

A New Bornean *Paraboea* (Gesneriaceae) Species Endemic to Niah National Park, Sarawak and Further Plant Records from Niah

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Abstract

Paraboea culminicola K.G. Pearce, endemic to the Subis limestone at Niah, was first collected in 1932 and subsequently in 1961, 1962 and 2002. The species is described and illustrated. In addition, a list is provided of 357 taxa (356 species) from Niah represented by specimens in the herbarium of the Sarawak Forestry Corporation (SAR), bringing the total number of taxa recorded for Niah National Park to c. 550 and the total number for the Park and its vicinity to c. 700; the total number of taxa associated with limestone at Niah to 281; and the total of Borneo endemics found in the Park to 19 taxa.

Introduction

Paraboea in Borneo is currently represented by 14 described species. All but one (*P. paraboeoides* (Kranzlin) B.L.Burt) are found on limestone and typically the species have restricted distributions, are described from a single or few collections and from remote locations (Burt, 1984; Xu & Burt, 1991).

In limestone locations in Sarawak for which data are available, more than one *Paraboea* species co-exist on the same hill (west Sarawak with *P. clarkei* B.L.Burt and *P. havilandii* (Ridl.) B.L.Burt (Kiew *et al.* 2004) and Mulu with *P. banyengiana* B.L.Burt, *P. candidissima* B.L.Burt, *P. effusa* B.L.Burt and *P. meiophylla* B.L.Burt (Burt, 1982) and now on the Niah limestone with *P. speluncarum* B.L.Burt (Burt, 1971) and the new species, *P. culminicola* K.G.Pearce, here described.

In preparation of the checklist of plants from the Niah National Park, (Pearce, 2004), based on botanical field investigations and examination of herbarium specimens carried out as part of the Sarawak Forest Department/DANIDA Project 'Support to Wild Life Master Plan Implementation through the Improved Management of Totally Protected Areas in Sarawak, Malaysia', a re-examination of the *Paraboea* specimens showed that one specimen from near the summit of Bukit Kasut did not conform to any species yet described from Sarawak. It was neither *P. speluncarum*, which is endemic to the Park, nor did it fit the description

for *P. treubii* H.O. Forbes as suggested by Burt (1971). This prompted a further look at other Niah *Paraboea* specimens in SAR with the conclusion that it is a distinct new species, here described as *P. culminicola*.

The Niah National Park includes the striking Gunung Subis limestone massif that reaches 394 m elevation and Bukit Kasut, a smaller limestone hill 220 m high. The Great Cave, world famous for its edible birds nests and prehistoric remains, and sometimes called 'Niah Caves' on herbarium labels, is located in the northern part of the Gunung Subis massif.

This new species was first collected in 1932 (Synge 589) and subsequently in 1961 (Anderson S16045) and 1962 (Burt & Woods B2023). In 1971, Burt described *Paraboea speluncarum* (then placed in the genus *Boea*) from Niah Caves. In the same paper he mentioned *Paraboea treubii* (H.O. Forbes) B.L. Burt originally described from Karangnata, Sumatra (Forbes, 1882) ascribing it to the three specimens from 'Niah Caves' and Gunung Subis, together with Henderson SFN 19459, a specimen from Gua Tipus, Pahang, Peninsular Malaysia. At the time, Burt considered that *Boea havilandii* (a monocarpic species from west Sarawak) 'may well be' a synonym of *B. treubii* as he then understood it, although he noted that *B. havilandii* differed in 'detail of indumentum and nervature on the underside of the leaf'.

In 1982, Burt described four new species of *Paraboea* from Gunung Mulu National Park, Sarawak (*P. banyengiana*, *P. candidissima*, *P. effusa* and *P. meiophylla*). Burt noted that *P. effusa* is 'similar to *P. treubii* (H.O. Forbes) B.L. Burt but differs from this in its habit, which is not monocarpic, and its glabrous sepals'. In 1984, Burt published revised generic concepts for *Boea* Lam and its allies, citing additional specimens from Gua Musang, Kelantan for *P. treubii*.

In 1991, Xu and Burt described a new species, *P. nervosissima*, from Peninsular Malaysia, based on specimens from Gua Tipus and Gua Musang, Kelantan. However, they made no mention of the Niah specimens. This left the three Niah specimens (Synge 589, Anderson S 16045 and Burt & Woods B 2023) doubtfully as *P. treubii*. A further Niah specimen deposited at SAR (Sonny Tan & E. Wright S 27279) and a DANIDA SWMPI Project plot specimen from the summit of Bukit Kasut, Niah National Park, also represent this taxon.

This new species differs from *Paraboea havilandii* in the felty rather than woolly tomentum covering the leaf undersurface, the shorter petiole (3–6 mm long not 7–10 mm long), the greater number of pairs of leaf veins (> 30 not 15–16 pairs) and more elongate calyx (> 3 times rather than 2 times as long as wide at the midpoint) and shorter fruit (inclusive of persistent style 1.5–2 cm, not 3.5 cm long). The new species differs from *P.*

effusa in its greater number of veins (> 30 pairs rather than 12–21 pairs), relatively narrower calyx lobes (3–5 times rather than up to 2.5 times as long as wide at the midpoint) and shorter fruit (1.5–2 cm, not 2.8 cm long). It is therefore a distinct new species and is described below.

***Paraboea culminicola* K.G.Pearce, sp. nov.**

Paraboea culminicola K.G.Pearce, sp. nov. a *P. havilandii* (Ridl.) B.L.Burtt et *P. effusa* B.L.Burtt nervis foliorum magis numerosis (>30-jugis non 12–21) et fructibus brevioribus (1.5–2 cm non 2.8–3.5 cm) distincta et etiam a *P. culminicola* petiolis brevioribus (3–6 mm longis non 7–10 mm) differt. **Typus:** Southern slopes of Gunong Subis, near Sekaloh river; Miri District; Fourth Division Sonny Tan & E. Wright S 27279 (holo SAR).

Unbranched herb, 75–120 cm tall. *Stem* woody, with or without shrivelled remains of dead leaves persisting below, with close, felty indumentum of matted hairs. Young parts with a network of fine, cobwebby white hairs, eventually lost. *Leaves* in whorls of 4; petiole winged, to 7–10 mm long; blade discolorous, adaxial surface reddish grey-brown, with fine, cobwebby white hairs eventually lost (barely visible at 10x magnification, thickly scattered globose, glistening (apparently) glandular hairs), abaxial surface with a pale cinnamon-brown, close, thin felty, persistent indumentum, oblanceolate, somewhat falcate, 25–30 x 5.5–6 cm, base with wings decurrent on the petiole, margin entire to obscurely dentate, veins c. 35 pairs, prominent below. *Inflorescence* a terminal panicle, its branches subtended by more or less sessile foliose bracts, axes tomentose as the stem, lowest branches 20–40 cm long, *flowers* with pedicel to 2.2 cm long, calyx 2–5.5 mm long, split almost to the base, lobes narrowly triangular, 3–5 or more times as long as the width at the midpoint, apices incurved, corolla in life pinkish cream or very pale blue, tube c. 2 mm long, the two posterior lobes c. 8 x 6 mm divided by a 2 mm-long sinus, the anterior lip c. 1.1 cm long, trilobed, median lobe 6 x 6 mm; stamens arising at the mouth of the tube, filaments c. 3 x 0.5 mm, flat, anthers transverse, cohering face to face, 4 x 2.5 mm, beaked; ovary c. 1.5 mm, glabrous, narrowed to a glabrous style 3.5–6 mm long. *Fruit* a capsule to 2 cm long, glabrous, spirally twisted.

Distribution: Borneo – SARAWAK: endemic to the Subis limestone

Habitat: On bare, exposed limestone rocks or on mor soil at or near the summit of limestone hills or pinnacles at 120–220 m altitude.

Notes: *Paraboea culminicola* is named for its habitat (at or near summits) and to contrast its habitat as one of a pair of *Paraboea* species endemic to Niah, the other being *P. speluncarum*. It would not be confused with *P. speluncarum*, which has leaves with c. 20 pairs of veins, which tend to be obscured by a thick woolly indumentum on the abaxial leaf surface.

Other specimens examined:

SARAWAK: Miri District, Niah National Park - *Anderson SI6045* (SAR), southern slopes of Gunung Subis, near Sekaloh river; Bukit Kasut
DANIDA/SWMPI Plot Specimen Plot 20 No. 1 (SAR).

Further Plant Records from Niah

A checklist of plant species occurring at or in the vicinity of Niah National Park, Sarawak, (Pearce, 2004), included c. 343 taxa (not all identified to species), represented by >300 collections made during recent investigations in the Park as part of the DANIDA/SWMPI Project Support to Wild Life Master Plan Implementation through the Improved Management of Totally Protected Areas in Sarawak, Malaysia (2000 – 2003) and >100 other records, chiefly earlier SAR collections.

A second checklist presented here includes an additional 357 taxa not listed in the earlier checklist, represented by >450 specimens in the SAR collection. The majority of these have been collected by the Sarawak Forest Department. Of these, 115 taxa are noted as being associated with limestone. This brings the total number of limestone-associated taxa at Niah to c. 281 (Pearce, 2004 reported 167 taxa associated with limestone for Niah, now 166 with the confirmation of *S 89270* as *Calanthe triplicata*).

Not all the specimens here cited were collected from what is now Niah N.P. About 180 specimens, mostly collected from Ulu Sg. Sekaloh, may have been located up to 15 km from the Park, the distance Sg. Sekaloh extends beyond the Park boundary. These specimens are mostly trees, collected in the 1960s, some from logging areas, and include many dipterocarp species. They indicate the richness of dipterocarp forest and some dimensions reached by trees in this area. A portion of this mixed dipterocarp forest is still protected in the Park's south west. Approximately 144 of the species in this checklist are represented only by such 'park vicinity' specimens.

The c. 90 tree and c. 21 epiphyte species from the Park listed here serve to provide a more complete picture of the flora of Niah N.P., the herb and shrub flora having been well-collected through the efforts of G.D. Haviland, C. Hose, Ahmad, W.M.A. Brooke, B.L. Burt, the DANIDA/SWMPI Project and others.



Figure 1. *Paraboea culminicola* K.G.Pearce. A. Shoot tip with inflorescence; B. leaf; C. indumentum of the lower leaf surface; D. flower, E. front view of flower, F. L.S. flower; G. flower after the corolla has fallen; H. stamens; I. fruit after dehiscence. (A-H DANIDA/SWMPI Plot Specimen Plot 20 No. 1; I. S27279).

