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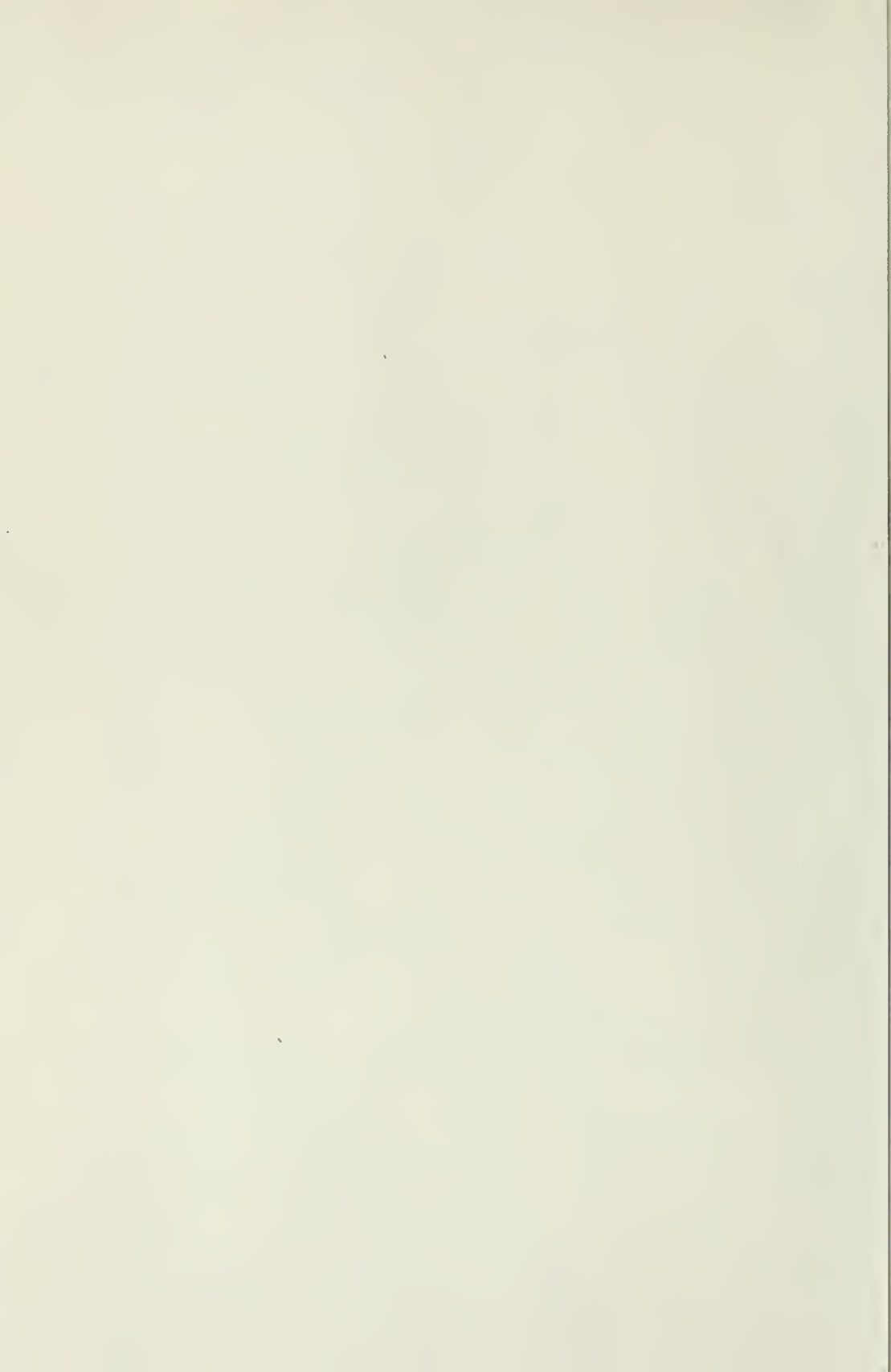
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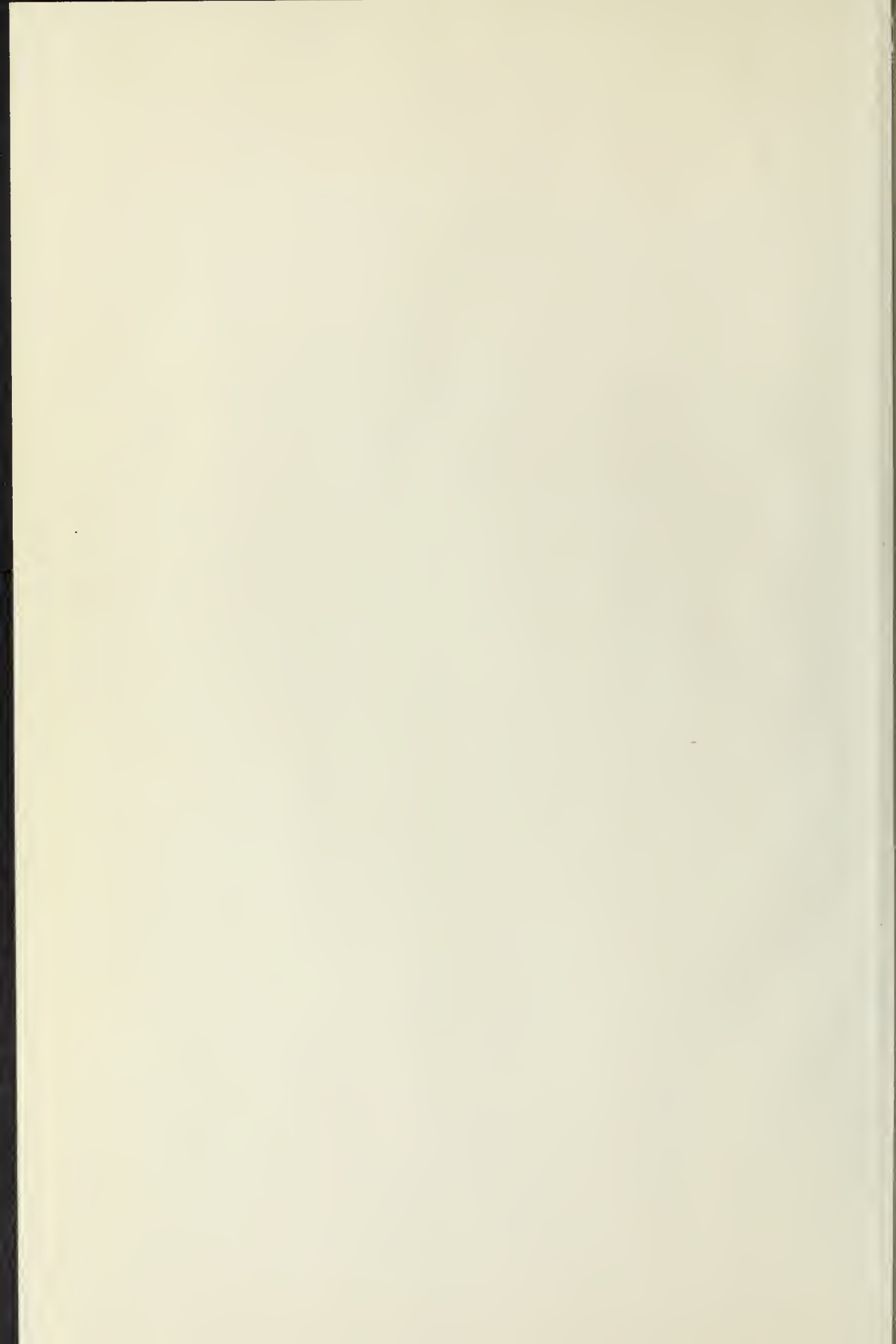
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The Freshwater Swamp-forest of South Johore and Singapore

By E.J.H. Corner, C.B.E. F.R.S.
Emeritus Professor of Tropical Botany
University of Cambridge



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Gardens' Bulletin Supplement

No. 1

Freshwater Swamp-Forest

Cover: The buttressed trunks of *Pometia pinnata* f. *alnifolia* (Sapindaceae) in the swamp-forest of the Sedili River

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E.J.H. Corner, C.B.E. F.R.S.

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CONTENTS

	PAGE
Text-figures - - - - -	vii
Tables - - - - -	vii
Unnumbered lists - - - - -	viii
Abstract - - - - -	1
Introduction — abbreviations - - - - -	1
PART I. The Sedili rivers - - - - -	3
1. General account - - - - -	3
2. Floods - - - - -	9
3. Longitudinal succession of riverside vegetation - - - - -	11
4. Freshwater swamp-forest - - - - -	19
5. Tree-crowns - - - - -	22
6. Buttresses, still-roots, and pneumatophores in the freshwater swamp-forest	22
7. Epiphytes - - - - -	27
8. Seasons, leafing, flowering, and fruiting - - - - -	28
9. Special localities on the Sedili Besar - - - - -	31
10. Flora of the kapur-forests (<i>Dryobalanops aromatica</i>) on the Jemaluang Rd between S. Berassau and mile 15 - - - - -	32
11. Bukit Tinjau Laut - - - - -	33
12. Ridge-flora of Gunong Panti, Johore - - - - -	36
13. Sedili Kechil - - - - -	38
14. Comparison with the Kemaman River, Trengganu - - - - -	40
15. Comparison with the rivers of Brunei - - - - -	45
16. Floristic richness - - - - -	46
17. Postscript - - - - -	47
PART II. Jason Bay - - - - -	49
Swamp-forest — Forest-succession on the sand-bank — Sand-dunes — Dry climax-forest — Depressions in the sand-banks — Cultivation — Coastal abrasion — Batu Belayar (K. Sedili Besar) — S. Diman — S. Sebong — Coast south of Tg Sedili Kechil — History of Jason Bay. Herbaceous plants on open sand-dunes, Jason Bay - - - - -	49
Seed-plants of <i>Barringtonia-Terminalia</i> rocky shore and <i>Eugenia grandis</i> forest - - - - -	58
Canopy-trees of the dry climax-forest, Jason Bay - - - - -	58

CONTENTS — *continued*

	PAGE
PART III. Swamp-forest at Mandai Rd and Jurong (Singapore) and at Pengkalan Rajah, Pontian (Johore) - - - - -	59
1. Mandai Road, Singapore - - - - -	59
2. Jurong Road 15th mile, Singapore - - - - -	63
3. Pengkalan Rajah, Pontian, Johore - - - - -	69
4. List of plants in the swamp-forest of Jurong, Mandai Road, and Pontian	72
PART IV. Freshwater swamp-forest and peat swamp-forest - - - - -	85
The Riouw pocket - - - - -	87
PART V. List of vascular plants of the Sedili region, Johore - - - - -	91
PART VI. Special notes on plants from Johore and Singapore - - - - -	165
PART VII. Malay names in the Sedili region - - - - -	225
References - - - - -	231
Index - - - - -	237
Plates - - - - -	- seq. 267

TEXT-FIGURES

	PAGE
Figs. 1, 2. Map of the Sedili Besar - - - - -	4, 5
Fig. 3. Diagram of the longitudinal distribution of characteristic riverside plants on the Sedili Besar - - - - -	12
Figs. 4, 5. Diagrammatic transects of the Sedili Besar at high tide - -	15, 17
Fig. 6. <i>Garcinia ? rostrata</i> , stilt-roots and pneumatophores - - - -	23
Fig. 7. <i>Xylopia fusca</i> , pneumatophores and loop-roots - - - -	25
Fig. 8. Map of lower reaches of the Kemaman River - - - -	41
Fig. 9. Diagrammatic transects of coastal forest at Jason bay - - - -	49
Fig. 10. Diagram of the estuary of S. Diman with transect - - - -	55
Fig. 11. Diagram of the estuary of S. Sebong with transect - - - -	56
Fig. 12. Diagrammatic transects of coastal vegetation near Jason Bay - -	57
Fig. 13. Site of plots at the east end of Mandai Road - - - -	60
Fig. 14. Plots at Mandai Road - - - -	61
Fig. 15, 16. Plots in Jurong - - - -	65, 66
Fig. 17. Plan of Riouw pocket with migration-routes - - - -	90
Fig. 18. <i>Mesua lepidota</i> ; diagram of the construction of the terminal inflorescence - - - -	177

TABLES

Tb 1. Trees of freshwater swamp-forest with buttresses, stilt-roots and pneumatophores - - - -	25-27
Tb 2. Enumeration of trees at Mandai Road - - - -	62-63
Tb 3. Enumeration of trees (> 25 cm thick) at Jurong Road - - - -	68
Tb 4. Enumeration of trees (< 25 cm) at Jurong Road - - - -	69
Tb 5. Numbers of species at Jurong and Mandai Road and at Pontian -	69
Tb 6. Specific comparison between the swamp-forest of the Sedili region and of Sarawak and Brunei - - - -	86

UNNUMBERED LISTS

Flora of <i>Tristania-banks</i> - - - -	18-19
Canopy-trees in the freshwater swamp-forest of the Sedili region - -	20-22
Flora of the kapur-forest (<i>Dryobalanops aromatica</i>) on the Jemaluang Road -	32-33
Plants collected at Bukit Tinjau Laut - - - -	35
Interesting plants on the ridge of G. Panti - - - -	36-37
Herbaceous plants on open sand-dunes, Jason Bay - - - -	57
Seed plants of <i>Barringtonia-Terminalia</i> rocky shore and <i>Eugenia grandis</i> forest -	58
Canopy-trees of the dry climax-forest, Jason Bay - - - -	58
Major trees at Jurong - - - -	67
Small trees at Jurong - - - -	67
Common climbers at Jurong - - - -	68
Common undergrowth at Jurong - - - -	68
Plants in the swamp-forest of Jurong and Mandai Road and of Pontian -	72-83

PLATES

Plate 1. The Sedili Besar near Bagan Kijang, 1932; *Tristania*-banks with *Buchanania sessilifolia* and a clump of *rassau* (*Pandanus helicopus*).

Plate 2. Sedili Besar, 1932. Between Bt Perah and Bt Tiga with Bt Tinjau Laut in the distance. Tg Rambutan; floating house at Danau.

Plate 3. S. Dohol near the Jemaluang Rd, with *Tristania*. A *Tristania*-bank on the Sedili Besar, 3 miles below Mawai.

Plate 4. The Sedili Besar near Bt Perah, 1932. *Rassau*-belt with *putat* (*Barringtonia conoidea*); *Pandanus helicopus*; *rengas* (*Gluta velutina*). *Rassau*, *putat*, and *rengas*, with the *mempisang*-belt.

Plate 5. The Sedili Besar near Bt Tiga with *jejawi* (*Ficus microcarpa*) smothering the belts of *putat* and *rassau*. *Pandanus kamii* in the freshwater swamp-forest.

Plate 6. An old tree of *rengas* (*Gluta velutina*) in the slime, at low water below Mawai. *Putat* (*Barringtonia conoidea*) at half tide.

Plate 7. *Dryobalanops oblongifolia* by a wood-cutter's track in freshwater swamp-forest, with several trees of *Ganua motleyana* and slender trees of *Tetractomia*, S. Kayu, 1935. *Sindora coriacea* in the dryer part of the swamp-forest.

Plate 8. *Shorea resina-nigra* (with *Ficus cucurbutina* as incipient strangler), by the Jemaluang Rd, mile 13. *Kostermansia*. The Jemaluang Rd under construction, 1932.

Plate 9. *Pometia pinnata* f. *alnifolia* in the freshwater swamp-forest, Sedili Besar 1934, with the buttresses aligned. *Aromadendron nutans* in the peat swamp-forest, Pontian 1939.

Plate 10. *Cyathocalyx ridleyi* with monopodial crown, in hillock-forest, Jemaluang Rd mile 13½, 1935. *Calophyllum sclerophyllum* in the freshwater swamp-forest, S. Kayu 1935.

Plate 11. Pneumatophores and trunks of *Polyalthia sclerophylla* at low tide near Mawai. Still-roots of *Ploiarium alternifolium* in the *mempisang*-belt, with Hassan, near Mawai.

Plate 12. *Elaeocarpus macrocerus*, stilt-roots and pneumatophores in the freshwater swamp-forest, with Hassan, near Mawai; buttressed trunks arisen from one prostrate trunk.

Plate 13. Mat of aerial roots of *Palaquium xanthochyllum*, with erect pneumatophores of *Polyalthia sclerophylla*, by the Sedili Besar. Loop-root *pneumatophores* of *Calophyllum sclerophyllum* in the freshwater swamp-forest.

Plate 14. A *Tristania*-bank on the Sedili Besar at low water, with *Tristania sumatrana* and *Lophopetalum multinervium*. *Myristica elliptica*, base of trunk and loop-roots, in the freshwater swamp-forest.

Plate 15. Stilt-roots of *Macaranga puncticulata* and *Endospermum*, Mawai 1934. Stilt-roots of *Hopea resinosa* and *Eugenia subhorizontalis* with the forest-guard Ibrahim, S. Berassau 1935.

Plate 16. *Lophopetalum multinervium* with pneumatophores, in the freshwater swamp-forest near Mawai 1931.

Plate 17. Pneumatophores of *Lophopetalum multinervium* in the freshwater swamp-forest at Jason Bay. Stilt-roots of *Palaquium xanthochyllum*, with Awan-ti, in the freshwater swamp-forest, S. Kayu.

Plate 18. Stilt-roots of *Platea latifolia*, with Awan-ti, S. Berassau 1935. Stilt-roots of *Platea excelsa* var. *riedeliana*, Pontian 1939.

Plate 19. Stilt-roots of *Blumeodendron tokbrai*. At S. Berassau 1935, with Awan-ti and in peat swamp-forest at Pontian 1939.

Plate 20. Buttressed trunk of *Adinandra sarosanthera*, S. Kayu 1935. Stilt-roots of *Palaquium* sp. 1934, Jemaluang Rd. Stilt-roots of *Neoscortechinia nicobarica* in freshwater swamp-forest near Mawai.

Plate 21. Stilt-roots, S. Kayu 1935. *Notaphoebe coriacea* with Awan-ti. *Melanochyla bracteata* with Mussib. *Goniiothalamus malayanus* with Mussib.

Plate 22. Stilt-roots of *Calophyllum sclerophyllum*, Mawai 1934, with Hassan. Stilt-roots of *Gluta wallichii*? 1935, (S. Kayu) with the forest-guard Che' Ali.

Plate 23. Stilt-roots of *Eugenia longiflora* (1934, Mawai) with Hassan. Stilt-roots of *Garcinia maingayi* with the forest-guard Ibrahim, S. Kayu Ara 1935.

Plate 24. Jurong, Singapore, 1932. *Xylopia fusca* with stilt-roots and loop-roots. *Myristica lowiana*, sapling. *Tristania ? merguensis*, blaze at 1.3m.

Plate 25. *Dracaena granulata* in freshwater swamp-forest near Mawai. Jemaluang Rd, 1935. *Mussaendopsis beccariana*, Jurong 1932.

Plate 26. Jason Bay 1934. Coastal abrasion at S. Rhu Reba with the *Casuarina*-forest cut back to a single file against *Eugenia grandis* forest; *Beilschmiedia tonkinensis* between the *Casuarina*-trees. *Petunga roxburghii* in young *Casuarina*-forest, with *Hibiscus* and *Scaevola*, S. Tuenseh.

Plate 27. Jason Bay 1934. *Casuarina*-forest developing just south of S. Tuenseh. Clearing at S. Rhu Reba with remains of *Eugenia grandis* forest and *Casuarina*. Clearing at S. Rhu Reba with intact transect of *Eugenia grandis* forest, with two old *Casuarina*-trees embedded in the forest, *Beilschmiedia tonkinensis*, *Casuarina*, *Erythroxylon cuneatum*, *Eugenia grandis* and *Oncosperma filamentosum*.

Plate 28. Jason Bay, S. Diman 1934, with young forest of *Sonneratia alba*. Near the river-mouth with *Casuarina*, a sward of *Paspalum vaginatum*, and seedlings of *Rhizophora*. Further inland with *P. vaginatum* in the foreground and *Cyperus malaccensis* behind.

Plate 29. Tg Temalak across Telok Temalak. The coast near Tg Gemoh. The coast between Tg Temalak and Tg Tebar with *Lumnitzera racemosa* at the stream-mouth, 1934.

Plate 30. The stream as in Plate 29, with *Lumnitzera racemosa* on both sides, *Pandanus odoratissimus*, and a bush of *Scyphiphora*. The coastal frontage of *L. racemosa*, as in Plate 29.

Plate 31. Jason Bay 1934. *Beilschmiedia tonkinensis*. *Tacca leontopetaloides*, the form with purple-streaked stem. *Tacca palmata*.

Plate 32. Jason Bay 1934, with Haron. *Mangifera ? foetida* in dry climax-forest. *Eugenia syzygioides* in *E. grandis* forest. *Ganua motleyana* in the freshwater swamp-forest, the blaze at 1.3m.

Plate 33. The relic of the peat swamp-forest at Pengkalan Rajah, Johore, 1939. Stump of *Melanorrhoea wallichii* at Jurong, 1933. An uprooted tree of *Parartocarpus venenosus* ssp. *forbesii* at Jurong, 1933.

Plate 34. Jurong, Singapore, 1932, the forest profile during felling. *Cratoxylon arborescens*, with surrounding small trees of *Melanorrhoea wallichii*, *Ganua motleyana*, *Garcinia ? rostrata*, *Koompassia malaccensis*, *Melanorrhoea* sp., *Mussaendopsis beccariana*, *Santiria laevigata* with epiphytic *Schefflera cephalotes*, *Santiria rubiginosa*, and *Tristania ? merguensis*.

Plate 35. Mandai Rd, Singapore, the forest in process of felling in 1940 with *Melanorrhoea wallichii*, *Palaquium xanthochymum*, *Pentace triptera* and *Xylopia fusca*.

Plate 36. Forest of *Kostermansia* with nine canopy trees, Ulu Tiram, Johore 1932. Peat swamp-forest at Pontian 1939; *Amoora rubiginosa* with pinnate leaves and *Tetractomia tetrandra* with small dense crown on the top of the tall slender trunk. Freshwater swamp-forest, Mandai Rd 1940 with *Eugenia* sp., *Myristica iners*, *Pometia pinnata* f. *alnifolia* and *Xylopia fusca*.

Plate 37. *Spilanthes urens* at S. Tuenseh, Jason Bay 1934. *Polyalthia hypoleuca* at Pontian, 1939. *Schefflera cephalotes*, epiphytic on the trunk of *Santiria laevigata* and supplanting the crown, at Jurong 1932.

Plate 38. *Myristica lowiana*, with *Pandanus atocarpus*, at Jurong 1932.

Plate 39. *Garcinia ? rostrata* at Pontian 1939. *Melanochyla auriculata* in freshwater swamp-forest near Mawai 1934.

Plate 40. *Ploiarium alternifolium* in incipient peat swamp-forest at Pontian 1939. *Podolasia stipitata* near Mawai 1937, with L. Moyses,

Abstract

This account records investigations into the freshwater swamp-forests of the Sedili rivers in east Johore, of Pontian in west Johore, and of Singapore, undertaken 1929-1940. Species-lists are supplied with critical notes. The succession of riparian belts leading to the swamp-forest is described, also that of the coastal belts leading to the interior swamp-forest. Comparison is made with similar forests in Sumatra and Borneo. Their bearing on the geographical problem of the Riouw pocket is considered.

Introduction

At last, in my retirement, the opportunity has come to write about the exploration of the swamp-forest in the south of the Malay Peninsula, conducted from the Singapore Botanic Gardens. When I arrived in Singapore in 1929, an extensive tract of this forest was being felled along the north side of the Mandai Road, at its western end. Ignorant of such vegetation, I marvelled at the strange forms of many trees, on which the 'floras' threw little light. I pursued the subject at the east end of the Mandai Road until this swamp-forest was also felled in 1940-1941 to extend the Seletar* Reservoir. Then, in 1932-1933, I studied the last area of swamp-forest in the west of the island, as it was being felled to the south of mile 15 on the Jurong Road. My main effort became, however, exploration of the coastal plain of the Sedili rivers in south east Johore. This area, now largely deforested or destructively logged, consisted in those days principally of primary forest. Finally, in 1939-1940, M. R. Henderson and I studied the peat swamp-forest at Pengkalan Rajah, Pontian, in south west Johore, as it was being felled. War, dislocation in the aftermath, and many ensuing duties prevented this account. Actually it could not have been written earlier with satisfaction because so many of the plants could not, until recently, have been identified specifically. Now, with the progress of the *Flora Malesiana*, edited by my great friend Professor Dr C. G. G. J. van Steenis, most identifications have come to hand. Above all, however, by lucky chance I was able to spend several weeks in Singapore in 1972, when I was able to consult again the majority of my collections, to many of which the all-important field-notes had been attached; and I made a brief return to the Sedili River. My memories were stirred, and I resolved that I must record what has so sadly disappeared.

I begin with the immense vegetation of the two Sedili rivers and Jason Bay (Telok Sebong). I compare the Kemaman River of Trengganu, which I studied in 1932 and 1935, with the Sedili Besar because variations in river-side forest are important in the biogeography of Malaysia. I add notes on the outlying mountains, Gunong Pantii and Bukit Tinjau Laut. I never explored the upper waters of the Sedili Besar, to the west, that is, of the road from Kota Tinggi to Jemaluang and Mersing. Then I introduce the comparative account and more detailed ecological studies at Jurong, Mandai Road, and Pontian. Finally I compare these results with the studies of peat swamp-forest in Sarawak, made by J. A. R. Anderson, in central and north Malaya by J. Wyatt-Smith, and in Sumatra by the Dutch botanists. The great beauty and pristine grandeur of lowland Johore has passed; yet pockets of vegetation remain and from these botanists may pick up and extend where I, perforce, have withdrawn.

It is a pleasure to acknowledge the help which I have received from the Singapore Botanic Gardens, particularly from 'Che Md Shah and Dr Chang Kiaw Lan, and from the Rijksherbarium, Leiden, whence Professor van Steenis and his collaborators have led the *Flora Malesiana*; their contributions to the identifications

* Old spelling: Selitar

are mentioned in the special notes appended to the flora of the Sedili region. To Dr J. A. R. Anderson, Dr P. S. Ashton, Dr E. F. Brunig, and Mr B. E. Smythies I am indebted for the privilege of their guidance in the forests of Sarawak and Brunei.

Abbreviations

Bt	Bukit (hill)	Kg	Kampong (village)
F.R.	Forest Reserve	S.	Sungei (river)
G.	Gunong (mountain)	Tg	Tanjong (cape, point, straight stretch of river)
K.	Kuala (estuary, river-junction)	Ulu	river-source, up-river.

Part I. The Sedili rivers

1. General account

At the beginning of August 1929 it chanced that a German collector of fresh-water aquarium-fish visited Singapore. He was taken on the Bank Holiday to Mawai on the Sedili Besar by William Birtwistle, Director of Fisheries S.S. and F.M.S., and I was invited to join. At that time the road from Kota Tinggi led only to Mawai, where it stopped at a small concrete jetty on the south bank of the river. I remember well for the German, with a smattering of Malay, shouted 'tangkap daun' at a floating leaf which he then used to lure his little fish. This day opened my eyes to vegetation that has enthralled me ever since. I had never seen pandans growing in the water or high forest arching over it with limbs heavy with epiphytes. I repeated these visits until 1941. Mawai was the base. I travelled upstream until fallen trunks barred the passage and downstream to Kuala Sedili Besar whence I began to explore the territory round Jason Bay and the Sedili Kechil. Few people lived in those parts; villages were scattered. Chinese wood-cutters had begun to log the lower reaches of the Sedili Besar. An occasional tongkang was poled up beyond Mawai and the building of tongkangs was just beginning above K. Dohol. Many stretches of the river, however, passed through virgin forest and, even, the mangrove-trees over 100 ft. high were barely cut.

At first I merely collected in order to learn the unfamiliar flora. The place was convenient. A day's trip enabled me to bring back living plants and to make herbarium-specimens on the morrow from what could not be identified. Of these there were too many, and I came to rely on the local names supplied to me by several knowledgeable Malays who became my companions on these river-trips. We hired the motor-boat (or *motor sangkut*) of Sultan bin Haji Hassan to tow the canoe (or *jalu*) in which we explored the recesses of the river-banks. Hassan was the tree-climber and the most knowledgeable in the forest; he accompanied me later on my tree-journeys to the north of Malaya; he stands by the tree with *Fomes lamaoensis* in my Life of Plants (plate 6) and is seated by the tree of *Lophopetalum* (plate 16 of this account; also plates 12, 22, 23). The place of young Awan-ti was in the bow to direct course from sunken trees, drift-wood, and other hazards that worked a passage downstream; he too was a born naturalist (Life of Plants, plate 13b; plates 17, 19, 21 of this account). Mussib (plate 21) carried the axe before the botanical monkeys disposed of this wasteful procedure. Mat Sah carried the heaviest collecting book. Later, when we had created the Botanical Reserve at the wide bend of the river just above Mawai, I was joined by the forest-guards 'Che Ali (plate 22) and Ibrahim (Life of Plants, plate 12a; plates 15, 23 of this account).

The small village of Mawai was on a slight bluff on the south bank of the river. It was, as I discovered, about the mid-point of the tidal reach of the Sedili Besar where *nipa* had ended, *rassau* (*Pandanus helicopus*) had taken over, and *Cerbera odollam* was still abundant. It suffered less from the floods which so frequently inundated other stretches of the river. The village consisted of a police-station with notice-board for official proclamations, a small mosque, and a football ground on the west side of the road's end and, on the east, a block of a dozen or so Chinese shops set on a concrete apron about fifty paces from the river; the shops tailed off into wooden tenements along the road. Just below the jetty there stood a large *jejawi*-tree (*Ficus microcarpa*) to the descending roots of which small boats were tied; I think that this tree still stands as the last big riverside example when travelling upstream from the kuala.



Figure 1. Map of the Sedili Besar from G. Panti and S. Gembut to mile 17 on the Jemaluang Road.

I would arrive soon after sunrise, report to the police-station whence word went round to summon helpers, take *kopi-o* in a shop and buy bananas while the motor-boats was being got ready. With so many helpers I was at a loss to repay the general kindness until I discovered the football ground. Two or three times a year I would arrive with footballs for Mawai, Kuala Sedili Besar and, K. Sedili Kechil, to be delivered by the police. Awan bin Hassan was then O.C.P.D. of Mawai district. The footballs had a short life because the fields were surrounded by jagged stumps on which they punctured. Later I took inexpensive pipes for headmen at whose houses I stayed up and down the river, and gymn-shoes against thorns in the forest. I have found these gifts acceptable in all parts where I have travelled in South America, Borneo, and the Solomon Islands. Not incidentally, it was on the Sedili Besar that I learned to enjoy Malay, so virile in speech, if torpid in print.



Figure 2. Map of the Sedili Besar from S. Gambut to the kuala, of Jason Bay, and of the Sedili Kechil. Letters and numbers on the Sedili Kechil as follows:—

K — K, *Mesua ferruginea* very abundant; N, upper limit of *nipa*, *Hibiscus tiliaceus*, and *Sonneratia*; P, lower limit of *Barringtonia conoidea*; RM, lower limit of *Pandanus helicopus* and *Horsfieldia irya*. 1, Tg Bukit; 2, Kg Sedili Kechil; 3, Kg Ladang; 4, Sedili Kechil; 5, S. Jawi; 6, Tg Putus with P. Tembakul; 7, Bt Jeriang; 8, S. Bt Jeriang; 9, S. Lebai Kator; 10, S. Bagan Lanchor; 11, S. Gelenggang Sari; 12, S. Loka.

The road to Mawai persists. It was never more than a lane. It carried sporadic traffic to the shops and, in return, rubber from the Chinese plantations on the hillocks between Mawai and K. Sedili Besar, gambir and pepper as relics of former and more extensive plantations, and such forest-produce as dammar, incense-wood,

rattans, and attap. The timber went as trunks in the tongkangs to the kuala and round the east coast to the Kallang saw-mills in Singapore. It consisted chiefly of dipterocarps, especially *balau*, *geronggang* (*Cratoxylon arborescens*) in demand for clogs and used to float the heavy *balau* in the river, *jangkang* (*Xylopia fusca*), *terentang* (*Camptosperma*) and *bintangor* (*Calophyllum*). I found the tracks and fellings of the woodmen helpful in the study of the remaining trees, and the stumps we soon learned to identify. The trunks, cut into lengths of 15-20 ft., were levered into the open hold of the tongkang, with little regard for over-loading or rolling, and for many years the tips of the two masts of a tongkang which had rolled and sunk off K. Sedili Besar broke the surface of the sea.

The road to Mawai is now a diverticulum of the highway to K. Sedili Besar. Mawai is dead, levelled to the concrete apron, but the jetty persists. Jason Bay, once so secluded and beautiful with tracts of high forest terminating in the fringe of *Casuarina* overhanging the waves, has been transformed by logging and reckless deforestation into a hot, fractured, and unattractive landscape. No botanist has recorded this passing, and no one intervened to conserve this wonderful outlet for the people of Johore Bahru and Singapore. During the war an Australian detachment, lodged at Mawai, surrendered there to the Japanese when, doubtless, some damage was done to the village, perhaps also in the ensuing years of occupation when it was a focus of the incessant guerilla warfare maintained in Johore. This chapter in the history of Mawai is unknown but there may be elders in the new village which has sprung up along the highway who can recount those happenings and explain the ill-feeling that has so sadly developed. The levelling of Mawai, however, seems to have occurred during the communist insurgence of the fifties. Thus I learned in August 1972 when, in the company of Professor Rao, Dr Hsuan Keng, and their research-students from the University of Singapore, we visited Mawai and Jason Bay. We found in the new village my old companion Mat Sah, who came running to the gate as soon as he saw me, to the astonishment of the students for whom the lapse of thirty years was a life-time. He and his wife lived in a new house where we found old photos that I had given to him and we exchanged many recollections. Awan-ti, unluckily, was in Singapore that day, but Hassan and my other companions were dead. I hope that their families may be traced and told of my appreciation of their companionship which was so disastrously broken. I noticed, however, that in the surrounding deforestation, which had removed so many of my former collecting-sites, there remained good forest to the west of the little road to Mawai. The significance did not occur to me until some time later, for the sight was familiar, but it was the area which in 1935-1936 with the help of the Conservator of Forests of Johore, Mr C. Smith, I had demarcated with notice-boards, nailed at intervals to the trees along the river-front and at certain chain-intervals within the forest, as the Botanical Reserve of the Sedili River. The old boards may still be found, and that area may yet become the place for those ecological studies that it had been my intention to undertake.

As I explored the Sedili Besar, I became aware of the regular change in river-side vegetation on travelling upstream from the mangrove, past the stands of *nipa*, into the stretches of *rassau*, with *mempisang* (*Polyalthia sclerophylla*), *pianggu* (*Horsfieldia irya*), and *pelawan* (*Tristania sumatrana*), and finally the territory of *keladan* (*Dryobalanops oblongifolia*) and *Saraca*-streams. Ecology deals with patches of forest and transects, and I could not recall the ecology of a river's length. I fancied the rivers of Europe in their prehistoric splendour and substituted *Pandanus* for *Phragmites*, *Tristania* for *Salix*, *Podocarpus* for *Pinus*, *Derris* for *Lonicera*, and many species of *Lithocarpus* for bog-oak. There were no parallels, however, for mangrove, *nipa*, *putat* (*Barrington conoidea*), *mempisang*, and the many stilt-rooted trees, palms, and gingers in the tropical swamp. I have since travelled the length of the Amazon from Belem-do-Pará and Macapá to Iquitos in boat, in low-flying aeroplane, and in part on foot, and learned that, though immensely vaster, the variety and grandeur of the forest did not equal that along the Sedili. This

river-side diversification of the forest became a main study. I mapped it carefully and decided, as one would expect from the seaward advance of Jason Bay, that it was progressing down-stream. The critical regions where the vegetation changed may yet be determined. This progress, however, is geologically recent. Into the history of the plain between Mawai and the coast there must be read the transgression of the sea in the interglacial periods, when it may have lapped the foot of G. Pantii, and the recession in glacial periods which, in the extreme, united east Johore with west Borneo and led the Sedili rivers past Pulau Aur into the China Sea. The *Tristania*-banks of the rivers seemed to be relics of this recession which I had hoped to explore across the sand-banks in the swamp-forest round Jason Bay. Misfortune frustrated the intention, but the banks remain, even if largely deforested; Bt Kuang (Quini on the maps) near K. Sedili Kechil appeared to be a place of special interest. An old Malay legend, related to me by one Mat who dwelt in a floating house on the Sedili Besar, tells how a great ship was driven by a storm, long ago, on to the coast, upturned, and became the long ridge of Gunong Pantii.

About 1930 the cutting began for the trace which has become the road from Kota Tinggi to Jemaluang. It traverses the hillocks on the east of G. Pantii and, thus, transects the main tributaries of the Sedili Besar. When I began the journeys to Mawai, trees were being felled on this trace and I took the advantage to collect from them. At first we walked a mile or two along the clearing, fifty yards wide in this virgin forest. Then, as earth from cuttings was shovelled into swamps and fallen timber made into bridges, we could take the car. The road became the western boundary of my explorations which extended north to the bridge over the main arm of the Sedili, S. Ampang, at mile 17. The cuttings exposed roots and soil; there was yellowish laterite with layers of pebbles and, at intervals, cuttings through stiff white clay. After mile 12 more sandy hillocks appeared and the stately *kapur*-trees (*Dryobalanops aromatica*) dominated the forest, as the southernmost occurrence of the species in the Malay Peninsula. Beside the bridge at mile 17 there was a tree on which *Pandanus epiphyticus* grew, and from which I collected the first fruits of the species in Malaya and, also, the young specimen which I planted on the mango-tree beside the lake in the Singapore Botanic Gardens (Stone 1968). This unmistakable species used to be common in the area between Kluang and Jemaluang where, seated, on the limbs of the great trees that then flanked this road across Johore, it gave a weird and spectacular effect. It occurs along the Endau River and, probably, the Rompin, but it has not been found outside this area in Malaya and I never saw it south of mile 17, to the east of the Jemaluang Road, or on G. Pantii. Yet it is common in west Borneo, particularly Sarawak, where it may abound on coastal rocks as well as on trees. It is certainly one of the relics of the former land-connection between the two countries and its exact distribution in Malaya should be ascertained. It made a natural limit to my exploration of the Sedili. Subsequently, when access by car was easy, I explored the Jemaluang Road with the help of the plant-collectors, Kiah and Ngadiman, of the Singapore Botanic Gardens. We stayed at the country house of Mr Ah Lec (of Borneo Motors in Singapore). He was starting an orchard at mile 6 on the road from Kota Tinggi to Mawai, and we were greatly indebted to him for this hospitality. The swamp-forest opposite to the orchard, where we collected intensively, persists, but the rest of the forest that we explored along the Jemaluang Road has been cut down. The late Mr J. Sinclair tried to find our localities for rare Annonaceae and Myristicaceae, but where there was high forest along the road, there is now lalang.

