

# **The Flora of the Peat Swamp Forests of Sarawak and Brunei, including a catalogue of all recorded species of flowering plants, ferns and fern allies**

By J. A. R. ANDERSON

*Forest Department, Sarawak*

THE COASTLINE OF SARAWAK appears to the casual observer monotonous and uninteresting. A coastal fringe of littoral forest or mangrove merges quickly into a flat plain behind which the inland mountain ranges appear in the distance. In south western Sarawak the regularity of the coastline is broken by mountains or low hills that form promontories jutting out into the sea; but from the mouth of the Batang Lupar to Kedurong Point—a distance of 200 miles—there is no high ground in the vicinity of the coast. Apart from the immediate coastal or riparian fringe, subject to regular or occasional inundation, the whole plain has been and still is largely covered in swamp forest growing on peat, recorded depths of which may exceed fifty feet. There is some evidence to show that this coastal plain has developed since the stabilisation of the sea level, about 5,500 years ago, following the last Glacial Period. Alluvium carried down by the rivers draining the interior has been deposited at the mouths of rivers or in bays along the coast and as the coastline has progressed seawards so peat has developed and accumulated under the dense forest on the plain behind. The Rejang, the largest river on the northern coast of Borneo, and to a lesser extent other rivers, has divided to form a complex deltaic system. Each island in the delta forms a distinct and self-contained swamp unit bounded by a fringe of mangrove or riparian forest.

The coastal and deltaic peat swamps cover 5,660 square miles in Sarawak and 380 square miles in Brunei, which amount to 11.9 and 12.5 per cent of the total land surfaces of the two territories respectively. Results of numerous precise level surveys prove that they are entirely of the raised bog type with a stilted water table and surface drainage. The ground water is typically tea-coloured, and the peat soils are oligotrophic and markedly acid. Similar swamps are well known elsewhere in Malaysia. Endert (5) recorded peat swamps in South Sumatra and East Borneo, and other descriptions have been made by Sewandano (11) in Central Sumatra, and by Durgnat (4) and Wyatt-Smith (16) in Malaya. Van Steenis (12–14) shows their distribution on the vegetation map of Malaysia and notes that large areas of southern New Guinea are also peat swamp. Dr. B. Polak (8) undertook fundamental research into the nature and physiognomy of peat swamps in Sumatra and East Borneo. There has been, however, no previous comprehensive study of the ecology or floristic composition of the peat swamp forests in the region.

The catalogue of the flora of the peat swamp forests includes all species of phanerograms, gymnosperms and pteridophytes collected during the course of an ecological survey of these forests. In compiling this catalogue it had been hoped initially to include records of previous collections, especially those by Beccari and by Haviland and Hose. It was found, however, that these collectors only very rarely recorded the habitat of the plant, and consequently there could be no certainty that the specimen originated in peat swamp forest; though frequently the locality of the collection indicates that this is probable. The catalogue, therefore, is confined to recent collections, largely by the author and Forest Department staff, but including a few specimens collected by Miss W. Brooke and Mr. J. Wyatt-Smith.

The species included in the catalogue are those found in the raised bog type of peat swamp forest. The marginal zones, such as the transitional zone from mangrove and near the inland perimeter of swamps, though including numerous true peat swamp species, have in addition a few species that are absent from the extensive coastal and deltaic swamps. The inland fresh-water swamp forests, which are subject to periodic inundation, and high altitude peat swamps require further investigation. These types cover a negligible area in relation to the area covered by the coastal and deltaic peat swamp forests. It is inevitable in an ecological survey of this nature that a good deal of sterile material is collected. However, during the past five years, collecting has been virtually confined to fertile material and about ninety-five per cent of the species is represented by flowering or fruiting specimens, frequently both.

One thousand seven hundred and six numbers are recorded in the catalogue. This total includes 1,528 specimens of dicotyledons, 106 monocotylons, 6 conifers and 66 pteridophytes. The complete collection is housed in separate cabinets in the herbarium of the Sarawak Forest Department at Kuching. Duplicates of early collections (1953–5) were sent to Singapore, and fertile material has in the past five years been distributed to herbaria at Kew, Leiden, Singapore and Bogor, with additional material of certain families to other herbaria. Wood specimens are available for most arboreal species.

The catalogue of phanerograms is arranged by families in accordance with the Bentham and Hooker system of classification with certain generally accepted exceptions. In those families revised for *Flora Malesiana* the nomenclature of the revision has been followed. For the classification of pteridophytes the system adopted by Holttum (6 and 7) has been used. Specimens of each species are recorded by administrative divisions and localities, and notes on the habit, frequency, distribution and occurrence in forest types are included. Furthermore, where species have been matched by the

author in the herbarium at Kew, the number of the matching specimen is noted with an indication by the symbols A, B, or C of the degree of reliability of the determination. All recorded vernacular names have not been included as frequently they are very unreliable. The vernacular names shown have been checked and found to have fairly consistent usage.

The completeness of the catalogue varies with the locality and the type of plant. More ecological work has been undertaken in the Rejang Delta than elsewhere and consequently the flora is better known. It also is incidentally the richest. Furthermore, collecting was originally concentrated on the tree flora, though during the past five years collections have been made of herbs, lianes, parasites, epiphytes and ferns. It is considered that for tree and shrub species the catalogue is virtually complete. Visits to peat swamps in the past twelve months have failed to yield any important unrecorded species. It has been found also that the herbaceous and climbing elements of the flora are remarkably uniform. Though the list is not as complete as that for the tree flora the same species tend to be found time and again. Even the epiphytic flora, which might have been expected to be the most variable, appears fairly constant in its distribution in peat swamps and in its occurrence in the forest types. Undoubtedly there are many species yet to be recorded in peat swamps but the most characteristic and abundant species have now been collected.

The names of some species included in the catalogue must be treated with a good deal of caution. The taxonomy of genera such as *Eugenia*, *Garcinia* and *Lithocarpus* is in a somewhat chaotic state and accurate specific identifications for many species will not be obtainable until the families are revised. Where matching material has not been found the species is designated by the generic name followed by the number in brackets of what is considered to be the most representative specimen.

It is impossible at this stage to say how many species new to science have been collected. This can only be ascertained with certainty when the families are revised for *Flora Malesiana*. In those families that have been revised or are at present in the process of revision the most important discovery has been a new species of *Litsea* (*L. palustris* Kostermans). This tree species is extremely abundant in the central areas of many swamps throughout Sarawak and Brunei; in the Rejang Delta it forms pure stands over many square miles with as many as 120 trees per acre. It is odd that it has never been collected previously. Presumably early collectors did not penetrate into the centres of the swamps. Other new species include *Cephalomappa paludicola* Airy-Shaw, *Pandanus andersonii* H. St. John and *Knema uliginosa* Sinclair, a small tree with a localised distribution in the Loba Kabang Protected

Forest. Mr. J. Sinclair has recently described a new species of *Goniothalamus*. He also considers that *Polyalthia* (9059) is undescribed. It is known from only one other previous collection, *p.b.* 3919 by Beccari. Mr. E. J. H. Corner has examined all the collections of *Ficus*, and has described three new species: *F. callicarpides* is a small root climber abundant on the buttresses of *Shorea albida*; *F. spathulifolia* and *F. supperforata* are stranglers or ground rooting epiphytes. In families that have not yet been revised there are a few distinctive species which are unmatched in herbaria at Kew, Leiden, Singapore and Bogor and are therefore probably new to science. These include a *Parishea*\* (2697), a *Xanthophyllum* (2614), a *Piper* (9234) and a *Cinnamomum* (4751). Finally a single collection of a small tree from the Lundu swamps has proved to belong to a new genus (*Jarandersonia*) in the Tiliaceae which has been described by Dr. A. J. G. H. Kostermans.

Two hundred and forty-two tree species have been recorded, including 38 small trees of the understorey which rarely or never exceed twelve inches girth. Some of the latter might be considered as shrubs, but this term has been purposely avoided as few species have a fastigate form (except in the stunted forest in the centre of certain swamps in the Baram). The arboreal flora is somewhat greater than originally expected. Sewandano (11) estimated that the arboreal flora of the swamps of East Sumatra to be less than a hundred species. In one forest type alone in the peat swamps of Sarawak and Brunei as many as seventy-five species are found to an acre.

### Representation of families

The representation, by genera and species, of the families of phanerograms is shown in Table 1. If the arboreal species alone are considered, it will be seen that most of the principal arboreal families that occur in lowland dipterocarp forest are to be found in peat swamp forest. Of the families that have not been recorded mention may be made of the Combretaceae, Lythraceae, Styracaceae, and Proteaceae. A comparison of the arboreal flora in peat swamp forest with that recorded by Wyatt-Smith (15) in two five-acre plots in Malaya shows an obvious similarity in the relative numbers of genera and species recorded. It should be remembered, however, that the comparison is between the total arboreal flora in peat swamp forest and species exceeding twelve inches girth in two small plots. Nevertheless most of those families, i.e. Dipterocarpaceae, Anacardiaceae, Annonaceae, Euphorbiaceae, Guttiferae, Lauraceae, Leguminosae, Myrtaceae, Rubiaceae and Sapotaceae, that predominate in lowland dipterocarp forest also provide

\* As result of a recent (1962) collection (S. 15951) this specimen has been identified as *Quassia borneensis* Nooteboom (msc.), the first representative of the Afro-American genus to be found in Asia. A previous collection (*San.* 20499) was made in Borneo.

most species that occur in peat swamp forest. It would appear, therefore, that specialized adaptations, such as pneumatophores, kneed roots and, perhaps, stilt roots, for growing in peat swamps do not tend to be exclusive to or predominate in certain botanical families.

In the herbaceous vegetation there is an absence of the predominantly aquatic families and genera of dicotyledons, e.g. Nymphaeaceae, *Limnanthemum*, *Jussiaea*, and *Ludwigia*. A possible cause may be the extremely acidic and anaerobic conditions of peat swamp soils. It is hardly surprising to find an almost complete absence of the calciphylous families such as Balsaminaceae (*Impatiens*), Acanthaceae, Scrophulariaceae, Begoniaceae, and Gesneriaceae. *Aeschynanthus hians*, of the last mentioned family, is the only record. Monocotyledons, and in particular the Araceae and Cyperaceae, preponderate in the herbaceous flora.

The climbing flora is drawn from many families, of which particular mention may be made of the Annonaceae, Rubiaceae and Moraceae. Species of Capparidaceae, Malpighiaceae, Solanaceae and Acanthaceae have not been recorded, and the Convulvaceae is only represented by two species, neither of which is common.

#### Floristic composition

Lists of the more important and characteristic peat swamp species are shown in Table 2. These include the more widely distributed and common species. For rarer and localised species reference should be made to the catalogue.

The arboreal flora has been subdivided into four canopy classes based on the average maximum girth attained by a species. This subdivision is somewhat arbitrary and does not presuppose that distinct canopy layers can be recognised or even exist. No consideration is taken here of the ecology of the species or their occurrence in the forest types. This will be briefly discussed later. Furthermore it should be remembered that the average maximum size class of a species varies very considerably in different forest types. For instance *Dactylocladus stenostachys*—the only tree species to occur in all forest types—is a massive dominant, with girths occasionally exceeding twelve feet, on the perimeter of the swamps, whereas in the stunted forest in the centre of certain swamps in the Fourth Division it occurs abundantly as a small tree rarely exceeding twelve inches girth and frequently little more than a shrub.

In the upper storey species of Dipterocarpaceae predominate. Of the six species of *Shorea* commonly found in peat swamps *Shorea albida* forms remarkable pure stands (in the upper canopy) with 40 to 160 trees per acre and covering very extensive areas in the central zones of many swamps from the Sadong river in southern Sarawak to Badas in Brunei. Other important dominants are

the timber producing species *Gonystylus bancanus*, *Dactylocladus stenostachys*, and *Copaifera palustris*. These three species with the *Shoreas* (*S. platycarpa*, *S. rugosa* var. *uliginosa*, *S. scabrida*, and *S. teysmanniana*) comprise on the average about 80 per cent of the upper storey (trees with girths exceeding 60 inches) in mixed swamp forest in the peripheral zone of swamps and near the coast. *Litsea palustris*, an associate of *Shorea albida*, occurs in almost pure forests in the centre of some of the larger swamps in the Rejang Delta. In Lawas District in north Sarawak, and in adjacent areas in North Borneo, *Shorea albida* is absent and is replaced by a unique forest dominated by the conifer *Dacrydium beccarii* var. *subelatum* and an undescribed species of *Casuarina*, formerly confused with *C. sumatrana*. Little now remains of this forest after forty years of heavy exploitation.

The middle and lower storeys include many species of the Lauraceae, Euphorbiaceae, Guttiferae, Burseraceae, Ebenaceae, Fagaceae, and Annonaceae. Some of the more abundant species in the middle storey are *Alangium havilandii*, *Blumeodendron tokbrai*, *Ctenolophon parvifolius*, *Diospyros evena*, *Diospyros pseudomalabarica*, *Kokoona ovato-lanceolata*, *Palaquium cochleariifolium*, *Parastemon spicatum* and *Xylopiā coriifolia*. In the lower storey the most widely distributed species in mixed swamp forest are *Neoscortechinia kingii*, *Cyathocalyx biovulatus*, and *Stemonurus umbellatus*. *Tetractomia holttumii* and *Cephalomappa paludicola* are abundant in the lower storey of pure *Shorea albida* forest.

In the understorey there are few species that rarely or never attain twelve inches girth, and most of these are rather rare or localised. Mention however may be made of *Ixora pyrantha* which is abundant in *Shorea albida* forest, and *Tarenna fragrans* in mixed swamp forest. Shrubby dicotyledons are rare. Those that do occur are largely confined to the more open forest in the centre of some swamps. Here may be found *Ficus deltoidea* var. *motleyana*, *Euthemis obtusifolius*, *Labisia punctata* f. *punctata* and *Medinilla hasseltii*. Some species, such as the *Nepenthes*, may have a scandent or climbing habit, but they are more commonly found on or near to the swamp surface, and may be more correctly considered as shrubs. It would appear that most of the *Nepenthes* in swamp forest only adopt a climbing habit when the canopy is opened. The stemless spiny palm *Zalacca conferta* and the large stemless pandan *Pandanus andersonii* frequently form dense thickets; the former in mixed swamp forest, especially on shallow peat, and the latter in association with *Shorea albida*. Two other pandans are common: *Pandanus brevifolius* in mixed swamp forest, and *Pandanus ridleyi* in stunted forest in the centre of some swamps in the Baram.

Herbaceous dicotyledons are practically absent. *Argostemma psychotrioides* is frequent in mixed swamp forest and the interesting small myrmecophyte *Clerodendron fistulosum* has a wide

distribution though is never common. Aroids and sedges predominate, of which the most abundant and widespread species is *Thorachostachyum bancanum*. Many aroids occur in damper localities where the water table is exposed or permanently near the surface. Here may be found *Aglaonema pictum*, *Homalomena rostrata*, *Alocasia longiloba* and *Alocasia beccarii*. Near streams or in particularly damp spots in the swamps where the water table is permanently exposed, the aquatic aroid *Cryptocoryne pallidinervia* abounds. Aroids are however almost entirely absent from the drier central areas of swamps. The large herb, *Hanguana malayana*, also favours the damper localities and is frequently found in places where a hole has been torn in the swamp surface by a tree uprooted by wind. A smaller form of this species tends to occur in slightly drier habitats. The two small terrestrial orchids, *Zeuxine violascens* and *Cystorchis variegata*, with attractive variegated foliage, occur on leaf litter in mixed swamp forest.

A simple classification, such as is attempted here, for herbs, epiphytes and climbers may lead to complications. Some species, such as *Ficus* spp., *Pycnarrhena borneensis*, and *Poikilospermum* spp., start life as epiphytes and later, after their roots have reached the swamp surface, develop a climbing habit; whereas others, e.g. *Randia* sp. (7904) and *Fagraea litoralis*, are initially epiphytes and later become independent shrubs or small trees. *Bulbophyllum beccarii*, a conspicuous epiphyte on *Shorea albida*, is stated by Beccari(1) to start as a climber from the ground surface, but early stages in its development have not been seen by the author. The species has always been found as an epiphytic climber spiralling round the upper boles of trees. Another complication is that some crown epiphytes, e.g. *Ficus deltoidea* var. *borneensis* and *Dischidia nummularia* may be terrestrial in the more open forest in the centre of some swamps, where presumably the ecological conditions are not dissimilar to those found in the crowns of the upper canopy in dense forest.

Many of the commonest crown epiphytes are confined to mixed swamp forest. They are particularly abundant in the crowns of *Gonystylus bancanus* and *Dactylocladus stenostachys*, both of which have a soft fibrous bark. No attempt, however, has been made to determine host specialisation. The best represented group is the orchids, of which *Bulbophyllum vaginatum*, *Dendrobium merrillii*, *Eria pannea* and *Eria* aff. *pulchella* are particularly abundant. Crown epiphytes on *Shorea albida* are scarce. *Dischidia* spp., *Hydnophytum formicarum* and *Myrmecodia tuberosa* are largely confined to stunted forest where conditions are similar to open heath forest in which these species also occur. The two most widely distributed and abundant shade epiphytes are *Medinilla laxiflora* and the orchid *Liparis lacerata*. Both tend to occur as epiphytes on small trees in dense forest at heights of from two to ten feet from the ground.

The liane and climber flora is not so conspicuous as that found in lowland dryland forest. The species are relatively few and do not appear to reach as large a size. In *Shorea albida* forest lianes are rare, and they are almost absent in the central forest types. Rattan palms, though not rare, are small in size and commercially of no value. Of the three species recorded two, *Plectocomiopsis wrayi* and *Korthalsia rigida*, are abundant; the latter frequently in association with *Shorea albida*. The commonest of the larger lianes is *Uncaria ovalifolia*, the sap of which is drunk by the natives to quench their thirst in the forest. This species also tends to form thickets in young secondary forest following exploitation. Other common lianes are *Willughbeia glaucina*, *Fibraurea chloroleuca*, and *Mitrella dielsii*.

Figs are particularly abundant in peat swamp forest; twenty-four species have been recorded. True strangling figs, that after killing the host develop a trunk of their own, are relatively rare. *Ficus crassiramea* is the most conspicuous example. This species is confined, however, to shallow peat near the coast. Many of the figs start as epiphytes but though adopting a strangling habit rarely, if ever, kill the host tree. They might be considered as partial stranglers, or, as is preferred, ground rooting epiphytes. These are especially abundant in mixed swamp forest on *Gonystylus bancanus* and *Dactylocladus stenostachys*. The most common species are *Ficus acamptophylla*, *Ficus consociata*, *Ficus spathulifolia*, *Ficus xylophylla* and *Ficus sundiaca*. Some tend to be rather localised: *Ficus xylophylla*, for instance, is very abundant on Pulau Bruit in the Rejang Delta but rather rare elsewhere in swamps. Of the small root climbing figs *Ficus callicarpides* is abundant on buttresses of *Shorea albida*.

Of the small climbers, generally confined to the lower storey, though some may reach the crowns of middle storey trees, the most numerous are *Lecananthus erubescens*, *Lucinaea morinda*, *Medinilla scandens*, *Aeschynanthus hians*, and the climbing aroid *Rhaphidophora lobbii*. *Nepenthes ampullaria* almost invariably has a climbing habit in peat swamps, though in heath forest the whorls of pitchers are not infrequently found embedded in the litter layer. *Gnetum neglectum*, a small twining climber which rarely attains a height of more than fifteen feet has been found throughout the Rejang Delta and Maludam Peninsula but is never common.

The myrmecophytes form an interesting group. They include two trees, *Macaranga caladifolia* and *Macaranga puncticulata*. The former is a primary forest species, whereas the latter has been only rarely recorded in primary forest, though it frequently forms almost pure dense stands in secondary swamp forest, especially along rail lines and on shallow peat cleared for cultivation. Of the other myrmecophytes only the herb *Clerodendron fistulosum* occurs in



dense forest, the remainder, which includes the epiphytic climbers *Dischidia nummularia* and *Dischidia rafflesiana* and the two conspicuous epiphytes *Myrmecodia tuberosa* and *Hydnophytum formicarum*, occurs in open stunted forest.

Parasites are not common in peat swamps. *Lepidaria oviceps*, a very conspicuous species, is found as a crown parasite of upper storey trees, whereas *Macrosolen beccarii* occurs as a parasite of lower or middle storey trees in the shade. It can be quite abundant locally. The parasitic shrub *Henslowia varians* is found in open stunted forest.

A list of the common ferns of peat swamp forests is included in Table 3. Terrestrial ferns are limited in number. The most typical species are *Vittaria elongata*, *Schizoloma coriaceum*, and *Syngamma lobbiana*, all of which occur in mixed swamp forest on roots and pneumatophores above the water table. The stemless tree fern *Cyathea glabra* is locally abundant in *Shorea albida* forest. *Schizaea malaccana*, more usually a montane species, occurs in stunted forest often in association with *Lycopodium cernuum*, which is so common on degraded soils. The interesting and rare *Ophioglossum intermedium* has only been recorded from one locality in the Rejang Delta. *Nephrolepis biserrata* is rare in primary forest but forms dense thickets in completely open secondary forest, especially where the slash has been burnt.

The epiphytic ferns are more difficult to classify into crown and shade epiphytes as they appear to be more tolerant than flowering plants of light and humidity conditions. Many of the common epiphytic ferns of gardens, rubber plantations, etc., such as *Asplenium nidus*, *Asplenium phyllitidis*, *Pyrrosia longifolia* and *Paragramma longifolia* are to be frequently found in peat swamp forest. *Humata angustata* and *Humata parvula* may be found as either crown or shade epiphytes and are occasionally even terrestrial in the central forest types. The most consistent shade epiphyte is *Lycopodium phlegmaria* var. *divaricatum* which occupies a similar habitat to *Medinilla laxiflora* and *Liparis lacerata*. Only two climbing ferns have been recorded: *Stenochlaena palustris* which clothes the lower stems of many trees on shallow peat near the coast, but becomes progressively rarer further inland; and *Teratophyllum ludens* which is confined to dense or moderately dense shade in the understory.

### Peat swamp endemics

A far greater knowledge of the flora of Borneo and of the ecology of the species is required before it can be stated with any authority which species are confined to peat swamp forest. There are probably very few. That there are similarities in the floras of heath and peat swamp forest is well known, and has been mentioned by Richards (9 & 10) and Browne (2 & 3). The author has recorded

ninety-eight species which occur in both vegetation types and Dr. P. S. Ashton has recently added to the list. A note is included in the catalogue under each species where its occurrence in heath forest has been recorded. Dr. E. F. W. O. Brunig is at present engaged on an ecological study of heath forests and when this is in a more advanced state a comparison of the two floras will be possible. Some typical peat swamp species are also to be found in lowland dipterocarp forest. A recent enumeration of a thirty acre block on a largely clay ridge in the Semengoh Forest Reserve near Kuching showed the presence of *Neoscortechinia kingii*, *Shorea scabrida*, *Swintonia glauca*, *Mangifera havilandii*, *Koompassia malaccensis*, *Santiria tomentosa*, *Bhesa paniculata*, *Endospermum malaccense*, *Cratoxylon arborescens*, *Litsea grandis*, *Dialium laurinum*, *Sindora leiocarpa*, *Carallia brachiata*, *Mussaenopsis beccariana* and *Pometia pinnata* f. *acuminata*. All these occur in peat swamp forest and there are probably others in this area which have not yet been definitely identified. It is significant that all these species, without exception, occur and are largely confined to the peripheral zone of mixed swamp forest, where the drainage is better and the peat soil probably more fertile. The species that occur in the forest types in the centre of the swamps are largely those that are also found on poor, frequently podzolic, soils found in heath forest.

### Distribution of peat swamp species

The peat swamps form an almost continuous strip along the coast of Sarawak and Brunei from south western Sarawak to the Tutong river in Brunei. The only major breaks in their distribution occur between Bintulu and the Nyalau river, a distance of forty-five miles, and eight miles which separate the swamps in the Sibuti river from those in the Baram river. Conditions of development of peat swamps and the nature of the peat soils themselves are similar over the whole area. It can be expected, therefore, that the flora is relatively uniform. In comparison with the flora of other soil types, where marked discontinuities occur, this is generally so. Nevertheless it has been found that the flora of the Rejang Delta is richer than that of swamps elsewhere in Sarawak or Brunei. Further collecting in less frequented areas will no doubt reveal a more widespread distribution of some species that are at present recorded from only the Rejang Delta. But there are in the Rejang Delta species such as *Lophopetalum rigidum*, *Blumeodendron subrotundifolium*, and *Stemonurus scorpioides* which occur so frequently that if present elsewhere it is unlikely that they would have been overlooked. Moreover, in ecological sample plots, recording all trees exceeding twelve inches girth, it has been found that the species per acre tend to be consistently more numerous in the

Rejang Delta than elsewhere. The following tree species are known in peat swamp forest only from the Rejang Delta: *Anacalosa frutescens*, *Blumeodendron subrotundifolium*, *Ellipanthus tomentosus* spp. *tomentosus*, *Parishea* sp. (2697), *Swintonia glauca*, *Lophopetalum rigidum*, *Castanopsis foxworthyi*, *Cephalomappa beccariana*, *Mangifera havilandii*, *Camptosperma montana*, *Linociera* sp. (9042), *Stemonurus scorpioides*, *Kibatalia* sp. (9300), and *Kibessia coriacea*. In contrast there are few species apparently absent from the Rejang Delta yet recorded in other swamps. *Neesia malayana* has a localised distribution in Lawas swamps and has also been recorded from the Setapok Forest Reserve near Kuching. *Tristania maingayi* is abundant in the central forest types in the Baram and in the Maludam Peninsula, but has not been recorded in similar forest in the Rejang Delta. *Ganua curtisii* is known in swamp forest only in the Badas forests of Brunei, where it occurs abundantly in association with *Shorea albida*.

In general it has been found that upper storey species tend to have a more widespread distribution than smaller tree species of the lower storey, and understorey trees are frequently very localised. Typical examples of the latter are *Knema uliginosa* in the Loba Kabang Protected Forest, and *Kibatalia* sp. (9300) and *Lophopetalum rigidum* which are confined to the apex of the Rejang Delta. An interesting exception to this generalisation is the distribution of the Dipterocarpaceae which is shown diagrammatically in Table 4. Six species occur in peat swamp forest throughout the two territories. *Cotylelobium flavum* has a widespread distribution in heath forests but in peat swamps it has only been recorded from the Rejang Delta and Brunei. *Shorea macrantha* and *Shorea pachyphylla* are also more frequently found in heath forest but both have a limited and localised distribution in heath and peat swamp forests. In peat swamps they are only found near the inland margins of the swamps. *Dipterocarpus coriaceus*, which is only known from localised areas in the Second Division and in the Sekai Forest Reserve in the Mukah river, is confined to peat swamps. It has not definitely been recorded from the Rejang Delta, but seedlings, probably of this species, have been found in the Naman Forest Reserve at the apex of the delta. The distribution of the gregarious species, *Shorea albida*, extends in peat swamps from the Sadong river to the Badas swamps of Brunei. It has also been recorded in heath forest near Lundu. *Shorea inaequilateralis* has a similar, though somewhat narrower, distribution.

