malayan Forest Rec.* 10: 236 (Foxworthy 1932).

Rubroshorea kunstleri (*King*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Hololectotype: Malaysia, Peninsular Malaysia, Perak Distr., Larut, *Kunstler* 3674 (K) (Ashton 2004: 276).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298324-1>

Shorea kunstleri King, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 62: 116 (1893).

Rubroshorea monticola (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298325-1>

Shorea monticola P.S.Ashton, *Gard. Bull. Singapore* 19: 297 (1962).

Rubroshorea pachyphylla (*Ridl. ex Symlington*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298326-1>

Shorea pachyphylla Ridl. ex Symlington, *J. Malayan Branch Roy. Asiat. Soc.* 19: 163 (1941).

Rubroshorea palembanica (*Miq.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298327-1>

Shorea palembanica Miq., *Fl. Ned. Ind., Eerste Bijv.* 3: 487 (Miquel 1861).

Rubroshorea palosapis (*Blanco*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298328-1>

Shorea palosapis (Blanco) Merr., *Sp. Blancoan.*: 271 (Merrill 1918). *Dipterocarpus palosapis* Blanco, *Fl. Filip.*, ed. 2: 312 (1845). Isolectotype: ‘Philippines’, *Cuming* 892 (K). Merrill (1918) chose this collection as lectotype; the holotype was presumably in the Manila herbarium, now destroyed.

Rubroshorea parvistipulata (F.Heim) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298329-1>

Shorea parvistipulata F.Heim, *Bull. Mens. Soc. Linn. Paris* 2: 974 (1891).

Rubroshorea pauciflora (King) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298330-1>

Shorea pauciflora King, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 62: 116 (1893).

Rubroshorea platyclados (Slooten ex Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298331-1>

Shorea platyclados Slooten ex Foxw., *Malayan Forest Rec.* 10: 214 (Foxworthy 1932). Holotype: Peninsular Malaysia, Selangor, Ulu Gombak, *Symington* KEP 24416, (KEP) (Ashton 2004: 315).

Rubroshorea polysperma (Blanco) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298332-1>

Shorea polysperma (Blanco) Merr., *Publ. Bur. Sci. Gov. Lab.* 27: 22 (Merrill 1905). *Mocanera polysperma* Blanco, *Fl. Filip. [F. M. Blanco]* (1837: 448).

Rubroshorea pubistyla (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298333-1>

Shorea pubistyla P.S.Ashton, *Gard. Bull. Singapore* 22: 297 (1967).

Rubroshorea scaberrima (Burck) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Indonesia, Java, Cult. Hort. Bogor. s.n., tree VIII D 54 (this is a gardens tree number, no collector cited) (BO) (Ashton 2004: 328).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298334-1>

Shorea scaberrima Burck, *Meded. Lands Plantentuin* 3: 22 (1886).

Rubroshorea selanica (Blume) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298335-1>

Shorea selanica (Lam.) Blume, *Mus. Bot.* 2: 33 (1856). *Dammara selanica* Lam., *Encycl. [J. Lamarck & al.]* 2 (1): 259 (Lamarck 1786).

Rubroshorea smithiana (Symington) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298369-1>

Shorea smithiana Symington, *Gard. Bull. Straits Settle.* 9: 345 (1938).

Rubroshorea venulosa (G.H.S.Wood ex Meijer) P.S.Ashton & J.Heck., **comb. nov.** Lectotype: Malaysia, Sabah, Sipitang Distr., Menggalong Forest Reserve, *G. H. S. Wood* SAN 15134 (holotype K; isolectotypes KEP, SAN) (Ashton 2004: 344).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298370-1>

Shorea venulosa G.H.S.Wood ex Meijer, *Acta Bot. Neerl.* 12: 342 (1963).

Rubroshorea waltonii (G.H.S.Wood ex Meijer) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298371-1>

Shorea waltonii G.H.S.Wood ex Meijer, *Acta Bot. Neerl.* 12: 3442 (1963).