However, species identifications of *Psychotria*, *Gnetum* and *Saurauia* remain uncertain.

At least 35 taxa here listed are Borneo endemics. Of these, seven (*Endocomia virella* W.J. de Wilde, *Gonystylus calophyllus* Gilg, *Paraboea culminicola* Pearce, *Shorea calcicola* P.S.Ashton, *S. seminis* (de Vr.) Slooten, *Vatica badiifolia* P.S.Ashton, *Voacanga havilandii* Ridley and *Zizyphus borneensis* Merr.) occur within the Park, bringing the number of Borneo endemics found within the Park to 19 (Pearce, 2004).

This second checklist of taxa is not the last word on species that occur in Niah N.P. and in its vicinity. Some specimens collected from Niah are not represented at SAR (e.g. those collected by P.M. Syngé in 1932 (Pearce, 2003)). Furthermore, some specimens recorded in the SAR card index file representing species not already included in this or the earlier (Pearce, 2004) checklist could not be located on the shelves.

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Appendix – Checklist of Plants Collected from Niah National Park

Note: descriptions of plants and habitats from field notes have been merged when there are more than one specimen.

MDF = Mixed Dipterocarp Forest; P.F. = Permanent Forest

G. = Gunung; Sg. = Sungai; Kg. = Kampung

* species associated with limestone at Niah National Park

^E species endemic to Borneo

ACANTHACEAE

**Borneacanthus grandifolius* Bremek.

Shrub 1 m tall. At base of limestone hill near river, alluvial soil, also limestone scree below cave, mineral soil. Southern slopes of G. Subis near Sekaloh River Sonny Tan & E. Wright S 27261; Sekaloh, G. Subis, Niah J.A.R. Anderson S 31960.

Hygrophila angustifolia R.Br.

Flat, wet ground at foot of hill. G. Subis, Niah B.L. Burt & P.J.B. Woods B 2022.

Hygrophila salicifolia (Vahl) Nees

Niah Haviland 3513A.

Pseuderanthemum crenulatum Radlk.

G. Subis area, Niah Mohidin S 21676.

**Ptyssiglottis caudata* (Stapf) B. Hansen

Limestone. Valley in front of Niah Caves B.L. Burt & P.J.B. Woods B 2013.

**Ptyssiglottis frutescens* Hallier

Shrublet 60–100 cm tall. Lower slopes of limestone hill, numerous limestone boulders. G. Subis area, Niah Mohidin S 21679; Southern slopes of G. Subis near Sekaloh River Sonny Tan & E. Wright S 27271.

Ptyssiglottis psychotriifolia (Stapf) B. Hansen

G. Subis area Niah Mohidin S 21667.

Rungia salaccensis Valetton

1–1.3 m tall. In jungle on wet ground. Kg. Tangap, Niah Ahmad 26; G. Subis area, Niah Mohidin S 21655.

Staurogyne sp.

G. Subis area, Niah Mohidin S 21654.

ADIANTACEAE

**Adiantum caudatum* L.

Limestone. Niah C. Hose s.n.; G. Subis area, Niah Mohidin S 21695.

**Adiantum hosei* Baker

Small terrestrial fern. In damp, shady crevices of limestone rockface at 67 m a.s.l. Great Cave, G. Subis, Niah J.A.R. Anderson S 31938.

**Taenitis cordata* (Gaudich.) Holttum

Small terrestrial fern. In shaded, dry rock crevices on damp, shaded limestone rockface at 67 m a.s.l., Great Cave, G. Subis, Niah J.A.R. Anderson S 31945.

AGAVACEAE

Dracaena elliptica Thunb.

G. Subis area, Niah Mohidin S 21675.

ALANGIACEAE

Alangium javanicum (Blume) Wangerin var. *javanicum*

Tree 18 m tall, 45 cm girth. Lowland MDF 150 m a.s.l., soil sandy clay. Sg. Sekaloh, Niah N.P. Yui Puan Ching S 40127.

ANACARDIACEAE

**Buchanania arborescens* (Blume) Blume

Tree 3 m tall, 20 cm girth. Limestone hill summit 110 m a.s.l. Yui Puan Ching S 40184.

Parishia maingayi Hook.f.

Tree 31 m tall, 75 cm girth. G. Subis P.F., Niah J.A.R. Anderson & Chew Wee Lek S 16022.

Semecarpus glaucus^E Engl.

Tree 5.3 m tall, 12.5 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibit ak Luang S 26136.

ANNONACEAE

Alphonsea ?johorensis J. Sinclair

Tree 17 m tall, 37 cm girth. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah *Erwin Wright S 29271*.

Cyathocalyx magnifica Diels

Tree 8.7 m tall, 17.5 cm girth. Lowland dipterocarp forest, alluvial soil beside stream. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 27877*.

Dasymaschalon blumei Finet & Gagnep.

Trelet 4 m tall. Primary lowland dipterocarp forest, clay sandy soil beside river. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 27873*.

Desmos teijsmannii Merr.

Climber on tree. Riverine forest also MDF near stream on steep slope. Along Sg. Niah, Niah N.P. *Paul Chai S 40057, Yui Puan Ching S 40121*.

**Enicosanthum coriaceum* (Hook.f. & Th.) Airy Shaw

Tree 8 m tall, 30 cm girth. Primary forest, lower flanks of limestone mountain. G. Subis, Niah *J.A.R. Anderson S 31646*.

Goniothalamus uvarioides Ridl.

Shrub 2.3 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26121*.

Monocarpia borneensis J.B. Mols & P.J.A. Kessler

Tree 22 m tall, 45 cm girth. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah *Erwin Wright S 29268*.

Polyalthia sumatrana (Miq.) Kurz

Tree 23 m tall, 90 cm girth. Primary lowland dipterocarp forest on clay loam soil. G. Subis area, Niah *Mohidin S 21644*; Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26104, Erwin Wright S 29120*.

Pseuduvaria pamattonis (Miq.) Su & Saunders

Tree 18 m tall, 39 cm girth. Lowland MDF 150 m a.s.l., soil sandy clay. Sg. Sekaloh, Niah N.P. *Yui Puan Ching S 40126*.

**Stelechocarpus cauliflorus* (Scheff.) R.E. Fr.

Trelet 5 m tall. On steep slope of limestone hill at 80 m a.s.l. Niah N.P. *Bernard Lee S 40078*.

Uvaria littoralis Blume

Climber on tree. On mudstone outcropping from riverbank also riverine forest. Nangau Sekalan, Ulu Sungei Sekaloh, Niah river *J.A.R. Anderson S 27599*; along Sg. Niah, Niah N.P. *Yui Puan Ching S 40114*.

APOCYNACEAE

**Kopsia arborea* Blume

6 m tall, 27 cm girth. In exposed situation on limestone cliff at 117 m alt. G. Subis, Niah *J.A.R. Anderson S 16033*.

Voacanga havilandii^E Ridley

Tree 17 m tall, 45 cm diam. On wet podsolic soil. Niah N.P. *Rena George S 39934*.

AQUIFOLIACEAE

Ilex cymosa Blume

Tree 3 m tall, 25 cm girth. Riverine forest. Along Niah river, Niah Yü Puan Ching S 40146.

**Ilex malaccensis* Loes.

Small tree or shrub. Summit ridge of limestone 267 m alt., limestone strongly dissected and covered by 15–23 cm 'mor' layer. Sg. Sekaloh, G. Subis, Niah J.A.R. Anderson S 31929.

ARACEAE

Homalomena elliptica Hook.f.

G. Subis area, Niah Mohidin S 21630.

**Homalomena griffithii* Hook.f. forma *acuminata* (Ridl.) Furtado

Herb on limestone rock. Foot of limestone at 17 m a.s.l. G. Brangin, Ulu Sg. Subis, Niah N.P. Yü Puan Ching S 40176.

Homalomena rostratum Griff.

Boggy ground at edge of primary forest. Pengkalan Lobang to Niah Caves B.L. Burt & P.J.B. Woods B 1999.

**Scindapsus coriaceus* Engl.

Epiphytic shrub 60–100 cm tall. Limestone hill, lower summit ridge, limestone pinnacles and 'mor' soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27563.

ARECACEAE

Pinanga mooreana J. Dransf.

Palm 7 m tall. Ulu Sg. Sekaloh, Niah river Erwin Wright S 29126.

ASPLENIACEAE

**Asplenium filicipes* Copel.

Small terrestrial fern. On limestone rocks, ravine between two limestone hills, limestone pavement and small heavily eroded limestone hillocks. G. Subis area, Niah Mohidin S 21620; Outside Great Cave, G. Subis, Niah J.A.R. Anderson 31906.

**Asplenium phyllitidis* D. Don.

In side (sic) Gua Tulang on rock Ahmad 103.

**Asplenium squamulatum* Blume

Epiphytic fern on small tree. Damp and shaded at base of limestone rock face at 67 m a.s.l. Great Cave, G. Subis, Niah J.A.R. Anderson S 31943.

**Asplenium thunbergii* Kunze

Small terrestrial fern. On rocks, also epiphytic at base of small trees, ravine between two limestone hills, limestone pavement and small heavily eroded limestone hillocks. Outside Great Cave, G. Subis, Niah J.A.R. Anderson 31904.

**Asplenium* aff. *unilaterale* Lam.

Small terrestrial fern. Slope between caves, limestone rocks, on residual soil not

on limestone, in semi-shaded locality, habitat semi-exposed, trees mainly felled.
Great Cave, G. Subis, Niah *J.A.R. Anderson 31914*.

ASTERACEAE

Blumea balsamifera (L.) DC.

2 m tall. In jungle on wet ground. Kg. Tangap, Niah *Ahmad 18*.

Sparganophorus vailantii Crantz

Wet, flat ground at foot of hill. G. Subis, Niah *B.L. Burt & P.J.B. Woods B 2023*.

Synedrella nodiflora Gaertn.

At path side. Niah Caves *B.L. Burt & P.J.B. Woods B 2011*.

BIGNONIACEAE

Deplanchea bancana (Scheff.) Steenis

Tree 40 m tall, 200 cm girth. Primary forest, alluvial soils, sandy, approaching kerangas type. Path from Pangkalan to Great Cave, Niah *J.A.R. Anderson 16427*.

BORAGINACEAE

**Tournefortia* sp.

Small climber or scrambler. Hanging on limestone cliff face. Outside Great Cave, G. Subis, Niah *J.A.R. Anderson S 31917*.

BURMANNIACEAE

Burmannia sp.