There are many factors involved in determining the geographical distribution of peat swamp species. Unpublished pollen evidence indicates that many of the species have been present in peat swamps in Borneo for millions of years. Recent changes in sea level during and immediately after the Glacial Period with consequent erosion and deposition along the coasts may have been an important factor.

Some species confined to peat swamps may have been eliminated from swamps in minor rivers yet retained a foothold in the Rejang river. After the stabilisation of the sea level, some 5,500 years ago, the spread of species may have been obstructed initially until the seaward development of peat swamps on alluvium had progressed sufficiently for the swamps to coalesce along the coast. There are, however, many other factors to be considered. Even if species were eliminated from coastal swamps, they would, no doubt, be preserved in heath forests and in small localised hill and montane peat swamps and thus be able to spread down again to the coast. Moreover, some of the species, such as *Swintonia glauca*, *Stemonurus scorpioides*, *Mangifera havilandii* and *Quassia borneensis*, which in peat swamp forest have only been recorded in the Rejang Delta, may be considered more accurately as constituents of dry land forest, and only in the Rejang Delta have they become adapted to growing and regenerating in peat swamps. Further understanding of the distribution of the peat swamp flora is only likely to be achieved after greater knowledge has been gained of the Bornean flora as a whole. Later a comprehensive study of the peat swamp flora in the Malaysian region might yield some interesting and valuable information on the phytogeography of Malaysia.

### Ecology of the peats swamp forests

It is not intended to describe in any detail the ecology of the peat swamp forests in this paper. This will be discussed at greater length elsewhere. However, as some details of the occurrence of the species in recognised forest types are included in the catalogue a few remarks by way of explanation are necessary.

The coastal and deltaic peat swamps are all of the raised bog type, each swamp or bog forming a separate unit in the ecosystem. Well developed raised bogs have a structure similar to that found in temperate raised bogs. The vegetation types are found in a catenary sequence from the perimeter to the centre of a raised bog. The term "Phasic Community" has been used to designate a vegetation or forest type. This term is particularly appropriate as a recent pollen analysis indicates that the horizontal pattern of vegetation types found on the ground is also likely to be found in a vertical succession in the centre of the raised bogs. Six phasic communities have been recognised and they are differentiated on floristic composition and structure of the vegetation. Two phasic communities (Nos. 5 and 6) occur only in the most highly developed raised bogs in the Baram river. Brief descriptions of the phasic communities follow:

#### Phasic Community 1

*Gonvstylus*—*Dactylocladus*—*Neoscortechinia* association. (Mixed swamp forest). Occurs on the perimeter of swamps and covers extensive areas of relatively undeveloped coastal bogs. The canopy is uneven, with dominants attaining 130 to 150

feet in height, and the floristic composition of all storeys very mixed. Of the phasic communities it most closely resembles lowland dryland forest. Principal dominants include *Gonystylus bancanus*, *Dactylocladus stenostachys* and four species of *Shorea* (not *Shorea albida*). Numerous species occur in the middle and lower storeys, of which the most widely distributed and abundant are *Neoscortechinia kingii* and *Alangium havilandii*. Tree species, twelve inches girth and over, recorded in ecological plots average between sixty and seventy per acre. The water table is frequently exposed and aroids and the sedge *Thorachostachyum bancanum* are abundant. *Zalacca conferta* may form dense thickets especially on shallow peat.

### Phasic Community 2

*Shorea albida*—*Gonystylus*—*Stemonurus* association. (Locally known *alan* forest). Occurs as a transitional zone, often of considerable depth, between phasic communities 1 and 3. The canopy is uneven, and large trees, frequently exceeding twelve foot girth, of *Shorea albida*, dominate the forest. These are almost invariably hollow and have the appearance of being moribund with large stag-headed crowns. Mid-girth trees and regeneration of *Shorea albida* are almost entirely absent. The moderately dense middle and lower storeys are large composed of species of Phasic Community 1. *Stemonurus umbellatus* is a characteristic species of this community.

### Phasic Community 3

*Shorea albida* consociation (*alan bunga* forest). This community covers very extensive areas in the second and fourth divisions and in the Badas swamps of Brunei, but is largely absent from the Rejang Delta. The upper storey is composed of a pure even canopy, ranging in height between 160 and 190 feet, of *Shorea albida* which averages between thirty-five and fifty trees per acre. The middle storey is largely absent and the moderately dense understorey is frequently dominated by a single species: *Tetractomia holttumii*, *Cephalomappa paludicola* or *Ganua curtisii*. Herbaceous vegetation is largely absent. *Pandanus andersonii* frequently forms dense thickets in the shrub layer.

### Phasic Community 4

*Shorea albida*—*Litsea*—*Parastemon* association (*padang alan* or *padang medang* forest). Occurs in the central area of numerous swamps in all localities, particularly in the Rejang Delta, and as a transitional zone in certain of the Baram swamps. The canopy is unbroken and even at heights ranging from 100 to 120 feet. All trees are relatively small in girth, few exceeding six feet, and the forest has a marked pole-like

and xerophytic aspect. Principal dominants are *Shorea albida* (*padang alan*), which may be represented by 180 stem per acre and *Litsea palustris* (*padang medang*). Other characteristic species are *Parastemon spicatum*, *Combretocarpus rotundatus* and *Calophyllum obliquinervum*.

### Phasic Community 5

*Tristania*—*Parastemon*—*Palaquium* association. Occurs as a narrow zone between phasic communities 4 and 6. The canopy is dense and even, with a few emergents, and an average height of between fifty and seventy feet. The forest has between 400 and 500 stems (12 inch girth and over) per acre, all of which are small; few exceeding three feet girth. The most abundant species are *Tristania obovata*, *Tristania aff. maingayi*, *Parastemon spicatum*, *Palaquium cochleariifolium* and *Dactylocladus stenostachys*. Herbaceous flora is largely absent.

### Phasic Community 6

*Combretocarpus*—*Dactylocladus* association (*padang keruntum*). The last known phase in raised bog development. It covers extensive areas of deep swamps in the middle reaches of the Baram, near and upriver from Marudi. The forest is open and markedly xerophytic. All trees and shrubs tend to have a stunted appearance. *Combretocarpus rotundatus* is the only species that exceeds three feet girth, and it rarely attains a height of more than forty feet. *Dactylocladus stenostachys*, *Litsea palustris* and *Garcinia rostrata* are abundant, but frequently little more than shrubs. Myrmecophytes and *Nepenthes* spp. are particularly numerous. *Thorachostachyum bancanum* and *Pandanus ridleyi* are abundant on the swamp surface, where sphagnum moss (*Sphagnum junghuhnianum*) also occurs.

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# A catalogue of the flora of the peat swamp forests of Sarawak and Brunei including all recorded species of flowering plants, ferns and fern allies

Abbreviations used in the text: Div.: Administrative Division of Sarawak; F.R.: Forest Reserve; g.: girth at 4 ft. 6 ins. from ground; h.: total height; I.: Iban; Kpg.: Kampong (village); L.D.F.: lowland dipterocarp forest; M.: Malay; Mil.: Milanau; P.C.: Phasic Community; P.F.: Protected Forest; Sg.: Sungai (river); Tj.: Tanjong (bend in a river).

## ANGIOSPERMAE

### I. DICOTYLEDONS

#### DILLENIACEAE

##### *Dillenia* L.

##### 1. *Dillenia pulchella* (Jack) Gilg.

*simpur* (M.); *beringin* (I.), *jengin perempuan* (Mil.).

II Div.: Triso 3154; III Div.: Igan 1590 Pulau Bruit 804, 2664, 2663, Loba Kabang P.F. 523, 411, Lepah P.F. 8079; V Div.: Kayangeran F.R. 1566.

Large tree, 96–108 ins. g., occasional in P.C. 1 and rather more common in coastal swamps; throughout Sarawak and Brunei.

##### 2. *Dillenia pulchella* (Jack) Gilg var.

*simpoh* (M.), *beringin* (I.), *jengin laki* (Mil.).

II Div.: Saribas F.R. 8551; III Div.: Pulau Bruit 7906, 9284, Singat 9747, Lassa 12430; V Div.: Kayangeran F.R. 1781; Brunei: Anduki 2142.

Small tree, frequently little more than a shrub, 10 to 20 ft. in height, but may reach 18–24 ins. g.; occasional, locally frequent, in P.C.s 1 and 2 throughout Sarawak and Brunei. This is very similar to 1 above but whereas the latter is a large tree the variant is a small tree of the understorey growing in association with 1, and flowering and fruiting more frequently.

##### *Tetracera* L.

##### 1. *Tetracera arborescens* Jack.

II Div.: Triso 12873; III Div.: Lassa P.F. 12414.

Small straggling shrub or climber, rare in understorey of P.C. 1, more abundant in secondary swamp forest. Recorded from Maludam Peninsula and Rejang Delta.

## MAGNOLIACEAE

**Aromadendrum** Bl.1. **Aromadendrum nutans** Dandy.

*merabungai* (I.), *medang limo* (Mil. Oya), *medang ikan* (Mil.).

II Div.: Simanggang 4806; III Div.: Loba Kabang P.F. 516, 1577, 867, Naman F.R. A 95, Daro F.R. 5233.

Medium-sized tree, 48–60 ins. g., occasional in P.C.s 1–2, locally abundant in P.C. 3 in the Sg. Tissak, II Div. Probably occurs throughout Sarawak and Brunei, but not yet recorded from Brunei and V Div. Easily identified in the forest by its thick fibrous bark which gives off a pungent fragrance when initially cut.

Specimen in Kew: 3660 (*Beccari*), Type—A.

## ANNONACEAE

**Artabotrys** R. Br.1. **Artabotrys suaveolens** (Bl.) Bl.

V Div.: Kuala Lawas 9114.

Climber to height of 60 ft. in P.C. 2 near coast, and recorded from Meludam Peninsula—Lawas.

**Cyathocalyx** Champion.1. **Cyathocalyx biovulatus** Boerl.

*eis* (Mil. Matu), *selemo* (M.), *mandap* (Kedayan), *eis pendok* (I.).

II Div.: Saribas F.R. 8545, 8561, Triso 3152, Lingga 4819; III Div.: Loba Kabang F.R. 2764, 9709, 693, 79322 (W.-S.), 514, Sg. Kelepa'an A 77, Naman F.R. A 71, Pulau Bruit P.F. 8028, 9264, 9210, 8029, Daro F.R. 5240; Brunei: Badas, 2836.

Small tree, 12–24 ins. g., occasionally larger, frequent in lower storey of P.C. 1 throughout Sarawak and Brunei. A characteristic tree of peat swamp forests which flowers and fruits all the year round.

Specimens in Kew: 653 (*Beccari*), 1869, *derc* (*Haviland*)—C.

**Disepalum** Hk. f.1. **Disepalum anomalum** Hk. f.

I Div.: Simunjun 11732; IV Div.: Miri, Sg. Dua 3288; V. Div.: Kayangeran F.R. 2024; Brunei: Badas 5960.

Shrub or small tree of understorey, 6–9 ins. g. and 15–20 ft. high; rare in P.C.s 1 and 2; through Sarawak and Brunei; also known to occur in heath forest.

**Fissistigma** Griffith.

1. **Fissistigma paniculatum** (Ridley) Merr.

III Div.: Loba Kabang 436.

Medium-sized climber, rare in P.C. 1, and recorded from only the Rejang Delta.

**Goniothalamus** Hook. f. et Thoms.

1. **Goniothalamus malayanus** Hook. f. et Th.

*serbah* (M.), *pudin* (Mil.), *lim panas paya*.

I Div.: Setapok F.R. 4787; II Div.: Simanggang 9431, Saribas F.R. 8514, 8512, Ng. Skrang 9829; III Div.: Pulau Bruit 8391, 9211, Lepah P.F. 5202, 8063, Loba Kabang P.F. 550, 541, 79324 (W.-S.), Lassa 12431; V Div.: Kayangeran F.R. 4911, 1561; Brunei: Anduki F.R. 2232.

Small tree, 12–24 ins. g., frequent and widely distributed in P.C.s 1 and 2 throughout Sarawak and Brunei; also occurs in heath forest.

Specimens in Kew: *borc*, *dxfc* (*Haviland*)—C.

2. **Goniothalamus andersonii** J. Sinclair.

*selukai* (I.), *pudin* (Mil.), *serbah semangun* (M.).

III Div.: Naman F.R. 5062, Daro F.R. 5236, Batang Igan 689, Sg. Pasir A 125; Brunei: Badas 2851.

Medium-sized tree, 36–48 ins. g., occasional in P.C.s 1 and 2 throughout Sarawak and Brunei. The bark is used as a repellent against mosquitoes.

**Mezzettia** Beccari.

1. **Mezzettia leptopoda** (Hk. f. et Th.) Oliver. (*Mezzettia havilandii* (Boerl.) Ridley).

*buah munau* (Mil.), *kepayang babi*.

II Div.: Tj. Keranji 12890; III Div.: Loba Kabang P.F. 2660, 868, 2719, Matu Daro P.F. 12264, Pulau Bruit P.F. A 173; IV Div.: Sg. Dua 3254.

Large tree, 72–84 ins. g., occasional in P.C. I throughout Sarawak and Brunei.

In Kew the specimens collected closely match both the Type, 2335 (*Haviland*), of *M. havilandii*, which is considered to be a synonym of *M. leptopoda*, and also 102 (Herb. Maingay) the Type of *M. leptopoda*.

2. **Mezzettia umbellata** Becc.

*karai*, *selemo*.

III Div.: Loba Kabang P.F. 478, 1578; IV Div.: Miri, Sg. Dua 3256; Brunei: Anduki 2244.

Small tree, 12–24 ins. g., rather rare in P.C.s 1 and 2 throughout Sarawak and Brunei; also recorded in heath forest.

Specimens in Kew: 1421 (Beccari) Type—A, and 2104 (Haviland).

**Mitrella** Miq.

1. **Mitrella dielsii** J. Sinclair.

*semulun* (Mil.).

II Div.: Saribas F.R. 8562; III Div.: Surong Irit 9708, Lassa 12428, Matu Daro P.F. 12319.

Medium-sized climber with distinctive foliage, rare in P.C. 1. Recorded from Saribas F.R., Batang Lupar, Rejang Delta and Baram.

**Polyalthia** Bl.

1. **Polyalthia glauca** (Hassk.) Boerl.

*dilleh* (I. Lassa), *mechang* (I. Igan), *selaut telur* (M.).

II Div.: Tj. Keranji 12401, Triso P.F. 2342; III Div.: Loba Kabang P.F. A 79; Brunei: Badas 2226.

Medium-sized tree, 36–48 ins. g., which may be easily identified by its smooth yellow bark and large leaves with glaucous undersurface; occasional in P.C.s 1 and 2. Occurs throughout Sarawak and Brunei, and has also been noted in heath forest (Badas).

2. **Polyalthia hypoleuca** Hk. f. et Th.

*selaut* (I.), *kayu semut*, *tatal* (M. Brunei), *udap* (Mil.).

III Div.: Loba Kabang P.F. 2681, 690, 6293; Brunei: Badas 2837.

Small to medium-sized tree, 15–36 ins. g., occasional in P.C.s 1 and 2, locally frequent in P.C. 3 (Badas, Brunei); distribution general throughout Sarawak and Brunei.

Specimen in Kew: Herb. Maingay 1516, Type—A.

3. **Polyalthia sclerophylla** Hk. f. et Th.

*karai*.

II Div.: Triso 12869, 12851, 14566; Brunei: Tutong, Kg. Lubok Pulai 5615.

Medium-sized tree, 36–48 ins. g., locally frequent in P.C. 1, but recorded from only the Maludam Peninsula and Sg. Tutong; probably occurs elsewhere in coastal swamps.

4. **Polyalthia sp. nov.** (9059).

II Div.: Saribas F.R. 8513; III Div.: Pulau Bruit P.F. 9059, 8031, 7942, Batang Igan 687, Naman F.R. 677, Matu Daro P.F. 12274.

Small tree of the understorey, 6–9 ins. g. 12–18 ft. high; rare and local. Recorded only in the Rejang Delta, Saribas F.R. and Maludam Peninsula. An undescribed species; one matching specimen (3919) was collected by Beccari in Sarawak.

**Pyramidanthe** Miq.

1. **Pyramidanthe prismatica** (Hk. f. et Th.) J. Sinclair.

*sebulan* (Mil. Daro), *handan malam* (I.).

III Div.: Naman F.R. 674, Pulau Bruit P.F. 9289. Daro F.R. 9730.

Large climber reaching 100 ft. or more in height; occasional in P.C. 1. Recorded only from Rejang Delta and Maludam Peninsula, but probably occurs in other swamp forests.

**Uvaria** L.

1. **Uvaria** sp. (9749).

III Div.: Singat 9749.

Medium-sized climber, rare in P.C. 1 and recorded only from the Rejang Delta.

**Xylopia** L.

1. **Xylopia coriifolia** Ridley.

*akau*, *bangoh* (Brunei M.), *sengkajang paya* (I.).

III Div.: Matu Daro P.F. 12304, Pulau Bruit P.F. A. 124, 9201, 2657, Loba Kabang P.F. 655, 2684, Naman F.R. A 13, Lepah P.F. 8100; V Div.: Kayangeran F.R. 1565; Brunei: Badas 2828.

Medium-sized tree, 48–60 ins. g., with numerous stilt roots; occasional in P.C.s 1 and 2, and also in P.C. 4 in Brunei; occurs throughout Sarawak and Brunei.

Specimen in Kew: 3335 (Beccari), Type—A, also 333 (Beccari), and 1906 (Haviland).

2. **Xylopia fusca** Maingay ex Hk. f. et Th.

*akau*.

III Div.: Lepah P.F. 8093, Pulau Bruit 5121.

Small to medium sized tree, 12–24 ins g., rare and local in P.C. I, preferring coastal margins of swamps. Recorded only from Triso P.F. and the Rejang Delta, but probably occurs throughout Sarawak and Brunei in localised habitats near the coast.

**MENISPERMACEAE**

**Fibraurea** Lour.

1. **Fibraurea chloroleuca** Miers.

*akar badi*.

II Div.: Saribas F.R. 5868; III Div.: Pulau Bruit 7923, Matu Daro P.F. 12271.

Medium-sized to large climber, attaining a height of 100 ft.; frequent in P.C. 1 throughout Sarawak and Brunei. One of the most common climbers in swamp forest. The stem is used by the Malays and Milanaus in the preparation of a stomach medicine.

**Pycnarrhena Miers.**

1. **Pycnarrhena borneensis** Diels.

III Div.: Daro F.R. 9731, 9066, 5205, Pulau Bruit 12230, Matu Daro P.F. 12272.

Small climbing epiphyte, rare in understorey of P.C. 1. Recorded from the Daro and Naman forest reserves in III Div.

**POLYGALACEAE**

**Trigoniastrum** Miq.

1. **Trigoniastrum hypoleucum** Miq.

III Div.: Loba Kabang P.F. 410, 434, Pulau Bruit 2679.

Small tree, 12–18 ins. g., rare in P.C.s 2 and 3 in the Rejang Delta.

**Xanthophyllum** Roxb.

1. **Xanthophyllum amoenum** Chod.

*nyalin.*

III Div.: Pulau Bruit 2634; IV Div.: Sg. Dua 4110.

Small to medium-sized tree, 12–30 ins. g., frequent in P.C.s 1 and 2. Poles and saplings are abundant in the understorey. Occurs throughout Sarawak and Brunei, also in heath forest.

Specimen in Kew: 2112 (*Haviland*), Type—A.

2. **Xanthophyllum** aff. **citrifolium** Chod.

*nyalin tikus, mera batu* (L.).

III Div.: Lassa 12413, Pulau Bruit 2636, 8002, 9027, 5111, Loba Kabang P.F. 525, 2750, Daro F.R. 5206; IV Div.: Sg. Dua 4176, 4190.

Small tree, 9–18 ins. g., occasional, locally frequent, in P.C. 1 from Batang Lupar to Baram. Recorded in L.D.F. in Brunei.

3. **Xanthophyllum** sp. (2614).

II Div.: Sg. Tissak 3183; III Div.: Pulau Bruit 12894, Loba Kabang P.F. 2614, 500, 2734, 1589; Brunei: Badas 2830.

Small tree, 12–30 ins. g., locally frequent in P.C. 4 throughout Sarawak and Brunei, but has not been recorded from V Div. It also occurs in heath forest.

Specimens of this distinctive tree are quite unmatched in Kew, Bogor and Singapore, and the species is probably undescribed.

## HYPERICACEAE

### Cratoxylon Blume.

1. *Cratoxylon arborescens* (Vahl) Blume.

*geronggang, entimau* (I.), *serungan*.

I Div.: Setapok F.R. 4765; II Div.: Triso P.F. 3155; III Div.: Loba Kabang P.F. 536.

Large tree, 72–84 ins. g., occasional in P.C. 1, abundant in secondary swamp forest; throughout Sarawak and Brunei.

Specimen in Kew: 3720 (*Beccari*), *bnpd* (*Haviland*)—B.

2. *Cratoxylon glaucum* Korth.

*geronggang puteh, geronggang padang*.

III Div.: Sungei Assan A 105, Loba Kabang P.F. 2721; V Div.: Kayangeran 1776.

Tree, 60–72 ins. g., occasional, locally frequent, in P.C. 4 throughout Sarawak and Brunei.

Specimens also closely match *Cratoxylon microphyllum* Bl., which is commonly found in heath forest as a small tree or shrub.

Specimens in Kew: 3176, 3170, 1133, 597 (*Beccari*)—B.

## FLACOURTIACEAE

### Casearia Jacq.

1. *Casearia elliptifolia* Merr.

II Div.: Triso 10023; IV Div.; Lawas 9198.

Small tree or shrub, rarely more than 15 ft. h., rare in P.C. 3; recorded from the Rejang Delta, Batang Lupar and Lawas.

### Ryparosa Bl.

1. *Ryparosa acuminata* Merr.

III Div.: Loba Kabang P.F. 888.

Small tree, 12–18 ins. g., rare in P.C. 1. Recorded from only the Rejang Delta.

Specimen in Kew: 501 (*Hose*), Type—B.

## GUTTIFERAE

### Calophyllum L.

1. *Calophyllum canum* Hook. f.

*bintangor*.

III Div.: Pulau Bruit A 137, Loba Kabang P.F. 1597.

Tree, 72–84 ins. g., rare in P.C. 1, and recorded from only the Rejang Delta. It also closely resembles *Calophyllum palustre* Ridley (3343, *Haviland*).

2. *Calophyllum fragrans* Ridley.*bintangor*.

III Div.: Loba Kabang P.F. 2698, 480, 2739, 2761.

Medium-sized tree, 36–48 ins. g., rare and local in P.C.s 1 and 2. Recorded from only the Rejang Delta. One of the two species of *Calophyllum* which have stilt roots.

Specimen in Kew: 1812 (*Haviland*), Type—A.3. *Calophyllum obliquinervum* Merr. (*Calophyllum benjamina* Ridley).*bintangor kuning*.

III Div.: Loba Kabang P.F. 659.

Medium-sized tree, 36–48 ins. g., locally abundant in P.C. 4 in the centre of certain swamps, also occurs in heath forest; throughout Sarawak and Brunei. Easily identified by its conspicuous bright yellow bark.

Specimen in Kew: 505 (*Haviland*), Type (*C. benjamina*)—A.4. *Calophyllum retusum* Wall. (*Calophyllum borneense* Vesq.)*bintangor paya*.

I Div.: Setapok F.R. 4817; III Div.: Loba Kabang P.F. 755, 79329 (W.-S.), Daro F.R. A 126, A 171, Pulau Bruit 8039.

Tree, 72–84 ins. g., occasional in P.C. 1 and more rarely in P.C. 2; throughout Sarawak and Brunei.

The specimens closely match the type (2101, *Beccari*) of *C. borneense*, which is considered to be a synonym of *C. retusum*.

5. *Calophyllum scriblitifolium* Hend. & W.-S.

III Div.: Sg. Assan 7361/10, Loba Kabang P.F. 2740.

Large tree, 60–72 ins. g., rare in P.C.'s 1 + 2 in the Rejang Delta and Meludam Peninsula.

6. *Calophyllum rhizophorum* Boerl. et Koord.*bintangor kapas* (M. Lawas), *bintangor dudok*.

III Div.: Loba Kabang P.F. 654, 756, 79328 (W.-S.), 1598; V Div.: Kayangeran F.R. 2843.

Tree, 60–72 ins. g., occasional in P.C.s 2 and 3. Recorded from the Rejang Delta, Baram, Brunei and Lawas, but not yet known to occur south-west of the Rejang Delta.

7. *Calophyllum sclerophyllum* Vesq.*bintangor jangkar*.

III Div.: Daro F.R. A 136.

Medium-sized tree, 36–48 ins. g., rare or very rare in P.C. 1. Probably occurs throughout Sarawak and Brunei but only recorded from the Rejang, Baram, and Brunei. This species is easily identified by its spreading stilt roots and large coriaceous leaves.



**Garcinia L.**

1. **Garcinia schizophoroides** Elm. var. **bicolor.**

*kandis.*

Brunei: Anduki F.R. 2249, Badas 2831; V Div.: Kayangeran F.R. 2028, 2016, 4910.

Small tree, 12–18 ins. g., locally frequent in P.C. 1 in Brunei and V Div., but not yet recorded elsewhere.

2. **Garcinia havilandii** Stapf.

*kandis jangkar.*

III Div.: Loba Kabang P.F. 669.

Distinctive medium-sized tree, 36–48 ins. g., with numerous spreading stilt roots. Occasional in P.C. 1 in the Rejang Delta and Batang Lupar.

3. **Garcinia microcarpa** Pierre.

III Div.: Baram 3284; Brunei: Badas 2824; V Div.: Kayangeran F.R. 1558.

Small tree, 12–18 ins. g., occasional in P.C.s 2–4 in the Rejang Delta, Baram, Lawas and Brunei.

4. **Garcinia** aff. **rostrata** Hassk ex Hook f.

II Div.: Triso P.F. 3169; III Div.: Loba Kabang P.F. 2611; Brunei: Badas 2817.

Small tree, 12–15 ins. g., frequent, locally abundant, in P.C. 4 in Batang Lupar, Rejang Delta, Baram and Brunei, and abundant in P.C. 6; also occurs in heath forest. All collections sterile.

5. **Garcinia tetrandra** Pierre.

*manggis hutan* (M.), *kunong* (Mil. Oya), *bua 'babal* (Mil. Rejang), *sakubangan* (I.).

II Div.: Saribas F.R. 8559, Triso P.F. 3168; III Div.: Matu Daro P.F. 12270, 12316, Pulau Bruit 9208, 2645, 806, 4965. Loba Kabang P.F. 5053, 669.

Very distinctive small to medium-sized tree, 15–30 ins. g., with leaves and fruit which closely resemble the cultivated mangosteen; occasional in P.C.s 1 and 2 throughout Sarawak and Brunei.

6. **Garcinia vidua** Ridley.

III Div.: Pulau Bruit 8046, Loba Kabang P.F. 407, 894, 462, 2765; Brunei: Badas 2839.

Medium-sized tree, 36–48 ins. g., occasional in P.C. 1 in the Rejang Delta, also recorded in Brunei.

7. **Garcinia** sp. (9745).

II Div.: Saribas F.R. 8519; III Div.: Loba Kabang P.F. 865, 2755, Daro F.R. 9745.