I note here that, at the foot of G. Pantii West, in Ulu Segun, there was in the forest a deposit of quartz gravel washed from the weathered granite, or washed down in storms from the weathered sandstone ridge, which was tending to compact into the white clay which puzzled me on the Jemaluang Road. How thick the deposit was I did not discover because the terrain was treacherous and on the two occasions when I visited the place there were heavy thunderstorms. This end

of the mountain is collapsing into a débris of enormous boulders covered by a precarious tangle of tree-roots below which one may hear in the gaps between the boulders streams gurgling, and catch an occasional glimpse of water; it is easy to fall into these chasms. There was a tale of a Chinese collector of the Taiping Museum who never returned from just such terrain on Pulau Tioman.

Collecting from trees is slow and arduous, even with an expert tree-climber or, as I later perfected, with a *berok* monkey. The botanist must adopt the forester's method with bark and fallen leaf for subgeneric, if not specific, recognition. I made a practice of noting vegetative characters for nearly every collection. With the sharp eyes of my companions we learned to identify most trees of the swamp-forest from such characters; then a new bark became a signal. Because little attention is paid to these points in most floras, I have given my observations on various species in the section headed Special Notes; many, however, were incorporated in the descriptions drawn up for Wayside Trees of Malaya. Stilt-roots intrigued me with their bizarre effect; I photographed them whenever possible and made collections of large specimens, but nearly all have been destroyed; they stood outside the Herbarium of the Botanic Gardens and became riddled with beetles. Mangroves-stilts are, of course, well known but even now few botanists realise that stilt-rooted trees of many genera of other families abound in the freshwater swamp-forest. I took up the study of pandans, which Dr Stone has mastered, then palms with the help of Dr Furtado, Zingiberaceae which Professor Holtum has described, and orchids with the help of my lamented friend C. E. Carr. Lastly I strove to deal with the big climbers, which are the most difficult and intractable, though with leafy spray in the hand among the easier to recognise. One day, when examining trees on the Jemaluang Road through binoculars, I learned the importance of the colour of withering leaves as a field-character; thus, from the red old leaves, I could identify *Uncaria* in the canopy (Corner 1938). As my own speciality, I took up the study of *Ficus*, especially the vast strangling figs which were so common in the freshwater swamp.

By 1934 I had acquired sufficient knowledge of the Sedili flora to begin the more difficult work of ascertaining the boundary between the swamp-forest and that of dry land, the series or belts of vegetation along the river, the peculiarities of the hillocks in the swamp-forest, the seasons of flowering and leafing, and the development of the swamp-forest on and between the succession of sand-banks at Jason Bay. Three events cut short these expectations. An almost fatal expedition to Jason Bay in June 1934 led to an attack of scrub-typhus, or Japanese river-fever, from which many months of convalescence were needed, and I was advised to give up further visits to the district. There was a record of fatality among the inhabitants of Kuala Sedili Besar and K. Sedili Kechil; around the bay there were several deserted villages where so many inhabitants had died of a mysterious sickness that cultivation had been given up; lalang invaded and it became an even better medium for the spread of scrub-typhus. The eyelids of my botanical monkeys, as they walked through this lalang, used to collect the mites which convey scrub-typhus; the monkeys did not suffer, but two Malays who were with me were stricken and I never discovered what became of them; one was the delightful character Haron bin Awang Kechil of Kampong Ladang on the Sedili Kechil. Then, of course, the war stopped all exploration and, at its end, I was at loggerheads with the Colonial Office and dismissed. My last recollection of Jason Bay, until I saw it again in 1972, was a cold and choppy passage across the rising waves of the afternoon swell, against the advice of Malays who feared lest the small boat would overturn, but I lay careless in the bottom while Ngadiman bailed and, besides the yawing and soaking, I can still see the *ikan parang* that leapt from a crest and shot over the top of us. With Ngadiman's assistance I got to Mawai and by taxi to Singapore where I entered the General Hospital clad in sweater, overcoat, scarf, and hat, and soon became insensible from the cold. So my researches are incomplete, though I continued to frequent Mawai and the Jemaluang Road, and I explored Bt Tinjau

Laut. I record them as a beginning for others. The Endau and Rompin will provide bigger instances, and there must be even larger rivers in west Borneo as yet not wholly deforested; their importance is emphasized by Hsuan Keng (1970).

2. Floods

The plain of the Sedili rivers, lying east of the Jemaluang Road, is flooded habitually in two ways. There is the daily tidal flooding the effect of which on the Sedili Besar extends c. 35 mile from the kuala to Tanjong Rambutan, well above Mawai (Figures 1, 2); its extent on the Sedili Kechil was not known to me. Salt water from the estuary banks up the brackish water to a depth of several feet and the effect is carried upstream until there is a rise of merely an inch or so, but even this can affect the vegetation, especially the forest herbs which seem the least tolerant of flooding. The water would rise in the creeks and spill over into the swamp-forest with a slight gurgling and hissing, as air was driven out, and a rush, here and there, where temporarily impeded by a fallen trunk; leaves and logs were floated; pneumatophores were covered, and a thin film of mud was deposited on them as the water retreated. Equally important is the recession of the tide, which increases at the spring tides as they approach the equinoxes when, as in other parts of Malaya at the change in tidal cycle, there may be only one extensive tide in the twenty four hours. On such an occasion at Kuala Pahang, I watched the river bed dry out into pools, exposing all the low mud-banks which were normally under water. These excessive tides, which I failed to study on the Sedili, must provide the rare opportunities for the establishment of seedlings of *putat* and *rassau*, after which they become bushy and spread with suckers from the base of the immersed stem.

The other way, of course, is freshwater flooding from rain. It is much less frequent but can be more drastic both for the vegetation and the river when banks are washed away. Much debris is carried down by the larger rain-floods; some is caught up in branches along the river, and a thicker film of mud is deposited as the water recedes; lenticels on roots and trunks then burst forth with renewed vigour. Thus I estimated that above Mawai floods might reach a height of 15-20 ft. I was anxious to witness a big flood, such as the inhabitants of Mawai had narrated to me, but there was no means of prediction and, as I discovered, it would have been impossible to ascend the torrent and see the effects, had one been prepared. Indeed, on such occasions, access to Mawai was impossible, even to Kota Tinggi for the water would be racing over the main road on both sides of the town and even the bridge across the Johore River might be submerged.

It happened, nevertheless, that I had planned to spend Easter week-end, 25-29 March 1932, on the Sedili Besar. It began to rain when I arrived at Mawai at 8 a.m. on Good Friday, but we took Sultan's motor-boat up to the floating house at Danau where we lodged for the next four nights. It poured incessantly until 3 p.m. when the skies cleared. Such bad luck for collecting had happened before and I gave little thought to it, but Hasan with long experience tied the motor-boat with two ropes to the upper part of the trunk of a little tree some fifty feet high, which stood on the bank beside the floating house. There were two or three of these rafts up river from Mawai, though none below. Big trunks were nailed and lashed together with poles to make a platform on which an attap hut was built, and the trunks were moored by stout rotans to two large trees on the bank. A Malay family lived in each on river-fish, fowls that ran about the platform, forest-produce, and such rice and other commodities that barter could obtain from Mawai. Each house had a dog to warn against the tiger, a *kerah* monkey whose screeching warned against the snake that might swim aboard, and a quantity of fish-traps. coiled rotans, fire-wood, and spare oars piled on the narrow platform (Plate 2). What with the unending

gossip of adults on this occasion, the scrambling of the children, the snarling of the dog, the chattering of the *kerah*, the smoke, and the smell of dried fish, I decided to sleep in the motor-boat. It bumped all night against the raft. The rain recommenced, beat upon the awning, and splashed into the straining and jolting boat. At length, near dawn, I snatched some sleep of exhaustion, to be awoken by a strange and loud hissing that filled the ears and all around; the rain had stopped. I looked out on an unfamiliar expanse of water. Logs were swirling past half-submerged trees; their branches were swaying, tugging, and bobbing all around, and their leaves were jerking and swishing in the turmoil and eddies. The opposite bank with its small clearing was not there. I thought we had broken loose and were travelling down river, when a trunk rolled into view. I looked for the ropes, and they were not there. I could not recognise the scene of yesterday. Then I saw that the prow of the motor-boat was almost submerged and that the ends of the ropes passed vertically into the water. In fact the river had risen over twenty feet in the night and I was level with the crown of the little tree to which the ropes had been attached. We were *in situ* and, thankfully, just in time to avoid a sinking. A coil of rotan was produced; the boat was lashed to the raft, and the ropes untied from the prow; Sultan recovered them on his next journey up the river. The water stayed at this height during Saturday and Sunday but fell about two feet on Monday. It rained that night and was still raining when we left on Tuesday, but the river was falling. We reached Mawai after dodging many floating trunks and found the jetty still awash; it had been completely submerged and the ground-floors of the shops had been flooded, but my car had been parked, luckily, on high ground behind the village.

During the three days at Danau we paddled in a canoe through the flooded forest. The force of the flood was lost among the trees, though impossible to stem on the main river. I could stand up at a height of twenty feet above the floor of the forest and collect from the tops of the undergrowth trees, though the collections could only be bundled up in the hope that they would last until I returned to Singapore and could have them dried. Wherever we touched leaf, twig, trunk, or floating log, showers of insects tumbled into the canoe. Everything that could have climbed above the water. Ants ran over everything. I bailed insects and spiders instead of water, even scorpions, centipedes, and frogs. All around there was the incessant swishing of the half-submerged leaves, the oblong lanceolate form of which was eminently successful for the occasion, and the incessant honking of frogs and toads. Lizards clung to the trunks; earthworms wriggled in the water, with snapping fish. I found in those short trees many birds' nests, one of which was a *reductio ad absurdum* for it consisted of two pairs of twigs crossed and entwined at right angles with one small egg perched over the central gap. As the water receded, there was the tell-tale smear of mud, and stranded trunks and branches were jammed into the small crowns suspended with débris of everything that could float. The subsiding waters revealed the tops of stilt-roots and I came, thus, to understand that the maximum height of these roots, which I had measured near Mawai as c. 30 ft. on trees of *Calophyllum* and *Palaquium*, was that of the rain-floods to which the trees were subjected. I realised the importance of the hillocks in and around the swamp-forest to animal life, for anything that could escape the flood must have fled there. We met no corpses. Pig, deer, tapir, rat, porcupine, leopard, tiger, monitor lizard, and snakes must have congregated on those hillocks in disquieting proximity. I saw, later, the trampling of elephants round the foot of Bt Kuing and Bt Tinjau Laut. The commotion of flood and feet must have churned up the statistical regularity of sediment beloved of numerical ecologists. Fallen trunks were shifted long distances by the floods; old trunks, buried in humus, were floated out and stranded upright in the crowns of small trees; all the upper soil-strata had been deranged. Bracket-fungi that had withstood the rush had a layer of débris deposited on them into which their hyphae would then grow as knobs, spikes and clavarioid branches

among seedlings of epiphytes. Loose pioneer vegetation along the river was washed away; new débris accumulated in creeks to supply new niches for fortuitous seedlings. As for the trees themselves, none that could not survive the drowning of roots and bole for several days would survive; perhaps the pneumatophores had a store of oxygen that supplied the roots. How often big floods occurred I could not find out but, certainly, two or three times a year. They are the great test of fitness which rules the life of the swamp-forest; they are ecological experiments of a surpassing magnitude that need to be witnessed. For a dramatic account of the greater flood of the Pahang River in 1926-1927, I refer to that by "Cactus" (1954).

3. Longitudinal succession of riverside vegetation

The plants that habitually occur on the riverside, either on firm banks or on the shifting mud, can be grouped into eight categories for which I have used mostly vernacular names. There are, of course, bridging species but it is necessary, at first, to get a concise view. These categories, or belts of vegetation, have the following succession from the estuary inland:—

1. Mangrove (Rhizophoraceae, *Avicennia*, *Carapa*, *Lumnitzera*) in the sea-water estuary.
2. *Nipa*-belt on the mud in brackish water and quieter parts of the estuary.
3. *Putat*-belt (*Barringtonia conoidea*) pioneering submerged mud-banks in flowing water, mainly in the tidal freshwater region.
4. *Rassau*-belt (*Pandanus helicopus*) with *rengas* (*Gluta velutina*) following closely behind the *putat*-belt as the mud bank widens.
5. *Mempisang*-belt (*Polyalthia sclerophylla*) with *medang jankang* (*Elaeocarpus macrocerus*) and *pianggu* (*Horsfieldia irya*), following behind the *rassau*-belt, as the first forest-formation on the stabilised mud-bank, limited to the freshwater tidal region.
6. *Jejawi*-belt (*Ficus microcarpa*) growing over *rassau* and *mempisang*, chiefly in the lower and variably brackish region.
7. *Tristania*-banks (*T. sumatrana*, or *pelawan*) on the firm raised river-banks, especially in the freshwater tidal zone, either fronting the river or behind the *mempisang*-belt. The *Tristania*-banks, however, extended far above the tidal region and were still evident at mile 17 on the Jemaluang Road.
8. *Saraca*-streams (*S. bijuga*) with *pelong* (*Pentaspadon officinalis*) and various dipterocarps, along the banks of the tributaries under the forest-canopy, at the periphery of the swamp-forest and leading from the *Saraca*-streams of the interior. *Schoutenia glomerata* accompanied *Saraca* and, by swift streams flowing through rocky foothills, *Ficus lepicarpa*.

These belts, or strips of vegetation along the river, are shown diagrammatically in Figure 3, as I had determined them by 1934. The environmental factors which control them are, evidently, salinity, silting, illumination, tides, freshwater floods, and the course of the river. The factors grade from a maximum to a minimum value and the belts have, in consequences, a maximal representation where conditions are optimal, whence the representation decreases upstream and downstream, and the belts variously overlap. Their state appeared to be steady but, over a long period with slow advance of the estuary, they must be moving gradually downstreams; that is, the upstream end of the belt should have moribund plants. This was obvious in the case of *jejawi*, the scraggy and scattered bushes of which above Mawai were

old, long-established, and unsuccessful plants compared with the vigorous growth in the upper part of the *nipa*-belt. Likewise in the *rassau*-thickets above Mawai there were dead and dying bushes of *rengas* and *putat*, between which the *rassau* was invading with new suckers.

The *jejawi*-belt illustrates the difficulty in giving precise measure to the environmental factors. Judged by abundance and vigour of growth, *jejawi* prefers the somewhat brackish tidal zone. It may require a certain degree of salinity or it may require the daily flushing with salt-water at high tide and freshwater at low tide. Then seasonal effects may bring severe conditions which the plants cannot tolerate, especially in youth. Dry weather in Ulu Sedili lowers the river and permits brackish water to ascend above Mawai where, on such occasions, even well-water became undrinkable. The effect is greatest if the drought coincides with the tides of the equinox. Clearly one needs a monthly, even weekly, assessment of these factors over a period of several years as part of the river-regime. The critical region for the change from fresh to salt-water on the Sedili Besar was the stretch of the river between Bt Tiga and Bt Prah.

All the riverside belts are light-loving except that of *Saraca*. *Putat* seemed to establish itself with fruits stranded on the outermost mud-banks at exceptionally low water. *Rassau*, on less deeply submerged banks, was taller than *putat* and, as the bank silted up, so the *rassau* encroached and established a river-front where dead *putat* and *rengas* could be found. The mud-banks of *rassau* were probably uncovered at spring tides; those of the *mempisang*-belt were uncovered at most low tides. The trees of the *mempisang*-belt, being taller than *rassau*, came similarly to

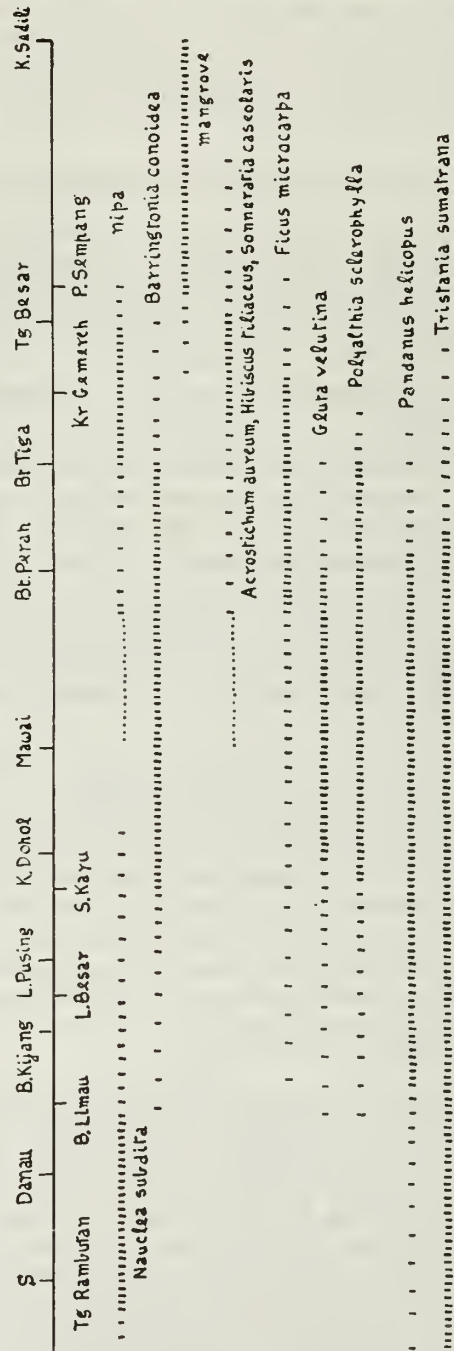


Figure 3. Diagram of the longitudinal distribution of characteristic riverside plants on the Sedili Besar; regions of abundance shown by the proximity of the short lines; scale c. 5 miles to the inch; tidal effect up to Tg Rambutan, c. 35 miles from the estuary.

invade it. Behind the *mempisang*-belt there was either freshwater swamp-forest or a *Tristania*-bank; in either case the taller trees overshadowed the *mempisang*-belt. Thus the forest closed on the river and began to undo its establishment. With dead and dying roots the mud of the *mempisang*-belt washed away. The taller trees of the swamp-forest grew out over the river, leant in the soft ground, and fell under their own weight or in storms or in floods. Gaps gradually appeared on the river-front and they were variously patched. If the fallen tree was not washed away, it entangled the flotsam of the river and started a new mud-bank; it probably deflected the current and so led to the undermining and destruction of other banks. The river front was, therefore, extremely complicated in detail and every place carried its own history. The wreckage of both Sedili rivers was stranded at Jason Bay.

The *Saraca*-streams belonged to the forest shade. Above the tidal reaches, the small *Saraca*-streams debouched here and there through *Tristania*-banks with or without an element of *rassau*; in such places it seemed that the smaller pandans, *P. malayanus* and *P. yvanii*, might substitute *P. helicopus*. In the tidal parts, the *Saraca*-streams were peripheral and commonly lost themselves in beds of *Salacca*, smaller pandans, and the water-lily *Barclaya*. They marked roughly the boundary of the swamp-forest.

Ox-bows, or cut-off river bends, were few. I note the large bow at Tanjong Besar towards the kuala; it had been formed but not yet eliminated as late as 1940. Another at Lobok Pusing above Mawai still retained in 1934 an isthmus of forest which the Malays were considering as narrow enough to sever.

The belts of *putat*, *rassau* and *mempisang* were best developed at the wide river-bends where, with reduced current on the inside, the mud-shelf extended. Behind the *mempisang*-belt there would be swamp-forest or a *Tristania*-bank and on the undercut outer side of the bend there was commonly a *Tristania*-bank. These banks, as I have mentioned, appeared to be relics of a former course of the river when it extended further into the China Sea. In places along the river below Mawai there were a few islets of *Tristania*-banks where the current had cut behind them. Such islets slumped eventually into the river and most of the trees, unable to withstand so much immersion, would die. An exception appeared to be *mensirau* (*Ilex cymosa*), a common tree of the *Tristania*-bank, which occurred in clumps at various places on the river-front, as if it were the last remains of a *Tristania*-bank. Possibly *dendulang* (*Eugenia cerina*) and *resak* (*Vatica walllichii*) had the same faculty. Shortly above Lubok Besar there was a low bench covered with *mensirau* along with *Cryptocarya kurzii*, *Elaeocarpus robustus*, and *Helicia robusta*, immediately in front of a *Tristania*-bank, as though part of it had slipped into the river and these were the survivors. I encountered many other unsolved problems as I explored the Sedili rivers more closely, and among them I mention the occurrence of *Mesua* (*Kayea*) *ferruginea*.

Mangrove-belt. I did not study this in detail. On travelling downstream from Mawai, the mangrove began about S. Gembut and Kangka Gemcreh. From Tanjong Besar down to the kuala there was typical mangrove-forest with trees of *Rhizophora* up to 40 m high.

Nipa-belt. The distribution of this belt, coincident with tidal brackish water, is shown in Figure 3. There was a small clump of *nipa*, apparently sterile, on the north bank of the river shortly below Mawai; whether it had been planted or was a relic of the original *nipa*-belt as it moved downstream, I do not know. The first big and fertile clumps were further down river about half a mile below Bt Prah. From there on, it formed an almost continuous front to the river until Tanjong Besar where the mangrove took over. The reason is not clear; perhaps the estuary was too rough for *nipa*. The rhizomes and leaf-bases, with large air-spaces, float on extremely treacherous mud. I have plunged sticks into the mud to depths of 2 and 3m without reaching firm ground. Usually one had to walk

along fallen trunks, on the rhizomes, or on a plank, to venture on foot into the *nipa*-belt. Plants commonly occurring in the belt were the following:—

Acrostichum aureum, *Aglaodorum griffithii* (the aroid forming carpets under *nipa*), *Brownlowia argentata*, *Carapa moluccensis*, *Cerbera odollam*, *Hibiscus tiliaceus*, *Oncosperma filamentosum*, *Pandanus affinis* (*P. aurantiacus*), *Scirpodendron*, *Sonneratia caseolaris*, *Vitex clarkeana*, and the climbers *Derris uliginosa*, *Randia longiflora*, and *Sarcolobus globosus*.

Photographs of *nipa* generally show it in open and deforested sites. The natural *nipa*-belt on the Sedili Kechil is shown in my Life of Plants (plate 36b). The time may not be distant when we shall lose track of the original surroundings of this plant.

Putat-belt. This was the pioneer belt that formed on the incipient mud-banks in the tidal freshwater zone. It consisted of the shrub *Barringtonia conoidea*, which seems to be the most remarkable species of the genus. It formed dwarf thickets, 1-1½ m high, composed of tufted stems in the manner of *B. racemosa* and *B. acutangula*, but never so robust (Plates 4, 6). At normal high tides all but the tops of the bushes were submerged; at spring tides they were completely submerged, at least in the lower course of the river. I never saw the stems exposed to the base, which may happen only at the equinoctial tides when, presumably, seedlings could establish themselves. The belt was narrow and as discontinuous as the mud-shelves appeared to be. The species, described in Wayside Trees of Malaya, is distributed from Lower Burma round the Malay peninsula to south west Sumatra and Borneo with, apparently, the same habitat. It certainly needs investigation.

Putat appeared to be more tolerant of variations in salinity than *rassau* or *rengas*. It overlapped with *nipa* and extended as far up the river as the tidal effect but, as the river-banks became more abrupt, the mud-shelf narrowed or disappeared and there was no foot-hold for *putat*. It did not occur above Bagan Limau on the Sedili Besar. It was abundant from S. Dohol past Mawai down to Bt Prah below which it was less frequent, and at Bt Tiga it had dwindled to scattered clumps among the *nipa*; at Tanjong Besar it had disappeared. At low water one could see the grass *Sphaerocaryum malaccense* in masses near the bases of the stems, as it clustered also round the stems of *rassau*.

Rengas (*Gluta velutina*). Whether this typical riverside shrub or small tree formed a belt distinct from those of *putat* and *rassau*, I could not determine. It grew between them. Its fruits float and the seedlings establish themselves on mud-banks which are probably less deep than those of *putat*. It grew up to 7 m high and, leaning towards the river, the thick and grotesque trunk inclined and was supported by many adventitious roots entering the mud (Plates 4, 6); it had no special pneumatophores. The thickets which it formed overshadowed *putat* and were in turn ousted by *rassau*. It had the same distribution as *putat* along the river but seemed less tolerant of salinity; thus it did not extend below Bt Tiga on the Sedili Besar. Mawai was at the centre of its abundance where, at night, it was conspicuous with fireflies (Buck 1966, 1968; Haneda 1966). This abundance might have been caused by the reluctance to clear the poisonous bushes. The large riverside *rengas* tree, *Gluta rengas*, did not occur on the Sedili rivers and, perhaps, may not occur south of the Pahang river; it seems, however, to occupy a similar habitat. Thus, there appear to be two kinds of rivers on the east coast of Malaya; the *neram*-rivers with *Dipterocarpus oblongifolius* in the upper parts and both *G. rengas* and *G. velutina* in the tidal parts occur from the Pahang river northwards, and to the south there is the Sedili kind with *Shorea lepidota* and *S. singkawang*, but only *G. velutina*. The *neram*-rivers, certainly, are mirrored along the north coast of Borneo as part of the China Sea enclave.

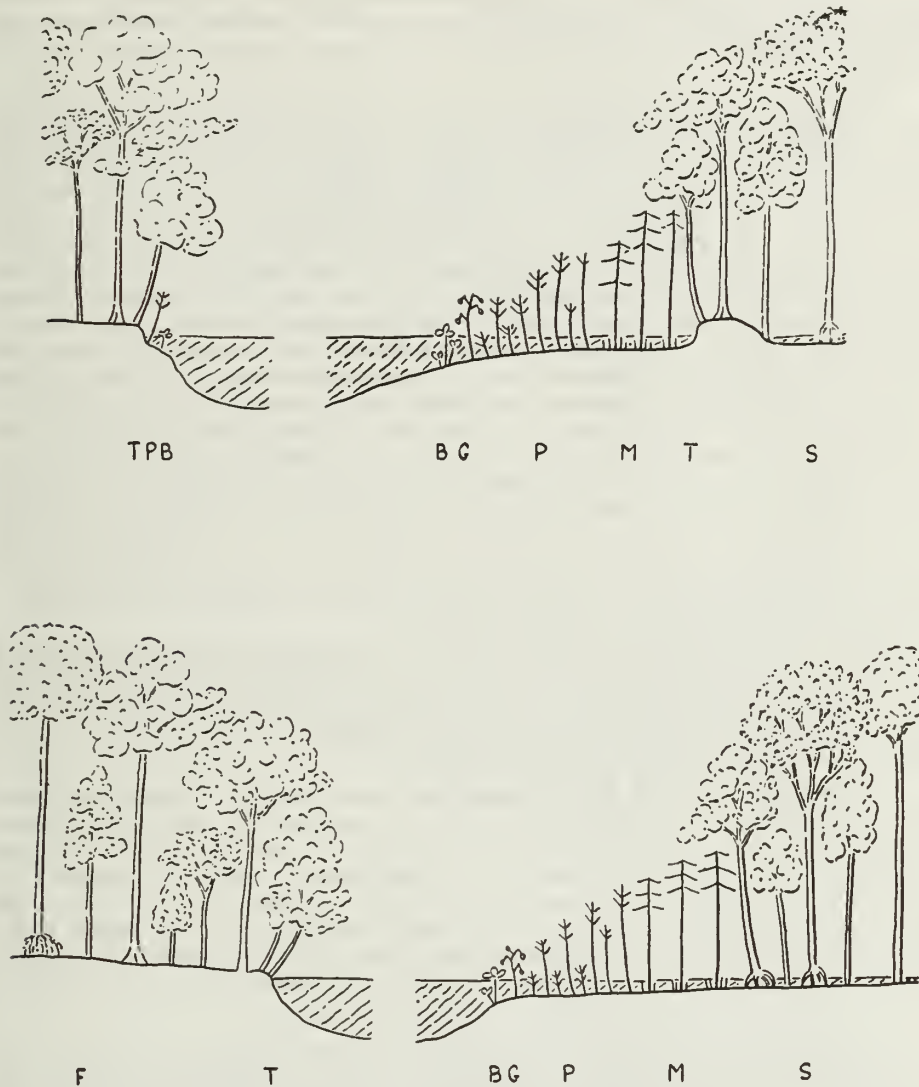


Figure 4. Diagrammatic transects of the Sedili Besar at high tide, showing the occurrence of *putat* (*Barringtonia conoidea*, B), *rengas* (*Gluta velutina*, G), *rassau* (*Pandanus helicopus*, P), *mempisang* (*Polyalthia sclerophylla*, M), *Tristania*-banks (T), freshwater swamp-forest (S), and flood-forest (F).

Rassau-belt. *Pandanus helicopus* grew taller, -12 m high, than *rengas* and, being soboliferous, formed thicker belts which were the chief invaders of the river-side (Plates 1, 4). On the Sedili Besar between K. Dohol and Lubok Besar, there were thickets advanced almost to one-third across the river, and the Sedili Kechil was in places almost blocked by *rassau*. Where it extended in this way, dead and dying stems of *rassau* were often seen along the advancing edge where the current had worn away the bank. So much of the river-front was infested with *rassau* that I saw no clear case of a young bank with colonising seedlings. Though some parts of the rhizomes were exposed at most low tides, the suckers grew up more or less under water and the young shoots jumped and bobbed in the flow; I used to say that

the emblem of the swamp-forest biologist should have been the sign of the sunken pandan. In floods only the tops of the *rassau* would be visible. Flowering occurred mainly from March to June, but could be prolonged by sporadic stems even till October.

On the Sedili Besar *rassau* occurred in the freshwater tidal parts. It overlapped with *nipa* and above Danau, where the river was steepened into predominant *Tristania*-banks, *rassau* was limited to rather small clumps, not more than 50 m long, and much less extensive than the main *rassau*-belts from Lubok Besar to Bt Prah. The last clump that I observed upstream was at the junction of S. Ampang with the Sedili Besar. The mud-spits that developed between the main river and the tributaries were favourite spots for *rassau* which had in many cases almost concealed the egress, especially at the junction of S. Berassau. Being a light-loving plant, *rassau* did not endure the forest and, by shady *Saraca*-streams, its place was taken in the muddy hollows by the smaller *Pandanus malayanus* and *P. yvanii*. Here and there, however, in the swamp-forest near to the river, I found thin sterile patches of a pandan which I took to be another species, but Dr Stone has identified it with *P. helicopus*; thus, they were evidently remnants of the former river-front, but I refer also to the record from the Pontian forest where there was no such river (see p. 80). Nevertheless, *P. helicopus* occurs far inland at Tasek Berah where, perhaps, variable flooding takes the place of the tidal effect though the locality may be the relic of a former tidal river. By the rivers of Sarawak I got the impression that *P. helicopus* grew taller, -17 m high, and that the stems branched more frequently. At Lubok Besar on the Sedili Besar, there were two islands of *rassau* containing moribund *putat* and *rengas*.

Trees of *Cerbera odollam* were frequent in the *rassau*-belt, as they were behind the *nipa*-belt, and the slender grass *Sphaerocaryum malaccense* often formed clumps at the bases of the stems of *rassau*, as they did with *putat*, but the remaining vegetation of the *rassau*-belt took the form of climbers, established in the belt or invading from the *mempisang*-belt. I noted the following:—

Dalbergia beccarii with delicate light green leaves, the very thorny *D. parviflora* (*akar laka*), *Derris heptaphylla*, *Ficus globosa*, *Loeseneriella macrantha*, *Premna trichostoma*, *Rourea mimosoides*, *Uncaria attenuata*, *U. scleroptera*, and *Zizyphus calophylla*. The orchid, *Thrixspermum amplexicaule*, commonly scrambled on *rassau*, *rengas*, and *putat*, and the aroid, *Raphidophora minor*, often covered old stems of *rassau*. Between Bagan Limau and Lubok Pusing on the Sedili Besar, *Eugenia spicata* grew in the *rassau*-belt though normally it belonged to the *mempisang*-belt; with scraggy scrambling branches and leaning trunk it resembled stunted specimens of *jejawi*. *E. spicata* was also a firefly bush.

Mempisang-belt. This belt of incipient forest, distinguished by its most characteristic species *Polyalthia sclerophylla* (though I am not satisfied with the identification), took the place of brackish water *Sonneratia caseolaris*. It occurred behind the *rassau*-belt in the freshwater tidal stretch from Bt Tiga, on the Sedili Besar, upstream to Bagan Limau. It seemed intolerant of much brackish influence but one member of the association, *Horsfieldia irya*, was less subject and occurred in the mangrove-belt from Kangka Gemereh to Tanjung Besar. The *mempisang*-belt was distinguished by the variety of trees and shrubs and by the prevalence of erect *pneumatophores* which, in places, were so dense that passage was impossible (Plates 11, 12). It formed on the older parts of the mud-banks where they were exposed at most low tides, and it was commonly backed by a *Tristania*-bank though it could lead directly into the low-lying swamp-forest of *Palaquium xanthochymum*. That it established itself on old *rassau*-banks and invaded them was clear from the common occurrence of dead *rassau* in the *mempisang*-belt, but I never saw an instance of the initiation of the *mempisang*-belt. Roots were so numerous that the mud-bank was no longer dangerous for walking. Stilt-roots occurred in *Elaeocarpus*

macrocerus, *Knema*, and *Ploiarium*. *Pneumatophores* were characteristic of *Polyalthia sclerophylla* (unbranched pegs as in *Sonneratia*) and as loops, knee-roots or λ -roots in *Elaeocarpus macrocerus* and *Myristica elliptica*. That this belt was invaded by the tall freshwater swamp-forest was clear from the occurrence of saplings of *Palaquium xanthochyllum* and from the fact that *E. macrocerus*, *Knema*, *Ixonanthes*, and *Myristica elliptica* persisted in the freshwater swamp-forest; other trees and shrubs seemed to die out as the shade increased. Nothing is known, however, of the requirements of the seedlings. None of the trees or shrubs had the faculty of vegetative spreading except, perhaps, *E. macrocerus* fallen trees of which could send up new shoots to grow into tall trees (p. 20, Plate 12).

Habitual members of the *mempisang*-belt were the following:— trees, *Cerbera odollam*, *Chisocheton amabilis*, *Dysoxylon costulatum*, *Elaeocarpus macrocerus*, *Eugenia muelleri*, *Garcinia bancana*, *G. nervosa*, *Helicia robusta*, *Horsfieldia irya*, *Ixonanthes reticulata*, *Ixora grandifolia*, *Knema glaucescens*, *K. intermedia*, *Lithocarpus elegans*, *Myristica elliptica*, *Notaphoebe coriacea*, *Ploiarium alternifolium*, *Polyalthia sclerophylla*, *Pongamia pinnata* var. *xerocarpa*, and *Vitex clarkeana*:— shrubs, *Ardisia tuberculata*, *Barringtonia racemosa*, *Ochthocharis borneensis*:— epiphytes, *Schefflera subulata*:— climbers, *Dalbergia parviflora*, *Derris uliginosa*, *Ficus globosa*, *Rourea mimosoides*, *Uncaria* spp., and *Zizyphus calophylla*:— palms, *Licuala spinosa*:— sedges, *Hypolytrum nemorum*, *Rhynchospora corymbosa*, and *Scirpodendron*.

Jejawi-belt. The small-leaved strangling fig, *F. microcarpa*, did not form a separate belt of vegetation but it transformed the *nipa*-, *rassau*-, and *mempisang*-belts, especially at the change from brackish to fresh water (Plate 5). Beginning as an epiphyte of *Sonneratia*, *Cerbera*, *Hibiscus*, *rassau*, or trees of the *mempisang*-belt, it grew long spreading branches from which copious aerial roots descended into the mud and from which side-roots clasped round neighbouring supports; it did not form a massive trunk. At its best along the Sedili Besar, between Bt Prah and Kangka Gemereh, the branches were more or less erect up to 10 m high, smothering

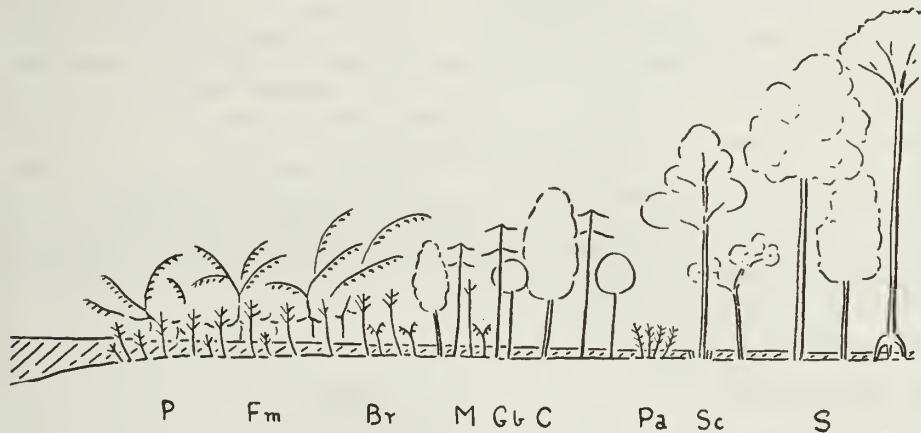


Figure 5. Diagrammatic transect of the bank of the Sedili Besar at high tide, c. 1 mile above Bt Tiga, Pa, *Pandanus affinis*; P, *Pandanus helicorpus*; Fm, *Ficus microcarpa*; Br, *Barringtonia racemosa*; M, *Polyalthia sclerophylla*; Gb, *Garcinia bancana*; C, *Carapa moluccensis* and *Cerbera odollam*; Sc, *Sonneratia caseolaris*; S, freshwater swamp-forest.

rassau and *nipa*, and the aerial roots were so abundant as to form impenetrable thickets. Here it was accompanied by the woody climber *Combretum tetralophum* which grew over it. The most luxuriant stands of *jejawi* were on the south bank from a mile above Bt Tiga down to the second bend of the river below this

point. Towards its upper and lower limits, at Bagan Limau and Tanjong Besar, *jejawi* took the form of a small woody climber insinuating into the thickets of *rassau* or *nipa*, without overwhelming them. Except for that at Mawai, no large tree of *jejawi* occurred along the riverside, which was remarkable because ten or more other species of strangling fig developed to a large size by or near the river's edge. Along the brackish tributaries, however, such as S. Gembut and the small rivers leading into Jason Bay, there were quite a number of large trees of *jejawi* among which was the largest that I have even seen; it was described in Wayside Trees of Malaya under the mistaken name of *F. retusa*. Many of these *jejawi*-trees still stood in the region in 1972 though the rest of the forest had been more or less cleared; the large number of pillar-roots make felling difficult and dangerous, and *jejawi* is one of the strangling figs venerated by Chinese wood-cutters. These relics of the forest showed the normal habitat of *F. microcarpa* by tidal creeks.