G. Subis area, Niah *Mohidin S 21638*. (Mixed collection)

Gymnosiphon aphyllum Blume

G. Subis area, Niah *Mohidin S 21638* (Mixed collection).

BURSERACEAE

**Canarium odontophyllum* Miq.

Tree 20 m tall, 65 cm girth. On steep slope of limestone hill at 80 m a.s.l. Niah N.P. *Bernard Lee S 40073*.

Santiria apiculata A.W. Benn. var. *apiculata*

Shrub 3 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26133*.

Santiria mollis^E Engl.

Tree 23 m tall, 120 cm girth. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah *Erwin Wright S 29272*.

CAPPARACEAE

**Crateva magna* (Lour.) DC.

Tree 10 m tall, 53 cm girth. On steep slope of limestone hill at 80 m a.s.l. Niah N.P. *Bernard Lee S 40074*.

CECROPIACEAE

Poikilospermum cordifolium (Barg.-Petr.) Merr.

Large climbing epiphyte to 10 m. Disturbed belian forest, alluvial soils at base of

limestone hill. Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. Anderson S 27582.

**Poikilospermum scabrinervium* (Barg.-Petr.) Merr.

Woody herb to 2 m tall. On limestone rock c. 50 m a.s.l. Niah N.P. Bernard Lee S 40087.

Poikilospermum suaveolens (Blume) Merr.

Climber 15–27 m tall entwined round tree. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah Benang ak Bubong S 27885, Erwin Wright S 29275.

CELASTRACEAE

Bhesa paniculata Arn.

Tree 20 m tall, 60 cm girth. MDF on clay loam soil, 100 m alt. Ulu Sg. Sekaloh, Niah river J.A.R. Anderson, Sonny Tan & E. Wright S 26068.

Kokoona sp.

Tree 25 m tall, 100 cm girth. Lowland MDF 80 m a.s.l., soil sandy loam. Sg. Sekaloh, Niah N.P. Yü Puan Ching S 40130.

Lophopetalum glabrum^E Ding Hou

Tree 15 m tall, 40 cm girth. Primary MDF on gentle slope, clay loam soil. Ulu Sg. Sekaloh, Niah river J.A.R. Anderson, Sonny Tan & E. Wright S 26124; Niah N.P. Bernard Lee S 40072.

**Reissantia grahamii* (Wight) Ding Hou

Creeper. Limestone hill summit 110 m a.s.l. G. Brangin, Niah N.P. Yü Puan Ching S 40185.

**Siphonodon celastrineus* Griff.

Tree 10 m tall, 40 cm girth. On near vertical slope of limestone hill, dry and in partial shade, 67 m alt. G. Subis, Niah J.A.R. Anderson S 16034.

CHRYSOBALANACEAE

Maranthes corymbosa Blume

Tree 18 m tall, 90 cm girth. MDF remnant forest. Niah N.P. Bernard Lee S 40067.

CLUSIACEAE

Garcinia parvifolia Miq.

Tree 17 m tall, 60 cm girth. On mudstone outcropping from river bank. Nangau Sekalan, Ulu Sg. Sekaloh, Niah river J.A.R. Anderson S 27288, Erwin Wright S 29264.

COMBRETACEAE

Combretum tetralophum C.B. Clarke

Climber on tree. Riverine forest. Along Sg. Niah, Niah N.P. Yü Puan Ching S 40115.

CONNARACEAE

Agelaea borneensis Merr.

Small climber. MDF, clay loam soil, sedimentary rocks, 100 m alt. Ulu Sg. Sekaloh,

Niah river *E. Wright S 27251*.

Connarus grandis Jack

Climber 23 m tall. MDF. Ulu Sg. Sekaloh, Niah *Erwin Wright S 29273*.

Ellipanthus beccarii Pierre var. *peltatus*^E (Schellenb.) Leenh.

Tree 7 m tall, 12.5 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26109*.

Rourea mimosoides Planch. f. *obtusifolia* Leenh.

Climber on tree. Riverine forest and river bank on sandy clay soil. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson 27295*; Along Niah River, Niah N.P. *Yii Puan Ching S 40148*.

COMMELINACEAE

Amischotolype marginata Hassk.

Large herbaceous creeper. Alluvial soil at base of limestone hill near river. Southern slopes of G. Subis, near Sekaloh River *Sonny Tan & E. Wright S 27258*.

CONVOLVULACEAE

Erycibe bullata Ridl. ex Hoogl.

Tree 5.7 m tall, 10 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26119*.

Erycibe glomerata Blume

Treelet 2.4 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29107*.

CUCURBITACEAE

**Gynostemma pentaphyllum* (Thunb.) Makino

Small climber climbing by tendrils to 7 m. Swampy area near stream, alluvium with limestone influence, 33 m a.s.l. Path from Pangkalan Lobang to Great Cave, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26073*.

DAVALLIACEAE

Davalia solida (G. Forst.) Sw.

Riverine forest. Along Sg. Niah, Niah N.P. *Yii Puan Ching S 40155*.

DENNSTAEDTIACEAE

Lindsaea scandens Hook. var. *terrestris* Holttum

Fronds dark shining green above, paler below. In loose litter on forest floor. Pengkalan Lobang to Niah Caves *B.L. Burt & P.J.B. Woods B 2002*.

DICHAPETALACEAE

Dichapetalum setosum Leenh.

Climber to 17 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26106*.

DILLENACEAE

Dillenia excelsa Martelli (Jack) Gilg var. *pubescens* (Corner) Corner ex Masamune

Tree 17 m tall, 25 cm girth. Primary lowland dipterocarp forest on clay loam soil.

Ulu Sg. Sekaloh, Niah river *Sibat ak Luang* S 26147.

Tetracera korthalsii Miq. var. *subrotunda* (Elmer) Hoogl.

Climber on tree. Along river bank, riverine forest. Along Niah river, Niah N.P. *Yü Puan Ching* S 40141.

DIPTEROCARPACEAE

Anisoptera costata Korth.

Tree 17 m tall, 210 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Edwin Wright* S 29127

Anisoptera grossivenia^E Slooten

Tree to 27 m tall, 230 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Sibat, Banyeng & Adenan* S 26164, S 26167.

Dipterocarpus acutangulus Vesque

Tree 32 m tall, to 203 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Sibat, Banyeng & Adenan* S 26168, S 26170.

Dipterocarpus applanatus^E Slooten

Tree 30 m tall, 273 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Sibat & Adenan* S 22553, *Benang & Adenan* S 22594.

Dipterocarpus caudatus Foxw. ssp. *penangianus* (Foxw.) P.S.Ashton

Tree 32 m tall, 85 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m alt. Ulu Sg. Sekaloh, Niah river *Sibat, Banyeng & Adenan* S 26173.

Dipterocarpus caudiferus Merr.

Tree to 33 m tall, 315 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Sibat & Adenan* S 22590, S 22591, S 22592.

Dipterocarpus elongatus Korth.

Tree to 30 m tall, 133 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Banyeng & Adenan* S 22573.

Dipterocarpus verrucosus Foxw. ex Slooten

Tree to 30 m tall, 225 cm girth. Lowland MDF on clay loam soil, 100–150 m a.s.l. Ulu Sg. Sekaloh, Niah river *Sibat & Adenan* S 22559, S 22560, *Adenan bin Dillah & Banyeng ak Nudong* S 26151; Sg Sekaloh, Niah N.P. *Yü Puan Ching* S 40125.

**Hopea plagata* (Blanco) Vidal

Tree 23 m tall, 148 cm girth. On limestone. South side of G. Subis in Sekaloh River, Niah *Sibat & Adenan* S 22568.

Parashorea cf. *lucida* (Miq.) Kurz

Tree 23 m tall, 188 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m alt. Ulu Sg. Sekaloh, Niah river *Sibat & Adenan* S 22588.

Shorea almon Foxw.

Tree 30 m tall, 308 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Adenan bin Dillah & Banyeng ak Nudong S 26153, S 26163, Banyeng & Adenan S 22576.

Shorea argentifolia^E Symington

Tree 33 m tall, 285 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Banyeng & Adenan S 22578, Sibat & Adenan S 26175.

Shorea cf. *atrinervosa* Symington

Tree 33 m tall, 193 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat, Banyeng & Adenan S 26171, Sibat & Adenan S 26176.

Shorea balanocarpoides Symington

Tree 23 m tall, 88 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 26174.

Shorea beccariana^E Burck

Tree 31 m tall, 323 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 22554, Sibat, Banyeng & Adenan S 26166.

**Shorea calcicola*^E P.S. Ashton

G. Subis, Miri District, Sg. Sekaloh. Sylvester S 27282.

Shorea confusa^E P.S. Ashton

Tree 27 m tall, 330 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Banyeng & Adenan S 22575.

Shorea domatiosa^E P.S. Ashton

Tree 33 m tall, 318 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 22593, Benang & Adenan S 22597, S 22598.

Shorea faguetiana F.Heim

Tree 27 m tall, 208 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 22587.

Shorea faguetioides^E P.S. Ashton

Tree 30 m tall, 208 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Banyeng & Adenan S 22579, S 22580, Adenan bin Dillah & Benang ak Bubong S 26161.

Shorea fallax^E Meijer

Tree 23 m tall, 128 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Adenan bin Dillah & Benang ak Bubong S 26160.

Shorea ferruginea^E Dyer ex Brandis

Tree 30 m tall, 88 cm girth. Primary lowland dipterocarp forest on clay loam soil,

100 m alt. Ulu Sungei Sekaloh, Niah river Adenan bin Dillah & Banyeng ak Nudong S 26154.

Shorea macroptera Dyer

Tree 30 m tall, 233 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Benang & Adenan S 22595, Adenan bin Dillah & Banyeng ak Nudong S 26156.

Shorea macroptera Dyer ssp. *macropterifolia*^E P.S. Ashton

Tree 30 m tall, 140 cm girth. Primary lowland dipterocarp forest on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Adenan bin Dillah & Benang ak Bubong S 26157, S 26159.

Shorea mecistopteryx^E Ridl.

Tree 33 m tall, to 350 cm girth. Primary lowland dipterocarp forest or MDF on reddish clay loam soil, 100 m alt. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 22557, S 22589, Benang & Adenan S 22585, Adenan bin Dillah & Banyeng ak Nudong S 26152, E. Wright S 29278.

Shorea ochracea^E Symington

Tree 33 m tall, to 488 cm girth. Primary lowland dipterocarp forest or MDF on reddish clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Benang & Adenan 22600, Adenan bin Dillah & Benang ak Bubong S 26158.