Small tree, 12–18 ins. g., occasional in P.C.s 1 and 2 in Batang Lupar and the Rejang Delta.

8. *Garcinia eugenifolia* Wall.

III Div.: Loba Kabang P.F. 2752, 2758; IV Div.: Sg. Dua 3277, 3259.

Small tree, 12–18 ins. g., rare in P.C. 2 in the Rejang Delta and Baram.

*Kayea* Wall.

1. *Kayea* sp. (9736).

*lupeh* (Mil. Oya), *beragasing* (I.).

III Div.: Daro F.R. 5214, 9736, Loba Kabang P.F. 855, 509.

Small tree, 12–24 ins. g., rare and local in P.C. 1 in the Rejang Delta and Maludam Peninsula.

**TERNSTROEMIAEAE**

*Ploiarium* Korthals.

1. *Ploiarium alternifolium* (Vahl) Melchior.

*somah*.

III Div.: Loba Kabang P.F. 661; V Div.: Kayangeran F.R. 2847.

Small tree, 12–24 ins. g., rare in P.C. 4, but abundant in heath forest and on degraded soils throughout Sarawak and Brunei. In peat swamps it develops numerous stilt roots.

*Ternstroemia* Mutis ex L. f.

1. *Ternstroemia hosei* Ridley.

II Div.: Triso 8941, Saribas F.R. 8574; III Div.: Loba Kabang P.F. 439, 2609; IV Div.: Sg. Dua 2885, Lobok Pasir 9874; Brunei: 2819.

Small tree, 15–24 ins. g., frequent, locally abundant, in P.C.s 4 and 5 throughout Sarawak and Brunei; also occurs in heath forest.

Specimens in Kew: 235 (*Hose*) Type, 1966, 3102 (*Haviland*), 2943 (*Beccari*).

Specimens also closely match *T. citrina* which may be a synonym.

2. *Ternstroemia magnifica* Stapf ex Ridley.

III Div.: Sg. Nangar 12277, Loba Kabang P.F. 416; V Div.: Kayangeran F.R. 4908.

Small tree, 18–30 ins. g., rather rare and localised; has been recorded in P.C.s 1–4. Occurs throughout Sarawak and Brunei, also recorded in L.D.F. in Brunei.

Specimen in Kew: unno. (*Haviland*) Type—C.

3. *Ternstroemia* aff. *penangiana* Choisy.

III Div.: Loba Kabang P.F. 899.

Small tree, 12–24 ins. g., very rare in P.C. 1 and recorded from only the Rejang Delta.

Unmatched in Kew, determined Singapore.

## DIPTEROCARPACEAE

### Anisoptera Korth.

1. **Anisoptera marginata** Korth. (*Anisoptera grandiflora* Brandis.)

*mersawa paya, pelpak.*

II Div.: Saribas F.R. 8401, Nanga Skrang 9827; III Div.: Pulau Bruit P.F. 9278, 9290, 8038, 8027, Loba Kabang P.F. 2718, 463, 698.

Medium-sized to large tree, 48–60 ins. g., though trees of over 96 ins. g. have been recorded; rather rare in P.C. 1. Recorded from only the Rejang Delta, Saribas and Maludam Peninsula, but probably also occurs in northern Sarawak and Brunei.

### Cotylelobium Pierre.

1. **Cotylelobium flavum** Pierre.

*resak durian.*

III Div.: Loba Kabang P.F. 405, A 185, A 147.

Tree, 24–36 ins. g., rare and local in P.C.s 2–4. Occurs throughout Brunei and Sarawak and is common in some heath forests, but has only been recorded in peat swamps in the Rejang Delta and Brunei.

### Dipterocarpus Gaertn. f.

1. **Dipterocarpus coriaceus** V. Sl.

*keruing paya.*

II Div.: Nanga Skrang 9820; III Div. Sg. Sekai F.R. 555, 556.

Medium-sized to large tree, 72–84 ins. g., localised and tending to be gregarious in P.C. 1 near up-river limits of peat swamps. Occurs only in I and II Divs., and the Sg. Sekai F.R. in the III Div.

### Dryobalanops Gaertn. f.

1. **Dryobalanops rappa** Becc.

*kapur paya.*

III Div.: Loba Kabang P.F. 753; IV Div.: Simalajau 263.

Large tree, 96–108 ins. g., occasional, locally frequent, in P.C.s 1 and 2. Occurs throughout Sarawak and Brunei in swamp and heath forests.

### Hopea Roxb.

1. **Hopea pentanervia** Sym.

*chengal paya, mang.*

III Div.: Loba Kabang P.F. 2729, A 121; V Div.: Kayangeran F.R. 1780.

Medium-sized tree, 24–36 ins. g., occasional in P.C.s 1 and 2. Occurs throughout Sarawak and Brunei and is one of the most sought after swamp species for its heavy durable timber; also a characteristic species of heath forest.

**Shorea Roxb.**

**1. Shorea albida Sym.**

*alan, meraka alan* (I, III Divs.), *empenit* (II Div.), *sengawan* (IV Div.), *seringawan* (Brunei).

III Div.: Loba Kabang P.F. 651, 2852, 2805, 2552, Daro F.R. 12250; IV Div.: Miri, Sg. Dua 2862, 2900.

Very large tree, 132–144 ins. g., over-mature trees may exceed 180 ins., very abundant and gregarious; the sole dominant over vast areas in P.C.s 2, 3 and 4. Extensive forests dominated by this species extend from the Sadong river in Sarawak to the Badas swamps in Brunei. One relatively small detached forest occurs in heath forest in the Sedilu F.R., and a few trees have been noted in the Tutong. A common species in certain heath forests.

**2. Shorea inaequilateralis Sym.**

*semayor*.

III Div.: Loba Kabang P.F. A30, A 144, 79319 (W.-S.).

Large tree, 96–108 ins. g., occasionally larger; has a rather limited distribution, being confined to a zone overlapping P.C.s 1 and 2, but is generally absent from P.C. 3 and from the coastal type of P.C. 1. Occurs from the Sadong in Sarawak to the Belait swamps in Brunei.

**3. Shorea longiflora (Brandis) Sym.**

*lun paya, barun paya* (Baram).

III Div.: Loba Kabang P.F. 2749, 9194.

Medium-sized tree, 48–60 ins. g., rare and local in peat-swamp forest; recorded in P.C. 1 from the Rejang Delta and Baram, but is known to occur elsewhere in L.D.F. and in heath forest.

**4. Shorea macrantha (Brandis) Sym.**

*engkabang bungkus, perawan lompong kijang* (I. Naman).

III Div.: Naman F.R. A 14, A 99, 9781.

Medium-sized to large tree, 60–72 ins. g., occasional and very local in peat-swamp forest. Confined to the inland margins of swamps in P.C. 1 and only recorded from Naman F.R., Setapok F.R. and Lingga. More frequently found as a riparian species and in certain types of heath forest. The fruit is a commercial illipe nut.

5. *Shorea pachyphylla* Ridley ex Sym.

*kerukup, urat mata.*

Brunei: Badas 1593.

Large tree up to 144 ins. g., occasional, locally frequent, in P.C. 1 but confined to inland margins of swamps; more common on podsolized soils of heath forests. Occurs in most coastal districts of Sarawak and Brunei, but is absent from the II and III Divs.

6. *Shorea platycarpa* Heim.

*meranti paya.*

II Div.: Triso 12853; III Div.: Naman F.R. A 32, Pulau Bruit 452.

Large tree, 108–120 ins. g., occasional in P.C. 1, especially on shallow peat near coast. Seedlings and saplings are liable to be confused with those of *Shorea rugosa* var. *uliginosa*; throughout Sarawak and Brunei, also occurs in heath forest.

7. *Shorea rugosa* Heim. var. *uliginosa* (Foxw.) Sym.

*meranti buaya.*

III Div.: Loba Kabang P.F. A145, 2858, Pulau Bruit 7908.

Very large tree, girths of over 144 ins. have been recorded, occasional, locally frequent, in P.C. 1. Easily identified by its incurved drooping leaves; throughout western and central Sarawak, but not yet recorded east of the Baram.

8. *Shorea scabrida* Sym.

*meranti lop.*

II Div.: Tj. Keranji 12409; III Div.: Loba Kabang P.F. 752, Naman F.R. A 19.

Large tree, 96–120 ins. g.; occasional but rather local in P.C. 1 throughout Sarawak and Brunei. Occurs more frequently in heath forest and also on ridges in L.D.F.

9. *Shorea teysmanniana* Dyer ex Brandis.

*meranti lilin.*

III Div.: Pulau Bruit 7907, Lepah P.F. 8077, Lassa 12419; IV Div.: Baram 3280.

Large tree, 108–132 ins. g., frequent in P.C. 1 in the Rejang Delta and Batang Lupar but rare in swamp forests of Brunei and Lawas; also occurs in heath forest.

**Vatica L.**

1. *Vatica mangachapoi* Blanco.

*resak paya.*

II Div.: Tj. Keranji 12878, Triso P.F. 3159; III Div.: Loba Kabang P.F. 511, Daro F.R. A 42, Narub F.R. 26; Brunei: Badas 2820.

Medium-sized tree, 48–60 ins. g., rather rare and usually confined to P.C. 1 but also recorded in P.C. 4 (Brunei); throughout Sarawak and Brunei in heath and peat swamp forests.

## MALVACEAE

### **Durio** Adans.

1. **Durio carinatus** Mast.

*durian burong, rian* (Mil.).

I Div.: Bako 1387; III Div.: Pulau Bruit 7920, Loba Kabang P.F. 425.

Large tree, 72–84 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

### **Neesia** Blume.

1. **Neesia malayana** Bakh.

*durian durian* (M. Lawas), *bengang*.

I Div.: Setapok F.R. 9853; V Div.: Kuala Lawas 9111.

Medium-sized to large tree, 48–60 ins. g., occasionally larger up to 9 ft. g., rare, locally frequent (Kuala Lawas), in P.C. 1. Recorded from only the two mentioned localities.

## STERCULIACEAE

### **Scaphium** Endl.

1. **Scaphium macropodum** (Miq.) Beumée.

*kembang semangkok*.

III Div.: Loba Kabang P.F. 2689.

Medium-sized tree, 48–60 ins. g., rare and localised in P.C. 1 near riparian fringe, but a common species in heath forest and L.D.F.

### **Sterculia** L.

1. **Sterculia bicolor** Mast.

III Div.: Lepah P.F. 8069, 8078.

Medium-sized tree, 36–48 ins. g., rare and local in P.C. 1 throughout Sarawak and Brunei.

2. **Sterculia macrophylla** Vent.

II Div.: Sabu F.R. 3207; III Div.: Loba Kabang P.F. 490.

Small tree, 18–30 ins. g., very rare in P.C. 2. Recorded from only the two mentioned localities.

3. **Sterculia rhoidifolia** Stapf ex Ridley.

*biris*.

II Div.: Sg. Tissak 3182; III Div.: Loba Kabang P.F. 879, 406; IV Div.: Sg. Dua 4118.

Small tree, 12–24 ins. g., occasional, locally frequent, in P.C. 4 throughout Sarawak and Brunei. Also occurs in heath forest.

## TILIACEAE

### **Elaeocarpus** Burm. ex L.

1. **Elaeocarpus beccarii** A. DC.

*beliban* (Mil. Oya).

I Div.: Setapok F.R. 4703; II Div.: Triso 3160, Sg. Tissak 3199; III Div.: Pulau Bruit 5120, 9265, 9022, Singat 9064, 9751, Lepah P.F. 8064; Brunei: Anduki F.R. 2241.

Small tree, 6–12 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

2. **Elaeocarpus griffithii** (Wight) Mast.

II Div.: Triso 4789, 12858, Saribas F.R. 8501, 9578; III Div.: Pulau Bruit 9250, 9009, 7905.

Small tree, 6–10 ins. g., occasional and localised in P.C. 1 on shallow peat near the coast especially in transitional zones from mangrove. Recorded from only the mentioned localities, but probably occurs throughout Sarawak and Brunei.

3. **Elaeocarpus mastersii** King.

IV Div.: Sg. Dua 4111, 3065.

Small tree, 9–15 ins. g., occasional in P.C.s 1–3, frequent in secondary forest following logging; throughout Sarawak and Brunei.

4. **Elaeocarpus obtusifolius** Merr.

*empedu, bangas* (Mil. Matu).

II Div.: Sg. Tissak 3192; III Div.: Pulau Bruit 9292, Loba Kabang P.F. 433, 492, 2733, 460, 2616; IV Div.: Sg. Dua 3058, 2889, 4175; V. Div.: Kayangeran F.R. 2849, 1557, 2026; Brunei: Anduki F.R. 2143.

Small to medium-sized tree, 18–36 ins. g., occasional, locally frequent, in P.C.s 1–4 throughout Sarawak and Brunei. Also occurs in heath forest.

### **Jarandersonia** Kostermans.

1. **Jarandersonia paludosa** Kosterm.

I Div.: Sg. Snibong, Lundu 6554.

Small tree, locally frequent in P.C. 1. Recorded only from this locality.

A new genus, reference *Reinwardtia*, Vol. 5, Part 3.

## LINACEAE

### **Ctenolophon** Oliv.

1. **Ctenolophon parvifolius** Oliv.

*temana'a* (Mil. Oya), *litoh, kriang* (I. Lassa).

II Div.: Tj. Keranji 12889, Saribas F.R. 8567, 8527; III Div.: Pulau Bruit 12897, 2649, 9245, 4969, 9040, Daro F.R. 9718, Loba Kabang P.F. 897, 462, 496, 465, Matu Daro P.F. 12260; V Div.: Kayangeran F.R. 4904.

Medium-sized tree, 36–48 ins. g., frequent in P.C. 1 throughout Sarawak and Brunei. In the forest this species is frequently confused with *ngilas paya* (*Parastemon urophyllum*).

Specimen in Kew: Herb. Maingay 382, Type—A.

### **Sarcotheca Bl.**

#### **1. *Sarcotheca glauca* (Hook. f.) Hallier f.**

II Div.: Triso 9798; III Div.: Pulau Bruit 2654, Lassa 12436; IV Div.: Baram 4115; Brunei: Berakas 2160.

Small tree, 12–15 ft. h., rare in P.C.s 1 and 2 throughout Sarawak and Brunei, also occurs in heath forest and on degraded soils.

## **RUTACEAE**

### **Tetractomia Hook. f.**

#### **1. *Tetractomia holttumii* Ridley.**

*rawang.*

II Div.: Lingga 9825, 4812, Triso P.F. 3158; III Div.: Pulau Bruit 2630, Daro F.R. 5210; IV Div.: Sg. Dua 3258, 3272; Brunei: Badas 2832.

Medium-sized tree, 24–36 ins. g., locally abundant in P.C. 3 in the Baram and frequent elsewhere; throughout Sarawak and Brunei; occurs in heath forest.

#### **2. *Tetractomia beccarii* Hook f.**

*rawang.*

I Div.: Setapok F.R. 358; II Div.: Triso 9792, Saribas F.R. 8504, 9579, Sg. Tissak 3189; III Div.: Loba Kabang P.F. 2667.

Medium-sized tree, 48–60 ins. g., occasional in P.C. 1 and confined to this forest type. Not yet recorded further east than the Rejang Delta.

Both species of *Tetractomia* are readily identified by their smooth yellowish bark and fragrant slash.

### **Luvunga Buch.—Ham.**

#### **1. *Luvunga motleyi* Oliv.**

III Div.: Daro F.R. 9063.

Small tree or erect shrub, 10–15 ft. h., rare in P.C. 1. Recorded from the Daro F.R., Loba Kabang P.F. and Setapok F.R. In Ridley's "Flora of Malaya" this species is stated to be a liane.



## SIMARUBACEAE

### Samadera Gaertn.

1. **Samadera indica** Gaertn.

*kelapahit* (M. and Mil.).

II Div.: Triso 12214; III Div.: Lepah P.F. 8090, Naman F.R. 9185, Loba Kabang P.F. 700.

Small tree, rarely exceeding 12 ins. g., and frequently little more than an erect shrub, rare in P.C. 1. Recorded from Batang Lupar, Rejang Delta and Bintulu but probably occurs throughout Sarawak and Brunei.

The timber is sought after for use as handles for parangs and knives.

### Quassia L.

1. **Quassia borneensis** Nooteboom (msc.)

*medang pahit, pelai pahit.*

III Div.: Loba Kabang P.F. 2697, 413, 891, Lassa 15951.

Medium-sized tree, 48–60 ins. g. with very distinctive compound leaves; occasional and local in P.C.'s 1 and 2 in the Rejang Delta. Also occurs in L.D.F. (Semengoh F.R.).

Previous sterile collections were identified as *Parishia*, matching sterile collections 29.570, and 29.122 (Buwalda), and 25.744 (Mol) from Sumatra. A recent (1962) fertile collection (15951) matches SAN 20499 which has been found to be a new species in the Afro-American genus *Quassia*.

## OCHNACEAE

### Euthemis Jack.

1. **Euthemis obtusifolia** Hook. f.

*rumput bintangor.*

III Div.: Loba Kabang P.F. 1592, 79332 (W.-S.); IV Div.: Baram 2882.

Prostrate shrublet with creeping habit, frequent, locally abundant (Rejang Delta), in P.C. 4 throughout Sarawak and Brunei.

Specimen in Kew: Herb. Hook. unno., colld. 1867, Type—A.

2. **Euthemis leucocarpa** Jack.

*mata tewop* (I.).

II Div.: Triso 10016, Saribas F.R. 8569, 9014; III Div.: Pulau Buit 9014, Lassa 11713.

Small erect shrublet, 4–8 ft. h., rare in P.C.s 1, 2 and 3. Recorded in peat swamps from only II Div. and the Rejang Delta. Fruit used in preparation of an eye medicine.

**Brackenridgea**1. **Brackenridgea hookeri** Planch.

I Div.: Lundu 9148; II Div.: Saribas F.R. 8516; IV Div.: Baram 3054.

Small tree, 9–18 ins. g., rare in P.C. 1 from Lundu to Baram. Not yet recorded from Brunei or V Div., but probably occurs throughout the two territories.

**Tetramerista** Miq.1. **Tetramerista glabra**. Miq.

*entuyut, kayu hujan.*

I Div.: Satapok F.R. 4780; III Div.: Pulau Bruit 802, 9038, 9035, 9283, 9233, Sg. Nangar 12301.

Large tree, 96–108 ins. g., rare, locally occasional in P.C. 1 throughout Sarawak and Brunei. Also occurs in heath forest and on degraded soils.

Specimens in Kew: 872, 1836 (*Haviland*), Flora of Sarawak 380.

**BURSERACEAE****Dacryodes** Vahl.1. **Dacryodes incurvata** (Engl.) H. J. Lam.

III Div.: Sg. Kelapa'an A 78, Pulau Bruit 2650.

Small to medium-sized tree, 24–36 ins. g., rather rare and localised in P.C. 1. Recorded only from the Batang Lupar and Rejang Delta.

2. **Dacryodes macrocarpa** (King) H. J. Lam var. **macrocarpa**.

*kayu tunjang* (I. Lupar).

II Div.: Triso 3105, 3111, 3108, 14501; III Div.: Lepah P.F. 8091, Sg. Nangar 12327.

Small tree, 12–24 ins. g., occasional and localised in P.C. 1 on shallow peat near coastal and riparian margins of swamps. Recorded from the Batang Lupar and Rejang Delta.

**Santiria** Blume.1. **Santiria laevigata** Bl. forma **laevigata**.

*kemayan* (I.), *seladah* (Mil.).

III Div.: Loba Kabang P.F. 494, Pulau Bruit 2625, 9223, Sg. Nangar 12305; V Div.: Kayangeran 1564.

Small to medium-sized tree, 24–36 ins. g., occasional in P.C. 2 throughout Sarawak and Brunei; also occurs in heath forests.

2. **Santiria rubiginosa** Bl. var. **rubiginosa**.

*seladah* (Mil.).

II Div.: Triso 3102; III Div.: Loba Kabang P.F. 898, 450, 475, 2703, Pulau Bruit 9204, Naman F.R. 676

Small to medium-sized tree, 24–36 ins. g., occasional, locally frequent, in P.C. 2 throughout Sarawak and Brunei.

3. **Santiria rubiginosa** Bl. var.

II Div.: Triso P.F. 14513; III Div.: Loba Kabang 869, 2754; IV Div.: Baram 4177, 3255, 3256; Brunei: Badas 2040.

Small tree, 12–24 ins. g., occasional in P.C.s 1–3 throughout Sarawak and Brunei.

This species was previously determined as *S. griffithii* Engl.

4. **Santiria tomentosa** Bl.

*seladah, soya bulu.*

I Div.: Sedilu F.R. 9566, Lundu 9776; II Div.: Triso 3202; III Div.: Pulau Bruit 9216, Lepah 8076; IV Div.: Sg. Dua 3270

Small tree, 12–24 ins. g., occasional in P.C. 2, especially near coast; throughout Sarawak and Brunei. Also recorded in L.D.F.

## MELIACEAE

### **Amoora** Roxb.

1. **Amoora rubiginosa** Hiern (*Aglaia ignea* Valetton ex K. Heyne).

*jelungan sasak, bersangai* (Mil.), *chenaga dayong* (I.).

II Div.: Triso 9807; III Div.: Daro F.R. A 101, A 20, Pulau Bruit 9807, 9018, 9243, 9734, Naman F.R. 9177, 9169, Matu, Daro P.F. 12257, 12308; IV Div.: Sg. Dua 4185; V Div.: 4916.

Very distinctive tree, 48–60 ins. g., occasional in P.C. 1 and rare in P.C. 2 throughout Sarawak and Brunei. This species is easily recognised in the field by its cream coloured pock-marked bark and crown with large compound pinnate leaves.

The specimens are an identical match with the type of *Aglaia ignea*, which is presumed to be a synonym.

### **Chisocheton** Bl.

1. **Chisocheton brachyanthus** Merr.

*bua 'pesa kanan* (Mil.).

III Div.: Matu Daro P.F. 12258, Pulau Bruit 9260, 9269, 9003, Lepah P.F. 8087, Loba Kabang P.F. 670 IV Div.: Lubok Pasir 4161.

Small tree of understorey, 6–12 ins. g., occasional in P.C. 1 from Batang Lupar to Baram, but not yet recorded from Brunei or V Div.

### **Sandoricum** Cav.

1. **Sandoricum emarginatum** Hiern.

*kelampu, apau* (Mil. Rejang).

III Div.: Matu Daro P.F. 12263, 12303, Lassa 12418, Daro F.R. 5234, 9711, A 107, Lepah P.F. 8075, Loba Kabang P.F. 2665, 2756.

Large tree, 108–120 ins. g., rare, locally occasional, in P.C. 1 throughout Sarawak and Brunei.

The fruit is edible, though rather tasteless.

## OLACACEAE

### **Anacolosa** Blume.

1. **Anacolosa frutescens** Bl. (*Anacolosa arborescens* K. and V.)

III Div.: Lepah P.F. 8065, Loba Kabang P.F. 2675, Daro F.R. 5237, 5215, Naman F.R. 11718, 14585.

Small tree, 18–24 ins. g., rare in P.C. 1 Recorded in peat swamp forests from only the Rejang Delta, but occurs in L.D.F. in Brunei.

Specimens are an identical match with unnamed specimen 2950 (*Haviland*).

### **Gomphandra** Wall.

1. **Gomphandra** aff. **comosa** King.

II Div.: Triso P.F. 3116, 14502, Saribas F.R. 8517; III Div.: Pulau Bruit 7914; IV Div.: Sg. Dua 4189.

Small tree, 12–20 ins. g., rare in P.C. 1 from Batang Lupar to Baram.

### **Platea** Bl.

1. **Platea excelsa** Bl.

II Div.: Saribas F.R. 8404, Triso 9796; III Div.: Loba Kabang P.F. 2688; IV Div.: Baram 2894; V Div.: Kayangeran F.R. 1774.

Small tree, 12–24 ins. g., occasionally larger, rare in P.C. 1 throughout Sarawak and Brunei. Distinctive features are the fragrant slash and numerous spreading stilt roots.

### **Stemonurus** Bl.

1. **Stemonurus scorpioides** Becc.

*jerumit* (Mil.), *semburok* (M.), *entaburok* (I.).

III Div.: Pulau Bruit 9020, 7932, Loba Kabang P.F. 699, 79321 (W.-S.), 2770.

Medium-sized tree, 48–60 ins. g., occasional, locally frequent in P.C.s 1 and 2 in the Rejang Delta, but absent in peat swamps elsewhere in Sarawak, though recorded on terraces in Brunei.

2. **Stemonurus umbellatus** Becc.

*semburok* (M.), *jerumit* (Mil.), *entaburok* (I.).

II Div.: Lingga 4810, Saribas F.R. 8543; III Div.: Pulau Bruit, 9006, 9259, 9247, Daro F.R. 9712, Loba Kabang P.F. 2785, 2786, 518, 539; IV Div.: Sg. Dua 2868; Brunei: Badas 2829.

Small tree, 12–24 ins. g., frequent in P.C.s 1 and 2 throughout Sarawak and Brunei; also of frequent occurrence in heath forest

## ILICINACEAE

### *Ilex* (Tourn.) L.

1. *Ilex hypoglauca* (Miq.) Loes.

*mungkulat, kerdam.*

II Div.: Triso 3153, 3161, Saribas F.R. 8536; III Div.: Daro F.R. 9760, Naman F.R. 9178; IV Div.: Baram, Sg. Dua 3271; V. Div.: Kayangeran F.R. 2848; Brunei: Badas 2825.

Small tree, 12–20 ins. g., locally frequent in P.C.s 1–3; throughout Sarawak and Brunei, also occurs in heath forest.

2. *Ilex sclerophylloides* Loes.

*mungkulat, kerdam.*

II Div.: Saribas F.R. 8405, Triso P.F. 14538; III Div.: Loba Kabang P.F. 2857, Pulau Buit P.F. 7919, 9011; IV Div.: Baram, Sg. Dua 2865, 2896, Lubok Pasir 8400; Brunei: Badas 2857.

Small tree, 9–15 ins. g.; occasional, locally frequent, in P.C.s 4 and 5; throughout Sarawak and Brunei. These two species may be confused in the field. The larger leaves with glaucous undersurface serve to distinguish *I. hypoglauca*.

## CELASTRACEAE

### *Bhesa* Arn.

1. *Bhesa paniculata* Arn. (*Kurrimia minor* Ridl.)

*tekam keladi.*

II Div.: Triso 8942, Saribas F.R. 8558; III Div.: Lassa P.F. A 45, Loba Kabang P.F. 417, Pulau Buit 9041, 9230.

Medium-sized tree, 24–36 ins. g., rather rare but widespread in P.C. 1 throughout Sarawak and Brunei; also found in heath forests.

### *Kokoona* Thw.

1. *Kokoona ovato-lanceolata* Ridl.

*bajan tulang* (I. Assam), *badang* (M.), *bajan* (Mil.), *masabong* (I. Lassa), *dian* (I. Marudi).

III Div.: Pulau Buit 9291, 7910, Igan A 58, Loba Kabang P.F. 2699; IV Div.: Baram 3285, Marudi F.R. 1485; V Div.: Kayangeran F.R. 4902.

Medium-sized tree, 48–60 ins. g., rare in P.C.s 1 and 2 throughout Sarawak and Brunei; also in heath forest.