Whether the small riverside trees of *jejawi* were an ecological form or a special variety is not clear. *F. microcarpa* is a wide-spread species that can be found in Malaya in such different habitats as limestone hills, rocky sea-coasts and islands, and infesting trees in towns. It does not occur in the lowland forest except by the tidal creeks, though in Ceylon it is a forest species ascending to 2000 m alt. On rocks and cliffs it has a low carpeting form with decumbent branches. The tall tree-form with massive trunk and many pillar-roots seems to develop only when seedlings have become established high up on host-trees. The riverside form may, therefore, be only an ecological variant.

Tristania-banks. These banks, with more or less vertical front, were raised $\frac{1}{2}$ -2 m above the general level of the river or, in the tidal part, that of the usual high tides (Plates 1, 3). Above Bagan Limau, *Tristania*-banks lined long stretches of the Sedili Besar up to the Jemaluang Road and, probably, beyond until the tall forest overshadowed this light-loving community. Down the river, *mempisang*- and *rassau*-belts commonly fronted the banks. The last *Tristania*-bank downstream was on the north side of the river just below Kangka Gemereh. The banks would be covered in rain-floods but seemed independent of the tidal effect. I never saw one in the process of making. They appeared to have been formed long ago when the river cut into the alluvial plain and before the river-silt had accumulated into mud-banks; they were not a continuation of this process. The vegetation of the banks was complicated through such accidents as undercutting, slumping, and gaps caused by falling trees. I list the following plants which occurred normally on these banks where *T. sumatrana* was predominant. There are c. 110 species of which twenty are climbers. Shrubs were few, namely *Gardenia tentaculata*, *Ixora javanica*, *Prismatomeris*, and the palm *Licuala spinosa*. The only herb was the sedge *Hypolytrum nemorum*. I remark that four species of *Connarus* grew commonly on the banks without obvious ecological preference, and there were three other species of Connaraceae (*Rourea*, *Roureopsis*). Similarly the five species of strangling fig revealed no difference in habitat.

Flora of *Tristania*-banks.

Adinandra sarosanthera
Barringtonia filirachis
B. racemosa
Bauhinia bidentata
Beilschmiedia glabra
B. kunstleri
Buchanania lucida
B. sessilifolia
Calophyllum macrocarpum
C. pulcherrimum
C. rupicolum
Carallia brachiata
Cerbera odollam
Connarus grandis

C. monocarpus
C. paniculatus
C. semidecandrus
Cratoxylon formosum
Cryptocarya kurzii
Daemonorops angustifolius
Dalbergia parviflora
Derris malaccensis
Dillenia excelsa
D. suffruticosa
Dryobalanops oblongifolia
Dysoxylon costulatum
Elaeocarpus griffithii
E. paniculatus

- E. petiolatus*
E. robustus
Embelia coriacea
Entada phaseoloides
Eugenia cerina
E. fastigiata
E. longiflora
E. muelleri
E. scortechinii
E. spicata
Fagraea racemosa
Ficus binnendijkii
F. bracteata
F. calophylla
F. consociata
F. crassiramea
F. globosa
F. obpyramidata
F. obscura var. *borneensis*
F. pisocarpa
F. retusa
F. sundaica
 (the three enormous flat-crowned
 stranglers of the river-banks were
F. calophylla, *F. crassiramea*, and
F. sundaica)
Garcinia bancana
G. nervosa
Gardenia tentaculata
G. tubifera
Gnetum gnemonoides
Gomphia serrata
Grewia antidesmifolia
Gynotroches axillaris
Helicia petiolaris
Hypolytrum nemorum
Ilex cymosa
Ixora javanica
Lepionurus sylvestris
Licuala spinosa
Lithocarpus elegans
L. sundaicus
- Marumia nemorosa*
Memecylon laevigatum
M. myrsinoides
Mesua ferruginea
Mischocarpus sumatranus
Mussaenda glabra
Nauclea maingayi
Nephelium glabrum
N. rubescens
Norrisia major
Notaphoebe panduriformis
Pandanus atroparpus
Parastemon urophyllum
Parishia ? pubescens
Pellacalyx axillaris
Phoebe cuneata
Podocarpus neriifolius
Poikilospermum amoenum
Pongamia pinnata var. *xerocarpa*
Prismatomeris tetrandra
Pternandra coerulea
Rourea mimosoides
R. minor
Roureopsis asplenifolia
Santiria laevigata
Schefflera subulata
S. tomentosa
Schizostachyum chilianthum
Shorea bracteolata
S. lepidota
S. palembanica
S. sumatrana
Tarennia fragrans
Tetracera arborescens
T. indica
Tristania sumatrana
Vatica wallichii
Vitex clarkeana ...
V. peralata
Xanthophyllum affine
X. kingii
Zizyphus calophylla

4. Freshwater swamp-forest

This was the forest of the alluvial plain round the Sedili rivers and Jason Bay, more or less subject to tides and floods. I distinguished it from the belts of vegetation along the riverside because it was not exposed to the force of the current and its trees did not usually occur in those belts. It pressed upon them, as it were, through the taller stature of its trees, and overshadowed them where trees leant or thrust boughs over the river. It was a climax forest though, presumably, in years beyond the span of human life it would have been displaced by lowland dipterocarp forest of dry land at the periphery, as it was displacing the brackish swamp-forest of *nipa* and *Sonneratia*.

This swamp-forest contained many peculiar trees with prominent buttresses (*banir*), stilt-roots (*akar jangkang*), and pneumatophores (*akar tunjang*). Yet, many of the trees lacked these peculiarities, such as *Cratoxylon*, *Mangifera*, *Sindora*, *Tristania*, and most Lauraceae and Annonaceae. The herbaceous flora was poor and consisted mainly of monocotyledons, ferns, and the water-lily *Barclaya*. Palms, especially rotans, and pandanus were abundant. There were many kinds of liane none of which had pneumatophores, so far as I observed, and epiphytes, some of which I never managed to identify.

I did not enumerate in detail any part of this swamp-forest, as I had done in Singapore (p. 59) and I was unable to analyse it in ecological detail because too many factors were involved. Thus, daily tidal flooding in varying depths and with high tides varying from morning to evening in different halves of the year, seasonal rain-flooding, extent of brackish water, and proximity to the main river or to sluggish muddy streams, were prime factors with endless interaction. Many events had to be seen in order to be realised. The fallen fruits of *Terminalia phellocarpa* float with the rising tide and are deposited mostly round the periphery of its influence; seedlings and saplings tended, therefore, to be separated from the river. I have stood knee-deep in the rising water as thousands of the fruits, like small mangos, drifted past. When a tree was uprooted, much soil was heaved up; in time, trunk and roots decayed and a mound of soil up to 1½ m high was left beside a hollow or pool where the roots had been pulled out. This effect puzzled me for a long time until I saw many intermediate stages in the coastal forest where strong winds and sandy ground caused many trees to be uprooted. *Salacca* thrive in the hollows and many seedlings sprouted on the mounds the tops of which might exceed normal high tide levels. Some trees, when prostrated, threw up from the trunk along its whole length new shoots which rooted adventitiously and established a short row of new trees. I saw such files of 3-8 trees of *Elaeocarpus macrocerus* which had grown to 20 m high with normal stilt-roots and formed colonies, or clones, in the swamp-forest. The old leaves of the massive palms such as *Livistona*, *Oncosperma*, and *Pholidocarpus* often created more or less barren patches by smothering or smashing the undergrowth. Along with rotans, their strong roots created special surroundings in the soil. Floods swept fallen trunks and limbs into heaps, padded with drifted humus, to create barriers, mounds, and pools where water was trapped, and this diversified the apparently uniform habitat. Pigs rooted up the soil in search of worms and edible rhizomes. Elephants, entering the swamp in the dryer periods, smashed pathways and pulled up seedlings, saplings, and many kind of monocotyledon. The result was the chaos of mounds, pools, muddy creeks, small clearings, and multifarious débris among dense stands of trees with stilt-roots and pneumatophores, often so closely set as to obstruct passage. In places I was unable to pass, even sideways, through the plank-like pneumatophores of *Lophopetalum multinervium* (Plates 16, 17). Hence I have limited my account to a list of species, their habitats, and such special notes as needed fuller explanation.

The average height of the freshwater swamp-forest was c. 35 m. Larger trees occurred, e.g. *Cratoxylon arborescens* (-45 m, 20-28 m to the first branch, bole 70-80 cm thick), *Ganua motleyana* (-50 m), *Koompassia malaccensis* (-50 m, 27 m to the first branch); the measurements were taken from trees felled by the woodcutters. In places both *Cratoxylon arborescens* and *Palaquium xanthochymum* were so abundant as practically to be dominants. Seedlings and saplings of the large trees abounded in the loose humus, many growing from the sides of fallen trunks, and not a few lost the leading shoot broken by falling limbs or palm-leaves, or browsed by tapir. The following is a list of the canopy-trees of this forest.

Canopy-trees in the freshwater swamp-forest of the Sedili region (*recorded from Sarawak and Brunei peat swamp-forest).

ANACARDIACEAE

Buchanania lucida
B. sessilifolia
*Camposperma squamata**
Gluta malayana
Melanorrhoea wallichii
Pentaspadon officinalis

ANNONACEAE

*Mezzettia leptopoda**
*Polyalthia hypoleuca**
*Xylopius fusca**

APOCYNACEAE

*Alstonia spathulata**

BOMBACACEAE

Coelostegia griffithii
Kostermansia malayana
*Neesia malayana**

BURSERACEAE

Canarium littorale
*Dacryodes macrocarpa**
D. rostrata

BURSERACEAE — *continued*

*Santiria laevigata**
*S. rubiginosa**
*S. tomentosa**

CELASTRACEAE

*Lophopetalum multinervium**

CLUSIACEAE

Calophyllum incrassatum
C. inophylloide var. *singaporensis*
C. macrocarpum
*C. retusum**
*C. sclerophyllum**
C. soulattri
C. wallichianum

COMBRETACEAE

Terminalia phellocarpa

DILLENIACEAE

Dillenia excelsa
D. grandifolia
*D. pulchella**
D. reticulata

DIPTEROCARPACEAE

Dryobalanops oblongifolia
Dipterocarpus lowii
Dipterocarpus sp.
Hopea mengarawan
Shorea bracteolata
S. exelliptica
S. lepidota
S. palembanica
*S. platycarpa**
S. singkawang
S. sumatrana
Vatica wallichii

ELAEOCARPACEAE

Elaeocarpus macrocerus
E. sphaericus

ERYTHROXYLACEAE

Ixonanthes reticulata

EUPHORBIACEAE

*Blumeodendron tokbrai**
Macaranga griffithiana

FAGACEAE

Lithocarpus bennettii
L. leptogyne
L. urceolaris

HYPERICACEAE

*Cratoxylon arborescens**
C. formosum

ICACINACEAE

*Platea latifolia**
*Stemonurus scorpioides**
S. secundiflorus

LEGUMINOSAE

Dialium patens
D. playtsepalum
D. wallichii
Intsia palembanica
*Koompassia malaccensis**
Parkia speciosa
Sindora coriacea
S. wallichii

LYTHRACEAE

Lagerstroemia ovalifolia

MELIACEAE

*Amoora rubiginosa**
Dysoxylon macrothyrsum

MORACEAE

Artocarpus elasticus
A. kemando
Ficus calophylla
*F. crassiramea**
*F. consociata**
F. delosyce
*F. sumatrana**
*F. sundaica**
Parartocarpus venenosus ssp. *forbesii**

MYRISTICACEAE

Gymnacranthera eugeniifolia var. *griffithii**
G. forbesii
Myristica crassa
M. iners
*M. lowiana**

MYRTACEAE

*Eugenia cerina**
E. leptostemon
E. nigricans
E. papillosa
E. pseudosubtilis

OLACACEAE

Ochanostachys amentacea
Scorodocarpus borneensis
Strombosia maingayi

ROSACEAE

Parinari costata
P. nannodes
P. oblongifolia

RUBIACEAE

*Mussaendopsis beccariana**
Nauclea maingayi

SAPINDACEAE

Nephelium glabrum
N. rubescens
Pometia pinnata f. *alnifolia**
*Xerospermum muricatum**

SAPOTACEAE

*Ganua motleyana**
Palaquium confertum
P. macrocarpum
P. obovatum
P. semaram
P. xanthochymum
*Planchonella maingayi**

STERCULIACEAE

Heritiera elata
H. simplicifolia
Pterospermum javanicum
*Scaphium macropodum**
*Sterculia macrophylla**

THEACEAE

Adinandra sarosanthera
Gordonia singaporeana

THYMELAEACEAE

Aquilaria malaccensis

TILIACEAE

Pentace triptera

GYMNOSPERMAE

*Podocarpus motleyi**P. neriiifolius**P. wallichianus*

5. Tree-crowns

I distinguished four kinds between which, however, there seemed to be all intermediates though species and, even, some genera and families were characteristic. Firstly, there were persistently monopodial trees, such as Annonaceae and Myristicaceae, *Calophyllum* and *Garcinia*, among which some species of *Calophyllum* and *Myristica* built large crowns in the canopy. Secondly, there were those like *Shorea*, *Koompassia*, *Cratoxylon*, and *Parartocarpus* which had a long phase of monopodial growth that gave place eventually to the dense sympodial crown. Thirdly, there were those with a shorter phase of monopodial growth, and their trunks divided at c. 17 m high into 2-3 (-4) main ascending limbs which continued the sympodial growth. Such were *Melanorrhoea wallichii* (rather narrow, even subcylindric, crown), *Amoora rubiginosa* (lax, incomplete crown), *Mussaendopsis* (rather lax crown), *Pometia* (dense crown), *Ganua motleyana* (as *M. wallichii* but with rather lax crown), *Palaquium xanthochyllum* (large rounded, fairly dense crown with small spires of foliage), and *Tristania* ? *merguiensis* (Jurong, Singapore, with thin, almost flat-topped crown with repeatedly forking branches); possibly *Terminalia phellocarpa* and *Pentace triptera* belong in this category. Fourthly, there were the small crowns on monopodial trunks which just inserted themselves into gaps in the canopy. The smallest of these was the crown of *Tetractomia*, frequently with but two or three short branches (Plates 7, 36). The better crowns of *Cyathocalyx ridleyi* and *Aromadendron nutans* (Pontian, Johore) had more or less unramified limbs (Plates 9, 10).

Thus it became possible to recognise many trees from their crowns and leaves, as well as from trunk and bark. The study of the mature crown, however, requires to be followed from the sapling into the flowering stage, which may set the limit to monopodial growth. Old moribund trees, of which there are few records in botany, also lose their shape in a characteristic manner of dying back, e.g. *Koompassia malaccensis*. I know of no case in the study of tropical trees which is complete from seedling to dead trunk. Once, as a novice in the Mandai Road forest in Singapore, I struck a tree with a parang and received almost instantly a tremendous blow on the strong topi that I was fortunately wearing, and the next moment I was showered with sawdust which filled my shirt until it ballooned from the belt. The upper piece of a dead trunk had toppled off and was so rotten that the merest shell had struck me. Later, on Mount Kinabalu, I was constantly aware of these dangerous trunks, and every camp required inspection. So I recommend not only the study of saplings but of the moribund which restore detritus to the soil. Probably wind-damage, permitting the entry of fungus and insect, kills the big tropical trees before they succumb naturally. Of the life and death of undergrowth trees I think we know nothing. The hard wood and thin bark of *Memecylon* and several Rubiaceae suggest slow growth and long life, c.f. *Buxus sempervirens* in temperate woodland.

6. Buttresses, stilt-roots, and pneumatophores in the freshwater swamp-forest

Stilt-roots are familiar among species of *Pandanus*. They occur also among some palms, sedges, and gingers, but neither stilts, buttresses, nor pneumatophores occur in shrubs, climbers, or, generally, small trees; the stilted *Goniothalamus malayanus*

is an exception (Plate 21). They develop, however, sooner or later in the saplings of certain tall trees, though the time of inception has not been studied in any detail. In the Sedili region about 150 species in 34 families had these features, as listed in Table 1. Inspection of this list reveals that the features occur in one or a few species of a genus and that they are rarely a generic character; yet the ability to produce them is a specific property and not, as often assumed, a general faculty in response to flooding. Many typical trees of the swamp-forest had cylindrical boles without any buttresses or stilts, e.g. most Annonaceae and Lauraceae, *Calophyllum*, *Dipterocarpus*, and *Elaeocarpus* and, perhaps, all species of *Cratoxylon*, *Mangifera*, *Sindora*, *Stemonurus*, and *Strombosia*.

Table 1 gives c. 75 species with strong buttresses and 9-10 with slight buttressing. Species with stilt-roots number 75, and two others have slight stiltling. Those with pneumatophores number 36, and there are two uncertainties. Nearly all the species were common and, hence, the striking appearance of the swamp-forest. Six species could develop both buttresses and stilt-roots (*Dryobalanops oblongifolia*, *Eugenia nigricans*, *E. oleina*, *Lithocarpus urceolaris*, *Myristica iners*, and *M. lowiana*). Two species had both buttresses and pneumatophores (*Alstonia spathulata*, *Ctenolophon*), and *Horsfieldia irya*, sometimes with slight buttresses, had pneumatophores. *Palaquium xanthochymum* and *Eugenia oleina* could develop all three features. In contrast, 18 species had both stilt-roots and pneumatophores, but 14 species with pneumatophores lacked stilt-roots and, of these, 11 species lacked also buttresses. There was a tendency for stilt-roots and pneumatophores to be associated. Stilt-roots involve the breaking out and downgrowth of aerial roots, which is the manner of branching of the λ -shaped pneumatophores which first grow upwards and then branch downwards to form the loops. Stilt-roots generally become flattened sideways and are composed, evidently, of tension-wood in the same way as the buttresses. When buttresses begin to develop in saplings, they thicken outwards over the main lateral roots and inhibit the thickening of the main stem in the intervals; the process continues up the trunk but the outgrowth and inhibition diminish and, in consequence the trunk comes to taper from its greatest diameter above the buttresses down to its insertion into the soil. Stilt-roots have the same effect and the tapering trunk can often be seen very clearly (Figure 6); indeed, the tapering base may rot away and leave the trunk supported only by the stilt-roots. In a few species, however, the stilts remained cylindrical and served as props on the leaning side of the tree; both methods of props and stays were illustrated in my Life of Plants (plate 12). The wood of pneumatophores, in contrast, was soft, aerenchymatous, and spongy.

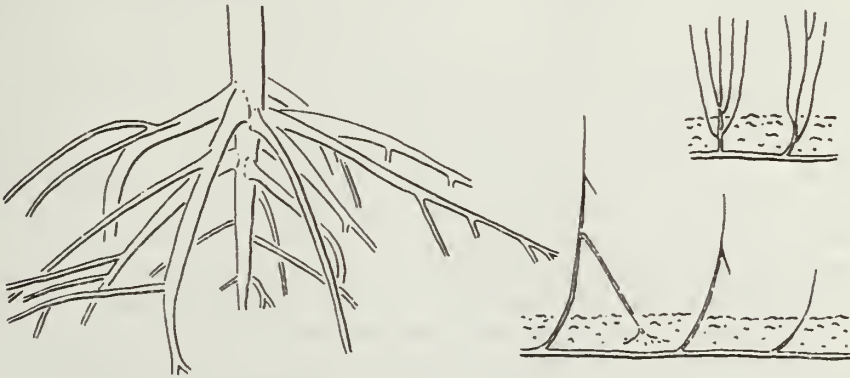


Figure 6. *Garcinia? rostrata*; stilt-roots of a small trunk c. 13 cm thick (from a photograph); pneumatophores developing as λ -roots or as clusters of erect roots.

Pneumatophores were best developed under strong tidal influence. The greatest variety occurred in the *mempisang*-belt, which corresponded with that of *Avicennia*, *Bruguiera*, and *Sonneratia* in salt water. This was true to some extent for stilt-roots and buttresses, but they were subject to other influences. Stilt-roots were connected with rain-flooding and, as already mentioned, the height at which they emerged from the trunk was that of average flooding. Buttresses were prevalent in the interior of the swamp-forest and were connected with tensions on main lateral roots in the soft soil. *Koompassia malaccensis* had shorter buttresses as the soil became firmer and dryer, but *Kostermansia* was an exception and had its biggest buttresses (up to 7 m high) in the hill-side forest of Gunong Pant. *Dillenia grandiflora*, *Xylopia ferruginea*, and some species of *Garcinia* and *Pandanus* were habitually stilted whether in hill-side or swamp-forest.

Five forms of pneumatophore could be distinguished by their shapes and direction of growth, but I failed to investigate them in detail. That they were aerenchymatous was tested simply by blowing through the cut ends and observing the bubbles that emerged from the lenticels when held under water. The five kinds were as follows:—

1. Erect conical pegs, as in *Polyalthia sclerophylla* and *Sonneratia*.
2. Erect planks in *Lophopetalum multinervium*, but degenerating into short thick knee-roots in places with shallow tidal flooding.
3. Slender loop-roots growing up, then curving down into the soil, as in *Xylopia fusca* (Figure 7) and species of *Calophyllum* (Plate 13).
4. As 3, but forming thick knee-roots, as in *Alstonia spathulata*, *Ganua motleyana*, *Horsfieldia irya*, *Myristica elliptica*, and *Tetractomia*.
5. λ -roots formed by more or less erect growth followed by a downgrowing lateral into the soil, the distal part often drying up; probably the most usual way of forming loop-roots, e.g. *Elaeocarpus macrocerus* (Plate 12).

The peat-swamp forests of Sarawak and Brunei add the following species, described by Anderson (1963):—

with stilt-roots; *Alangium havilandii*, *Calophyllum fragrans*, *Eugenia nemestrina* (see Ashton 1964b, plate 32), *Garcinia havilandii*, *Lithocarpus andersonii* (as *L. wenzigianus*), *Xylopia ceriifolia*.

with pneumatophores; *Copaifera palustris*, *Dyera lowii*, *Dactylocladus stenostachys*.

Trees with cylindrical boles in the swamp-forest had stout lateral roots from which descended many smaller tapering roots perpendicularly into the peat or swamp ground, even to depths of 3 m as with *Parartocarpus* (Plate 33). This was also the habit of most buttressed trees. I studied the roots in the deforested area round the swamp-forest of Jurong in Singapore, and photographed various upheaved stumps and those from which the peat had shrunk as it had dried. It seemed to me that, in spite of the obviously shallow or superficial main lateral roots, these trees were firmly anchored and well supplied with water even in the dry season. In this connection, I refer to the special notes under *Eugenia grandis*, *Kostermansia*, *Mussaendopsis*, *Parartocarpus*, *Scaphium macropodum*, and *Shorea collina*.

For comparative accounts of buttresses, stilt-roots, and pneumatophores from West Africa there are the recent articles by Jenik (1967), Kunkel (1965), and Lowe (1963). The African *Xylopia staudtii* resembles the Malaysian *X. fusca*; *Anthocleistus* (Loganiaceae) resembles *Polyalthia sclerophylla*; and *Mitragyna* (Rubiaceae) resembles *Ganua motleyana*. Oldeman (1970) has analysed the forms of the riverside trees in French Guiana.

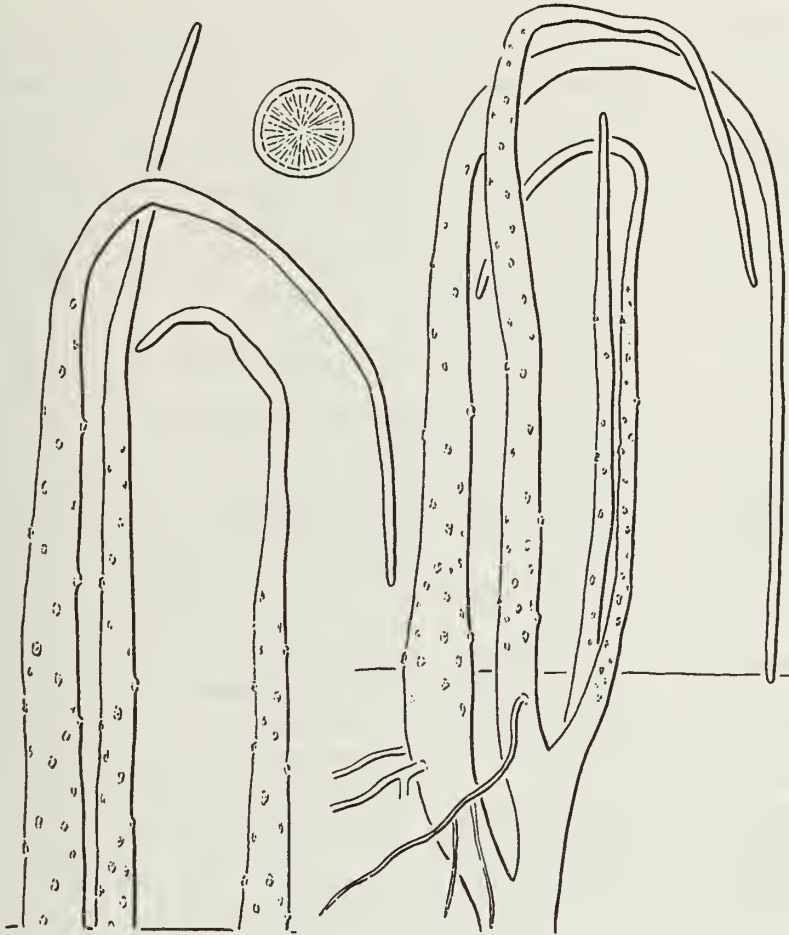


Figure 7. *Xylopia fusca*; small lenticellate pneumatophores as loop-roots, $\times \frac{1}{4}$; t.s., $\times \frac{1}{4}$.

Table 1. Trees of freshwater swamp-forest with buttresses (B), stilt-roots (SR), and pneumatophores (P).

	B	SR	P		B	SR	P
ANACARDIACEAE				<i>X. fusca</i>		—	—
<i>Camposperma macrophylla</i>	—			<i>X. malayana</i>	—	(—)	—
<i>Melanochyla sp.</i> (Pontian)		—	—	APOCYNACEAE			
<i>Melanorrhoea aptera</i>	—			<i>Alstonia spathulata</i>	—		—
<i>Gluta malayana</i>	—			BOMBACACEAE			
<i>Parishia spp.</i>	—			<i>Coelostegia griffithii</i>	—		
<i>Pentaspadon officinalis</i>	—			<i>Kostermansia malayana</i>	—		
ANNONACEAE				BURSERACEAE			
<i>Goniothalamus malayanus</i>		—		<i>Dacryodes macrocarpa</i>		—	
<i>Polyalthia sclerophylla</i>			—	<i>Santiria laevigata</i>	—		
<i>Xylopia ferruginea</i>		—	—	<i>S. rubiginosa</i>	(—)		—
				<i>S. tomentosa</i>	—		—

Table 1 cont.

	B	SR	P		B	SR	P
CELASTRACEAE				FAGACEAE			
<i>Lophopetalum multinervium</i>	(—)		—	<i>Castanopsis inermis</i>	—		
CLUSIACEAE				<i>C. megacarpa</i>	—		
<i>Calophyllum curtisii</i>	—	—	—	<i>Lithocarpus bennettii</i>	—		
<i>C. inophylloide</i>				<i>L. ? cyclophorus</i>	—		
<i>C. kunstleri</i>				<i>L. hystrix</i>		—	
<i>C. retusum</i>				<i>L. ? javensis</i>	—		
<i>C. sclerophyllum</i>		—	—	<i>L. leptogyne</i>		—	—
<i>C. soulatri</i>		—	—	<i>L. urceolaris</i>	—	—	
<i>Calophyllum sp.</i> (n. 44)		—	—	<i>Lithocarpus sp.</i> (Pasania A)	—	(—)	
<i>Garcinia bancana</i>		—	—	GONYSTYLACEAE			
<i>G. forbesii</i>		—	—	<i>Gonystylus bancanus</i>			—
<i>G. maingayi</i>		—	—	ICACINACEAE			
<i>G. nigrolineata</i>		—	—	<i>Platea excelsa</i> var.		—	—
<i>G. ? rostrata</i>		—	—	<i>riedeliana</i> (Pontian)			
<i>Mesua lepidota</i>		—	—	<i>P. latifolia</i>		—	
CORNACEAE				<i>Stemonurus scorpioides</i>			—
<i>Alangium ebenaceum</i>	—			LAURACEAE			
DILLENIACEAE				<i>Lindera sp.</i> (SFN 28520)	—		
<i>Dillenia albiflos</i>		(—)		<i>Litsea gracilipes</i>		—	
<i>D. grandifolia</i>		—		<i>Notaphoebe coriacea</i>		—	
<i>D. reticulata</i>		—		LEGUMINOSAE			
DIPTEROCARPACEAE				<i>Dialium spp.</i>	—		
<i>Dryobalanops oblongifolia</i>	—	—		<i>Intsia spp.</i>	—		
<i>Dipterocarpus grandiflorus</i>	(—)			<i>Koompassia malaccensis</i>	—		
<i>D. sublamellatus</i>	—	—		<i>Parkia speciosa</i>	—		
<i>Hopea mengarawan</i>		—		<i>Pterocarpus indicus</i>	—		
<i>H. resinosa</i>		—		LILIACEAE			
<i>Shorea spp.</i>	—	—		<i>Dracaena granulata</i>		—	
EBENACEAE				LINACEAE			
<i>Diospyros lanceifolia</i>		—		<i>Ctenolophon parvifolius</i>	—		—
<i>D. maingayi</i>	—			MELIACEAE			
<i>D. siamang</i>		—	—	<i>Amoora rubiginosa</i>	—		
ELAEOCARPACEAE				MORACEAE			
<i>Elaeocarpus macrocerus</i>		—	—	<i>Artocarpus elasticus</i>	—		
<i>E. griffithii</i>		—	—	<i>A. kemando</i>	—		
<i>E. stipularis</i>		—	—	<i>A. maingayi</i>	—		
<i>E. paniculatus</i>		—	—	<i>Ficus spp.</i> (stranglers)		—	
ERYTHROXYLACEAE				MYRISTICACEAE			
<i>Ixonanthes reticulata</i>	—			<i>Gymnacranthera eugeniifolia</i>		—	
EUPHORBIACEAE				<i>Horsfieldia crassifolia</i>		—	
<i>Baccaurea bracteata</i>		—		<i>H. irya</i>	(—)		—
<i>Blumeodendron tokbrai</i>		—		<i>H. polyspherula</i>		—	
<i>Bridelia pustulata</i>		—		<i>Horsfieldia sp.</i>		—	
<i>Macaranga amissa</i>		—		<i>Knema glaucescens</i>		—	—
<i>M. punctulata</i>		—		<i>K. intermedia</i>		—	—
<i>Neoscortechinia nicobarica</i>		—		<i>K. plumulosa</i>		—	—
				<i>Myristica crassa</i>		—	
				<i>M. elliptica</i>		—	—
				<i>M. iners</i>	—	—	
				<i>M. lowiana</i>	—	—	?
				<i>M. maingayi</i>	—	—	

Table 1 cont.

	B	SR	P		B	SR	P
MYRTACEAE				SAPINDACEAE			
<i>Eugenia atronervia</i>		—		<i>Pometia pinnata</i> f.	—		
<i>E. cerina</i>		—	—	<i>alnifolia</i>			
<i>E. conglomerata</i>	—			SAPOTACEAE			
<i>E. cumingiana</i>		—		<i>Ganua motleyana</i>			—
<i>E. garciniiifolia</i>	—			<i>Palaquium confertum</i>	—		
<i>E. grata</i>		—		<i>P. hexandrum</i>	—		
<i>E. kiahii</i>		—		<i>P. macrocarpum</i>	—		
<i>E. leptostemon</i>	—			<i>P. rostratum</i>	—		
<i>E. longiflora</i>		—		<i>P. semaram</i>	—		
<i>E. muelleri</i>		—		<i>P. xanthochymum</i>	—	—	—
<i>E. nigricans</i>	—			<i>Palaquium</i> sp.		—	
<i>E. oblata</i>		—		<i>Planchonella maingayi</i>	(—)		
<i>E. oleina</i>	—		—	<i>Pouteria malaccensis</i>	—	(—)	
<i>E. papillosa</i>		—	—				
<i>E. pauper</i>		—		STAPHYLEACEAE			
<i>E. pseudocrenulata</i>		—		<i>Turpinia sphaerocarpa</i>	—		
<i>E. subhorizontalis</i>		—	?				
<i>E. tumida</i>		—		STERCULIACEAE			
<i>Eugenia</i> sp. (SFN 37730)	—			<i>Heritiera elata</i>	—		
<i>Pseudoeugenia</i>		—		<i>H. simplicifolia</i>	—		
<i>singaporensis</i>				<i>H. sumatrana</i>	—		
PANDANACEAE				<i>Pterospermum javanicum</i>	—		
<i>Pandanus atrocarpus</i>		—	—	<i>Scaphium linearicarpum</i>	—		
<i>P. helicopus</i>		—		<i>S. macropodium</i>	—		
<i>P. malayanus</i>		—		<i>Sterculia macrophylla</i>	(—)		
<i>P. yvanii</i>		—					
POLYGALACEAE				THEACEAE			
<i>Xanthophyllum</i> ?				<i>Adinandra sarosanthera</i>	—		
<i>pulchrum</i>		—		<i>Ploiarium alternifolium</i>		—	
RHIZOPHORACEAE				<i>Tetramerista glabra</i>			—
<i>Pellacalyx axillaris</i>			—				
RUBIACEAE				TILIACEAE			
<i>Anthocephalus cadamba</i>	—			<i>Pentace triptera</i>	—		
<i>Mussaendopsis beccariana</i>	—						
RUTACEAE				VERBENACEAE			
<i>Tetractomia tetrandra</i>			—	<i>Vitex peralata</i>	(—)		
				<i>V. pubescens</i>	(—)		

7. Epiphytes

I made no special study of epiphytes but collected from fallen trees as the opportunity arose. Two interesting species, concerning the distribution of which more should be discovered, were *Solanum parasiticum* and the fern *Platyserium ridleyi*. In June 1937, in company with the late F. Kingdon-Ward, I enumerated the species of epiphyte (36) which grew on an old tree of *Norrisia major* (20 m high) on the bank of the Sedili Besar shortly below Mawai; the tree was festooned with the root-climber *Ficus recurva*, and the trunk and branches were thickly covered with these epiphytes:—

Asclepiadaceae, *Dischidia nummularia*:— Gesneriaceae, *Aeschynanthus parvifolius*:— Melastomataceae, *Medinilla hasseltii*, *M. maingayi*, *Pachycentria tuberosa*:—Moraceae, *F. deltoidea* var. *deltoidea*:— Orchidaceae, *Bulbophyllum*

pulchellum, *B. purpurascens*, *B. sessile*, *B. vaginatum*, *Cymbidium finlaysonianum*, *Dendrobium acerosum*, *D. aloifolium*, *D. spurium*, *Eria pudica*, *E. vestita*, *Sarcostoma javanicum*, *Taeniophyllum* sp.:—Rubiaceae, *Hydnophytum*, *Myrmecodia*:—Pteridophyta, *Asplenium nidus*, *Cyclophorus acrostichoides*, *Davallia solida*, *Drymoglossum piloselloides*, *Drynaria quercifolia*, *Humata repens*, *Hymenophyllum neesii*, *H. polyanthos*, *H. serrulatum*, *Lycopodium laxum*, *Microsorium punctatum*, *Ophioglossum pendulum*, *Phymatodes sinuosum*, *Platyceium coronarium*, *Pyrrosia longifolia*, *Selliguea heterocarpa*, *Thelypteris crassifolia*, *Vittaria ensiformis*.

This diversity on one tree raised the question whether there were 36 physiological ways of extracting a livelihood from this species of *Norrisia*, and the immense problem why the tropical forest was so rich.

8. Seasons, leafing, flowering, and fruiting

A wet season from October to December or January, with the river more or less in flood, was followed by less rainy weather and fine periods from February to September with the river at its lowest about July and August. This was my general conclusion without exact meteorological observations; there were no meteorological stations at Mawai or Kuala Sedili. It was the climate of the east coast, but it was modified in two ways. The dual regime of south Johore and Singapore, with dry weather in February-March and again in July-August, had some effect in the Sedili region, which was also influenced by the proximity of Gunong Pantii and the range of small mountains leading north to G. Belumut, as the main watershed. Floods from heavy rain in the ulu happened in any month of the year, and there were other vagaries. In 1935, January was exceptionally dry, February exceptionally wet, and March exceptionally dry. In other years heavy rain would begin in August and, then, October or November would be fairly dry. Yet, there was an annual succession of leafing flowering and fruiting which occurred once a year, as on the east coast, or for some trees and shrubs twice a year as in Singapore. Whether the stimulus lay in the dryness of the air, the lowering of the water-table, the rise in insolation and temperature, or the opposite effects in rainy weather, it was impossible to decide. Perhaps the bright and dry days of January made the biggest contrast and, then, the gradual, if intermittent, lowering of the water-table. Nevertheless, a field-note of mine for 3 Feb. 1934 says 'I went along the Mawai-Jemaluang road about 7 a.m. and was so cold in the back-seat of the open car that my teeth chattered and I had to clutch myself to keep warm'. The behaviour of trees which I record is based mainly on observations during the years 1934-1940, when I was sufficiently acquainted with the flora to be able to identify leafing and flowering on the spot.

The following information on rainfall, extracted from the tables compiled by Wycherley (1967), confirm the conclusion that the climate was partly that of the east coast and partly that of Singapore:—

Mersing: 2616 mm per ann. (average of 25 years), with the dryer season Feb.-Oct.

Kahang: 2718 mm per ann. (average of 14 years), with the dryer season Feb.-Oct.

Kota Tinggi: 2946 mm per ann. (average of 27 years), with dryer periods Feb.-March and June-Sept., and generally wet March-April and Oct.-Jan.