Shorea parvistipulata^E F.Heim ssp. *albifolia* P.S. Ashton

Tree 30 m tall, to 320 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river Sibat & Adenan S 22561, Adenan bin Dillah & Benang ak Bubong S 26162.

Shorea pauciflora King

Tree 27 m tall, to 293 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah Benang & Adenan S 22599.

Shorea saggitata^E P.S. Ashton

Tree 23 m tall, to 233 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah Sibat & Adenan S 22558.

**Shorea seminis* (de Vr.) Slooten

Tree 27 m tall, 2 m girth. Alluvial soils by Sg. Sekaloh at base of limestone cliff. On southern slope of G. Subis in Sekaloh river, Niah Sibat & Adenan S 22567.

Shorea smithiana^E Symington

Tree 33 m tall, to 323 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah Banyeng & Adenan S 22577, S 22581, S 22586.

Shorea superba^E Symington

Tree 33 m tall, to 325 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah Sibat & Adenan S 22556, Adenan bin Dillah & Banyeng ak Nudong S 26155.

Vatica badiifolia^E P.S. Ashton

Tree 31 m tall, to 298 cm girth. Primary lowland dipterocarp forest or MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah Sibat, Banyeng & Adenan S 26165.

**Vatica globosa*^E P.S. Ashton

Limestone. Niah G.D. Haviland & C. Hose Hav. 3159.

DRYOPTERIDACEAE

**Tectaria brooksii* Copel.

Small terrestrial fern. On dry, shaded vertical bare limestone rock also cave and large overhang 100 m up on steep limestone hill, light dry soil partly composed of guano and damp also shaded limestone rockface at 67 m a.s.l. G. Subis, Niah Mohidin S 21690 J.A.R. Anderson S 16024; Gua Pangomah, G. Subis, Niah J.A.R. Anderson S 31687; Great Cave, G. Subis, Niah J.A.R. Anderson S 31949.

**Tectaria melanorachis* (Baker) Copel.

Terrestrial fern. On damp and shaded limestone rockface at 67 m a.s.l. Great Cave, G. Subis, Niah J.A.R. Anderson S 31944.

**Tectaria pleiosora* (Alderw.) C. Chr.

Terrestrial fern 60–100 cm high. Markedly shaded localities on vertical limestone rock, cave and large overhang 100 m up on steep limestone hill, light dry soil partly composed of guano also on residual soils in semi-exposed position, slope between caves, limestone rocks and residual soil, trees mainly felled. Gua Pangomah, G. Subis, Niah J.A.R. Anderson S 31689; Great Cave, G. Subis, Niah J.A.R. Anderson S 31915.

**Tectaria* sp.

Terrestrial fern. On limestone rock, foot of limestone at 17 m a.s.l. G. Brangin, Ulu Sg. Subis, Niah N.P. Yii Puan Ching S 40180.

EBENACEAE

**Diospyros cauliflora* Blume

Tree 13 m tall, 38 cm girth. On summit of dry limestone rock at base of limestone hill. Near Great Cave, G. Subis, Niah J.A.R. Anderson S 16026.

Diospyros foxworthii Bakh.

Tree to 27 m tall, 67 cm girth. Primary MDF on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 27881, Edwin Wright S 29115.

Diospyros korthalsiana Hiern

Tree 20 m tall, 60 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Edwin Wright S 29102, S 29141.

**Diospyros venosa* Wall. ex A.DC.

Tree 7 m tall, 30 cm girth. On 'mor' layer near summit of limestone hill. G. Subis, Niah J.A.R. Anderson S 16050.

ELAEocarpaceae

Elaeocarpus obtusus Blume

Tree 30 m tall, 150 cm girth. Ulu Sg. Sekaloh, Niah river Banyeng ak Nudong S

26144.

Elaeocarpus submonoceras Miq. ssp. *lasionyx* (Ridl.) R. Weibel
Tree 3 m tall, 20 cm girth. Riverine forest. Along Niah river, Niah N.P. *Yii Puan Ching S 40140*.

ERICACEAE

**Vaccinium leptanthum* Miq.
Epiphyte or straggling shrub. Near or on summit of limestone hill. G. Subis, Niah J.A.R. *Anderson S 16048*; G. Brangin, Niah N.P. *Yii Puan Ching S 40181*.

EUPHORBIACEAE

Agrostistachys longifolia (Wight) Benth. ex Hook.f. var. *leptostachya* (Pax & K. Hoffm.) Whitmore
Tree 7 m tall. Summit of small sandstone hill, primary forest on clay loam soil. Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. *Anderson S 27592*.

**Antidesma leucopodium* Miq.
G. Subis area, Niah *Mohidin S 21646*.

Antidesma cf. pendulum Hook.f.
Tree 7 m tall, 10 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 27862*.

**Aporosa grandistipulata* Merr.
Tree c. 3 m tall, 5 cm diam. Limestone area, relatively open *Dipterocarpus* forest. G. Subis, to right of Sg. Sekalau, at footpath from Kuala Sekalau to Bukit Drusau *H.P. Fuchs 21271*.

Aporosa nigricans Hook.f.
Tree 7 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sonny Tan & E. Wright S 26101*.

Aporosa nitida Merr.
Tree 8 m tall, 15 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29118*.

**Aporosa prainiana* King ex Gage
Tree c. 7 m tall, to 10 cm thick. Limestone area 100 m a.s.l., also clay loam soil, sedimentary rocks relatively open MDF. Ulu Sg. Sekaloh and to right of Sg. Sekalau at footpath from Kuala Sekalau to Bukit Drusau, G. Subis *H.P. Fuchs 21264, 21287*; J.A.R. *Anderson, Sonny Tan & E. Wright S 26064, E. Wright S 27255*.

Baccaurea lanceolata (Miq.) Muell.-Arg.
Tree 17 m tall, 55 cm girth. Alluvial soils by Sg. Sekaloh at base of limestone cliff. S. side of G. Subis, Niah J.A.R. *Anderson, Sonny Tan & E. Wright S 27552*.

Baccaurea sarawakensis Pax & K. Hoffm.
Tree 12 m tall, 30 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 27859*.

Baccaurea trunciflora Merr.

Tree 7 m tall, 20 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Banyeng ak Nudong S 26142*.

Cleistanthus pyrrhocarpus Airy Shaw

Slender tree to 8 m tall. MDF between two steep slopes at 85 m a.s.l. Niah N.P. *Yii Puan Ching S 40070*.

Glochidion rubrum Blume

Tree 8 m tall, 35 cm girth. Riverine forest c. 17 m a.s.l., loamy soil. Kuala Sg Sekaloh, Niah N.P. *Yii Puan Ching S 40102*.

Drypetes crassipes Pax & K. Hoffm.

Tree 17 m tall, 100 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26129*, *Erwin Wright S 29121*.

Koilodepas longifolium Hook.f.

Tree 7 m tall, 15 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29117*.

Macaranga bancana (Miq.) Muell.-Arg.

Tree 7 m tall, 30 cm girth. Riverine forest c. 17 m a.s.l., soil loamy. Kuala Sg Sekaloh, Niah N.P. *Yii Puan Ching S 40108*.

**Mallotus dispar* (Blume) Muell.-Arg.

Bushy tree 7 m tall 25 cm girth. On limestone rocks, base of limestone hill also ravine between two limestone hills, limestone pavement and small, heavily eroded limestone hillocks. G. Subis, path to Great Cave *J.A.R. Anderson S 31693*; Outside Great Cave, G. Subis, Niah *J.A.R. Anderson S 31910*.

**Mallotus korthalsii* Muell.-Arg.

Tree c. 3 m tall, 8 cm diam. In small river valley between limestone boulders, relatively open *Dipterocarpus* forest, 150 m a.s.l. G. Subis to right of Sg. Sekalau, at footpath from Kuala Sekalau to Bukit Drusau *H.P. Fuchs 21272, 21273*.

Mallotus wrayii King ex. Hook.f.

Tree 7 m tall, 12.5 cm girth. MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson, Sonny Tan & E. Wright S 26063*.

Margaritaria indica (Dalziel) Airy Shaw

Tree 10 m tall, 40 cm girth. Riverine forest. Along Sg. Niah, Niah N.P. *Yii Puan Ching S 40160*.

**Neoscortechinia sumatrensis* S. Moore

Tree 17 m tall, 15 cm diam. with stilt roots. On limestone. Along the plankwalk to Niah Cave, Niah N.P. *Rena George S 39936*.

Pimelodendron griffithianum (Muell.-Arg.) Benth.

Tree 11.7 m tall, 18 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river. *Sibat ak Luang S 26135*.

Ptychopyxis grandis Airy Shaw

Tree 8.3 m tall, 30 cm girth. Primary lowland or MDF on clay loam soil. Ulu Sg. Sekaloh, Niah river. *Benang ak Bubong S 26112, Erwin Wright S 29149.*

**Sauropus androgynus* (L.) Merr.

Shrub 1 m tall. Cave and large overhang 100 m up on steep limestone hill, light dry soil, partly composed of guano. Gua Pangomah, G. Subis, Niah *J.A.R. Anderson S 31682.*

Trigonostemon merrillianus Airy Shaw

Tree 3 m tall, 10 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26123, Erwin Wright S 29123.*

FABACEAE

**Bauhinia endertii* K. & S.S. Larsen Creeper on limestone or climber on tree. Riverine forest along Sg Niah also limestone hill summit 110 m a.s.l. Niah N.P. *Yü Puan Ching S 40157; G. Brangin, Niah N.P. Yü Puan Ching S 40182.*

Bauhinia excelsa (Blume ex Miq.) Prain

Climber to 40 m tall on tree, 30 cm girth at base. Mudstone outcropping from river bank of Nangau Sekalan also disturbed belian forest, alluvial soils at base of limestone hill. Ulu Sg Sekaloh, Niah River *J.A.R. Anderson S 27291; Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. Anderson S 27581.*

Derris elegans Benth.

Climber. Riverine forest. Along Sg. Niah, Niah N.P. *Yü Puan Ching S 40117.*

**Dialium indum* L.

Tree 25 m tall, 200 cm girth. Foot of limestone 17 m a.s.l. G. Brangin, Ulu Sg. Subis, Niah N.P. *Yü Puan Ching S 40173.*

Parkia sumatrana Miq.