### *Lophopetalum* Wight ex Arn.

1. *Lophopetalum multinervium* Ridley.

*perupok, dual* (M. Lawas).

II Div.: Simanggang 9435; III Div.: Pulau Buit 803, 12233, 451; IV Div.: Baram 1264, 934; V Div.: Lawas 1512.

Large tree, 84–96 ins. g., occasional and local; generally confined to coastal perimeter of P.C. 1; throughout Sarawak and Brunei.

2. **Lophopetalum rigidum** Ridley.

*bajan perupok* (I. Naman), *perupok*.

III Div.: Loba Kabang P.F. 2608, 663.

Medium-sized tree, 36–48 ins. g., very localised; recorded only in the Rejang Delta where it is abundant in P.C.s 2 and 3 and frequent in P.C. 4.

Specimen in Kew: 2236 (*Haviland*)—A.

## RHAMNACEAE

### **Zizyphus** Tourn. ex L.

1. **Zizyphus suluensis** Merr.

III Div.: Lepah P.F. 8095.

Climbing shrub, occasionally with upright habit, rare in primary P.C. 1 but becoming abundant in open secondary swamp forest. Occurs throughout Sarawak and Brunei.

## AMPELIDACEAE (VITACEAE)

### **Ampelocissus** Planch.

1. **Ampelocissus thyrsoflora** (Miq.) Planch.

II Div.: Saribas 8509.

Small climber with attractive mauve foliage, rare but widely distributed in understorey of P.C. 1; through Sarawak and Brunei. Also occurs in heath forest.

### **Cissus** L.

1. **Cissus** sp. (10013).

II Div.: Maludam Peninsula 10013.

Distinctive small climber, rare in understorey of P.C. 1; throughout Sarawak and Brunei. Only sterile collections have been made.

### **Tetrastigma** Planch.

1. **Tetrastigma** sp. (12420).

III Div.: Lassa P.F. 12420, Pulau Bruit 9241, 12899, Surong Irit 5225; IV Div.: Baram 3287; V Div.: Lawas 5225.

Climber to height of 60 ft., occasional and widely distributed in P.C. 1; throughout Sarawak and Brunei.

## SAPINDACEAE

### **Nephelium** L.

1. **Nephelium maingayi** Hiern.

*serait, buah serait.*

II Div.: Triso 12857; III Div.: Surong Irit 5203, 9710, Loba Kabang P.F. 2737, 489, 852, Pulau Bruit 2637; V Div.: Kayangeran F.R. 1563.

Medium-sized tree, 36–48 ins. g., frequent in P.C. 1 throughout Sarawak and Brunei. Also recorded from heath forests.

### **Pometia** Forst.

1. **Pometia pinnata** Forst. forma **acuminata** (Hook f.) Jacobs.

*kasai* (M.), *repangah* (Mil. Daro).

I Div.: Setapok F.R. 2469; III Div.: Igan 686, Loba Kabang P.F. 2621, 2672, Singat 9732.

Tree, 24–36 ins. g., frequent and localised on shallow peat in P.C. 1 near coastal margins of swamps. A smaller form, 6–10 ins. g., is found near inland margins of peat swamps where it flowers and fruits as a small tree, 6–10 ins. g., in the understorey.

### **Xerospermum** Blume.

1. **Xerospermum muricatum** (Griff.) Radlk.

*tundum biawak* (Mil.), *buah laup*.

II Div.: Triso P.F. 9801, 3113, Saribas F.R. 8556, 8521; III Div.: Sg. Nangar 12255, 12311, Loba Kabang P.F. 2700, Pulau Bruit 9240, 2646, 9007, Lassa P.F. 12435; IV Div.: Sg. Dua 4116, 4152; V Div.: Kayangeran F.R. 1554; Brunei: Badas 2140.

Small tree, 12–24 ins. g., frequently smaller, occasional in P.C. 1 throughout Sarawak and Brunei, also recorded in L.D.F. in Brunei.

Fruit edible, rather similar in taste to the cultivated *rambutan*.

## ANACARDIACEAE

### **Androtium** Stapf.

1. **Androtium astylum** Stapf.

*merambang* (Iban).

III Div.: Loba Kabang P.F. 2613, 2735, 443, 2720.

Small tree, 12–24 ins. g.; occasional in P.C. 4 in Rejang Delta and Baram.

The only closely matching specimen seen is 7939 (*Koster-mans*) from Borneo.

**Buchanania Spreng.**

1. **Buchanania arborescens** Bl. var. **florida**.

III Div.: Loba Kabang P.F. 859; IV Div.: Sungei Dua 4155.

Small tree, 18–24 ins. g., rare and confined to P.C. 1. As yet only recorded from the Rejang Delta and Baram, but occurs as a riparian tree in Brunei. Only sterile collections have been made.

**Camptosperma Thw.**

1. **Camptosperma coriacea** (Jack) Hallier f. ex v. Steenis.

*terentang*.

III Div.: Loba Kabang P.F. 861, Pulau Bruit P.F. 8011, 9209; IV Div.: Miri 1413.

Conspicuous large tree, 72–84 ins. g.; occasional in P.C. 1, locally abundant near coastal margin of peat swamps, also occurs locally in P.C. 4; throughout Sarawak and Brunei.

2. **Camptosperma montana** Lauterbach (*C. squamatum* Ridley et *C. minus* Corn.).

*terentang*.

III Div.: Loba Kabang P.F. 2686, 667, 691, 2790, 537, 2686; IV Div.: Sg. Dua 2897.

Small tree, 12–24 ins. g., occasional and local in P.C.s 1–3 in the Rejang Delta and Baram.

Specimen in Kew: 3196 (*Haviland*) Type—A.

**Mangifera L.**

1. **Mangifera havilandi** Ridley.

*buah raba* (M.).

III Div.: Loba Kabang P.F. 2713, 513, 464.

Small tree, 12–24 ins. g., rare and local in P.C. 1. Recorded in peat swamp forest in only the Loba Kabang P.F., but also noted in heath forest in Setapok F.R. (I Div.) and Brunei.

The exceptionally long petioles are distinctive.

Specimen in Kew: 3368 (*Haviland*), Type—A.

**Melanorrhoea Wall.**

1. **Melanorrhoea beccarii** Engl.

*rengas paya*.

III Div.: Loba Kabang P.F. 418, 481, 666, 7289, 495, 499, 885, Sungei Retus A 57, Lassa 12434.

Large tree, 120–132 ins. g., frequent in all forest types, except P.C.s 5 and 6, near inland margin of peat swamps, but absent or very rare in coastal swamps; throughout Sarawak and Brunei, also occurs in heath forest.

Specimen in Kew: 1484 (*Beccari*), Type—A.



2. *Melanorrhoea tricolor* Ridley.

*rengas paya.*

II Div.: Lingga 5316; III Div.: Daro F.R. 9758, Loba Kabang P.F. 754, 2788, 668, 422, Lassa 12433, Naman 9758.

Large tree, 120–132 ins. g., occasional in all forest types near inland margin of peat swamps, except P.C.s 5 and 6, but absent or very rare in coastal swamps except in Tatau P.F. Distribution is confined to II and III Divs., and Bintulu District of IV Div.

This species is often confused with *Melanorrhoea beccarii*. On field characters they are almost identical but the slightly larger and more coriaceous leaves with more pronounced venation, especially in immature leaves, distinguishes this species.

Specimen in Kew: 2231 (*Haviland*), Type—A.

3. *Melanorrhoea speciosa* Ridley.

*rengas bulu.*

II Div.: Tj. Keranji 12883; III Div.: Loba Kabang P.F. 2710, 2787.

Medium-sized tree, 60–72 ins. g.; rare in P.C.s 1 and 2. Recorded in peat swamps from the Rejang Delta and Saribas and in heath forest in Brunei.

Specimen in Kew: 3247 (*Haviland*), Type—B.

*Parishia* Hook. f.

1. *Parishia insignis* Hook. f.

*upi paya.*

II Div.: Triso 9802, 12862, 3117, Tj. Keranji, 12249, 12885, Lingga 5315.

Large tree, up to 96 ins. g., similar in habit and habitat to *P. sericea* but recorded only from the Maludam Peninsula in II Div. It may be easily distinguished by the longer leaflets with more pronounced midrib and venation.

2. *Parishia sericea* Ridley.

*upi paya, rengas susu.*

III Div.: Loba Kabang P.F. 471, 2751, A 76; IV Div.: Bintulu 262; V Div.: 1772.

Very large tree, 120–132 ins. g., with large ascending buttresses to a height of 12 ft. or more. Occasional, locally frequent, in P.C. 1; throughout Sarawak and Brunei.

*Swintonia* Griff.

1. *Swintonia glauca* Engl.

*petoh, selan petoh, tilong, sikat* (Mil.).

III Div.: Loba Kabang P.F. 886, 2607, 665, 421, 660, Oya Mukah P.F. A 184, Lassa 12429.

Medium-sized tree, 60–72 ins. g., with characteristic, very smooth, pinkish brown bark. Frequent and local in P.C.s 1 and 2 towards the inland margin of swamps. Recorded only from the Rejang Delta and Mukah District in peat swamps, though known to occur elsewhere in heath forests.

Specimens in Kew: 366, Type, 1085 (*Beccari*)—A.

## CONNARACEAE

### Connarus L.

1. *Connarus semidecandrus* Jack.

III Div.: Pulau Bruit 7944, 7922; IV Div.: Sg. Dua 4193.

Twining climber or scandent shrub frequent in understorey of P.C. 1 throughout Sarawak and Brunei.

### Ellipanthus Hook. f.

1. *Ellipanthus tomentosus* Kurz. ssp. *tomentosus*.

*kelin* (Mil. Matu).

III Div.: Daro F.R. 5238, 9721, Pulau Bruit 9275, 9294.

Small tree, 4–12 ins. g., rare and local in P.C. 1. Recorded from only the Rejang Delta.

### Rourea Aubl.

1. *Rourea mimosoides* (Vahl) Planch. forma *mimosoides* Leenhouts.

II Div.: Triso 10022.

Distinctive medium-sized climber, occasionally attaining crowns of dominants, occasional in P.C. 1 throughout Sarawak and Brunei.

No fertile specimens have yet been collected.

## LEGUMINOSAE

(Sub-family *Caesalpinaceae*)

### Copaifera

1. *Copaifera palustris* (Sym.) De Wit.

*sepetir paya*, *petir paya*, *tepih* (Mil.).

II Div.: Sg. Tissak 3193, Saribas F.R. 8565; III Div.: Pulau Bruit 453, 2624, 501, 454, A 27, Loba Kabang P.F. 2779, Daro F.R. 5219; IV Div.: Miri 1210.

Large tree, 84–96 ins. g., occasional, locally frequent, in P.C.s 1 and 2 throughout Sarawak and Brunei.

### Dialium L.

1. *Dialium laurinum* Baker.

*keranji paya* (M. and I.), *cham* (Mil. Oya).

II Div.: Triso P.F. 3104; III Div.: Lepah P.F. 8073, Daro F.R. 9743, Loba Kabang P.F. 757, 2725, A 80, 491.

Medium-sized tree, 48–60 ins. g., rather rare in P.C. 1; throughout Sarawak and Brunei.

### **Koompassia Maing.**

#### 1. **Koompassia malaccensis** Benth.

*menggris.*

II Div.: Triso P.F. 9804.

Very large tree, 108–144 ins. g., one of the giants of peat swamp forest, occasional and usually rather localised near coastal perimeter of P.C. 1, throughout Sarawak and Brunei. Also occurs in heath forest and on ridges and terraces.

### **Phanera Lour.**

#### 1. **Phanera moultonii** (Merr.) De Wit var. **moultonii**.

II Div.: Simanggang 14573.

Medium-sized climber, occasionally reaching upper canopy, rare in P.C.s 1 and 2, throughout Sarawak and Brunei. Occurs more frequently in heath forests.

### **Sindora Miq.**

#### 1. **Sindora leiocarpa** Backer ex K. Heyne.

*tapar hantu.*

III Div.: Sg. Empawah A 111, Loba Kabang P.F. 529, 424, Pulau Bruit A 4, 7911.

Tree, 24–36 ins. g., but individuals up to 50 ins. g., have been recorded, occasional in P.C. 1 throughout Sarawak and Brunei. Also recorded in heath forest.

## **LEGUMINOSAE**

(Sub-family **Mimosaceae**)

### **Adenanthera Linn.**

#### 1. **Adenanthera pavonina** Linn.

*saga.*

III Div.: Loba Kabang P.F. 900; V Div.: Kayangeran F.R. 4909.

Tree, 20–30 ins. g., rare in P.C. 1 throughout Sarawak and Brunei

### **Parkia R. Br.**

#### 1. **Parkia singularis** Miq.

III Div.: Loba Kabang P.F. 8889 (Brooke), 2705, Pulau Bruit 8051.

Medium-sized tree, 48–60 ins. g., rare and localised in P.C.  
1. Recorded from the Rejang Delta and Batang Lupar in peat swamps but also occurs in heath forest.

**Pithecellobium Mart.**

1. **Pithecellobium borneense Benth.**

*jiring paya, petai belalang.*

III Div.: Lepah P.F. 8097, Pulau Bruit 9008, 9253, Loba Kabang P.F. 414; IV Div.: Sg. Dua 4163, 2864; Brunei: Badas 2838.

Small tree of the understorey, 9–15 ins. g., occasional, locally frequent, in P.C.s 1–3 throughout Sarawak and Brunei; also occurs in heath forest.

**ROSACEAE**

**Parastemon A. DC.**

1. **Parastemon spicatum Ridley.**

*ngilas padang.*

II Div.: Sg. Tissak 3190, 3151; III Div.: Pulau Bruit 9056, Loba Kabang P.F. 440, 658; IV Div.: Lobok Pasir 9885, 8497, Sg. Dua 3276, 4169, 2898; Brunei: Badas 2833, 2816; V Div.: Lawas 1511.

Small to medium-sized tree, 24–36 ins. g., occasionally larger, abundant in P.C.s 4–6 throughout Sarawak and Brunei; also one of the commonest small trees of heath forests.

Specimens of this species are frequently confused with *P. urophyllum*.

2. **Parastemon urophyllum A. DC.**

*ngilas, mendailas (Brunei).*

II Div.: Triso 9803; III Div.: Sg. Nangar 12306, Loba Kabang P.F. 423.

Large tree, 72–84 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

**Pygeum Gaertn.**

1. **Pygeum parviflorum Teijsm and Binn.**

*enteli (I.), akil (Mil. Rejang).*

II Div.: Saribas 12402, 12879; III Div.: Daro F.R. 12437, Loba Kabang P.F. 2602, 2731, 2778, 426; IV Div.: Baram 4173.

Small tree, 12–18 ins. g., frequent in P.C.s 3 and 4 in the Rejang Delta and rare in Baram; throughout Sarawak and Brunei.

## RHIZOPHORACEAE

### **Carallia** Roxb.

1. **Carallia brachiata** (Lour.) Merr.

*rabong* (Mil.).

III Div.: Sg. Nangar 12256, Pulau Bruit 9050, 9286, 2640, 8021, Lepah P.F. 8085; V Div.: Lawas 9116.

Small tree, 12–24 ins. g., occasional in P.C. 1, and generally confined to coastal margin; throughout Sarawak and Brunei. Also occurs in heath forest.

### **Combretocarpus** Hook. f.

1. **Combretocarpus rotundatus** (Miq.) Dans.

*keruntum, perepat paya.*

II Div.: Sabu F.R. 3206; III Div.: Pasai A 126, Lassa P.F. A 9, Loba Kabang P.F. 9067.

Medium-sized to large tree, 72–84 ins. g., frequent, locally abundant, in P.C.s 2–6. It is the dominant species of P.C. 6, where it occurs as a small stunted tree, 12–30 ins. g., and 20 to 40 ft. h. Occurs throughout Sarawak and Brunei, and is also a characteristic species of many heath forests.

Specimen in Kew: Unno. Herb. Hook. Type—A.

## MYRTACEAE

### **Barringtonia** Forst.

1. **Barringtonia gitingensis** Elm.

*putat paya.*

III Div.: Surong Irit 5201, Naman F.R. 9184.

Small tree, 6–12 ins. g., rare in understorey of P.C. 1. Recorded in peat swamps from only the Rejang Delta, but occurs in L.D.F. in Brunei.

### **Eugenia** Mich. ex L.

1. **Eugenia cerina** Hend.

III Div.: Loba Kabang P.F. 2612, 2766; IV Div.: Bakong 3265, 4154; Brunei: *Badas* 2856.

Small tree, 18–36 ins. g., with distinctive coriaceous glossy foliage, occasional in P.C. 4 in the Rejang Delta, Baram and Brunei.

2. **Eugenia christmannii** Merr. & Perry.

III Div.: Naman F.R. 675, Surong Irit 9703, Loba Kabang P.F. 856, 2708, 532, 876, Pulau Bruit 2623, 9276; Brunei: *Badas* 2855.

Medium-sized tree, 36–48 ins. g., occasional in P.C. 1 and 2; throughout Sarawak and Brunei.

3. *Eugenia* aff. *havilandii* Merr.

II Div.: Triso P.F. 3166, 3103, 12866, 3204, Saribas F.R. 8555; III Div.: Pulau Bruit 4966, 3258, 9251, 7902, 4968, 9023, 2659, 9207, 2658, 9274, 5153, Loba Kabang P.F. 467, 2741, Matu Daro P.F. 12318, 12253.

Small to medium-sized tree, occasional in P.C. 1 in Batang Lupar and the Rejang Delta. Recorded in heath forest in Brunei.

4. *Eugenia incarnata* Elm.

II Div.: Triso P.F. 3203, Sg. Tissak 3191, Loba Kabang P.F. 2763, 438, 864, Pulau Bruit 7913; IV Div.: Sg. Dua 3278, 3170, 2890; V Div.: Lawas 2017.

Medium-sized tree, 36–48 ins. g., occasional, locally frequent, in P.C.s 1 and 2; throughout Sarawak and Brunei.

5. *Eugenia lineata* Duthie.

I Div.: Setapok F.R. 9577; III Div.: Singat 9746, Pulau Bruit 4972.

Small to medium-sized tree, 24–36 ins. g., rare in P.C. 1; recorded from Setapok F.R. and Rejang Delta.

6. *Eugenia* aff. *luzonensis* Merr.

II Div.: Saribas F.R. 8502; III Div.: Pulau Bruit 9004, 8020, 9270.

Small tree, 12–18 ins. g., occasional in P.C. 1 close to coastal perimeter of swamps, on shallow peat transitional from mangrove. Recorded from the Rejang Delta and Saribas.

7. *Eugenia nemestrina* M. R. Hend.

*ubah jankar.*

II Div.: Triso P.F. 12860, 3186; III Div.: Loba Kabang P.F. 2717, 461, Naman F.R. 682, Surong Irit 9705; IV Div.: Sg. Dua 4175.

Medium-sized tree, 48–60 ins. g., occasional in P.C.s 1 and 2; throughout Sarawak and Brunei. A distinctive species with conspicuous stilt roots.

8. *Eugenia spicata* Lamk. (*Eugenia zeylanica* (L.) Wight).

II Div.: Ng. Skrang, 9821; III Div.: Loba Kabang P.F. 409, 2727, 1594, Pulau Bruit 9263; IV Div.: Bintulu 9891; V Div.: Kuala Lawas 9115.

Small to medium-sized tree, 36–48 ins. g., occasional in P.C. 1 especially near the coast, where it flowers and fruits as a small tree 10–15 ft. h. Occurs throughout Sarawak and Brunei.

9. *Eugenia verticilligera* Rid.

II Div.: Triso 9791; III Div.: Loba Kabang P.F. 2715, 2711.

Medium-sized tree, 48–60 ins. g., occasional in P.C. 1 in the Rejang Delta.

10. *Eugenia* sp. (2615).

*ubah padang*.

III Div.: Loba Kabang P.F. 2615, 1595.

Small tree, 12–24 ins. g., with distinctive foliage, occasional in P.C. 4 in the Rejang Delta and Baram. Occurs in heath forest in Brunei.

11. *Eugenia* sp. (479).

III Div.: Loba Kabang P.F. 479, 2738, 2732, 883; V Div.: Kayangeran F.R. 2850.

Small tree, 18–36 ins. g., rare in P.C. 1 and recorded from only the two mentioned localities.

12. *Eugenia* sp. (2822).

*kelat jambu* (M. Brunei).

V Div.: Kayangeran F.R. 4903; Brunei: Badas 2822.

Small tree, 12–24 ins. g., rare in *sempilor* forests of Lawas District and abundant in P.C. 4 at Badas, Brunei. Recorded from only northern Sarawak and Brunei, where it also occurs in heath forest.

*Tristania* R. Br.

1. *Tristania grandifolia* Ridley.

*tekoyong-tekoyong* (M. Lawas), *jinggau* (I.).

II Div.: Triso P.F. 14572; III Div.: Loba Kabang P.F. 2695; V Div.: Kayangeran F.R. 1555, 1797.

Medium-sized tree, 24–36 ins. g., occasional in P.C.s 1 and 2, and abundant in Lawas swamps. Occurs throughout Sarawak and Brunei.

Specimen in Kew: 2489 (*Beccari*), Type—A.

2. *Tristania* aff. *maingayi* Duthie.

*selunsor*.

II Div.: Triso P.F. 3171, 14561; IV Div.: 9880, 4161.

Medium-sized tree, 24–36 ins. g., frequent, locally abundant in P.C.s 4 and 5. Recorded in swamps only from Batang Lupar and Baram; absent from extensive pole forests in the Rejang Delta. A common species in heath forests.

3. *Tristania obovata* R. Br.

*selunsor*.

II Div.: Triso P.F. 3172; III Div.: Loba Kabang P.F. 656, 446.

Medium-sized tree, 48–60 ins. g., frequent, locally abundant, in P.C.s 4 and 5 throughout Sarawak and Brunei; also occurs in heath forest and on degraded soils.

Specimen in Kew: 1955 (*Haviland*)—B.

MELASTOMACEAE

**Dactylocladus** Oliv.

1. **Dactylocladus stenostachys** Oliv.

*jongkong, medang jongkong, merebong* (Bintulu), *medang tabak* (Brunei).

II Div.: Saribas F.R. 8541; III Div.: Lepah P.F. 8074, Sg. Retus A 18, Loba Kabang P.F. 1596, Naman F.R. 673, A 6, 9174, Pulau Bruit 9261, 9017, Matu Daro P.F. 12269; IV Div.: Sg. Dua 2879, 4191; V Div.: Kayangeran F.R. 2031.

Very large tree, girths exceeding 168 ins. have been recorded. One of the most characteristic species of swamp forest. The only species that is represented in all communities; throughout Sarawak and Brunei.

Specimen in Kew: 3272 (*Beccari*) Type, 2916 (*Haviland*)—A.

**Kibessia** DC.

1. **Kibessia coriacea** Cogn.

III Div.: Loba Kabang P.F. 2606, 2806.

Small tree, 12–24 ins. g., rare and local in P.C. 2. Recorded from the Loba Kabang P.F. and Naman F.R. in the Rejang Delta.

Specimens in Kew: 3324 (*Beccari*) Type, *dmrc*, 972, 1753 (*Haviland*)—A.

**Medinilla** Gaud.

1. **Medinilla hasseltii** Bl.

III Div.: Loba Kabang P.F. 2814.

Creeper, locally abundant in P.C. 4 in the Rejang Delta and Baram.

Specimens in Kew: 4167, *cllq* (*Haviland*)—B.

2. **Medinilla laxiflora** Ridley.

II Div.: Sg. Tissak 3195, Saribas F.R. 8535; III Div.: Naman F.R. 8951, Pulau Bruit 8025, Lepah P.F. 8098.

Epiphyte on small trees or poles, between heights of 3 and 15 ft. from ground, frequent in P.C. 1; throughout Sarawak and Brunei.

3. **Medinilla scandens** King.

III Div.: Loba Kabang P.F. 2810, 79331 (W.-S.).

Small creeper, frequent on pneumatophores, buttresses and protruding roots in P.C. 1. Recorded from the Rejang Delta and Batang Lupar.



4. *Medinilla* sp. (2029).

III Div.: Rantau Panjang 9867, Naman F.R. 12442; V Div.: Kayangeran F.R. 2029.

Epiphytic shrub, rare in P.C. 1. Recorded from the Rejang Delta, Brunei and Lawas.

5. *Medinilla* sp. (9025).

III Div.: Pulau Bruit 9025, Daro F.R. 9724; IV Div.: Sg. Dua 4122.

Epiphyte or epiphytic shrub in understorey of P.C. 1. Recorded from the Rejang Delta and Baram.

**Marumia** Bl.

1. *Marumia nemorosa* Bl.

III Div.: Naman F.R. 9765.

Climber in understorey of P.C. 1. Recorded from only the one locality.

**Pogonanthera** Bl.

1. *Pogonanthera pulverulenta* Bl.

II Div.: Simanggang 9430, Triso P.F. 12220; III Div.: Daro F.R. 9723, Pulau Bruit 7916.

Epiphytic shrub at heights of from 3 to 15 ft. in understorey of P.C. 1. Occurs throughout Sarawak and Brunei.

## CUCURBITACEAE

**Bryonopsis** Arn.

1. *Bryonopsis laciniosa* (L.) Naud.

III Div.: Daro F.R. 5241.

Low climber, very rare in primary peat-swamp forest, but occasional in secondary forest, especially in open areas near rail lines following logging. Occurs throughout Sarawak and Brunei.

## ARALIACEAE

**Arthrophyllum** Blume.

1. *Arthrophyllum diversifolium* Bl.

III Div.: Loba Kabang P.F. 2666; V Div.: Kayangeran F.R. 2032.

Small tree of the understorey, 6–8 ins. g., rare. Recorded only from the Rejang Delta and Lawas District; also occurs in heath forest.

2. **Arthrophyllum rubiginosum** Ridley.

III Div.: Loba Kabang P.F. 662, 2622; IV Div.: Miri, Sungei Dua 4174.

Small tree, 12–18 ins. g., with conspicuous rufous shoots and young leaves; rare in P.C.s 4 and 5 in Rejang Delta and Baram; also recorded from Saribas F.R.

Specimen in Kew: 591 (*Hose*), Type—A.

**Schefflera** Forst.

1. **Schefflera ridleyi** (King) Viguier.

III Div.: Pulau Bruit 9046; V Div.: Kuala Lawas 9113.

Distinctive sun epiphyte in crowns of large trees, rare and confined to P.C. 1; throughout Sarawak and Brunei.

2. **Schefflera subulata** (Seem) Viguier.

I Div.: Lundu 9144; II Div.: Sg. Tissak 2143; III Div.: Surong Irit 5211; IV Div.: Sg. Dua 9/1956.

Shrub, or climbing shrub to height of 15 ft., in P.C.s 1–3. Recorded from I to IV Divs.

**CORNACEAE**

**Alangium** Lam.

1. **A'angium havilandii** Bloemb.

*midong* (I.), *jadam* (M.), *dadam* (Mil.).

II Div.: Saribas F.R. 8531; III Div.: Loba Kabang P.F. 695, 459, 530, Pulau Bruit P.F. 12868, 9218, 5114, 2629, 8067, Daro F.R. 9702, 5224, Sg. Nangar 12302.

Small to medium-sized tree, 36–48 ins. g., with conspicuous spreading stilt roots; occasional in P.C. 1, throughout Sarawak and Brunei.