Firstly I note that by the Sedili Besar and on the slopes of Gunong Pantii, there were always two seasons for the fruiting of fungi, March-May and Aug-Oct. (Corner 1935). The fruiting was the result of 2-4 weeks of fine weather, sufficient to dry the humus and halt mycelial growth, followed by heavy rain which induced fructification. It was the consequence of the double monsoon. On the ridge of G. Pantii, however, I never observed a fungus season, though I visited the ridge

many times, covering most months, from 1929-1940. The ridge, athwart the monsoons, is exceptionally wet and probably accounts for the higher rainfall of Kota Tinggi. January was the only month when dry weather could be expected; otherwise, on most days, heavy rain would begin about 11 a.m. and last well into the afternoon. I noted, nevertheless, dry weather on the ridge in March-April 1931. To this abundant rain and cloud-cover the ridge owes its peculiarity of lowland swamp-forest and mountain *Leptospermum*-forest (p. 36).

With the opening of the new year, various trees in the swamp-forest began to change leaves and to flower. From January on there was a succession of flowering even into the wet weather of November and December when some species of *Calophyllum* and of *rengas* flowered. The canopy was never wholly in flower and, thus, individual trees could be picked out and their specific abundance recognised. The period of flowering for any one species was 3-5 weeks, after which fruits ripened in 3-6 months. January to May was the best flowering season, and May to October the fruiting. Double flowering occurred with *Tristania sumatrana*, the two species of *Buchanania*, and *Ixora grandifolia* in Jan.-Feb. and in July-Aug. The shrub *Kopsia singapurensis* and the shrubby species of *Ixora* flowered copiously in the forest-undergrowth in Jan.-Feb. and Sept.-Oct. *Pentaspadon officinalis*, *Pterospermum javanicum*, and, perhaps, *Mesua rosea* flowered about April and October. Since these double flowerings were so general, I assumed without proof that the individual plants flowered twice a year. When *Kopsia* and *Ixora* flowered, the undergrowth became a mixture of white and orange-red, which seemed to me as good a mark as any of the double climate. Perhaps the species of *Nephelium* and *Xerospermum* flowered twice. In contrast, the single annual rhythm was shown by the undergrowth tree *Macaranga baccaureifolia* which shed its leaves in February (p. 187).

Exceptions to the annual rhythm were few, though outstanding, and I think that many more remain to be discovered. As is well known, a general flowering of dipterocarps occurs at intervals of 3-4 years, especially when preceded by a very dry spell. Medway (1972) records the flowering of various dipterocarps in Selangor on 1-3 occasions during the seven years 1963-1969. Burgess (1969 records the fruiting of *Shorea curtisii* every 7-10 years after severe drought. I noted a general flowering of dipterocarps in the Sedili region only in May 1935 when January had been exceptionally dry. I collected the first fruiting specimens of *Kostermansia* in Sept. 1932, when there was a general fruiting of this fairly common and immense tree in south east Johore, but I never saw flowers or fruits again until the end of March 1940 when there was a general flowering. I am certain of this because I inspected regularly a group of trees that stood near the beginning of the Jemaluang road. It appears that *Kostermansia* flowers about March, once in eight years. This appears to be the rate of flowering of *lanjut* (*Mangifera lagenifera*), a few trees of which occurred by the Sedili Besar, but I did not observe them in flower. Medway (1972) records the flowering of *Gluta renghas* in two consecutive years over the period 1963-1969, and three annual flowerings of *Swintonia schenkii* in the same period. My impression was that several kinds of Anacardiaceae in the swamp-forest seldom flowered. Then I note that fertile material of the large tree *Pentace corneri* has not been collected, though it is known from Borneo and east Johore. *Pentace triptera* seemed to flower as seldom as *Kostermansia*. Medway (1972) recorded two annual flowerings of *Pentace strychnoidea* in the years 1963-1969.

January. The year began with the conspicuous white flowering of *Buchanania sessilifolia*. As it was finishing in the second half of the month, the crowns of *Melanorrhoea wallichii* were converted into white mounds of fragrance. The abundance of both species became obvious, though the trees were not gregarious. Towards the end of the month *Tristania sumatrana* began to flower and the *Tristania*-banks were whitened for 3-4 weeks. Leaf-fall and the development of inflorescences began in the *mempisang*-belt.

February. The following events might overlap into March.

Gregarious flowering:— *Buchanania lucida* (see also August), *Camptosperma*, *Croton laevifolius* (small undergrowth tree, fruiting in May), *Eugenia* spp., *Lithocarpus* spp., various Lauraceae and Myristicaceae, *Macaranga baccaureifolia* (small undergrowth tree, fruiting in June), *Neesia*, *Ponetia*, *Kopsia singapurensis*, shrubby species of *Ixora*.

Fruiting:— *Calophyllum* spp. (evidently from flowering in Oct.-Nov.), *Connarus grandis*.

New leaves:— *Shorea* spp., *Sindora coriacea* (deciduous), *Macaranga baccaureifolia* (deciduous).

March. The main flowering of trees began in this month of uncertain rain. Most striking was the leaf-fall and flowering of *Cratoxylon formosum*; the bare crowns flushed with reddish pink from the flowers and opening buds, revealed the great abundance of this tree (up to 30 m high) in the swamp-forest. Not being a timber-tree sought by Chinese wood-cutters, it flourished after their selective logging.

Gregarious flowerings:— *Castanopsis* spp., *Cerbera odollam*, *Crateva religiosa*, *Elaeocarpus* spp., *Entada phaseoloides*, *Eugenia spicata*, *Flagellaria*, *Gardenia tubifera*, *Gluta velutina* (with flowering prolonged into June or July), *Goniothalamus* spp., *Horsfieldia irya*, *Poikilospermum* spp., *Vitex clarkeana*.

Fruiting:— *Mesua ferruginea*, *Myristica elliptica*, *Neoscortechinia forbesii*, *Nephelium glabrum*, *Vatica wallichii*.

New leaves:— *Dalbergia beccarii* (riverside climber), *Koompassia malaccensis*, *Pongamia pinnata* var. *xerocarpa*, *Polyalthia sclerophylla* (beginning to shed all its old leaves, developing olive-buff new leaves), *Calophyllum sclerophyllum* (complete leaf-change but no inflorescences; see July).

These events might begin in February or be prolonged into April. Regarding *Koompassia malaccensis*, Medway (1972) recorded the development of new leaves about every six months but flowering was uncertain; only one general flowering was observed in the years 1963-1969.

April, May. Gregarious flowering:— *Barringtonia filirachis*, *Chisocheton anabilis*, *Cratoxylon arborescens*, *Dillenia excelsa*, *Elaeocarpus macrocerus*, *Eugenia spicata*, *Garcinia bancana*, *Gardenia tubifera*, *Horsfieldia irya*, *Jackia*, *Lophopetalum multinervium*, *Mussaendopsis*, *Myristica elliptica*, *Palaquium xanthochyllum*, *Pandanus helicopus* (prolonged into August or September), *Pentaspadon officinalis* (see also October), *Polyalthia sclerophylla*, *Premna trichostoma* (riverside climber), *Pterospermum javanicum*, *Shorea* spp., *Sterculia bicolor*, *Vitex peralata*, *Ixora congesta* and *I. lobbii* (continuing to flower in the undergrowth).

Aquatic plants flowering:— *Barclaya*, *Cryptocoryne* spp.

Fruiting:— *Bhesa paniculata*, *Connarus grandis*, *Gnetum gnemon*, var. *brunonianum*.

New leaf:— *Podocarpus neriifolius*.

In May 1935, when there was the heavy flowering of dipterocarps, many trees of *Scaphium macropodum* became completely deciduous and flowered on the new shoots. I recorded also that this species changed its leaves in Singapore in November 1935, then flowered for three weeks on the bare twigs, and developed new leaves in January 1936. Medway (1972) records two flowerings of *S. macropodum* (as *S. affine*) during the years 1963-1969. *Sterculia bicolor* seemed to ripen its fruits and shed its leaves in March-April along the Sedili Besar before it flowered in May.

June, July. Gregarious flowering:— *Connarus grandis*, *Elaeocarpus* spp., *Eugenia cerina*, *Fagraea racemosa*, *Nephelium rubescens*, *Tristania sumatrana* (second flowering), *Vitex clarkeana* (see March).

Fruiting:— *Buchanania*, *Dillenia excelsa*, *Elaeocarpus macrocerus*, *Gardenia tubifera*, *Grewia antidesmaefolia*, *Pentaspadon officinalis*, *Pentace triptera* (1939, 1940, as in Singapore), *Rinorea anguifera*, *Schoutenia accrescens*, *Sterculia macrophylla*, *Vitex clarkeana*, *Xanthophyllum affine*, and *Pandanus helicopus* (continuing to fruit until October or November).

New leaves:— many kinds of tree; some, as *Calophyllum sclerophyllum* (see March) changed leaves in July.

August. A general fruiting, and a second flowering of *Buchanania lucida*.

September. General flowering of *Dysoxylon macrothyrsum* and second flowering of *Kopsia singaporensis* and the shrubby species of *Ixora* (both delayed in some years until October).

October. Gregarious flowering:— *Dacryodes macrocarpa*, *Dryobalanops oblongifolia* (in 1936), *Pentaspadon officinale* (second flowering), *Pterospermum javanicum* (second flowering, see April), *Xanthophyllum affine*.

Fruiting:— *Garcinia* ? *penangiana*.

New leaves:— *Melanorrhoea aptera* (more or less deciduous, ? flowering in November, with or before the new leaves).

November. Many trees in fruit.

December. Several species of *Calophyllum* flowered in this month, or in November. As the wettest time of year, collecting was often impossible.

Deciduous trees. The following were noteworthy as deciduous even in the conditions of the swamp-forest and its tidal effect:—

Cratoxylon formosum, *Dillenia grandifolia*, *D. reticulata*, *Heritiera simplicifolia*, *Macaranga baccaureifolia*, *Melanorrhoea pubescens*, *Parkia speciosa*, (? *Pentace triptera*), *Pentaspadon officinalis*, (? *Pterospermum javanicum*), *Polyalthia sclerophylla*, *Scaphium macropodum*, *Sterculia bicolor*, *S. macrophylla*, *Sindora coriacea*.

Ever-flowering trees. I noted merely *Dillenia suffruticosa* and *Hibiscus tiliaceus*, but *Barringtonia racemosa* may be such.

9. Special localities on the Sedili Besar

S. Berassau. The Jemaluang Road crossed two branches of this stream, the southern being more swampy and lying lower. Both were restricted in places by banks 2-3 m high or there were merely slight banks leading into muddy backwaters. After heavy rain the streams overflowed into the surrounding swamp-forest with *Elaeocarpus macrocerus*, *Notaphoebe coriacea*, *Palaquium xanthochymum*, *Cratoxylon arborescens*, *Dryobalanops oblongifolia*, and *Xylopia fusca*. This forest merged gradually into that of the hillocks. I never followed the stream to its junction with the main river. From mile 8 to mile 13, the Jemaluang Road cut through white clay soil on the hillocks.

S. Kayu Ara. Where the Jemaluang Road crossed this stream, it was like S. Berassau but with steeper banks clad with hillock-forest. Here *Areca montana* was common on the west side of the road. Cuttings through hillocks in this part had a layer of sharp broken stones, 8-60 mm wide, situated about 70-100 cm below the surface.

S. Buntut Jong. I visited this place above Danau in July 1940 and found that fallen trees had caused a sand-bank to form across much of the main river. It appeared to have been about two years old. On it grew *Mapania* sp., *Cyperus*

haspan, *Cryptocoryne* sp., and seedlings of *Gardenia tentaculata*. It would be interesting to know if and how this bank may have developed.

S. Kayu. At this part of the Jemaluang Road the Hock Moh saw-mill started in January 1934. A rail-track was laid eventually into the kapur-forest north of G. Panti East. The site for logging and for building tongkangs on the Sedili Besar about 200 yards above its junction with S. Kayu was started in April in 1934. These were the timber tongkangs described by Gibson Hill (1952).

Mile 17, Jemaluang Road. Here the main branch of the Sedili Besar would, in flood, cover the long bridge. At the beginning of February 1934 the river was low, c. 2 m deep, but flood-marks on the banks showed that it had recently flowed about 6 m higher.

Riverside from Bt Tiga to K. Sedili Besar. Downstream from Bt Tiga there were long stretches of *nipa* with *jejawi*, and where *jejawi* ended, there the mangrove began. *Aglaodorum griffithii* and *Herpestis monniera* were common on the *nipa*-mud. The first riverside mangrove tree was *Kandelia*, a few bushes of which occurred above Kangka Gemereh. A mile or so below the Kangka, *Bruguiera*, *Rhizophora mucronata*, and *Carapa moluccensis* began; mixed with *Kandelia*, they were very abundant at Tg Besar. From this island down to the Kuala there was continuous mangrove forest consisting mainly of *Kandelia* and *R. mucronata*, without *nipa* though it occurred in patches throughout the interior of the mangrove forest. In gaps in the *nipa*-front, below Bt Tiga to the start of the mangrove, there were stands of *Hibiscus tiliaceus*, *Sonneratia caseolaris*, and *Acrostichum aureum*; they were especially abundant between the end of *jejawi* and the start of the mangrove, but in the upper part of the mangrove reaches they became sporadic. Actually these three plants extended up stream beyond Bt Tiga to about three miles below Mawai where they were small and scattered in the mud in front of the *Tristania*-banks; whether they were unsuccessful establishments above their normal occurrence or relics of a former *nipa*-belt, I did not ascertain. I have noted the clump of *nipa* just below Mawai; near to it was a fruiting tree of *S. caseolaris* about 7 m high. The patches of *nipa* in the mangrove forest near the estuary may have been relics of former open creeks for, presumably the sun-loving *nipa* is shaded out by the mangrove in its local advance and becomes sterile, but I made no observation on the death of *nipa*.

Behind the *nipa*-belt in the reaches of the river below Bt Tiga there were belts of *rassau* and *mempisang*, as well as *Tristania*-banks, and there was an occasional frontage of *Barringtonia conoidea*. Thus, this part of the river had the most complicated riverside vegetation. I fear that it may now have been much disturbed.

10. Flora of the kapur-forest (*Dryobalanops aromatica*) on the Jemaluang Road between S. Berassau and mile 15

I give a bare list of the plants that I found in this magnificent forest. I think it has been entirely exploited.

Adinandra acuminata
A. corneriana
Alphonsea johorensis
Alseodaphne obovata
Anisophyllea corneri
Aporosa lunata
Aralidium pinnatifidum
Ardisia pachysandra
A. ? solanacea
Areca montana
Artocarpus elasticus
Baccaurea parviflora

Balanocarpus heimii
Calophyllum incrassatum
C. wallichianum
Canarium littorale
Chrysophyllum lanceolatum
Cinnamomum mollissimum
Cleistanthus praetermissus
Cnestis palala
Cryptocarya griffithiana
Cyathocalyx pahangensis
C. ridleyi

- Dialium ? kingii*
Dillenia albiflos
Diospyros confertiflora
D. lanceifolia
D. nutans
Dissochaeta punctulata
Dryobalanops aromatica
Durio singapurensis
Dysoxylon cauliflorum

Elateriospermum tapos
Electrariopsis curtisii
Endospermum diadenum
Enicosanthum praestigiosum
Erycibe maingayi
Eugeissona tristis
Eugenia conglomerata
E. cf. duthieana
E. dyeriana
E. pseudosubtilis
Eugenia sp. (SFN 29319)

Fagraea ceilanica

Gaertnera obesa
Garcinia ? penangiana
Gardeniopsis longifolia
Gironniera nervosa
Gluta tavoyana
Gomphandra quadrifida var. *ovalifolia*
Goniothalamus tapis
Gymnacranthera bancana

Hopea mengarawan
H. polyalthoides
Horsfieldia polyspherula
Hydnocarpus castanea

Ixora javanica var. *retinervia*

J. Teysmannia altifrons

Koompassia malaccensis

Lasianthus ellipticus
Lepisanthes tetraphylla
Leptonychia glabra
Lindera malaccensis

Madhuca sessiliflora
Mangifera cf. quadrifida
Mapania kurzii

M. lorea
M. micropandanus
Melanochyla aff. auriculata
Meliosma pinnata ssp. *ridleyi*
Memecylon maingayi
Mesua ferrea
M. kochummeniana

Nenga macrocarpa

Osbeckia sp. ? (s.n. 11.5.35)

Palaquium clarkeanum
P. sukoei
Parinari nannodes
Phyllanthus gomphocarpus
P. oxyphyllus
Polyalthia brunneifolia
P. sumatrana
Pouteria malaccensis
Pseuduvaria galeata
P. macrophylla
Ptychoraphis singapurensis

Randia penangiana
Raphidophora sylvestris
Rennellia elongata

Sandoricum sp. (SFN 29363)
Saprosma glomerulatum
S. quadrifidum var. ?
Scorodocarpus borneensis
Shorea acuminata
S. exelliptica
S. foxworthyi
S. palembanica
Stephania ? (s.n. 11.5.35)
Sterculia coccinea
S. rubiginosa
S. cf. scortechinii
Streblus taxoides
Strychnos ignatii
Swintonia penangiana
Symplocos barringtoniifolia

Ternstroemia elongata
Timonius wrayi
Trigonostemon longifolius
T. rufescens
T. villosus
Tristania ? pontianensis

11. Bukit Tinjau Laut

This hill, 400 m high, is isolated on the northern limit of the Sedili region. As its name implies, it is a look-out to the sea. I had often seen it from the long tanjong of the Sedili Besar one or two miles above Bt Prah, and I wished to compare it with Gunong Panti (500 m), the long ridge of which contrasted with the apparently simple hump of Bt Tinjau Laut. The opportunity came in August 1939, and the approach was made from Lubok Pusing on the Sedili Besar.

I left Singapore at 5.30 a.m. on 5 August and did not reach Mawai until 7.45 a.m. on account of heavy rain. The river was in flood, but Sultan and his companions were ready with the motor-boat. We left Mawai at 8 a.m., reached Lubok Pusing

at 9.30 a.m., and had set up camp at the foot of Bt Tinjau Laut by 2 p.m. There was a track from Lubok Pusing for about a mile through secondary forest and derelict primary forest. As we approached the hill, signs of elephant increased, and we camped on flat ground in secondary forest by a little stream crossed by a wide elephant track with fresh dung. We kept a fire and two hurricane lamps burning on the three nights of our visit, lest the elephants returned. The stream was meagre; the water was clear but there were horse-leeches and, for bathing, we had to scoop water with a frying pan.

On 6 August we set out at 7.30 a.m. and went up a ridge to the summit. It was a granite hill covered, to my surprise, with virgin *kapur*-forest. The trees, along with *chengal* and several kinds of *Dipterocarpus* and *Shorea*, stood c. 50 m high. *Millettia atropurpurea*, which I had not seen elsewhere in the Sedili region, was frequent. The ascent was moderately steep, though not as steep as on G. Panti, and there were no rocky cliffs. On the summit a survey-beacon was overgrown with secondary forest 6-7 m high, and no clear view was obtainable. In this secondary forest *Cratoxylon ligustrinum* was abundant, though I had seen it but rarely in the rest of the Sedili region. I saw no difference in the forest from foot to summit except for the commoner occurrence of *Pandanus recurvatus* in the upper part above 250 m. The undergrowth consisted mainly of saplings, *Licuala*, *Nenga*, *Arenga westerhoutii*, and the abundant *Fordia johorensis*; neither of these last two had been found elsewhere in the Sedili region. I noted the absence of *Eugeissona*, *J. Teysmannia*, and the Euphorbiaceous *Trigonostemon*, typical of the *kapur*-forest on the Jemaluang road. There were many kinds of *Eugenia*, but most were sterile; I noted particularly the abundance of *E. rugosa* and *Eugenia* spp. (A and B, 6.8.39, and A, 7.8.39). Later identification of my collections revealed the following peculiarities. *Sapium baccatum*, *Beilschmiedia lunutensis*, and the two large Sapotaceous trees, *Ganua kingiana* and *Palaquium hexandrum*, were common in the *kapur*-forest, but I had not found them on the Jemaluang road. The Anacardiaceous *Swintonia penangiana*, with orange bark like *Pometia*, and *Melanochyla* sp. were common on the ridges. *Antidesma pahangense* was frequent, though it has been known otherwise only from the mountains of north Malaya and from G. Panti. I collected, also, *Cyathea obscura* and *Zingiber wrayi*, otherwise from the main range of Malaya, *Vatica stipularis* (otherwise known from Mt. Ophir), and the ferns *Asplenium borneense* and *Thelypteris motleyana*.

That afternoon it rained hard until sunset and drizzled all night. I suspect that, like other hills of the east coast, it had its local climate. On 7 August the day was fine, though cloudy in the afternoon. We explored the second top of the hill, which is not discernible from a distance, and ascended and descended by valleys. The upper valleys were very steep and filled with big granite boulders (much as Fern Valley on Bt Timah). The second top was rounded and almost flat, just as the main summit. Scattered boulders occurred on the slopes but mostly near the top. The valley-bottoms were filled with *Phacelophrynium maximum* which, in the Sedili region, occurred also by S. Kayu on the Jemaluang road, yet did not occur round G. Panti. This day we suffered from the little ticks and had to spend an hour smoking them off our bodies and out of our clothing.

On 8 August we left camp, met Sultan with his motor-boat at Lubok Pusing, and were in Singapore by sunset. Ngadiman of the Singapore Botanic Gardens and four local Malays accompanied me on this trip; they were well satisfied with \$1 per day along with the food of their choice, namely rice, dried fish, salt, condensed milk, tea, and bananas. I have recorded details because it would be interesting to note how a visit to Bt Tinjau Laut would now be undertaken.

If it has not been too drastically deforested, the hill needs much further exploration, earlier in the year when more trees could be expected in flower. *Phacelophrynium* indicates floristic connection with Trengganu. The abundance of *Eugenia rugosa* indicates connection with coastal dry-climax forest. The dominance of *kapur*, which is absent from G. Panti, is curious for it represents the southerly limit of the species in the peninsula. The hill seems to be a relic of the complex of G. Muntahak and G. Belumut, or the southernmost of a coastal range from Trengganu. There may be traces of marine transgression round the foot.

Plants collected on Bt Tinjau Laut (August 1939)

- Achasma macrocheilus*
Aglaiia cf. *trichostemon*
Aglaiia sp. (SFN 36939)
Aglanonema simplex
Antidesma pahangense
Antidesma sp. (SFN 37080)
Aquilaria malaccensis
Ardisia ? *wrayi* (SFN 36949)
Ardisia sp. (SFN 36929)
Arenga westerhoutii
Aromadendron elegans
Artocarpus elasticus
A. integer var. *silvestris*
Asplenium borneense

Balanocarpus heimii
Bauhinia integrifolia
Beilschmiedia lumutensis
Boesenbergia praineana

Canarium littorale
Combretum sundaicum
Cratoxylon ligustrinum
Croton laevifolius
Cyathea obscura

Dapania racemosa
Dillenia albiflos
Diospyros ? *graciliflora* (SFN 36936)
Diospyros sp. (s.n. 6-8-39)
Dipterocarpus spp. (abundant)
Donax grandis
Dryobalanops aromatica
Dryopteris crassifolia
Durio singapurensis

Ellipanthus tomentosus var. *gibbosus*
Eugenia rugosa
Eugenia tumida
Eugenia sp. (A, 6.8.39; B, 6.8.39)
Eugenia sp. (B, 7.8.39)

Fordia johorensis

Ganua kingiana
Globba variabilis
Gluta ? *malayana* (tree B, C, 6.8.39)
Gluta tavoyana
Gordonia ? *multinervia*

Habenaria sumatrana

Justicia sp. (SFN 37051)

Knema glaucescens var. *patentinervia*
Knema laurina
- Kopsia singapurensis*

Licuala lanuginosa
L. triphylla

Madhuca tomentosa
Mapania lorea
M. palustris
Melanochyla sp. (A, 6.8.39)
Melanorrhoea woodsiana (rengas A, 6.8.39:
tree -40m, common up to the summit)
Memecylon maingayi
Millettia atropurpurea

Nenga macrocarpa

Ochthocharis sylvestris

Palaquium hexandrum
Parkia speciosa
Phacelophrynium maximum
Phrynium capitatum
Pithecellobium bubalinum
Piptospatha ridleyi
Plagiostachys albiflora
Plocoglottis gigantea
Polyalthia cauliflora var. *beccarii*
Psychotria helferiana

Randia scortechinii
Rennellia elongata

Sapium baccatum
Saurauia tristyla
Scaphium linearicarpum
S. macropodum
Scaphochlamys klossii var. *minor*
Schismatoglottis brevicuspis
Schoutenia accrescens
Shorea foxworthyi
Shorea spp.
Sonerila costulata
Staurogyne griffithiana
Stichoneuron caudatum
Streblus taxoides
Styrax crotonoides
Swintonia penangiana

Trivalvaria nervosa

Urophyllum streptopodium

Vatica stipulata

Zingiber wrayi

Unidentified:— s.n. 6.8.39, as Tree A; see special notes.

12. Ridge-flora of Gunong Pantı, Johore

The long ridge of G. Pantı (c. 500 m) tops the granite mass of the mountain as a sandstone crest (c. 50 m high) from north west to south east. The highest point at the west end drops precipitously into lowland dipterocarp forest. There is a survey-beacon in a small clearing whence, on a fine day, G. Belumut may be seen and, formerly, the incursions of *kapur*-forest in the lowland leading to Muntahak, but they have largely been destroyed. The flanks of the ridge are precipitous and, apart from the ascent-route at the west end, they have not been explored botanically.

It has been known since Ridley's ascent in 1892 (Burkill 1927) that the flora of the ridge is peculiar and distinct from the dipterocarp forest on the granite slopes. The ridge-forest is a mixture of montane, lowland, and freshwater swamp forest. Probably there is nowhere else where *Leptospermum*, *Cibotium barometz*, and *Cyrtostachys* grow together. When, to these, there are added *Ficus pendens*, *Cheiropleuria*, *Parartocarpus*, *Myristica lowiana*, *Lithocarpus wrayi*, *Illicium*, and *Sympetalandra*, it can be seen that the ridge is a relic of a high mountain with upland swamps comparable, perhaps, with some range in west Borneo. It may be that Bt Tinjau Laut, P. Tinggi, and P. Tioman have lost the sandstone cap which lingers on the islet P. Berhala to the north of P. Tioman. According to Gobbett and Hutchison (1973), the sandstone is upper Jurassic to lower Cretaceous and situated unconformably on palaeozoic granite; it suffers very slow vertical weathering and is destroyed by scarp-retreat. Similar instances of mountain flora on lowland summits are given by Ashton (1964b, p. 51).

In 1935 a proposal was put to the Johore Government by the surveyor, F. B. Sewell, for a hill-station at the east end of the ridge. Aware of the damage that an ascent road might cause, as well as irreparable damage to the ridge itself through deforestation, a counter proposal for the conservation of the whole ridge with its unique flora was made by the Singapore Botanic Gardens. The original plan fell through for various reasons, as I was informed by the Conservator of Forests, C. Smith, but the danger is ever present even though the ridge has been scheduled as part of the Pantı Reserve.

I have made the following list of c. 75 remarkable species known to occur on the ridge, but it must be emphasized that it has not been thoroughly explored. Perusal of collections in the Singapore Herbarium will add many more species but, too often, the brief locality 'G. Pantı' gives no indication whether the collection came from the ridge or the lower slopes. Indeed the ridge needs exploration over a period of years in all months, as it were *de novo*, by the botanists of Singapore. Ahmat, Ridley's plant-collector, used to tell me how they were nearly frustrated on their first attempt to ascend the mountain by a tiger, until Ridley shouted at it and it went off.

Interesting plants known to occur on the ridge of G. Pantı (*, species of lowland swamp-forest)

ANNONACEAE

Disepalum anomalum Hook.f. (also Perak, Sarawak, Sabah)

**Polyalthia macropoda* King

ARACEAE

Homalomena deltoidea Hook.f.

BIGNONIACEAE

**Deplanchea bancana*

CLUSIACEAE

Calophyllum austrocoriaceum Whitmore; several other species.

Garcinia sp. A3 (Tree Flora of Malaya vol. 2); on the slopes of the mountain and on the ridge; also several other species of *Garcinia*.

CONNARACEAE

**Ellipanthus tomentosus*

CYPERACEAE

- **Mapania palustris*
Paramapania parvibracteata (Clarke) Uitt.
 (also from Kelantan)

DILLENIACEAE

- **D. grandifolia* (? *D. reticulata*); *D. albiflos*
 unrecorded.

EBENACEAE

- **Diospyros maingayi*
 **D. siamang*

ERICACEAE

- Vaccinium bracteatum* Thunb. (sea-shore
 species)

EUPHORBIACEAE

- Antidesma pahangense* (also Bt Tinjau Laut,
 G. Bubu, G. Tahan, Penang)
Blumeodendron calophyllum Airy Shaw
 frequent tree, -20m high)

FAGACEAE

- Lithocarpus wrayi* (King) A. Cam. (north
 Malaya)

GESNERIACEAE

- Loxocarpus holttumii*

ILLICIAEAE

- Illicium peninsulare* A.C. Smith (frequent on
 the rocky sides of the ridge; also on the
 main range and G. Benom).

LEGUMINOSAE

- Sympetalandra hildebrandii* v. St. (at the foot
 of the ridge)

LILIACEAE

- Smilax calophylla* Wall.

MARANTACEAE

- **Phrynium hirtum*

MELASTOMATAEAE

- **Medinilla rubicunda* var. *hasseltii*
 **Pachycentria tuberosa*

MELIACEAE

- Aglaia angustifolia*

MORACEAE

- Ficus pendens* Corner (also the mountains of
 Pahang, Perak, Penang)
 **Parartocarpus venenosus* ssp. *forbesii*

MYRISTICACEAE

- **Gymnacranthera eugeniifolia* var. *griffithii*
 **Knema laurina*
 **Myristica lowiana*

MYRTACEAE

- **Eugenia cerina*
 **E. papillosa*
 **E. spicata*
Leptospermum flavescens (common along the
 edges of the ridge)
 **Tristania sumatrana* (but ? *T. spatulata*)

NEPENTHACEAE

- **Nepenthes ampullaria*, *N. gracilis*,
N. rafflesiana

ORCHIDACEAE

- Bulbophyllum cuspidipetalum* J.J.Sm.
B. membranifolium Hook.f.
Calanthe johorensis Holtt.
Corybas mucronatus (Bl.) Schltr
Dipodium pictum (Lindl.) Rehb.f.
Liparis tricallosa Rehb.f.
Paphiopedilum bullenianum (Rehb.f.) Pfitz.
Phaius tankervilleae (Ait.) Bl.
 **Plocoglottis* sp.
Sarcochilus berkeleyi Rehb.f.
Thecostele secunda Ridl.
Trichoglottis lanceolaria Bl.

PALMAE

- Calamus holttumii* Furt.
 **Cyrtostachys lakka*

PANDANACEAE

- **Freycinetia corneri*
 **Pandanus kamii*
 (several spp. of *Pandanus*, ? *P. atrocarpus*,
P. recurvatus).

PIPERACEAE

- Piper stylosum* Miq. (growing on rocks)

ROSACEAE

- Pygaeum griffithii* (*Prunus arborea*)

RUBIACEAE

- **Timonius flavescens* (very common, nearly
 all the trees infested by a form of *Fomes*
pectinatus)

SAPOTACEAE

- Ganua kingiana* (also G. Belumut, Bt Tinjau
 Laut)

PTERIDOPHYTA

- Belvisia callifolia* (Chr.) Copel.
Cheiropleuria bicuspis (Bl.) Presl (lowest
 altitudinal record in Malaya)
Cibotium barometz (L.) J.Sm. (lowest alti-
 tudinal record in Malaya)
Ctenopteris moultoni (Copel.) Holtt. ?
Dipteris conjugata Reinw.
Hymenophyllum penangianum Matt. et Chr.
Isoloma divergens (Hook. et Grev.) J. Sm.
I. ovatum (J.Sm.) Presl
Lindsaea borneensis Hook.
Ophioglossum simplex Ridl. (at the n.w. end
 of the ridge, as the only locality in
 Malaya)
Polystichopsis hasseltii (Bl.) Holtt.
Pteris asperula J.Sm.
Pteridium aquilinum (L.) Kuhn
Scleroglossum debile (Kuhn) v.A.v.R.
Syngamma alismifolium (Pr.) J.Sm.
S. borneensis (Hook.) J.Sm.
S. minima Holtt.
Tectaria grandidentata (Ces.) Holtt.
Trichomanes aphlebioides C. Chr.

13. Sedili Kechil

The river descends gradually from the low hills that confine the southern end of the vast swamp of Jason Bay. Like S. Gembut to the Sedili Besar, it flows north but enters Jason Bay at the opposite end from K. Sedili Besar. It drains part of the swamp with its main tributaries S. Bahan and S. Leban, and short tributaries drain the west side of the strip of coastal hills which separate the river by 1-3 miles from the sea. There is no mountainous source to direct massive floods into the narrow Sedili Kechil, as happens on the Sedili Besar. Its flat terrain is mostly swamp-forest, and it seemed to me that here lay the best possibility of probing into the history of Jason Bay by means of pits and borings. When I visited the region in April and June 1934, the forest had not been exploited except for the extraction of mangrove at the kuala and for old clearings on some hillocks for plantations of pepper, gambir, and, more recently, rubber. The river was navigable at high tide by small motor-boat up to the derelict Chinese village of Kangkar Sedili Kechil, where I stayed in June. The village is about ten miles in a straight line from the kuala. Higher up fallen trees obstructed passage. The places which I visited are shown in Figure 2. Local names were verified from several sources; firstly from my guide Haron bin Awang Kechil, then from the inhabitants of Kampong Ladang and Kangkar Sedili Kechil, and finally from the records in the police-station at Kuala Sedili Besar.

Access in those days was either by foot along the coast of Jason Bay from K. Sedili Besar or across the bay, but these crossings were restricted by the rough weather that blew up in the afternoon. My visits were limited to five days (30 March - 3 April) as a reconnaissance for the main visit of two weeks in the following June, though this visit should have been longer because I intended to explore the Sedili Kechil and S. Banum, as well as the coast, with some thoroughness. Along the coast I succeeded eventually in traversing the whole distance from Tg Tebar, north of K. Sedili Besar, to Tg Gemoh, south of K. Sedili Kechil. A few notes from my diary of April will convey some of the circumstances. The diary of June was unfinished but, fortunately, I have the accounts of most of my botanical studies.

30 March 1934. Went down to K. Sedili Besar. Stayed in an empty room at the Police Station. Walked round to Batu Belayar in the evening.

31 March. Too rough to cross the bay. The masts of a sunken tongkang project from the sea between Pulau Tagal and Tg Sedili Besar. Walked along Jason Bay (Telok Sebong) from Tg Lembu to S. Tuenseh.

1 April. Left K. Sedili Besar in a small motor-boat about 7.45 a.m., reached K. Sedili in an hour after a rough passage, then up the Sedili Kechil with a few stops to collect plants, and reached Kangkar Sedili Kechil about noon. Returned to Sedili Besar as darkness fell after a rougher crossing with much bailing.

2 April. Went similarly to K. Sedili Kechil, stopped at the kuala, and walked east through the forest to Pasir Seruang, then for two miles down the coast. Had to wait two hours for the wind to drop before we could return to K. Sedili Besar, so walked along the beach north of the kuala for two miles. Drinking water at K. Sedili Besar from a Government well at 10 cts for two kerosene tins, but good water; a well of rather dirty water at K. Sedili Kechil, but a good clear stream at Kangkar Sedili Kechil. Pasir Seruang and Lundong Wai (where I had hoped to camp) had several good clear streams said not to fail in dry weather; tiger-marks along the sand.

3 April. Returned to Mawai via a trip up S. Kambau to Tan Chin Tuan Estate, reached after walking for half a mile across the swamp along pairs of planks raised on wooden stakes. The estate employed the most enormous Chinese labourer, like a Japanese wrestler, who carried two pikuls of rubber-sheet across these planks

daily, ate a prodigious amount of rice, had a very red face, and was most cheerful and foolish.

The officer in charge of the Police District at K. Sedili Besar was Awan bin Hassan. The headmaster of the Malay School at the Kuala was away and the second master Masbut introduced me to the school. Abdul Rani bin Halifin, of Kangkar Sedili Kechil, was the local guide.

Riverside vegetation. This was essentially the same as on the Sedili Besar but with sharper transitions between the characteristic belts or formations. The more remarkable differences were the following:—

1. The mangrove from the kuala to Kg Landang had been drastically cut. *Carapa moluccensis* was common by the river in the upper mangrove reaches.

2. The *nipa*-belt was short but extremely beautiful from the narrowness of the river and the high forest which rose behind it (see my Life Of Plants, plate 36c, of the east bank of the Sedili Kechil).

3. *Rassau* encroached so as almost to obstruct the river which in places flowed in lanes 2-3 m wide through serried ranks of *rassau*. Above S. Lebai Kator the whole river narrowed to 7-10 m wide, almost as a tunnel through the swamp-forest, and there the light-loving *rassau* stopped.

4. *Rengas* (*Ghuta velutina*) was scarce. There were few large bushes and no sign that it was ousting *putat*. The narrow passage of the river appeared to have been stabilised.

5. *Jejawi* formed no continuous banks. I saw no large trees but Haron told me that S. Jawi (or Jejawi), as a tributary of S. Banum, was indeed blocked by the trees from which it had got its name.

6. The following trees were largely absent or scarce:— *Buchanania sessiliflora*, *balau* (*Shorea* spp., hence little or no logging along the river), *Dryobalanops oblongifolia*, *Nauclea subdita*, *Polyalthia sclerophylla*, *Shorea sumatrana*, *sengkawang* (*Shorea* spp.) and *Tristania sumatrana*. *Elaeocarpus macrocerus* was scarce by the river. In fact, there was neither *mempisang*-belt nor *Tristania*-bank. The river was a ditch with slight and continually inundated banks, winding through flat swamp-forest, as if its valley had been an arm of Jason Bay that had silted up.

7. *Piangu* (*Horsfieldia irya*) was common, as big trees up to 27 m high, much larger than had been usual on the Sedili Besar, where the straight trunks might have been felled for poles, masts, or spars.

8. *Pandanus affinis* was very abundant in the upper reaches of the mangrove and *nipa* where, on going upstream, the first plants of *putat* appeared.

9. *Pandanus malayanus* formed small thickets in the water among the taller *rassau* and was especially abundant in all the darker or tunnel-like tributaries without *rassau*.

10. *Mesua ferruginea* was exceedingly abundant, much more than on the Sedili Besar. It grew from the edge of the *rassau* in thickets up to 5 m high, standing in the water at high tide, spreading over the river, and smothering both *putat* and *rengas* but, eventually, smothered by *rassau*.

11. Despite the absence of *Tristania*-banks, *Elaeocarpus griffithii* and *Trigonachras acuta* were more abundant than on the Sedili Besar.