Niah *G.D. Haviland & C. Hose Haviland 3273.*

**Saraca declinata* (Jack) Miq.

Tree to 20 m tall and 60 cm girth. Base of limestone hill on limestone rocks and lower slopes of steep limestone hill, numerous limestone boulders also primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26150; South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27554; G. Subis, path to Great Cave J.A.R. Anderson S 31694.*

**Whitfordiodendron niewenhuisii* (J.J. Sm.) Dunn

Climbing shrub. Limestone area, relatively open *Dipterocarpus* forest, 150 m a.s.l. G. Subis to right of Sg. Sekalau, at footpath from Kuala Sekalau to Bukit Drusau *H.P. Fuchs 21262.*

FAGACEAE

Lithocarpus meijeri Sopadmo

Tree 23 m tall, 240 cm girth. Primary forest on ridge at 133 m a.s.l. Niah *Dan bin Hj. Bakar S 16524.*

FLACOURTIACEAE

Casearia rugulosa Blume

Tree 4 m tall, 7.5 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29142*.

Hydnocarpus subfalcata Merr.

Tree 13.3 m tall, 45 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29110*.

**Osmelia philippina* (Turcz.) Benth.

Tree 10 m tall, 28 cm girth. On limestone rocks near river and alluvial soils at base of limestone hill in disturbed belian forest. On southern slopes of G. Subis in the Sekaloh river. Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26083*; between mouth of Sg. Sekaloh and G. Subis, Niah *J.A.R. Anderson S 27579*.

Pangium edule Reinw.

Tree 33 m tall, 90 cm girth. On alluvial soil at base of limestone hill. Just beyond Great Cave, G. Subis. Niah *J.A.R. Anderson S 16428*.

Ryparosa acuminata Merr.

Tree 7 m tall 13 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26122*.

Ryparosa kostermansii Sleumer

Tree 17 m tall, 75 cm girth. MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson, Sonny Tan & E. Wright S 26054*.

FLAGELLARIACEAE

Flagellaria indica L.

Climber on tree. Riverine forest. Along Sg. Niah, Niah N.P. *Yii Puan Ching S 40113*.

GESNERIACEAE

**Paraboea culminicola*^E K.G. Pearce

Large herb 75–120 cm tall. On bare, exposed limestone rock near summit of limestone pinnace or crest of limestone hill, 'mor' soil, 170 m a.s.l. Niah *J.A.R. Anderson S 16045*; Southern slopes of G. Subis, near Sekaloh river *Sonny Tan & E. Wright S 27279*.

Included in Pearce, 2004 as *Paraboea* sp.

GNETACEAE

Gnetum cuspidatum Blume

Woody climber c. 33 m long, 15 cm girth on large tree. Riverine forest c. 17 m a.s.l., soil loamy also primary lowland dipterocarp forest on clay loam soil. Kuala Sg. Sekaloh, Niah N.P. *Yii Puan Ching S 40107*; Ulu Sg. Sekaloh, Niah River *Erwin Wright S 29105*.

**Gnetum diminutum* Markgr.

Climber to 27 m. Slopes of limestone hill, immediately below cliff, 133 m a.s.l., litter layer overlying limestone boulders also limestone hill, lower summit ridge, limestone pinnacles and 'mor' soil. South side of G. Subis in Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 27560*; Sg. Sekaloh, G. Subis, Niah

J.A.R. Anderson 31954.

Gnetum gnemonoides Brongn.

Entwined round tree. Mudstone outcropping from river bank. Nangau Sekalan, Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson S 27286.*

**Gnetum klossii* Merr. ex Markgr.

Climber to 13 m. Lower slopes of steep limestone hill, numerous limestone boulders. South side of G. Subis in Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 27556*

Gnetum loerzingii Markgr.

Scrambler to 13 m high. Remnant forest near river bank. Niah N.P. *Bernard Lee M.H. S 40066.*

Gnetum macrostachyum Hook.f.

Climber 27 m high. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26116.*

HYMENOPHYLLACEAE

Crepidomanes bipunctatum (Poir.) Copel.

G. Subis area, Niah *Mohidin S 21625.*

Crepidomanes christii (Copel.) Copel.

G. Subis area, Niah *Mohidin S 21614.*

HYPERICACEAE

Cratoxylon formosum (Jack) Dyer ssp. *formosum*

Tree c. 10 m tall, 10 cm girth. Riverine forest along Sg. Niah. Niah N.P. *Yü Puan Ching S 40152.*

ICACINACEAE

Cantleya corniculata (Becc.) R.A. Howard

Tree 20 m tall, 80 cm girth. Lowland MDF, 80 m a.s.l., soil sandy loam. Sg. Sekaloh, Niah N.P. *Yü Puan Ching S 40131.*

**Gomphandra cumingiana* (Miers) F.-Vill.

Treelet 5 m tall, 8 cm girth. 17 m below summit ridge of limestone hill, limestone outcropping and 'mor' soil present, also lower slopes of limestone hill, numerous limestone boulders and primary lowland dipterocarp forest on clay loam soil. Southern slopes of G. Subis near Sekaloh river, Niah *Sonny Tan & E. Wright S 27263*; Ulu Sungei Sekaloh, Niah river *Erwin Wright S 29104*; *J.A.R. Anderson S 31934.*

LAMIACEAE

Anisomeles indica O. Kuntze

In secondary growth on ground. Niah *Ahmad 47.*

Pogostemon auricularis (L.) Hassk.

Niah *Haviland 3598.*

LAURACEAE

Litsea lancifolia (Roxb. ex Wall.) Hook.f.

Tree 8 m tall, 25 cm girth. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah
Erwin Wright S 29262.

Nothaphoebe sarawacensis Gamble

Tree 4 m tall, 45 cm girth. Along Sg Niah, Niah N.P. Yii Puan Ching S 40119.

LECYTHIDACEAE

Barringtonia lanceolata^E (Ridl.) Payens

Tree 12 m tall, 25 cm girth. MDF on clay loam soil. Ulu Sg. Sekaloh, Niah river
Erwin Wright S 29124.

Barringtonia macrostachys (Jack) Kurz

Tree 8 m tall, 38 cm girth. MDF with reddish clay loam soil. Ulu Sg. Sekaloh, Niah
Erwin Wright S 29269.

LEEACEAE

Leea indica (Burm.f.) Merr.

Treelet 2.7 m tall. Lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh,
Niah river Sibat ak Luang S 27879.

LORANTHACEAE

Lepeostegeres beccarii (King) Gamble

Epiphyte. Riverine forest. Along Niah river, Niah N.P. Yii Puan Ching S 40149.

**Macrosolen beccarii* Tiegh.

Parasite on small tree. On limestone rocks near river. On southern slopes of G.
Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 26081.

Trithecanthera cf. xiphostachys Tiegh.

Large parasite in crown of *Pometia pinnata* at 20 m. Alluvial soils by Sg. Sekaloh
at base of limestone cliff. On southern slopes of G. Subis in Sekaloh river, Niah
J.A.R. Anderson, Sonny Tan & E. Wright S 26097.

MALVACEAE

Sida acuta Burm.f.

In secondary growth on ground. Rumah Pasang, Niah Ahmad 49.

Urena lobata L. ssp. *lobata* f. *sinuata* (L.) Borss.

120–150 cm tall. In jungle on wet ground. Rumah Pasang, Niah Ahmad 19.

MARANTACEAE

Phrynium capitatum Willd.

Herb 1 m tall. In jungle on ground, also alluvial soil at base of limestone hill near
river. Rumah Pasang, Niah Ahmad 41; Southern slopes of G. Subis near Sekaloh
river, Niah Sonny Tan & E. Wright S 27257.

Schumannianthus dichotomus (Roxb.) Gagnep.

Shrub c. 2 m high. Secondary shrubby vegetation along small creek to right of Sg.
Sekalau, to left of footpath from Kuala Sekalau to Bukit Drusau, near Kuala
Skaloh longhouse, limestone area, G.Subis H.P. Fuchs 21284.

MELASTOMATACEAE

Dissochaeta annulata Hook.f. ex Triana

G. Subis area. Niah Mohidin S 21636.

Dissochaeta hirsuta Hook.f. ex Triana

Climber on tree. Riverine forest. Along Sg. Niah, Niah N.P. Yü Puan Ching S 40124.

Dissochaeta rostrata Korth.

Climber entwined round tree. Lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 27878.

Medinilla macrophylla Blume

Epiphyte 27 m high on tree. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Benang ak Bubong S 26105.

**Memecylon paniculatum* Jack

Tree c. 6 m tall, 10 cm thick. Limestone area, relatively open *Dipterocarpus* forest, 150 m a.s.l. G. Subis, to right of Sg. Sekalau, at footpath from Kuala Sekalau to Bukit Drusau H.P. Fuchs 21263.

Memecylon scolopacinum^E Ridl.

Shrub 2 m high. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 26130.

**Pachycentria microsperma* Becc.

Epiphyte on limestone hill summit. Limestone hill summit 110 m a.s.l. G. Brangin. Niah N.P. Yü Puan Ching S 40183.

Plethiandra motleyi Hook.f.

Epiphyte 8 m high on *Dipterocarpus oblongifolia*. Mudstone outcropping from river bank. Nanagu Sekalan, Ulu Sg. Sekaloh, Niah river J.A.R. Anderson S 27287.

**Plethiandra robusta* (Cogn.) Nayar ex Bakh.

Epiphyte 23 m high on tree trunks, and on rocks. Limestone hill, lower summit ridge, limestone pinnacles and 'mor' soil also primary lowland dipterocarp forest on clay loam soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27562; Ulu Sg. Sekaloh, Niah river Erwin Wright S 29109.

Pternandra crassicalyx J.F. Maxwell

Tree 8 m tall, 15 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 26131.

Pternandra multiflora Cogn.

Tree 15 m tall, 60 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Erwin Wright S 29135.

Pternandra rostrata (Cogn.) M.P. Nayar

Tree to 12 m tall, 28 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 27855, Erwin Wright S 29129.

MELIACEAE

**Aglaia elaeagnoides* (A. Juss.) Benth.

Tree 7 m tall, 20 cm girth. Partially exposed situation on dry limestone cliff. Niah J.A.R. Anderson S 16032.

Aglaia elliptica Blume

Tree. Riverbank on sandy clay soil. Ulu Sg. Sekaloh, Niah river J.A.R. Anderson S 27297.

**Aglaia odoratissima* Blume

Tree to 27 m tall, 90 cm girth. MDF with reddish clay loam soil, also lower slopes of limestone hill with numerous limestone boulders, steep slopes of limestone hill with deep litter layer and narrow limestone ridge at 130 m a.s.l. Ulu Sg. Sekaloh Sibat ak Luang S 26149, Benang ak Bubong S 27861, Erwin Wright S 29274; Southern slopes of G. Subis near Sekaloh river Sonny Tan & E. Wright S 27276, J.A.R. Anderson & Sonny Tan S 27573; Niah N.P. Paul Chai S 40059.