Specimen in Kew: 3285, 3019 (*Haviland*), Type—A.

**RUBIACEAE**

**Argostemma** Wall.

1. **Argostemma psychotrioides** Ridl.

III Div.: Naman F.R. 8954, Loba Kabang P.F. 2801.

Small herb, occasional, locally frequent (Naman F.R.), on pneumatophores and roots above surface of swamp in P.C.s 1 and 2. Recorded from the Batang Lupar and the Rejang Delta, but probably occurs throughout the two territories.

2. **Argostemma psychotrioides** Ridl. var.

III Div.: Singat 9070, Sg. Kalaparan 8502 (Brooke).

Small herb, rare and localised in P.C. 1 in the Rejang Delta. The status of this species or variant is uncertain. It is distinguished from 1 primarily by its minute size.

**Canthium** Lam.

1. **Canthium didymum** (Bedd.) Gaertn. f.

*janang*.

III Div.: Loba Kabang P.F. 880, 485; V Div.: Kayangeran F.R. 1560, 2025.

Small tree, 18–24 ins. g., occasional in P.C.s 1 and 2 throughout Sarawak and Brunei; also occurs in heath forest.

2. **Canthium umbellatum** (Benth. & Hook f.) Wight.

*tulang ular*.

II Div.: Sg. Tissak 2384; III Div.: Naman F.R. 9761, Pulau Bruit 9231, 2643, 9016, Lassa P.F. 12424.

Small tree of the understorey, 6–12 ins. g., rare in P.C. 1 and recorded from only the Batang Lupar and the Rejang Deta.

**Gaertnera** Lam.

1. **Gaertnera borneensis** Val. ex Winkler.

III Div.: Loba Kabang P.F. 2794, 435; Brunei: Badas 5659.

Small tree, 10–15 ft. h., frequently little more than an erect shrub, occasional in P.C.s 1 and 2 throughout Sarawak and Brunei; also of frequent occurrence in heath forests.

**Gardenia** Ellis.

1. **Gardenia pterocalyx** Val.

*benah* (Mil.), *malau*, *sulong* (M. Lawas).

II Div.: Triso 9797; III Div.: Pulau Bruit 9026, 9228, 8034, 4976, Sg. Nangar 12265; IV Div.: Sg. Dua 2886; V Div.: Kayangeran F.R. 1562.

Small to medium-sized tree, 24–30 ins. g., occasional, locally frequent (Sg. Dua, Baram) in P.C. 3, rare in P.C.s 1 and 2; throughout Sarawak and Brunei. Also occurs in heath forest and L.D.F. (Brunei). The sticky excrescence on the buds is used to cement parang handles.

**Hedyotis** Linn.

1. **Hedyotis tenelliflora** Bl.

III Div.: Loba Kabang P.F. 2795, 2796.

Slender woody creeper on litter layer and on base of lower boles of trees, occasional in P.C. 4. Recorded from the Batang Lupar and Rejang Delta.

**Hydnophytum** Jack.

1. **Hydnophytum formicarum** Jack.

II Div.: Triso P.F. 10024.

Myrmecophilous epiphyte on small trees in understorey of P.C.s 3 and 6.

**Ixora** Linn.

1. ***Ixora pyrantha*** Brem.

II Div.: Saribas F.R. 8570; III Div.: Sg. Nangar 12254, Lassa P.F. 8846, Pulau Bruit 9205, 9220, 8035; IV Div.: Sg. Dua 4179, 3273; Brunei: Anduki F.R. 4942, Badas 5660.

Erect shrub, 5–10 ft. h., occasional in P.C. 1, frequent in P.C.s 2 and 3. Occurs throughout Sarawak and Brunei.

**Jackia** Wall.

1. ***Jackia ornata*** Wall.

*selumar.*

III Div.: Pulau Bruit 9236, 8001, A 41, Loba Kabang P.F. 2792.

Small tree, 18–36 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

**Lecananthus** Jack.

1. ***Lecananthus erubescens*** Jack.

II Div.: Saribas F.R. 8523; III Div.: Pulau Bruit 8016; IV Div.: Sg. Dua 2869.

Small root climber on buttresses, roots and at base of trees, may attain a height of 10–15 ft., frequent in P.C. 1 throughout Sarawak and Brunei.

**Lucinaea** DC.

1. ***Lucinaea morinda*** DC.

*ngulut* (Mil.).

II Div.: Triso 9799; III Div.: Pulau Bruit 5109; IV Div.: Sg. Dua 2878.

Small to medium-sized climber, occasionally attaining 100 ft., occasional in P.C. 1 throughout Sarawak and Brunei.

**Mussaendopsis** Baill.

1. ***Mussaendopsis beccariana*** Baill.

III Div.: Loba Kabang P.F. 522, 685, 517.

Medium-sized tree, 36–48 ins. g., with very localised distribution towards inland margin of swamps; occasional in P.C. 1 in the Loba Kabang P.F. and the Naman F.R., and the species has also been recorded at Ng. Skrang in the II Div. Recorded in L.D.F. from Brunei.

**Myrmecodia** Jack.

1. ***Myrmecodia tuberosa*** Jack.

IV Div.: Lobok Pasir 9873.

Myrmecophilous epiphyte, frequent in crowns of *Combretocarpus rotundatus* in P.C. 6; in peat swamps is known to occur only in the Baram, but is a characteristic epiphyte of certain open heath forests.

**Nauclea** Linn.

1. **Nauclea parva** (Havil.) Merr.

*jengkai* (M. Pusa).

II Div.: Saribas F.R. 8508, Triso P.F. 3167; III Div.: Lepah F.R. 8061, Pulau Bruit 7941, 9266, Loba Kabang P.F. 8051; IV Div.: Sg. Dua 3253, 3167.

Small tree, 9–18 ins. g., rather rare but widely distributed throughout P.C. 1, in Sarawak from Batang Lupar to the Baram. Occurs in Brunei in secondary forest on degraded soils.

**Psychotria** Linn.

1. **Psychotria sarmentosa** Bl.

II Div.: Triso 10007; III Div.: Naman F.R. 9296, Pulau Bruit 9031, Loba Kabang P.F. 2809; IV Div.: Sg. Dua 9441.

Small creeper on roots and buttresses, occasionally climbing to height of 10 ft., occasional in P.C. 1 throughout Sarawak and Brunei.

2. **Psychotria** sp. (5213).

II Div.: Triso 12213; III Div.: Surong Irit 5213.

Small straggling climber in understorey, rare and local in P.C. 1; recorded from Maludam Peninsula and Rejang Delta.

**Randia** Linn.

1. **Randia auriculata** (Hook. f.) K. Schum.

II Div.: Tj Keranji 12410; III Div.: Pulau Bruit 9203, Surong Irit 5216.

Climber to middle-storey, rare in P.C. 1, and recorded from the Rejang Delta and Maludam Peninsula.

2. **Randia dilleniacea** Baill.

II Div.: Tj Keranji 12405; III Div.: Singat 9738.

Slender-stemmed climber to height of 120 ft., rare in P.C. 1; recorded from Saribas and Rejang Delta.

3. **Randia** sp. (7904).

III Div.: Pulau Bruit 12952, 9288, 7904, 5113, Sg. Nangar 12259.

Small tree or erect shrub, 5–18 ft. h. and 3–6 ins. g., recorded only from Pulau Bruit where it is occasional in the understorey of P.C. 1.

**Tarenna** Gaertn.

1. **Tarenna fragrans** (Bl.) Koord. and Val.

II Div.: Tj Keranji 12882, Saribas F.R. 8530; III Div.: Pulau Bruit 9033, 8009, 9257, 8047; IV Div.: Sg. Dua 4167, 4198; V Div.: Kayangeran F.R. 2023, 4912, 2845, 2021.

Erect shrub, 5–10 ft. h., frequent in P.C. 1 throughout Sarawak and Brunei; also occurs in heath forest.

**Timonius DC.**

1. **Timonius peduncularis** (Wall.) Ridl.

*rentap.*

II Div.: Triso 9790; III Div.: Loba Kabang P.F. 430, Pulau Bruit 9238, 9029, 9285; IV Div.: Sg. Dua 2892, 2870; V Div.: Kayangeran F.R. 2019.

Small tree, 9–18 ins. g., occasional in P.C. 1 and abundant in P.C. 4 throughout Sarawak and Brunei; also one of the commonest species in heath forest.

**Uncaria Schreb.**

1. **Uncaria ovalifolia** Roxb.

II Div.: Saribas F.R. 8522; III Div.: Pulau Bruit 7938, 9053, 9045, 9202, Loba Kabang P.F. 8810; IV Div.: Sg. Dua 3063.

One of the largest climbers in swamp forest and probably the most common; abundant in P.C. 1 and occasional in P.C. 2; particularly common in secondary growth following exploitation. Occurs throughout Sarawak and Brunei.

**ERICACEAE**

**Vaccinium L.**

1. **Vaccinium borneëse** W. W. Sm.

III Div.: Loba Kabang P.F. 79331 (W.-S.).

Straggling shrub 3 ft. h. in P.C. 4. In peat swamps only recorded from Rejang Delta, but occurs throughout Sarawak and Brunei in heath forests.

**MYRSINACEAE**

**Ardisia Sw.**

1. **Ardisia copelandii** Mez.

*merajemah.*

II Div.: Triso 14503, 12864; IV Div.: Sg. Dua 4113.

Small tree, 9–12 ins. g., rare and local in P.C.s 2 and 3. Recorded from II and IV Divs. and Brunei.

2. **Ardisia polyactis** Mez.

II Div.: Sebuyau F.R. 2462; III Div.: Pulau Bruit 12951, 9273, 8003, Lepah P.F. 8071, 8092, Naman F.R. 9167, Daro F.R. 9062.

Small tree, 8–15 ft. h. and 4–8 ins. g., occasional in understorey of P.C. 1 in the Rejang Delta, but with the exception of one record in the Sebuyan F.R. it has not been noted elsewhere.

3. **Ardisia** sp. (9826).

II Div.: Lingga 9826, Sg. Tissak 3194; III Div.: Loba Kabang P.F. 79333 (W.-S.), 2791.

Straggling shrub, 5–10 ft. h., occasional, locally frequent, in P.C. 4 in Batang Lupar and the Rejang Delta.

**Embelia** Burm.

1. **Embelia coriacea** Wall.

III Div.: Sg. Nangar 12326.

Large climber in P.C. 1, recorded from Rejang Delta and Maludam Peninsula.

2. **Embelia pergamacea** A. DC.

II Div.: Triso 10002, 12407.

Large climber, rare in P.C. 1. Recorded only from Maludam Peninsula.

**Grenacheria** Mez.

1. **Grenacheria beccariana** Mez.

II Div.: Saribas F.R. 8505, 8553; III Div.: Pulau Bruit 7918, 9258, 9239; IV Div.: Sg. Dua 3289, 3055.

Slender climber to height of 100 ft. or more, rarely a straggling shrub, occasional in P.C.s 1–3 from Batang Lupar to Baram. Not yet recorded from Brunei or V Div.

**Labisia** Lindl.

1. **Labisia punctata** (Reinw.) Airy-Shaw f. **pumila** (Bl.) Airy-Shaw.

III Div.: Loba Kabang P.F. 1571.

Small procumbent shrub, frequent, locally abundant, on litter layer in P.C. 4 from Batang Lupar to Baram.

2. **Labisia punctata** (Reinw.) Airy-Shaw f. **punctata**.

II Div.: Triso 3173; III Div.: Pulau Bruit 8057.

Short undershrub, stem less than 12 ins., rare, locally occasional, in P.C. 1 in Batang Lupar, Saribas, and the Rejang Delta.

**Rapanea** Aubl.

1. **Rapanea avenis** (A. DC.) Mez.

II Div.: Triso P.F. 14522, Sg. Tissak 2346; III Div.: Loba Kabang P.F. 2610.

Small tree, 12–24 ins. g., rare in P.C. 4 in the Rejang Delta and Batang Lupar.

2. **Rapanea philippinensis** Mez.

IV Div.: Sg. Dua 3081, 3073, 2881, 9883.

Shrub, 5–10 ft. h., occasional in P.C. 4 in the Baram. No fertile material has yet been collected.

3. **Rapanea umbellulata** (A. DC.) Mez.

Brunei: Sg. Ayom Ayom 2181; V Div.: Kayangeran F.R. 2020.

Small tree, 9–12 ins. g., occasional in P.C. 1 near coastal margin, and in transitional zone from mangrove swamps. Recorded from only Brunei and Lawas.

**SAPOTACEAE**

**Ganua** Pierre ex Dubard.

1. **Ganua coriacea** Pierre ex Dubard.

*nyatoh ketiau* (M.), *nyatoh chabi* (Mil.).

III Div.: Surong Irit 5232, Loba Kabang P.F. 2692, 512, 875, 526, 545, 2714, 875, 893.

Medium-sized tree, 24–48 ins. g., frequent, locally abundant (Rejang Delta) in P.C. 1. Occurs throughout Sarawak and Brunei, but is rare east of the Rejang Delta.

2. **Ganua curtisii** (K. and G.) H. J. Lam.

Brunei: Badas 2815.

Tree, 18–24 ins. g., abundant in understorey of P.C. 3 in the Badas area of Brunei, but not recorded elsewhere in swamps. Occurs in heath forest.

3. **Ganua motleyana** (de Vriese) Pierre ex Dubard.

*ketiau* (M.), *skiew* (Mil. Rejang, Matu, Daro).

II Div.: Saribas F.R. 8402; III Div.: Singat 9737, Pulau Bruit, 9037, 9222, Mubong 671, Sg. Nangar 12317, Lassa 12900.

Medium-sized tree, 36–72 ins. g., locally frequent in P.C. 1 on shallow peat near the coast. Occurs throughout Sarawak and Brunei.

Fruit produces an edible oil and is collected for local use and export.

4. **Ganua pierreii** v.d. Assem.

III Div.: Loba Kabang P.F. 469, 2683 534, 2690, 684, 521, 528, 534, Singat 9737.

Small to medium-sized tree, 24–36 ins. g., occasional in understorey of P.C. 1 in the Rejang Delta; also recorded from Batang Lupar and Bintulu. Occurs in heath forest in Brunei.

**Palaquium** Blanco.

1. **Palaquium cochleariifolium** van Royen.

*nyatoh jelutong*, *nyatoh temiang* (M. Lingga).

II Div.: Lingga 4809; III Div.: Loba Kabang P.F. A 64, 5647, 653, 657, 1531, 432, Sg. Pak A 109; IV Div.: Sg. Dua 2867.



Medium-sized tree, 36–48 ins. g., occasional in P.C. 3, frequent in P.C.s 4 and 5, throughout Sarawak and Brunei; also occurs in heath forest.

2. ***Palaquium leiocarpum*** Boerl.

*nyatoh rian, jankar.*

III Div.: Igan A 102; IV Div.: Baram 1289.

Small to medium-sized tree, 24–48 ins. g., occasional and localised in P.C. 1, preferring the coastal and riparian margins of peat-swamp forest; throughout Sarawak and Brunei; of more frequent occurrence in heath forests.

One of the species that produces the commercial *getah rian*.

3. ***Palaquium pseudocuneatum*** H. J. Lam.

*nyatoh babi.*

II Div.: Saribas F.R. 8542; III Div.: Pulau Bruit 7917, 4962, 9058, 9246, 9256, 4954, Singat 9733, Daro F.R. 2627, A 402, Loba Kabang, P.F. 497, 1526, 2680, 2685, 2759, 854; IV Div.: Sg. Dua 3279.

Tree, 36–48 ins. g., occasional, locally frequent, in P.C. 1 throughout Sarawak and Brunei.

4. ***Palaquium pseudorostratum*** H. J. Lam.

*nyatoh babi.*

I Div.: Setapok 9084; II Div.: Triso 9433, 3112, 3165, Saribas 12336. Simanggang 9433; III Div.: Naman F.R. A 98, A 106, Loba Kabang P.F. 2678; V Div.: Meregang 1542.

Medium-sized to large tree, 72–84 ins., g., occasional and widely distributed in P.C. 1 throughout Sarawak and Brunei. The largest of the *nyatohs*.

There is frequently confusion in differentiating between this and the previous species in the field or from sterile specimens. The length of the petiole and shape of base of the lamina are diagnostic features.

5. ***Palaquium ridleyi*** King et Gamble.

*nyatoh terong, jerabukor.*

II Div.: Tissak 2345; III Div.: Pulau Bruit 801, 9024, 9013, 7921, 8040, Loba Kabang P.F. 2619, 1520, 441, 680, 874, 546, 2619, 2605; IV Div.: Sg. Dua 4192, 4172, 4156, Lobok Pasir 9895; V Div.: Lawas 1513, Sg. Panchanak 9117.

Medium-sized tree, 36–48 ins. g., occasional in P.C. 1, especially towards inland margins, and in P.C.s 2 and 3; widely distributed throughout Sarawak and Brunei, also occurring in heath forest. This species, especially when immature, is liable to be confused with *Palaquium cochleariifolium*.

6. **Palaquium walsurifolium** Pierre.

*nyatoh jangkar.*

I Div.: Setapok F.R. 4773, 4776, Lundu 9775; II Div.: Sedilu F.R. 4782; III Div.: Loba Kabang P.F. 872, 877, 696, 508, 882, Sg. Kelapa'an 751, Pulau Bruit 9735, A 100, Oya 5302, Singat 5002, 5218.

Medium-sized tree, 36–48 ins. g., occasional, locally frequent near inland margins of swamps, in P.C. 1; throughout Sarawak and Brunei.

A distinctive species with numerous spreading stilt roots.

**Payena** A. DC.

1. **Payena obscura** Burck.

*nyatoh padang.*

III Div.: Loba Kabang P.F. 2722, 2768, 2618.

Small tree, 18–30 ins. g., occasional and localised in P.C. 4 in the Rejang Delta.

**Planchonella** Van Tiegh.

1. **Planchonella maingayi** (Clarke) van Royen.

II Div.: Triso 3205; III Div.: Pulau Bruit A 25, 8049.

Medium-sized to large tree, 60–84 ins. g., rare in P.C. 1 near the coast. Recorded from the Batang Lupar and the Rejang Delta.

**EBENACEAE**

**Diospyros** L.

1. **Diospyros elliptifolia** Merr.

*balih* (Mil.).

II Div.: Saribas F.R. 8537; III Div.: Pulau Bruit 8048, 7930, 542, Loba Kabang P.F. 697, 895.

Small tree, 12–24 ins. g., occasional in P.C.s 1 and 2, and recorded from Batang Lupar, Saribas, Rejang Delta, and Bintulu.

2. **Diospyros evena** Bakh.

*merpinang.*

II Div.: Tj Keranji 12887, Triso 14504, 3164, 12871; III Div.: Pulau Bruit 4971, 4962, 9244, 9010, 7903, 4953, Daro F.R. 9716, 5004, Loba Kabang P.F. 483, A 12, Sg. Nangar 12315; Brunei: Anduki F.R. 5552, Badas 2848.

Small to medium-sized tree, 24–36 ins. g., frequent and widely distributed, occurring in all forest types except P.C. 6, also in heath forest; throughout Sarawak and Brunei.

3. **Diospyros maingayi** (Hiern.) Bakh.

*merpinang*.

II Div.: Saribas 8403, Tj Keranji 12888, Sg. Tissak 2159, 3196, 3197; III Div.: Loba Kabang P.F. 5052, 79320 (W.-S.), 890.

Small to medium-sized tree, 24–36 ins. g., occasional, but very localised, in P.C. 1 in the Rejang Delta and Batang Lupar; also occurs in heath forest.

4. **Diospyros pseudomalabarica** Bakh.

*kayu malam*.

II Div.: Triso 3176; III Div.: Sg. Nangar 12307, Pulau Bruit 4963, 9214, 9032, 4955, Daro 5001, Loba Kabang P.F. 5051, 507, Naman F.R. A 17.

Medium-sized tree, 48–60 ins. g., frequent in P.C.s 1 and 2, throughout Sarawak and Brunei, also recorded in L.D.F. in Andulau F.R. (Brunei).

## OLEACEAE

### **Linociera** Swartz.

1. **Linociera insignis** Clarke.

IV Div.: Sg. Dua 2887; V Div.: 4914.

Small tree, 12–24 ins. g., rare in P.C. 1. Recorded from only the Baram and Lawas, but occurs in heath forest in Brunei.

2. **Linociera racemosa** Merr.

III Div.: Pulau Bruit 9042.

Medium-sized tree, 24–36 ins. g., rare in P.C. 1, and recorded from only Pulau Bruit.

3. **Linociera** sp. (3282).

IV Div.: Sg. Dua 1775, 1777, 3282; Brunei: Anduki 2041; V Div.: Kayangeran F.R. 4906.

Small tree, 12–24 ins. g., occasional in P.C.s 2 and 3 and in *sempilor* forest of V Div.; also occurs in heath forest in Brunei.

### **Myxopyrum** Blume.

1. **Myxopyrum ellipticum** A. W. Hill.

III Div.: Naman F.R. 14586; IV Div.: Sg. Dua 4171, Lobok Pasir 9878.

Small to medium-sized climber, occasional in P.C.s 2 and 3. Recorded from III and IV Divs.

**APOCYNACEAE**

**Alstonia Br.**

1. **Alstonia spathulata** Blume.

*pelai, pulai* (M. Brunei), *tembilak purak* (Dusun).

III Div.: Mukah 551, 552, Pulau Bruit P.F. A 62, 12441.

Forest giant, girths may exceed 156 ins. above buttresses. A very conspicuous and frequent tree of swamp forest on the coastal margins, but rare or absent elsewhere; throughout Sarawak and Brunei.

**Dyera Hook. f.**

1. **Dyera lowii** Hook. f.

*jelutong paya.*

III Div.: Daro F.R. 9750.

Large tree, 108–120 ins. g., with prominent pneumatophores; frequent, locally abundant, in P.C. 1, but also occurs, less commonly, in P.C.s 2–4; throughout Sarawak and Brunei.

This species is the most important local source of the commercial chicle used in the manufacture of chewing gum.

**Urceola Roxb.**

*lukut* (Mil.).

1. **Urceola brachysepala** Hk. f.

II Div.: Saribas F.R. 8557; III Div.: Pulau Bruit P.F. 7909, 9225.

Medium to large-sized climber which reaches the upper storey; occasional in P.C. 1. So far recorded from only II and III Divs., but distribution is probably more widespread.

**Kibatalia G. Don.**

1. **Kibatalia** sp. (9300).

III Div.: Loba Kabang P.F. 79323 (W.-S.), Naman F.R. 9300, 7945, 9181.

Shrub, 6–12 ft. h., occasional, locally frequent, but confined to P.C.s 2 and 3. Recorded only from the two localities from which specimens have been collected.

**Willughbeia Roxb.**

1. **Willughbeia coriacea** Wall.

III Div.: Sg. Semup 5124.

Medium-sized climber in P.C. 1, and recorded from only the one locality.

2. **Willughbeia glaucina** K. Schum.

III Div.: Naman F.R. 9764.

Medium-sized to large climber in P.C. 1. This species is only definitely recorded from the Rejang Delta, but its distinctive leaves have also been noted on the swamp surface in the Batang Lupar.

**ASCLEPIADACEAE**

**Dischidia** R. Br.

1. **Dischidia hirsuta** (Bl.) Dcne.

II Div.: Triso 12856; III Div.: Pulau Bruit 5110.

Small climbing epiphyte in crowns of dominants and middle storey trees in P.C. 1. Probably occurs throughout Sarawak and Brunei but only recorded from II and III Divs.

2. **Dischidia nummularia** R. Br.

IV Div.: Lobok Pasir 9871, 4184.

Small climbing epiphyte, rare in crowns of dominants in P.C. 1, abundant at a low level on boles and crowns of trees and shrubs in P.C. 6; throughout Sarawak and Brunei.

3. **Dischidia rafflesiana** Wall.

IV Div.: Lobok Pasir 9872.

Small climbing epiphyte, frequent in crowns and on stems of *Combretocarpus rotundatus* in P.C. 6.

*Note:* Two further *Dischidia* spp. have been collected. Both occur as small climbing epiphytes in crowns of dominants in P.C. 1; their distribution and occurrence is at present incompletely known.

**Hoya** R. Br.

1. **Hoya coronaria** Bl.

Brunei: Tutong 4140.

Small climbing epiphyte in understorey of P.C. 6. Large fruits are used by native people in the preparation of a stomach medicine.

2. **Hoya mitrata** Kerr.

II Div.: Saribas F.R. 8534, Triso P.F. 10015; IV Div.: Sg. Dua 3062.

Small twining climber in understorey of P.C. 3, occasional and rather localised. Not yet recorded from the Rejang Delta. The leaves tend to be in pseudo-whorls, which are inhabited by ants.

3. **Hoya** sp. (9877).

IV Div.: Lobok Pasir 9877, 4178.

Climbing epiphyte in understorey of P.C. 6 in Baram.

## LOGANIACEAE

### *Fagraea* Thunb.

1. *Fagraea racemosa* Wall.

III Div.: Naman F.R. 9170, 9179, 9756, Rantau Panjang 9869, Pulau Bruit 9267, 9237, Lepah P.F. 8082.

Small upright shrub, 6–10 ft. h., rare, locally occasional, in P.C. 1 on shallow peat at margins of swamps. Recorded from only the Rejang Delta.

2. *Fagraea litoralis* Bl.

II Div.: Saribas F.R. 8511; III Div.: Pulau Bruit 8026, 7943.

Small epiphytic shrub, rare in P.C. 1. Recorded only from the Rejang Delta and Saribas.

## CONVOLVULACEAE

### *Erycibe* Roxb.

1. *Erycibe* c.f. *impressa* Hoogl.

*meruyan batu*.

II Div.: Triso P.F. 10017, Saribas F.R. 8560; III Div.: Pulau Bruit 9280.

Liane, reaching crowns of dominants, occasional in P.C. 1, rare in P.C.s 2 and 3, throughout Sarawak, but not yet recorded from Brunei.

2. *Erycibe* sp. (4117).

IV Div.: Sg. Dua 4117.

Liane in P.C. 2. Recorded from only the one locality.

## GESNERIACEAE

### *Aeschynanthus* Jack.

1. *Aeschynanthus hians* C. B. Clarke.

*handan haka* (I.).

II Div.: Saribas F.R. 8510; III Div.: Loba Kabang P.F. 2803, Naman F.R. 9755, 9183.

Small creeper or low climber, on litter layer and lower stems and buttresses of large trees, but rarely ascending to a height of more than 6 ft.; occasional in P.C. 1 throughout Sarawak and Brunei.

## VERBENACEAE

### *Clerodendron* L.

1. *Clerodendron fistulosum* Becc.

III Div.: Naman F.R. 9171, 7946, 9298; IV Div.: Sg. Dua 2876, 4188.

Small myrmecophilous herb, rare, locally occasional, in P.C.s 1 and 2; throughout Sarawak and Brunei. Also recorded in heath forest (Bako National Park).

**Premna** Linn.

1. **Premna** sp. (9725).

III Div.: Singat 9725, Sg. Nangar 12328.

Medium-sized to large climber, rare in P.C. 1; recorded from only the Rejang Delta.

**Vitex** Tourn. ex L.

1. **Vitex secundiflora** H. Hallier.