12. In the swamp-forest off the river's edge, *Lophopetalum multinervium* and *Palaquium xanthochyium* were exceptionally abundant; indeed, their aerial roots blocked one's passage. *Xylopia fusca* was scarce.

13. Upstream beyond the *rassau*, which ended at S. Lebai Kator, there seemed to be no distinct river-side vegetation but continuous swamp-forest, just as along the tributaries of the Sedili Besar. I noted the following as common:— *Anaxagorea*,

Aporosa frutescens, *Artocarpus kemando*, *Barringtonia reticulata*, *Calophyllum* spp., *Camposperma auriculata*, *Crudia havilandii*, stilted *Dillenia*, *Elaeocarpus griffithii*, *Eugenia cerina*, *E. pseudosubtilis*, *Ganua motleyana*, *Garcinia nigrolineata*, *Goniiothalamus malayanus*, *Grewia antidesmaefolia*, *G. fibrocarpa*, *Ilex cymosa*, *Koompassia malaccensis*, *Lithocarpus bennettii*, *Melanorrhoea wallichii*, *Memecylon paniculatum*, *Morinda* ? *rigida* (commonly climbing *Ilex cymosa*), *Pternandra coerulescens*, *Shorea platycarpa*, *Strombosia*, *Symplocos celastriifolia*, and *Vitex peralata*. Strangely my notes have no reference to *Cratoxylon*. The big spiny aroid, *Podolasia stipitata*, (Plate 40), was common in the swamp-forest, in the water by streams and in shallow parts by the river's edge. I found also in the shady streams a species of *Batrachospermum* (SFN 28445) which I had not met by the Sedili Besar.

There were immense stranglers of *Ficus calophylla*, *F. crassiranea*, *F. sundaica*, and *F. virens* var. *glabella*. by the main river.

14. Comparison with the Kemaman River, Trengganu

In June 1932 I paid my first visit to Bt Kajang Tin Mine, which lay inland from Chukai. I took the opportunity of comparing the riverside vegetation of the Kemaman with that of the Sedili, and spent four days in the undertaking (Figure 8). On 26 June I went in an open prahu from S. Ayam near the mine, to S. Nipa and thence to the Kemaman river as far as S. Pinang Hilir. There I took an old car to Chukai and spent the night at the house of E. T. Swan, manager of the mine. Next day I drove back to S. Pinang Hilir and took the prahu down to the kuala, returning that evening to Bt Kajang. On 29 June I went down to Kg Ayer Puteh, where I spent the night, and next day I took a motor-boat to the kuala in order to check my first observations. I repeated most of the journey in 1935 and find, now, in my diary for 28 October 1935 "Came up to Bt Kajang from Chukai. The journey takes 6 hours under favourable conditions, and has scarcely altered since 1932. The river looks just the same and the road to S. Pinang Hilir is no better. I was poled up the river by the same Malays, and the same persons met me at the mine". That road was fearful and the car had broken springs. On 26 June, when it was raining hard and the hood was up and I was wearing a rubber topi to keep the drips off, the driver was bent on getting the journey over. The car thumped into a pot-hole, jerked up, and rammed my topi through the hood. After several minutes of agony, I straightened my neck, and I have never worn a topi in a closed car again. Yet it was the guard against bumps and thorns in the forest, and the place for matches in the rain.

In contrast with the Sedili, the banks of this lower part of the Kemaman river were under cultivation with rice-fields and orchards, or had been deforested and returned to belukar. There were, nevertheless, patches of original vegetation sufficient to reconstruct the sequence. In broad outline it resembled that of the Sedili. The succession from the estuary, as shown in Figure 8, was mangrove, *nipa*, *Sonneratia caseolaris*, *putat*, and *rassau* leading to *Tristania*-banks, and finally *neram* (*Dipterocarpus oblongifolius*) and *Saraca*-streams. The failure of the original vegetation to regenerate was striking. The reason lay, evidently, in the deforestation of the river, the death of the protective layer of tree-roots along the banks, and the removal of fallen trees which stemmed the current. Torrential rains streamed into the river, instead of percolating through the forest, and eroded new channels. The swifter current eroded the banks and carried away the soft mud of the *putat-rassau* belts. At river-bends there were spits and bars of coarse sand, unsuited to the regeneration of *putat* or *rassau*, while the opposite bank was severely undercut. Everywhere along the river, banks were slipping. There was denudation on a scale not seen on the Sedili; yet, this may be its fate.



Figure 8. The lower reaches of the Kemaman river, with that from Kg Machang Satuahan downstream enlarged to show the following details as observed in June 1932:— 1, the upper limit of *nipa*; 2, *Licuala spinosa* and *Sonneratia caseolaris* abundant; 3, *Eugenia densiflora*, *Millettia hemsleyana*, *Hibiscus tiliaceus*, and *Acrostichum aureum* abundant; 4, *Sonneratia caseolaris*; 5, *Millettia hemsleyana*, *Hibiscus tiliaceus*, and *Ixora javanica* abundant; 6, *Barringtonia conoidea*, *Gluta velutina*, and *Pandanus helicopus* abundant; 7, *Pandanus helicopus*, *Dipterocarpus oblongifolius*, *Millettia hemsleyana*, and *Tristania sumatrana*; 8, *Saccharum arundinaceum* in big stands.

The river was tidal up to the region just above the entry of S. Dadong from the west. It was brackish up to the vicinity of S. Rassau Beranyut and Lubok Gambir. Below this bend, the river broadened and mangrove had some stabilising effect on its course. Upstream there were patches of *putat*, *rassau*, *pelawan* (*Tristania*), and *neram*. The long stretch from K. Simpang to Kg Machang Satuahan was entirely kampong and belukar. Above this village *neram* became more abundant, but without *pelawan*.

In the following notes I give some precise details of the river as it was in 1932 and 1935. It would be interesting to know how the relics of the original vegetation may have survived.

Transition between *neram* and *pelawan*. The only indication of this was at Kg Pasir Halus, shortly below K. Simpang. Here the river made a wide bend. On its south side there was a small backwater, or sluggish stream, which had on its low west bank fairly large clumps of *rassau* in mud that had not been scoured away, and on its abrupt east bank a well-grown original stand of *neram*, *jada* (*Millettia hemsleyana*), and *pelawan* intermixed. The trees stood about 20-25 m high, as the critical forest relic. Above this bend there was no *pelawan*. Below the bend *pelawan* and *jada* occurred in patches down stream to Kg Nior, but no *neram*. Below this village there were no abrupt banks to sustain *pelawan*. Thus *pelawan* indicated the original steep banks of the river in its tidal freshwater stretch; *neram* indicated the upper non-tidal reaches; but *jada* infiltrated both. I note here the absence of *Gluta renghas* from the Kemaman river, in contrast with the Pahang, Trengganu, and

Kelantan rivers where its large trees marked, also, the tidal freshwater stretch. Possibly they had been felled or carried away by floods.

Floristic comparison with the Sedili. In the few days available to me I concentrated on the more conspicuous members of the vegetation.

a. Species common on the Kemaman river, absent from the Sedili:—*Barringtonia spicata* (*putat ulu*, *B. acutangula* ssp. *spicata*), *Derris heptaphylla* (rare on the Sedili), *Eugenia densiflora* (*jambu ayer*), *Dipterocarpus oblongifolius* (and its associated flora, p. 44), *Grewia tomentosa* (common in belukar on the Kemaman, coastal in the Sedili region), *Lagerstroemia speciosa* (*bungor raya*), *Mallotus floribundus* (*taping*), *Millettia heinsleyana* (*jada*), and *Securinega virosa* (*bebeti*).

Lagerstroemia ovalifolia (*bungor menuku*), was fairly common, but scarce on the Sedili. Two species of *Tetracera* (*T. akara*, *T. indica*, *akar pelah* or *mempelas*) were abundant up stream from the *nipa*-zone.

b. Species common on the Sedili river, absent from the Kemaman:—*Buchanania*, *Ceratopteris*, *Elaeocarpus macrocerus*, *Eugenia cerina*, *E. fastigiata*, *E. muelleri*, *E. pseudosubtilis*, *E. spicata*, *E. valdevenosa*. *Ficus calophylla*, *Gardenia tubifera*, *Limnophila*, *Mesua ferruginea*, *Polyalthia sclerophylla*, *Pongamia pinnata*, and *Vatica wallichii*.

There was, in fact, no vestige of the *mempisang*-belt of the Sedili river. The common large strangling figs of the Kemaman were *F. crassiramea* and *F. sundaica*. *F. microcarpa* was very scarce on the Kemaman; I saw only one fairly well-grown specimen on the river-bank at S. Rassau Beranyut where, as might be expected, the fresh and brackish water interchanged.

Notes on the river-side vegetation of the Kemaman river.

Acrostichum aureum extended from the mangrove abundantly to Kg Nior; not seen above Kg Binjai.

Barringtonia conoidea (*putat*) appeared in the upper part of the *nipa*-zone and continued in more or less scattered clumps up to Kg Pasir Halus where the last upstream stand of *rassau* was situated. *Putat* was most abundant between Kg Nior and S. Rassau Beranyut. It soon disappeared where, on going downstream, *nipa* began.

Barringtonia spicata (*putat ulu*) occurred in fair abundance from Kg Nior upstream to K. Simpang. It was evidently restricted to the freshwater tidal stretch of the river.

Derris heptaphylla occurred chiefly between the upper limit of *nipa* and K. Simpang, but scattered plants were climbing in flood-damaged parts of the *neram*-banks on S. Ayam and S. Nipa.

Dipterocarpus oblongifolius (*neram*) was first encountered, going upstream, at Kg Pasir Halus, where tidal effect in the freshwater part of the river was becoming slight. Probably, in its original state, the Kemaman was a *neram*-river from S. Pinang Hilir up to the *Saraca*-streams of the ulu.

Eugenia densiflora (*jambu ayer*) was in full flower at the end of June 1932 and, therefore, easy to distinguish. It occurred from Kg Binjai upstream to S. Ayam and was abundant as far up as Kg Pasir Gajah, well above K. Simpang. Between Kg Binjai and S. Pinang Hilir it formed in many places almost pure stands for up to 100 m along the river's edge. Here it was entwined with the two species of *Tetracera*, the red fruits of which among the posges of fragrant white flowers of the *Eugenia* made striking and beautiful pictures but the Malays with me were, as usual, indifferent to such sights. Upstream with *neram* this *Eugenia* was very scattered, but prospered in open flood-damaged places. It had become, indeed, a plant of river-side belukar.

Eugenia oblata (kelat) was co-extensive with *Hibiscus tiliaceus* but extended about two miles further upstream to Kg Telok Pasir, above which no examples were seen. This species was rare on the Sedili, where it occurred in freshwater tidal swamp-forest.

Ficus microcarpa (jejawi) was very scarce in the neighbourhood of S. Rassau Beranyut where one fairly large tree occurred.

Ficus obpyramidata was much commoner than on the Sedili, doubtless because it succeeded with deforestation and flood-damage. It first appeared going upstream, about S. Pinang Hilir and continued thence in flood-damaged places up to the beginning of the *Saraca*-streams.

Gluta velutina (rengas, *r. ayer*) was co-extensive with *rassau*. The last stand, upstream, of *rassau*, *rengas*, and *putat* had exactly the same construction as on the Sedili, but this stand was being sanded up in places and becoming moribund. At Kg Telok Pasir Semoh there were similar stands.

Hibiscus tiliaceus (*baru baru*, *bebaru*) became conspicuous from Alur Mak Lagam, where the *nipa* ended, upstream to S. Rassau Beranyut; that is in the brackish tidal stretch. Between S. Alur and Alur Mak Lagam, *H. tiliaceus* and *Eugenia oblata* were the commonest shrubs or small trees along the river.

Ilex cymosa (*mensirau*) appeared to have the same distribution as *Eugenia densiflora*, but it was much less abundant. It occurred chiefly between Kg Binjai and K. Simpang.

Ixora javanica and *I. lobbii* var. *stenophylla* together made a more or less continuous undergrowth along the river-side from the *neram*-river down to Kg Nior. They were bushes of steep banks, growing $\frac{1}{2}$ -1 m above the ordinary flood-level. All the bushes were flowering at the end of June 1932 but, unfortunately, my notes do not distinguish their exact distribution, Var. *stenophylla* was upstream in forested places while *I. javanica* was downstream in the belukar.

Lagerstroemia ovalifolia (*bungor menuku*) occurred on the banks of S. Nipa behind, or above, the *neram*-trees, and a few individuals were seen in such places between S. Ayam and Kg Machang Satuhan.

Lagerstroemia speciosa (*bungor raya*) also had the same distribution along the river as *Eugenia densiflora*, but was much less common. It was more abundant, in fact, in belukar far removed from the river.

Mallotus floribundus (*taping*) was roughly co-extensive with *F. obpyramidata*.

Millettia hemsleyana (*jada*) occurred throughout the lower *neram*-reaches of S. Nipa (from Jeram Gajah downstream) and S. Ayam, and throughout the *pelawan*-reach of the Kemaman. It seemed to prefer the flood-damaged parts of the *neram*-rivers and, evidently as a more light-demanding species than sapling *neram*, prospered in the forest-relics along the Kemaman. No trees were seen below Kg Nior.

Nipa occurred in the long stretches of the river-bank from Chukai up to Alur Mak Lagam where it disappeared quite abruptly.

Pandanus helicopus (*rassau*) occurred from Kg Binjai upstream to Kg Pasir Halus. It formed small clumps where streams entered the river, but it was very scattered and several clumps were being covered with river-sand and were clearly moribund. Thus it showed the automatic destruction of the primeval vegetation as deforestation changed the character of the river.

Saccharum arundinaceum (*tebrau*) occurred only between K. Simpang and Kg Machang Satuhan where, in several places, it formed massive stands.

Securinega virosa (*bebeti*) and *Nauclea subdita* (*gedembak*) occurred abundantly on flood-damaged river-banks from Kg Binjai upstream to S. Ayam. Both seemed intolerant of brackish water.

Sonneratia caseolaris (*berembang*) occurred in the estuarine mangrove, behind the *nipa*-belt. At S. Betok and Kg Nior it was still abundant, but the last groups upstream at Kg Telok Awang Mati consisted of small stunted trees. Here *Hibiscus tiliaceus* disappeared also on journeying upstream. *Licuala spinosa* appeared to be co-extensive with *S. caseolaris*.

Tetracera akara and *T. indica* occurred from the upper limit of *nipa* right up the main river and its tributaries, and on S. Nipa up to Jeram Gajah, but they were especially abundant with *Eugenia densiflora*.

Tristania sunatrana (*pelawan*) required raised river-banks and occurred from Kg Nior up to Kg Pasir Halus. The trees were very scattered and stumps showed that many had been cut down, probably for firewood. *Pelawan* did not occur where *neram* had established its hold on the river-banks, except in the overlap at Kg Pasir Halus.

Neram-rivers. By this name I indicated, in Wayside Trees of Malaya, the swift rivers with firm banks along which there grow in great abundance trees of *neram* (*Dipterocarpus oblongifolius*). They occur in Pahang, Trengganu, and Kelantan but whether they have always the same characteristic river-bank flora as in Kemaman has yet to be recorded.

Neram-trees on S. Nipa grew on the very edge of the river-bank, just above normal flood-level. The banks varied 2-7 m high and were steep and earthy with boulders here and there and a fair amount of humus, but the lower half metre or so in the flood-zone was swept bare. The *neram*-trees leant over the water and their branches arched into a canopy at a height of some 25 m. They were heavily laden with epiphytes among which *Ficus deltoidea* var. *kunstleri* was characteristic. In flower, *neram* scented the river with orange-blossom. The trunks rose from a twisted buttressed base, generally with a buttress up the bank, away from the direction of leaning and the main roots were more or less superficial and spread horizontally.

The banks of the Kemaman river and the lower part of S. Nipa had been badly flood-damaged. Many *neram*-trees had fallen into the water. In the gaps there grew up thickets of *Nauclea subdita*, *Ficus obpyramidata*, and *Securinega virosa*. Where no such damage had occurred, big *neram*-trees stood about 20 m apart with smaller *neram*-trees at irregular intervals so that young and old occurred almost every 2 m; in one place on S. Nipa I counted ten well-grown trees along 40 m of the bank. Associated with them were trees of *jada* which, however, seemed not to extend so far into the ulu as *neram*; on S. Nipa I saw none beyond Jeram Gajah.

Under the *neram*-trees there was a characteristic flora of the following herbs, shrubs, and small trees, which became more or less submerged in floods:—

Grasses:— *Coelorachis glandulosa* (Trin.) Stapf, *Eragrostis unioloides* (Retz.) Nees, *Lophatherum gracile* Brong., *Panicum brevifolium* L., *Paspalum conjugatum* Berg, *Pogonatherum paniceum* (Lamk) Hack., *Vetiveria nemoralis* (Bal.) A. Cam.

Cyperaceae:— *Fimbristylis dura* (Zoll. et Mor) Merr., *Scleria* ? *purpurascens* Steud. (SFN 25908, as *S. multifoliata* Boeck.)

Araceae:— *Homalomena confusa* Furt. (collected as *H. angustifolia*), *H. griffithii* (Schott) Hook.f.

Acanthaceae:— *Hygrophila saxatilis* Ridley.

Clusiaceae:— *Garcinia cataractalis* Whitmore.

Euphorbiaceae:— *Antidesma salicinum* Ridley (*mempenai ayer*, *chapok*), *Drypetes riparia* Ridley (*behulu*, *bebulus*), *Homonoia riparia* Lour. (*kayu suarah*).

Meliaceae:— *Aglaiia salicifolia* Ridley, *Dysoxylon angustifolium* King (*jemari*).

Rubiaceae:— *Gardenia tentaculata* Hook.f., *Hedyotis auricularia* L., *Ixora lobbii* var. *stenophylla* Corner.

Scrophulariaceae:— *Vandellia crustacea* Benth.

Vitaceae:— *Leea gigantea* Griff.

Pteridophyta:— *Blechnum orientale* L., *Lindsaea lucida* Bl., (? *Dipteris lobbiana*, though I made no record of this).

Of these species, the *Aglaia*, *Blechnum*, *Drypetes*, *Garcinia*, *Homalomena*, *Dysoxylon*, *Leea*, and *Ixora* grew on the earthy banks just above the usual flood-zone. The *Antidesma*, *Gardenia*, and *Lindsaea* grew on the rocky banks and among the large boulders by the river's edge. *Homonoia* and *Hygrophila* stood the full force of the current in rock-clefts and on the rocks in mid-stream. The grasses and sedges developed mainly on the sand-spits which formed in the quieter stretches and in the backwaters. Here *Paspalum conjugatum* formed swards up to 60 cm high. *Panicum brevifolium* and *Scleria* ? *purpurascens* occurred also at the normal flood-level of the earthy banks. At Jeram Gajah, on S. Nipa, *Begonia sinuata* occurred on the rocks where a small stream entered, and the little herb *Salomonina cantoniensis* Lour. was abundant. A noteworthy absentee was *Ficus ischnopoda* Miq., which is common in the swift forest rivers from Selangor and Pahang northwards, but has not been recorded for Trengganu.

All these riparian plants, as well as *neram* and *jada*, have oblong, lanceolate, willow-like leaves or leaflets, and this form is typical of these swift rivers. In the case of *Ixora* it seems to be an adaptation to the swift current (Corner 1941), but there was no clear evidence of this for the others. It would be interesting to raise plants from seeds under various conditions to discover any possible variability in leaf-form. The *Garcinia*, when I first met it in abundance on S. Nipa, did not seem to be a plant distinctive of cataracts, if such small broken falls can be called such, but a very twiggy bush -2.7 m high of the river-banks with *Aglaia* and *Dysoxylon*; the specimens had been filed provisionally under *G. uniflora*. Had I known that it was to be described, I could have corrected the impression.

As the *neram*-rivers narrowed upstream, the *neram* disappeared and they became *Saraca*-streams with *Pometia pinnata*, *Meliosma sumatrana*, *Pternandra capitellata*, *Saraca bijuga*, and *Schoutenia glomerata*. Conditions were, presumably, too shady for the growth of *neram*, as they had become too shady for *jada*, or the waters of the *Saraca*-streams may be too cold. Practically nothing is known in detail of the manner in which the seedlings of these riparian plants establish themselves, the nature and construction of the roots which hold them so firmly against the current, or, indeed, of their stems; they are, still mainly herbarium-specimens.

15. Comparison with the rivers of Brunei

In February 1959, in company with Dr P. S. Ashton, I studied the more obvious features of riverside succession on S. Damit, S. Belait, and S. Temburong. There was a general agreement with the Sedili Besar, but some floristic differences.

Mangrove gave place to the *nipa*-belt with *Pandanus affinis* and *P. corneri*. Then, upstream, there came thickets of *Barringtonia conoidea*, *B. racemosa*, *Gluta velutina* (mostly old specimens with thick gnarled trunks), and *Notaphoebe coriacea*. On the muddy flats behind these pioneers there were in abundance *Horsfieldia irya* and *Sapium indicum*. I saw neither *Pandanus helicopus* nor *Polyalthia sclerophylla*; where they would have been expected, there was *Dyera lowii*, which is absent from Malaya. In the freshwater tidal reach *Metroxylon*, with spiny trunk, was common on the river-bank, and *Hanguana anthelminthica* floated into the water along with a grass. In the *nipa*-belt there were scattered plants of a stout spiny pandan recalling *P. odoratissimus*. Most timber had been removed from the lower stretches of the rivers. Above the tidal reach on S. Temburong the abundance of *Duabanga moluccana* showed that this river lay in a different phytogeographical region. The

continental *D. grandiflora* (*D. sonneratioides*) does not occur in the south of the Malay Peninsula, Sumatra, or Riouw; in fact *Duabanga* is absent from the Riouw pocket in its widest extent.

16. Floristic richness

The richness of the tropical flora is well known. The problem is what all these different plants are doing side by side in the same forest. In the long list of seed-plants from the Sedili region, it is easy to pick out a few which, with special requirements, have special habitats, e.g. *Barringtonia conoidea*, *Ficus microcarpa*, *nipa*, *Pandanus helicopus*, or *Tristania sumatrana*. The more particular the habitat, the fewer are the species which it holds. Presumably, for it has not been ascertained, their seeds may sprout anywhere and in the general competition die, unless under those particular circumstances. With the trees of the high forest, however, the climbers that ascend them, and their epiphytes, the numbers mount and it is impossible to say at once which factors govern the establishment of seedlings, the survival of saplings, and the success of flowering, fruiting, and seeding; in these steps there enter successively the characters of species, genus, family, and, even, order. The idea behind the systematic categories is that the individuals of a species are working together in a certain way that differs from the ways of other species; there must be, for instance, some fifty ways of Annonaceous, Lauraceous, Leguminous, or Myrtaceous existence in the Sedili region. The tropical flora shows that the more favourable the environment for plant-growth, so the number of different ways of plant-life increases. As in a prosperous city, trade and occupations multiply; they build establishments and, in so doing, create new occupations, trades, and services; their complexity is evolving. Thus it is in the tropics that uniform habitats such as freshwater swamps or copiously watered plains develop such complex forests. They are communities in that they are the outcome of this symbiotic evolution; and the scope for ecological research is titanic.

In this respect I draw attention to roots. Commonly hidden, even from our thoughts, in the swamp-forest they obstruct, trip, and force themselves to the front. They are anchoring, breathing, and absorbing of water, mineral salts, and the products of decomposition from the litter of the forest. This litter is, perhaps, the most complicated organic mixture in the world. It cannot be processed into simple substances for root-absorption in any single manner. Inspection of the occurrence of such obvious products of decomposition as the fruit-bodies of fungi shows that they occupy many more or less restricted habitats, not the whole litter of a species of tree, for instance, but parts of this litter; petioles may be distinguished from blades, veins even from mesophyll, and all these from twigs, branches, flowers, fruits, seeds, and roots. An underground city of micro-organisms is required for the sewerage of the forest. The micro-organisms around and within the rootlets are part of this processing and they pass on to the green plant some of the simplified organic substances. It cannot be supposed that one species of green plant is fitted with a 'rhizosphere' competent to reduce all the litter. It follows, therefore, that the more varied the forest, the more varied become the opportunities for root-growth. Stems largely compete, but the roots, as shown by the relays of micro-organisms required for decomposition of the litter, may also act in relay. Hence I consider that different species of root may be in symbiosis, as well as their micro-organisms, and that this is part of the answer to the question why tropical forest is so rich in species. Every new product of photosynthesis that gets into the litter needs a new micro-organism, or a new process, for its decomposition, and this provides a niche for another species of green plant. The formative action of roots on stems has

been recognised (Torrey and Clarkson 1975); its extent needs investigation in the diversity of the tropical forest.*

17. Postscript

Since completing this account, I have been able to study aerial photographs of the Sedili rivers taken by the Royal Air Force in 1957 and 1958. They show the whole region heavily forested as I knew it in the years before the war. Such photographs, of course, were not available in my day; indeed, it was not possible even to fly over the region. If, however, the botany of the rivers is to be pursued, it will be essential to compare these aerial photographs with the modern environment as it has been opened up in order to detect the relics of forest and the remaining places of particular ecological interest; recent aerial photographs may be available for comparison. The photographs reveal much of the detail that I have described and, I think, the various riverside belts, freshwater swamp-forest as opposed to hillock forest, and mangrove could be distinguished when they have been correlated on the ground with the pattern and tint in the aerial photograph. Three points strike me as having special interest: 1, the pools of standing water in the swamp-forest about $\frac{1}{2}$ - $\frac{3}{4}$ mile to the east and west of the large bend of the Sedili Besar at Bt Tiga, for I did not encounter such pools in my explorations; 2, similar pools on the north side of the river about midway between Bt Perah and K. Gembut; 3, the large swamps of *nipa*, apparently pure stands, in the mangrove east of S. Kambau.

* See the recent publication by Dr. P. J. Grubb, The maintenance of species richness in plant communities, *Biological Reviews* vol 52, 1977, pp. 107-145. The author emphasizes the importance of specific differences in matters of dispersal, seedling-establishment, and regeneration.

Date	Description	Debit	Credit
1890			
Jan 1	Balance		100.00
Jan 15	Wages	50.00	
Jan 30	Expenses	20.00	
Feb 15	Income		75.00
Feb 28	Expenses	15.00	
Mar 15	Wages	60.00	
Mar 31	Income		80.00
Apr 15	Expenses	10.00	
Apr 30	Wages	40.00	
May 15	Income		90.00
May 31	Expenses	12.00	
Jun 15	Wages	55.00	
Jun 30	Income		70.00
Jul 15	Expenses	18.00	
Jul 31	Wages	45.00	
Aug 15	Income		85.00
Aug 31	Expenses	14.00	
Sep 15	Wages	50.00	
Sep 30	Income		78.00
Oct 15	Expenses	16.00	
Oct 31	Wages	48.00	
Nov 15	Income		82.00
Nov 30	Expenses	13.00	
Dec 15	Wages	52.00	
Dec 31	Income		76.00
Total		500.00	500.00

Part II. Jason Bay

This shallow bay, about six miles across, was known locally as Telok Sebong; the cartographic name was unfamiliar. The coast between the two headlands was sandy, but rocky immediately to the north and south. The coastal dune was raised 1-2 m above high tide level, in places even to 3 m, and consisted of white coral sand with, here and there, the tops of buried rocks; there was no alluvial layer on the sand-bank. It varied in width from 50 yards to a third of a mile, but on the west side of K. Sedili Kechil it was nearly a mile. A succession of forest developed on the bank. *Casuarina*-forest fronted the sea and was overtaken by that of *Eugenia grandis* which, in turn, became what I called in my notes dry climax-forest because it was raised above the level of the swamp-forest to the interior. The sand became greyer from the addition of humus and on the inland side of the broad dune it was discoloured to a depth of 30 cm or more. There was no extensive system of dunes along the coast, but short series of wide sand-spits developed at the mouths of the rivers.

Swamp-forest. For 2-3 miles inland from the coast there was a confusion of brackish and freshwater swamp-forest and remains of former coastal dunes. It was drained on its western boundary by S. Gembut, flowing north by the hillocks leading to Bt Tiga on the Sedili Besar. I travelled up this river, when it was a tunnel through the forest, as far as Kangkar Gembut, but made little investigation. I note that Swan (1967) in his map of east Johore shows a north-south line of

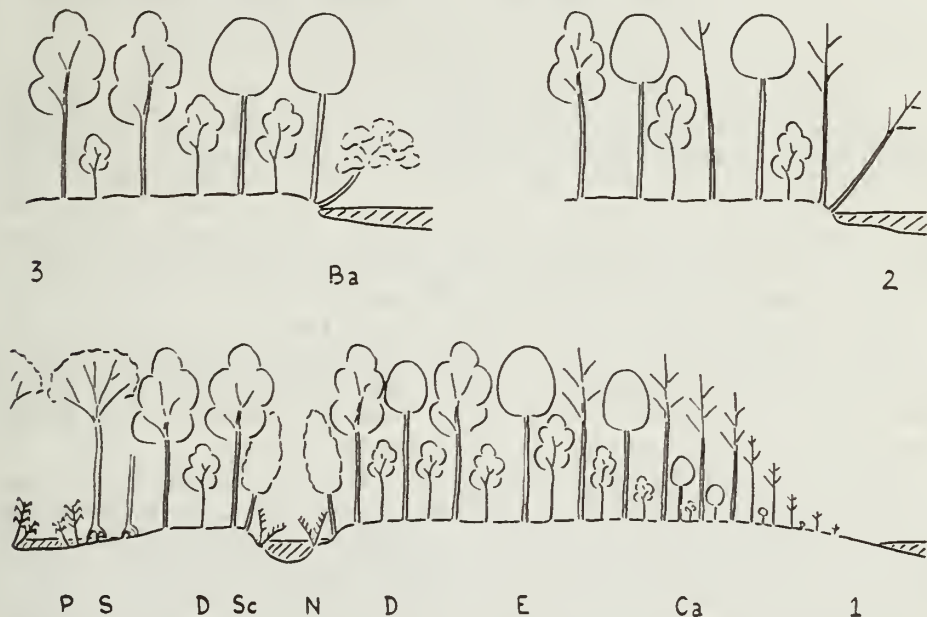


Figure 9. Diagrammatic transects of coastal forest at Jason Bay. 1, the sandy shore advancing seawards to the right. 2, the shore receding with *Casuarina* undercut. 3, The shore abraded to *Eugenia grandis* forest with a coastal strip of *Barringtonia asiatica*, *Calophyllum inophyllum*, and *Terminalia catappa*. — Ba, *Barringtonia asiatica*; Ca, *Casuarina equisetifolia*; D, dry climax-forest; E, *Eugenia grandis* forest; N, *nipa*; P, *Pandanus*; S, freshwater swamp-forest; Sc, *Sonneratia caseolaris*.

gabbroic intrusion along the course of S. Gembut. I explored more fully the seven short rivers which flowed directly into Jason Bay. I intended to traverse the whole area from east to west at several places, but illness overcame me. I wanted to discover if any coastal plants, such as *Cycas rumphii*, *Pandanus dubius*, *P. odoratissimus*, or *Eugenia grandis* survived on the old sand-banks from the time when they had been on the earlier sea-coast. Though much of this area has now been logged and cleared, enough bits of forest remain to piece together the botanical history of the bay; it seemed to have been seaward advance with short periods of retreat, as shown by the erosion of the coast in 1934. It was in this swamp-forest that *kerepit* or *kopit* (*Inocarpus fagiferus*) was so abundant, being apparently its only place of occurrence in the Malay Peninsula and the western limit of its wide Pacific distribution.

Forest-succession on the sand-bank. This was the main botanical problem at Jason Bay. The natural succession from bare sand-dune to dry climax-forest could be seen at the mouths of S. Tuenseh, S. Sebong, S. Diman, S. Lebai, and S. Semandan, which I describe later in some detail. The open dune was colonised by the usual grasses, sedges, *Canavalia*, and *Ipomoea* but, at the same time, there sprouted among them seedlings of *Casuarina equisetifolia* and those of the fruits of coastal trees thrown up by the waves. In these hot places young *Casuarina* grew fast and built a forest-belt, 10-50 m wide, of small trees which developed into an apparently pure stand of tall trees but, in fact, there were growing up beneath them the more shade-tolerant saplings which, with slower growth, would form the *Eugenia grandis* forest. Seeds of *Casuarina* sprouted nowhere but on the open dunes, never in the shade or under old trees of *Casuarina*. Thus the presence of a file of old trees along the sea-front meant that the sand-bank had not extended or, if so, it had been eroded. S. Rhu Reba was, indeed, the place where the coast was being eroded and the old *Casuarina*-trees were falling into the sea (Plate 26).

The plants of *Eugenia grandis* forest are listed on p. 58. Their seedlings may also require open places for establishment, but those of the dry climax-forest, brought by flood and animal from the interior, established themselves in the shade of *Eugenia grandis* forest. Old, lofty, and stag-headed crowns of *Casuarina* could be seen embedded even in the dry climax-forest, as much as 300 m from the sea (Plate 27). The old trees appeared to die, eventually, from attack by the polypore *Phellinus* (*Fomes*) *rimosus*. *Eugenia grandis* and *Beilschmiedia tonkinensis* persisted in the dry climax-forest up to 400 m from the coast.

The purple-brown and clavaria-like fungus *Thelephora ramarioides* was invariably associated with the roots of *Casuarina*, possibly mycorrhizal, and in season the fruit-bodies developed in myriads along the lines of the roots (Corner 1968). On the open dunes a species of the agaric *Naucoria* and one of *Inocybe* developed in great numbers from the buried remains of grasses.

This *Casuarina*-forest seems to be the only formation in Malaya that is dominated by a single species of tree. Under it there persisted for varying lengths of time the grasses, sedges, and herbs of the open dune and, as mentioned, there were growing up in it the plants of the *Eugenia grandis* forest. The one other species at Jason Bay that seemed peculiar to the *Casuarina*-forest was the small, shrubby, Sapindaceous *Dodonaea viscosa*; I found no evidence that it persisted in the *Eugenia grandis* forest.

Eugenia grandis, though commonly planted inland, occurs wild only on rocky and sandy shores in the Malay Peninsula. It did not occur along the Sedili rivers or in their interior forests, but there were some old trees at Bt Kuing (Bt Quini on the map) which lay two miles inland from K. Sedili Kechil, clearly as relics of coastal forest.

Whether the old sand-banks with dry climax-forest persisted as long islands in the swamp-forest, far removed from the coast, seemed doubtful because with falling trees and erosion by floods they were worn away. I traversed the forest for a mile inland from S. Semandan and found that, while the dry climax-forest persisted, it was being invaded by such swamp-forest trees as *Ilex cymosa*, *Eugenia cerina*, *Myristica lowiana*, *Camposperma squamata*, *Shorea platycarpa*, *Koompassia malaccensis*, *Coelostegia*, *Parartocarpus*, *Dialium patens*, *Nephelium glabrum*, *Crudia wrayi*, and *Timonius flavescens*; floods would carry their seeds into this swamp.

Sand-dunes. These formed at the mouths of the rivers; they were not piled up by wind. Spits of sand grew across the river-mouth from a northerly direction, probably owing to the prevailing wind and current, and the spits deflected the mouth southwards. The spits varied from 50 yards to a quarter of a mile wide and extended even for a mile. It was evident that this long deflection caused the rivers, when in flood and re-inforced perhaps by an exceptional high tide, to break through the sand-bank at some flexure distant from the mouth; possibly abrasion helped the siting of the new mouth. The result was the formation of a new sand-spit and dune roughly parallel with the first, and the development of brackish swamp-forest in the estuarine part of the river as it became cut off by deposition of silt. There were no extensive dunes along the coast to suggest a general build-up into the bay. If, as seems, this had been the manner of advance of the coast, then the swamp-forest to the interior should have consisted of a succession of sand-banks of varying length, intersected with freshwater swamp-forest away from the coast, and brackish swamp-forest near to it. Probably these ancient dunes have become blurred as floods wore them away and in the older parts, just east of S. Gembut, they may have disappeared under the extension of the swamp-forest. For comparison, I refer to the account by Fitch (1949) on the sand-dunes formed in the bay between the Kuantan and Kemaman rivers, but I observe that Gobbett and Hutchison (1973) record a northward current along the east coast of Johore and imply a northward deflection of the river-mouths; there are, also, the accounts of Mersing beaches by Hill (1966) and Tjia (1970 a).

I was informed by Haron bin Awang Kechil, who had lived at Jason Bay for 34 years and was thoroughly acquainted with it, that some twenty years ago S. Tuenseh had opened into the sea a mile or so south of its present mouth, probably at the mouth of S. Sebong. The new opening had been forced by the river but it was also cut in part by an old Malay called Tuenseh, who had since died. The bed of the short river S. Sebong was dry when I visited it and was being filled with swamp-forest. It appeared to me that, formerly, S. Diman had opened at the mouth of S. Lebai.

The sand-spit, just north of the mouth of S. Semandan, carried a dense stand of *Casuarina* 10-15 m high, up to 25 m in the older part that was furthest north, but in this forest there were seedlings and saplings (up to 7 m high) of *Barringtonia asiatica*, *Cerbera manghas*, *Calophyllum inophyllum*, *Eugenia grandis*, *Hibiscus tiliaceus*, *Terminalia catappa*, *Ardisia elliptica*, *Guettarda*, *Scaevola*, and *Dillenia suffruticosa* with abundance of the creeping *Wedelia biflora*. I think that this site has been felled.

The most interesting plant on the sand-dunes was the small creeping Composite *Spilanthes* which occurred, apparently as a relic, only between the mouths of S. Tuenseh and S. Semandan (Plate 37). I note the absence of *Spinifex*, *Cyperus pedunculatus* (*Remirea maritima*), and *Sesuvium portulacastrum*, the rarity of *Fimbristylis sericea*, and the occurrence of *Paspalum vaginatum* where *Sesuvium* would have been expected.

Dry climax-forest. As *Casuarina* gave place to *Eugenia grandis* forest, so this was overcome by taller trees 30-50 m high, the seedlings of which had grown up in the deeper shade. I list below the canopy-trees of this forest. It became infiltrated, however, by so many seeds of the freshwater swamp-forest and the low sand-bank on which it grew was so apt to be flooded with freshwater, that this climax-forest changed into a mixture of climax and swamp-forest. As the inland sand-bank deteriorated, typical freshwater swamp-forest took over and had the complex and various character of that seen round Mawai. Very few of these swamp-forest trees, small or large, established themselves in the *Casuarina*-forest as those of the *Eugenia grandis* forest generally did. Hence there was the continuous succession from open dune through forest of *Casuarina*, *Eugenia grandis*, and dry climax to the freshwater swamp; and this, presumably, would have been gradually overcome by low-land dipterocarp forest as the swamp filled in at its boundary. The whole may be a sere prolonged over many centuries but every stage has its edaphic situation where it is an extensive climax.

