



*ACB Field Guide Series No. 3*

Julia Sang  
Jok Wan Ngau  
Nickson Joseph Robi  
Nobuyuki Tanaka  
Victor Luna Anak Amin

**Field Guide to the  
Plants of the  
Deer Cave Trail  
Gunung Mulu National Park  
Sarawak**

*Editors*  
Edwino S. Fernando  
Hidetsugu Miwa  
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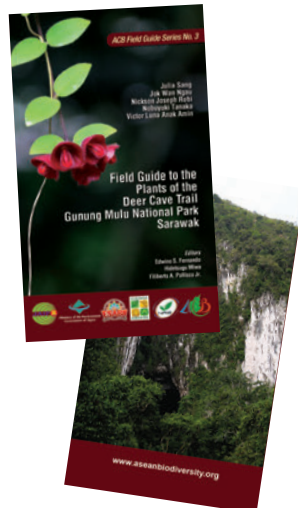
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**Cover**

*Aeschynanthus tricolor* Hook.  
Photo by Edwino S. Fernando

**Backcover**

Deer Cave Entrance  
Photo by Edwino S. Fernando



## FOREWORD

Increasing knowledge of the rich diversity of species that populate the land and waters of ASEAN only adds to what we know, and therefore, what we can and should conserve. What are the plants and animals that are known to live in our parks, forests, national parks, and marine areas? Why are they important? A better understanding of species and their significance increases appreciation and ultimately encourages more people to contribute to the conservation of the region's wildlife.

The ASEAN Centre for Biodiversity (ACB) is committed to strengthening taxonomy in ASEAN as it is recognized as a significant measure to reducing biodiversity loss and achieving the Aichi Biodiversity Targets of the Convention on Biological Diversity. ACB, the Japan ASEAN Integration Fund (JAIF) and East and Southeast Asia Biodiversity Information Initiative (ESABII) continued their longstanding collaboration with the *Training Workshop on Biodiversity Assessment Methodologies, Data Gathering and Communication, Education and Public Awareness for Park Management Staff*, which was held on 12–22 October 2015 at Gunung Mulu National Park in Sarawak. The training workshop was co-organized by ACB with the Ministry of Natural Resources and Environment, Malaysia (NRE) and Sarawak Forestry Corporation, and with funding from JAIF, ESABII, and the Ministry of Environment-Japan (MoE-J).

A major outcome of the workshop is this *Field Guide to the Plants of the Deer Cave Trail, Gunung Mulu National Park, Sarawak*, which is the third in a series of guide books produced with the support of MoE-J, JAIF, and ESABII. The field guide provides scientific, cultural, and historical information on various plants and trees in the park, a testament to the intimate relationship between biodiversity, people, and culture.

The publication embodies the skills learned by representatives of the ASEAN Member States on biodiversity assessment and information dissemination, and is a substantial addition to the growing knowledge of taxonomy of species in the region. Envisioned for the use of both scientists, plant enthusiasts, and visitors to Gunung Mulu National Park, it is hoped that the field guide will spur greater appreciation of the importance of taxonomy and perhaps plant the seeds for the next generation of taxonomists in ASEAN.

**ATTY. ROBERTO V. OLIVA**  
Executive Director  
ASEAN Centre for Biodiversity

## **Field Guide to the Plants of the Deer Cave Trail Gunung Mulu National Park, Sarawak**

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## FOREWORD

We would like to express to the authors in the various institutions, the staff in Gunung Mulu National Park, and the staff of the ASEAN Centre for Biodiversity, our gratitude for their wonderful contributions to the third field guidebook on Plants.

The ASEAN region is home to rich biological diversity. Despite its richness, it remains underexplored with many species still unidentified. This publication is a special opportunity for capacity building in ASEAN, and is also anchored on the program of work for the Global Taxonomy Initiative under the Convention on Biological Diversity.

We are glad that we were able to support the capacity building on Taxonomy through the East and Southeast Asia Biodiversity Information Initiative of the Ministry of the Environment Government of Japan, with the Japan-ASEAN Integration Fund of the Ministry of Foreign Affairs JAPAN.

We hope that we will be able to continue working with the authors, Gunung Mulu National Park and ASEAN Centre for Biodiversity, for Biodiversity and Taxonomy.

### **HIDETSUGU MIWA, PhD**

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The assistance of Dr Mitzi Pollisco in the technical editing of this guidebook is also highly appreciated.



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# GUNUNG MULU NATIONAL PARK

Located 100 km east of Miri, Gunung Mulu National Park is the largest national park in Sarawak, covering an area of 528.64 sq km. The park is known for its karst features, which are among the most studied tropical karst in the world. Intricate cave systems can be found within sandstone and limestone mountains in the park, highest of which is Gunung Mulu at 2,376 meters.

The towering limestone mountains, vast cave passages, centuries-old rock formations, lush forests, and amazing array of wildlife, are testaments to the rich geological, cultural, and biodiversity heritage of the park. Gunung Mulu National Park has thus earned recognition as a World Heritage Site, and an ASEAN Heritage Park (AHP), one of three in Malaysia and of 38 AHPs in the region.

Knowledge of the park's features stem from a long history of explorations starting in 1858. Edward Shackleton, son of the legendary explorer Ernest Shackleton, was the first to reach the summit of Gunung Mulu in 1938 as a member of the Oxford University Exploration Club. Cave explorations began in earnest in the 1960s and continue today, where new species and cave systems continue to be discovered in the park.

## **Outstanding rock formations and intricate cave systems**

World class caves are among the most defining features of the park. These include Deer Cave, the largest cave passage in the world; Clearwater Cave, the biggest cave in the world; and Sarawak Chamber, the world's largest underground chamber. The cave systems within the park are among the most extensive globally and includes the Clearwater cave system (207.064 km), Benarat Caverns system (50.67 km), Terikan System (32.57 km) and Cobra-Bridge-Cloud System (20.63 km).

Scientists attribute the impressive geological formations to movements dating back 60 million years, when rock grinding against rock resulted in the Mulu Formation – a 5 km-thick layer of sand that has been cemented together as a deposit of sandstone. The Mulu Formation lay in ocean water 40 million years ago, when a coral reef lagoon developed 20 million years after. These formed layers of calcium carbonate mud from soluble minerals found in seawater, and mixed with millions upon millions of minute sea shells. These layers of compressed calcium carbonate then created the Melinau Formation – a 1,500 meter-thick deposit of limestone.

About 5 million years ago, the movement of the Australian and Asian landmasses caused the earth's surface to buckle and fold, lifting sandstone and limestone formations high above the sea to create the mountains of Mulu. As limestone dissolves in freshwater, weathering by the elements shaped the landscape of Gunung Mulu National Park into what people currently enjoy. Over a long period of time, water passing through soil, pores and cracks in the limestone gradually dissolved limestone rocks, creating larger and ever expanding cracks to form a remarkable series of cave chambers and passages. This process also helped create one of the park's most distinctive attractions, the Pinnacles, a series of jagged rock formations at 1,200 m on Gunung Api.



The Pinnacles

Photo by Sahlee B. Barrer and Edwin S. Fernando  
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Clearwater Cave. Photo by Pamela O. Reblora



Clearwater Cave. Photo by Pamela O. Reblora

### Center of plant diversity

The park has a wide range of soil types and altitudes, resulting in the identification of 17 vegetation zones; over 3,500 plant species; 8,000 fungi; 1,500 flowering plants; and 170 species of orchids.

On Gunung Mulu, multi-storied mixed lowland dipterocarp forest occurs up to an altitude of 800 m. Common trees include species of *Shorea*, *Durio*, *Garcinia*, *Calophyllum* and *Syzygium*. Lower montane forest occurs between 800 to 1,200 m and is dominated by *Quercus subsericea*. Upper montane forest displaces this between 1,200 m to 2,177 m. The small tree and shrub layer is represented by four species of *Rhododendron* and *Vaccinium* and the pitcher plants *Nepenthes lowii*, *N. tentaculata* and *N. muluensis* that are endemic to Gunung Mulu.

Examples of limestone forest can be found on the Melinau limestone formation. This includes limestone scree forest, limestone cliff vegetation, lowland limestone montane forest, upper montane limestone forest and limestone cave vegetation. Many endemic Calcareous species are represented in this area. Examples of such species include Gesneriaceae such as *Monophyllaea beccarii*, *M. horsfieldii* and *Cytandra* spp.

The alluvial plain in the park is comprised of lowland alluvial forest, tropical heath forest, peat swamp and riparian forest. Some emergent species attain a height of 40 m, with maximum girths of 250 m.

Gunung Mulu National Park is considered one of the richest sites in the world for palms, with approximately 111 species and 20 genera recorded. Of particular significance is wild sago palm *Eugeissona utilis* that occurs on the steep slopes of Gunung Mulu. *Iguanura melinauensis* and *Licuala lanata* are endemic to the alluvial plain. *Calamus neilsonii* and *Salacca rupicola* are endemic to the limestone and *Areca abdulrahmanii* occurs on the Setap shales.

A total of 1,700 species of liverworts and mosses have been recorded. Examples of endemic mosses in the park include *Stereodontopsis flagellifera*, *Coryphopteria andersonii*, *Hypnodendron beccarii* and *H. vitiense*. The very rare bog moss *Sphagnum perichaetiale* can be found in rain gullies in the high forest. About 442 species of pteridophytes, or spore producing plants, have been identified, many of which are ferns.

## Amazing array of fauna

Bats are probably the most famous residents of the park, which exit *en masse* in awe inspiring formations from the Deer Cave each afternoon. Twelve species of bats have been recorded within Deer Cave, including the colony of wrinkled-lipped bats estimated to number between 2.5 and 3.5 million individuals. Their guano deposits support a wide variety of invertebrate fauna.

As the sun sets, bat hawks take up their roost on the cliff face, waiting for the first of the millions of bats to appear. The bats start to gather at the cave entrance in large ring-shaped formations, circling higher and higher up the cliff face before moving out across the rainforest in spiraling ribbons. The donut-like formations are best seen at the cave entrance, as visitors are mostly likely to see the bats streaming out in wave like formations from the amphitheater. The bats travel up to 100 km from the cave at 3,500 m and cruise up to 75KPM.

Recorded fauna in the park include 81 species of mammals, 270 species of birds, 20,000 species of invertebrates, 55 species of reptiles, 76 species of amphibians and 48 species of fish. Important mammal species include the Malayan pangolin *Manis javanica*; 28 species of bats; and two species of endemic Borneo squirrels, the tufted ground squirrel *Rheithrosciurus macrotis* and the plain pigmy squirrel *Exilisciurus exilis*. The smallest mammal in the world, the Savi' pigmy shrew *Suncus etruscus*, weighing only two grams, is also found in the park.

A total of 270 bird species, including 26 bird species that are endemic to Borneo, have been recorded in the park. Eight of Borneo's hornbill species have been identified including the wrinkled hornbill *Rhyticeros corrugatus*. Other species include Bulwer's pheasant *Lophura bulweri*, crested fire back pheasant *L. ignita*, Storm's stork *Ciconia stormi*, and the bamboo muni, which is endemic to Borneo and has only been found in Mulu and Kinabalu.

Cave fauna includes 200 troglitic species (animals that live entirely in the dark parts of caves).

A total of 25 snake species have been recorded and include the regal python *Python reticulatus*, reed snake *Calamaria borneensis* and *C. melanota*. Poisonous snakes include the banded-coral snake *Maticora intestinalis*, the red headed krait *Bungarus flaviceps* and the white-spotted cat snake *Boigo drapiezii*. Significant species of amphibians found in the park are Wallace's flying frog and *Philautus* spp., which only breeds in the fluid of the pitcher plant. Twenty-seven species of lizards have been identified.



Pit viper. Photo by Filiberto A. Pollisco Jr.



Bleeding heart pigeon.

Photo by Pamela Q. Reblora



Green crested lizard.

Photo by Pamela Q. Reblora



## DEER CAVE

Deer Cave is not only the biggest show cave in Gunung Mulu, it is also the largest cave passage in the world. A powerful underground river once passed through the area, dissolving and eroding the limestone to create a massive space.

Parts of Deer Cave was first explored in 1961, when G.E. Wilford of the Malaysian Geological Survey arrived in Mulu to explore its caves. He surveyed Deer Cave and parts of Cave of the Winds and predicted that Gunung Mulu would yield many more caves in the future.

From 1977-1978, the Royal Geographical Society Mulu Expedition, the largest expedition ever to leave the United Kingdom at the time, spent 15 months in Gunung Mulu studying many aspects of the rainforest. In three months, six speleologists (cave explorers) surveyed 50 km of cave passages including parts of Clearwater Cave, Green Cave and others. Deer Cave measured 174 m wide, and 122 m high in one section. As early as 1978, cavers stated that Deer Cave was a strong contender for the title of largest cave passage in the world.

The dimensions were confirmed in a 2009 survey undertaken by the Hoffman Institute of Western Kentucky University. The 2009 survey increased the known passage length to 4.1 km and connected Lang's Cave, another show cave within the park, to the Deer Cave system. The maximum cross sectional area is in the large southern passage, which was documented at 169 m wide with a ceiling height of 125 m. The northern passage registered the greatest ceiling height at 148 m with a cross sectional width of 142 m. The main entrance of Deer Cave was measured at 146 m and the Garden of Eden Entrance was measured to be 140 m wide. The survey revealed the existence of an unascended 305 m high aven (vertical shaft leading upward from a cave passage) in the roof of the upstream passage. The highest elevation roof passage was measured at 226 m above the main cave trail.

Like many other national parks in Sarawak, local communities living in the area prior to its establishment as a national park were dependent on the natural resources of the park for their survival. One of their traditional activities included hunting of wildlife within the watershed of Melinau-Paku at the southwestern area of the park.

There are plenty of wildlife species, such as barking deer, mouse deer, wild boar and other small mammals within the watershed.

The local people, particularly the Berawans, often went hunting for deer in the caves of the southern hills, thus the name Gua Payau or Gua Rusa (Deer Cave), which has been in use since the 1960s. They stated that deer would enter the cave following a common route on the cave floor, looking for the source of salt licks from bat drops or guano. Today, deer footprints can still be noticed on the cave floor as evidence of their presence in the old days.

Lang's Cave, another exceptional show cave inside the park, adjoins Deer Cave and was also previously frequented by deer and other wildlife. It was named by the earliest expedition group in the area in honor of their local guide from the Berawan community.

### Deer Cave Trail

Deer Cave is reached by following a 3 km plankwalk, which passes through peat swamp, alluvial flats and limestone outcrops. There is much to see on the way to the cave, including some superb rainforest, jungle streams and an ancient Penan burial cave. Another feature is the famous profile of Abraham Lincoln, which guards the southern entrance of the cave.



## PEOPLE, PLANTS, AND CULTURE

The people of Sarawak comprise migrant settlers and indigenous ethnic groups, including the Iban, Malay, Bidayuh, Melanau, Orang Ulu, Kedayan, Chinese, Indian, Sikh, and Eurasian communities.