III Div.: Pulau Bruit 2644.

Medium-sized tree, 24–36 ins. g., very rare in P.C. 1 and recorded from only the mentioned locality.

**NEPENTHACEAE**

**Nepenthes** L.

1. **Nepenthes albo-marginata** Lobb. ex Lindl.

III Div.: Loba Kabang P.F. 1586.

Slender straggling shrub, rare to very rare in P.C. 4 in the Rejang Delta.

2. **Nepenthes ampullaria** Jack.

*tuyud.*

III Div.: Pulau Bruit 8059; IV Div.: Sg. Dua 3061; V Div.: Kayangeran F.R. 2769.

Climber, which may attain a height of 60–80 ft., rarely procumbent, occasional in P.C.s 1 and 2 throughout Sarawak and Brunei; also occurs in heath forest.

3. **Nepenthes bicalcarata** Hook. f.

*tuyud.*

II Div.: Saribas F.R. 8533; III Div.: Loba Kabang P.F. 2820; IV Div.: Sg. Dua 3064, 3077.

Large shrubby pitcher plant, occasionally a low climber to a height of 15–20 ft., frequent, locally abundant in P.C.s 2 and 3 throughout Sarawak and Brunei. The largest pitcher plant and a characteristic associate of *Shorea albida*. Pitchers stated to be used occasionally by Ibans as a vessel for boiling rice.

4. **Nepenthes gracilis** Korth.

II Div.: Saribas F.R. 8575; III Div.: Loba Kabang P.F. 1585; IV Div.: Sg. Dua 3053, 4199, 3068, 3274, 3267, 4196, 3075, 4180.

Slender straggling shrub, or low climber to height of 15–20 ft.; frequent, locally abundant, in P.C.s 4–6; also occurs more rarely in all other forest types; throughout Sarawak and Brunei. The pitchers vary very considerably in shape and especially in size. Plants with smallest pitchers being found in infertile central zone of P.C. 6. Abundant in heath forests.

5. **Nepenthes rafflesiana** Jack.

IV Div.: Lubok Pasir 3080, 3056, 2860, Sg. Dua 3078, 3076.

Low shrub or slender climber to 10 ft., rare in P.C.s 3 and 4, but frequent in P.C. 6; throughout Sarawak and Brunei. Also found in open heath forest.

## PIPERACEAE

### Piper Linn.

1 **Piper arborescens** Roxb.

*sireh hutan.*

III Div.: Pulau Bruit 8019, 5115; IV Div.: Sg. Dua 4112.

Slender climber, occasionally forming a dense mass on lower stems of trees to a height of 30 to 40 ft., occasional in P.C. 1. Recorded from the Batang Lupar to the Baram; probably also occurs in Brunei and the V Div.

2. **Piper muricatum** Bl.

II Div.: Ng. Skrang 9823.

Herb, locally abundant in P.C. 1 towards inland margin of peat swamps. Recorded from the Batang Lupar and Lawas.

3. **Piper** sp. (2811).

II Div.: Triso P.F. 10019; III Div.: Loba Kabang P.F. 2811.

Small slender climber on buttresses, pneumatophores and at the base of stems of trees; occasional in P.C. 1 throughout Sarawak and Brunei.

Only sterile specimens have been collected.

4. **Piper** sp. (9234).

III Div.: Pulau Bruit 9234, 5116.

Climber, attaining a height of 100 ft. or more, rare in P.C. 1 and recorded from only the Rejang Delta.

## MYRISTICACEAE

### Gymnacranthera Warb.

1. **Gymnacranthera eugeniifolia** (A. DC.) Sinclair var. **griffithii** (Warb.) Sinclair.

I Div.: Sedilu 9567; II Div.: Triso P.F. 9584; III Div.: Loba Kabang P.F. 1583, 2723, 540; IV Div.: Sg. Dua 3251.



Small tree, 12–24 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

Specimen in Kew: *Gymnacantha farquhariana*, Herb. E.I. Coy. 4355, Type—A.

### Horsfieldia Willd.

#### 1. *Horsfieldia crassifolia* (Hk. f. et Th.) Warb.

*kumpang ensuliue* (I. Assan), *kumpang sadara* (Mil. Rejang), *terada'a* (Mil. Oya), *ta'dara* (Mil.).

II Div.: Sg. Tissak 3188; III Div.: Singat 9738, Loba Kabang P.F. 2716, 524, Naman F.R. 672, 688, Pulau Bruit 9226, 9279, 9028, Daro F.R. A 127, 5204, Sg. Nangar 12325; Brunei: Badas 2826.

Medium-sized tree, 36–48 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei. Also occurs in L.D.F.

Specimens in Kew: 865, 1941 (Haviland), Herb. E.I. Coy. 4350—A.

#### 2. *Horsfieldia carnosa* Warb.

III Div.: Binatang 9739, Lassa 15955.

Small tree, 8–12 ins. g., very rare and localised in P.C. 1; probably confined to swamps near banks of freshwater rivers. Recorded from only the Rejang Delta.

### Knema Laur.

#### 1. *Knema intermedia* (Bl.) Warb.

II Div.: Sg. Tissak 3184, 3185; III Div.: Loba Kabang P.F. 412, Pulau Bruit 7931, 9055, 9039.

Small tree, 9–18 ins. g., rare in P.C. 1; recorded from the II and III Divs., also recorded in L.D.F. from Brunei.

Specimens in Kew: *ecqc*, 1967 (Haviland).

#### 2. *Knema kunstleri* (King) Warb. var. *kunstleri*.

*kumpang pinggu* (I. Assan).

I Div.: Sarawak Mangrove Reserve 7746; II Div.: Triso 3178, Saribas F.R. 8518; III Div.: Sg. Nangar 12252, Pulau Bruit 2638, 9249, 9019, 8030; Brunei: Badas 2853, Anduki F.R. 5551; V Div.: Kayangeran F.R. 2027, 2842.

Small tree, 9–18 ins. g., frequent in understorey of P.C.s 1 and 2 throughout Sarawak and Brunei; also occurs in heath forest.

Specimens in Kew: 1761, Plants of Sarawak 164.

#### 3. *Knema uliginosa* Sinclair.

III Div.: Loba Kabang P.F. 447, 9893.

Small tree, 9–12 ins. g., rare and localised in P.C.s 1 and 2. Known from only the one locality.

**Myristica L.**

1. **Myristica lowiana** King.

*kumpang kiong* (I. Assan), *kumpang pendarahan* (M.),  
*kumpang darah* (I.).

III Div.: Lassa P.F. A 16, Pulau Bruit A 128, 9227.

Distinctive medium-sized tree, 36–48 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei; also occurs in heath forest. Easily identified by its brittle black bark and numerous spreading stilt roots.

Specimen in Kew: Herb. Calcutta 7258, Type—A.

**LAURACEAE**

**Actinodaphne** Nees.

1. **Actinodaphne** aff. **myriantha** Merr.

II Div.: Loba Kabang P.F. 448, 1583.

Small tree of the understorey, 9–12 ins. g., and 20–30 ft. h., occasional in P.C. 2 in the Loba Kabang P.F. but recorded from only this locality in peat swamps; occurs in heath forest in Brunei.

Specimens in Kew: 1756 (Haviland), Plants of Borneo 21238, 21809.

**Alseodaphne** Nees.

1. **Alseodaphne insignis** Gamble.

III Div.: Loba Kabang P.F. 2762, 476, 2694, 889, 404; IV Div.: Marudi F.R. 8446.

Medium-sized tree, 36–48 ins. g., occasional in P.C.s 1 and 2 throughout Sarawak and Brunei.

Specimen in Kew: 251 (*Hose*).

2. **Alseodaphne rigida** Kostermans.

*medang lui*, *medang lendir* (M. Bintulu).

III Div.: Loba Kabang P.F. 2691, 2687, Pulau Bruit 2632, 2635, Mukah 5101 V Div.: Kayangeran; F.R. 4905.

Medium-sized tree, 36–48 ins. g., occasional, locally frequent, in P.C. 1 throughout Sarawak and Brunei. The slash has a characteristic greasy feel when freshly cut.

Specimens in Kew: Flora B.N.B. 6727, 6219.

**Beilschmiedia** Nees.

1. **Beilschmiedia** aff. **maingayi** Hook. f.

II Div.: Triso P.F. 3101.

Small tree, 12–18 ins. g., rare and recorded from only the Maludam Peninsula in II Div.

**Cinnamomum** (Tourn.) L.

1. **Cinnamomum javanicum** Bl.

V Div.: Bukit Bubong Rumah 10028.

Shrub or small tree, 15 ft. h., in peat-swamp forest, recorded only from V Div. at an altitude of 2,000 ft., but occurs more frequently in heath forest and along river banks (Brunei).

2. **Cinnamomum** sp. (4751).

*medang tiga.*

I Div.: Setapok F.R. 4751.

Shrub or small tree, 10–15 ft. h., confined to inland margin of peat-swamp forests and more frequently found in heath forest. In swamp forest recorded from only I Div.

**Cryptocarya** R. Br.

1. **Cryptocarya griffithiana** Wight.

II Div.: Tj. Keranji 12880, Triso P.F. 3114; III Div.: Pulau Bruit 9282, 9005, Lepah P.F. 8062.

Small tree of the understorey, 12–18 ft. h. and 6–9 ins. g., occasional in P.C.s 1 and 2 from Rejang Delta to Batang Lupar.

**Dehaasia** Blume.

1. **Dehaasia** sp. (9252).

I Div.: Setapok F.R. 357; II Div.: Saribas F.R. 4770; III Div.: Pulau Bruit 9252, 9262, 9268, 9030, 8006, Daro F.R. 9748, Sg. Nangar 12321.

Small tree of the understorey, 15–20 ft. h. and 6–12 ins. g., occasional and rather localised in P.C. 1 from I to III Divs.

**Endiandra** R. Br.

1. **Endiandra** sp. (3252).

*bejubai* (Mil.).

III Div.: Loba Kabang P.F. 2701, Pulau Bruit 2633, 9221; IV Div.: Baram 3252, 1554.

Medium-sized tree, 24–36 ins. g., rare in P.C. 1 in Baram and Rejang Delta. Probably an undescribed species.

Unnamed specimen in Kew: 2199 (*Haviland*).

**Litsea** Lam.

1. **Litsea cylindrocarpa** Gamble.

*medang pasir.*

III Div.: Loba Kabang P.F. 858, 1580, 1581, 549, 2844, Pulau Bruit P.F. 2641, 7915, 4970; V Div.: Kayangeran F.R. 2030.

Medium-sized tree, 24–36 ins. g., frequent in P.C.s 1 and 2 and abundant in secondary swamp-forest; throughout Sarawak and Brunei. Occurs in heath forest.

Specimens in Kew: 3143 (Beccari), Flora of North Borneo 2385.

2. *Litsea gracilipes* Hook f.

*medang keli.*

II Div.: Triso P.F. 3109; III Div.: Loba Kabang P.F. 2626, 2704, Daro F.R. 5003, Lepah P.F. 8088, Pulau Bruit 4967, 9287, 5101, Matu Daro P.F. 12262.

Medium-sized tree, 24–36 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

Specimens in Kew: 3326, 3327, 3329, 3330 (*Haviland*)—A.

3. *Litsea grandis* (Wall.) Hook. f.

*medang bulu.*

II Div.: Saribas F.R. 8532, Triso P.F. 14520; III Div.: Loba Kabang P.F. 531, 2760.

Medium-sized tree, 36–48 ins. g., rather rare in P.C. 1 from Rejang Delta to Batang Lupar, probably also occurs in northern Sarawak and Brunei. Recorded in heath forest in Brunei. Easily identified in the field by its large leaves with dense pubescence on the lower surface.

Specimen in Kew: 2537 (*Beccari*)—A.

4. *Litsea nidularis* Gamble.

I Div.: Setapok F.R. 7726; II Div.: Triso P.F. 14543, 3107; III Div.: Lepah P.F. 8070, Pulau Bruit 5122, Sg. Nangar 12310.

Medium-sized tree, 24–36 ins. g., rare in P.C. 1, locally frequent in coastal swamps, from Kuching to the Rejang Delta.

5. *Litsea palustris* Kostermans.

*medang padang* (Rejang Delta), *medang lada* (Baram), *medang kuning* (Brunei).

II Div.: Lingga 4811, 9819; III Div.: Pulau Bruit 8053, 8041, 7912, Sungei Retus A 22, Loba Kabang P.F. 427, 664, 79335 (W.-S.); IV Div.: Sg. Dua 1579, 2880, 2893, Lubok Pasir 4151, 8050, 9894, 9875; V Div.: Kayangeran F.R. 9197.

Medium-sized to large tree, 60–72 ins. g., occasionally larger, abundant to very abundant in P.C.s 4, 5 and 6, also occurring less frequently in P.C.s 2 and 3, but largely absent from P.C. 1. In the centre of swamps in the Rejang Delta it is gregarious forming an almost pure forest (in the upper canopy), known as the *padang medang*. Occurs throughout Sarawak and Brunei and is also found in heath forest.

6. *Litsea resinosa* Bl.

*medang engkala* (M.), *medang tebulus* (Mil. Rejang).

I Div.: Setapok F.R. 9438, 4760; II Div.: Sebuyau F.R. 4815; III Div.: Loba Kabang P.F. 474, 2891, 2895, Pulau Bruit 9036, 4977, Daro F.R. 9701, 9060, 9752, Sg. Nangar 12324; Brunei: Badas 2835; V Div.: Kayangeran F.R. 4123.

Distinctive small tree, 12–18 ins. g., frequent in P.C.s 1 and 2 throughout Sarawak and Brunei; also occurs in heath forest.

7. *Litsea* sp. (8520).

*medang sekelat.*

II Div.: Lingga 9812, Saribas F.R. 8520, Sg. Tissak 2343.

Small tree, 12–18 ins. g., occasional in P.C.s 1 and 2 from the west bank of the Batang Lupar to east bank of the Saribas, but not yet recorded in peat swamps elsewhere in Sarawak or Brunei. Occurs in fresh-water swamp, subject to periodic inundation, in Brunei. A very distinctive little tree with beautiful foliage.

8. *Litsea* sp. (4121).

IV Div.: Sg. Dua 4121.

Small tree, 12–15 ins. g., rare in P.C. 3 in the Baram.

*Phoebe* Nees.

1. *Phoebe* sp. (4959).

II Div.: Saribas F.R. 8538; III Div.: Pulau Bruit 4959, 2628.

Small tree, 12–24 ins. g., locally frequent in P.C. 1 from the Rejang Delta to Batang Lupar. Prefers shallow peat on coastal margins, also recorded from heath forest in Brunei.

## THYMELIACEAE

*Gonystylus* Teys. et Binn.

1. *Gonystylus bancanus* (Miq.) Kurz.

*ramin, ramin telur, lunak* (Mil).

I Div.: Lundu 9622; II Div.: Triso P.F. 10001, Lingga 5317; III Div.: Pulau Bruit A 21, 8005, 8044, Naman F.R. A 5, 9173, Daro F.R. 5220.

Large tree, 108–132 ins. g., frequent, in P.C. 1 where it is the most important dominant; occurs also as a smaller tree in P.C.s 2–4; throughout Sarawak and Brunei. The most important economic timber species in peat swamps.

2. *Gonystylus forbesii* Gilg.

*ramin batu paya.*

II Div.: Sg. Tissak 2349; III Div.: Pulau Bruit A 36, 8054, Daro F.R. 401, Lepah P.F. 8084, Lassa P.F. A 179, Loba Kabang P.F. 862, 431, 2724; V Div.: Kayangeran F.R. 4901, 4913.

Medium-sized tree, 36–48 ins. g., rare and localised in P.C.s 1 and 2; throughout Sarawak and Brunei. Clearly differentiated in the field from the previous species by fluted bole and darker sooty coloured bark.

3. **Gonystylus maingayi** Hook f.

*ramin batu.*

II Div.: Triso 12861; Sungei Mukah 553, A 149.

Large tree, 72–84 ins. g., with a very localised distribution. Occurs in riverain peat swamp forest where peaty streams flow through the swamps and are liable to overflow and flood the adjacent forest. Not yet recorded from northern Sarawak or Brunei, but probably occurs there in similar habitats.

**Linostoma** Wall.

1. **Linostoma longiflorum** Hall. f.

II Div.: Triso 12874; III Div.: Pulau Bruit 9047.

Small climber, rare and localised in P.C. 1. Recorded from the Rejang Delta and Maludam Peninsula.

**LORANTHACEAE**

**Dendrophthoë** Mart.

1. **Dendrophthoë falcata** Bl.

III Div.: Surong Irit 5217.

Parasite in crowns of *Gonystylus baneanus* in P.C. 1 Recorded from only the one locality.

**Lepidaria** Van Tiegh.

1. **Lepidaria oviceps** Dans.

*chempaka kijangan* (Mil.).

III Div.: Daro F.R. 9729, 9714, Naman F.R. 9175.

Very distinctive parasitic shrub of crowns of dominants in P.C. 1. Recorded from the Rejang Delta, Batang Lupar and Lawas and probably occurs throughout Sarawak and Brunei.

**Macrosolen** Blume.

1. **Macrosolen beccarii** Van Tiegh. ex Beccari.

III Div.: Naman F.R. 9763, 11717.

Parasitic shrub of small trees in understorey of P.C. 1. Recorded from the Rejang Delta, where it is locally frequent.

**SANTALACEAE**

**Henslowia** Blume.

1. **Henslowia varians** Bl.

IV Div.: Lobok Pasir 4158.

Rare parasite on small trees in understorey of P.C. 1 in the Baram.

2. **Henslowia** sp. (9884).

IV Div.: Lobok Pasir 9884, 4159.

Small straggling parasitic shrub, frequent in P.C. 6, and recorded from only IV Div. Also occurs in certain open heath forests (Bako National Park).

**EUPHORBIACEAE**

**Antidesma** Burm. ex L.

1. **Antidesma coriaceum** Tul.

III Div.: Naman F.R. 9762, Loba Kabang P.F. 449, 1773, Lassa 12416, Pulau Bruit 5112; IV Div.: Sg. Dua 2873, 4162, 3059, 4194, 3281.

Small tree, 15–30 ft. h. and 12–18 ins. g., locally abundant in P.C.s 1–3. Recorded from the Batang Lupar, Rejang Delta and Baram, but probably occurs throughout Sarawak and Brunei.

2. **Antidesma phanerophlebium** Merr.

I Div.: Lundu 9145; II Div.: Triso P.F. 4768, 3119, Simanggang 9432, Saribas F.R. 8503; III Div.: Loba Kabang P.F. 2668, Lepah P.F. 8081, Naman F.R. 9176, Daro F.R. 5207, Lassa 8832 (Brooke).

Shrub or small tree, 10–20 ft. h., occasional in understorey of P.C. 1. Recorded from I, II and III Divs.

**Baccaurea** Lour.

1. **Baccaurea bracteata** Muell.-Arg.

*tampoi paya, perak burong* (I. Brunei).

I Div.: Lundu 6552; II Div.: Lingga 9815; III Div.: Naman F.R. 9782, Loba Kabang P.F. 419; IV Div.: Sg. Dua 2888, 2883; V Div.: Kayangeran F.R. 1553, 1771.

Small tree, 12–18 ins. g., frequent in P.C.s 1–3 throughout Sarawak and Brunei.

Specimens in Kew: 3185, 3227 (*Beccari*), *brfs* (*Haviland*)—B.

2. **Baccaurea javanica** Muell.-Arg.

I Div.: Lundu 6553, 6555.

Small tree or shrub, 10–20 ft. h., frequent but very localised in P.C. 1 and recorded from only the one locality.

**Blumeodendron** Kurz.

1. **Blumeodendron subtundifolium** Merr.

*lemak manok* (M.), *mertawa* (I.).

III Div.: Naman F.R. 681, Daro F.R. 5228.

Tree, 24–36 ins. g., frequent in P.C. 1 of Rejang Delta, but absent elsewhere. Recorded in heath forests from the Setapok F.R. (I Div.).

Specimens in Kew: 1648 (*Haviland*), 3849 (*Beccari*)—B.

2. **Blumeodendron tokbrai** (Blume) J. J. Sm.

*merahbulan* (M.), *teku* (Mil.), *umpungan* (M. Kuching and II Div.).

I Div.: Setapok F.R. 4779; II Div.: Triso 12863, Saribas F.R. 8515; III Div.: Pulau Bruit 9235, 9248, 9043, 2655, Naman F.R. 683, Daro F.R. 9717.

Tree, 24–36 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei. Easily identified by its spreading stilt roots and silvery white bark; the latter appearance is caused by lichen growth, the true bark being a dull greyish colour.

Specimen in Kew: 3670 (*Haviland*)—B.

**Bridelia** Willd.

1. **Bridelia ovata** Decne.

IV Div.: Sg. Dua 3060.

Scandent shrub, locally frequent in P.C. 2 in the Baram.

**Cephalomappa** Baill.

1. **Cephalomappa beccariana** Baill.

*ahrau*.

III Div.: Loba Kabang P.F. 2859, 870, 484.

Tree, 12–24 ins. g., occasional in P.C.s 2 and 3 in Rejang Delta, but not recorded from elsewhere.

2. **Cephalomappa paludicola** Airy-Shaw.

*ahrau* (M.), *kayu pelah* (Mil. Oya), *melasau* (I. Lassa), *bantas arau* (I. Assan).

II Div.: Tj. Keranji 12896, Sebuyau P.F. 4767, Triso P.F. 2347, Saribas F.R. 8540; III Div.: Naman F.R. 8953, 679, 5123, Daro F.R. 9713, 5235, Loba Kabang P.F. 1599, 2677, 1600, 2771, 2772.

Tree, 12–24 ins. g., locally abundant in P.C.s 2 and 3 in Rejang Delta and Batang Lupar, but absent from northern Sarawak and Brunei. In the field the two species of *Cephalomappa* are difficult to differentiate. The young twigs, inflorescence, and petioles and midribs of the leaves of *C. beccariana* are covered in a stellate tomentum, whereas this species is almost glabrous.

**Croton** L.

1. **Croton laevifolius** Bl.

III Div.: Loba Kabang P.F. 2673, Daro F.R. 9744.

Small tree, 6–12 ins. g. and 20–30 ft. h., rare in P.C. 1. Recorded from only the Rejang Delta.



**Endospermum** Benth.

1. **Endospermum malaccense** Benth. ex Muell.-Arg.  
*terbulan.*

IV Div.: Sg. Dua 3283.

Tree, 36–48 ins. g., rare in P.C. 1 near coast, but frequent in secondary forest (not peat swamp) at a low level. Occurs throughout Sarawak and Brunei.

**Glochidion** Forst.

1. **Glochidion lucidum** Bl.

III Div.: Pulau Bruit 2651, Loba Kabang P.F. 445, 2773, 2674, 2775; V Div.: Kayangeran F.R. 4907, 4915, 1556.

Tree, 12–18 ins. g., occasional, locally frequent, in understorey of P.C. 1 throughout Sarawak and Brunei.

2. **Glochidion obscurum** (Willd.) Bl.

III Div.: Pulau Bruit 9002, Loba Kabang P.F. 2671, Lepah P.F. 8068.

Small tree, 15–30 ft. h. and 6–9 ins. g., rare in understorey of P.C. 1. Recorded from only the Rejang Delta, but probably occurs elsewhere in heath forest.

**Longetia** Baill.

1. **Longetia malayana** (Benth.) Pax. et K. Hoffm.  
*ubah banir.*

II Div.: Saribas F.R. 8571, 8573, Tj. Keranji 12889; III Div.: Lassa 12422, Loba Kabang P.F. 520, 2720, 871, 2736, Pulau Bruit 2631, 4974, 12897, 9215, 7928, 9049, 9295; IV Div.: Sg. Dua 4153; Brunei: 2840.

Medium-sized tree, 36–48 ins. g., occasional in P.C.s 1 and 4 throughout Sarawak and Brunei. It appears possible that there are two variants of this species; the trees in P.C. 1 are markedly different in field characters from those found in P.C. 4.

**Macaranga** Thou.

1. **Macaranga caladifolia** Becc.

*benuah hutan* (M.), *tutup* (Mil. Rejang).

III Div.: Pulau Bruit 2639, Loba Kabang P.F. 9285 (Brooke), Naman F.R. 9168, Lassa 12415.

Medium-sized tree, 24–36 ins. g., occasional in P.C.s 1–3. Recorded from Batang Lupar, Saribas and Rejang Delta; also occurs in heath forest.

Specimen in Kew: 464 (*Haviland*) Type—A.

2. *Macaranga puncticulata* Gage.

*benuah*.

IV Div.: Sungei Dua 2899, 3257.

Tree, 12–24 ins. g., abundant in open secondary swamp forest after felling, but very rare in primary swamp forest. Probably occurs throughout Sarawak and Brunei, but only recorded from the Rejang Delta and Baram.

*Neoscortechinia* Pax.

1. *Neoscortechinia kingii* (Hook. f.) Pax et Hoffm.

*bantas* (M.), *m̄aras* (M. Btg. Lupar), *bantas ketapong* (I.).

II Div.: Saribas F.R. 8528, Triso P.F. 3179, 3157; III Div.: Pulau Bruit 8043, 9254, 2642, 2647, 9213, Loba Kabang P.F. 692, 892, 510.

Small tree, 12–24 ins. g., abundant in P.C. 1 throughout Sarawak and Brunei.

Specimen in Kew: 1164 (*Beccari*) Type—A.

2. *Neoscortechinia sumatrensis* S. Moore.

V Div.: Kuala Lawas 9112.

Distinctive variant which has been recorded in peat swamps from V Div., where it is locally frequent in P.C. 1 near the Coast.

Also recorded at Kuala Bakong in the Baram.

URTICACEAE

*Poikilospermum* Zipp. ex Miq.

1. *Poikilospermum suaveolens* (Bl.) Merr.

II Div.: Saribas F.R. 8566; III Div. Lassa R. 13.

Distinctive epiphyte, rare in understorey of P.C. 1. Probably occurs throughout Sarawak but recorded in peat swamp from only the mentioned locality and the Rejang Delta.

2. *Poikilospermum microstachys* (Barg.-Petr.) Merr.

*akar labat* (Mil.).

II Div.: Kpg. Budu 12333, Saribas F.R. 8552; III Div.: Pulau Bruit 9272, 8010, Lepah P.F. 8083, Naman F.R. 9182.

Epiphyte, facultative climber, occasional in understorey of P.C. 1; throughout Sarawak and Brunei.

MORACEAE

*Artocarpus* Forest.

1. *Artocarpus g'aucus* Bl.

III Div.: Serupai 27.

Large tree 96–108 ins. g., locally abundant in P.C. 1 near large streams flowing through the swamps; throughout Sarawak and Brunei.

2. **Artocarpus rigidus** Bl.

*pudau*.

III Div.: Sg. Assan 502, Lepah P.F. 10190, Bukit Lima F.R. 12902.

Large tree, 72–84 ins. g., rare and rather localised in P.C.s 1 and 2; throughout Sarawak and Brunei.

**Ficus** Tourn. ex L.

1. **Ficus acamptophylla** Miq.

*ara* (generic name for all climbing figs).

II Div.: Triso 3118; III Div.: Daro F.R. 9722.

Ground rooting epiphyte in crowns of dominants in P.C. 1; throughout Sarawak and Brunei.

2. **Ficus annulata** Bl.