The herb *Tacca palmata* and the small Rubiaceous tree *Petunga roxburghii* were common in *Eugenia grandis* forest and persisted well into the shade of the dry climax-forest (Plates 26, 31). Then, as mentioned, *E. grandis* and *Beilschmiedia tonkinensis* persisted as canopy trees in this forest as far as 400 m from the coast, but what was the end of these old trees I did not discover. It was possible that a species of *Dipterocarpus* (*D. ? hasseltii*) also entered the *E. grandis* forest; at S. Sebong some canopy trees of this species, 25-30 m high, stood in this forest merely 60 m. from the shore.

In several parts of the dry climax-forest. I found that the large trees were gregarious, e.g. *Cratoxylon*, *Pterospermum*, and the three species of *Eugenia*. In one patch, c. 50 x 30 m, there were seven large trees of *Cratoxylon formosum*, 25-35 m high and 30-50 cm thick at breast-height. They appeared to be the second generation around the parent tree which had been the pioneer seedling in the upgrowth of *E. grandis* forest. *Cratoxylon* and *Pterospermum* were common in the swamp-forest, but the three species of *Eugenia* (list on p. 58) appeared, like *E. grandis*, to be strictly coastal.

Depressions in the sand-banks. A fairly thick layer of humus formed in the climax forest. Pushing through the dense undergrowth, one would come suddenly upon a ditch or hollow. Some of these were old stream-beds, tributary to the main rivers but filling up with debris and saplings. Others seemed to be irregular backwaters which the river might have scoured previously into the sand-bank; and yet others of greater extent were bits of old river-courses filled up with *nipa*, *Acrostichum*, *Avicennia*, *Sonneratia*, *Scirpodendron*, and rotans. Generally the main dune-troughs were recognisable in the *Casuarina*-forest and that of *E. grandis*; they collected the same brackish swamp-plants as the bits of old river-bed. One kind of hollow, however, puzzled me until I came upon its cause and, then, discovered the process which led to subcircular depressions 2-4 m across and about $\frac{1}{2}$ -1 m deep. They were the places where large trees had been uprooted and fallen over. The prostrate trunk with smashed crown had pulled the large roots out of the sandy soil, where they had been interlaced in the tangle of other roots, and they projected several metres vertically upward with a great deal of soil, rootlets, and humus entangled in them. Where the roots had been pulled out, there was the hollow and, generally, it became half full of water. In course of time rain washed, and gravity pulled, the soil about the upstanding roots into a heap round the base of the trunk. Root and trunk then mouldered away until there was left a heap of soil covered with young ferns and seedlings, and on one side of it the depression which filled with debris and was colonised by *Salacca*, *Scirpodendron*, and rotans.

The heap subsided into a slight mound with ferns, *Agrostistachys*, *Mapania*, and saplings. Having searched for these stages, I was astonished at their abundance and concluded that the strong north east winds eventually blew down most of the canopy-trees, one by one, as they aged, to churn up the soil and start in little patches a new generation of trees. Thus, too, the general outline of the old forested sand-bank was obliterated and merged into the hollows of the swamps-forest. Then I learnt round Bt Kuing, where there were many traces of elephants, that they pushed over not only the smaller trees to create many small hollows, but the dead boles of big rotting trees to create large hollows. The elephants evidently put their trunks into the hollow trees and mopped up the soft, mouldering, and cheesy wood until the interior was smooth; and the hollow trunks were often smashed with trampling. The final result of all these excavations must have been the levelling of the old sand-bank into swamp-forest.

Cultivation. Primeval forest, rising intact from the sandy shore, occurred between S. Tuenseh and S. Semandan, and for some distance south of S. Rhu Reba. The rest had been variously felled. *Casuarina* provided good firewood. The mature trees were felled except, usually, for a single file as a wind-break along the shore. The dune-grasses, which were being shaded out, then flourished again and built a sward for goats and cattle. This was fired once a year, at least, and *lalang* entered to form the vast wastes on white sand from which the humus had been burnt; indeed, patches of white sand were in places all that remained of the forest. These *lalang* wastes harboured the rats which carried the Japanese river-fever that had decimated the Malay villages round the bay and which ended our expedition in June 1934. After the *Casuarina* had been felled, then followed the forest of *E. grandis* and that of the dry climax. In their place coconuts were planted. *Lalang* fires extended into the plantations and burnt off the scrub. The neighbouring swamp-forest never burnt.

The padang at K. Sedili Kechil, just north west of the village, consisted of shining white sand without a trace of old tree-stumps. The vegetation consisted chiefly of *Adinandra dumosa*, *Rhodomirtus*, *Eugenia palembanica* and, in damper parts, *Dillenia suffruticosa*. In the driest part near the cemetery there was only *Rhodomirtus*. I do not doubt that it was once covered by high climax-forest.

Coastal abrasion. Between the mouths of the small rivers the coast was being abraded. Sand-banks with *Casuarina* were undercut; the exposed roots trailed over the sand and were awash at high tide; many trees were slowly falling into the sea. Where cultivation had substituted coconut palms, they too were inclining into the sea. Yet, there were three exceptions. For a mile north of the mouth of S. Rhu Reba the coast was sanding up; there was a rather narrow bank with *Casuarina*-seedlings among the runners of *Ischaemum* and *Ipomoea*, but the bank did not appear to be growing rapidly, and the coast was being abraded half a mile north of it. Then a stretch of a few hundred yards immediately west of K. Sedili Kechil was sanding up. About S. Lebai the situation appeared to be stabilised. The sand washed away must have contributed to the building of the sand-spits at the river-mouths.

Abrasion leads naturally to the disappearance of the *Casuarina*-fringe and to the appearance of *Eugenia grandis* forest on the sea-front, as if it had been the pioneer. This was the case at Pasir Seruang and Lundong Wai, south of Tg Sedili Kechil, where the steep shore lead directly to *E. grandis* forest backed by dry climax-forest (Figures 9, 12).

Batu Belayar (K. Sedili Besar). Northwards from the kuala the steep rocky coast, c. 100 m high, led to Batu Belayar and Tg Temalak. Then came Telok Temalak, which was a delightful sandy bay with primeval forest along its shore (Plates 29, 30); I had intended to study this had not the bigger Jason Bay commanded my

attention. The forest on the rocky coast up to Batu Belayar had been more or less felled. Further north it was intact with a typical sea-front of *Barringtonia-Terminalia* (as listed on p. 58); yet it had interest. At the foot of the cliff, more or less embedded in the forest, there were old trees of *Casuarina* to show that, formerly, there had been a sandy shore where, now, shelving rocks led into the sea. On these rocks, low and wind-swept bushes of *Pemphis acidula* grew just above high tide with branches spread away from the sea. In ravines in the cliff there grew *Cryptostachys lakka*, *Pandanus recurvatus*, *Caryota mitis*, and *Scirpodendron*. The first and last bespoke swamp-forest, as if in creeks where *P. recurvatus* had grown on the sloping sides. Where small streams emptied on to the rocks, there grew *Lumnitzera littorea*, *Sonneratia alba*, and *Rhizophora mucronata* to show the relics of mangrove which had led from the swampy creeks on to the *Casuarina*-foreshore. In muddy crevices on the rocks, there survived the dune-plants *Ischaemum muticum*, *Fimbristylis ferruginea*, and *F. polytrichoides*. It might be supposed that these small plants were recent and haphazard arrivals, but tell-tale *Casuarina*, *Cyrtostachys*, and *Scirpodendron* revealed the disappearance of a bay, such as Jason, of which Telok Temalak was the relic. If the sea washed four miles inland to the hillocks separating the Sedili Besar from the coastal swamp of Jason Bay, there would be such a rocky coast as at Batu Belayar. If the sea receded, there would be a vast sandy plain along the east coast of Johore, as there is in Pahang.

S. Diman. This small river turned north for a short distance before debouching on to the sandy shore with a typical sand-spit developed on its north side (Figure 10). At this estuarine part three sand-banks were evident, which I have numbered from the sea inland as banks 1-3 (Figure 10). The first was submerged at high tide and carried no vegetation. The second was raised about 1 m above high tide and carried a close stand of *Casuarina* with saplings of *Eugenia grandis* forest. On its seaward side there was a rather narrow stretch of sand with *Ischaemum*, *Canavalia*, *Ipomoea*, etc., with seedlings of *Casuarina* in transition to the forest on the bank. At low tide there remained a few inches of sea-water between the first and second banks. On the landward side the second bank was separated from the third and oldest by the river itself. The third bank was about 1 m high and, to north and south of the estuary of the river, it was united with the second. The third bank carried *E. grandis* forest and, further inland, dry climax-forest. Both second and third banks dipped rather steeply into the river and carried on this slope a narrow belt of *Sonneratia alba*. In the estuarine region (marked F in Figure 10), there was a dense sward of *Paspalum vaginatum*, up to 45 cm high, under the trees and inundated at high tide (Plate 28). Then, higher up in the region marked G (Figure 10), *Sonneratia* was joined by *nipa*, *Cyperus malaccensis* (in place of *Paspalum*) in thickets nearly 2 m high, *Bruguiera sexangula*, and *Rhizophora apiculata*. But, between the *Sonneratia* and the *E. grandis* forest on the third bank, there was a narrow belt of old *Casuarina*-trees (marked D, Figure 10); some of them grew even among the *Sonneratia*.

It would seem that three sand-banks had developed here and that, in making the second with *Casuarina*-forest, the river had been deflected northwards, contrary to the usual trend on this coast. I think, however, that there had been but two sand-banks, the first and the older combining the second and third, and that the river had flowed south, even to S. Lebai, and had then broken through the older bank and made the new estuary by cutting through the *Casuarina*-forest.

The river had at its mouth four zones of vegetation, thus: — 1, the sand-spit with *Paspalum vaginatum* and seedlings of *Sonneratia* and *Rhizophora*; it was the zone where *Sesuvium* would have been expected if it occurred at Jason Bay.— 2, the zone of *Sonneratia alba* and *P. vaginatum*.— 3, the zone of *S. alba* with *nipa*,

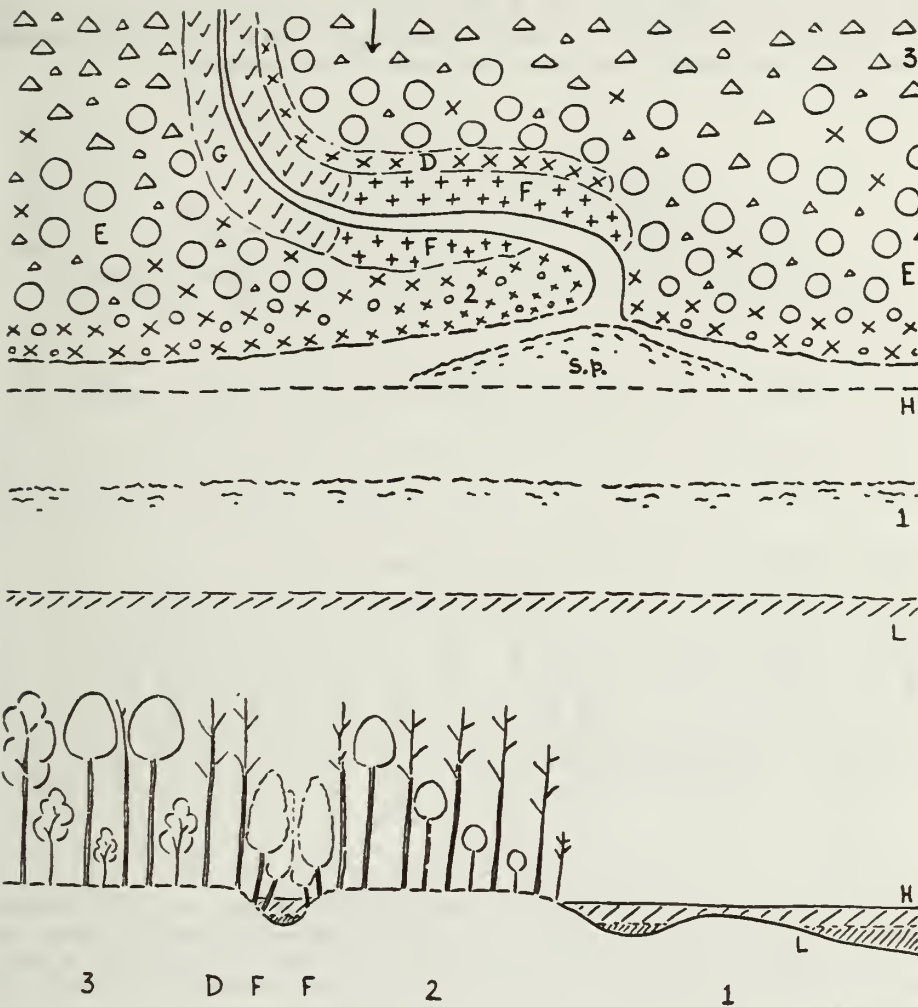


Figure 10. Diagram of the estuary of S. Diman (Jason Bay) in June 1934, with a transect in the direction of the arrow. 1, 2, 3, successive sand-banks; H, high tide; L, low tide; S.p., sand-spit at the river-mouth; D, row of *Casuarina equisetifolia* (X) along the left bank of S. Diman; E, *Eugenia grandis* forest (O); F, *Sonneratia alba* (+) with *Paspalum vaginatum*; G, *S. alba* with *Rhizophora* (√), *Bruguiera*, *Cyperus malaccensis*, and *nipa*; dry climax-forest (Δ).

Bruguiera, etc.— 4, typical freshwater swamp. I note that *P. vaginatum* occupied similar places at S. Tuenseh and S. Semandan where I observed it to be awash on the sand-spit at high tide.

S. Sebong. The structure of the river-mouth, as it was in 1934, is shown in Figure 11. It seemed to be a derelict river-mouth, following the diversion of S. Tuenseh some twenty years previously. The bed dried up at low tide; yet the estuary retained in miniature the typical vegetation as on the Sedili Besar. There was mangrove (A, Figure 11) leading to freshwater swamp, a strip of mature *Casuarina* along the abraded coast, *E. grandis* forest (E) behind this strip, and freshwater swamp-forest behind the *E. grandis*, as though this swamp were the remains of an old river-bed

that had led south to S. Diman. Trees of *Sonneratia caseolaris* (B, Figure 11) in this freshwater swamp were nearly 30 m high and surrounded with pneumatophores -50 cm high, often with capitate or knobbed apices. Between them and the *E. grandis* forest there was almost a single file of tall trees of *Pterocarpus indicus* (Pt).



Figure 11. Diagram of the estuary of S. Sebong (Jason Bay) in June 1934, with a transect in the direction of the arrow. A, *Rhizophora apiculata*, *Bruguiera sexangula*, *Sonneratia alba* (near the estuary), *S. caseolaris*, *nipa*, *Scirpodendron*, and *Hibiscus tiliaceus* (✓); B, freshwater swamp-forest; Ca, *Casuarina* (X); E, *Eugenia grandis* forest (O); Pt, *Pterocarpus indicus* (▲); S, freshwater swamp-forest (⊥); H, high tide; L, low tide.

Coast south of Tg Sedili Kechil. At Pasir Seruang and Lundong Wai a narrow sandy beach rose steeply from the sea, but not undercut, and a flat sandy padang 100-200 m wide led inland to the dry forest on the hillside (Figure 12). The padang, or deforested sward, was a terrace separated from the coastal bank by a small cliff 1-3 m high. Rocks were scattered in the littoral and sublittoral zone. There was no *Casuarina* along the sea-front. All the forest, presumably dry climax-forest, on the padang had been felled. The coastal sand-bank was covered for the most part with *Eugenia grandis* forest, in which I met no old *Casuarina*-trees. The padang-terrace with its low seaward cliff indicated extensive abrasion long ago. The *E. grandis* forest indicated a later seaward growth followed by recent abrasion.

I studied the coast as far as a mile or two south of Tg Gemoh which I reached by cutting east through the forest from Kangkar Sedili Kechil along a track known to Haron bin Awang Kechil. Unfortunately the Japanese fever was coming on us. Haron, his companion, and I were feeling hot, dry, sick, and oppressed by headache. I failed to write up notes in the evening but, by a great effort, I managed to develop

the photographic plates that I exposed, and I have this record (Plate 29; Life of Plants pl. 35b).

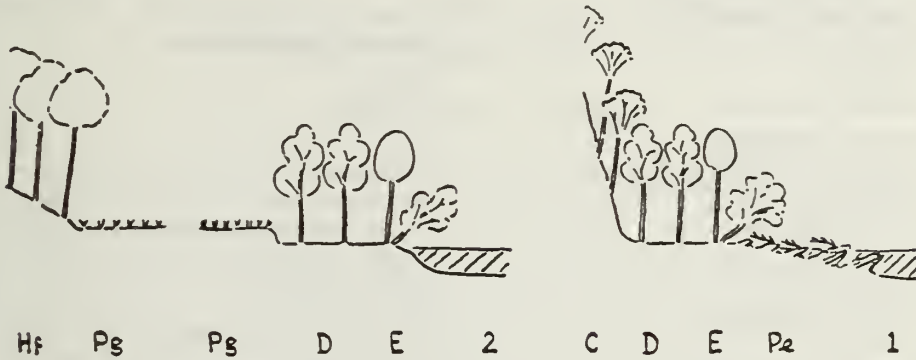


Figure 12. Diagrammatic transects of coastal vegetation near Jason Bay. 1, near Tg Tebar; rocks with *Pemphis* (Pe) leading into the sea, backed with the *Barringtonia-Terminalia* belt (E), with a strip of dry climax-forest (D) in front of the cliff-forest (C); H, high tide. 2, at Lundong Wai, as in 1, but with a cliff 2-3 m high behind the dry climax-forest, a deforested padang (Pg, 100-200 m wide) and hill-side forest (Hf).

I note that the name Pasir Seruang, given on the map, was unknown locally, and this long stretch of sandy coast was called Pasir Tiris.

History of Jason Bay. It appeared in 1934 that most of the coast of Jason Bay and of the headlands to the north and south was being abraded. The evidence from Batu Belayar and Pasir Seruang indicated a much longer period of abrasion than in the bay itself. In contrast, the extent of swamp-forest and old sand-banks inland from the coast of Jason Bay, without alluvial soil or firm *Tristania*-banks, the occurrence of *Casuarina* deeply embedded in the coastal forest, and the manner of formation of sand-dunes at the river-mouths indicated a long period of seaward extension. These facts must somehow be connected with the recession of the sea in glacial times and its subsequent advance. At maximum advance, Jason Bay would have extended to the hillocks west of S. Gembut and the Sedili Kechil. At maximum retreat, the rivers of east Johore would have drained into, or along with, the proto-Kampar river that flowed from south Sumatra between Borneo and Malaya into the China Sea. At some intermediate period, Pulau Aor and P. Tinggi would have been headlands of the great bay that has dwindled into Telok Sebong.

Herbaceous plants on open sand-dunes, Jason Bay

<i>Borreria hispida</i>	<i>Ipomoea gracilis</i>
<i>Bulbostylis barbata</i>	<i>I. pescaprae</i>
<i>Canavalia rosea</i>	<i>I. stolonifera</i>
<i>Cyanotis vaga</i>	<i>Ischaemum muticum</i>
<i>Cyperus javanicus</i>	<i>Panicum repens</i>
<i>C. polystachyos</i>	<i>Paspalum cartilagineum</i>
<i>C. radicans</i>	<i>P. orbiculare</i>
<i>C. stoloniferus</i>	<i>P. vaginatum</i>
<i>Dactyloctenium aegyptiacum</i>	<i>Sebastiania chamaelea</i>
<i>Digitaria dispar</i>	<i>Spilanthes urens</i>
<i>D. ? longiflora</i>	<i>Sporobolus virginicus</i>
<i>Eragrostis atrovirens</i>	<i>Synostemon bacciformis</i>
<i>Evolvulus alsinoides</i>	<i>Thuarea involuta</i>
<i>Eulophia graminea</i>	<i>Vigna marina</i>
<i>Euphorbia atoto</i>	<i>Vitex ovata</i> (scarce)
<i>Fimbristylis cymosa</i>	<i>Wedelia biflora</i>
<i>F. dichotoma</i>	
<i>F. polytrichoides</i>	
<i>F. sericea</i> (scarce)	

Seed plants of *Barringtonia-Terminalia* rocky shore and *Eugenia grandis* forest; (large trees marked t).

<i>Adenanthera pavonina</i> (t)	<i>Heritiera littoralis</i> (t)
<i>Allophylus cobbe</i>	<i>Hernandia nymphaeifolia</i> (t)
<i>Ardisia crispa</i>	<i>Hibiscus tiliaceus</i> (t)
<i>A. elliptica</i>	<i>Hoya</i> spp.
<i>Atalantia monophylla</i>	<i>Intsia bijuga</i> (t)
<i>Barringtonia asiatica</i> (t)	<i>Lumnitzera littorea</i> (t)
<i>Beilschmiedia tonkinensis</i> (t)	<i>L. racemosa</i>
<i>Calophyllum inophyllum</i> (t)	<i>Mallotus tiliifolius</i>
<i>Canthium confertum</i>	<i>Myristica guattariifolia</i> (t)
<i>Cerbera manghas</i> (t)	<i>Ochrosia borbonica</i> (t)
<i>Cycas rumphii</i>	<i>Pandanus dubius</i> (t)
<i>Cynometra ramiflora</i>	<i>P. odoratissimus</i>
<i>Dalbergia ferruginea</i>	<i>Peltophorum pterocarpum</i> (t)
<i>Dendrobium crumenatum</i>	<i>Pemphis acidula</i>
<i>D. secundum</i>	<i>Petunga roxburghii</i>
<i>Desmodium umbellatum</i>	<i>Pittosporum ferrugineum</i>
<i>Diospyros ferrea</i> (?)	<i>Planchonella obovata</i> (t)
<i>Dischidia rafflesiana</i>	<i>Podocarpus polystachyus</i> (t)
<i>Dracaena maingayi</i> (t)	<i>Pongamia pinnata</i> (t)
<i>Erythroxylon cuneatum</i> (t)	<i>Scaevola taccada</i>
<i>Eugenia densiflora</i>	<i>Serianthes dilmyi</i> (t)
<i>E. grandis</i> (t)	<i>Suregada glomerulata</i>
<i>E. palembanica</i> (t)	<i>Terminalia catappa</i> (t)
<i>Eugenia</i> sp. (25.11.34)	<i>Thespesia populnea</i> (t)
<i>Ficus microcarpa</i>	<i>Thrixspermum arachnites</i>
<i>F. xylophylla</i>	<i>Vaccinium bracteatum</i>
<i>Garcinia hombroniana</i>	<i>Vanilla griffithii</i>
<i>Garcinia</i> sp. (25.11.34)	
<i>Guettarda speciosa</i>	
<i>Guioa pleuropteris</i>	

Canopy-trees of the dry climax-forest, Jason Bay

<i>Artocarpus elasticus</i>	<i>Ficus callophylla</i>
<i>A. gonezianus</i>	<i>F. consociata</i>
<i>A. kemando</i>	<i>F. crassiramea</i>
<i>Buchanania lucida</i>	<i>F. delosyce</i>
<i>Chisocheton pentandrus</i>	<i>F. dubia</i>
<i>Cratoxylon arborescens</i>	<i>F. stricta</i>
<i>C. formosum</i>	<i>F. sundaica</i>
<i>Dipterocarpus grandiflorus</i>	<i>F. xylophylla</i>
<i>D.</i> ? <i>hasseltii</i>	<i>Mangifera</i> ? <i>foetida</i>
<i>Eugenia nigricans</i>	<i>Palaquium semaram</i>
<i>E. rugosa</i>	<i>Parinarium corymbosum</i>
<i>E. syzygioides</i>	<i>Podocarpus neriifolius</i>
	<i>Pterospermum javanicum</i>

Part III. Swamp-forest at Mandai Road and Jurong (Singapore) and at Pengkalan Rajah, Pontian (Johore).

1. Mandai Road, Singapore

Between the Seletar Reservoir and the Mandai Road there used to be a tract of original swamp-forest large enough for one to get lost, if it had not been for the occasional passage of a car along the road. It became a favourite haunt of mine morning, afternoon, and evening at week-ends, until it was felled for the extension of the reservoir in 1940. There I began the study of tropical trees as I followed up my first impressions when the swamp-forest was being cleared at the west end of the road on my arrival in Singapore. Now a highway has removed all trace of the narrow road that wound under the trees by the edge of the swamp.

On many visits I had the privilege of the companionship of Ahmad bin Hassan, storekeeper of the Botanic Gardens, who had begun his career as Ridley's plant-collector and with his brothers Sappi and Sappan had served the Gardens so truly; I am grateful for the enthusiasm which he imparted to the recruit. Together we established a look-out in the canopy of the forest by driving iron-pegs into the trunk of a big Meliaceae tree (never identified) which served as a ladder, and I began to record leafing and flowering of surrounding trees and lianes until one day an incursion of minute ants bit me so insidiously that I cannot recall how I descended, got home, or retained sanity during hours of scalding irritation. After this I carried in my haversack a small bottle of Scrubb's Ammonia which, by counter-irritation at least, rendered such bites tolerable. Lotong, kerah and a troop of berok monkeys would pass by in the canopy, though the authorities at Raffles Museum denied the existence of wild berok on the island. When this forest was cleared, I photographed the large trees which I had known from root and bole before they fell (Plate 35). Some forest of this kind persists to the south of the reservoir. I visited it in 1944 with Professor Kwan Koriba during the Japanese occupation and it was there that we found the fruits of *Sloanea javanica*, and the durian-theory began.

By April 1933 I had decided to follow up at the Mandai Road the detailed work that I had begun at Jurong. With the help of Ahmad three plots were marked out at a bend of the old Mandai Road where it passed through the swamp-forest (Figure 13). We enumerated the trees in two plots, A and B, but merely inspected plot C for comparison. The results are given in Table 2, and the actual occurrence of trees in plot A is shown in Figure 14.

Plot A

Size; c. 1 acre (80 x 60 yards), rectangular.

Canopy-height; c. 32 m, the biggest tree being *Palaquium xanthochyllum*.

Situation; low, level, between two streams, with an ill-defined streamlet through the middle; no raised ground; water-table generally c. 30 cm below the surface of the loose humus, the whole area liable to flood and, possibly, somewhat tidal before the construction of the reservoir.

Ground; no solid earth, merely humus or peat built up by ants, termites, and decay of vegetable remains, over a complex of wide-spreading roots, those of *P. xanthochyllum* being conspicuous; roots making a trellice on which to step, with

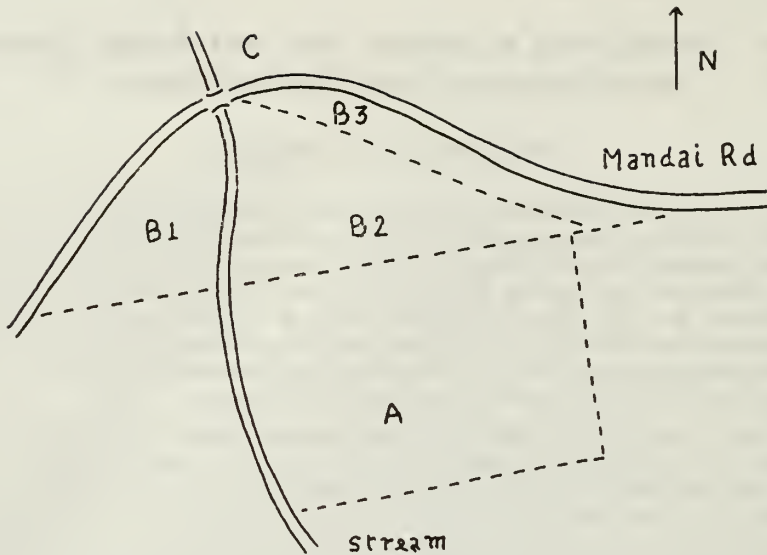


Figure 13. The sites of plots A, B1, B2, B3, and C at the east end of the Mandai Road, Singapore, April 1933.

the water showing through the irregular meshes; humus collecting round tree-trunks and building slight mounds (? the action of flood), but the mounds soft and often giving under foot.

Undergrowth; mainly *Pandanus atrocarpus* (to 20 m high), *P. kani*, *Nenga*, *Oncosperma horridum*, *Salacca*, and rotans, and the aroids *Aglaonema* and *Homalomena*, with seedling and saplings; few fallen trees.

Small trees; *Talauma singaporensis* very abundant, with *Timonius*, *Urophyllum*, *Garcinia*, and saplings.

In this plot *P. xanthochyllum* was dominant. It composed nearly half of the canopy. The trunks were massive with copious stilt-roots branching extensively into the humus and forming bundles and fans of thin subaerial roots which accumulated the humus and provided in many parts the only means of walking. The second abundant tree was *Xylopius fusca* which, instead of providing pathways, tripped one with its copious loop-roots. These extended up to 18 m from the trunk and often followed hidden streamlets. Thirdly *Pometia* with its orange-brown bark and sharp buttresses guided one to firmer mounds of humus where it was possible to stand at ease. *Lophopetalum multinervium* and *Alstonia spathulata* occurred along the streams with pneumatophores not exceeding 50 cm high. *P. xanthochyllum* tended to be gregarious, though not by coppicing from fallen trunks.

The *Myristica-Horsfieldia* group (n. 22 in Table 2) consisted of species which, at that time, were much confused. They were mostly trees up to 20 m high with trunks c. 30 cm thick at 1.7 m.

I listed as unknown about 7 species of tree which it was then impossible to identify. Some have turned out to be *Strombosia maingayi*. I have been unable to trace the other records in modern revisions because unnumbered specimens are seldom listed.

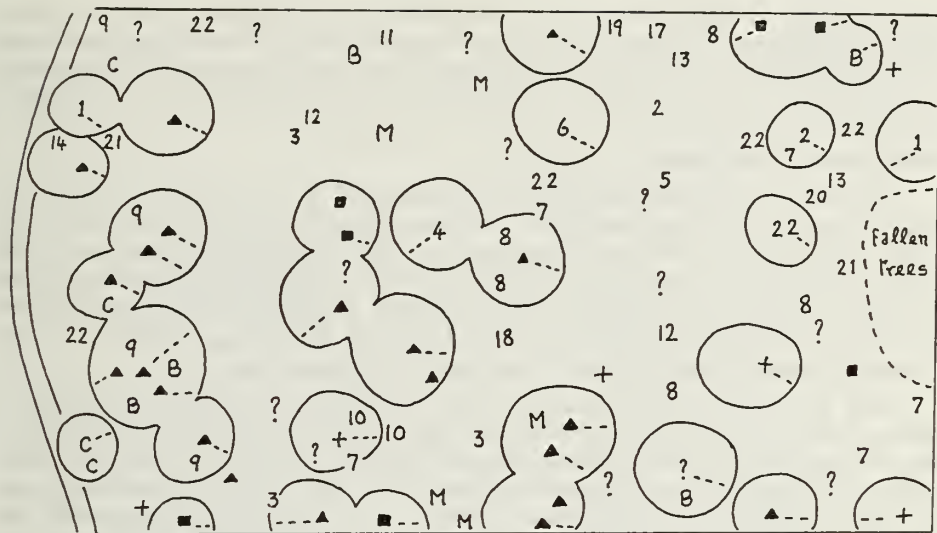


Figure 14. Plot A, Mandai Road; the trees numbered or marked as in Table 2; the crowns of the larger trees outlined; the larger gaps between the crowns filled mainly by *Oncosperma horridum* and *Pandanus atrocarpus*.

Plot B

Size; c. $1\frac{3}{4}$ acres, divided into plots B1 ($\frac{1}{2}$ acre), B2 ($\frac{3}{4}$ acre) and B3 ($\frac{1}{2}$ acre).—Canopy height as in plot A.

Situation; B1 and B2 roughly level with plot A; B3 on slightly raised ground, c. 50-70 cm higher than B1 and B2, but sufficient to affect the vegetation (see below); ground similar to plot A, but in B3 without standing water under the tangle of roots and humus.

In B1 the dominant tree was *Xylopija fusca* with *Cratogeomys arborescens* as the second most abundant; *P. xanthochyllum* was curiously scarce. B2 had essentially the same construction as plot A, with *P. xanthochyllum* as the dominant. In B3 the dominant trees were *Melanorrhoea wallichii*, *Shorea macroptera* and *S. platycarpa*, indicative of the dryer part of the swamp less prone to flooding. The area of B3 was barely one third of the whole plot B, yet it contained half the trees of *M. wallichii*, most of those of *S. platycarpa*, *Lithocarpus bennettii*, *Ganua motleyana*, *C. arborescens*, and *Xylopija malayana*, and all those of *S. macroptera*. Unrepresented in B3 were *P. xanthochyllum*, *Pometia*, *Lophopetalum multinervium*, and *X. fusca*. The old road along the edge of plot B evidently followed the slightly raised ground; yet in floods this part of it soon became impassable.

Plot C

Inspection of this plot showed that it had the same swamp-forest on level ground as in plots A, B1, and B2. Therefore I did not trouble to enumerate it in detail.

Comparison of the plots

In spite of their small size these plots revealed differences in tree-composition that appeared to indicate differences in habitat. Plots A and B2 were very similar, though *Pometia* and *Alstonia* were absent from B2. The presence of many saplings

and specimens of medium-size of the dominant trees showed that, after the death of the canopy-trees, the plots would retain their character. *P. xanthochyllum* forest was the swampiest in the sense of that most prone to flooding, and it might have been within the tidal reach before construction of the reservoir. In this connection I note that only one specimen of *Polyalthia sclerophylla*, as a 17 m tree, was found in the Mandai Road forest.

Plot B1 was distinguished by the abundance of *X. fusca* and *C. arborescens* and the scarcity of *P. xanthochyllum*. Such an association occurred near the stream in the west of plot A, and plot B1 appeared to be a continuation of the association on the other side of the stream above the main swamp of *P. xanthochyllum*. Possibly *X. fusca* is less suited to tidal fluctuation. I noticed that both here and on the Sedili Besar *X. fusca* tended to occur higher up the swampy streams than did *P. xanthochyllum*. Thus *X. fusca* forest may be distinguished.

Plot B3 on the slightly raised ground typified the freshwater swamp-forest which occurred at some distance from the tidal influence in the Sedili region. There was no sharp demarcation between plots B2 and B3; yet the four trees so characteristic of the more swampy forest were absent from B3, namely *P. xanthochyllum*, *X. fusca*, *Pometia*, and *Lophopetalum*. There were many more canopy-trees per unit area in B3 than in B2 and plot A because the crowns of many, especially *M. wallichii*, were narrower. Hence I would describe this slightly raised forest as *M. wallichii* forest. It is that which leads from the swamp to the *Shorea* forest of dry ground.

With regard to the species represented by one or two individuals, I think that their occurrence was fortuitous. Larger plots might well have shown their general, if sparse, distribution, and they would have introduced other such species which were notably absent, e.g. *Koompassia malaccensis*, *Eugenia spp.*, *Pentace triptera*, *Myristica lowiana*, and *Cratoxylon formosum*. Larger plots in this restricted area, however, would have introduced different situations. Transects would have led only to secondary forest on the rising ground, for which reason I did not employ them.

On comparison with the Jurong Forest (described later), plot B3 had most similarity. At Jurong, *Alseodaphne ? penduliflora*, *Mangifera aff. parvifolia*, and *Tristania ? merguensis* were common, but the first was scarce at Mandai Road and the other two were absent, *Oncosperma horridum* and *Talauma singaporensis* were common at Mandai Road but absent from Jurong. The thickets of *Pandanus atroparpus* and *Salacca* were much denser at Jurong. I think that these differences were phytogeographical and ecological.

Table 2. Mandai Road, Singapore. Enumeration of trees with trunks 25cm thick and more at 1.7m. (Ca = canopy-trees).

Symbol in Fig. 14		Plot A 1 acre		Plot B 1½ acre	
		Ca	Total	Ca	Total
▲	<i>Palaquium xanthochyllum</i>	18	26	20	26
■	<i>Xylopiia fusca</i>	5	7	18	24
+	<i>Pometia pinnata</i> f. <i>alnifolia</i>	3	6	0	0
B	<i>Blumeodendron tokbrai</i>	2	4	2	12
1	<i>Alstonia spathulata</i>	2	2	0	0
C	<i>Cratoxylon arborescens</i>	1	4	4	15

Table 2—continued

Symbol in Fig. 14		Plot A 1 acre		Plot B 1½ acre	
		Ca	Total	Ca	Total
2	<i>Camptosperma auriculata</i>	1	2	0	6
3	<i>Camptosperma squamata</i>	1	3	3	10
4	<i>Santiria rubiginosa</i>	1	2	2	2
5	<i>Coelostegia griffithii</i>	1	1	1	1
6	<i>Parishia</i> sp.	1	1	0	0
M	<i>Melanorrhoea wallichii</i>	0	6	10	26
7	<i>Horsfieldia polyspherula</i>	0	5	2	12
8	<i>Canarium pilosum</i>	0	5	0	0
9	<i>Lophopetalum multinervium</i>	0	4	1	2
10	<i>Ganua motleyana</i>	0	2	2	4
11	<i>Polyalthia glauca</i>	0	2	0	0
12	<i>Artocarpus kemando</i>	0	2	1	5
13	<i>Shorea platycarpa</i>	0	2	3	4
14	<i>Xylopiya malayana</i>	0	1	2	6
15	<i>Calophyllum floribundum</i>	0	1	0	2
16	<i>Macaranga puncticulata</i>	0	1	0	5
17	<i>Mussaendopsis beccariana</i>	0	1	0	1
18	<i>Artocarpus scortechinii</i>	0	1	0	1
19	<i>Amoora rubiginosa</i>	0	1	0	0
20	<i>Knema intermedia</i>	0	1	0	0
21	<i>Eugenia</i> spp.	0	2	1	5
22	<i>Myristica-Horsfieldia</i> spp.	1	7	2	14
?	Unidentified (plot A 7 spp., plot B c. 12 spp.)	1	14	14	32
	<i>Shorea macroptera</i> (plot B3)	0	0	5	6
	<i>Lithocarpus bennettii</i>	0	0	3	5
	<i>Myristica iners</i>	0	0	2	4
	<i>Calophyllum retusum</i>	0	0	2	3
	<i>Sterculia macrophylla</i>	0	0	1	1
	<i>Calophyllum incrassatum</i>	0	0	0	2
	<i>Vatica wallichii</i>	0	0	0	2
	<i>Artocarpus elasticus</i>	0	0	0	1
	<i>Diospyros siamang</i>	0	0	0	1
	<i>Jackia ornata</i>	0	0	0	1
	Totals	38	116	103	241

2. Jurong Road 15th mile, Singapore

Tree-trunks piled by the road to Jurong in 1932 indicated the felling of high forest the existence of which was not known at the Botanic Gardens. I was always on the look-out for fellings as a means of learning about trees, climbers, and epiphytes, and my attempts to learn from official sources where they would occur met no success. By chance I found that half a mile south of mile 15 on this road

there remained some 15-20 acres of original swamp-forest where felling had just begun. I explained my interest to the Chinese headman and his wood-cutters, and I was indeed grateful to them for their full co-operation. I was allowed to select two representative acres which they left untouched for several months until I had enumerated the trees. When fine specimens of trees became revealed by the felling, they would leave them standing until there was sufficient clearance around for photography (Plate 34). Thus, gradually, I recorded with photograph, specimens, and notes the disappearance of the last tract of swamp-forest in the west of the island. Felling began, as usual, with clearance of the undergrowth; what might remain was smashed by falling trees, and my presence was not welcome on these dangerous occasions. I discovered that after the logs had been removed and the slash burnt, it was still possible to identify the large stumps and, so, to obtain in the cleared parts an idea of specific abundance. In felling, many trees were knocked over and uprooted; then, as the peaty soil contracted from burning and exposure, the root-systems became apparent. There was, indeed, a battlefield where I studied and counted corpses and skeletons. My friend C. E. Carr came with me on several occasions and to him I owe the fairly complete list of orchids. (c. 45 species).