The Iban are Sarawak's largest ethnic group, and are formerly known as "Sea Dayaks" as they migrated to Sarawak from West Kalimantan, Indonesia around the 15th century. Today the Iban are found throughout Sarawak. Traditionally, the Iban are hill rice (*padi*) farmers, using shifting cultivation methods. The Iban are known for the practice of longhouse living, where a series of independently owned family households (*bilik*) are joined together to produce one single structure, which varies from a handful of *bilik* to as many as 60.

The Malays are found in all divisions of Sarawak. More than half practice a peasant-fisherman economy in rural coastal areas, while most of the remainder work in civil service and the private sector.

Chinese traders came to Sarawak as early as the 6th century but settled down in large numbers in the early 19th century. Most of the early settlers came to mine for gold at Bau, a small village near Kuching.

The Bidayuh were known as the Land Dayaks (the Dayak, or people, of the hill country) and are believed to be indigenous to Borneo, originating from the interior of West Kalimantan. The Bidayuh of Sarawak consist of the Bukar-Sadong, Biatah, Bau-Jagoi, and Salako-Lara groupings. The Bidayuh are traditionally hill *padi* farmers, who also cultivate cash crops such as pepper, rubber, fruits, vegetables and oil palm, and rear pigs and chickens for their own consumption.

The Melanau inhabit the Rejang River Basin, the coastal areas of Igan, Oya, Dalat, Mukah, Balingian, and Bintulu, and some small settlements around Miri and are considered among the earliest settlers of Sarawak. Most of the Melanau population still live in rural communities along major waterways of the region, where fishing and sago-related activities continue to provide an income for many households.

Orang Ulu literally means people living upriver and is a convenient term for numerous indigenous minority groups

of central and northern Sarawak. The three major groups are Kayan and Kenyah, Kajang, and the Highlanders (Lun Bawang and Kelabit), each with a host of subgroups and affiliated tribes. Other smaller communities include the Bisaya, Penan, Beketan, and Tagal, and three minor groups – Ukit, Lisum, and Punan Busang.

The Kedayan community trace their ancestry to Javanese migrants who settled in Brunei Darussalam and intermarried with Brunei Malays.

Indians came to Sarawak as spice and textile traders and the largest single influx arrived in 1887 when a few hundred Indians were recruited to start coffee and tea plantations in the mountains of Matang, near Kuching. A small number of Sikhs first arrived in 1858 as recruits for the Sarawak Police Force.

The people of Sarawak also include Eurasians who comprise the offspring of European officers and local women of various races.

The indigenous ethnic minority also have an intimate relationship with the environment. Various plants are used in sacred and religious ceremonies, important events, as medicine or in traditional handicrafts. Species with cultural significance to the people of Sarawak include the following:

### ***Artocarpus elasticus*** Reinw. ex Blume

Locally known as *tekalong* or *pedalai*, *pingan* (Iban), *terap* (Malay), *kian* (Berawan, Kayan, Kenyah), and *pian* (Bidayuh). *Artocarpus elasticus* is a tree that grows up to 10–45 m tall and contains copious white, sticky latex.

The Bidayuh use the inner fibrous bark for tying and producing sacred objects used during religious or spiritual occasions. The traditional belief is that the sticky white latex will glue or bind the evil spirits together if they come to steal people's food or property. During the rice harvest, the leaves are placed upon farm altars. It is believed that the latex will keep the rice grains stuck onto the rice plants until the harvest is finished, thus ensuring a good harvest.

Some Malay people still ascribe occult powers to the leaves of *Artocarpus elasticus*. A simple human figure is drawn on the leaf with white lime (*bunyah/kapur*). The leaf

is then hung above the door or above where a baby is sleeping. Its presence is believed to prevent the approach of evil spirits that intend to harm occupants of the house.

In the Iban community, the swing, *tali wa*, is also used by the shaman, the *manang*. These swings are made from the bark of *Artocarpus elasticus* and they have to be hung in a special way. Special miniature *tali wa* are hung for the spirit guides and sometimes outdoor swings, called *tiang pancha*, are hung by the river banks. These are used by the *manang* to summon and slay evil spirits.

The Iban use the *tikai idas* (mat made of rattan and bark from *Artocarpus elasticus*) for drying the rice grains. Each morning the *tikai idas* is “fed” with cooked rice before it is used for drying the new rice to prevent the mat from spiritually “wasting” the grain.

The *tikai idas* is also used in curing sessions where a *manang* seeks to recover an errant soul. What is usually the first ritual in the curing session, named *pelian anchau bidai* (rite to spread a working mat), involves the symbolic spreading of a *bidai idas*.

While the rice grains are drying on the *tanju'* (outer veranda of the longhouse), a *sengkuit* or *sengkuar* (pole) is suspended, which can be swung out over the rice to scare away birds and chickens. The *tali sengkuit* (the loop from which the poles are hung) is made of barkcloth from *Artocarpus elasticus*. These loops are associated with spirits, called (in Saribas) *antu buyu tempuan*, who are said to use them as swings. In Saribas *adat*, after the rice has dried, the *tali sengkuit* have to be cut down, so that they will not attract the *antu buyu tempuan*.

The Berawans of the Orang Ulu community believe in using the large, ovate-oblong hairy leaves of *Artocarpus elasticus* as protector to keep bad spirits away. There is an old story among the Berawans of a group of five young and one elderly man, who went to the jungle to tap *jelutong* latex. The young men always talked about women, which the older man cautioned against as it was taboo. The young men continued to talk about ladies until one day, they heard the sound of a boat paddling up the river, with the sound of women's laughter. The men became very excited and when the boat landed, despite the warnings of the elderly man, each young man went with a woman from the boat. Suspecting that the women

were ghosts or evil spirits, the older man ran away, and one of the spirits came after him. He covered himself with the leaves of *Artocarpus elasticus* and the spirit later gave up and disappeared. He was the only survivor in the group. To this day, the Berawan still place the leaves of *Artocarpus elasticus* above the door or underneath the floor of their homes to prevent the approach of evil spirits.

In the old days the Iban used the inner bark for men's loincloth (*sirat*), blanket (*pua*), and coat (*kelambi*). The loincloth is a narrow strip, which may be up to 6 m long. A woven blanket may be 2 x 3 m, while a coat is shorter. The blankets were used to wrap the abdomen of a mother who had just given birth. Bark cloth was used for skirts, stout war coats, and rough wear, and for padding woven or beaded garments. The bark is also used as rope, strings, threads, and straps for fish traps, fishing-nets, and fishing lines, and for stitching, tying, and fastening all sorts of materials. The bark fiber is still the most used material for pack straps and basket straps in many interior communities.

The sticky white latex is traditionally used in Borneo as a bird lime (*sempulut*) for catching birds. The bark of the tree is slashed, and after the latex has exuded for a few hours, it is collected and smeared onto a rod. The sticky rod is then placed on a fruit tree bearing a kind of fruit that birds like to eat. When the birds arrive, they will stick to the lime as they perch on the rod to eat the fruit. Or, a rod smeared with sticky latex may be hung over a stream frequented by birds.

#### ***Alstonia pneumatophora*** Baker ex. Den Berger

The *pelai paya* (Iban) or *kita* (Berawan, Kayan) is used for making hornbill (*kenyalang*) icons for rituals. This is also used for making shields (*teraba*) since the wood is light. The Iban shield is long, narrow and v-shaped in cross-section with a central handgrip, and decorated with native designs. A single piece of wood is used for the shield. Formerly used by the Iban during headhunting expeditions, the shields are now only used for decoration. The tree is also used for making masks (*indai abau*), which are used to chase away children in the longhouse who are too naughty to be controlled.

***Alstonia scholaris*** (L.) R.Br.

Latex from young shoots of the tree is applied to the body part affected by herpes. The treatment is of considerable importance since longhouse folks believe that the disease cannot be treated at the clinic.

Local people believe it is taboo for the husband of a pregnant woman to tap or slash the *pelai* tree, which has white sap, as it is believed that this could cause the wife to experience unstoppable bleeding while giving birth.

This wood is also used for making small carved human or animal figures (*pentik* in Iban), which are used to ward off evil spirits. In farming, it is used to keep off *padi* bugs (*empangau*). A cat *pentik* is used against rats; a kite *pentik* against locusts; and a worm *pentik* is used when moving in to a new house. It consists of a small stick, notched like steps with a grain of *padi* in each notch, a ring of creeper hung on it, and a wooden hook in the creeper. The wood is also used for hunting equipment such as knives and spears.

***Antidesma*** sp

Locally known as *jirak* (Iban), the bark of the trees of the genus *Antidesma* are boiled to produce a red dye. The dye was extensively used during weddings and Gawai Dayak, an annual festival celebrated by the Dayak people in Sarawak, Malaysia, and West Kalimantan, Indonesia.

***Dillenia suffruticosa*** (Griff.) Martelli

A decoction made from a root (that points to the direction of sunrise), boiled in water for 20 minutes and with a little salt, is drunk to drive away fever. The leaves can be eaten raw with a brine pickle, and the young shoots can be eaten after being cooked. The leaves are also used for wrapping. The Selako community makes a poultice from the leaves to heal cuts and wounds. The bark is scraped and mixed with a little cooking oil and massaged on itchy skin.

***Garcinia beccarii*** Pierre

Both the ripe and unripe fruit of the tree can be eaten raw after removing the hard skin. Sometimes the fruits are boiled for about 20 minutes to peel off the skin. The tree is also used for firewood.

***Macaranga gigantea*** (Reichb.f. & Zoll.) Müll. Arg.

Parts of the tree are used to make skillfully-shaved poles (with curling shavings on one end) that are used to decorate a *pandong*, a shrine erected at major festivals (*gawai*) by the Dayak communities. This is also used to build fires since this is the most common use of wood shavings. The tree is also used by the Orang Ulu communities to send specific messages in the jungle, such as “wait”, “go this way”, “do not go this way”, or “be wary”, depending on how the wood is shaved.

***Pangium edule*** Reinw.

The seeds are dried (since fresh seeds are poisonous) and used as soap, or crushed to make perfume. For food, the seeds are boiled and later the kernels soaked for several nights, then cut into smaller pieces and cooked with meat or fish. It is a very nutritious fruit with high values for energy, protein, fat, fiber, minerals, and Vitamin C. Crushed or sliced leaves are added to a brine for pickling rice, fish, and other food.

***Pometia pinnata*** J.R. & G.Forst.

The *kasai* (Malay, Iban) or *ngong* (Berawan) is a tree that is commonly sawn for timber as the trunk is moderately hard, flexible and tough, light red, and fairly easy to work with. The Malays boil the leaves and bark to produce a decoction in a bath for removing fever. As a source of food, the oily seeds may be eaten after roasting.

***Potoxylon melagangai*** (Symington) Kosterm.

The wood from the tree is most commonly used for carvings by the Iban, including carp trap charms (*tuntun peti*), Iban pig trap sticks, blowpipes, hour-glass drums (*ketebong*), dibbers (*tugal*) for making holes for padi seed during the planting season, and beautifully carved weaving tools.

***Globba atrosanguinea*** Teijsm. & Binn.

The Iban make a poultice with a paste of the rhizome, which is used to alleviate inflammation, head wounds, and bone fractures. A paste of the leaves is applied to reduce cancer swellings while chanting “*Enti nuan tu empá ríman, tenggelam padam meh nuan tu*” (If you have cancer swelling, let it subside and disappear).

***Poikilospermum suaveolens*** (Blume) Merr.

The Penans boil the whole plant, including flowers and

fruits, in a big pot of water and allow the steam to warm the private parts to treat gonorrhoea. The Bidayuh make a poultice from a patch of young leaves, which is placed on the forehead to cure a headache.

***Baccaurea lanceolata*** (Miq.) Müll. Arg.

The fruits are extremely sour and eaten with salt. The fruit is also sometimes used for cooking fish soup.

***Caryota mitis*** Lour., ***Caryota no*** Becc., and  
***Iguanura melinauensis*** Kiew

The Iban boil the young stem (apex) or 'cabbage' in a liter of water and apply the solution for treating ulcers in the mouth. It is also an important source of sago for the Penan, and was reported as having the greatest starch content per trunk. The apex or 'cabbage' is reported to be particularly good for eating.

***Korthalsia echinometra*** Becc.

Used by the Iban for making baskets and mats. Considerable lengths of stem are cut, sheaths are removed, and the cane is split and woven into various types of baskets (used for agriculture and hunting activities) and large, coarse mats, which are normally used during ceremonial functions in longhouses.

***Korthalsia rigida*** Blume

This is among a number of rattan species that are historically used to wrap up ritual plates or head-hunted human skulls. It is also used as part of the materials for weaving mats and baskets used in rituals or ceremonies among the Dayak communities. The stem also reminds young school children of their past punishment for unfavorable behavior in school or at home.

***Angiopteris evecta*** (G.Forst.) Hoffm.

A decoction of the roots is said to arrest bleeding after a miscarriage, and pounded fronds are used to relieve coughs. A tea made from the pounded rhizome is used to treat blood in stool.

***Asplenium nidus*** L.

The plant is occasionally eaten and used to ease labor in childbirth. The Iban make a poultice from the leaves and place it on the forehead to relieve headaches. The Kayan make a drink out of a handful of the rhizome boiled in two cups of water to treat blood in stools.

***Lygodium circinnatum*** (Burm.f.) Sw.

The Kedayan soak the root in water and the solution is used for bathing and as a shampoo to prevent hair loss. A drink is also made from the root boiled in water to relieve general pain. The Iban mash the leaves, which are wrapped in a banana leaf, warmed over a fire, and applied to treat fungal skin infections.

***Nephrolepis biserrata*** (Sw.) Schott.

The Iban make a soup from young shoots or fronds that are boiled with water, salt, and ginger to stimulate milk production in mothers after childbirth. Young leaves are also rubbed on parts of the body suffering from itchiness due to contact with drops of animal urine.

***Stenochlaena palustris*** (Burm.f.) Bedd.

The young frond is usually fried with other ingredients, such as garlic or *belacan* (prawn paste). This fern is popularly served in many food stalls and restaurants throughout Sarawak. Served as a vegetable and eaten with rice, the fern is said to invigorate women after childbirth. Boiled with water, the juice can be used to cure fevers. The long rhizomes are used for making baskets and fish traps.

***Sticherus truncatus*** (Willd.) Nakai

The Iban dry and use black fibers inside the main stem as decorative lashing on knife sheaths or hilts. The fibers are also used for bracelets and leg bangles that were usually worn by men either for both daily use and ceremonial purposes.