II Div.: Triso 12872.

Small tree, 15–20 ft. high, in secondary peat swamp forest near coast. Recorded from Rejang Delta, Maludam Peninsula and Bintulu.

3. **Ficus apiocarpa** Miq.

II Div.: Triso 12854; III Div.: Naman F.R. 5325.

Climbing fig, rather rare and confined to wetter localities where streams drain through P.C. 1. Recorded from Rejang Delta and Maludam Peninsula.

4. **Ficus callicarpides** Corner.

II Div.: Triso P.F. 9805, Saribas F.R. 8539; IV Div.: Sg. Dua 4120, 9890.

Root climber, usually at low level but occasionally reaching crowns of dominants, very abundant on buttresses and lower stems of *Shorea albida* in P.C. 3, also occasional and localised in P.C. 1. Recorded from Batang Lupar, Rejang Delta and Baram.

5. **Ficus consociata** Bl.

II Div.: Triso 12210, 12222.

Large ground rooting epiphyte, locally frequent in P.C. 1 throughout Sarawak and Brunei. Also occurs in heath forest.

6. **Ficus crassiramea** Miq.

II Div.: Triso 10/1959 (J.A.R.A.).

Enormous strangling fig, abundant on shallow peat at coastal margins of P.C. 1, and transitional zone from mangrove; throughout Sarawak and Brunei.

7. **Ficus deltoidea** Jack var. **borneensis** Corn.

II Div.: Sg. Tissak 4807; III Div.: Singat 9754.

Epiphytic fig at low levels, occasionally terrestrial, rare in P.C. 4; more frequently found in heath forest. Occurs throughout Sarawak and Brunei.

8. **Ficus deltoidea** Jack var. **deltoidea**.

II Div.: Triso P.F. 141514, 12201, 12204; III Div.: Pulau Bruit 9048, Sg. Nangar 12312; IV Div.: Sg. Dua 2871.

Epiphytic fig in crowns of dominants and middle storey trees, locally abundant in P.C.s 1 and 2; throughout Sarawak and Brunei. Also occurs in heath forest and is terrestrial on rocky headlands.

9. **Ficus deltoidea** Jack var. **motleyana** (Miq.) Corner.

II Div.: Triso 14515; III Div.: Lassa P.F. 12901, Loba Kabang P.F. 79330 (W.-S.), 2784; IV Div.: Bakong 2872, Sg. Dua 2884.

Straggling shrub, rarely more than 4 ft. h., locally frequent in P.C. 4 throughout Sarawak and Brunei; also a characteristic species of heath forest.

10. **Ficus disticha** Bl.

II Div.: Tj. Keranji 12892.

Root climber to canopy in P.C. 1; rare and recorded in peat swamps from only the one locality. More usually a montane species.

11. **Ficus globosa** Bl.

III Div.: Pulau Bruit 12898.

Medium-sized climber in P.C. 1. Recorded only from the one locality.

12. **Ficus heteropleura** Bl. var. **hirta** Corner.

I Div.: Lundu 9147.

Climbing fig to height of 100 ft. in P.C. 1; a single record.

13. **Ficus pellucido-punctata** Griff.

III Div.: Surong Irit 9706.

Strangling fig of dominants in P.C. 1. Recorded from only the Rejang Delta.

14. **Ficus pisocarpa** Bl.

III Div.: Pulau Bruit 5117, Oya 5301.

Epiphytic fig in crowns of dominants in P.C. 1; rare and recorded from only the Rejang Delta.

15. **Ficus recurva** Bl.

II Div.: Triso 12867.

Small climbing fig in understory of P.C. 1.

16. **Ficus spathulifolia** Corner.

II Div.: Triso 12203; III Div.: 7933, 8008, 9044, 9232.

Ground rooting epiphyte, rarely strangling, locally frequent in P.C. 1. Recorded from II and III Divs.

17. **Ficus sumatrana** Miq.

Brunei: Badas 2841.

Strangling fig in P.C.s 1 and 2, rare. Recorded from Rejang Delta and Brunei.

18. **Ficus sundaica** Bl.

II Div.: Triso 3163, Saribas 4771, Sg. Tissak 4808; II Div.: Pulau Bruit 9229, 8052, 7934, 8014, 9012.

Large ground rooting epiphyte, occasionally strangling, frequent in P.C. 1 throughout Sarawak and Brunei.

19. **Ficus sundaica** Bl. var. **beccariana** (King) Corner.

II Div.: Triso 12202; III Div.: Sg. Nangar 12313, Pulau Bruit 9051.

Large ground rooting epiphyte, occasionally strangling, rare in P.C. 1. Recorded from Rejang Delta, Saribas and Batang Lupar.

20. **Ficus supperforata** Corner.

III Div.: Daro P.F. 9061, Pulau Bruit R3.

Climbing (?) fig in P.C. 1. Single record.

21. **Ficus tristaniifolia** Corner.

III Div.: Pulau Bruit 12232, 12231.

Ground rooting epiphyte, locally frequent in P.C. 1. Recorded from Pulau Bruit and Maludam Peninsula.

22. **Ficus uniglandulosa** Wall. var. **parvifolia** Miq.

II Div.: Triso 12215.

Epiphytic fig at height of 80 ft. in P.C. 1; single record.

23. **Ficus villosa** Bl.

II Div.: Kpg. Budu 12334, Simanggang 12226, Triso 14546.

Root climber, occasional in understorey of P.C. 1; throughout Sarawak and Brunei. This species shows remarkable dimorphism in foliage.

24. **Ficus xylophylla** Wall.

III Div.: Pulau Bruit 12228, 5118, 12896, 12895.

Large ground rooting epiphyte, occasionally strangling, locally frequent (Pulau Bruit) in P.C. 1. Recorded from Rejang Delta and Maludam Peninsula.

**Parartocarpus** Baill.

1. **Parartocarpus venenosus** (Zoll. and Mor.) Becc. ssp. **forbesii** (King) Jarrett.

*minggi, katih* (I.), *kelidam* (Murut).

III Div.: Daro F.R. 9715, A 7, Loba Kabang P.F. 2746, Naman F.R. A 122, Lassa 12432, Sg. Nangar 12309.

Medium-sized to large tree, 60–72 ins. g., occasional in P.C. 1 throughout Sarawak and Brunei.

**CASUARINACEAE**

**Casuarina** Linn.

1. **Casuarina** sp. nov.

*rhu ronang, sempilau* (Lawas).

V Div.: Kayangeran F.R. 1569.

Tree, 60–84 ins. g., abundant in association with *Dacrydium elatum*. Distribution in peat-swamp forest confined to north Sarawak and localised areas of Brunei: throughout Sarawak and Brunei, it is a characteristic species of heath forests.

This undescribed species was formerly confused with *Casuarina sumatrana*.

**FAGACEAE**

**Castanopsis** Spach.

1. **Castanopsis foxworthyi** Schottky ex Winkler.

*berangan paya*.

III Div.: Daro F.R. 9753, Loba Kabang P.F. 442, 477, 881.

Small tree, 12–20 ins. g., rare and localised in P.C.s 1 and 2. Recorded from only the Rejang Delta.

**Lithocarpus** Blume.

1. **Lithocarpus rassa** (Miq.) Rehd.

III Div.: Loba Kabang P.F. 515, 2767, 2783, 444.

Small to medium-sized trees, 24–30 ins. g., occasional in P.C. 2. Recorded from only the Rejang Delta and Maludam Peninsula in peat swamps, but also occurs in heath forest in Brunei.

2. **Lithocarpus** sp. (9813).

II Div.: Nanga Skrang, 9824, Lingga 9813; III Div.: Loba Kabang P.F. 878, 428, 519, 2780.

Small tree, 9–18 ins. g., rare in P.C.s 1 and 2 towards the inland margins of swamp forest in Rejang Delta and Batang Lupar.

3 **Lithocarpus sundaicus** (Bl.) Rehd.

*empenit padang*.

II Div.: Lingga 9814, Triso 3201; III Div.: Naman F.R. 678, Loba Kabang P.F. 2767, 2730, 492; Brunei: Anduki F.R. 2043, Badas 5646.

Small tree, 12–18 ins. g., abundant to very abundant in understorey of P.C.s 2, 3 and 4. A dominant species in the regrowth following logging. Occurs throughout Sarawak and Brunei.

4. **Lithocarpus wenzigianus** (King) A. Camns.

*empenit jangkar, penyibong* (Mil. Rejang), *kayu kikai* (Mil. Oya, Mukah).

II Div.: Sabu F.R. 3209; III Div.: Daro F.R. 9720, Sg. Kelapa'an 5054, Pulau Bruit 8013, Surong Irit 5227, 5229, Mukah 5102, Loba Kabang P.F. 2709, 538, 2648, 2682.

Medium-sized tree, 48–60 ins. g., frequent in P.C. 1 throughout Sarawak and Brunei. The largest oak in swamp forest and readily identified in the field by the presence of numerous spreading stilt roots.

## II. MONOCOTYLEDONS

### ORCHIDACEAE

#### **Adenoncos** Blume.

1. **Adenoncos sumatrana** J. J. S.

III Div.: Pulau Bruit 7936.

Small epiphytic orchid, occasional in crowns of trees, especially on *Gonystylus bancanus*, in P.C. 1.

#### **Appendicula** Blume.

1. **Appendicula pendula** Bl.

II Div.: Triso 9808.

Small epiphytic orchid, on base of small trees, surface roots and pneumatophores in P.C. 1; frequent and localised. Recorded only from the Rejang Delta and Batang Lupar.

#### **Bulbophyllum** Thou.

1. **Bulbophyllum beccarii** Rchb. f.

II Div.: Saribas 13258; III Div.: Loba Kabang P.F. 9192.

Distinctive epiphytic orchid which spirals round upper boles of large trees, especially *Shorea albida*; occasional in P.C.s 1 and 2 and frequent in P.C. 3; throughout Sarawak and Brunei.

2. **Bulbophyllum** aff. **concinnum** Hook. f.

II Div.: Triso 9806.

Small epiphytic orchid at heights of between 3 ft. and 10 ft. in P.C. 1; rare and recorded from only the mentioned locality.

3. **Bulbophyllum vaginatum** (Lindl.) Rchb. f.

III Div.: Pulau Bruit 9217, Sg. Nangar 12267.

Epiphytic orchid in crowns of trees in P.C. 1, occasional; throughout Sarawak and Brunei.

**Cystorchis** Blume.

1. **Cystorchis variegata** Bl. var. **purpurea** Ridl.

III Div.: Pulau Bruit 8033; IV Div.: Sg. Dua 4181.

Small terrestrial orchid growing in dense shade and preferring damper localities in P.C.s 1 and 2. Occurs throughout Sarawak, but not recorded from Brunei.

**Dendrobium** Sw.

1. **Dendrobium cumulatum** Lindl.

III Div.: Lepah P.F. 7901, Matu—Daro P.F. 12275.

Epiphytic orchid on small trees at heights from 5 to 12 ft. above swamp surface, rare in P.C. 1. Recorded from only the Rejang Delta.

2. **Dendrobium** aff. **merrillii** Ames.

III Div.: Pulau Bruit 7935, 7937, 10618 (Brooke).

Distinctive epiphytic orchid in crowns of trees in P.C. 1; recorded from the Batang Lupar and Rejang Delta.

**Dipodium** R. Br.

1. **Dipodium pictum** Rchb. f.

I Div.: Telok Sabang 10198; II Div.: Saribas F.R. 8572; III Div.: Rantau Panjang 9868.

Epiphytic orchid at heights from 3 to 10 ft. above swamp surface, rare in P.C. 1.

**Eria** Lindl.

1. **Eria** aff. **obliqua** Lindl.

II Div.: Triso 12207, 10008, Loba Kabang P.F. 9068, Surong Irit 5223.

Small epiphytic orchid in crowns of dominant trees, especially *Gonystylus bancanus*, occasional in P.C. 1; throughout Sarawak and Brunei.

2. **Eria pannea** Lindl.

II Div.: Saribas F.R. 8526; III Div.: Daro F.R. 5223.

Epiphytic orchid, frequent in crowns of dominants in P.C. 1. Recorded from the Batang Lupar and Rejang Delta.

3. **Eria** aff. **pulchella** Lindl.

II Div.: Saribas F.R. 8525; III Div.: Naman F.R. 8952, Daro F.R. 9065.



Epiphytic orchid, frequent in crowns of dominants, especially *Gonystylus bancanus*, in P.C. 1; throughout Sarawak and Brunei.

**Eulophia** R. Br.

1. **Eulophia squalida** Lindl.

II Div.: Triso 12219; Brunei: Badas 5648.

Terrestrial or low epiphytic orchid, rare to very rare in P.C.s 1 and 2; throughout Sarawak and Brunei.

**Bromheadia** Lindl.

1. **Bromheadia finlaysoniana** (Lindl.) Rchb. f.

IV Div.: Lobok Pasir 3074.

Terrestrial orchid, frequent in P.C. 6. In peat swamp forest, it is confined to this forest type, though it is a characteristic species in open secondary heath forest and on degraded soils.

**Grammatophyllum** Bl.

1. **Grammatophyllum speciosum** Bl.

*lukut gergasi* (Mil. Rejang).

III Div.: Matu-Daro P.F. 12276.

Large epiphytic orchid in crowns of upper and middle storey trees, rare in P.C. 1; throughout Sarawak and Brunei.

**Liparis** Rich.

1. **Liparis lacerata** Ridl.

III Div.: Pulau Bruit 9255, 9212, 8024, Naman F.R. 11720, 8955, Rantau Panjang 9443.

Epiphytic orchid on small trees at heights from 5 to 20 ft. above swamp surface, rare but widely distributed in P.C. 1; throughout Sarawak and Brunei.

**Zeuxine** Lindl.

1. **Zeuxine violascens** (Bl.) Ridl.

IV Div.: Sg. Dua 4187.

Small terrestrial orchid in dense shade in P.C.s 1 and 2, rare and localised. Recorded from I, III and IV Divs.

**ZINGIBERACEAE**

**Alpinia** L.

1. **Alpinia** sp. (8096).

III Div.: Lepah P.F. 8096.

Unidentified species, which is found as a low epiphyte in P.C. 1, rare and localised. Recorded from only the Rejang Delta.

**Globba L.**

1. ***Globba panicoides* Miq.**

II Div.: Triso 14548, 3175; III Div.: 8830 (Brooke).

Herb, rare, locally occasional, in P.C. 1, preferring shallow peat near riparian or coastal margins of forest; throughout Sarawak and Brunei.

**DIOSCOREACEAE**

**Dioscorea Blume.**

1. ***Dioscorea* sp. (9001).**

III Div.: Pulau Bruit 9001.

Unidentified low climber in P.C. 1, rare and only recorded from Pulau Bruit.

**LILIACEAE**

**Pleomele Salzb.**

1. ***Pleomele cantleyi* (Vand.) N.E. Br.**

III Div.: Pulau Bruit 8393; IV Div.: Sungei Dua 3275.

Straight stemmed shrub, 9–12 ft. h., rare in P.C.s 1–3; throughout Sarawak and Brunei.

**FLAGELLARIACEAE**

**Flagellaria L.**

1. ***Flagellaria indica* L.**

*rotan tikus.*

I Div.: Setapok F.R. 4754; III Div.: Loba Kabang P.F. 1573; IV Div.: Sg. Dua 3071, 9882.

Small to medium-sized climber, very rare in P.C.s 1–3, occasional in P.C.s 4 and 5 and frequent in P.C. 6. Occurs throughout Sarawak and Brunei.

**Hanguana Blume.**

1. ***Hanguana malayana* (Jack) Merr.**

*bakong.*

III Div.: Pulau Bruit 8060, Loba Kabang P.F. 2816, 1570.

Large herb, occasional and localised in P.C.s 1–3, preferring damper localities where the water table is exposed. A much shorter form is frequently found in a slightly drier habitat. Occurs throughout Sarawak and Brunei.

PALMAE

**Calamus** Linn.

1. **Calamus** sp. (4788).

I Div.: Setapok F.R. 4788.

Rattan palm, occasional in P.C. 1 throughout Sarawak and Brunei.

**Cyrtostachys** Blume.

1. **Cyrtostachys** *lacca* Becc.

*pinang raja, pinang laka.*

III Div.: Lepah P.F. 8099.

Conspicuous slender palm, attaining a height of 20 ft., abundant on shallow peat in transitional zone from mangrove, also occasional and localised in P.C. 1, and more rarely in P.C.s 2 and 3; throughout Sarawak and Brunei.

**Daemonorops** Blume.

1. **Daemonorops** *longipes* Mart.

III Div.: Loba Kabang P.F. 2823.

Short stemmed palm, occasional in P.C. 1 but rather localised and preferring wetter localities; throughout Sarawak and Brunei.

**Iguanura** Bl.

1. **Iguanura** sp. (12246).

I Div.: Telok Sabong 12246.

Slender palm, 3–10 ft. h., locally frequent in P.C. 1, preferring shallow peat near coast, though also found inland on peat near streams subject to periodic inundation. Recorded from I, II and III Divs., and probably occurs throughout Sarawak and Brunei.

**Korthalsia** Blume.

1. **Korthalsia** *rigida* Bl.

II Div.: Triso P.F. 10027.

Rottan palm, frequent in P.C.s 2 and 3 and occasional in P.C. 1; throughout Sarawak and Brunei.

**Pinanga** Bl.

1. **Pinanga** sp. (12332).

II Div.: Tanjong Keranji 12332, 12402.

Small slender palm, 2–6 ft. h., locally occasional in P.C. 1. Recorded from only the Maludam Peninsula.

**Plectocomiopsis** Becc.

1. **Plectocomiopsis wrayi** Becc.

III Div: Loba Kabang P.F. 5119.

Rottam palm, occasional in P.C. 1; recorded from only the Rejang Delta.

**Zalacca** Rumph.

1. **Zalacca conferta** Griff.

*asam paya*.

Stemless spiny palm which forms dense thickets on shallow peat near the coast, occasional elsewhere in P.C. 1 especially in wetter localities; throughout Sarawak and Brunei.

**PANDANACEAE**

**Pandanus** Rumph.

1. **Pandanus andersonii** H. St. John.

*pandan, surong nriit*.

III Div.: Loba Kabang P.F. 2815, 1588; V Div.: Lawas no number (Anderson).

Large stemless pandan which frequently forms dense thickets in P.C.s 2 and 3, and occurs more rarely in P.C.s 1 and 4; throughout Sarawak and Brunei.

2. **Pandanus ridleyi** Martelli.

II Div.: Triso 9817, III Div.: Loba Kabang P.F. 9069; IV Div.: Sg. Dua 4119.

Short stemmed pandan occasionally attaining heights of 6–8 ft., rare in P.C.s 3 and 4, becoming abundant in P.C.s 5 and 6.

3. **Pandanus brevifolius** Martelli.

I Div.: Telok Sabong 10199; II Div.: Triso 12209; III Div.: Pulau Bruit 8055.

Small stemless pandan, locally abundant in damper areas of P.C. 1. Not yet recorded east of the Rejang Delta.

**Freycinetia** Gaud.

1. **Freycinetia** sp. (14545).

II Div.: Triso 14545, 14549.

Small climbing pandan, occasional in understorey of P.C. 1 throughout Sarawak and Brunei.

**ARACEAE**

**Aglaonema** Schott.

1. **Aglaonema pictum** (Roxb.) Kunth.

II Div.: Saribas F.R. 8506; III Div.: Pulau Bruit 8023, 8056, Loba Kabang P.F. 2812.

Herb, 9–18 ins. h., occasional in P.C. 1. Recorded only from II and III Divs.

### **Alocasia Neck.**

#### 1. **Alocasia longiloba** Miq.

*birah hutan* (Mil.).

II Div.: Triso 12218, Saribas F.R. 8507; III Div.: Pulau Bruit 9219, 8018; IV Div.: Sg. Dua 4195.

Distinctive herb, rare in P.C. 1, occasional and localised in P.C. 2; throughout Sarawak and Brunei.

#### 2. **Alocasia beccarii** Engl.

II Div.: Triso 3174, Saribas F.R. 8364; III Div. Naman F.R. 9299.

Small herb, occasional in P.C.'s 1 & 2. Recorded from only II & III Divs.

### **Cryptocoryne** Fisch.

#### 1. **Cryptocoryne pallidinervia** Engl.

II Div.: Triso 12212; III Div.: Pulau Bruit 8022.

Aquatic herb, occasional, locally frequent, in wetter localities of P.C. 1; throughout Sarawak and Brunei.

### **Cyrtosperma** Griff.

#### 1. **Cyrtosperma lasioides** Griff.

III Div.: Pulau Bruit 9021, Lepah P.F. 8066.

Large herb, rare in P.C. 1, more frequent in areas where there has been an opening in the canopy and on shallow peat; throughout Sarawak and Brunei.

### **Epipremnopsis** Engl.

#### 1. **Epipremnopsis media** Engl.

*teririp* (Mil.).

III Div.: Daro F.R. 9707.

Climber to height of 15–20 ft., rare in P.C. 1. Recorded in peat swamps from only the Rejang Delta and V Div.

### **Homalomena** Schott.

#### 1. **Homalomena rostrata** Griff.

II Div.: Triso 10020; III Div.: Pulau Bruit 8012, Loba Kabang P.F. 2813.

Herb, occasional and localised in P.C. 1 in wetter localities where the water table is exposed. Occurs throughout Sarawak, but not recorded from Brunei.

**Podolasia** N. E. Br.

1. **Podolasia stipitata** N.E.Br.

III Div.: Loba Kabang P.F. 2818.

Spiny aroid, rare in P.C.s 1 and 2, and recorded from only the Rejang Delta and Maludam Peninsula.

**Rhaphidophora** Schott.

1. **Rhaphidophora lobbii** Schott.

II Div.: Triso 14547, 12216; III Div.: Pulau Bruit 8007, 8032.

Small climbing aroid, not exceeding 10 ft. in height, occasional in P.C. 1. Recorded from Maludam Peninsula and Rejang Delta, but probably occurs throughout two territories.

**CYPERACEAE**

**Tetraria** Beauv.

1. **Tetraria borneensis** Kern.

IV Div.: Lobok Pasir 9876.

Tall sedge which is only found in peat swamp forest in the centre of P.C. 6 where it is abundant but localised. Also occurs in open heath forest (Bako National Park).

**Thorachostachyum** Kurz.

1. **Thorachostachyum bancanum** (Miq.) Kurz.

II Div.: Triso 3177; III Div.: Loba Kabang P.F. 2802, 1574;

IV Div.: Sg. Dua 3072.

Sedge, very abundant in P.C.s 1 and 6 but rare in P.C.s 2-5; occurs throughout Sarawak and Brunei.

**III. GYMNOSPERMAE**

**CONIFERAE**

**Dacrydium** Soland.

1. **Dacrydium beccarii** Parl. var. **subelatum** Corner.

V Div.: Kayangeran F.R. 1795, 1568.

Tree, 72-84 ins. g., forming dense almost pure stands in the Lawas District, the only locality that it occurs in swamp forest, though it is a common component of heath forests.

**Podocarpus** (L'Hérit.) Pers.

1. **Podocarpus blumei** Endl.

III Div.: Naman F.R. 11716.

Small tree, 12-24 ins. g., frequent but very localised in P.C. 1 near inland margins of peat swamps. Recorded from only the Rejang Delta but distribution probably more widespread in localised areas. Occurs more commonly in heath forests.

## GNETACEAE

### Gnetum L.

1. *Gnetum neglectum* Bl.

II Div.: Ng. Skrang 9828; III Div.: Naman F.R. 9180, Surong Irit 5239.

Small twining climber in understorey of P.C. 1. Rare, recorded from only the Rejang Delta and Batang Lupar.

## IV. PTERIDOPHYTA

### LYCOPODIACEAE

### Lycopodium L.

1. *Lycopodium cernuum* Sw.

IV Div.: Lobok Pasir 4165.

Terrestrial club moss, abundant in P.C. 6 of the Baram. In swamp forest it occurs only in this one forest type but it is abundant elsewhere in open heath forest and on degraded soils.

2. *Lycopodium phlegmaria* L. var. *divaricatum* Bl.

II Div.: Triso 9900, 10005; III Div.: Pulau Bruit 9015.

Epiphytic club moss, rare in P.C. 1 on stems of small trees 4–10 ft. above swamp surface. Recorded from only the Rejang Delta and Batang Lupar.

3. *Lycopodium pinifolium* Bl.

II Div.: Triso 14521.

Small epiphytic club moss usually found on rotting stumps and fallen trees, rather rare and recorded only from the Batang Lupar.

### OPHIOGLOSSACEAE

### Ophioglossum L.

1. *Ophioglossum intermedium* Hook.

III Div.: Pulau Bruit 9034.

Small terrestrial fern on litter layer of P.C. 1, very rare and localised. Recorded from only the one locality.

### SCHIZAEACEAE

### Schizaea Smith.

1. *Schizaea malaccana* Baker.

IV Div.: Lobok Pasir 3082.

Small terrestrial fern, rare and confined to P.C. 6, where it is found associated with sphagnum moss (*Sphagnum junghuhnianum*).

## CYATHEACEAE

### **Cyathea** Smith.

1. **Cyathea glabra** (Bl.) Copel.

IV Div.: Sg. Dua 4160.

Stemless tree fern, occasional, locally abundant, in P.C.s 2 and 3 throughout Sarawak and Brunei.

## POLYPODIACEAE

### **Crypsinus** Presl.

1. **Crypsinus albidopaleatus** (Bl.) Copel.

II Div.: Triso 14517; III Div.: Naman F.R. 9297.

Small epiphytic fern near ground level in P.C.s 1 and 2, rare and localised. Recorded from the Rejang Delta and Batang Lupar.

### **Drynaria** J. Sm.

1. **Drynaria involuta** v. A. v. R.

II Div.: Saribas F.R. 8529; III Div.: Pulau Bruit 7927, Naman F.R. 9187, 9188.

Nest fern, occasional in understorey of P.C. 1, more rarely in crowns of middle and upper storey trees; throughout Sarawak and Brunei.

### **Lecanopteris** Bl.

1. **Lecanopteris sinuosa** (Wall.) Copel.

III Div.: 9085; IV Div.: Lobok Pasir 9879; V Div.: Lawas 9200.

Small epiphytic myrmecophilous fern, rare in crowns of large trees in P.C. 1, also found near ground level in P.C. 6; throughout Sarawak and Brunei.

### **Paragramma** Copel.

1. **Paragramma longifolia** (Bl.) Moore.

II Div.: Triso 14518; III Div.: Pulau Bruit 8042, 9052, Naman F.R. 9787.

Epiphytic fern on boles of trees in middle and understoreys, rare in P.C. 1 in the Rejang Delta and Batang Lupar.

### **Photinopteris** Presl.

1. **Photinopteris speciosa** (Bl.) Presl.

III Div.: Pulau Bruit 12205.

Crown epiphyte; rare in P.C. 1 and recorded from only the Rejang Delta.

### **Phymatodes** Presl.

1. **Phymatodes crustacea** (Copel.) Holttum.

II Div.: Saribas F.R. 8544; V Div.: Lawas 9199.



Epiphytic myrmecophilous fern in crowns of dominant trees in P.C. 1, rare; recorded from the Rejang Delta and Batang Lupar, and Lawas.

**Platycterium Desvaux.**

1. **Platycterium coronarium** (Koenig) Desv.