Rubroshorea section **Rubroshorea** subsection **Auriculatae** (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.** Type species: **Rubroshorea macroptera** (Dyer) P.S.Ashton & J.Heck.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298377-1>

Shorea section *Mutica* subsection *Auriculatae* P.S.Ashton, *Gard. Bull. Singapore* 22: 300 (1967).

Rubroshorea acuta (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298382-1>

Shorea acuta P.S.Ashton, *Gard. Bull. Singapore* 19: 268 (1962).

Rubroshorea ferruginea (Dyer ex Brandis) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298383-1>

Shorea ferruginea Dyer ex Brandis, *J. Linn. Soc., Bot.* 31: 91 (1895).

Rubroshorea macroptera (Dyer) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298384-1>

Shorea macroptera Dyer, *Fl. Brit. India* [J. D. Hooker] 1: 308 (1874).

Rubroshorea myrionerva (Symington ex P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298385-1>

Shorea myrionerva Symington ex P.S.Ashton, *Gard. Bull. Singapore* 19: 299 (1962).

Rubroshorea sagittata (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298386-1>

Shorea sagittata P.S.Ashton, *Gard. Bull. Singapore* 22: 299 (1967).

Rubroshorea slootenii (G.H.S.Wood ex P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298387-1>

Shorea slootenii G.H.S.Wood ex P.S.Ashton, *Gard. Bull. Singapore* 19: 312 (1962).

Section **Rubroshorea**, Subsection **Rubroshorea**. Type species (designated here): **Rubroshorea parvifolia** (Dyer) P.S.Ashton & J.Heck.

Section *Mutica* Brandis, *J. Linn. Soc. Bot.* 31: 100 (1895).

Rubroshorea acuminata (Dyer) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298388-1>

Shorea acuminata Dyer, *Fl. Brit. India* [J. D. Hooker] 1: 305 (1874).

Rubroshorea argentifolia (Symington) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298389-1>

Shorea argentifolia Symington, *Gard. Bull. Singapore* 17: 489 (1960).

Rubroshorea curtisii (Dyer ex King) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Malaysia, Peninsular Malaysia, Penang Hill, *Curtis* 1394 (K) (Ashton 2004: 245).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298390-1>

Shorea curtisii Dyer ex King, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 62: 111 (1893).

Rubroshorea dasyphylla (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298391-1>

Shorea dasyphylla Foxw., *Malayan Forest Rec.* 10: 224 (Foxworthy 1932).

Rubroshorea foraminifera (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298392-1>

Shorea foraminifera P.S.Ashton, *Gard. Bull. Singapore* 22: 295 (1967).

Rubroshorea hemsleyana (*King*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: Malaysia, Peninsular Malaysia, Perak, Larut, *Kunstler* 6670 (K) (Ashton 2004: 266).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298393-1>

Shorea hemsleyana (King) King ex Foxw., *Malayan Forest Rec.* 10: 1967 (Foxworthy 1932). *Balanocarpus hemsleyanus* King, *J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist.* 62: 134 (1893).

Rubroshorea lepidota (*Korth.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298394-1>

Shorea lepidota (Korth.) Blume, *Mus. Bot.* 2: 32 (1856). *Vatica lepidota* Korth., *Verh. Nat. Gesch. Ned. Bezitt., Bot.* 3: 73 (Korthals 1841).

Rubroshorea leprosula (*Miq.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: Indonesia, Sumatra, loc. incert., *Teijsmann* Herb. Bog. 1122 (L) (Ashton 2004: 282).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298395-1>

Shorea leprosula Miq., *Fl. Ned. Ind., Eerste Bijv.* 3: 487 (Miquel 1861).

Rubroshorea macrantha (*Brandis*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298396-1>

Shorea macrantha Brandis, *J. Linn. Soc., Bot.* 31: 97 (1895).