*Authors:* Sahlee B. Barrer and Victor Luna Anak Amin

Information on People, Plants, Culture taken from the following sources:  
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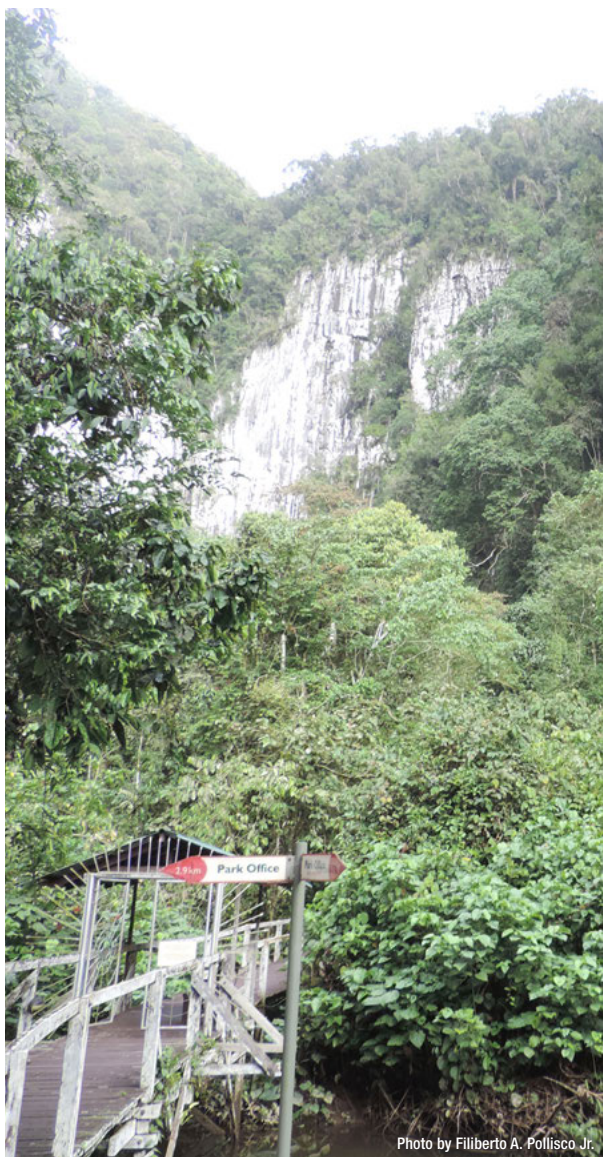


Photo by Filiberto A. Pollisco Jr.

## List of Plants along the Deer Cave Trail

### TREES

*Alstonia pneumatophora* Baker ex Den Berger  
*Alstonia scholaris* (L.) R.Br.  
*Artocarpus elasticus* Reinw. ex Blume  
*Baccaurea lanceolata* (Miq.) Müll.Arg.  
*Dehaasia incrassata* Symington ex P.S.Ashton  
*Dillenia suffruticosa* (Griff.) Martelli  
*Elaeocarpus obtusus* Blume subsp. *apiculatus* (Mast.) Coode  
*Garcinia beccarii* Pierre  
*Hopea pachycarpa* (F.Heim) Symington  
*Macaranga gigantea* (Reichb.f. & Zoll.) Müll. Arg.  
*Magnolia kobus* DC.  
*Neolamarckia cadamba* (Roxb.) Bosser  
*Octomeles sumatrana* Miq.  
*Pangium edule* Reinw.  
*Parashorea macrophylla* Wyatt-Sm. ex P.S.Ashton  
*Pometia pinnata* J.R. & G.Forst.  
*Potoxylon melagangai* (Symington) Kosterm.  
*Semecarpus bunburyanus* Gibbs  
*Shorea hopeifolia* (F.Heim) Symington  
*Shorea leprosula* Miq.  
*Shorea myrionerva* Symington ex P.S.Ashton

### HERBS AND SHRUBS

*Aglaonema nitidum* (Jack) Kunth  
*Aglaonema simplex* (Blume) Blume  
*Alocasia princeps* W.Bull.  
*Alocasia reginae* N.E.Br.  
*Alocasia sarawakensis* M.Hotta  
*Alpinia ligulata* K.Schum.  
*Amischotolype griffithii* (C.B.Clarke) I.M.Turner  
*Amischotolype mollissima* (Blume) Hassk.  
*Amomum coriaceum* R.M.Sm.  
*Amorphophallus julaiihii* Ipor, Tawan & P.C.Boyce  
*Appendicula undulata* Blume  
*Amorphophallus borneensis* (Engl.) Engl. & Gehrm.  
*Begonia conipila* Irmsch. ex Kiew  
*Begonia lucychongiana* S.Julia & Kiew  
*Begonia melinauensis* S.Julia & Kiew  
*Begonia umbratica* S.Julia

*Begonia vulgare* S.Julia & Kiew  
*Bulbophyllum medusae* (Lindl.) Rchb.f.  
*Cheilocostus speciosus* (J.Koenig) C.D.Specht  
*Clerodendrum paniculatum* L.  
*Cryptocoryne longicauda* Becc. ex Engl.  
*Dendrobium endertii* J.J.Sm.  
*Epithema involucreatum* (Roxb.) B.L.Burt  
*Etilingera fimbriobracteata* (K.Schum.) R.M.Sm.  
*Globba argentiana* R.M.Sm.  
*Globba atrosanguinea* Teijsm. & Binn.  
*Lasia spinosa* (L.) Thwaites  
*Monophyllaea cupiflora* B.L.Burt  
*Monophyllaea insignis* B.L.Burt  
*Musa campestris* Becc.  
*Phymatarum borneensis* M.Hotta  
*Plocoglottis plicata* (Roxb.) Omerod  
*Schismatoglottis calyptrata* (Roxb.) Zoll. & Moritzi  
*Schismatoglottis trifasciata* Engl.  
*Zingiber vinosum* Mood & Theilade

## VINES AND LIANAS

*Aeschynanthus flavidus* M.Mendum & P.Wood  
*Aeschynanthus tricolor* Hook.  
*Bauhinia kockiana* Korth.  
*Poikilospermum suaveolens* (Blume) Merr.  
*Pothos insignis* Engl.  
*Pothos longipes* Schott  
*Rhaphidophora elliptifolia* Merr.  
*Rhaphidophora foraminifera* (Engl.) Engl.  
*Scindapsus geniculatus* Engl.  
*Scindapsus latifolius* M.Hotta  
*Scindapsus longistipitatus* Merr.  
*Tetracera macrophylla* Wall. ex Hook.f. & Thoms.

## PALMS AND PANDANS

*Caryota mitis* Lour.  
*Caryota no* Becc.  
*Freycinetia sarawakensis* Martelli  
*Iguanura melinauensis* Kiew  
*Korthalsia echinometra* Becc.  
*Korthalsia rigida* Blume  
*Pandanus yvanii* Solms  
*Pinanga aristata* (Burret) J.Dransf.  
*Salacca magnifica* Moge  
*Salacca rupicola* J.Dransf.

## FERNS

*Angiopteris evecta* (G.Forst.) Hoffm.  
*Antrophyum callifolium* Blume  
*Asplenium affine* Sw.  
*Asplenium nidus* L.  
*Cyathea contaminans* (Wall. ex Hook.) Copel.  
*Lygodium circinnatum* (Burm.f.) Sw.  
*Nephrolepis biserrata* (Sw.) Schott  
*Stenochlaena palustris* (Burm.f.) Bedd.  
*Sticherus truncatus* (Willd.) Nakai





# Trees

***Alstonia pneumatophora*** Baker ex Den Berger

**Synonym** *Alstonia pneumatophora* Baker ex Den Berger  
var. *petiolata* Monach.

**Local names** *pelai paya* (Iban), *kita* (Berawan, Kayan)

**Description** Large tree, 25–85 m tall, trunk 30–200 cm diameter at breast height (dbh), fluted at base and forming tall steep buttresses to 8 m, pneumatophore roots well-developed. Bark smooth or sparsely scaly, grey or yellowish gray; latex white. Leaves in whorls of 3–6, without stalk or with short stalk, lower surface whitish, gray-green above, glabrous on both sides, leaf blade spatulate or obovate, 4–13 x 1.5–4.5 cm, base tapering towards the leaf stalk, midrib sunken above; secondary veins parallel, 18–30 pairs. Inflorescences 3–10 cm long, compound, forming two bunches of densely clustered flowers. Flowers fragrant; corolla glabrous outside, white. Fruits very long and narrow, in pairs; splitting open to expose many small seeds with two tufts of hairs for wind dispersal.

**Habitat and distribution** Lowland forests in alluvial or swampy areas. Borneo, Peninsular Malaysia, Singapore, Sulawesi, and Sumatra. Common along the trail to Deer Cave.

*Author:* Merlita Tabamo



Photo by Jennelyn Asegurado



Photo by Edwino S. Fernando



Photo by Zin Wun Tun

***Alstonia scholaris*** (L.) R.Br.

**Local names** *pelai lilin* (Iban), *kita* (Berawan, Kayan)

**Description** Medium to large tree, to 40 m tall with a somewhat tessellated corky gray to gray-white bark. The boles of larger trees are strongly fluted to 10 m tall. The outer bark is cream to yellowish with abundant milky latex that flows freely when cut. Leaves in whorls of 4–8 in the upper axils; leaf stalks 1–1.5 cm long, 11.5–23 x 4–7.5 cm. Upper surface is dark green, the lower green white with 25–40 pairs of secondary veins. The tip of the leaf is rounded or shortly pointed, tapering towards the base. The inflorescence is a much-branched terminal panicle, up to 120 cm long; flowers 7–10 mm long white; cream or green; the tube hairy; 1.5–4 mm long; the left margins overlapping; strongly scented. Fruit a pendulous, two-lobed, dehiscent follicle, brown or green, dry or woody, spindle-shaped, 15–32 cm long, 4–6 mm in diameter, containing numerous flat, oblong, and brown seeds.

**Habitat and distribution** Lowland to upper hill forest to 900 m elevation. Widespread in Asia.

*Author:* Merlita Tabamo



Photo by Edwino S. Fernando

Photos by Jennelyn Asegurado

***Artocarpus elasticus*** Reinw. ex Blume

**Synonyms** *Artocarpus blumei* Trécul, *Artocarpus kunstleri* King

**Local name** *tekalong* (Iban)

**Description** Medium size tree to 40 m tall with prominent buttresses. Bark smooth and ring-like. Leaves deeply bilobed or dissected.

**Habitat and distribution** Forests up to 1,500 m elevation. Widespread in Southeast Asia.

*Author:* Jok Wan Ngau

***Baccaurea lanceolata*** (Miq.) Müll.Arg.

**Synonyms** *Adenocrepis lanceolata* (Miq.) Müll.Arg., *Baccaurea glabriflora* Pax & K.Hoffm., *Baccaurea pyrrhodasya* (Miq.) Müll.Arg., *Hedycarpus lanceolatus* Miq., *Pierardia pyrrhodasya* Miq.

**Local names** *asam pahong*, *asam pahung*, *asam paung*, *limpanong*, *pahu asam*, *pahu temuangi*

**Description** Variable tree with a dense crown that can range in size from 3–30 meters tall. The bole is unbuttressed and can be 5–60 cm in diameter. Abundant sour greenish-white fruits hang in strings on the trunk.

**Habitat and distribution** Open areas in undisturbed mixed dipterocarp forest. Peninsular Thailand, Peninsular Malaysia, Sumatra, Java, Borneo, and the Philippines.

*Author:* Jok Wan Ngau



Photo by Jennelyn Asegurado



Photo by Jok Wan Ngau

***Dehaasia incrassata*** Symington ex P.S.Ashton

**Description** Sub-canopy tree up to 28 m tall and 48 cm dbh. Leaves alternate, simple, penni-veined, glabrous. Flowers 3.5 mm diameter, yellow, placed in panicles. Fruits 32 mm long, blue-purple, fleshy drupes placed on swollen red fruit stalks.

**Habitat and distribution** Mixed dipterocarp forests up to 900 m elevation. Taiwan, Thailand, Peninsular Malaysia, Sumatra, Java, Borneo (throughout the island), the Philippines, Celebes, Moluccas, and New Guinea.

*Author:* Jennelyn Asegurado



Photo by Julia Sang

***Dillenia suffruticosa*** (Griff.) Martelli

**Synonyms** *Dillenia burbridgei* (Hook.f.) Martelli, *Dillenia suffruticosa* var. *borneensis* Ridl., *Wormia burbridgei* Hook.f., *Wormia subsessilis* Miq., *Wormia subsessilis* var. *borneensis* Ridl., *Wormia suffruticosa* Griff.

**Local names** *buan*, *bui* (Iban), *simpoh* (Malay)

**Description** Tree up to 63 m tall, 123 cm dbh with conspicuous stilt-roots. Leaves elliptic or elliptic-oblong to obovate with rounded to slightly emarginate apex, obtuse to rounded or cordate base and entire to slightly undulate-dentate margin. Petiole 4–10 cm long. Inflorescence 3–15-flowered. Flowers 8 cm diameter, sepals 5, broadly elliptic, 20–25 x 16–20 mm, petals yellow 35 x 16 mm. Fruit indehiscent, greenish yellow, slightly flattened-globular, 30–35 mm across, 1–3-seeded.

**Habitat and distribution** Forests up to 700 m elevation. Peninsular Malaysia, Sumatra, Borneo, and the Philippines.

*Author:* Jennelyn Asegurado



Photo by Jennelyn Asegurado

***Elaeocarpus obtusus*** Blume subsp.  
***apiculatus*** (Mast.) Coode

**Synonyms** *Elaeocarpus apiculatus* Mast., *Elaeocarpus apiculatus* Mast. var. *annamensis* Gagnep. in Humbert, *Elaeocarpus rugosus* Roxb. ex G. Don var. *singaporensis* Ridl.

**Description** Evergreen tree with buttresses that can be up to 5 meters high. This species is one of the main sources of 'sengkurat' timber in Malaysia.

**Habitat and distribution** Open places and along the sea coast. China (Guangdong, Hainan, Yunnan), Peninsular Malaysia (Kedah, Kelantan, Trengganu, Perak), Singapore, and Viet Nam.

*Author:* Sahlee B. Barrer



Photo by Edwin S. Fernando



Photo by Jok Wan Ngau

***Garcinia beccarii*** Pierre

**Local name** *kandis* (Iban)

**Description** Sub-canopy tree up to 26 m tall and 35 cm dbh. Stem with yellow latex. Leaves opposite, simple, penni-veined, glabrous, venation inconspicuous. Flowers ca. 5 mm diameter, green-yellow, placed in bundles in leaf axils. Fruits ca. 20 mm diameter, yellow-orange-red, fleshy berry, seeds with aril.

**Habitat and distribution** Undisturbed mixed dipterocarp and sub-montane forests up to 1,000 m altitude. Mostly on hillsides and ridges with sandy soils. In secondary forests usually present as a pre-disturbance remnant tree. Borneo (Sarawak, Brunei Darussalam, and East-Kalimantan).

*Author:* Sahlee B. Barrer



Photo by Jennelyn Asegurado



Photo by Edwino S. Fernando

## *Hopea pachycarpa* (F.Heim) Symington

**Synonyms** *Balanocarpus pubescence* Ridl., *Hopea laxa* Symington, *Hopea resinosa* Symington

**Local name** *merkoyong* (Iban)

**Description** Medium size tree to 40 m tall with low flying buttresses and stilt root present. Bark smooth. Leaves thinly coriaceous, blade flat. Fruit with 2 larger outer wings and 3 small inner wings. The wood is highly flammable and used for firewood.