Large crown epiphyte, rather rare in peat swamps and confined to P.C. 1.

**Polypodium L.**

1. **Polypodium verrucosum** (Hook.) Wall.

II Div.: Triso P.F. 10006, 12217.

Large epiphytic fern in middle and understoreys of P.C. 1, rather rare and usually associated with *Asplenium nidus*. Occurs throughout Sarawak and Brunei.

**Pyrrosia Mirbel.**

1. **Pyrrosia longifolia** (Burm.) Morton.

III Div.: Pulau Bruit 9057, 9054.

Epiphytic fern on boles of trees in the middle storey, rarely at a lower level, occasional in P.C. 1 throughout Sarawak and Brunei.

**Selliguea Bory.**

1. **Selliguea heterocarpa** Bl.

II Div.: Triso 14516; III Div.: Pulau Bruit 7926, 8037, 8036;  
V Div.: Kayangeran F.R. 9199.

Epiphytic fern which occupies a similar habitat to *Pyrrosia longifolia*, rare in P.C. 1; throughout Sarawak and Brunei.

**Stenochlaena J. Smith.**

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

II Div.: Triso No number (Anderson).

Climbing fern, very abundant on trees in P.C. 1 near coast, less abundant inland and in P.C.s 2 and 3, very rare or absent in P.C.s 4-6; throughout Sarawak and Brunei.

**DENNSTAEDTIACEAE**  
**(LINDSAYOIDEAE)**

**Lindsaya Dryand.**

1. **Lindsaya scandens** Hk. var. *terrestris* Holttum.

III Div.: Pulau Bruit 8795 (Brooke); IV Div.: Sg. Dua 3085, Lobok Pasir 9442.

Terrestrial fern, rather rare in P.C. 1, occasional in P.C.s 2 and 3, throughout Sarawak and Brunei.

**Schizoloma** Gaudich.

1. **Schizoloma coriaceum** v. A. v. R.

III Div.: Pulau Bruit 8015, 9293, Loba Kabang P.F. 2804,  
V Div.: Sg. Dua 4186.

Terrestrial fern, abundant on pneumatophores and roots at surface level in P.C. 1; throughout Sarawak and Brunei.

(DAVALLIOIDEAE)

**Humata** Cav.

1. **Humata angustata** (Wall.) J. Sm.

II Div.: Triso 9809, 10014; III Div.: Naman F.R. 8599.

Small epiphytic fern, rather rare in crowns of middle-storey trees in P.C.s 1–3, becoming frequent in P.C. 4 as an epiphyte at ground level; throughout Sarawak and Brunei.

2. **Humata parvula** (Wall.) Mett.

II Div.: Triso 10012, 9811.

Minute epiphytic fern which occupies a similar habitat to *H. angustata*, but is much rarer. Probably occurs throughout Sarawak and Brunei, but recorded from only the Rejang Delta and Batang Lupar.

(OLEANDROIDEAE)

**Nephrolepis** Schott.

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

III Div.: Lepah P.F. 8089.

Terrestrial fern, very rare in primary P.C. 1 but more frequent in transitional zone from mangrove, and very abundant in secondary swamp vegetation following extensive openings of the canopy.

(ASPLENIOIDEAE)

**Asplenium** L.

1. **Asplenium glaucophyllum** v. A. v. R.

III Div.: Pulau Bruit 7940; IV Div.: Sg. Dua 3263.

Epiphytic fern at low level in understorey of P.C. 1, rather rare and localised. Occurs throughout Sarawak but not recorded from Brunei.

2. **Asplenium longissimum** Bl.

II Div.: Triso 10004; IV Div.: Sg. Dua 3269, 3286.

Terrestrial fern, or epiphytic on rotten stumps and roots, occasional in P.C. 1, becoming abundant after the opening of the canopy; throughout Sarawak and Brunei.

3. **Asplenium nidus** L.

III Div.: Pulau Bruit 7929.

Bird's nest fern, frequent in crowns of trees of lower and middle storeys and occasional in crowns of upper storey trees

in P.C. 1, becoming less frequent in P.C.s 2 and 3 and rare in P.C.s 4-6.

4. **Asplenium phyllitidis** Don.

III Div.: Pulau Bruit 7939.

Bird's nest fern, similar in habitat to *A. nidus* but much rarer and more restricted in its distribution; recorded in swamps from only the Rejang Delta.

5. **Asplenium tenerum** Forst.

II Div.: Triso 10018, 9810.

Small epiphytic fern at base of small trees and on roots and pneumatophores in P.C. 1, occasional and localised. Occurs throughout Sarawak and Brunei.

(LOMARIOPSIDOIDEAE)

**Teratophyllum** Mett.

1. **Teratophyllum ludens** (Fée) Holttum.

IV Div.: Sg. Dua 3262, 3086.

Small climbing fern, occasional in P.C. 1 and rare in P.C. 2; throughout Sarawak and Brunei.

ADIANTACEAE

**Syngamma** J. Smith.

1. **Syngamma lobbiana** (Hook.) Sm.

III Div.: Pulau Bruit 8448, Loba Kabang P.F. 2807.

Terrestrial fern, frequent on pneumatophores and surface roots in P.C. 1; throughout Sarawak and Brunei.

**Vittaria** Smith.

1. **Vittaria elongata** Sw.

II Div.: Saribas F.R. 8563; III Div.: Pulau Bruit 8017, Loba Kabang P.F. 2808; IV Div.: Sg. Dua 3264.

Small terrestrial fern, abundant on pneumatophores and surface roots in P.C. 1; throughout Sarawak and Brunei.

2. **Vittaria ensiformis** Sw.

III Div.: Pulau Bruit 7925.

Small epiphytic fern on boles of trees in understorey of P.C. 1, rare and only recorded from the Rejang Delta and Maludam Peninsula.

3. **Vittaria hirta** Fée.

II Div.: Triso 10011.

Minute epiphytic fern, occasional in crowns of trees in middle storey in P.C.s 1 and 2. Recorded only from the Rejang Delta and Batang Lupar but distribution probably more widespread.

TABLE I

REPRESENTATION OF BOTANICAL FAMILIES OF  
ANGIOSPERMS AND GYMNASPERMS

Families	Total numbers of genera and species (in brackets) represented	NUMBERS OF GENERA AND SPECIES (IN BRACKETS) REPRESENTED					
		Trees > 12" girth	Trees < 12" girth	Shrubs	Herbs	Climb- ers and Lianes	Epi- phytes
<b>Gymnosperms</b>							
Coniferae	.. 2 (2)	2 (2)					
Gnetaceae	.. 1 (1)						1 (1)
<b>Angiosperms</b>							
<i>Dicotyledons</i>							
Dilleniaceae	.. 2 (2)	1 (1)					1 (1)
Magnoliaceae	.. 1 (1)	1 (1)					
Annonaceae	.. 12 (17)	5 (9)	3 (3)				5 (5)
Menispermaceae	.. 2 (2)						1 (1) 1 (1)
Polygalaceae	.. 2 (4)	2 (4)					
Hypericaceae	.. 1 (2)	1 (2)					
Flacourtiaceae	.. 2 (2)	1 (1)	1 (1)				
Guttiferae	.. 3 (16)	3 (16)					
Ternstroemiaceae	.. 2 (4)	2 (4)					
Dipterocarpaceae	.. 7 (15)	7 (15)					
Malvaceae	.. 2 (2)	2 (2)					
Sterculiaceae	.. 2 (4)	2 (4)					
Tiliaceae ..	.. 2 (5)	1 (2)	2 (3)				
Linaceae ..	.. 2 (2)	2 (2)					
Rutaceae	.. 2 (3)	1 (2)	1 (1)				
Simarubaceae	.. 2 (2)	1 (1)	1 (1)				
Ochnaceae	.. 3 (4)	2 (2)			1 (2)		
Burseraceae	.. 2 (6)	2 (6)					
Meliaceae	.. 3 (3)	2 (2)	1 (1)				
Olacaceae	.. 4 (5)	4 (5)					
Ilicinaceae	.. 1 (2)	1 (2)					
Celastraceae	.. 3 (4)	3 (4)					
Rhamnaceae	.. 1 (1)						1 (1)
Ampelidaceae	.. 3 (3)						3 (3)
Sapindaceae	.. 3 (4)	3 (3)	1 (1)				
Anacardiaceae	.. 7 (11)	7 (11)					
Connaraceae	.. 3 (3)		1 (1)				2 (2)
Leguminosae	.. 8 (8)	6 (6)	1 (1)				1 (1)
Rosaceae	.. 2 (3)	2 (3)					
Rhizophoraceae	.. 2 (2)	2 (2)					
Myrtaceae	.. 3 (16)	3 (15)	1 (1)				
Melastomaceae	.. 4 (8)	2 (2)			1 (1)		1 (2) 1 (3)
Cucurbitaceae	.. 1 (1)						1 (1)
Araliaceae	.. 2 (4)	1 (1)	1 (1)	1 (1)			1 (1)
Cornaceae	.. 1 (1)	1 (1)					

TABLE 1—Continued

REPRESENTATION OF BOTANICAL FAMILIES OF  
ANGIOSPERMS AND GYMNOSPERMS

Families	Total numbers of genera and species (in brackets) represented	NUMBERS OF GENERA AND SPECIES (IN BRACKETS) REPRESENTED							
		Trees		Shrubs	Herbs	Climb- ers and Lianes	Epi- phytes		
> 12" girth	< 12" girth								
Rubiaceæ	.. 18 (22)	6 (6)	5 (5)	1 (1)	1 (1)	5 (7)	2 (2)		
Ericaceæ	.. 1 (1)			1 (1)					
Myrsinaceæ	.. 5 (11)	1 (1)	2 (3)	3 (4)		2 (3)			
Sapotaceæ	.. 4 (12)	4 (12)							
Ebenaceæ	.. 1 (4)	1 (4)							
Oleaceæ ..	.. 2 (4)	1 (3)				1 (1)			
Apocynaceæ	.. 5 (6)	2 (2)	1 (1)			2 (3)			
Asclepiadaceæ	.. 2 (6)							2 (6)	
Loganiaceæ	.. 1 (2)			1 (2)					
Convolvulaceæ	.. 1 (2)					1 (2)			
Gesneriaceæ	.. 1 (1)					1 (1)			
Verbenaceæ	.. 3 (3)	1 (1)			1 (1)	1 (1)			
Nepenthaceæ	.. 1 (5)			1 (4)		1 (1)			
Piperaceæ	.. 1 (4)				1 (1)	1 (3)			
Myristicaceæ	.. 4 (7)	4 (5)	2 (2)						
Lauraceæ	.. 9 (18)	6 (14)	3 (4)						
Thymeliaceæ	.. 2 (4)	1 (3)				1 (1)			
Loranthaceæ	.. 3 (3)							3 (3)	
Santalaceæ	.. 1 (2)			1 (1)				1 (1)	
Euphorbiaceæ	.. 11 (17)	7 (12)	4 (4)		1 (1)				
Urticaceæ	..							1 (2)	
Moraceæ	.. 3 (27)	2 (3)		1 (1)		1 (19)	1 (4)		
Casuarinaceæ	.. 1 (1)	1 (1)							
Fagaceæ	.. 2 (5)	2 (5)							
<i>Monocotyledons</i>									
Orchidaceæ	.. 12 (17)				3 (3)		11 (14)		
Zingiberaceæ	.. 2 (2)				1 (1)		1 (1)		
Dioscoreaceæ	.. 1 (1)					1 (1)			
Liliaceæ ..	.. 1 (1)			1 (1)					
Flagellariaceæ	.. 2 (2)				1 (1)	1 (1)			
Palmae ..	.. 7 (7)		1 (1)	3 (3)		3 (3)			
Pandanaceæ	.. 1 (4)			1 (3)		1 (1)			
Araceæ ..	.. 9 (9)				7 (7)	2 (2)			
Cyperaceæ	.. 2 (2)				2 (2)				

TABLE 2

FLORISTIC COMPOSITION (ANGIOSPERMS AND GYMNOSPERMS)  
OF PEAT SWAMP FORESTS

Note:—Only the more abundant and widely distributed species are included.

*Tree species*

(i) Upper storey (60 ins. girth and over):

<i>Alstonia spathulata</i>	<i>Gonystylus maingayi</i>
<i>Anisoptera marginata</i>	<i>Koompassia malaccensis</i>
<i>Artocarpus rigidus</i>	<i>Litsea palustris</i>
<i>Calophyllum retusum</i>	<i>Lophopetalum multinervium</i>
<i>Camptosperma coriacea</i>	<i>Melanorrhoea beccarii</i>
<i>Casuarina</i> sp. nov.	<i>Melanorrhoea tricolor</i>
<i>Combretocarpus rotundatus</i>	<i>Mezzettia leptopoda</i>
<i>Copaifera palustris</i>	<i>Parartocarpus venenosus</i> ssp. <i>forbesii</i>
<i>Cratoxylon arborescens</i>	<i>Parastemon urophyllum</i>
<i>Cratoxylon glaucum</i>	<i>Parishia sericea</i>
<i>Dacrydium beccarii</i> var. <i>subelatum</i>	<i>Planchonella maingayii</i>
<i>Dactylocladus stenostachys</i>	<i>Shorea albida</i>
<i>Dillenia pulchella</i>	<i>Shorea inaequilateralis</i>
<i>Dipterocarpus coriaceus</i>	<i>Shorea platycarpa</i>
<i>Dryobalanops rappa</i>	<i>Shorea rugosa</i> var. <i>uliginosa</i>
<i>Durio carinatus</i>	<i>Shorea scabrida</i>
<i>Dyera lowii</i>	<i>Shorea teysmanniana</i>
<i>Ganua motleyana</i>	<i>Swintonia glauca</i>
<i>Gonystylus bancanus</i>	<i>Tetramerista glabra</i>

(ii) Middle storey (24–60 ins. girth):

<i>Alangium havilandii</i>	<i>Gonystylus forbesii</i>
<i>Alseodaphne insignis</i>	<i>Horsfieldia crassifolia</i>
<i>Alseodaphne rigida</i>	<i>Jackia ornata</i>
<i>Amoora rubiginosa</i>	<i>Kokoona ovato-lanceolata</i>
<i>Aromadendron nutans</i>	<i>Lithocarpus wenzigianus</i>
<i>Arthrophyllum rubiginosum</i>	<i>Litsea cylindrocarpa</i>
<i>Bhesa paniculata</i>	<i>Litsea gracilipes</i>
<i>Blumeodendron subrotundi-</i> <i>folium</i>	<i>Litsea grandis</i>
<i>Blumeodendron tokbrai</i>	<i>Litsea nidularis</i>
<i>Calophyllum fragrans</i>	<i>Longetia malayana</i>
<i>Calophyllum obliquinervum</i>	<i>Macaranga caladifolia</i>
<i>Calophyllum sclerophyllum</i>	<i>Mussaendopsis beccariana</i>
<i>Cotylelobium fuscum</i>	<i>Nephelium maingayi</i>
<i>Ctenolophon parvifolius</i>	<i>Palaquim cochleariifolium</i>
<i>Dacryodes incurvata</i>	<i>Palaquim pseudocuneatum</i>
<i>Dacryodes macrocarpum</i> var. <i>macrocarpum</i>	<i>Palaquium ridleyi</i>
<i>Dialium laurinum</i>	<i>Palaquium walsurifolium</i>
<i>Diospyros evena</i>	<i>Parastemon spicatum</i>
	<i>Parkia singularis</i>

TABLE 2—continued

Diospyros maingayi	Platea excelsa
Diospyros pseudomalabarica	Polyalthia glauca
Elaeocarpus obtusifolius	Pometia pinnata f. acuminata
Eugenia christmannii	Santiria laevigata
Eugenia havilandii	Santiria rubiginosa var. rubiginosa
Eugenia incarnata	Santiria tomentosa
Eugenia nemestrina	Sindora leiocarpa
Eugenia spicata	Stemonurus scorpioides
Ganua coriacea	Tristania grandifolia
Ganua pierrei	Tristania aff. maingayi
Gardenia pterocalyx	Tristania obovata
Garcinia havilandii	Vatica mangachapoi
Garcinia vidua	Xerospermum muricatum
Goniothalamus andersonii	Xylophia coriifolia

(iii) Lower storey (12–24 ins. girth):

Antidesma coriaceum	Ilex sclerophylloides
Baccaurea bracteata	Knema kunstleri var. kunstleri
Brackenridgea hookeri	Lithocarpus sundaicus
Canthium didymum	Lithocarpus sp. (9813)
Carallia brachiata	Litsea resinosa
Cryptocarya griffithiana	Mezzettia umbellata
Cyathocalyx biovulatus	Nauclea parva
Cephalomappa paludicola	Neoscortechinia kingii
Dillenia pulchella var.	Pithecellobium borneense
Diospyros elliptifolia	Polyalthia hypoleuca
Eugenia cerina	Pygeum parviflorum
Garcinia rostrata	Samadera indica
Garcinia tetrandra	Stemonurus umbellatus
Glochidion lucidum	Sterculia rheidifolia
Gomphandra comosa	Ternstroemia hosei
Goniothalamus malayanus	Ternstroemia magnifica
Gymnacranthera eugeniifolia var. griffithii	Tetractomia holttumii
Ilex hypoglauca	Timonius peduncularis
	Xanthophyllum amoenum
	Xanthophyllum aff. citrifolium

(iv) Understorey (less than 12 ins. girth):

Antidesma phanerophlebium	Disepalum anomalum
Ardisia copelandii	Gaertnera borneensis
Canthium umbellatum	Ixora pyrantha
Chisochetum brachyanthus	Polyalthia sp. (9059)
Cyrtostachys lacca	Tarenna fragrans
Dehaasia sp. (9252)	

Shrubs:

Daemonorops longipes	Labisia punctata f. pumila
Euthemis leucocarpa	Medinilla hasseltii
Euthemis obtusifolius	Nepenthes bicalcarata

TABLE 2—continued

<i>Fagraea litoralis</i>	<i>Nepenthes gracilis</i>
<i>Fagraea racemosa</i>	<i>Nepenthes rafflesiana</i>
<i>Ficus deltoidea</i> var. <i>motleyana</i>	<i>Pandanus andersonii</i>
<i>Hanguana malayana</i>	<i>Pandanus ridleyi</i>
<i>Iguanura</i> sp. (12246)	<i>Pandanus brevifolius</i>
<i>Labisia punctata</i> f. <i>punctata</i>	<i>Pinanga</i> sp. (12332)
	<i>Pleomele cantleyi</i>
	<i>Schefflera subulata</i>
	<i>Zalacca conferta</i>

*Herbs.*

<i>Aglaonema pictum</i>	<i>Globba panicoides</i>
<i>Alocasia beccarii</i>	<i>Homalomena rostrata</i>
<i>Argostemma psychotrioides</i>	<i>Piper muricatum</i>
<i>Bromheadia finlaysoniana</i>	<i>Podolasia stipitata</i>
<i>Clerodendron fistulosum</i>	<i>Thorachostachyum bancanum</i>
<i>Cryptocoryne pallidinervia</i>	<i>Zeuxine violascens</i>
<i>Cyrtosperma lasiodes</i>	
<i>Cystorchis variegata</i>	

*Epiphytes*

## (i) Sun epiphytes:

<i>Adenoncos sumatrana</i>	<i>Eria pannea</i>
<i>Bulbophyllum vaginatum</i>	<i>Eria pulchella</i>
<i>Dendrobium</i> aff. <i>merrillii</i>	<i>Ficus deltoidea</i> var. <i>deltoidea</i>
<i>Dischidia hirsuta</i>	<i>Grammatophyllum speciosum</i>
<i>Dischidia nummularia</i>	<i>Hoya coronaria</i>
<i>Dischidia rafflesiana</i>	<i>Hydophytum formicarum</i>
<i>Eria obliqua</i>	<i>Myrmecodia tuberosa</i>

## (ii) Shade epiphytes:

<i>Appendicula pendula</i>	<i>Liparis lacerata</i>
<i>Bulbophyllum beccarii</i>	<i>Medinilla laxiflora</i>
<i>Dendrobium cumulatum</i>	<i>Pogonanthera pulverulenta</i>
<i>Dipodium pictum</i>	<i>Pycnarrhena borneensis</i>
<i>Eulophia squalida</i>	

*Climbers*

## (i) Large climbers, frequently attaining crowns of upper canopy trees, including ground rooting epiphytic and strangling figs:

<i>Calamus</i> sp. (4788)	<i>Grenacharia beccariana</i>
<i>Erycibe impressa</i>	<i>Korthalsia rigida</i>
<i>Fibraurea chloroleuca</i>	<i>Mitrella dielsii</i>
<i>Ficus acamptophylla</i>	<i>Piper arborescens</i>
<i>Ficus consociata</i>	<i>Plectocomiopsis wrayi</i>
<i>Ficus crassiramea</i>	<i>Rourea mimosoides</i> forma <i>mimosoides</i>
<i>Ficus spathulifolia</i>	<i>Tetrastigma</i> sp. (12420)
<i>Ficus sundaica</i>	<i>Uncaria ovalifolia</i>
<i>Ficus sundaica</i> var. <i>beccariana</i>	<i>Willughbeia glaucina</i>
<i>Ficus xylophylla</i>	<i>Zizyphus suluensis</i>

## (ii) Small climbers, usually confined to understorey:

<i>Aeschynanthus hians</i>	<i>Lucinaea morinda</i>
<i>Ampelocissus thyrsoflora</i>	<i>Linostoma longiflorum</i>
<i>Connarus semidecandrus</i>	<i>Medinilla scandens</i>
<i>Epipremnopsis media</i>	<i>Nepenthes albomarginata</i>
<i>Flagellaria indica</i>	<i>Nepenthes ampullaria</i>
<i>Ficus callicarpides</i>	<i>Pandanus</i> sp. (14545)
<i>Ficus villosa</i>	<i>Psychotria sarmentosa</i>
<i>Gnetum neglectum</i>	<i>Rhaphidophora lobbii</i>
<i>Lecananthus erubescens</i>	



TABLE 3

COMMON FERNS AND FERN ALLIES OF PEAT SWAMP FORESTS

*Terrestrial ferns:*

Asplenium longissimum	Nephrolepis biserrata
Cyathea glabra	Schizaea malaccana
Lindsaya scandens var. terrestris	Schizoloma coriaceum
Lycopodium cernuum	Syngamma lobbiana
	Vittaria elongata

*Epiphytic ferns*

(i) Sun epiphytes:

Asplenium nidus	Lecanopteris sinuosa
Asplenium phyllitidis	Photinopteris speciosa
Crypsinus albidopaleatus	Phymatodes crustacea
Drynaria involuta	Platyterium coronarium

(ii) Shade epiphytes:

Asplenium glaucophyllum	Lycopodium pinifolium
Asplenium tenerum	Paragramma longifolia
Crypsinus albidopaleatus	Polypodium verrucosum
Humata angustata	Pyrrosia longifolia
Humata parvula	Selliguea heterocarpa
Lycopodium phlegmaria var. divaricatum	Vittaria ensiformis
	Vittaria hirta

*Climbing ferns:*

Stenochlaena palustris	Rhaphidophora lobbii
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TABLE 4

DISTRIBUTION OF THE SPECIES OF DIPTEROCARPACEAE IN THE PEAT SWAMPS OF SARAWAK AND BRUNEI

Species	DIVISIONS											
	I PRINCIPAL SWAMPS		II	III	IV	BRUNEI V						
	Lundu	Kuching— Semarahan	Sadong	Maludam	Peninsula Rejang Delta	Mukah	Balingian	Tatau	Baram	Badas	Temburong	Lawas
<i>Anisoptera marginata</i> ..			-----									
<i>Cotylelobium flavum</i> ..	x	x	x	x	x	x	x	x	x	x	x	x
<i>Dipterocarpus coriaceus</i>			-----									
<i>Dryobalanops rappa</i> ..	x	x	x	x	x	x	x	x	x	x	x	x
<i>Hopea pentanervia</i> ..	x	x	x	x	x	x	x	x	x	x	x	x
<i>Shorea albida</i> ..	x	x						x	x	x	x	x
<i>Shorea inaequilateralis</i>			-----									
<i>Shorea longiflora</i> ..									x	x	x	x
<i>Shorea macrantha</i> ..		x	x									
<i>Shorea pachyphylla</i> ..		x	x						x	x	x	x
<i>Shorea platycarpa</i> ..			-----									
<i>Shorea rugosa</i> var. <i>uliginosa</i> ..			-----									
<i>Shorea scabrida</i> ..	x	x	x	x	x	x	x	x	x	x	x	x
<i>Shorea teysmanniana</i> ..			-----									
<i>Vatica mangachapoi</i> ..	x	x	x	x	x	x	x	x	x	x	x	x

Note:—A straight line indicates known distribution of species in peat swamp forest, and a broken line probable distribution but no records yet. Crosses indicate distribution of species in heath forest.



1. Swamp surface in the *Gonystylus Dactylocladus Neoscortechinia* association, showing the typical groups of pneumatophores covered in bryophytes. The seedling in the right foreground is a *Copaifera palustris* (Sym.) De Wit, at the base of which the fern, *Syngnema lobbiana* J.J. Sm. is to be seen.



2. The somewhat dense understorey in the *Gonystylus* *Dactylocladus* *Neoscortechinia* association. The medium-sized tree to the left of the forester is a *Diospyros maingayi* Hk. f.



3. Two typical pitcher plants of peat swamp forest. On the left is *Nepenthes ampullaria* Jack, which has here adopted a climbing habit, though frequently it is found with the pitchers half imbedded in the litter layer. *Nepenthes bicalcarata* Hk. f. on the right is the largest pitcher plant in the peat swamps.



4. The *Shorea albida* *Litsea* *Parastemon* association, showing the dense understory but relative absence of a middle storey. The relatively small straight stemmed trees may be noted; *Shorea albida* Sym. is the tree with the fissured bark; and *Litsea palustris* Kost. the smooth barked tree. The sapling to the left of the forester is a *Cotylelobium flavum* Pierre.



5. *Pandanus andersonii* H. St. John in *Dacrydium Casuarina* forest in the Lawas District. This species is also very abundant in the *Shorea albida* consociation. *Cyrtostachys lacca* Becc. is the prominent palm and the mottled bark tree is *Diospyros evena* Bakh.



6. Open stunted forest (*Combretocarpus Dactylocladus* association) in the centre of the Baram peat swamps. The prominent larger trees are all *Combretocarpus rotundatus* (Miq.) Dans.





7. The swamp surface in the Combretocarpus Dactylocladus association. Two pitcher plants, *Nepenthes bicalcarata* Hk. f. and *Nepenthes gracilis* Korth, are growing on a small peat hag.



8. *Dacrydium Casuarina* forest on deep peat in the Lawas District. This photograph taken in a clearing shows the two principal dominants: *Dacrydium beccarii* Parl. var. *subelatum* Corn. with feathery crowns, and *Casuarina* sp. nov. with small umbrella—shaped crowns.



9. The swamp surface in the Combretocarpus Dactylocladus association showing *Nepenthes bicalcarata* Hk. f. growing amidst *Sphagnum junghuhnianum* Dz. et Molkenb. The peat depth in this locality was forty feet.



10. The *Shorea albida* consociation. The height of the pure even canopy of *Shorea albida* Sym. is approximately 170 feet. The almost complete absence of a middle storey may be noted.