Rubroshorea ovata (*Dyer ex Brandis*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: Malaysia, Peninsular Malaysia, Penang Hill, *Curtis* 201 (K) (Ashton 2004: 303).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298397-1>

Shorea ovata Dyer ex Brandis, *J. Linn. Soc., Bot.* 31: 91 (1895).

Rubroshorea pallidifolia (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298398-1>

Shorea pallidifolia P.S.Ashton, *Gard. Bull. Singapore* 22: 296 (1967).

Rubroshorea parvifolia (*Dyer*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298399-1>

Shorea parvifolia Dyer, *Fl. Brit. India [J. D. Hooker]* 1: 306 (1874).

Rubroshorea platycarpa (*F.Heim*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298400-1>

Shorea platycarpa F.Heim, *Bull. Mens. Soc. Linn. Paris* 2: 956 (1891).

Rubroshorea quadrinervis (*Slooten*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: Indonesia, West Kalimantan, Sambas, Sungei Akar, (collector not cited) bb. 29450 (BO) (Ashton 2004: 319).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298401-1>

Shorea quadrinervis Slooten, *Bull. Jard. Bot. Buitenzorg, ser. 3*, 17: 220 (1942).

Rubroshorea retusa (*Meijer*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: C. Kalimantan, Barito Ulu, Muara Tewe, *Malinka* bb. 29715 (BO) (Ashton 2004: 321).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298402-1>

Shorea retusa Meijer, *Acta. Bot. Neerl.* 12: 340 (1963).

Rubroshorea revoluta (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298403-1>

Shorea revoluta *P.S.Ashton*, *Gard. Bull. Singapore* 19: 304 (1962).

Rubroshorea rubra (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298404-1>

Shorea rubra *P.S.Ashton*, *Gard. Bull. Singapore* 19: 309 (1962).

Rubroshorea rugosa (*F.Heim*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298405-1>

Shorea rugosa *F.Heim*, *Bull. Mens. Soc. Linn. Paris* 2: 973 (1891).

Rubroshorea scabrida (*Symington*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298406-1>

Shorea scabrida *Symington*, *Gard. Bull. Straits Settlem.* 8: 287 (1935).

Rubroshorea singkawang (*Miq.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298407-1>

Shorea singkawang (*Miq.*) *Burck*, *Ann. Jard. Buitenzorg* 6: 219 (1887). *Hopea singkawang* *Miq.*, *Fl. Ned. Ind., Eerste Bijv.* 3: 489 (*Miquel* 1861).

Rubroshorea teysmanniana (*Dyer ex Brandis*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298408-1>

Shorea teysmanniana *Dyer ex Brandis*, *J. Linn. Soc. Bot.* 31: 100 (1895).

Rubroshorea uliginosa (*Foxw.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298409-1>

Shorea uliginosa *Foxw.*, *Malayan Forest Rec.* 10: 210 (*Foxworthy* 1932).

Rubroshorea section Ovalis (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298410-1>

Shorea section *Ovalis* *P.S.Ashton*, *Gard. Bull. Singapore* 20: 268 (1963).

Rubroshorea ovalis (*Korth.*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298411-1>

Shorea ovalis (*Korth.*) *Blume*, *Mus. Bot.* 2: 33 (1856).
Vatica ovalis *Korth.*, *Verh. Nat. Gesch. Ned. Bezitt., Bot.* 73 (*Korthals* 1841).

Ruborshorea section Pachycarpae (*F.Heim*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77303213-1>

Shorea section *Pachycarpae* *F.Heim*, *Rech. Dipt.* (1892: 44). Type species (designated here): *R. macrophylla* (*de Vriese*) *P.S.Ashton* & *J.Heck.*

Rubroshorea amplexicaulis (*P.S.Ashton*) *P.S.Ashton* & *J.Heck.*, **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298412-1>

Shorea amplexicaulis *P.S.Ashton*, *Gard. Bull. Singapore* 19: 273 (1962).