**Habitat and distribution** Mixed dipterocarp forest and *kerangas* forest. Borneo, Peninsular Malaysia, and Sumatra.

*Author:* Alim Bin Mohd



Photo by Jennelyn Asegurado



Photo by Jennelyn Asegurado



***Macaranga gigantea*** (Reichb.f. & Zoll.) Müll. Arg.

**Synonyms** *Macaranga incisa* Gage, *Macaranga megalophylla* (Müll.Arg.) Müll.Arg., *Macaranga rugosa* (Müll.Arg.) Müll.Arg., *Mappa gigantea* Reichb.f. & Zoll.

**Local names** *badad*, *bangauwang*, *brunt*, *malau*, *marakubong*, *merkubong*, *sedaman*, *talinga gajah*

**Description** Sub-canopy tree up to 30 m tall and 50 cm dbh. Stipules ca. 43 mm long. Leaves huge, alternate, simple, 3-lobed, palmately veined, peltate, toothed margin, hairy lower surface. Flowers ca. 0.5 mm diameter, greenish, placed in bundles within bracts, which are part of large branched inflorescences. Fruits ca. 7 mm diameter, green-yellow-brownish, 2-lobed, dehiscent capsules, seeds with purple aril. It is one of the earliest colonists of degraded land, but can also be found in large forest gaps within primary forest. It is regularly found as one of the dominant tree species in regenerating forests after 10–20 years following the abandonment of shifting cultivation. Under good soil conditions this species can grow exceptionally quickly. It produces huge quantities of small seeds that are taken by a wide range of small birds and squirrels.

**Habitat and distribution** Disturbed, open sites in mixed dipterocarp forest. Very common in secondary forests and scrub. Often found along roads and on hillsides on sandy to clay soils. It has a very broad ecological range occurring from lowland coastal and swampy areas, to c. 800–1,000 m. Peninsular Myanmar, Peninsular Thailand, Peninsular Malaysia, Sumatra, and Borneo.

*Author:* Mitzi T. Pollisco



Photo by Edwino S. Fernando



Photo by Julia Sang

***Magnolia kobus*** DC.

**Synonyms** *Magnolia candollei* (Blume) H.Keng subsp. *obovata* (Korth.) Noot., *Magnolia liliifera* (L.) Baill. subsp. *obovata* (Korth.) Govaerts, *Talauma betongensis* Craib, *Talauma levissima* Dandy, *Talauma oblanceolata* Ridl., *Talauma sclerophylla* Dandy

**Local names** *cempaca*, *cempaca telur*, *megar*, *talaumah*, *talauma*, *talahuma*

**Description** Mid-canopy tree up to 33 m tall and 45 cm dbh. Stipules leaving ring scar around the twigs when dropped. Leaves alternate, simple, penni-veined, tertiary venation conspicuous reticulate, glabrous. Flowers ca. 46 mm diameter, white-yellowish, placed solitary. Fruits ca. 96 mm long, green-yellow-red, syncarps. Seeds with pink-red-orange aril, remain attached to central fruit axis when ripe.

**Habitat and distribution** Undisturbed mixed dipterocarp to sub-montane forests up to 2,000 m altitude. Usually on hillsides and ridges. On sand to clay soils, but also on limestone. In secondary forests usually present as a pre-disturbance remnant tree. Thailand and Indo-China to New Guinea. In Borneo found throughout the island.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Nobuyuki Tanaka

***Neolamarckia cadamba*** (Roxb.) Bosser

**Synonyms** *Anthocephalus cadamba* (Roxb.) Miq.,  
*Nauclea cadamba* Roxb.

**Local name** *kelampayan*

**Description** Medium tree up to 40 m tall, sometimes with low buttresses. The crown is umbrella-shaped and the branches are arranged in tiers. Leaves simple, 10–30 cm long. Flowers orange, small, in dense, globose heads. The fruits are packed closely together to form a fleshy, yellow or orange infructescence (fruit bunch) containing many seeds. The small capsules split releasing the seed at maturity.

**Habitat and distribution** Lowland to hill forests. South to Southeast Asia.

*Author:* Merlita Tabamo



Photo by Edwino S. Fernando

***Octomeles sumatrana*** Miq.

**Local names** *benuang*, *binuang* (Iban), *kita* (Berawan, Kayan)

**Description** Medium to big size tree to 40 m tall. Bark pale brownish cream or gray, thin, hooped (branch scars, dot-like lenticels visible). Leaves 12–33 x 16–29 cm, drying rather papery, with scattered white hairs below; base heart-shaped, margin toothed or wavy, apex acute to acuminate; midrib raised above and below; secondary veins 7–10 pairs, the basal 1–2 pairs originating from the stalk insertion, giving a somewhat 3-veined or palmately vein appearance, mostly parallel and looping near margin, raised above and below. Flower in spikes 20–60 cm long, 8 mm across. Fruit stalk 8–12 mm long, with pale brown endocarp.

**Habitat and distribution** Alluvial forest. Brunei Darussalam, Indonesia, Malaysia, Papua New Guinea, the Philippines, and the Solomon Islands.

*Author:* Nguyen Thanh Tam



Photo by Edwino S. Fernando

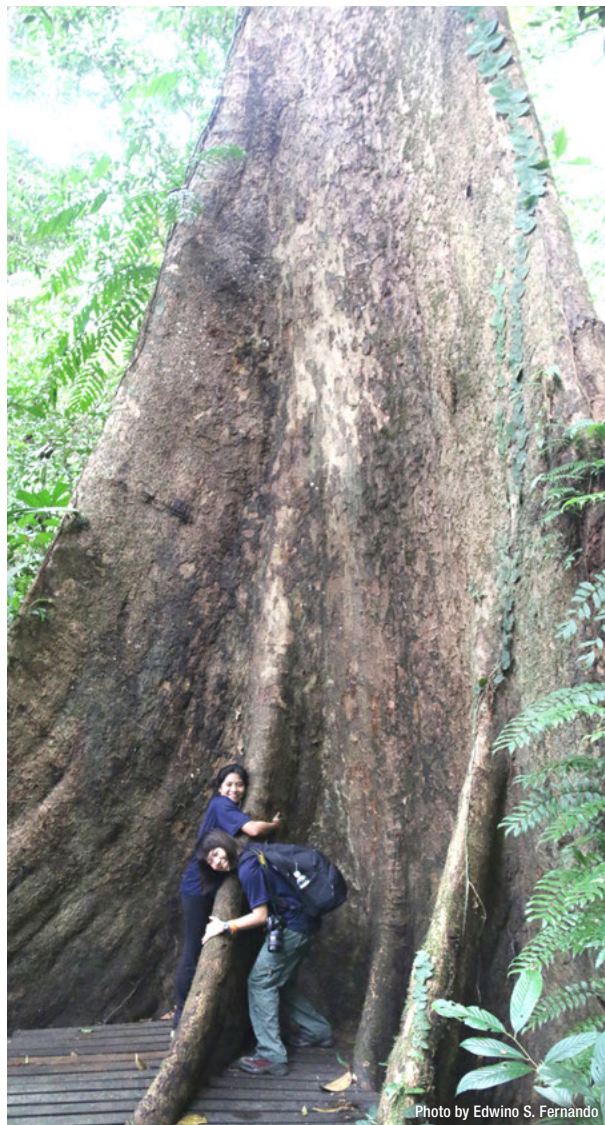


Photo by Edwino S. Fernando

***Pangium edule*** Reinw.

**Synonyms** *Hydnocarpus edulis* (Reinw.) Peterm., *Hydnocarpus polyandrus* Blanco, *Pangium ceramense* Teysm. & Binn., *Pangium ceramense* Teysm. & Binn. ex van Slooten, *Pangium naumanni* Warb.

**Local name** *kepayang* (Iban, Malay)

**Description** A large tree reaching height in excess of 40 m. It has large heart-shaped leaves. The flowers are small with yellowish white color. The fruits are large weighing from 1–1.5kg, brown in color. There is a nipple at the end of the fruit, with each containing up to 20 seeds enclosed in a yellowish white color.

**Habitat and distribution** Commonly found in riparian forests and often planted as domesticated plants near longhouses or villages. Malaysia and Southeast Asia.

*Author:* Jok Wan Ngau



Photo by Julia Sang



Photo by Julia Sang

***Parashorea macrophylla***

Wyatt-Sm. ex P.S.Ashton

**Local names** *bilat* (Iban), *peran*

**Description** Large tree to 50 m tall, to 1 m diameter, remaining monopodial into maturity; crown diffuse and adorned with giant silvery leaves. Young parts, buds, and inflorescence densely ochreous puberulent. Stipules to 15 x 2.5 cm. Leaves distichous, subchartaceous, silvery below, prominently corrugated between lateral veins; blade oblong-elliptic, 30–50 x 16–24 cm, base subcordate, apex obtuse to shortly acuminate; lateral veins 28–36 pairs, straight, prominent below; intercostal venation very slender, dense; petiole 3–5 cm long.

**Habitat and distribution** In mixed dipterocarp forest on moist lower slopes and periodically flooded alluvium, along inland rivers, on clay soils, at altitudes to 300 m. Endemic to Borneo. In Sarawak known from Bintulu, Kapit, Limbang, Marudi, Miri, and Tatu districts. Occurring in Gunung Mulu National Park but vulnerable elsewhere.

*Authors:* Mitzi T. Pollisco and Alim Bin Mohd



Photo by Julia Sang

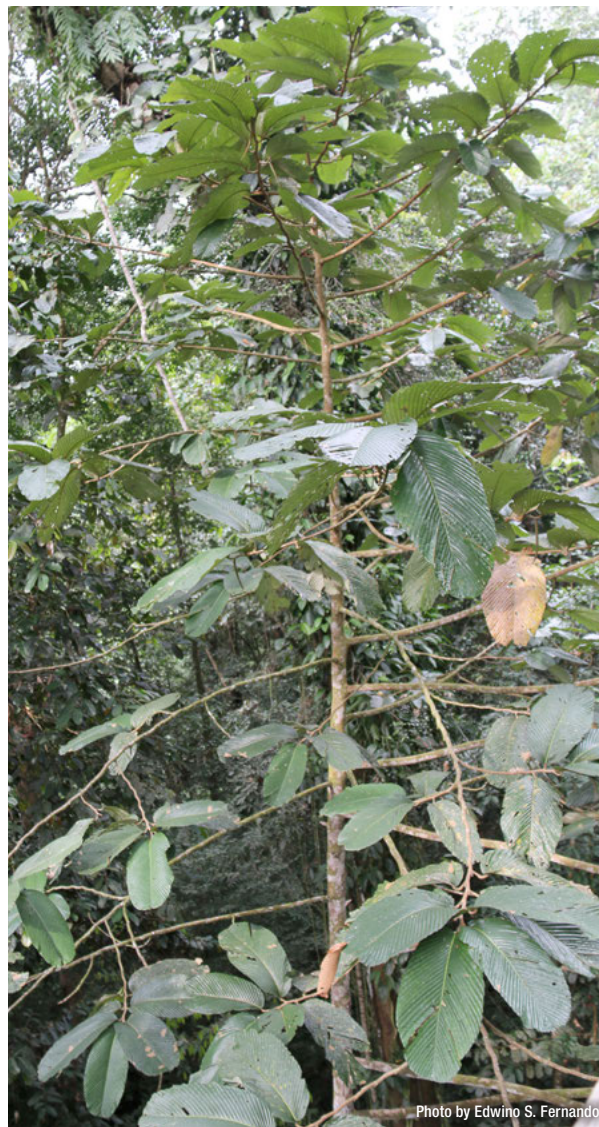


Photo by Edwino S. Fernando

***Pometia pinnata*** J.R.Forst. & G.Forst.

**Local names** *kasai* (Malay, Iban), *ngong* (Berawan)

**Description** Tree up to 50 m tall and 1.4 m dbh; buttresses to 5 m high, spreading to 3 m wide, to 15 cm thick. Leaves to more than 1 m long, compound, leaflets penni-veined, glabrous to densely hairy. Stipules absent, but pseudo-stipules usually present (i.e. leaf-like appendages at leaf petiole base, not on twig); margin entire to toothed. Inflorescences erect to drooping, 15–70 cm long, mostly hairy. Flowers calyx 1–2.5 mm diameter, petals shorter or longer than calyx. Fruits 1.5–5 x 1–3 cm, red-purple, drupes. Seeds to 2.5 x 1.5 cm with white aril.

**Habitat and distribution** In undisturbed mixed dipterocarp forests up to 700 m elevation. Often on alluvial forest and along or near rivers and streams, but also on hillsides. Widespread from Sri Lanka and southern China to New Guinea and the western Pacific. In Borneo throughout the island.

*Author:* Jennelyn Asegurado



Photo by Julia Sang



Photo by Edwino S. Fernando

***Potoxylon melangai*** (Symington) Kosterm.**Synonym** *Eusideroxylon melangai* Symington**Local names** *belian*, *tebelian kebuau* (Iban)**Description** Mid-canopy tree up to 36 m tall and 95 cm dbh. Leaves alternate, simple, 14–18 cm long and 5–11 cm wide, without stipules. Flowers ca. 2.6 mm diameter, white-yellow, paniculate. Fruits ca. 84 mm long, grey-green, stony drupes.**Habitat and distribution** Lowland to hill mixed dipterocarp forest. Sumatra, Bangka, Belitung, Borneo, Sulu archipelago, and Palawan.*Author:* Jennelyn Asegurado

Photo by Edwino S. Fernando



Photo by Edwino S. Fernando



## *Semecarpus bunburyanus* Gibbs

**Synonyms** *Semecarpus subsessilifolia* Merr., *Semecarpus oblanceolatus* Merr., *Semecarpus scaberulus* Merr.

**Description** Tree (rarely unbranched treelet or shrub), (1½–)5–15 m high and 5–21 cm diameter at breast height (dbh) (young tree sometimes with divaricate spines, 3–5 cm long, near the base). Leaves spaced, spiral (sometimes subverticillate on unbranched treelets or shrubs), subcoriaceous to coriaceous, obovate-oblong to oblanceolate, rarely very narrow-oblanceolate, 15–49 (–100) by (3½–)7½–17 (–22) cm. Flowers greenish white or white. Petals valvate, elliptic, elliptic-oblong, or lanceolate, 3½–5 by 1–1¼ mm, glabrous rarely puberulous outside, with several longitudinal veins; stamens 2½ mm. Panicles terminal, up to 35 cm long, tomentose or pubescent, glabrescent; Ovary conical, 1½–2 mm diameter, pilose and/or papillose.

**Habitat and distribution** Borneo (Kalimantan, Sabah, and Sarawak) and the Philippines (Panay and Palawan).

*Author:* Sahlee B. Barrer



Photo by Jennelyn Asegurado



Photo by Jennelyn Asegurado

***Shorea hopeifolia*** (F.Heim) Symington**Synonym** *Cotylelobium hopeifolium* F.Heim**Local name** *lun kuning*

**Description** Tree with a large, diffuse, cauliflower-shaped crown; can grow up to 65 meters tall. The straight, cylindrical bole can be 2 m in diameter with stout, spreading buttresses up to 4 meters high. Leaves somewhat chartaceous and undulate, drying dark tawny-brown with the midrib distinctly dark red below; blade ovate, 3.5–8 x 2–4 cm, base broadly cuneate, apex with prominent acumen to 1 cm long; midrib flat above, prominent below, usually with prominent pore-like domatia either side at base; lateral veins 9–11 pairs, with distinct shorter intermediates, slender, hardly raised below, arched; intercostal venation reticulate, evident; petiole slender, geniculate, 0.8–1 cm long. Inflorescences terminal or axillary; rachis terete, to 5 cm long, singly branched, branchlets bearing to 9 flowers; bracteoles elliptic, obtuse, to 2 x 2 mm.