The Jurong district had been a collecting ground for H. N. Ridley and I. H. Burkill (Burkill 1927). I have not recorded their collections in this account because the exact locality was too often uncertain. As proof of the virgin nature of the forest which I studied, I found no old cut stumps, no *Gleichenia*, *Lycopodium cernuum*, *Lygodium*, *Adinandra*, *Eurya*, or *Dillenia suffruticosa*, such as were abundant along the Jurong Road itself. By June 1933 the whole forest had been transformed into a pine-apple estate.

I selected for enumeration two plots A and B, about 1 acre each, in the distant south-west part of this uniform forest on flat land. With compass and string, boundaries were delimited and, when I had become familiar with the trees which were being felled, I enumerated the contents of the plots in the last week of February 1933 and the first week of March. The wood-cutters were waiting to come in, fell, and burn in the dry weather of May and June. Five trees in the plots have remained unidentified, and I cannot trace the leaf-specimens which were put in the Singapore Herbarium; they were not dominant trees. What puzzles me now is that I recorded no *Aglaia*, *Baccaurea*, *Barringtonia*, *Chisocheton*, *Coelostegia*, *Memycon*, *Neesia*, *Calamus*, *Caryota*, *Livistona*, or *Pinanga*, and few species of *Ardisia*, *Calophyllum*, *Eugenia*, *Lithocarpus*, *Macaranga*, and *Pandanus*.

In comparison with the swamp-forest at Mandai Road and at Pontian (described later), that at Jurong was distinguished by 15 species which did not occur in the other two and by the great abundance of *Tristania ? merguensis*, which might have occurred at Pontian, thus:—

Alseodaphne ? penduliflora (common), *Anisoptera marginata* (scarce), *Cantleya corniculata* (frequent), *Dischidia* aff. *complex* (frequent), *Eugenia muelleri* (common), *Ficus albipila* (rare), *Hexapora ? curtisii* (scattered), *Hopea mengarawan* (scattered), *Horsfieldia macrocoma* (scarce), *Hymenocardia* sp. ? (common), *Mangifera* aff. *parvifolia* (common), *Melanorrhoea* sp. (rare), *Ormosia macrodisca* (rare), *Schefflera cephalotes* (frequent), *Sterculia coccinea* (very abundant), and *Tristania ? merguensis* (common).

I note the absence, too, from Jurong of *Campnosperma squamata*, *Carallia brachiata*, *Elaeocarpus griffithii*, *Fagraea racemosa*, *Gymnacranthera*, *Ilex*, *Litsea gracilipes*, and *Talauma*. I conclude that the Jurong forest in the west of Singapore was phytogeographically distinct from that at Mandai, Pontian, and the Sedili region.

I intended also to enumerate small trees in restricted plots, but I managed to do this in the time available only for one part of plot B, which I have called plot C (Table 4). It showed the density of saplings in this forest and the lack of other undergrowth except where there were thickets of *Pandanus atrocarpus*, *Cyrtostachys*, *Daemonorops*, and *Salacca*. There were few places in this original forest where it was possible to walk without hacking a passage.

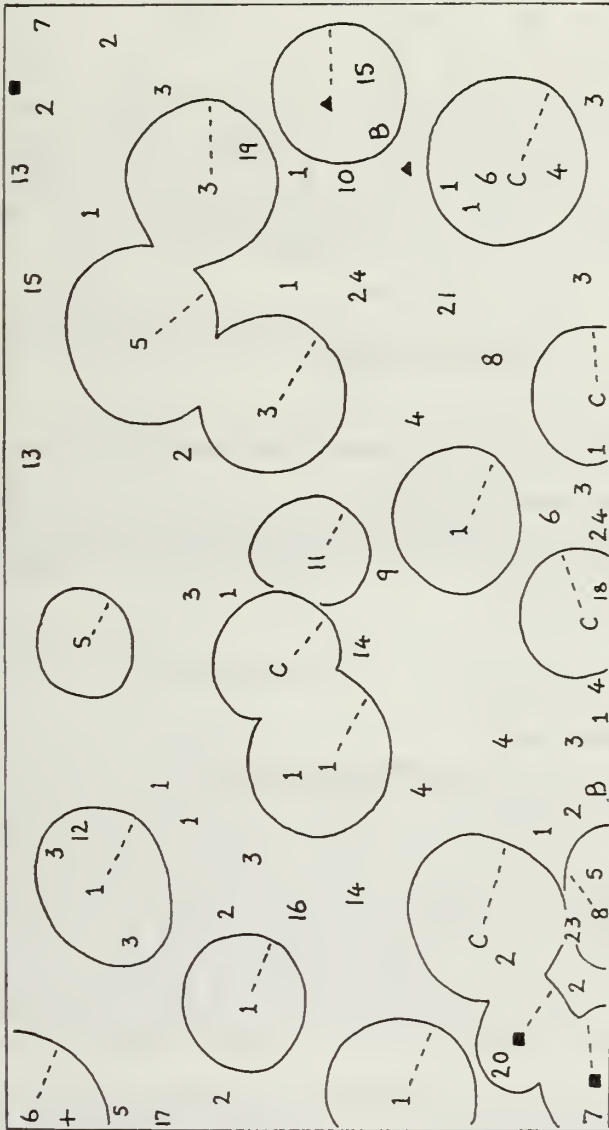


Figure 15. Plot A, Jurong, Singapore, March 1933; the trees numbered or marked as in Table 3; the crowns of the larger trees outlined; the larger gaps between the crowns filled mainly by *Pandanus atrocarpus*.



Figure 16. Plot B, Jurong, Singapore, March 1933; the trees numbered or marked as in Table 3; the crowns of the larger trees outlined.

Plot A

Size; c. 1 acre. Canopy-height not above 32 m, the highest tree being *Cratoxylon arborescens* (bole 70 cm thick at 2 m).

Situation; more or less level but with loose mounds of humus built up round the big trunks, swampy and easily flooded, not or scarcely tidal; bounded on one side by a stream deepened artificially into a straight ditch for drainage; water-table c. 30-40 cm below the humus.

Plot B

As plot A but further east of the stream and, probably, less flooded. Canopy height c. 30 m (*C. arborescens*).

Comparison of plots A and B

The plots appeared identical until enumeration showed a denser stand in plot B (Table 3). The rather narrow crowns of the two predominant trees in plot B, namely *Ganua motleyana* and *Melanorrhoea wallichii*, seemed to permit this increase in both canopy and undergrowth. The interest of both plots lay in the greater resolution that they gave to the forest-types condensed at the Mandai Road. They represented *M. wallichii* forest adjoining the more regularly and deeply flooded *P. xanthochymum* forest and its riverine continuation into *X. fusca* forest, but the greater extent of the level, or slightly shelving, land spread out this transition in plot A to plot B. *P. xanthochymum*, *X. fusca*, and *Pometia* were represented in plot A, but only *X. fusca* was present, if thinly, in plot B. The transition between the *P. xanthochymum* forest and that of *M. wallichii* appeared to be filled by *G. motleyana*.

The succession, then, from tidal freshwater swamp-forest to dry land appeared to follow the loss of tidal effect and the gradual rise, or build-up, of the ground in this sequence:— from *mempisang*-belt through *P. xanthochymum* and *X. fusca* forests to *G. motleyana* forest, *M. wallichii* forest, and finally lowland dipterocarp forest. In this sequence many other species come and go; their ecological preferences are not known; the plots which I studied were too small to recognise peculiarities in their scattered or locally gregarious occurrence. It would seem that *Mussaendopsis*

beccariana and *Diospyros siamang* went with *G. motleyana*, and that *Eugenia*, *Horsfieldia*, *Knema*, and *Lithocarpus bennettii* went with *M. wallichii* forest. *C. arborescens*, however, went with both. It is noteworthy that *L. bennettii* had practically the same representation in plot B of Mandai Road and plot B of Jurong. The scattered trees of *Koompassia malaccensis* escaped both plots.

While, therefore, the swamp-forests at Jurong and Mandai showed the same general ecological structure as in the Sedili region, the species peculiar to Jurong showed the floristic difference which did not occur in so striking a manner between the Mandai Road and the Sedili.

Plot C

This small plot, 10 ft. square, was a minuscule part of the forest, and many such plots would be needed to obtain a fair picture of the undergrowth. Using the figure of 46 small trees per 100 sq. ft. (as in Table 4), then an acre (as plots A or B), would have above 20,000 small trees. Fair sampling on this scale with such a mixed flora appeared impossible. Another such small plot might have contained only *Pandanus atrocarpus*, *Cyrtostichys*, or *Salacca*. Transects might have been more useful. Plot C, however, indicates regeneration of plot B.

Major trees at Jurong

- Amoora rubiginosa* — 1 large tree per 3-4 acres.
- Artocarpus kemando* — scattered, ? not a canopy-tree.
- Blumeodendron tokbrai* — scattered.
- Calophyllum retusum* — frequent, some very big trees, with loop-roots.
- C. wallichianum*, *C. floribundum* — scattered.
- Camposperma auriculata* — frequent, not secondary forest.
- Canarium pilosum* — scattered.
- Cantleya corniculata* — 1 large tree per 1-3 acres, rarely in the canopy.
- Cratoxylon arborescens* — frequent big trees, ? little regeneration.
- Dialium patens* — c. 1 large tree per 2-3 acres.
- Dillenia pulchella* — rare, but in the canopy.
- Diospyros siamang* — c. 1 large tree per acre.
- Ganua motleyana* — most abundant, regenerating.
- Hopea mengarawan* — scattered.
- Koompassia malaccensis* — scattered.
- Lithocarpus bennettii* — rather scattered.
- Lophopetalum multinervium* — scarce.
- Mangifera* aff. *parvifolia* — common.
- Melanorrhoea wallichii* — frequent to locally abundant.
- Mussaendopsis beccariana* — 1-2 large trees per acre, rarely 5; saplings common.
- Myristica lowiana* — scattered.
- Polyalthia glauca* — frequent, rarely in the canopy.
- Palaquium xanthochymum* — scarce.
- Pometia pinnata* f. *alnifolia* — c. 1 large tree per acre; mostly as slender trees or saplings.
- Santiria laevigata* — abundant, with many saplings, but not in the canopy.
- Santiria rubiginosa* — 1-2 large trees per 2-3 acres.
- Shorea platycarpa* — 1 large tree per acre.
- Strombosia maingayi* — rather common, rarely 23m high.
- Tristania ? merguensis* — locally common, in places scattered.
- Xylopius fusca* — locally frequent.
- Xylopius malayana* — scattered.

Small trees at Jurong

- Alseodaphne ? penduliflora* — common.
- Cyathocalyx ramuliflorus* — tree -17 m, frequent.
- Eugenia cerina* var. *turbinata* — frequent, often shortly buttressed, but here without stilt-roots.
- Eugenia muelleri* — tree -11 m, frequent, occasionally with short stilt-roots.
- Garcinia forbesii* — common, flowering at 3 m high.
- G. gaudichaudii* — common.
- G. ? rostrata* — locally frequent.

Horsfieldia polyspherula — scattered.

Jackia ornata — common, occasional large trees in the canopy at 1 per 1-2 acres.

Knema curtisii — scattered.

K. intermedia — frequent, with or without stilt-roots.

Macaranga puncticulata — common, occasionally as a canopy-tree at c. 1 per 1-2 acres.

Polyalthia hypoleuca — frequent.

Timonius flavescens — common.

Xylopia caudata — frequent, not in the canopy.

Pandanus atrocarpus — very abundant.

Common climbers at Jurong

Dapania (large), *Embelia*, *Mitrella kentii* (often large), *Morinda rigida* (often large), *Uncaria*; *Daemonorops leptopus*, *Flagellaria indica*, *Pothos latifolia*; *Gnetum*.

Common umdergrowth at Jurong

Ardisia tuberculata, *Labisia*, *Sterculia coccinea*; *Cyrtostachys*, *Hanguana*, *Nenga*, *Salacca*.

Table 3. Jurong Road, Singapore. Enumeration of trees with trunks 25 cm thick and more at 1.7 m (Ca = canopy-trees).

Symbol in Fig. 15, 16		Plot A		Plot B		
		Ca	Total	Ca	Total	
1	<i>Gnua molleyana</i>	5	17	10	40	
2	<i>Mangifera</i> aff. <i>parvifolia</i>	5	10	3	8	
C	<i>Cratoxylon arborescens</i>	5	5	3	8	
3	<i>Melanorrhoea wallichii</i>	2	11	6	16	
4	<i>Mussaendopsis beccariana</i>	3	5	0	0	
■	<i>Xylopia fusca</i>	2	3	0	1	
5	<i>Camposperma auriculata</i>	1	4	1	10	
6	<i>Shorea platycarpa</i>	1	3	1	2	
7	<i>Diospyros siamang</i>	1	2	0	1	
▲	<i>Palaquium xanthochymum</i>	1	2	0	0	
8	<i>Parartocarpus venenosus</i> ssp. <i>forbesii</i>	1	2	1	3	
9	<i>Canarium pilosum</i>	1	1	1	1	
10	<i>Hexapora</i> ? <i>curtisii</i>	1	1	0	0	
11	<i>Polyalthia glauca</i>	1	1	0	0	
B	<i>Blumeodendron tokbrai</i>	0	2	0	1	
12	<i>Jackia ornata</i>	0	2	0	1	
13	<i>Myristica lowiana</i>	0	2	1	1	
14	<i>Santiria laevigata</i>	0	2	0	1	
15	<i>Xylopia malayana</i>	0	2	1	2	
16	<i>Austrobuxus nitidus</i>	0	1	0	0	
17	<i>Cantleya corniculata</i>	0	1	0	1	
18	<i>Garcinia</i> ? <i>rostrata</i>	0	1	0	0	
19	<i>Horsfieldia</i> , <i>Knema</i>	0	1	1	6	
20	<i>Lithocarpus bennettii</i>	0	1	3	4	
21	<i>Macaranga puncticulata</i>	0	1	0	0	
+	<i>Pometia pinnata</i> f. <i>alnifolia</i>	0	1	0	0	
22	<i>Vatica wallichii</i>	0	1	0	0	
23	<i>Xylopia caudata</i>	0	1	0	1	
24	Unidentified (A, 4 spp.; B, 1 sp.)	0	4	0	1	
25	<i>Calophyllum retusum</i>	0	0	1	6	
26	<i>Dialium patens</i>	0	0	1	2	
27	<i>Tristania</i> ? <i>merguiensis</i>	0	0	1	2	
28	<i>Alstonia angustifolia</i>	0	0	0	4	
29	<i>Alseodaphne</i> ? <i>penduliflora</i>	0	0	0	1	
30	<i>Artocarpus kemando</i>	0	0	0	1	
31	<i>Calophyllum wallichianum</i>	0	0	0	1	
32	<i>Eugenia cerina</i>	0	0	0	1	
33	<i>Garcinia bancana</i>	0	0	0	1	
34	<i>Santiria rubiginosa</i>	0	0	0	1	
Plot A c. 33 spp., plot B c. 31 spp.		Totals	30	90	35	129

Table 4. Jurong Road, Singapore. Enumeration of trees with trunks 5-24 cm thick at 1.7 m (mostly 5-18 m high), in Plot C.

		Number of trees or trunks
<i>Pandanus atrocarpus</i>		7
<i>Knema intermedia</i> , <i>Melanorrhoea wallichii</i>		5 each
<i>Ganua motleyana</i> , <i>Horsfieldia polyspherula</i> , <i>Mangifera</i> aff. <i>parvifolia</i> , <i>Mussaendopsis beccariana</i> , rotans (large stems)		3 each
<i>Alseodaphne</i> ? <i>penduliflora</i> , <i>Hymenocaria</i> ?, <i>Santiria laevigata</i>		2 each
<i>Alstonia angustifolia</i> , <i>Diospyros siamang</i> , <i>Jackia ornata</i> , <i>Myristica lowiana</i> , <i>Parartocarpus</i> , <i>Polyalthia glauca</i> , <i>Vatica wallichii</i> , unidentified sp.		1 each
Plot C, 19 spp.	Total	46

3. Pengkalan Rajah, Pontian, Johore

This small area of swamp-forest, about the size of that at Jurong, had persisted in south west Johore, though all the surrounding forest had been converted into pine-apple estates (Plate 33), until 1939 when the District Officer informed M. R. Henderson, Curator of the Herbarium, that it was about to be felled. Henderson and I arrived as the felling began in July. We collected all that could not be identified on the spot and all flowering and fruiting material, but any opportunity to enumerate intact plots had been lost. The situation was flat land, as at Jurong, even flatter, and my first impression was that the forest was similar, but in spite of general agreement with swamp-forest in Singapore and the Sedili region it proved to be distinct. The species which occurred at Pontian, Jurong, and the Mandai Road are give on pp. 72-83.

The forest at Pontian did not seem to have been tidal; it was certainly not brackish. From the abundance of stilt-rooted trees throughout, it was clearly a uniform stand of freshwater swamp. As at Jurong, the soil was peaty humus collected round the big trees and over the roots with many hollows to the water-table which, in the dry month of July, stood about 30-40 cm below the uneven surface of the humus.

The poverty of the Pontian flora is shown in the following Table 5.

Table 5. Numbers of species at Jurong (J), Mandai Road (M), and at Pontian (P); species not in the Sedili region in brackets.

	J	M	P
Angiosperms (excl. orchids)	158 (28)	313 (55)	123 (20)
Orchidaceae	41 (1)	13* (?)	16 (5)
Gymnosperms	3 (0)	1* (0)	2 (0)
Pteridophyta	18 (0)	15* (2)	7 (3)
	220	342	148

* not fully collected.

This poverty was revealed by the absence from Pontian of the following genera and species:—

Aglaia, *Chisocheton*, *Dysoxylon*, *Artocarpus*, *Baccaurea*, *Barringtonia* (absent from all three localities), *Calophyllum floribundum*, *C. wallichianum*, *Canarium pilosum*, *Coelostegia*, *Dillenia* (stilt-rooted), *Euonymus javanicus*, *Ganua*, *Gynotroches*, *Horsfieldia*, *Knema*, *Lithocarpus*, *Lophopetalum*, *Melanochyla*, *Melanorrhoea*, *Memecylon*, *Mussaendopsis*, *Neesia*, *Nenga*, *Oncosperma*, *Palaquium xanthochymum*, *Pseudoeugenia*, *Salacca*, *Santiria rubiginosa*, *Strombosia*, *Vatica*, *Xylopi*, Apocynaceae, Connaraceae, and most woody climbers. It was shown by *Ficus* which had at Pontian but three species of large strangler, namely *F. callophylla*, *F. stricta*, and the rare *F. tristaniifolia* which has been found elsewhere in the Malay peninsula only at S. Udang in Malacca. The poverty was more striking because formerly the forest must have been surrounded by the rich dipterocarp forest of south Johore; it could not be ascribed to the isolation in which we found it. The forest at Mandai Road owed its richness to this proximity.

The following 14 species, which distinguish also the swamp-forest of Singapore and the Sedili, were frequent to abundant at Pontian:— *Amoora rubiginosa*, *Blumeodendron tokbrai*, *Calophyllum retusum*, *Camptosperma squamata*, *Cratoxylon arborescens*, *Eugenia cerina*, *Garcinia nigrolineata*, *Jackia ornata*, *Koompassia malaccensis*, *Macaranga puncticulata*, *Myristica lowiana*, *Pometia pinnata* f. *alnifolia*, *Santiria apiculata*, *Shorea platycarpa*.

Amoora and *Koompassia* were unusually abundant. In addition, there was the usual sprinkling of *Austrobuxus*, *Camptosperma auriculata*, *Dialium patens*, *Diospyros siamang*, and *Podocarpus wallichianus*. *Pandanus atrocarpus* (-20 m high), *Cyrtostachys lakka*, and *Timonius flavescens* were common in the undergrowth which, as at Jurong, consisted mainly of saplings. At Jurong *Cyrtostachys* was often tufted but at Pontian the palms were nearly all solitary.

Then the Pontian forest had the following 24 species which did not occur at Jurong or the Mandai Road, though 13 or 14 (marked S) occurred in the Sedili region:— *Aromadendron nutans*, *Camptosperma macrophylla* (common) *Ctenolophon parvifolius* (abundant; S), *Dialium platysepalum* (S), *D. wallichii* (S), *Diospyros* sp. A (see special notes), *Engelhardtia serrata* (scattered as a big tree), *Eugenia kiahii* (S), *F. callophylla* (S), *F. stricta* (S), *F. tristaniifolia*, *Gonystylus bancanus* (common; S), *Macaranga pruinosa* (common; S), *Palaquium burckii*, *P. ridleyi*, *P. semarum* (S), *Platea excelsa*, *Ploiarium* (frequent big trees 20-30 m, stilt-roots -2.5 m high; S), *Santiria tomentosa* (S), *Stemonurus secundiflorus* (S), *Tetractomia major* (S), *T. tetrandra* (common; S), *Tetramerista* (common), *Tristania pontianensis* (perhaps the commonest tree as saplings and up to 30 m high; ?S).

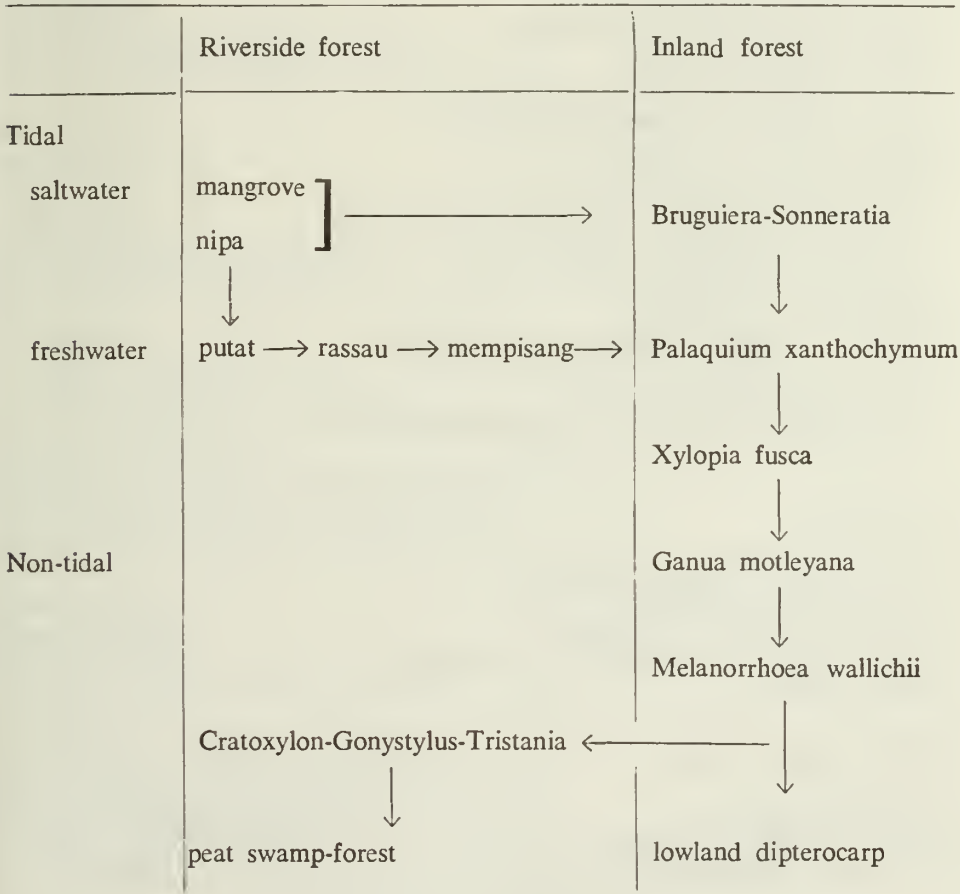
This contingent is the Malayan element, as opposed to that of Singapore or the Riouw pocket, and it has sufficient character with 9 or 10 particular species to distinguish it as the swamp-forest of west Johore from that of east Johore.

In common with the forest at Mandai Road, there were *Carallia brachiata*, *Elaeocarpus griffithii*, *Gymnacranthera eugeniifolia* (common), *Litsea gracilipes*, and *Parastemon urophyllum*. In common with the forest at Jurong, there were *Dillenia pulchella*, *Eugenia rugosa*, *Garcinia bancana*, *G. ? rostrata*, *Parartocarpus*, *Polyalthia hypoleuca* (very abundant, -30 m high), *Santiria laevigata*, *Cyrtostachys lakka*, and possibly *Tristania ? merguiensis* (which needs comparison with *T. pontianensis*). Absent from the Sedili region were 18% of the species at Jurong and at the Mandai Road, and 16% of those at Pontian. For the orchids and ferns at Pontian the values rise to 31% and 43% respectively.

So far as I could judge there was little difference in the habitat of the fresh-water swamp-forest at Jurong, Mandai, Pontian, or the Sedili. Certainly the proximity of the Sedili rivers led to more frequent and, possibly, deeper flooding but, if

the height of stilt-roots is a measure of the height of flooding, there was little to choose between the four localities. I came to the conclusion in 1940 that the four represented different phytogeographical regions, namely the south Sumatran for Jurong, the Riouw archipelago for Mandai, the mid-Sumatran for Pontian, and the west Bornean for the Sedili. They must date from the geography of the proto-Kampar river, which defines the Riouw pocket. Thus I have long realised that the phytogeography of Singapore and south Johore was far from simple. Most of the forest has been irredeemably exploited or entirely destroyed but, through the exertions of a few botanists, there are the past collections to be collated and it should still be possible to compare the forests of G. Pulau, G. Panti, and Bt Timah, perhaps Bt Tinjau Laut.

Now, long after my explorations, Anderson (1963) and Wyatt Smith (1959) have described the peat-swamp forests of Borneo and Malaya as distinct from the freshwater which is subject to inundation and does not form a raised bog. I had concluded that the Pontian forest, composed so largely of *Cratoxylon*, *Gonystylus*, and *Tristania*, without *Melanorrhoea* and *Mussaendopsis*, was a phase leading from *Melanorrhoea* forest to lowland dipterocarp forest, such as had surrounded it. Now it seems that the Pontian forest was freshwater swamp-forest on the way to becoming peat-forest. I take this up later in the section dealing with the Sarawak forest, though I fear it may never be solved. I give, therefore, the following scheme for the sequence of the swamp-forests.



List of plants in the swamp-forest of Jurong (J) and Mandai Road (M) in Singapore and of Pontian (P) in Johore.

(present marked as —; species not in the Sedili region marked *)

	J	M	P
ANACARDIACEAE			
<i>Camposperma auriculata</i> ; 26021 (J)	—	—	—
* <i>C. macrophylla</i> (Bl.) Hook. f.; 36625 (P), see special notes			—
<i>C. squamata</i> ; 36757 (P)		—	—
* <i>Mangifera</i> aff. <i>parvifolia</i> ; 26193 (J), see special notes	—	—	
<i>M. quadrifida</i> ; s.n. 1940 (M)		—	
<i>Mangifera</i> sp.; s.n. 1940 (M)		—	
<i>Melanochyla auriculata</i>		—	
* <i>M. kunstleri</i> King; 37128 (M)		—	
<i>Melanorrhoea wallichii</i> ; 26095 (J), 37116 (M)	—	—	
* <i>Melanorrhoea</i> sp.; s.n. 1933 (J)	—	—	
<i>Parishia</i> sp.; s.n. (M)		—	
ANNONACEAE			
* <i>Cyathocalyx ramuliflorus</i> (Maing.) Scheff.; 26162 (J)	—		
<i>Cyathostemma viridiflorum</i> ; 39246 (M)		—	
<i>Desmos dumosa</i> ; s.n. 19.10.32 (J), big climber	—		
<i>Goniothalamus malayanus</i> ; 36775 (P)			—
<i>G. ridleyi</i> King; s.n. 26.1.30 (M), 14.9.30 (M)		—	
<i>Mezzettia leptopoda</i> ; 33147 (M)		—	
<i>Mitrella kentii</i> ; 26157 (J), s.n. 28.11.34 (M)	—	—	
* <i>Oxymitra biglandulosa</i> (Bl.) Scheff.; 38870 (M)		—	
* <i>O. borneensis</i> Miq. var. <i>sumatrana</i> Miq.; 40004 (M)		—	
<i>O. glauca</i> ; 26151 (J)	—	—	
<i>Polyalthia angustissima</i> ; 40028 (M)		—	
<i>P. glauca</i> ; 26099 (J); 34448, 37120, 37706 (M)	—	—	
<i>P. hypoleuca</i> ; 26163 (J); 36644, 36689, 36697 (P); <i>tepis</i> ; see special notes. Plate 37	—		—
<i>P. lateriflora</i> ; 33141, 40375, s.n. 12.8.40 (M); 33141 as a 13 m tree with c. 100 fruiting carpels per branch		—	
<i>P. sclerophylla</i> ; s.n. 1940 (M)		—	
* <i>Popowia hirta</i> Miq.; 39540 (M)		—	
* <i>Pyramidanthe prismatica</i> (Hook.f.) J. Sinclair; 26152 (J)	—		
<i>Uvaria leptopoda</i> ; 26153, s.n. 3.11.32 (J)	—		
<i>Xylopiia caudata</i> ; 26030 (J)	—	—	
<i>X. fusca</i> ; 26096 (J); 34531, 37115 (M)	—	—	
<i>X. malayana</i> ; 26098; s.n. 4.2.33 (J); 37140, 37147, 37744, s.n. 26.7.40, Nov. 1940 (M)	—	—	
APOCYNACEAE			
<i>Alstonia angustifolia</i>	—	—	
<i>A. spathulata</i>		—	
<i>Anodendron candolleianum</i>	—	—	
<i>Kopsia singapurensis</i> ; 37714 (M), abundant		—	
<i>Parameria polyneura</i> ; 37733 (M)		—	
<i>Tabernaemontana corymbosa</i> ; 30668 (M)		—	
* <i>Urceola torulosa</i> Hook. f.; 34529 (M)		—	
* <i>Urnularia flavescens</i> (Dyer) Staff; 26161 (J), 37135 (M)	—	—	
<i>Willughbeia coriacea</i>	—	—	—
APOSTASIACEAE			
<i>Nieuwiedia griffithii</i> ; 36758 (P)			—
AQUIFOLIACEAE			
<i>Ilex cymosa</i> ; 37726 (M)		—	
* <i>I. macrophylla</i> Wall.; 36620 (P)		—	—
<i>Ilex</i> sp.; 36633, 36673, 36691 (P)			—

	J	M	P
ARACEAE			
<i>Aglonema nitidum</i>		—	
* <i>A. pictum</i> Kunth; s.n. 18.6.39 (P)			—
<i>Alocasia denudata</i>		—	—
<i>Anadendrum montanum</i>	—	—	
<i>Homalomena sagittifolia</i>		—	
<i>H. sagittifolia</i> var. <i>angustifolia</i> ; 36652 (P)			—
<i>Pothos latifolia</i> Hook.f.; 26102 (J)	—	—	
<i>Raphidophora sylvestris</i> ; 36774 (P)			—
ARALIACEAE			
<i>Arthropphyllum ovalifolium</i>		—	
* <i>Schefflera cephalotes</i> (C.B.Clarke) Harms; 28142 (J). Plate 37	—		
<i>S. subulata</i> ; 36653 (P)			—
ASCLEPIADACEAE			
<i>Dischidia coccinea</i> ; 36772 (P)			—
<i>D. collyris</i>	—		
<i>D. aff. complex</i> ; see special notes	—		
<i>D. hirsuta</i>	—	—	
<i>D. nummularia</i>	—	—	—
<i>D. rafflesiana</i>	—		
<i>Hoya lacunosa</i>	—		
<i>Hoya sp.</i> ; (P)			—
* <i>Physostelma wallichii</i> Wight; s.n. 25.6.39 (P)			—
<i>Toxocarpus glabrescens</i> ; (J), frequent slender climber	—		
* <i>T. griffithii</i> Dcne		—	
BIGNONIACEAE			
<i>Deplanchea bancana</i>		—	
BOMBACACEAE			
<i>Coelostegia griffithii</i>		—	
<i>Durio graveolens</i> ; s.n. 1940 (M)		—	
<i>D. singapurensis</i> ; 26060, 37046 (M)		—	
<i>Neesia malayana</i> ; 37138 (M)		—	
BURSERACEAE			
* <i>Canarium pilosum</i> Benn.; 26197, s.n. April 1933 (J); 26135, 33142, 37130 (M)	—	—	
<i>C. odontophyllum</i> ; s.n. 25.4.34 (M)		—	
* <i>Dacryodes incurvata</i> (Engl.) H.J. Lam; s.n. 29.7.40 (M)		—	
<i>D. rostrata</i> ; 37743 (M)		—	
<i>Santiria apiculata</i> ; 26046 (J); s.n. 25.7.40 (M) 36648, 36753 (P)	—	—	—
* <i>S. griffithii</i> (Hook.f.) Engl.; 34904 (M), 20 m tree		—	
<i>S. laevigata</i> ; 26039, 26046 (J); 36648, 36753 (P)	—	—	—
<i>S. rubiginosa</i> ; s.n. 26.2.33 (J); 34903, 37118, s.n. 25.7.40 (M)	—	—	—
<i>S. tomentosa</i> ; 36755 (P)			—
CELASTRACEAE			
<i>Bhesa paniculata</i>		—	
<i>Euonymus javanicus</i>	—	—	
<i>Lophopetalum multinervium</i> ; 28092 (M)	—	—	
CLUSIACEAE			
<i>Calophyllum floribundum</i> ; s.n. 14.1.33 (J); 33143, s.n. 12.9.36, 26.7.40, 1.8.40 (M); no special roots	—	—	
<i>C. incrassatum</i> ; s.n. 12.11.36 (M), flowering Oct.-Nov.		—	
<i>C. inophylloides</i> var. <i>singapurensis</i>		—	
* <i>C. molle</i> King; 37715 (M)		—	
<i>C. retusum</i> ; 26047, 26159, s.n. 13.12.32, 25.12.32 (J); 36637 (P); common tree -35 m, no special roots, at Jurong	—	—	—

	J	M	P
CLUSIACEAE — <i>continued</i>			
<i>C. wallichianum</i>	—	—	
<i>Garcinia bancana</i> ; 36618, 36666, 36755 (P)	—		—
<i>G. forbesii</i> ; 34625, 34626 (M)	—	—	
<i>G. gaudichaudii</i> ; 26038 (J)	—	—	
<i>G. ? hombroniana</i> ; s.n. 20.8.40 (M)	—	—	
<i>G. nigrolineata</i> ; 26198 (J); 28098, s.n. 15.4.34 (M); 36614, 36617 (P); see special notes	—	—	—
<i>G. parvifolia</i> ; s.n. 19.10.32 (J); fissured grey bark, yellow latex	—		
<i>G. ? rostrata</i> ; 26097 (J); 36613, 36615, 36629, 36687 (P); see special notes	—		—
* <i>G. scortechinii</i> King; s.n. 7.9.40 (M)		—	
<i>Garcinia sp.</i> ; 28087, 28094 (M); see special notes		—	
COMBRETACEAE			
<i>Terminalia phellocarpa</i> ; 36987, s.n. 5.9.40 (M)		—	
CONNARACEAE			
<i>Agelaea borneensis</i>	—		
<i>Cnestis palala</i>		—	
<i>Connarus monocarpus</i> ssp. <i>malayanus</i>		—	
<i>C. semidecandrus</i> ; s.n. 25.7.40 (M)		—	
<i>Rourea minor</i> ; 37124, 37139 (M)	—	—	
CONVOLVULACEAE			
<i>Argyreia ridleyi</i>	—	—	
* <i>Erycibe griffithii</i> Clarke		—	
CORNACEAE			
<i>Alangium ebenaceum</i> var. <i>tutela</i> ; 37708 (M)		—	
<i>Mastixia trichotoma</i> ; 37746 (M)		—	
CYPERACEAE			
* <i>Cyperus sphacelatus</i> Rottb.; 36776 (P), forest edge			—
<i>Fimbristylis pauciflora</i> , 36784 (P), forest edge			—
<i>Mapania enodis</i>		—	
<i>M. lorea</i>	—		
<i>Mapania sp.</i>			—
<i>Thoracostachyum banacanum</i>	—	—	
DILLENIACEAE			
<i>Acrotrema costata</i>		—	
<i>Dillenia grandifolia</i>		—	
<i>D. pulchella</i> ; 26041 (J); 36640 (P); 33 m at Jurong	—		—
* <i>Tetracera akara</i> (Burm.f.) Merr. (<i>T. sylvestris</i>)		—	
<i>T. arborescens</i> s.n. 25.11.40 (M) (<i>T. lucida</i>)		—	
DIPTEROCARPACEAE			
* <i>Anisoptera marginata</i> Korth.; (J), 20 m tree, scarce	—		
<i>Hopea mengarawan</i>	—		
<i>Shorea ? eximia</i> ; 37719 (M)		—	
* <i>S. gratissima</i> Ridley		—	
<i>S. macroptera</i> ; 37125 (M)		—	
<i>S. platycarpa</i> ; 37720, s.n. April-May 1933 (M); 36680 (P)	—	—	—
<i>Vatica wallichii</i> ; 26184 (J)	—	—	
EBENACEAE			
* <i>Diospyros coriacea</i> Hiern; 37150 (M)		—	
<i>D. lanceifolia</i> ; 37145 (M)		—	
<i>D. maingayi</i> ; 37711 (M)		—	
<i>D. oblonga</i> ; 37728, 37749 (M)		—	
<i>D. siamang</i> ; 26167 (J); 36623 (P); see special notes	—	—	—
<i>Diospyros sp. A</i> ; s.n. 1.7.39 (P); see special notes			—