**Aglaia speciosa* Blume

Tree 7 m tall, 25 cm girth. Knife-edge ridge near summit of limestone hill, limestone pinnacles and deep (45 cm) 'mor' soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27569.

Aglaia tomentosa Teijsm. & Binn.

Tree 6 m tall, 8 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Banyeng ak Nudong S 26140.

Chisocheton ceramicus (Miq.) C.DC.

Tree 15 m tall, 50 cm girth. Riverine forest. Along Niah river, Niah N.P. Yü Puan Ching S 40144.

Chisocheton sarawakanus (C.DC.) Harms

Treelet 5 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river Erwin Wright S 29148.

**Dysoxylum alliaceum* (Blume) Blume

Tree to 33 m tall and 180 cm girth. Steep slopes of limestone, numerous limestone boulders, deep litter layer also primary lowland dipterocarp forest on clay loam soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27576; Ulu Sg. Sekaloh, Niah river Erwin Wright S 29114.

Dysoxylum brachybotrys Merr.

S. Subis area, Niah Mohidin S 21643.

Sandoricum borneense Miq.

Tree 18 m tall, 70 cm girth. Riverine forest. Along Niah river, Niah N.P. Yü Puan Ching S 40145.

Walsura dehiscens T.P. Clark

Tree 13 m tall, 40 cm girth. Lowland MDF 80 m a.s.l., soil sandy loam. Sg. Sekaloh, Niah N.P. Yü Puan Ching S 40128.

MENISPERMACEAE

Fibraurea tinctoria Lour.

Climber to 5 m on *Agrostistachys*. Primary tropical heath forest, 33 m a.s.l. Path from Pangkalan Lobang to Great Cave, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 26070.

MONIMIACEAE

**Kibara coriacea* (Blume) Tulasne

Tree to 10 m tall, 25 cm girth or 25 cm diam. Limestone forest at 80 m a.s.l. and along plankwalk to Great Cave. Niah N.P. Rena George S 39938, Yii Puan Ching S 40200.

MORACEAE

Ficus aurata (Miq.) Miq.

Tree 5 m tall, 18 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sungei Sekaloh, Niah river Erwin Wright S 29128.

**Ficus aurita* Blume var. *auriculifera* (Merr.) Corner

Bushy tree 6 m tall. Base of limestone hill on limestone rocks at 17 m a.s.l. G. Subis area, Niah Mohidin S 21604; Path to Great Cave, G. Subis J.A.R. Anderson S 31695; G. Brangin, Ulu Sg. Subis, Niah N.P. Yii Puan Ching S 40169.

Ficus beccarii King

Tree 3 m tall. Disturbed belian forest, alluvial soils at base of limestone hill. Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. Anderson S 27589.

**Ficus benjamina* L.

Tree 23 m tall, 90 cm girth or shrub. Vertical exposed limestone cliff, also swampy alluvial soils at base of limestone hill subject to periodic inundation. Niah J.A.R. Anderson S 16029; On southern slopes of G. Subis in the Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 26087.

**Ficus binnendykii* (Miq.) Miq. var. *coriacea* Corner

Tree 13 m tall, 28 cm girth. Primary lowland dipterocarp forest on rocks beside waterfall. Ulu Sg. Sekaloh, Niah river Benang ak Bubong S 27871.

Ficus delosyce Corner

Epiphyte 3 m tall, 12 cm girth. Riverine forest. Along Sg. Niah, Niah N.P. Yii Puan Ching S 40122.

Ficus fistulosa Reinw. ex Blume

Tree 5 m tall, 12 cm girth. River bank of Nangau Selakan on clay soil. Ulu Sg. Sekaloh, Niah river J.A.R. Anderson S 27600.

Ficus laevis Blume var. *tomentosa* King

G. Subis area, Niah Mohidin S 21671.

Ficus lepicarpa Blume

Tree 8 m tall, 50 cm girth. Swampy alluvial soils at base of limestone hill subject to periodic inundation, also at foot of limestone hill near stream 50 m a.s.l. Ulu Sg. Subis, Niah N.P. Bernard Lee S 40086; On southern slopes of G. Subis in the Sekaloh river, Niah Mohidin S 21609, J.A.R. Anderson, Sonny Tan & E. Wright S 26089.

Ficus magnoliifolia Blume

Tree 23 m tall, 60 cm diameter. On sandy soil at starting point of path to Niah Cave. Niah N.P. *Rena George S 39932*.

**Ficus pisocarpa* Blume

Climber entwined round tree. Hillslope on limestone rocks, 167 m a.s.l. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson S 27570*.

**Ficus sundaica* Blume var. *sundaica*

Tree 17 m tall. Foot of limestone 17 m a.s.l. G. Brangin, Ulu Sg. Subis, Niah N.P. *Yii Puan Ching S 40175*.

Ficus treubii^E King

Tree 10 m tall, 20 cm girth. On rocks beside swift flowing stream. Niah *Banyeng Bubong S 27869*.

Ficus uniglandulosa Wall. ex Miq.

Climber 15 m high. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29132*.

MYRISTICACEAE

Endocomia virella^E W.J. de Wilde

Tree 20 m tall, 50 cm diam. Along path to Niah Cave, Niah N.P. *Rena George S 39933*.

Gymnacranthera farquhariana (Hook.f. & Thom.) Warb. var. *zippeliana* (Miq.) R.T.A.Schouten.

Tree 23 m tall, 50 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sonny Tan & Benang ak Bubong S 26103*.

Knema curtisii (King) Warb. var. *curtisii*

G. Subis area, Niah *Mohidin S 21659*.

Knema latifolia Warb.

Tree 19 m tall, 30 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26107*.

Knema tridactyla^E Airy Shaw ssp. *tridactyla*

Tree to 5 m tall, 8 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26128, Erwin Wright S 29136*.

Myristica iners Blume

Tree 22 m tall, 150 cm girth. MDF between two steep slopes at 85 m a.s.l. Niah N.P. *Normah Yusoff S 40069*.

Myristica malaccensis Hook.f.

Tree 15 m tall, 40 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29145*.

MYRSINACEAE

**Ardisia breviramea* Merr.

Treilet to 2.7 m tall. Lower slopes of limestone hill, large limestone boulders. Sg.

Sekaloh, G. Subis, Niah J.A.R. Anderson S 31923.

Ardisia livida Mez

Treelet 6 m, 15 cm girth. MDF on clay loam soil. Ulu Sg. Sekaloh, Niah river J.A.R. Anderson, Sonny Tan & E. Wright S 26055.

MYRTACEAE

**Eugenia aff. glanduligera* Ridl.'

Tree 49 cm girth. Primary forest, lower slopes of limestone mountain. South side of mountain near Sg. Sekaloh, G. Subis, Niah J.A.R. Anderson S 31641.

'*Eugenia prasiniflora* Ridl.'

Niah Haviland & C. Hose, Haviland. 3127A.

**Syzygium aff. castaneum* (Merr.) Merr. & Perry

Limestone. Niah Haviland & C. Hose Hav. 3215.

* *Syzygium caudilimbium* (Merr.) Merr. & Perry

Tree 10 m tall, 33 cm girth. Knife-edge ridge near summit of limestone hill, limestone pinnacles and deep (45 cm) 'mor' soil, also lower slopes of limestone hill. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27274, S 27572.

Syzygium foxworthyianum (Ridl.) Merr. & Perry

G. Subis area, Niah Mohidin S 21666.

**Syzygium nigricans* (King) Merr. & Perry

Tree 10 m tall, 35 cm girth. Hill slope on limestone rocks, 167 m a.s.l. Ulu Sungei Sekaloh, Niah river J.A.R. Anderson S 27559.

Syzygium pycnanthum Merr. & Perry

Tree 10 m tall, 45 cm girth. On mudstone outcropping from river bank and riverbank on sandy clay soil. Nangau Sekaloh, Ulu Sg. Sekaloh, Niah river J.A.R. Anderson S 27293, S 27596.

Syzygium remotiflorum (Ridl.) Merr. & Perry

Tree 17 m tall, 60 cm girth. On riverine alluvium. Niah Dan bin Hj. Bakar S 16526.

OCHNACEAE

Campylospermum serratum (Gaertn.) Bittrich & M.C.E. Amaral

Tree 3 m tall. Disturbed belian forest, alluvial soils at base of limestone hill. Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. Anderson S 27580.

PASSIFLORACEAE

Passiflora foetida L.

Climbing on small tree. In jungle on ground. Kg. Tangap, Niah Ahmad 25.

PIPERACEAE

**Piper arborescens* Roxb.

Root climber to 5 m. Knife-edge ridge near summit of limestone hill, limestone pinnacles and deep (45 cm) 'mor' soil, South side of G. Subis in Sekaloh river, Niah Mohidin S 21629; J.A.R. Anderson, Sonny Tan & E. Wright S 27571.

**Piper vestitum* C.DC.

Shrublet 60 cm high or creeper on slope of limestone hills also on limestone rocks at 50 m a.s.l. and on residual soils. Great Cave, G. Subis. Niah *J.A.R. Anderson S 31919*, G. Brangin, Niah National Park *Yii Puan Ching S 40085, S 40188*.

PITTOSPORACEAE

**Pittosporum ferrugineum* Aiton

Small tree or shrub. On exposed rockface immediately above large cave overhang 100 m up on steep limestone hill, light dry soil, partly composed of guano. Gua Pangoma, G. Subis, Niah *J.A.R. Anderson S 31680*.

POACEAE

Phragmites karka (Retz.) Trin. ex Steud.

G. Subis area, Niah *Mohidin S 21635*.

POLYGALACEAE

Xanthophyllum flavescens Roxb.

Tree to 23 m tall, 210 cm girth. Primary lowland dipterocarp forest on clay loam soil, also riverine forest along Sg. Niah. Ulu Sg. Sekaloh and Sg Niah *Sibat ak Luang S 27852, Benang ak Bubong S 27883, S 27884, Erwin Wright S 29131, S 29140, S 29150, Yii Puan Ching S 40151*.

Xanthophyllum velutinum Chod.

Tree 16 m tall, 40 cm girth. Between two steep slopes, MDF at 85 m a.s.l. Niah *N.P. Bernard Lee S 40071*.

PSILOTACEAE

**Pilotum complanatum* Sw.

Epiphyte at low height on tree. Limestone hill, lower summit ridge; limestone pinnacles and 'mor' soil. South side of G. Subis in Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 27566*.