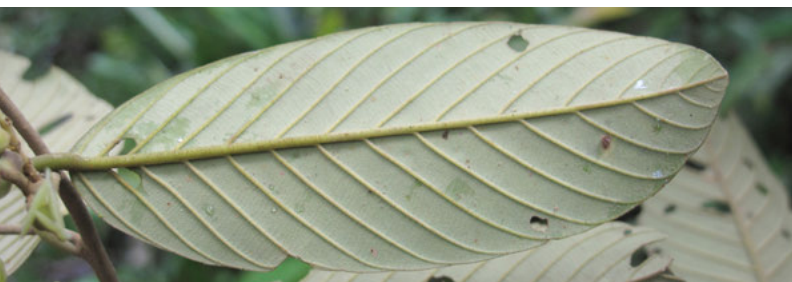
**Habitat and distribution** Scattered on fertile clay rich soil on undulating land and hills below 600 meters, often in moist places. Sumatra, Peninsular Malaysia, Borneo, and the Philippines (Mindanao).

*Author:* Mitzi T. Pollisco

Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Shorea leprosula*** Miq.**Synonym** *Shorea maranti* (Miq.) Burck**Local name** *meranti tembaga***Description** Emergent tree to 60 m tall with low buttresses; bark grayish-brown. Leaves simple, alternate, the lower surface dull grayish-brown or yellowish-brown, rough to the touch, and densely covered with short yellow-brown hairs. Flowers are small with yellow petals. Fruit is a single-seeded nut with three long and two shorter wings.**Habitat and distribution** Lowland forest, mixed dipterocarp forest. Borneo, Peninsular Malaysia, Thailand, and Sumatra.*Author:* Alim Bin Mohd

Photos by Jennelyn Asegurado



Photo by Jennelyn Asegurado

***Shorea myrionerva*** Symington ex P.S.Ashton

**Local name** *langgai sepit undang* (Iban)

**Description** Medium to big tree to 40 m tall with small buttresses. Bark smooth. Leaves not hairy, distichous, prominently corrugated between lateral veins. The twigs and leaf stalks covered with short torn-like scales such as on prawn claw.

**Habitat and distribution** Mixed dipterocarp forest. Endemic to Borneo.

*Author:* Alim Bin Mohd



Photo by Jennelyn Asegurado



Part of the trail to Deer Cave.  
Photo by Edwino S. Fernando



## Herbs & Shrubs

***Aglaonema nitidum*** (Jack) Kunth

**Synonyms** *Aglaonema oblongifolium* Schott, *Calla nitida* Jack

**Description** Ground herb with erect stem to 1 m tall and the leaf stalk measures up to 70 cm long. The leaf is about 37 cm long and 16.5 cm wide. The inflorescence stalk is about 15 cm long and the length of each spathe is about 8 cm.

**Habitat and distribution** Lowland or alluvial forest Thailand, Peninsular Malaysia, and Borneo. Common on lowland forests along the trail from Park Headquarters to Deer Cave. Also planted at the Park Headquarters area.

**Authors:** Bunga Raumanen Hasibuan, Jeanne Tan, Jhon Maruli Purba, and Julia Sang



Photo by Jeanne Tan



Photo by Jeanne Tan

***Aglaonema simplex*** (Blume) Blume

**Synonyms** *Aglaonema alpinum* Elmer, *Aglaonema angustifolium* N.E.Br., *Aglaonema angustifolium* N.E.Br. var. *undulatum* Ridl., *Aglaonema birmanicum* Hook.f., *Aglaonema borneense* Engl.

**Local names** *sumpuh bulan*, *sumpuh kering*, *penggeheh*

**Description** Stem erect, to 1.5 m tall, greyish. Each leaf is about 26 cm long and 8 cm wide. The flower stalk is about 80 cm long. The fruit stalk is about 8 cm long. Each fruit is about 2 cm across.

**Habitat and distribution** Pockets of soil between limestone boulders or limestone derived soil in lowland forest. Indonesia, Peninsular Malaysia, Nicobar Island, and Borneo. Common along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan



Photo by Jeanne Tan



Photo by Edwino S. Fernando

***Alocasia princeps*** W.Bull

**Synonym** *Alocasia porphyroneura* Hallier f.

**Description** Grows up to 75 cm tall. The leaf is 24 cm long and 12 cm wide, petiole length is 50 cm. Upper surface of leaves are green with dark green veins while the under surface of leaves are pale purple with dark purple veins, and non-hairy surface on both sides. The leaf is deeply lobed and resembles a deer's ear.

**Habitat and distribution** On pockets of soil between limestone boulders. Australia, Peninsular Malaysia, and Borneo. Common but usually in small populations near the entrance to Deer Cave and along the trail from Park Headquarters.

*Author:* Jeanne Tan



Photo by Julia Sang

***Alocasia reginae*** N.E.Br.

**Description** Ground herb, leaf measured about 11 cm long and 6.5 cm wide. The leaf stalk is 12 cm in length.

**Habitat and distribution** On soil with thick layer of leaf litter in lowland forest. Borneo. Rather rare along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan





***Alocasia sarawakensis*** M.Hotta

**Description** Largest ground aroid that can reach 2–3 m tall; leaf stalk to 1.5–2 m long, leaves are not hairy, and measures 74 cm long to 76 cm wide, glossy and thick with veins raised on upper leaf surface. This plant can produce up to 18 inflorescences; the inflorescence stalk reaches 30 cm long, pale green, the spathe is creamy white, 6–8 cm long. The species is also known as ‘Poor Man’s Umbrella’ as the large leaf can be used as an umbrella during a rainy day.

**Habitat and distribution** Growing on patches of alluvial or swampy areas. Borneo. Widespread in Sarawak. Common along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan

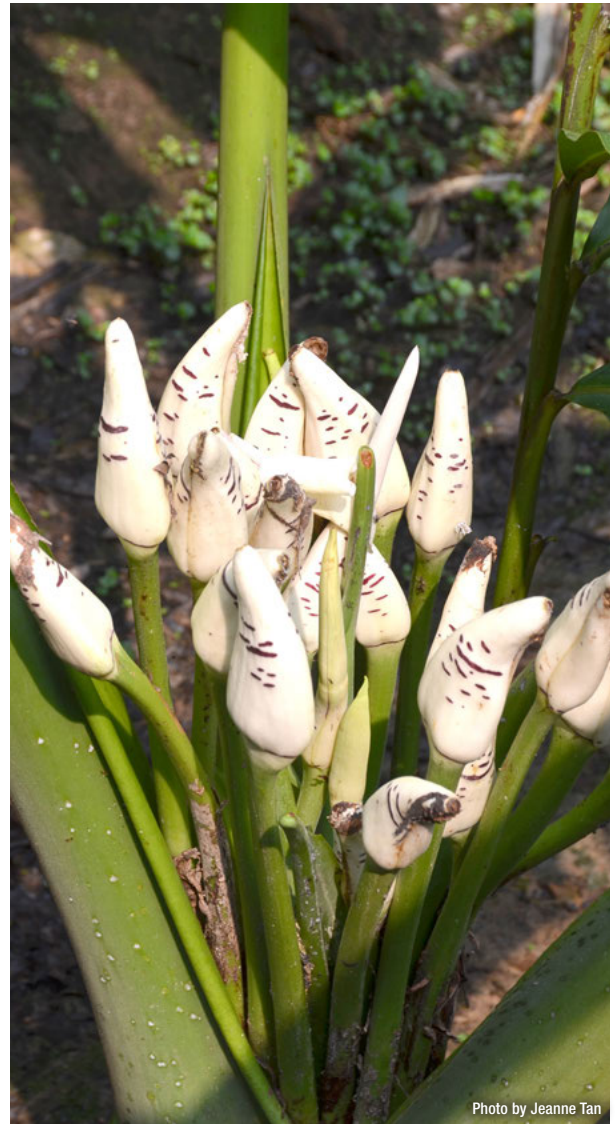


Photo by Jeanne Tan

***Alpinia ligulata*** K.Schum.

**Synonyms** *Alpinia reticosa* Ridl., *Languas ligulata* (K.Schum.) Merr., *Languas reticosa* (Ridl.) Merr.

**Local name** *senggang ai* (Iban)

**Description** This ground herbaceous plant has a pseudostem (false stem) 0.9–2 m long. The leaflets are not hairy, measures to 70 cm long, 16 cm wide with ligule to 4 cm long. The inflorescence to 40 cm long, branched, inflorescence and flower stalks dark red, calyx brownish, corolla reddish, lip not lobed, reddish, paler near the margin. The young fruit is pale green, dull yellow when ripening, about 3 cm long, 3 cm wide; seeds dark brown. The fruit is also edible with slightly sweet taste.

**Habitat and distribution** On limestone soil with thick leaf litter. Borneo. Common along the Deer Cave trail.

*Author:* Jhon Maruli Purba



Photo by Nobuyuki Tanaka

Photos by Jeanne Tan

***Amischotolype griffithii*** (C.B.Clarke) I.M.Turner**Synonym** *Forrestia griffithii* C.B.Clarke**Description** Succulent herb to 1 m tall. The stem and leaves softly hairy. Light magenta red inflorescences produce on erect stem. The flower bud orange, opened flower less than 2 cm across, pure white.**Habitat and distribution** On soil with thick layer of leaf litter in shaded area. Peninsular Malaysia and Borneo. Common along the trail from Park Headquarters to Deer Cave.*Author:* Julia Sang

Photo by Jeanne Tan

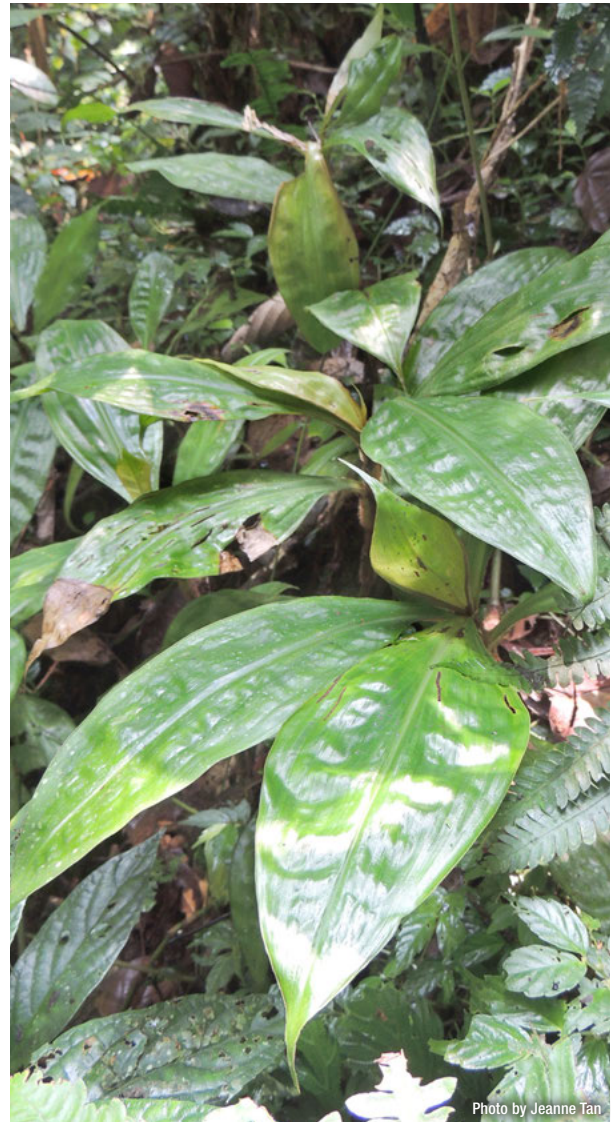


Photo by Jeanne Tan

***Amischotolype mollissima*** (Blume) Hassk.

**Synonym** *Forrestia mollissima* (Blume) Koord.

**Description** Succulent herb that grows to 1 m tall. The stem and leaf stalk softly hairy. The leaves not hairy and the bright magenta red inflorescences produce on horizontal stem. The flower bud orange, opened flower less than 2 cm across, pure white.

**Habitat and distribution** Growing in the same habitat as *A. griffithii*. Common along the trail from Park Headquarters to Deer Cave.

*Author:* Julia Sang



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Amomum coriaceum*** R.M.Sm.

**Synonyms** *Alpinia cylindrostachys* K.Schum., *Languas cylindrostachys* (K.Schum.) Merr.

**Description** Growing in small clusters. Pseudostem (false stem) hairy, plain green. The whole leaf is about 2 m long, and the leaflets are not hairy on its surface. Each leaflet is about 30 cm long and 8 cm wide. The inflorescence is produced from the base of the pseudostem, dark red and 10 cm long.

**Habitat and distribution** The plant thrives on limestone derived soil, and grows on a layer of leaf litter. Borneo. Common along the Deer Cave trail, on alluvial portions of the trail.

*Author:* Jhon Maruli Purba



***Amorphophallus borneensis***

(Engl.) Engl. &amp; Gehrm.

**Synonyms** *Amorphophallus borneensis* (Engl.) Engl. & Gehrm. var. *winkleri* Engl., *Hydrosme borneensis* Engl.**Description** The plant may grow to about 2.5 m tall, measured from base to the top. The petiole of this plant itself can grow up to 2 m tall. The width of the petiole is about 9 cm, and the coloration of the petiole resembles a python skin.**Habitat and distribution** On pockets of soil between limestone boulders or limestone-derived soil. Common along the trail from Park Headquarter to Deer Cave.*Author:* Jeanne Tan

Photo by Jeanne Tan

***Amorphophallus julaiihii***

Ipor, Tawan &amp; P.C.Boyce

**Description** Small to medium-size herb. The stem-like part, which is actually the leaf stalk, is 1–1.2 cm long, plain pale green with highly dissected leaf and each leaflet is about 25 cm long and 8 cm wide.**Habitat and distribution** Growing between the limestone boulders and lowland forest with limestone derived-soil. Very common along the trail from Park Headquarters to Deer Cave. Endemic to Gunung Mulu National Park.*Author:* Jeanne Tan

Photo by Julia Sang

***Appendicula undulata*** Blume

**Synonyms** *Appendicula longicalcarata* (Rolfe) Schltr., *Appendicula peruligera* Rchb.f., *Appendicula undulata* Blume var. *longicalcarata* (Rolfe) Ames

**Description** Epiphytic orchid to 18 cm long. The leaves are pale green, to 3 cm long and 1.5 cm wide.

**Habitat and distribution** Mossy montane forests at riversides and at the base of limestone foothills at elevations around 200 to 800 meters. Borneo (Brunei Darussalam, Kalimantan, Sabah), Peninsular Malaysia, Java, Sumatra, and the Philippines. Rare along the trail from Park Headquarters to Deer Cave.