Rubroshorea beccariana (*Burck*) *P.S.Ashton* & *J.Heck.*, **comb. nov.** Holotype: Malaysia, Sarawak, loc. incert., *Beccari* P.B. 1127 (BO) (*Ashton* 2004: 235).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298413-1>

Shorea beccariana Burck, *Ann. Jard. Bot. Buitenzorg* 6: 213 (1887).

Rubroshorea macrophylla (*de Vriese*) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Indonesia, W Kalimantan, *de Vriese* s.n. (*Rubroshorea* H.L. no. 902146589), 'Borneo' (BO) (Ashton 2004: 287).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298414-1>

Shorea macrophylla (*de Vriese*) P.S.Ashton, *Gard. Bull. Singapore* 20: 278 (1963). Basionym: *Hopea macrophylla* *de Vriese*, *Minjak Tangkawang* (1861: 28).

Rubroshorea mecistopteryx (*Ridl.*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298415-1>

Shorea mecistopteryx *Ridl.*, *Bull. Misc. Inform., Kew* 1925: 280 (*Ridley* 1925).

Rubroshorea pilosa (*P.S.Ashton*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298417-1>

Shorea pilosa P.S.Ashton, *Gard. Bull. Singapore* 19: 304 (1962).

Rubroshorea pinanga (*Scheff.*) P.S.Ashton & J.Heck., **comb. nov.** Lectotype: Indonesia, Java, s.n., cult. in Hort. Bogor (holotype BO, isolectotypes L, U) (Ashton 2004: 313).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298418-1>

Shorea pinanga *Scheff.*, *Tijdschr. Nederl. Ind.* 31: 350 (*Scheffer* 1870).

Rubroshorea praestans (*P.S.Ashton*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298419-1>

Shorea praestans P.S.Ashton, *Gard. Bull. Singapore* 22: 297 (1967).

Rubroshorea rotundifolia (*P.S.Ashton*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298420-1>

Shorea rotundifolia P.S.Ashton, *Gard. Bull. Singapore* 22: 299 (1967).

Rubroshorea splendida (*de Vriese*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298422-1>

Shorea splendida (*de Vriese*) P.S.Ashton, *Gard. Bull. Singapore* 20: 279 (1963). *Hopea splendida* *de Vriese*, *Minjak Tangkawang* (1861: 28).

Rubroshorea stenoptera (*Burck*) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Indonesia, W Kalimantan, Sintang, *de Vriese* s.n. (L) (Ashton 2004: 338).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298423-1>

Shorea stenoptera *Burck*, *Meded. Lands Plantentuin* 3: 11 (1886).

Rubroshorea woodii (*P.S.Ashton*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298424-1>

Shorea woodii P.S.Ashton, *Tree Fl. Sabah & Sarawak* 5: 486 (2004).

Rubroshorea section **Rubella** (*P.S.Ashton*) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298425-1>

Shorea section *Rubella* P.S.Ashton, *Gard. Bull. Singapore* 20: 267 (1963). Type species: *Rubroshorea rubella* (P.S.Ashton) P.S.Ashton & J.Heck.

Rubroshorea albida (*Symington*) P.S.Ashton & J.Heck., **comb. nov.** Lectotype: Brunei, Kuala Belait, *Zainal* F.M.S. 30353 (holotype KEP, isolectotype L) (Ashton 2004: 221).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298426-1>

Shorea albida Symington, *Gard. Bull. Straits Settle.* 8: 283 (1935).

Rubroshorea dispar (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298427-1>

Shorea dispar P.S.Ashton, *Gard. Bull. Singapore* 31: 45 (1978).

Rubroshorea elliptica (Burck) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298428-1>

Shorea elliptica Burck, *Ann. Jard. Bot. Buitenzorg* 6: 215 (1887).

Rubroshorea negrosensis (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298429-1>

Shorea negrosensis Foxw., *Philipp. J. Sci., C.* 6: 274 (Foxworthy 1911).

Rubroshorea rubella (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298430-1>

Shorea rubella P.S.Ashton, *Gard. Bull. Singapore* 19: 307 (1962).