PTERIDACEAE

Pteris longipinnula Wall. ex J. Agardh

G. Subis area, Niah *Mohidin S 21610*.

**Pteris vittata* L.

On rock near entrance, Niah Cave. Niah *Ahmad 56*; G. Subis area. Niah *Mohidin S 21696*.

RHAMNACEAE

Zizyphus borneensis^E Merr.

Climber creeping on tree. Riverine forest c. 17 m a.s.l. Kuala Sg. Sekaloh, Niah *N.P. Yii Puan Ching & Bernard Lee S 40106*.

Zizyphus horsfieldii Miq.

Climber entwined round tree. Mudstone outcropping from river bank of Nangau Sekaloh. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson S 27284*.

RHIZOPHORACEAE

**Carallia brachiata* (Lour.) Merr.

Tree 43 cm girth. Lower flanks of limestone mountain, primary forest. South side

of mountains near Sg. Sekaloh, G. Subis, Niah J.A.R. Anderson S 31642.

RUBIACEAE

**Acranthera multiflora* Valetton

Succulent herb. On steep slope of limestone hill at 80 m a.s.l. Niah N.P. Bernard Lee S 40076.

**Argostemma borragineum* Blume

Herb 15–23 cm tall, stock woody. Crevices on vertical shady limestone rocks and in gully between limestone hill, heavily dissected limestone rocks and pavement, mineral soil very sparse. Pengkalan Lobang to Niah Caves B.L. Burt & P.J.B. Woods B 2005; Gunong Subis J.A.R. Anderson S 31672.

**Argostemma havilandii* Ridl.

Herb 7.5 cm tall. On limestone rock face at 67 m a.s.l., damp and shaded. Great Cave, G. Subis, Niah J.A.R. Anderson S 31946.

**Canthium* sp.

Tree 10 m tall, 60 cm girth. Narrow limestone ridge at 130 m a.s.l. Niah N.P. Yii Puan Ching S 40058.

Cephaelis sp.

Shrublet 30–37 cm tall. Disturbed belian forest, alluvial soils at base of limestone hill. Between mouth of Sg. Sekaloh and G. Subis J.A.R. Anderson S 27586.

Chasallia curviflora (Wall.) Thw.

Niah Haviland & C. Hose Haviland 3454A.

Coptosapelta sp.

Climber on large tree. Lowland MDF, 80 m a.s.l., soil sandy loam. Sg. Sekaloh, Niah N.P. Yii Puan Ching S 40134.

**Diplospora singularis* Korth.

Small tree 40 cm girth. Ravine between two limestone hills, limestone pavement and small heavily eroded limestone hillocks. Outside Great Cave, G. Subis, Niah J.A.R. Anderson S 31909.

Gaertnera vaginans (DC.) Merr. ssp. *junghuhniana* (Miq.) Beusek.

Tree 3.3 m tall. Primary MDF on reddish clay loam soil. Ulu Sungei Sekaloh, Niah Banyeng ak Nudong S 26139, Erwin Wright S 29267.

Geophila aff. *hirta* (L.) Pearson

Scrambling herb. MDF, yellow clay soil. Niah N.P. Paul Chai et al. S 40053.

Hedyotis congesta Wall. & G. Don

Niah Haviland & C. Hose Haviland 3459A.

**Hydnophytum formicarum* Jack

Shrublet 67 cm tall. Crest of limestone hill, limestone pinnacles on 'mor' soil. Southern slopes of G. Subis near Sekaloh river Haviland & C. Hose Haviland 3448, J.A.R. Anderson S 16043, Sonny Tan & E. Wright S 27280.

Ixora brevicaudata Bremek.

Treelet 2.3 m tall. Lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Mohidin S 21642*; *Sibat ak Luang S 27880*.

Ixora stenophylla (Korth.) Kuntze

Shrub 1 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29116*.

Ixora woodii Bremek.

Treelet 6 m tall, 13 cm girth. Primary MDF on a ridge and on clay loam soil, sedimentary rocks 80—100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 26110*; *Erwin Wright S 27252*.

Lasianthus cf. maingayi Hook.f.

G. Subis area, Niah *Mohidin S 21641*.

Lucinaea membranacea King

Treelet 3.3 m high, 8 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29134*.

**Ludekia borneensis* C.E.Ridsdale

Tree 25 m tall, 200 cm girth. Foot of limestone, 17 m a.s.l. G. Brangin, Ulu Sg. Subis, Niah N.P. *Yii Puan Ching S 40171*.

**Mitreola sphaerocarpa* (Leenh.) Leenh.

Creeping herb. In shade at base of limestone cliff, 167 m alt. On southern slopes of G. Subis in the Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26096*.

Motleyia borneensis J.T. Johansson

G. Subis area, Niah *Mohidin S 21665*.

Mussaendopsis beccariana Baill.

Tree 30 m tall, 100 cm girth. Primary lowland forest. Niah *J.A.R. Anderson & Chew Wee Lek S 16020*.

**Mycetia javanica* (Blume) Korth.

Fleshy herb or slender shrub to 2 m tall. On limestone at 17 m a.s.l., also in secondary alluvial forest with heavy silty clay soil near riverbank also on broad sloping ravine between two vertical limestone hills with numerous limestone boulders and some residual soil, c. 167 m a.s.l. G. Subis area, Niah *Mohidin S 21605*; Niah Caves *Chew Wee-Lek CWL 316*; On southern slopes of G. Subis, in the Sekaloh river. Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26091*; Niah N.P. *Paul Chai S 40052*, G. Brangin, Ulu Sg. Subis *Yii Puan Ching S 40170*.

Myrmeconuclea strigosa (Korth.) Merr.

Shrub 1.3 m tall. Primary lowland dipterocarp forest on rocks beside swift running stream. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 27868*.

Nauclea parva (Havil) Merr.

Shrub about 3 m tall. Riverine forest. Along Sg. Niah, Niah N.P. *Yii Puan Ching S 40116*.

**Ophiorrhiza fibrillosa* Ridl.

Herb c. 67 cm tall. On broad sloping ravine between two vertical limestone hills with numerous limestone boulders and some residual soil. Niah Caves area *B.L. Burt and P.J.B. Woods B 2029*; Southern slopes of G. Subis in the Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26095*.

Petunga coniocarpa Korth.

Tree 5 m tall, 10 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang S 26126*.

Pleiocarpidia enneandra (Wight) K. Schum. & Bremek.

Tree 15 m tall, 48 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Banyeng ak Nudong S 26143*.

Pleiocarpidia opaca Bremek.

Tree 6 m tall, 8 cm girth. Primary MDF on clay loam soil, sedimentary rock, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *Banyeng ak Nudong S 26138, E. Wright S 27253*.

Pleiocarpidia sandahanica Bremek.

Tree 21 m tall, 75 cm girth. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benyang ak Bubong S 27867*.

Porterandia anisophylla (Jack ex Roxb.) Ridl.

Tree 13 m tall, 43 cm girth. MDF on clay loam soil, 100 m a.s.l. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson, Sonny Tan & E. Wright S 26051*.

Prismatomeris beccariana (Baillon) J.T. Johansson.

Treelet 2 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Erwin Wright S 29119*.

**Psychotria elmeri* Merr.

Tree 3 m tall, 10 cm girth. Lower crest of limestone hill, limestone pinnacles on 'mor' soil, 167 m a.s.l. Southern slopes of G. Subis near Sg. Sekaloh Niah *Mohidin S 21617, Sonny Tan & E. Wright S 27593*.

**Psychotria cf. expansa* Blume

Limestone. Niah *Haviland & C. Hose, Haviland 3462A*.

Psychotria laxiflora Blume

Climber. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benyang ak Bubong S 27882*.

**Psychotria pachyphylla* Ridl.

Epiphyte at 1.3 m near base of small tree. Summit ridge of limestone, 267 m a.s.l., limestone strongly dissected and covered by 15–23 cm 'mor' layer. Sg. Sekaloh, G. Subis, Niah *J.A.R. Anderson S 31932*.

**Psychotria sarmentosa* Blume

Creeping herb. Crest of limestone hill, limestone pinnacles and 'mor' soil. Southern slopes of G. Subis near Sekaloh river, Niah *Sonny Tan & E. Wright S 27281*.

Psychotria woodii Merr.

Small tree. In forest on ground. Kg. Tangap, Niah *Ahmad* 30.

**Timonius matangensis* Valetou

Tree 10 m tall, 23 cm girth. Limestone hill, lower summit ridge, limestone pinnacles and 'mor' soil. South side of G. Subis in Sekaloh river, Niah *J.A.R. Anderson, Sonny Tan & E. Wright* S 27561.

Uncaria cordata (Lour.) Merr. f. *sundiaca* C.E. Ridsdale

Climber entwined around tree. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang* S 26132.

Uncaria ferrea DC.

G. Subis area, Niah *Mohidin* S 21633.

Uncaria insignis DC.

Climber creeping on trees. Riverine forest c. 17 m a.s.l., soil loamy. Kuala Sg. Sekaloh, Niah N.P. *Yii Puan Ching* S 40110.

Xanthophyllum glabrum Axelius

G. Subis area, Niah *Mohidin* S 21651.

RUTACEAE

Clausena excavata Burm.f.

Tree 4 m tall, 35 cm girth. Flowers in bud light green, fruits green when young, whitish when mature. Riverain forest. Along Niah River, Niah N.P. *Yii Puan Ching* S 40143.

Glycosmis chlorosperma (Blume) Spreng. var. *elmeri* (Merr.) Tanaka

Treelet 3 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang* S 27856.

Glycosmis superba^E B.C. Stone

Tree to 7 m tall, 12.5 cm girth. MDF on clay loam soil at 100 m. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson, Sonny Tan & E. Wright* S 26059 (type specimen), *Benang ak Bubong* S 26118.

**Lunasia amara* Blanco

Slender shrub or treelet 2–3.3 m tall. On 'mor' soil, summit ridge of limestone 130–267 m a.s.l., limestone strongly dissected and covered by 15–23 cm 'mor' layer. Sg. Sekaloh, G. Subis, Niah *J.A.R. Anderson* S 31925; Niah N.P. *Paul Chai* S 40061.

SABIACEAE

Meliosma sumatrana (Jack) Walp.

G. Subis area, Niah *Mohidin* S 21674.

SAPINDACEAE

Dimocarpus longan Lour. ssp. *malesianus* Leenh.

Tree 6 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Sibat ak Luang* S 26148.

Guoia bijuga (Hiern) Radlk.