*Author:* Bunga Raumanen Hasibuan

***Begonia conipila*** Irmsch. ex Kiew

**Description** Low creeping herb. Leaves plain green or variegated and hairy, measures 4–7.5 cm long and 3.5–8 cm wide. The flower stalk erect with white or whitish-pink small flowers. This is the first begonia species described from Gunung Mulu National Park in 2001.

**Habitat and distribution** In limestone forest on shaded mossy rocks and boulders. Widespread in Gunung Mulu National Park.

*Author:* Julia Sang



Photo by Nobuyuki Tanaka



Photo by Julia Sang

***Begonia lucychongiana*** S.Julia & Kiew**Local name** *riang* (Iban)**Description** Creeping herb with slender reddish stem. Leaves not hairy, usually glossy and plain green, 5–12 cm long, 4–13 cm wide with slightly reddish margin and slightly pointed tip. The male flowers have 2 white tepals and yellow stamens. The female flowers have 5 whitish or pinkish tepals, pale yellow stigma and plain green ovary. The fruits have 3 unequal wings, 6–15 cm long, and 8–13 cm wide.**Habitat and distribution** Creeping on limestone boulders with thin layer of leaf litter. Endemic to Gunung Mulu National Park. Common on limestone hills along the trail to Deer Cave.*Author:* Julia Sang

Photos by Julia Sang

***Begonia melinauensis*** S.Julia & Kiew**Local name** *riang* (Iban)**Description** Shrubby and bushy cane-like begonia to 1.5 m tall. The stem and leaves are covered in soft velvety hairs, yellowish green, 10–22 cm long, 12–23 cm wide, the margin irregularly toothed and with long pointed tip. Male flower with 2 tepals, to 6 mm long and 4 mm wide with pale yellow stamens. Female flower with 5 tepals, 18 mm long and 9 mm wide with pale yellow stigma. Fruit stalk reddish, capsule softly hairy, 3 cm long, 1.5 cm wide, wings 3. Leaves of some populations have been badly eaten by ladybugs.**Habitat and distribution** On edge of limestone boulders in shaded area or on pocket of soil between boulders. Endemic to Gunung Mulu National Park. Common on limestone hill along the trail to Deer Cave. Also observed along the trail to Clearwater Cave.*Author:* Julia Sang

Photos by Julia Sang



***Begonia umbratica*** S.Julia**Local name** *riang* (Iban)

**Description** Bushy cane begonia to 1 m tall. Stem fleshy, green with reddish internodes or dark red. Leaves dark green with row of short stiff hairs between the veins, otherwise glabrous, 14–20 x 15–21 cm, margin finely toothed, apex shortly pointed; young leaves yellowish green; leaves of juvenile plant sometime with white spots; male inflorescence compact with many male flowers; male flower–bract and bracteoles pale green, tepals 2, white or pinkish, ovate, 5–6 cm across; stamens pale yellow; female flower–pedicel and wings green, ovary reddish, tepals 5, pinkish, elliptic, 8–10 x 6–8 mm, stigma pale yellow. Fruits pedicel green, capsule reddish or greenish, longer than broad, 24–40 x 10–20 mm with 3 green wings 3–9 mm wide.

**Habitat and distribution** On thin layer of soil at the base of limestone hill or on limestone-derived soil in lowland forest. Endemic to Gunung Mulu National Park. Common along the trail from Park Headquarters to Deer Cave. Also commonly observed at Clearwater Cave and Wind Cave areas.

*Author:* Julia Sang

Photo by Julia Sang

***Begonia vulgare*** S.Julia & Kiew**Local name** *riang* (Iban)

**Description** Bushy cane begonia to 2 m tall. Stem much branched, reddish brown, 6–8 mm thick, sparsely pubescent. Leaves slightly unequal, 13–19 x 6–13 cm, plain green, glabrous, margin finely toothed, apex pointed. Male inflorescence terminal, erect, to 15 cm long, peduncle reddish. Male flower–pedicel reddish, tepals 2, to 6 mm long and 4 mm wide; female flower pedicel less than 1 cm long, tepals 5, to 1 cm long and less than 1 cm wide. The fruits longer than wide, 4 cm long and 1 cm, wings 3.

**Habitat and distribution** On lowland forest on limestone derived soil. Endemic to Gunung Mulu National Park.

*Author:* Julia Sang

Photo by Jeanne Tan



Photo by Julia Sang

***Bulbophyllum medusae*** (Lindl.) Rchb.f.

**Synonym** *Cirrhopetalum medusae* Lindl.

**Description** Epiphytic orchid on tree trunk to 3 m from the ground. The leaf stalk to 5 cm long and the leaves dark green, to 16 cm long, 3 cm wide. The inflorescence stalk to 9 cm long, pale yellow and the hair-like appendages are 12.5 cm long and pale yellow in color.

**Habitat and distribution** Lowland forest. Borneo, Thailand, Peninsular Malaysia, Sumatra, Bangka and Lesser Sunda Islands. Rare and probably planted at Park Headquarters area on *Elaeocarpus* trees.

*Author:* Bunga Raumanen Hasibuan



Photo by Edwino S. Fernando

***Cheilocostus speciosus*** (J.Koenig) C.D.Specht

**Synonym** *Costus speciosus* (J.Koenig) Sm.

**Description** Herb with stems 1.5–2 m tall. The leaves are softly hairy underneath, not hairy on upper surface, to 22 cm long and 8.5 cm wide. The inflorescence produced on the top of the stem, bracts dark red and white to pinkish flowers less than 4 cm long.

**Habitat and distribution** Lowland or alluvial forest. Thailand, Peninsular Malaysia and Borneo. Common along the trail from Park Headquarters to Deer Cave. Also planted at Park Headquarters.

*Author:* Jeanne Tan



Photo by Jeanne Tan

***Clerodendrum paniculatum* L.**

**Synonym** *Caprifolium paniculatum* Noronha

**Local name** *pangil-pangil* or *panggih-panggih*

**Description** Shrub to 3 m tall. Leaf stalk to 30 cm long, leaves 30 cm long, 30 cm wide. It has many branches and a bright red inflorescence, which resembles a pagoda with each flower about 3 cm across with long protruding filament and style. The fruit of the skin is a dark shade of blue. Also known as pagoda plant.

**Habitat and distribution** Flatland or near streams in exposed areas. Common near the entrance of Deer Cave. Widespread in Thailand, Indonesia, Peninsular Malaysia, Singapore, Papua New Guinea, and Borneo.

*Author:* Bunga Raumanen Hasibuan



Photo by Jeanne Tan

***Cryptocoryne longicauda* Becc. ex Engl.**

**Synonyms** *Cryptocoryne caudata* N.E.Br., *Cryptocoryne johorensis* Engl.

**Description** Semi-aquatic aroid with leaves flat on the ground, occasionally submerged. The leaves plain green with wrinkle-like surface, 7 cm long and 5 cm wide. The inflorescence protruding from the ground, spathe creamy white on lower part and dark purple on upper part with long and pointed tip. Each inflorescence is about 8 cm long.

**Habitat and distribution** Alluvial forest where it grows in water-logged areas. Indonesia, Peninsular Malaysia, and Borneo. Localized along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan



Photo by Jeanne Tan

***Dendrobium endertii*** J.J.Sm.

**Synonym** *Eurycaulis endertii* (J.J.Sm.) M.A.Clem.

**Description** Epiphytic orchid on tree trunk about 2 m from the ground. The plant grows to 30 cm long and the leaves to 9 cm long and 3 cm wide. The inflorescence produced at the top of the leaves, to 5 flowers in one inflorescence. The flowers have a purple stalk and the sepals and tepals yellowish and not more than 4 cm long and 1.5 cm wide.

**Habitat and distribution** On tree trunks that grow in alluvial forests. Endemic to Borneo. Uncommon along the trail from Park Headquarters to Deer Cave.

*Author:* Bunga Raumanen Hasibuan



Photo by Jeanne Tan

***Epithema involucreatum*** (Roxb.) B.L.Burtt

**Synonyms** *Epithema roxburghii* DC., *Gratiola involucreata* Roxb.

**Description** This herb grows up to 15 cm tall. The leaf is 15 cm long and 14 cm wide, softly hairy. The inflorescence stalk is about 13 cm tall and dark purple, and each flower is less than 2 cm and is whitish or light purple in color.

**Habitat and distribution** Growing in shaded areas on pockets of soil on mossy limestone boulders. Endemic to Sarawak. Common at the base of the limestone hill along the trail to Deer Cave.

*Author:* Julia Sang



Photo by Edwino S. Fernando

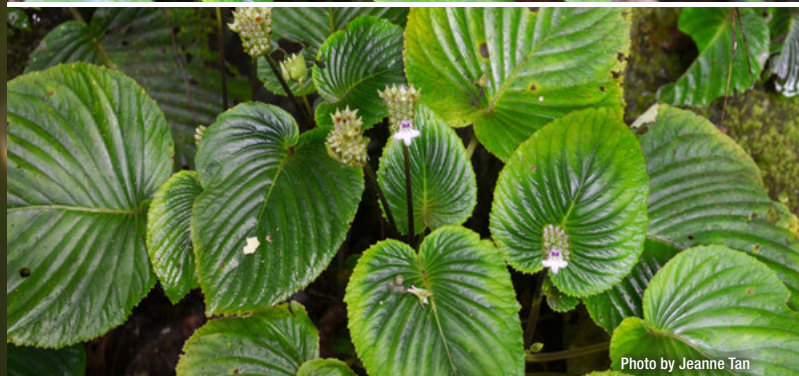


Photo by Jeanne Tan

***Etilingera fimbriobracteata*** (K.Schum.) R.M.Sm.

**Synonyms** *Amomum fimbriobracteatum* K.Schum.,  
*Geanthus fimbriobracteatus* (K.Schum.) B.L.Burt &  
R.M.Sm

**Description** This ground herb ginger plant has individual leaves that grow up to about 3 to 4 m tall. They have a leafless pseudostem about 1m in length. Each leaflet is about 90 cm long, and 17 cm wide. The diameter is each leaf stalk measures about 2.5 cm. This is apparently the largest gingers that can be seen along the trail to Deer Cave.

**Habitat and distribution** Alluvial forest. Borneo. Common on alluvial and lowland forests along the trail from Park Headquarters to Deer Cave.

*Author:* Jhon Maruli Purba



Photo by Nobuyuki Tanaka



Photo by Jeanne Tan

***Globba argentiana*** R.M.Sm.

**Description** This ground herbaceous plant grows up to approximately 1 m in length and in small clusters. The leaves are not hairy and glossy. The inflorescence is produced at the end of the leaf. Flowers are orange-yellow in color.

**Habitat and distribution** On pockets of soil on limestone boulders. Borneo. Common along the trail between Park Headquarters to Deer Cave.

*Author:* Jhon Maruli Purba



Photo by Jeanne Tan

***Globba atrosanguinea*** Teijsm. & Binn.

**Synonym** *Globba coccinea* H.J.Veitch

**Description** Ground herb to 32 cm long. The leaflet is 14 cm long and 5.5 cm wide. The inflorescence is produced at the tip of the leaves with stalk to 12 cm long and bright red in color.

**Habitat and distribution** Shaded areas on lowland forest, sometimes near semi-exposed areas. Endemic to Borneo. Less common along the trail to Deer Cave.

*Author:* Jhon Maruli Purba



Photo by Jeanne Tan



Photo by Jeanne Tan

***Lasia spinosa*** (L.) Thwaites

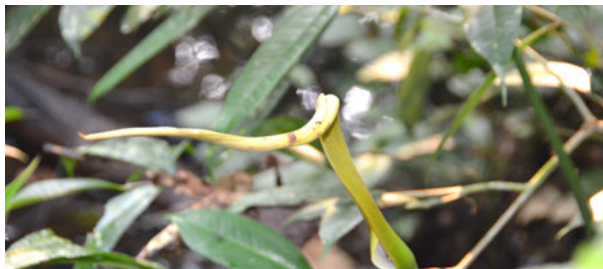
**Synonyms** *Dracontium spinosum* L., *Lasia aculeata* Lour., *Lasia crassifolia* Engl.

**Local name** *kaki ayam*

**Description** This ground herb grows up to 70 cm tall. The leaves are 32 cm long and 11 cm wide. The leaf stalk is about 58 cm in length. This plant has sharp spines about 2 mm long on the leaf stalk. The spines are also seen on the venation under the leaf surface. The inflorescence is about 38 cm long.

**Habitat and distribution** Alluvial forest. Sri Lanka, Indonesia, New Guinea, and Borneo. Common on alluvial forest along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan



Photos by Jeanne Tan

***Monophyllaea cupiflora*** B.L.Burtt

**Description** One-leaf plant. The leaf is glossy and not hairy. Inflorescence produce at the base of leaf stalk. The flowers shortly spaced on scoriopod axis, pedicel longer than calyx, glabrous; calyx divided nearly to base. Lower lip of corolla green; corolla tube as long as calyx, swollen or barrel-shaped, upper corolla lobes straight, small, 1 x 2 mm, curved backward.

**Habitat and distribution** On limestone boulders with thin layer of soil. Endemic to Gunung Mulu National Park. Common on limestone hills.

*Author:* Julia Sang



Photo by Edwino S. Fernando

***Monophyllaea insignis*** B.L.Burtt

**Description** Single-leaf herb to 60 cm tall. The leaves are not hairy. The inflorescence produced from the base of leaf, 3–6 inflorescence per plant. Flowers not hairy and shortly spaced on scopioid axis. Lower lip of corolla yellow and red; corolla tube longer than calyx; upper corolla lobes straight, small, 1 x 2 mm, revolute, corolla tube barrel-shaped.

**Habitat and distribution** Growing on vertical limestone cliffs or shady and mossy limestone boulders. Endemic to Gunung Mulu National Park. Common at the base of limestone hills along the trail to Deer Cave.

*Author:* Julia Sang



Photos by Jeanne Tan

***Musa campestris*** Becc.

**Local name** *lengki* (Iban)

**Description** This ground herb grows to about 3–4 m tall. Each leaf is about 2 m long and 30 cm wide. The flower stalk is 12 cm and the flower is about 9 cm. The diameter of each flower is about 4 cm. Each fruit measures about 6 cm long and 2 cm wide.

**Habitat and distribution** Disturbed forest. Common on lowland forests near the Tree Canopy trail. Also planted at the Park Headquarters and Marriot Resort or along the roadside.

*Author:* Jhon Maruli Purba



Photo by Jeanne Tan



***Phymatarum borneensis*** M.Hotta

**Description** Gregarious rheophyte herb grows commonly on mud banks. Plant grows up to 20 cm tall. The leaves dark green above, pale green below, measures 15 cm long and 5–7 cm wide. The leaf stalk is about 10–12 cm in length. The inflorescence to 10 cm long with green spathe and the flower entirely white.