Richetia F.Heim (1891: 975, nomen nudum; 1892: 50). *Shorea* section *Richetioides* F.Heim (1892: 48). *Shorea* subgen. *Richetia* (F.Heim) Meijer (1963: 322). Type species: *Richetia coriacea* F.Heim (1891: 975), designated here.

VERNACULAR NAMES. Meranti damar hitam (general); lun (Iban).

Richetia acuminatissima (Symington) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298433-1>

Shorea acuminatissima Symington, *Gard. Bull. Straits Settle.* 9: 340 (1938).

Richetia alutacea (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298435-1>

Shorea alutacea P.S.Ashton, *Gard. Bull. Singapore* 22: 288 (1967).

Richetia angustifolia (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298436-1>

Shorea angustifolia P.S.Ashton, *Gard. Bull. Singapore* 19: 277 (1962).

Richetia bakoensis (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298437-1>

Shorea bakoensis P.S.Ashton, *Gard. Bull. Singapore* 22: 289 (1967).

Richetia balanocarpoides (Symington) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298438-1>

Shorea balanocarpoides Symington, *Gard. Bull. Straits Settle.* 9: 330 (1938).

Richetia blumutensis (Foxw.) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298439-1>

Shorea blumutensis Foxw., *Malayan Forest Rec.* 10: 236 (Foxworthy 1932).

Richetia chaiana (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298440-1>

Shorea chaiana P.S.Ashton, *Gard. Bull. Singapore* 31: 42 (1978).

Richetia collaris (Slooten) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298441-1>

Shorea collaris Slooten, *Reinwardtia* 3: 329 (1956).

Richetia conica (Slooten) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298442-1>

Shorea conica Slooten, *Reinwardtia* 3: 336 (1956).

Richetia coriacea F.Heim (1891: 975). *Shorea richetia* Symington (1938: 330).

Richetia cuspidata (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298443-1>

Shorea cuspidata P.S.Ashton, *Gard. Bull. Singapore* 22: 290 (1967).

Richetia faguetiana (F.Heim) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Malaysia, Sarawak, Kuching Distr., Matang, Beccari P.B. 2491 (P) (Ashton 2004: 253).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298444-1>

Shorea faguetiana F.Heim, *Bull. Mens. Soc. Linn. Paris* 2: 975 (1891).

Richetia faguetioides (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298445-1>

Shorea faguetioides P.S.Ashton, *Gard. Bull. Singapore* 19: 287 (1962).

Richetia gibbosa (Brandis) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298446-1>

Shorea gibbosa Brandis, *J. Linn. Soc. Bot.* 31: 99 (1895).

Richetia hopeifolia (F.Heim) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298447-1>

Shorea hopeifolia (F.Heim) Symington, *Gard. Bull. Straits Settlement.* 7: 150 (1933). *Cotylelobium hopeifolium* F.Heim, *Bull. Mens. Soc. Linn. Paris* 2: 971 (1891).

Richetia iliasii (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298449-1>

Shorea iliasii P.S.Ashton, *Gard. Bull. Singapore* 22: 291 (1967).

Richetia induplicata (Slooten) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298450-1>

Shorea induplicata Slooten, *Reinwardtia* 3: 327 (1956).

Richetia kuantanensis (P.S.Ashton) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298451-1>

Shorea kuantanensis P.S.Ashton, *Gard. Bull. Singapore* 31: 41 (1978).

Richetia kudatensis (G.H.S.Wood ex Meijer) P.S.Ashton & J.Heck., **comb. nov.** Holotype: Malaysia, Sabah, Kudat Distr., Tamalang Forest Reserve, G. H. S. Wood SAN 15363 (K) (Ashton 2004: 275).

<http://www.ipni.org/urn:lsid:ipni.org:names:77298452-1>

Shorea kudatensis G.H.S.Wood ex Meijer, *Act. Bot. Neerl.* 12: 346 (1963).

Richetia laxa (Slooten) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298453-1>

Shorea laxa Slooten, *Reinwardtia* 3: 345 (1956).