Tree 10 m tall, 40 cm girth. Riverine forest. Along Sg. Niah, Niah N.P. *Yü Puan Ching S 40153*.

**Harpullia cupanioides* Roxb.

Tree 13 m tall, 58 cm girth. Broad sloping ravine between two vertical limestone hills with numerous limestone boulders and some residual soil. On southern slopes of G. Subis, in the Sekaloh river. Niah *J.A.R. Anderson, Sonny Tan & E. Wright S 26093*.

Lepisanthes alata (Blume) Leenh.

Slender tree. On riverbank, riverine forest. Along Niah river, Niah N.P. *Yü Puan Ching S 40142*.

**Lepisanthes fruticosa* (Roxb.) Leenh.

Tree to 17 m tall and 28 cm girth. Primary MDF on clay loam soil at 100 m a.s.l., also on limestone rocks near river. Ulu Sg. Sekaloh, Niah river *J.A.R. Anderson, Sonny Tan & E. Wright S 26057, 26079, Benang ak Bubong S 26113, Sibat ak Luang S 27854*.

SAPOTACEAE

**Isonandra lanceolata* Wight var. *lanceolata*

Tree to 27 m tall and 133 cm girth. Crest of limestone hill, limestone pinnacles and 'mor' soil and narrow limestone ridge at 130 m a.s.l. Southern slopes of G. Subis. Near Sekaloh river *Sonny Tan & E. Wright S 27278; Niah N.P. Paul Chai S 40060*.

Madhuca cf. *spectabilis*^E P. Royen

Tree 14 m tall, 45 cm girth. MDF on clay loam soil at 100 m a.s.l. Ulu Sg. Sekaloh, Niah River *J.A.R. Anderson, Sonny Tan & E. Wright S 26058*.

**Pouteria obovata* (R.Br.) Baehni

Tree 10 m tall, 38 cm girth. Summit ridge of limestone 267 m a.s.l., limestone strongly dissected and covered by 15–23 cm 'mor' layer. Sg. Sekaloh, G. Subis, Niah *J.A.R. Anderson S 16049, S 31928*.

SAURAUACEAE

**Saurauia acuminata* Merr.

7 m tall with many arching stems. From limestone bank and also base of limestone hill on limestone rocks. Niah Caves *B.L. Burt and P.J.B. Woods B 2038; Path to Great Cave J.A.R. Anderson S 31692*.

Saurauia cf. *ferox* Korth.

Treelet 2.7 m tall. Primary lowland dipterocarp forest on clay loam soil. Ulu Sg. Sekaloh, Niah river *Benang ak Bubong S 27863*.

Saurauia reinwardtiana Blume

G. Subis area, Niah *Mohidin S 21680*.

SCROPHULARIACEAE

**Lindernia serrata* (Roxb.) O. Kuntze

Limestone. Niah *Haviland & C. Hose, Haviland 3511A*.

Torenia polygonoides Benth.

Niah Haviland & C. Hose, Haviland 3508A.

Vandellia sp.

Niah Haviland & C. Hose, Haviland 3538A.

SCHIZAEACEAE

Lygodium borneense Alderw.

G. Subis area, Niah Mohidin S 21661.

Lygodium circinnatum (Burm.f.) Sw.

In Subis forest on ground, Niah Ahmad 87.

Schizaea dichotoma (L.) Sm.

In forest on ground. Rumah Pasang, Niah Ahmad 42.

SELAGINELLACEAE

**Selaginella alutacia* Spring

Hanging on limestone rockface. Niah Lord Medway 8956.

**Selaginella hewittii* Hieron.

On damp limestone rockface. Niah Mohiden 8960.

Selaginella paxii Hieron.

G. Subis area, Niah Mohidin S 21615.

Selaginella phanerotricha Baker agg.

G. Subis area, Niah Mohidin S 21693.

Selaginella cf. *roxburghii* (Hook. & Grev.) Spring

G. Subis area, Niah Mohidin S 21699.

SOLANACEAE

Nicotiana tabacum L.

Cultivated, Niah Haviland & C. Hose Haviland 3536.

STERCULIACEAE

**Sterculia coccinea* Roxb.

Tree 3.3 m tall. Base of limestone hill on limestone rocks. Path to Great Cave, G. Subis J.A.R. Anderson S 31696.

**Sterculia macrophylla* Vent.

Tree 30 m tall, 120 cm girth. On limestone rocks amidst alluvium by stream at base of limestone hill also on MDF with reddish clay loam soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27578; Ulu Sg. Sekaloh, Niah Erwin Wright S 29263.

**Sterculia megistophylla* Ridl.

Small tree. On limestone rocks or scree c. 100 m a.s.l. Vicinity of Niah Caves B.C. Stone 13729.

THEACEAE

Adinandra dumosa Jack

Tree 40 m tall, 300 cm girth. Lowland MDF 80 m a.s.l. soil sandy loam. Sg. Sekaloh, Niah N.P. Yii Puan Ching S 40137.

THELYPTERIDACEAE

Christella arida (D. Don) Holttum

1.3 m long. In Subis forest on ground. Niah Ahmad 88.

Christella subpubescens (Blume) Holttum

G. Subis area, Niah Mohidin S 21621.

Cyclosorus sp.

G. Subis area, Niah Mohidin S 21684.

**Pronephrium simillimum* (C. Chr.) Holttum

Terrestrial fern. In shaded or semi-shaded localities under large overhang 100 m up on steep limestone hill, light dry soil, partly composed of guano. Gua Pangomah, G. Subis, Niah J.A.R. Anderson S 31690.

Pronephrium sp.

On rock near entrance Niah Cave. Niah Ahmad 39.

THYMELAEACEAE

Gonystylus calophyllus^E Gilg

Tree 5 m tall. Primary forest at base of sandstone hill, clay loam soil. Between mouth of Sg. Sekaloh and G. Subis, Niah J.A.R. Anderson 27583.

**Wikstroemia indica* (L.) C.A. Mey.

Shrub 1.7 m high. Crest of limestone hill, limestone pinnacles and 'mor' soil. Southern slopes of G. Subis, near Sekaloh river Sonny Tan & E. Wright S 27277.

TILIACEAE

Brownlowia sp.

Tree 27 m tall. In poorly drained area with dense primary forest. Niah N.P. Rogstad 729.

TRIURIDACEAE

Sciaphila sp.

G. Subis area, Niah Mohidin S 21638. (Mixed collection)

URTICACEAE

**Elatostema palioneurum*

Limestone. Niah Haviland & C. Hose Haviland 3318H

**Elatostema variolaminosum* H. Schr. var. *latum* Schrooter

Herb. On limestone ridge at 130 m a.s.l. G. Branchin, Ulu Sg. Subis, Niah N.P. Yii Puan Ching S 40165.

**Pipturus argenteus* (G. Forst.) Wedd.

Shrub c. 5 m tall. On limestone c. 167 m, also at the foot of limestone hill near stream at 20 m a.s.l. Niah Caves Chew Wee-Lek CWL 312: Ulu Sg. Subis, Niah N.P. Bernard Lee S 40081.

Pouzolzia zeylanica (L.) Benn.
Niah Haviland & C. Hose Haviland 3319.

VERBENACEAE

Clerodendrum fistulosum Becc.
1.3 m tall. In forest on ground. Niah Ahmad 51.

**Clerodendrum laevifolium* Blume
Herb or shrub 30—67 cm tall. Limestone forest at 80 m a.s.l. and on limestone in shelter of cave mouth, damp and partially shaded. Northern entrance to Great Cave and G. Subis area, Niah G.D. Haviland & C. Hose Haviland 3556, Ahmad 79, Mohidin S 21602, J.A.R. Anderson, Sonny Tan & E. Wright S 26071, Yii Puan Ching S 40197.

Stachytarpheta dichotoma (L.) Vahl
1–1.3 m tall. In jungle on wet ground. Kuala Tangap, Niah Ahmad 20.

VITACEAE

Ampelocissus capillaris Merr.
G. Subis Area. Niah Mohidin S 21668.

**Tetrastigma diepenhorstii* (Miq.) Latiff
Climber to 13 m tall. Primary lowland dipterocarp forest on clay soil and limestone hill, lower summit of ridge, limestone pinnacles and 'mor' soil. South side of G. Subis in Sekaloh river, Niah J.A.R. Anderson, Sonny Tan & E. Wright S 27565; Ulu Sg. Sekaloh, Niah river Erwin Wright S 29139.

VITTARIACEAE

**Antrophyum callifolium* Blume
Small terrestrial fern. In Subis forest on ground, also on limestone rocks, slope between caves, limestone rocks and residual soil, and as an epiphytic at base of trees, on trees mainly felled, habitat semi-exposed. Great Cave, G. Subis, Niah J.A.R. Anderson 31920; Niah Ahmad 86.

Vittaria elongata Sw.
G. Subis area, Niah Mohidin S 21677.

WOODSIACEAE

**Diplazium crinitum* (Baker) C.Chr.
Frond 1.3 m long. Below Niah cave on rock. Niah C. Hose 1230, Ahmad 75, G. Subis area, Niah Mohidin S 21607.

ZINGIBERACEAE

Alpinia sp.
2.7 m tall. Flower buds bright red. Lowland dipterocarp forest, alluvial soil beside stream. Ulu Sg. Sekaloh, Niah river Sibat ak Luang S 27875.

**Burbridgea stenantha* Ridl.
Herb, stem bronze. On vertical limestone, rooting in crevices, gully between limestone hill, limestone rocks and pavement, heavily dissected, mineral soil very sparse also on limestone wooded rocks. G. Subis B.L. Burt and P.J.B. Woods B 2007; J.A.R. Anderson 31669.

Globba affinis Rendle

Herb 25 cm tall. Clayey soil not far from stream. Ulu Sg. Sekaloh, Niah Erwin Wright S 29270.

Plagiostachys strobilifera (Bak.) Ridl.

3 m tall. Flower buds bright red, fruits brown. Lowland dipterocarp forest, alluvial soil beside stream. Ulu Sungei Sekaloh, Niah river Sibat ak Luang S 27874.

Erratum from 'The Vegetation and Plants of Niah National Park, Borneo'

DRYOPTERIDACEAE

Tectaria andersonii Holttum. J.A.R.Anderson S 31936 (not S 31963).

ORCHIDACEAE

Appendicula undulata Blume var. *longicalcatara* (Rolfe) Ames
Pearce et al. S 89489

Calanthe triplicata (Willemet) Ames
Jamree et al. S 89050, Pearce et al. S 89270.