**Habitat and distribution** Riparian forest. Borneo. Common on mud bank along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan



Photo by Edwino S. Fernando

***Plocoglottis plicata*** (Roxb.) Omerod

**Synonyms** *Dendrobium javanicum* Korth. ex Blume, *Limodorum plicatum* Roxb., *Plocoglottis acuminata* Blume, *Plocoglottis latifolia* Blume

**Description** Ground orchid to 35 cm tall with plain or white spotted leaves. The leaves are about 26 cm long and 9 cm wide. The inflorescence stalk is dark green and the flowers are pale green with reddish spots on the inner part, to 2 cm across. Each flower stalk measures 4 cm in length.

**Habitat and distribution** Shaded areas on lowland forest or base of limestone hills. Borneo, Sumatra, Java, and Philippines. Common along the trail to Deer Cave but usually in small populations.

*Author:* Bunga Raumanen Hasibuan



Photos by Nobuyuki Tanaka

***Schismatoglottis calyptrata***

(Roxb.) Zoll. &amp; Moritzi

**Synonym** *Schismatoglottis muluensis* M.Hotta**Description** Large aroid to 1.2 m tall.**Habitat and distribution** In limestone forest or limestone derived soils. Widespread in Papua New Guinea, Australia, Indonesia, Peninsular Malaysia, Borneo, and the Philippines. Common along the trail from Park Headquarters to Deer Cave.*Author:* Jeanne Tan

Photos by Jeanne Tan

***Schismatoglottis trifasciata*** Engl.**Synonym** *Schismatoglottis colocasiodea* M.Hotta**Description** Ground aroid to 25 cm tall. The leaves have pale green or yellowish green patches on both sides of the upper leaf surface and very closely spaced venation but sometime the patches are not very conspicuous. The leaf stalk dull purple, to 13 cm long and the leaves are thin, to 12 cm long and 9 cm wide. The inflorescence stalk dark purple, 13 cm long, spathe to 10 cm long with the lower part of the spathe is dark purple and the upper part of the spathe is greenish yellow.**Habitat and distribution** On thin layer of pocket of soil between the limestone boulders. Malaysia. Common on limestone hill along the trail to Deer Cave.*Author:* Jeanne Tan

Photo by Jeanne Tan

***Zingiber vinosum*** Mood & Theilade

**Description** Grows in small clusters of leafy shoots to 1 m long. The inflorescence to 20 cm long, with dark red bracts is formed at the base of the plant, with several white or yellowish flowers.

**Habitat and distribution** Thrives on limestone derived soil on flat ground. Borneo. Uncommon along the trail to Deer Cave but is widespread and common elsewhere.

*Author:* Jhon Maruli Purba



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

A photograph of a vine with clusters of bright orange flowers and green leaves, set against a blurred background of a forest. The vine is the central focus, with several large, dense clusters of small, bright orange flowers. The leaves are green and glossy. The background is a soft-focus forest scene with various shades of green and brown. The text "Vines & Lianas" is overlaid on the right side of the image in a white, sans-serif font.

# Vines & Lianas

Photo by Edwino S. Fernando

***Aeschynanthus flavidus*** M.Mendum & P.Wood

**Description** Sub-shrub epiphyte. Stems hanging, sparsely branching and granular pubescent, brown color, internodes to 9.5 x 0.3 cm. Leaves opposite, broadly elliptic, margin entire, leathery, bright green above with purple flush below. Young leaves sparsely glandular hairy on both surfaces or petiole, blade 4.5–8.8 x 2–4 cm. Inflorescences usually 2-flowers, axillary near tips of calyx.

**Habitat and distribution** Species found climbing or clinging on tree trunks. Endemic to Borneo. Uncommon in Gunung Mulu National Park but widespread and common elsewhere.

*Author:* Nickson Joseph Robi



Photo by Edwino S. Fernando

***Aeschynanthus tricolor*** Hook.

**Synonym** *Trichosporum tricolor* (Hook.) Kuntze

**Description** Sub-shrub, vine plant. Leaves light green, opposite, ovate and leathery. Flower tubular, within a red cup-like calyx. It is given the common name “lipstick plant”, as it resembles a tube of lipstick. Fruit is light green, elongated, thin, and pencil-like. Fruits hang from the base of the leaf stem.

**Habitat** Climbing on tree trunks, branches, and stems.

**Distribution** Endemic to Sarawak.

*Author:* Maxine Tan



Photos by Edwino S. Fernando

***Bauhinia kockiana*** Korth.

**Synonyms** *Bauhinia creaghii* Baker, *Phanera kockiana* (Korth.) Benth.

**Description** Vine with beautiful orange-red flowers. Often called the “Orchid Tree”. A woody perennial vine. Leaves simple, ovate to elliptical and alternate. Leaves have 3 prominent veins running from the base to leaf apex. Flowers are bisexual and in large clusters that open yellow, but gradually turn reddish-orange. Each flower bears 5 small green sepals and 5 large petals. Flowers develop in sequence, resulting in a mixture of different colored flowers at any one time.

**Habitat and distribution** Found to climb on tree trunks and branches. Brunei Darussalam, Indonesia, Kalimantan, Lesser Sunda Islands, Peninsular Malaysia, Sabah, Sarawak, and Sumatra. Common in Gunung Mulu National Park.

*Author:* Maxine Tan



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Poikilospermum suaveolens*** (Blume) Merr.

**Synonym** *Poikilospermum sinense* (C.H.Wright) Merr.

**Local name** *entaban* (Iban)

**Description** Epiphytic woody climber and scrambler, dioecious, evergreen, and stout. Leaf is broadly ovate to elliptical or obovate 10–40cm x 6–25 cm, hairless. Base wedge-shaped to distinct cordate and acute to obtuse at apex. Fruit, one seed entirely covered by persistent perianth. Flower is in pseudo-umbrellules.

**Habitat and distribution** Ground, open forest and brushwood, rare in monsoon forest. Widespread in India, Indochina, southeastern China, Peninsular Malaysia, Java, Borneo, Sulawesi, and the Philippines. Very common in Gunung Mulu National Park.

*Author:* Nickson Joseph Robi

***Pothos insignis*** Engl.

**Synonym** *Pothos borneensis* Furtado

**Description** Climbing plant with stem to 4 m diameter and nodes 2–8 cm apart. Produce conspicuously numerous roots from the nodes of the stem. Leaves various sizes 6–35 cm long, 3–15 cm wide with grooved leaf stalk. Inflorescence with green-purple spathe and purplish spadix.

**Habitat and distribution** Found on tree trunks and stems Brunei Darussalam and Sarawak. Common along the Deer Cave trail in Gunung Mulu National Park.

*Author:* Jok Wan Ngau



Photo by Nattapong Banterng

***Pothos longipes*** Schott

**Synonyms** *Pothos australasicus* F.Muell., *Pothos brownii* Domin

**Description** Climbing plant with glossy leaves. Leaves 1.5–5 cm long, 5 to 15 mm wide. Easily recognized with flattened leaves that are constricted in the middle of the leaf. Inflorescence to 3 cm long with purplish spathe and spadix.

**Habitat and distribution** Found on tree trunks and stems in the limestone area. Widespread. Common in Gunung Mulu National Park

*Author:* Jok Wan Ngau



Photo by Nattapong Banterng

***Rhaphidophora foraminifera*** (Engl.) Engl.

**Synonym** *Epipremnum foraminiferum* Engl.

**Description** Usually climbers on tree trunks or sometimes on limestone boulders. The leaves are unique with irregular holes near both sides of the midrib. The leaf stalk to 36 cm long and the leaves are not hairy, to 39 cm long, 15 cm wide.

**Habitat and distribution** In lowland forest with alluvial soil or in limestone forest. Borneo, Peninsular Malaysia, and Sumatra. Common along the trail from Park Headquarters to Deer Cave.

*Author:* Edwino S. Fernando



Photo by Jeanne Tan

***Scindapsus geniculatus*** Engl.

**Description** Robust climbing aroid with large and thick leaves. The leaves glossy and not hairy with distinctly sunken venations, to 55 cm long and 20 cm wide with stalk to 90 cm long. The inflorescence stalk yellowish, to 5 cm long and the spathe and spadix is thick and creamy white, spathe 10 cm long and 5 cm wide.

**Habitat and distribution** Light shaded areas in lowland forests. Borneo (Sarawak). Uncommon along the trail from Park Headquarters to Deer Cave.

*Author:* Jeanne Tan



Photos by Jeanne Tan



***Scindapsus latifolius*** M.Hotta

**Description** Robust epiphytic aroid on small tree trunk. The leaf stalk to 1 m long, dark green and swollen near the leaf base. The leaves glossy, not hairy, to 60 cm long and 28 cm wide with distinct petiolar leaf sheath and brownish prophyll debris.

**Habitat and distribution** On sunny areas or with light shade in alluvial forest. Borneo. Uncommon along the trail from Park Headquarters to Deer Cave but widespread and common elsewhere.

*Author:* Jeanne Tan



Photo by Edwino S. Fernando

***Scindapsus longistipitatus*** Merr.

**Description** Usually climbers on tree trunks or sometimes on limestone boulders. The leaves to 26 cm long and 10 cm wide, not hairy and with winged stalk to 16.5 cm long.

**Habitat and distribution** In lowland forest with alluvial soil or in limestone forest. Sumatra and Borneo. Common along the trail from Park Headquarters to Deer Cave.

*Author:* Nickson Joseph Robi



Photo by Jeanne Tan

***Tetracera macrophylla*** Wall. ex Hook.f. & Thoms.

**Synonyms** *Tetracera grandis* King, *Tetracera havilandii* Ridl., *Tetracera macrocarpa* Wall., *Tetracera macrophylla* Wall., *Tetracera radula* Martelli

**Local name** *randau empelas* (Iban)

**Description** Woody climber with hairy leaves to 30 cm. Leaves are used as sandpaper. Young branchlets densely pubescent, glabrescent. Petiole 1–1.5 cm, pubescent. Leaf blade ovate or obovate, 4–10 x 2.5–5 cm, leathery and scabrous. Secondary veins 9–12, approximately parallel. Base rounded, often oblique, apex rounded or obtuse or slightly acute.

**Habitat and distribution** Found to climb on tree trunks and branches. Indonesia, Kalimantan, Myanmar, Peninsular Malaysia, Sabah, Sarawak, Thailand, Viet Nam, and Sumatra. Very common in Gunung Mulu National Park.

*Author:* Nickson Joseph Robi



Photo by Nattapong Banterng

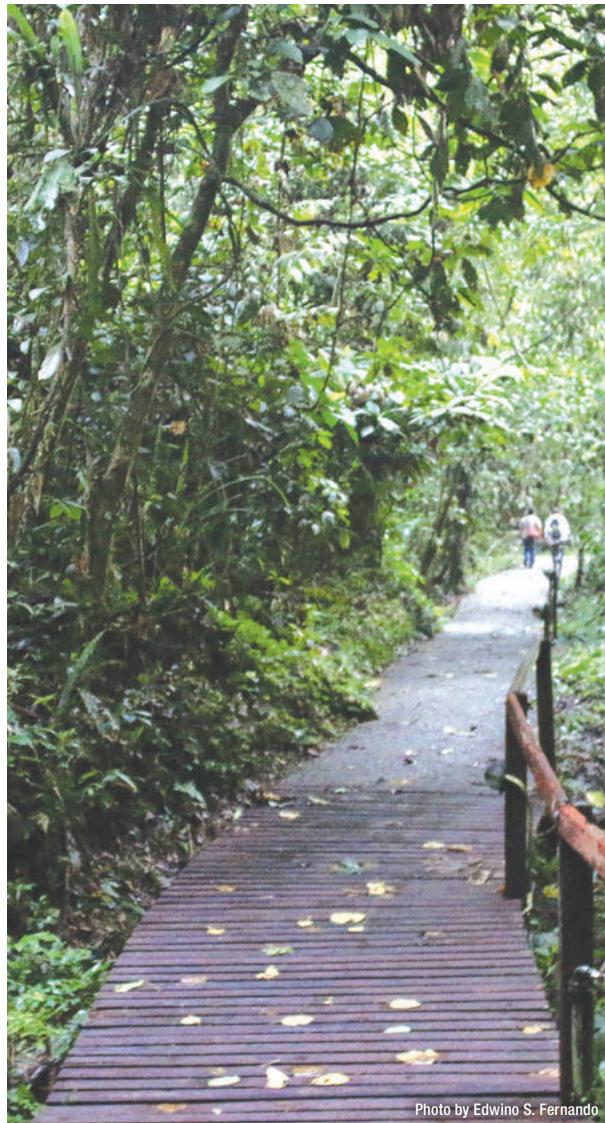


Photo by Edwino S. Fernando

A photograph of a dense forest floor. The scene is filled with various green plants, including palms and pandans. The leaves are mostly vibrant green, with some showing signs of aging or damage, such as a prominent brown, curled leaf in the center-left. The background is dark and shadowy, suggesting a thick canopy. The overall composition is a close-up of the forest's undergrowth.

# **Palms & Pandans**

Photo by Edwino S. Fernando

***Caryota mitis*** Lour.

**Synonyms** *Caryota furfuracea* Blume ex Mart., *Caryota griffithii* Becc., *Caryota griffithii* Becc. var. *selebica* Becc.

**Local names** *mudor* (Iban), *leuteu* (Penan)

**Description** Clustering palm with stems about 15 cm tall. The leaves dissected and fish tail-like. The fruit red or blackish when ripe and contains one seed.

**Habitat and distribution** Common in disturbed areas in alluvial or lowland forests. Widespread.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Caryota no*** Becc.

**Synonym** *Caryota rumphiana* Mart. var. *borneensis* Becc.

**Local name** *iman* (Penan)

**Description** Trunk is solitary, brownish gray. Height reaches 20 m and spreads to 10 m. Leaf pinnately compound, alternately opposed, bipinnate, to 5 m, light green. Flower spathe emerges from crown, large mop like inflorescence, golden in color. Fruit ripens to dark purple/black; seeds are round, dark brown, glossy, approximately, 1.75 cm across, germinate within 2 months and grow rapidly.

**Habitat and distribution** Rainforests. Endemic to Borneo. Widespread.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Freycinetia sarawakensis*** Martelli

**Description** *Freycinetia* is one of the five extant genera in the flowering plant family Pandanaceae. The genus comprises approximately 180–200 species, most of them climbers. Usually they are dioecious and vines, climbing by aerial roots, or sometimes scrambling shrubs

**Habitat and distribution** They have been found growing in rainforests, coastal forests, humid mountain forests and associated biomes, from sea level to mountain cloud forests. The species are distributed through the tropics and subtropics of South Asia and the western Pacific Ocean, from Sri Lanka eastwards through the mainland of Southeast Asia to the Melanesia floristic region, and southwards to northern Australia (Queensland, Northern Territory, northern New South Wales), Norfolk Island, and New Zealand.