Richetia longiflora (Brandis) P.S.Ashton & J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298454-1>

Shorea longiflora (Brandis) Symington, *Gard. Bull. Straits Settlement.* 9: 330 (1938). *Hopea longiflora* Brandis, *J. Linn. Soc., Bot.* 31: 63 (1895).

Richetia longisperma (Roxb.) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298455-1>

Shorea longisperma Roxb., *Fl. Ind. Carey ed.* 2, p. 618
(Roxburgh 1832).

Richetia macrobalanos (P.S.Ashton) P.S.Ashton &
J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298456-1>

Shorea macrobalanos P.S.Ashton, *Gard. Bull. Singapore* 22:
292 (1967).

Richetia maxima (King) P.S.Ashton & J.Heck., **comb.**
nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298457-1>

Shorea maxima (King) Symington, *Gard. Bull. Straits
Settlem.* 9: 339 (1938). *Balanocarpus maximus* King,
J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 62 (2): 133 (1893).

Richetia mujongensis (P.S.Ashton) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298458-1>

Shorea mujongensis P.S.Ashton, *Gard. Bull. Singapore* 22:
292 (1967).

Richetia multiflora (Burck) P.S.Ashton & J.Heck., **comb.**
nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298459-1>

Shorea multiflora (Burck) Symington, *Gard. Bull. Straits
Settlem.* 9: 330 (1938). *Doona multiflora* Burck, *Ann.
Jard. Bot. Buitenzorg* 6: 231 (1887).

Richetia obovoidea (Slooten) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298460-1>

Shorea obovoidea Slooten, *Reinwardtia* 3: 332 (1956).

Richetia patoiensis (P.S.Ashton) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298462-1>

Shorea patoiensis P.S.Ashton, *Gard. Bull. Singapore* 19:
302 (1962).

Richetia peltata (Symington) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298463-1>

Shorea peltata Symington, *J. Malayan Branch Roy. Asiat.
Soc.* 19: 158 (1941).

Richetia polyandra (P.S.Ashton) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298464-1>

Shorea polyandra P.S.Ashton, *Gard. Bull. Singapore* 22:
286 (1967).

Richetia subcylindrica (Slooten) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298465-1>

Shorea subcylindrica Slooten, *Reinwardtia* 3: 331 (1956).

Richetia tenuiramulosa (P.S.Ashton) P.S.Ashton &
J.Heck., **comb. nov.**

<http://www.ipni.org/urn:lsid:ipni.org:names:77298466-1>

Shorea tenuiramulosa P.S.Ashton, *Gard. Bull. Singapore*
31: 42 (1978).

Richetia xanthophylla (Symington) P.S.Ashton & J.Heck.,
comb. nov.

<http://www.ipni.org/urn:lsid:ipni.org:names:77298467-1>

Shorea xanthophylla Symington, *Gard. Bull. Straits
Settlem.* 9: 342 (1938).

Species incertae sedis:

Shorea furfuracea Miq. (Miquel 1861: 488).

The lofty emergent canopy of dipterocarps by which the equatorial lowland forests of Asia were so elegantly distinguished has now become restricted by conversion and unmanaged logging to national parks and nature reserves, most small, in Malaysia and Sri Lanka but for larger swathes in Sabah; also the Temburong District of the Sultanate of Brunei which has now lost its isolation, having been connected to the rest of its nation by a 30 km bridge, seemingly in part over the mangrove which is itself the world's most species rich, ostensibly to enhance development. Little unlogged forest remains elsewhere in the Indonesian Sunda heartlands, or Philippines. Many species are now reduced to clusters too small to ensure long term sustainment, and some may now be extinct. The priority must be in conservation research policy planning and execution. In this, the dipterocarps, with their easily identifiable coriaceous rot-resistant leaves, and their high habitat specificity, provide a unique field tool for this critical endeavour. The re-establishment of clearly recognisable generic boundaries within the tribe Shoreae provides a botanical icon comparable to the great terrestrial vertebrates to this quest.

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