*Authors:* Sahlee B. Barrer and Rhia C. Galsim



Photo by Edwino S. Fernando

***Iguanura melinauensis*** Kiew

**Description** Habit is very small, undergrowth palms; solitary and clustering, rarely exceeding 4 m in height. Stem 0.5–1.5 m tall. Bark smooth. Annuli 2–2.5 cm apart. Crown shaft 22–30 cm long. Endosperm homogeneous and with ridges corresponding to the endocarp. Leaf has long peduncle and fine and diverging rachillae. Sheath 9–14 cm long. Petiole short, 7–12 cm long. Lamina 30–65 cm long and 12–16 cm wide, divided into 2–5 pairs of segments. Segments parallel-sided but with apical distal corner elongate. Terminal segment pair wide, often 1/3–1/2 as long as whole laminal region. Veins 1/2–3/4 cm apart. Inflorescence among or below the leaves. Outer spathe 20 cm long, inner 25–30 cm long. Peduncle 42–53 cm long. Rachillae 4–7, straight, 10–20 cm long and 1–2 mm thick, diverging at 45 degrees. Flowers 11 cm apart. Anthers lobed. Fruit olive-shaped with central ridge and two lateral ridges on either side.

**Habitat and distribution** Grows in alluvial soil; endemic to alluvial forest; also thrives near the river (Melinau); within riverine forest with open canopy to closed canopy vegetation; tolerant in slight-shaded to full-shaded environment. Endemic to Sarawak.

*Authors:* Sahlee B. Barrer and Rhia C. Galsim



Photo by Edwino S. Fernando

***Korthalsia echinometra*** Becc.

**Synonyms** *Calamus ochreatus* Miq., *Daemonorops ochreata* Teijsm. & Binn., *Korthalsia angustifolia* Blume var. *gracilis* Miq., *Korthalsia horrida* Becc.

**Local name** *wi sero* (Iban)

**Description** Robust clustering rattan, branched, climbing up to 40 m tall. Sheath green, almost completely covered by the ocreas. The ocreas occupied by ants, swollen, covered with black spines. Leaf to 2 m long and the leaflets to 30 cm long, 3 cm wide, to 25 leaflets per leaf.

**Habitat and distribution** Occurs in lowland and hill dipterocarp forest up to 1,000 m above sea level. Indonesia, Peninsular Malaysia, and Borneo.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Edwino S. Fernando

***Korthalsia rigida*** Blume

**Synonyms** *Calamosagus ochriger* Griff., *Calamosagus polystachys* (Mart.) H.Wendl., *Korthalsia ferox* Becc. var. *malayana* Becc., *Korthalsia hallieriana* Becc., *Korthalsia paludosa* Furtado, *Korthalsia polystachya* Mart.

**Local names** *wi danan* (Iban), *wae seleda* (Penan)

**Description** Clustering rattan that climb up to 50 m. Sheath covered with dense grey indumentum and covered with sparsely triangular spines. Leaf to 1.5 m long with 5–7 leaflets, each leaflet to 15 cm long, 8 cm wide.

**Habitat and distribution** Found in lowland and hill dipterocarp forests at altitudes up to 900 m but appears to avoid peat swamp forest. Indonesia, Peninsular Malaysia, and Borneo.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Edwino S. Fernando

***Pandanus yvanii*** Solms

**Synonyms** *Pandanus motleyanus* Solms, *Pandanus brevifolius* Martelli, *Pandanus ridleyi* Martelli, *Pandanus sigmoideus* H.St.John, *Pandanus sigmoideus* H.St.John ex B.C.Stone

**Local name** *rasau* or *rassau* (Dayak, Nanga Pinoh)

**Description** Slender clustered tree pandan, 2–3 m high, commonly forming dense thickets. Prop roots short, 20 cm or less. Stem unbranched or branched in the terminal part, slender, older bark dark purplish brown, spiny, diameter c. 1.5 cm. Leaves in a rosette, spirally arranged in 3 ranks (tristichous); each lanceolate elongate, 40–45 cm long, 1–1.5 cm wide, apex acute to acuminate, margin with spines throughout the length; adaxial surface green, glabrous, adaxial ventral pleats absent; abaxial surface pale green, glabrous, recurved spines present, small, brown; leaf sheath yellowish green to yellow. Infructescences solitary, terminal, 17–20.5 cm long; bracts persistent, each 10–28 cm long, c. 2.5 cm wide, brown to deep brown. Cephalium ellipsoidal elongated, creamy yellow to dull creamy yellow or dull yellowish orange, 7.5–11 cm long, 13–14 cm in circumference; style ascending, needlelike, 2–2.5 mm long; stigma pointed, sharp.

**Habitat and distribution** Peat swamps, where it usually forms dense thickets. Sometimes grows along riversides or in riverine forest. Malay Peninsula, Sumatra (including Bangka Island), and Borneo.

**Author:** Sahlee B. Barrer

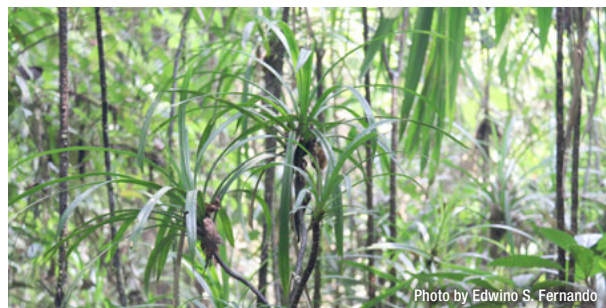


Photo by Edwino S. Fernando



Photo by Edwino S. Fernando



***Pinanga aristata*** (Burret) J.Dransf.

**Synonym** *Pseudopinanga aristata* Burret

**Description** Small, clustering palm, to 2 m tall; leaves pinnate, usually mottled, very prominent in newly unfolding leaves; leaflets about 5 on each side of the rachis, generally sigmoid or lanceolate in shape. Inflorescences below the leaves, with up to 5 rachillae; fruits arranged spirally and densely along the rachilla, yellow, then red at maturity.

**Habitat and distribution** Tropical moist forest. Borneo.

*Author:* Edwino S. Fernando



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Salacca magnifica*** Mogea

**Description** Large clustering acaulescent (without visible trunk) palm. Leaves up to 5 m long, 70 cm wide, and sparsely divided along the margins, whitish grey underside, bright glossy green; inflorescence arise from within the leaves. Leaf stalk contains crown-shaped and sharp-pointed spines alternately attached throughout the open portion (without leaves) starting from the base. Fruit pink.

**Habitat and distribution** Tropical moist forest. Endemic to Borneo.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando

***Salacca rupicola*** J.Dransf.

**Description** Clustering palm, without a distinct stem. Leaves to 2.25 m, petiole to 1 m long, with a row of groups of spines. Leaflets sigmoid in shape, up to 15 on each side of the rachis, arranged in groups of 2–3, the leaf terminating in a large almost oval flabellum; lamina dark bluish-green on the under surface (when fresh), pinkish-creamy brown on the upper surface due to abundant floccose persistent indumentum. Inflorescences axillary; staminate ones to 15 cm; pistillate to 35 cm at opening of flowers, elongating after fertilization, to 40 cm long at fruiting stage. Young fruit spherical, 1 cm diameter, densely covered in dark brown reflexed scales, the tips swept upwards, spine-like.

**Habitat and distribution** Forms small clumps in crevices of limestone rocks. This species can be seen on the limestone face just above the main entrance to Deer Cave. Endemic to Gunung Mulu National Park.

*Author:* Edwino S. Fernando



Photo by Edwino S. Fernando



Photo by Edwino S. Fernando



# Ferns

### *Angiopteris evecta* (G.Forst.) Hoffm.

**Synonyms** *Angiopteris acrocarpa* de Vriese, *Angiopteris affinis* de Vriese, *Angiopteris alata* Nadeaud, *Angiopteris albidopunctulata* Rosenst., *Angiopteris amboinensis* de Vriese

**Local name** *paku gajah* (Malay)

**Description** Stipes and stipules are streaked with patches of aerating tissues or lenticels. Segments of the lamina articulate at the pulvini, which function as 'elbows' when the unlignified tissues wilt during dry periods.

**Habitat and distribution** Occurs in shaded streams in the lowland and by forest streams in the hill to the elevation of 1,200 masl. Also occurs in less shaded areas on wet ground but not near streams. Found at Park Headquarters only.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



### *Antrophyum callifolium* Blume

**Synonyms** *Antrophyum alatum* Brack., *Antrophyum annamense* Tardieu & C.Chr., *Antrophyum callifolium* Blume var. *germainii* Tard.-Blot & C.Chr., *Antrophyum callifolium* Blume var. *magnum* C.Chr.

**Local name** *akar selempar* (Malay)

**Description** Fronds are simple, rather fleshy and usually pendulous. Long exspendusiate sori develop in shallow grooves in the upper part of the lower surface of fertile lamina.

**Habitat and distribution** Occurs on rock and tree trunks in shaded forest in the lowlands to moderate altitude. Growing on trees at 0.5–1.5m above the ground. Widespread. Found in Southeast Asia in Borneo (including Mt. Kinabalu), peninsular Malaysia, Thailand (widespread), Sulawesi, Viet Nam, Sumatra, the Philippines, Lao PDR, and Cambodia.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



## *Asplenium affine* Sw.

**Synonyms** *Asplenium affine* Sw. f. *majus* Sledge, *Asplenium affine* Sw. var. *affine*, *Asplenium gracillifolium* Copel., *Asplenium laceratum* Desv., *Asplenium spathulinum* J.Sm.

**Description** Fronds are tripinnatifid with broad spatulate pinnules, which are bluntly toothed around the apex. Long indusiate sori develop midway along vein branches.

**Habitat and distribution** Occurs in moderate shaded landscape. Can be found at limestone area near the Bats Observatory. Widespread. Found in Southeast Asia in Viet Nam, Java, Borneo (including Mt. Kinabalu), Thailand, Cambodia, Lao PDR, Sulawesi, Sumatra, and the Philippines.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



## *Asplenium nidus* L.

**Synonyms** *Acrostichum gorgoneum* Kaulf., *Asplenium ellipticum* (Fée) Copel., *Asplenium ficifolium* Goldm., *Asplenium nidus* var. *acutifolium* Bir

**Local names** bird's nest fern (English), *paku pandan* (Malay), *rajang* (Iban), *tuban* (Kayan)

**Description** Fronds are simple and entire with broad bases and form an efficient 'nest' or 'litter-basket' that trap falling leaves and other debris, which eventually rot to become humus. The ferns can grow to 2 meters in diameter, and large ferns can contain substantial quantities of organic matter. At the base of the fern is a sponge-like root mass that soaks up rain water and absorbs nutrients released from the decaying litter. They grow on tree trunks and branches at heights of up to 60 m above the ground.

**Habitat and distribution** A common species in lowland and mountains, often growing on trees, rocks, and forest floor after falling from trees. Found almost everywhere along the Deer Cave trail. Most can be seen growing on the trees.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco

***Cyathea contaminans*** (Wall. ex Hook.) Copel.

**Synonyms** *Alsophila acuta* Presl, *Alsophila brunoniana* Bedd., *Alsophila clementis* Copel., *Alsophila contaminans* Wall., *Alsophila contaminans* Wall. ex Hook.

**Local names** tree fern (English), *suo luo* (Chinese)

**Description** Glaucous, purplish, and thorny stripe base.

**Habitat and distribution** Common in open places at moderate or high altitudes and often abundant at the forest edge. Can only be seen at Park Headquarters and near the entrance of Deer Cave.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco

***Lygodium circinnatum*** (Burm.f.) Sw.

**Synonyms** *Hydroglossum circinnatum* (Burm.f.) Willd., *Ophioglossum circinnatum* Burm.f.

**Local names** *langgitu* (Kedayan), *remat* (Iban)

**Description** The texture of lamina is thick and the secondary rachis-branches almost glabrous.

**Habitat and distribution** Inhabit the edge of clearings and open places in lowland forest and is common in secondary growth vegetation. Found at Park Headquarters only.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



Photo by Taha Bin Wahab

### *Nephrolepis biserrata* (Sw.) Schott.

**Synonyms** *Aspidium acuminatum* Willd., *Aspidium acutum* Schkuhr, *Aspidium articulatum* Sieb., *Aspidium biserratum* Sw., *Aspidium biserratum* Sw. var. *paraense* (Willd.) Farw.

**Local names** broad sword fern (English), *paku uban* (Malay), *paku kubok* (Iban), *paku bura* (Kayan)

**Description** The fronds are pinnate with crenate pinnae. The narrower fertile pinnae bear indusiate sori half, or two thirds, of the way from the costa to the margin.

**Habitat and distribution** Grows on the ground in abundance in open areas. Usually in lowlands (sea level up to 750 m, rarely higher, to 1,500 m), in open, disturbed situations, occasionally in forest; epiphytic or terrestrial. Widespread. In Southeast Asia, found in Viet Nam, Borneo (Mt. Kinabalu), Thailand, Peninsular Malaysia, Cambodia, Philippines, Myanmar, Sulawesi, Sumatra, Java, and Lesser Sunda Islands (Lombok, Bali, Alor, Timor).

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco



### *Stenochlaena palustris* (Burm.f.) Bedd.

**Synonyms** *Acrostichum laurifolium* (Presl) Hook., *Acrostichum palustre* (Burm.f.) C.B. Clarke

**Local names** *paku miding* (Malay), *lemiding* (Iban), *pauh ira* (Kelabit)

**Description** The fronds are pinnate, the broad sterile pinnae with sharply toothed margins and young fronds are red in color. This coarse climbing fern has an indefinite length. The rhizomes can attach themselves to the trunks of trees with adhesive roots. The stems are brown, smooth, somewhat less than 1 centimeter in diameter and sparingly branched. The sterile fronds are up to 80 centimeters in length, the fertile fronds somewhat shorter.

**Habitat and distribution** Scrambling in open areas and climbing in secondary forest in the lowlands and hills. Can be seen almost everywhere along the Deer Cave trail.

*Authors:* Sahlee B. Barrer and Mitzi T. Pollisco





***Sticherus truncatus*** (Willd.) Nakai

**Synonyms** *Gleichenia bifurcata* Blume, *Gleichenia javanica* Spreng., *Gleichenia laevigata* (Willd.) Hook., *Gleichenia truncata* (Willd.) Spreng., *Mertensia bifurcata* Kunze

**Local names** *resam* (Malay), *deman* (Iban)

**Description** Rhizome dichotomously branched, near the apex protected by peltate scales. Fronds of mature plants usually with indefinite growth in length, bearing primary branches in pairs. Main rachis high-climbing; resting buds covered with brown, short-fringed scales; stipular leaflets at base of primary branch and at its first fork, deltoid, deeply lobed or the basal lobes again lobed, up to 2.7 cm long; rachis branches repeatedly forked, all branches, except the basal segments, leafy throughout, each branch 7.5–12 cm long; lobes patent, adnate at base, hardly decurrent to the next ones, usually irregular in length even on the same branch, up to 3.5 cm long, 2 mm broad, the margin entire, revolute, not glaucous beneath; veins free. Sori exindusiate, with 3–5 sporangia, surrounded by stellate hairs, medial.

**Habitat and distribution** Most common at moderate altitudes, climbing on the edge of forest, where it forms thickets in open places. Can be found at one spot only at KM 1.5 of the Deer Cave trail. Grows in open areas.

*Author:* Sahlee B. Barrer



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Photo by Rhia C. Galsim



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