	J	M	P
ELAEOCARPACEAE			
<i>Elaeocarpus griffithii</i> ; 32522, 34530 (M), with stilt-roots -45 cm high; 36649 (P)			
* <i>E. mastersii</i> King	—	—	—
<i>E. polystachyus</i>		—	
<i>Elaeocarpus</i> sp.; s.n. 1.7.39 (P), sapling with few stilt-roots -1 m high, buds resinous			—
EUPHORBIACEAE			
<i>Agrostistachys sessilifolia</i>	—	—	—
* <i>Alchornea villosa</i> (Benth.) M.A.		—	
* <i>Antidesma</i> ? <i>montanum</i> Bl.; 36602, 36630 (P)			—
<i>Austrobuxus nitidus</i> ; 28143 (J); 36619 (P)	—	—	—
<i>Baccaurea</i> ? <i>bracteata</i>		—	
* <i>B. kunstleri</i> King		—	
<i>Baccaurea</i> sp.; 37713 (M); tree -23 m, fruit yellow-ochre with pale orange translucent seed-pulp		—	
<i>Blumeodendron tokbrai</i> ; s.n. 19.10.32 (J); 30665, 32515, 37113 (M); 36766 (P)	—	—	—
<i>Bridelia cinnamomea</i>			—
* <i>B. griffithii</i> Hook.f.		—	
<i>Croton laevifolius</i>		—	
* <i>Drypetes pendula</i> Ridley; 33148 (M)		—	
<i>Endospermum diadenum</i>		—	
<i>Galearia fulva</i> ; 34450 (M)		—	
<i>Glochidion lutescens</i> ; 32525, 32526 (M)		—	
<i>G. leiostylum</i> ; 32527, 32533, s.n. 25.11.36 (M)		—	
<i>G. sericeum</i>		—	
* <i>Hymenocardia</i> sp.; 26100, 28146 (J); see special notes	—		
* <i>Macaranga conifera</i> (Zoll.) M.A.; 34543 (M)		—	
<i>M. gigantea</i>		—	
<i>M. griffithiana</i>		—	
<i>M. hypoleuca</i>		—	
<i>M. pruinosa</i>			—
<i>M. puncticulata</i> ; 26033, s.n. 19.10.32 (J); 36636, 36688 (P)	—	—	—
<i>M. recurvata</i> ; 34528, 37709 (M)		—	
<i>M. trichocarpa</i>		—	
<i>M. triloba</i>			—
<i>Pimeleodendron griffithianum</i> ; 37717 (M)		—	
* <i>Sapium discolor</i> (Champ.) M.A.		—	
FAGACEAE			
<i>Castanopsis inermis</i>		—	
<i>Lithocarpus bennettii</i> ; 26192 (J); 37149 (M)	—	—	
<i>L. elegans</i> ; 36545 (M)		—	
<i>L. encleisacarpus</i>		—	
FLACOURTIACEAE			
* <i>Casearia lobbiana</i> Turcz.; (J), common; 32532 (M)	—	—	
<i>Casearia</i> sp.; 32517 (M); see special notes		—	
<i>Flacourtia rukam</i>	—	—	
* <i>Osmelia maingayi</i> King; 28096 (M)		—	
FLAGELLARIACEAE			
<i>Flagellaria indica</i>	—	—	—
<i>Hanguana malayana</i> ; 36651 (M)	—	—	—
GESNERIACEAE			
<i>Aeschynanthus parvifolius</i> ; 36612 (P)		—	—
<i>A. wallichii</i> ; 26034 (J); 36656 (P)	—	—	—
GONYSTYLACEAE			
<i>Gonystylus bancanus</i> ; 36657 (P); see special notes			—
<i>G. confusus</i> ; s.n. 7.9.40 (M)		—	

	J	M	P
GRAMINEAE			
<i>Leptaspis urceolata</i>		—	
HYPERICACEAE			
<i>Cratoxylon arborescens</i> ; 36665, 36754 (P)	—	—	—
<i>C. formosum</i>		—	
<i>C. ligustrinum</i>		—	
ICACINACEAE			
<i>Cantleya corniculata</i> ; 26182 (J)	—		
* <i>Phytocrene bracteata</i> Wall.;		—	
* <i>Platea excelsa</i> Bl. var. <i>riedeliana</i> Sleumer; 36686 (P); see special notes. Plate 18.			—
<i>P. latifolia</i> ; 37723 (M)		—	
<i>Stemonurus scorpioides</i>		—	
<i>S. secundiflorus</i> ; 36761 (P)			—
JUGLANDACEAE			
* <i>Engelhardtia serrata</i> Bl.; 36658, 36677 (P); tree to 33 m high, kedi; (<i>E. nudiflora</i>)			—
LAURACEAE			
<i>Actinodaphne maingayi</i> ; s.n. 29.7.40 (M)		—	
<i>A. sesquipedalis</i> var. <i>venosa</i> ; 36766 (P)		—	—
<i>Actinodaphne</i> sp.; 36765 (P); tree -5 m			—
* <i>Alseodaphne</i> ? <i>penduliflora</i>	—		
<i>Beilschmiedia kunstleri</i> ; (M) frequent		—	
<i>Cryptocarya griffithiana</i>	—		
<i>Cryptocarya</i> sp.		—	
* <i>Hexapora</i> ? <i>curtisii</i> ; 26196, s.n. 4.3.33 (J); see special notes	—		
<i>Lindera lucida</i>		—	
<i>L. malaccensis</i> ; 28091 (M)		—	
* <i>Litsea ferruginea</i> Bl.; 28093, 37132 (M)		—	
<i>L. firma</i> ; s.n. 3.1.37 (M), common		—	
<i>L. gracilipes</i> ; s.n. 3.7.39 (P)		—	—
<i>L. grandis</i> ; 34449 (M)		—	
* <i>L. machilifolia</i> Gamble; s.n. 3.8.39 (P)			—
<i>Litsea</i> sp.; s.n. 1.8.40 (M)		—	
LEGUMINOSAE			
* <i>Adinobotrys erianthus</i> Dunn; s.n. 12.8.40 (M)		—	
<i>Crudia caudata</i> ; 24985 (M)		—	
* <i>Dalbergia havilandii</i> Prain; s.n. 17.3.32 (J); climber	—		
<i>Dialium patens</i> ; 37721 (M); 36759 (P)	—		—
<i>D. platysepalum</i> ; 36764 (P)			—
<i>D. wallichii</i> ; s.n. 4.7.39 (P)			—
<i>Koompassia malaccensis</i> ; 37745 (M); 36764 (P)	—	—	—
* <i>Kunstleria curtisii</i> Prain		—	
* <i>K. ridleyi</i> Prain; 37735 (M)		—	
* <i>Ormosia macrodisca</i> Baker; (J); see special notes	—		
<i>Parkia speciosa</i>		—	
* <i>Pithecellobium confertum</i> Benth.		—	
* <i>P. ellipticum</i> (Bl.) Hassk.		—	
<i>Sindora wallichii</i>		—	
<i>Spatholobus</i> sp.		—	
LILIACEAE			
<i>Dianella ensifolia</i>		—	
<i>Dracaena</i> sp.		—	
<i>Peliosanthes</i> sp.		—	

	J	M	P
LINACEAE			
<i>Ctenolophon parvifolius</i> ; 36607, 36647, 36672 (P); see special notes			—
<i>Roucheria griffithiana</i> ; (J), common	—	—	
LOGANIACEAE			
* <i>Fagraea auriculata</i> Jack; 37739 (M); 36752 (P)		—	—
<i>F. ceilanica</i> ; 36671 (P)			—
<i>F. racemosa</i>		—	—
MAGNOLIACEAE			
* <i>Armomadendron nutans</i> Dandy; 36626 (P); see special notes. Plate 9.			—
* <i>Talauma lanuginosa</i> Hook.f.; 37272 (M)		—	
<i>T. singapurensis</i> ; 37126 (M), frequent		—	
MARANTACEAE ?			
MELASTOMATACEAE			
* <i>Anplectrum viminale</i> (Jack) Triana; 30666 (M)		—	
* <i>Marumia rhodocarpa</i> Cogn.; 26035 (J)	—		
<i>Medinilla rubicunda</i> var. <i>hasseltii</i> ; (J), common; 36642 (P)	—	—	—
<i>Memecylon</i> sp.; 37742 (M)		—	
<i>Pternandra coerulescens</i> ; 37737 (M)	—	—	
* <i>P. echinata</i> Jack		—	
MELIACEAE			
<i>Amoora rubiginosa</i> ; 26020 (J); 36601, 36641 (P)	—	—	—
<i>Aphanamixis rohituka</i> ; 26036 (J)	—		
* <i>Sandoricum ? emarginatum</i> ; 33146 (M)		—	
MORACEAE			
<i>Artocarpus elasticus</i>		—	
<i>A. kemando</i> ; 37716 (M)	—	—	
<i>A. nitidus</i> ssp. <i>griffithii</i> ; 32545 (M)		—	
* <i>A. scortechinii</i> King;		—	
* <i>Ficus albipila</i> Miq.; s.n. 1932 (J), one tree (? the last in Singapore)	—	—	
<i>F. apiocarpa</i> ; (J), common	—	—	
<i>F. binnendijkii</i> ; 36543 (M)		—	
<i>F. bracteata</i> ; 24797, s.n. 1940 (M)	—	—	
<i>F. callophylla</i> ; 36955 (P)			—
<i>F. consociata</i>	—	—	
<i>F. excavata</i> ; s.n. 18.11.32 (J)	—	—	
<i>F. fistulosa</i>		—	
<i>F. globosa</i> ; 37738 (M)	—	—	
<i>F. grossularioides</i> ; 36777 (P)		—	—
<i>F. microcarpa</i>	—	—	
<i>F. microsyce</i> ; s.n. 25.7.40 (M)		—	
<i>F. obscura</i> var. <i>borneensis</i> ; 24798 (M); 36692, 36773 (P)		—	—
<i>F. pellucido-punctata</i> ; 37127 (M)		—	
<i>F. recurva</i> var. <i>ribesioides</i> ; s.n. 22.1.33 (J)	—	—	
<i>F. retusa</i> ;	—	—	
<i>F. ruginervia</i>		—	
<i>F. sagittata</i> var. <i>minor</i> ; 39992 (M)		—	
<i>F. stricta</i> ; 36693 (P)		—	—
<i>F. sundaica</i> ; 37137, 37143 (M)	—	—	
<i>F. trichocarpa</i> ; s.n. 3.11.32 (J); 25.11.40 (M)	—	—	
* <i>F. tristaniifolia</i> Corner; 36606, 36698 (P)		—	—
<i>F. villosa</i>		—	
* <i>F. xylophylla</i> Wall.; 37136 (M); 36694 (P)		—	—
<i>Parartocarpus venenosus</i> ssp. <i>forbesii</i> ; 26194, 28145, 28147 (J); 36661, 36682 (P)	—	—	—
* <i>Streblus elongatus</i> (Miq.) Corner		—	

	J	M	P
MYRISTICACEAE			
<i>Gymnacranthera bancana</i>		—	
<i>G. eugeniifolia</i> var. <i>griffithii</i> ; 37718, s.n. 26.7.40 (M); s.n. 2.7.39 (P)		—	—
<i>Horsfieldia bracteosa</i> ; s.n. 26.7.40 (M)		—	
<i>H. crassifolia</i> ; 34542, 34905, 37710, 37258 (M)		—	
<i>H. grandis</i> ; see Sinclair (1975, p. 48)		—	
<i>H. macrocoma</i> var. <i>canarioides</i> ;	—	—	
<i>H. polyspherula</i> ; s.n. 5.3.33 (J); 37144, s.n. 24.7.40 (M)	—	—	
* <i>H. subglobosa</i> (Miq.) Warb.		—	
<i>H. superba</i> ;		—	
<i>Knema conferta</i> ; 33145, 37129, 37254 (M)		—	
* <i>K. curtisii</i> (King) Warb, var. <i>paludosa</i> J.Sinclair 26155 (J); 37123, 37148, s.n. 15.4.34 (M)	—	—	
<i>K. glaucescens</i> var. <i>patentinervia</i> ; s.n. 24.7.40, s.n. 7.8.40 (M)		—	
<i>K. intermedia</i> ; 34544 (M)	—	—	
<i>K. malayana</i>		—	
<i>Myristica cinnamomea</i> ; see Sinclair (1958a, p. 360)		—	
<i>M. elliptica</i> ; 37275, s.n. 24.7.40 (M)		—	
<i>M. iners</i> ; 28097, 36282, 37134 (M)		—	
<i>M. lowiana</i> ; 28131, s.n. 19.10.32 (J); 36603, 36623 (P), flowering July 1939	—	—	—
MYRSINACEAE			
<i>Ardisia tuberculata</i> ; 36605 (P)	—		—
<i>Ardisia</i> sp.; 36609 (P); see special notes			—
<i>Embelia</i> ? <i>amentacea</i> ; 26185 (J)	—		
<i>E. coriacea</i>	—	—	
<i>Labisia punctata</i> ; (J), common; 36643 (P)	—	—	—
<i>Maesa ramentacea</i>		—	
<i>Pachycentria tuberosa</i>	—	—	
MYRTACEAE			
<i>Decaspermum fruticosum</i>		—	
* <i>Eugenia brantiana</i> Henders.; 36574, 36956, riverside, Pontian Besar			—
<i>E. cerina</i> ; s.n. 15.10.32, 15.4.33 (J); s.n. 26.7.40, 12.8.40 (M); 36639 (P)	—	—	—
<i>E. cumingiana</i> ; 37727, s.n. 1.8.40 (M)		—	
<i>E. kiahii</i> var. <i>angustifolia</i> ; 36668 (P), tree -17 m		—	—
<i>E. kunstleri</i> ; 37725, s.n. 1.8.40 (M), tree -10 m		—	
<i>E. longiflora</i> ; 36767 (P)		—	—
* <i>E. microcalyx</i> Duthie; 39603 (M)		—	
<i>E. muelleri</i> ; 26042, 29966, s.n. 18.12.32 (J), common	—	—	
* <i>E. nemestrina</i> Henders.; 28095, 37252, 37396, 37736, s.n. 25.7.40, 12.8.40 (M), tree -33 m, frequent		—	
<i>E. oleina</i>	—	—	
<i>E. pachyphylla</i>		—	
<i>E. papillosa</i> ; 37259 (M)		—	
* <i>E. pseudocrenulata</i> Henders.; 28090 (M)		—	
<i>E. ? rugosa</i> ; 26190 (J); 36612, s.n. 25.6.39 (P)	—	—	—
<i>E. tumida</i> ; s.n. 15.1.33 (J)	—	—	
<i>Eugenia</i> spp.; 37133 (M), 37730 (M), 37741 (M)		—	
<i>Pseudoeugenia singaporensis</i> ; 26029 (J), frequent; 37141, 37712 (M)	—	—	
<i>Tristania ? merguensis</i> ; 26049, s.n. 5.12.32 (J); see special notes, Plates 24, 34	—		?
<i>T. pontianensis</i> Henders.; 36659, 36695 (P); see special notes			—
NEPENTHACEAE			
<i>Nepenthes ampullaria</i> ; 36624 (P)	—	—	—
<i>N. gracilis</i>	—	—	—
<i>N. rafflesiana</i> ; 36631 (P)		—	—

	J	M	P
NYMPHAEACEAE			
<i>Barclaya motleyana</i>		—	
OCHNACEAE			
<i>Brackenridgea hookeri</i>	—		
* <i>Euthemis leucocarpa</i> Jack; 36635 (P)			—
OLACACEAE			
<i>Strombosia maingayi</i> ; 26160, s.n. 17.4.32 (J); 37257, 37707, 37740 (M); tree -23 m, in swamp-forest	—	—	
OLEACEAE			
<i>Linociera ? insignis</i> ; 36664, 36670 (P); tree -13 m			—
<i>L. pauciflora</i>		—	
ORCHIDACEAE			
* <i>Adenoncos sumatrana</i> J.J. Sm; 36676 (P)			—
<i>Agrostophyllum bicuspidatum</i>	—	—	
<i>Anaectochilus geniculatus</i>		—	
<i>Appendicula lucida</i>			—
<i>Appendicula</i> sp.	—		
* <i>Bromheadia finlaysonianana</i> (Lindl.) Rchb. f.; 36685 (P)			—
<i>Bulbophyllum acuminatum</i>	—		
<i>B. apodum</i> ; 28132 (J)	—		
<i>B. botryophorum</i>	—		
<i>B. pileatum</i> ; 26181 (J)	—		
<i>B. pulchellum</i>	—		
<i>B. purpurascens</i>	—		
<i>B. restrepia</i>			—
<i>B. sessile</i>	—		
<i>B. vaginatum</i>	—		
<i>Bulbophyllum</i> sp. (sect. <i>Aphanobulbum</i>)	—		
<i>Calanthe pulchra</i>		—	
<i>Camarotis adnata</i>	—		
<i>Chamaeanthus laciniatus</i>	—		
<i>Cheirorchis filiformis</i>			—
<i>Claderia viridiflora</i>	—	—	
* <i>Coelogyne rochussenii</i> de Vr.			—
<i>Dendrobium aloifolium</i>	—		
* <i>D. bifarium</i> Lindl.			—
* <i>D. calycopsis</i> Ridley	—		
<i>D. carnosum</i>	—		
<i>D. comatum</i>	—		
<i>D. crumenatum</i>	—	—	—
<i>D. leonis</i>	—		
<i>D. lonchophyllum</i>	—		
<i>D. plicatile</i>	—		
<i>D. prostratum</i>	—		
<i>D. spurium</i>	—		
<i>Dendrochilum longifolium</i>	—		
<i>Eria floribunda</i>	—		
<i>E. neglecta</i>	—		
<i>E. nutans</i>	—		
<i>E. pannea</i> ; 36762 (P)	—		—
* <i>E. pulchella</i> Lindl.; 36770 (P)			—
<i>E. velutina</i>	—	—	
<i>Eulophia graminea</i> ; 36769 (P)			—
<i>E. squalida</i> ;	—	—	—
<i>Galeola kuhlii</i>	—	—	
<i>Hylophila mollis</i>	—	—	
<i>Lepidogyne longifolia</i>			—
<i>Liparis gibbosa</i>	—		
<i>L. wrayi</i>		—	

	J	M	P
ORCHIDACEAE — <i>continued</i>			
<i>Malaxis micrantha</i>			—
<i>Nervilia punctata</i>		—	
<i>Oberonia</i> sp.	—		
<i>Plocoglottis javanica</i>		—	
<i>Sarcostoma javanicum</i> ; 36763 (P)			—
<i>Schoenorchis secundiflora</i>	—		
<i>Taeniophyllum filiforme</i>	—	—	
<i>T. obtusum</i>	—		
<i>Thelasis micrantha</i>	—		
<i>T. triptera</i>	—		
<i>Vanilla griffithii</i>			—
OXALIDACEAE			
<i>Dapania racemosa</i> ; 36751 (P)	—	—	—
PALMAE			
<i>Calamus</i> spp.			
<i>Cyrtostachys lakka</i> ; (J), commonly tufted; (P), solitary	—	—	—
<i>Daemonorops leptopus</i> ; s.n. Nov. 1932, March 1933 (J)	—		
<i>Daemonorops</i> spp.		—	
* <i>Nenga pumila</i> (Mart.) Wendl.; 26101 (J)	—	—	
<i>Oncosperma horridum</i>		—	
<i>Salacca conferta</i> ; 26200 (J)	—	—	
PANDANACEAE			
<i>Freycinetia angustifolia</i> ; s.n. 28.2.42 (M)		—	
<i>F. confusa</i>		—	—
<i>F. corneri</i> ; 26481, s.n. 22.2.43 (M)	—	—	
<i>F. javanica</i>		—	—
<i>Pandanus atroparpus</i>		—	—
<i>P. alticola</i>	—	—	—
<i>P. kamii</i>		—	
<i>P. odoratissimus</i> ; 37386 (P)			—
<i>Pandanus</i> sp.; ? <i>P. helicopus</i> , forest-form, as on the Sedili River)			—
PIPERACEAE			
* <i>Piper flavimarginatum</i> C.DC.	—		
<i>P. miniatum</i>	—	—	
* <i>P. nigrum</i> L.	—		
POLYGALACEAE			
<i>Xanthophyllum affine</i> ; 36542 (M)		—	
<i>X. ? ellipticum</i> ; (J)	—		
RHAMNACEAE			
<i>Zizyphus elegans</i>		—	
RHIZOPHORACEAE			
<i>Anisophyllea disticha</i>		—	
<i>Carallia brachiata</i> ; 36546, 37273, 37281 (M); 36604 (P)		—	—
<i>Gynotroches axillaris</i>	—	—	
<i>Pellacalyx axillaris</i>		—	
ROSACEAE			
<i>Parastemon urophyllum</i> ; 37724 (M); ? 36663 (P), tree -30 m high		—	—
<i>Parinari costata</i>		—	
<i>P. oblongifolia</i>		—	
* <i>Pygeum griffithii</i> Hook.f.; [<i>Prunus arborea</i> (Bl.) Kalkm.]		—	
* <i>P. lanceolatum</i> Hook.f.; [<i>Prunus grisea</i> (C.Muell.) Kalkm.]		—	

	J	M	P
RUBIACEAE			
* <i>Coelospermum scandens</i> Bl.	—		
<i>Gaertnera</i> sp.		—	
<i>Gynochthodes lanceolata</i> ; 36632, 36782 (P)			—
<i>Ixora congesta</i>	—	—	
<i>Hydnophytum formicarum</i>	—	—	
<i>Jackia ornata</i> ; 26183 (J); 36638 (P)	—	—	—
<i>Lasianthus griffithii</i>		—	
<i>Lecananthus erubescens</i> ; 36654 (P)	—		—
<i>Lucinaea morinda</i> ; 36681 (P)			—
<i>Morinda ridleyi</i>	—		
* <i>M. rigida</i> Miq.; 26111 (J); see special notes	—		
<i>Mussaendopsis beccariana</i>	—	—	
<i>Myrmecodia tuberosa</i>	—	—	
<i>Pavetta indica</i>	—	—	
<i>Psychotria maingayi</i>		—	
<i>P. obovata</i> ; ? 36669 (P)	—		—
<i>Randia auriculata</i> ; (J), common; 37750 (M)	—	—	
* <i>R. clarkei</i> King; 26180 (J), scarce	—		
* <i>R. macrophylla</i> Hook.f.		—	
<i>Tarenna appressa</i> ; 36645, 36778 (P)			—
<i>T. longifolia</i>		—	
<i>Timonius flavescens</i> ; 32524 (M); 36621 (P)	—	—	—
<i>T. wallichianus</i>		—	
<i>Uncaria ovalifolia</i> ; (J), common; 37146 (M); 36781 (P)	—	—	—
<i>Urophyllum glabrum</i>	—	—	
<i>U. streptopodium</i> ; s.n. 22.4.34 (M)		—	
RUTACEAE			
<i>Tetractomia major</i> ; 36674 (P), tree -26 m			—
<i>T. tetrandra</i> ; 36634, 36684, 36690 (P); see special notes			—
SANTALACEAE			
* <i>Dendrotrophe buxifolia</i> (Bl.) Miq.; 36616 (P)			—
SAPINDACEAE			
* <i>Lepisanthes fruticosa</i> (Roxb.) Leenh.; s.n. 20.8.40 (M)		—	
<i>Nephelium glabrum</i> ; 37131 (M)		—	
<i>N. rubescens</i>		—	
<i>Pometia pinnata</i> f. <i>alnifolia</i> ; 37114 (M)	—	—	—
SAPOTACEAE			
<i>Ganua motleyana</i> ; 26158 (J)	—	—	
<i>Ganua</i> sp.	—		
* <i>Palaquim burckii</i> H.J.Lam; 36678, 36683 (P)			—
<i>P. hexandrum</i> ; 37720 (M); buttressed steeply -70 cm		—	
* <i>P. leiocarpum</i> Boerl.; 36679, 36646 (P)			—
* <i>P. ridleyi</i> King et Gamble; 36699 (P); see special notes			—
* <i>P. rostratum</i> Burck; 37117, 37720 (M), buttressed -2 m		—	
<i>P. semaram</i> ; 36298 (P)			—
<i>P. xanthochymum</i> ; 37122, s.n. 25.7.40, 1.8.40 (M)	—	—	
<i>Planchonella maingayi</i> ; 37734 (M)	—	—	
SIMAROUBACEAE			
* <i>Irvingia malayana</i> Oliver; s.n. 12.8.40 (M), on slightly raised bank at edge of swamp, with new leaves		—	
STERCULIACEAE			
<i>Heritiera elata</i> ; 37731 (M); tree -23 m, fluted-buttressed -3.5 m high		—	
<i>Sterculia bicolor</i> ; 37732 (M)		—	
<i>S. coccinea</i> ; (J), very common; (<i>S. laevis</i>)	—		
<i>S. macrophylla</i>		—	
<i>S. rubiginosa</i>		—	

	J	M	P
SYMPLOCACEAE			
<i>Symplocos barringtoniifolia</i>		—	
TACCACEAE			
<i>Tacca integrifolia</i> (<i>T. cristata</i>)		—	
THEACEAE			
<i>Ploiarium alternifolium</i> ; 36662 (P), tree -30 m			—
* <i>Tetramerista glabra</i> Miq.; 36667, 36696 (P); see special notes			—
THYMELAEACEAE			
<i>Aquilaria malaccensis</i> ; 37142 (M); see special notes		—	
TILIACEAE			
<i>Grewia blattaefolia</i>		—	
<i>G. umbellata</i>		—	
<i>Pentace triptera</i> ; 37119 (M), fruiting 27.7.40		—	
ULMACEAE			
<i>Gironniera parvifolia</i>		—	
<i>Trema tomentosa</i> ; 36785 (P); (<i>T. amboinensis</i>)			—
URTICACEAE			
<i>Poikilospermum scortechinii</i> ; 36700 (P)			—
VERBENACEAE			
<i>Clerodendron deflexum</i>		—	
<i>C. villosum</i>		—	
<i>Callicarpa farinosa</i> ; 36783 (P)			—
VITACEAE			
<i>Pterisanthes coriacea</i>	—		
* <i>Vitis glaberrima</i> Wall.	—		
* <i>V. hastata</i> Miq.	—		
<i>V. japonica</i> ; 36780 (P)			—
<i>V. mollissima</i>	—	—	
* <i>V. novemfolia</i> Wall.; 36650 (P)			—
ZINGIBERACEAE			
<i>Amomum hastilabium</i>		—	
<i>A. xanthophlebium</i>	—	—	
<i>Hornstedtia leonurus</i>		—	
* <i>H. scyphiphora</i> (Koen.) Steud.		—	
<i>Zingiber puberulum</i> ; 36608 (P)			—
GYMNOSPERMAE			
<i>Gnetum gnemonoides</i> ; 26191 (J), frequent	—		
<i>G. latifolium</i> var. <i>funiculare</i> ; 36660 (P)			—
<i>G. microcarpum</i> f. <i>silvestre</i> ; (J), frequent	—		
<i>Podocarpus wallichianus</i> ; scattered	—	—	—
PTERIDOPHYTA			
<i>Asplenium glaucophyllum</i>	—		
<i>A. nidus</i>	—	—	—
* <i>A. tenerum</i> Forst.; 36655 (P)			—
<i>Blechnum orientale</i>	—	—	—
* <i>Cyathea glabra</i> (Bl.) Copel.; 36610 (P)		—	—
<i>C. latebrosa</i>	—	—	—
<i>Drynaria quercifolia</i>	—	—	—
* <i>Histiopteris incisa</i> (Thunb.) J.Sm.; 36675 (P)		—	—

	J	M	P
PTERIDOPHYTA — continued			
<i>Lindsaea scandens</i>	—	—	
<i>Lycopodium phlegmaria</i>	—		
<i>L. scabrum</i>	—		
<i>L. squarrosum</i>	—	—	
<i>Nephrolepis biserrata</i> ; 36627 (P)			—
<i>Phymatodes sinuata</i>	—	—	
<i>Platynerium coronarium</i>	—	—	
* <i>Pteris tripartita</i> Sw.; 36760 (P)			—
<i>Pyrrosia angustata</i>	—		
<i>Stenochlaena palustris</i>	—	—	—
<i>Taenitis blechnoides</i>	—		
<i>Teratophyllum ludens</i>	—	—	
<i>Thelypteris chlamydophora</i> ; (J), abundant	—	—	
* <i>Trichomanes motleyi</i> v.d.Bosch		—	
<i>T. obscurum</i>	—		
<i>Vittaria ensiformis</i>	—	—	



Part IV. Freshwater swamp-forest and peat swamp-forest.

At the U.N.E.S.C.O. symposium in 1958 at Tjiawi, Java, interest in lowland tropical peat swamp-forest was re-awakened by Anderson's account of his thorough investigations in Sarawak and Brunei. The discussion which ensued, and is printed with the record of Anderson's paper, revealed almost as many points of view as there were speakers with different territories in mind. Since then Anderson (1963, 1964) has published his fuller accounts and Wyatt-Smith (1959, 1961, 1964) has published his account of peat swamp-forest in Malaya; his work has been followed up by Hewitt (1967) and Tay (1969).

Peat swamp-forest is considered to be an outcome of freshwater swamp-forest, behind the mangrove and nipa, where for some reason the water-logged soil is no longer subject to tidal inundation or disturbed by the passage of streams. The forest debris accumulates into peat which raises the soil into a convex mound or dome, even up to 16 m in depth in Sarawak and Brunei, and becomes eventually so poor for plant-growth that a rather low forest of small trees, like crowded poles, survives along with a little undergrowth and *Sphagnum*. Regeneration is mainly vegetative through suckers or coppice-shoots from trunks broken by wind or blown down (Ashton 1964, plate 12; see also plate 12 in this paper).

Anderson distinguished six phasic communities in the development of the peat swamp-forest of Sarawak and Brunei. They are largely peculiar to these countries because many of the dominant or participant trees are endemic, e.g. *Shorea albida* and species of *Casuarina*, *Dacrydium*, and *Dactylocladus*. The first phasic community, with abundance of *Gonystylus bancanus* and *Neoscortechinia* (as well as *Dactylocladus*), has its analogy in Malaya and Sumatra, and so has the final phase of pole-forest though worked out with different species. Thus, if the Menchali F.R. in south Pahang (without *Gonystylus* and *Tetramerista*) is peat swamp-forest, then *Vatica wallichii* forms the pole-forest (Beveridge 1953). Ecologically the sequence has similarities in all the countries but floristically there are differences between Borneo, on the one hand, and Malaya and Sumatra on the other hand; they should not be under-rated. The litter of Malayan peat swamp-forest may not be so resistant to decay and, therefore, such strongly domed peat swamps as in Borneo may not develop. In other words, the peat swamp-forests of Malaya appear to represent Anderson's first phasic community more or less integrated, at least peripherally, with freshwater swamp-forest.

In his map of the peat swamp-forests of the Malay Peninsula Wyatt-Smith excludes the swamp-forests of the Johore and Sedili rivers, but includes that of Pengkalan Rajah at Pontian. Certainly at Pontian *Gonystylus bancanus*, *Gymnocranthera eugeniifolia*, and *Tetramerista* were abundant, as in Anderson's first phasic community. Yet, floristically, the Sedili region was closer to Wyatt-Smith's circumscription of peat swamp-forest. He gives 36 species as characteristic, to which I add *Polyalthia hypoleuca* because it is probably confused with *P. glauca*. Of these 37 species, 9 are not recorded from the Sedili region; 10 are not recorded by Anderson for Borneo; 16 are not recorded from Pengkalan Rajah; 18 are not from Jurong and 20 not from the Mandai Road. Some of these differences may be omissions of collecting or faults in identification of sterile specimens, but on the whole they are ecological or phytogeographical. The nine species of Malayan peat swamp-forest missing from the Sedili region are:—

Anisoptera marginata (J), *Calophyllum scribifolium*, (local in north Johore and in Perak), *Camposperma macrophylla* (P), *Durio carinatus*, *Palaquium ridleyi* (P), *Phoebe declinata*, *Shorea rugosa* var. *uliginosa*, *S. teysmanniana*, and *Tetramerista glabra* (P); note occurrence in Jurong (J) and Pontian (P).

The three of these nine species which occurred at Pontian seem to indicate progress from freshwater swamp-forest, for the region was certainly inundated at times, towards peat swamp-forest, but there was no pole-forest at the site.

The species of *Tristania* are puzzling and in need of taxonomic revision. It is a peat-forming genus in that the vegetative parts are slow to decay. It is not in Wyatt-Smith's list of peat-swamp species, but Anderson records *T. grandifolia*, *T. aff. maingayi*, and *T. obovata* for the Bornean peat-swamps. *T. ? merguensis* was characteristic of the Jurong swamp-forest and the allied *T. pontianensis* of that at Pontian. Sewandono (1938) recorded *Tristania sp.* for the Sumatran swamps, but Polak (1933) made no mention of it. In the Sedili region, apart from the riverside *T. sumatrana*, *T. ? merguensis* was curiously rare and *T. pontianensis*, or an ally, together with another species in the hillock-forest.

The following 16 species are excluded from the definition of peat swamp-forest by Wyatt-Smith and referred to freshwater swamp-forest:—

Camposperma auriculata, *C. squamata* (*C. minor*), *Coelostegia griffithii*, *Dryobalanops oblongifolia*, *Engelhardtia serrata* (*E. nudiflora*), *Hopea mengarawan*, *Macaranga triloba*, *Melanorrhoea wallichii*, *Mezzettia leptopoda*, *Nauclea maingayi*, *Neesia*, *Palaquium xanthochymum*, *Parishia insignis*, *Pometia pinnata*, *Shorea platycarpa*, and *Vatica wallichii*.

Except *Engelhardtia*, which was common at Pontian, the fifteen other species were common in the Sedili region and, mostly, at Jurong and the Mandai Road. Anderson, however, records many of them in his first phasic community which, evidently, makes the transition from freshwater to peat swamp-forest and for which there can be no exact limits. With increasing stagnation and peat-development, the

Table 6. Specific comparison between the swamp-forest of the Sedili region and that of Sarawak and Brunei (S.B.).

Category	S.B.	Sedili	Species in common	Sedili species in common as % of S.B.	Species at Pontian (P), Mandai Road (M), or Jurong (J), not in the Sedili region
Upper storey	38	92	13	34%	1 (J), 1 (P), see note 1
Middle storey	65	142	24	37%	1 (M), 3 (P), see note 2
Lower storey	38	170	15	39%	
Under storey	11	168	2	18%	1 (G. Panti), see note 3
Shrubs	20	71	9	45%	1 (P), see note 4
Herbs	14	78	6	43%	1 (P), see note 5
Sun-epiphytes	14	93	9	40%	2 (P), see note 6
Shade-epiphytes	9	38	3	33%	
Large climbers	19	94	7	37%	1 (Selangor), 1 (Endau), see note 7
Small climbers	17	82	9	53%	
Pteridophyta	30	52	12	40%	1 (M.P), see note 8
Totals	387	1080	138	36%	2 (J), 4 (M), 10 (P) 2 (G. Panti), see note 9

Note 1: *Anisoptera marginata* (J), *Tetramerista glabra* (P).—Note 2: *Eugenia nemestrina* (M), *Aromadendron nutans* (P), *Palaquium ridleyi* (P), *Platea excelsa* (P).—Note 3: *Disepalum anomalum*.—Note 4: *Euthemis leucocarpa* (P).—Note 5: *Aglaonema pictum* (P).—Note 6: *Adenoccos sumatrana* (P), *Eria pulchella* (P).—Note 7: *Ficus spathulifolia* (Selangor), *Willoughbeia grandiflora* (*W. glaucina*; Endau).—Note 8: *Cyathea glabra* (M.P.).—Note 9: *Ficus tristaniifolia* (P), *Elaeocarpus mastersii* (J,M), *Sandoricum ? emarginatum* (M), *Pygeum griffithii* (M), *Dipodium pictum* (G. Panti).

flora begins to be impoverished. To obtain a fuller idea of this depletion I have compared in Table 6 the two kinds of swamp-forest according to the ecological categories used by Anderson (1963); the riparian species and those of brackish swamp have been omitted.

The incessant tidal seepage in and out of the Sedili swamp-forest, the frequency of rain-floods, and the devious passage of streams prevented the accumulation of peat and permitted the continued enrichment of the soil with silt. Yet, in nearly all the ecological categories, the percentage of species in common with Anderson's list for Sarawak and Brunei was roughly the same, about 36%. Possibly in the interior of the swamp inland from Jason Bay there was some deterioration into peat swamp-forest. At the Mandai Road the forest partook of the richness of the Sedili region. With Jurong and Pontian it was different.

About 50% of the species in the relatively poor flora of Pengkalan Rajah are recorded by Anderson for Bornean peat-swamps. The resemblance is heightened by the abundance of *Gonystylus*, *Gymnacranthera*, *Ctenolophon*, *Tetrainerista*, and large trees of *Parastemon urophyllum*, which was nowhere conspicuous in the Sedili region. Then, the ten species which Pengkalan Rajah had in common with Borneo, but did not occur in the Sedili region (Table 6, notes), emphasize the resemblance, especially the rare *Aromadendron nutans* and *Ficus tristaniiifolia*. Further, the following trees (c. 36 species) of freshwater swamp-forest were not recorded either for Pengkalan Rajah or by Anderson for Sarawak and Brunei:—

Melanorrhoea wallichii, *Pentaspadon*, *Coelostegia*, *Kostermansia*, *Terminalia phellocarpa*, *Dillenia grandifolia*, *D. reticulata*, *Dryobalanops oblongifolia*, *Dipterocarpus lowii*, *D. sublamellatus*, *Hopea mengarawan*, *Shorea bracteolata*, *S. exelliptica*, *S. palembanica*, *S. singkawang*, *S. sumatrana*, *Vatica wallichii*, *Elaeocarpus macrocerus*, *Ixonanthes reticulata*, *Lithocarpus bennettii*, *L. leptogyne*, *L. urceolaris*, *Cratoxylon formosum*, *Artocarpus elasticus*, *A. kemando*, *Myristica crassa*, *M. iners*, *Eugenia papillosa*, *Parinari*, *Strombosia*, *Palaquium xanthochyllum*, *Heritiera elata*, *Pterospermum*, *Adinandra*, *Gordonia*, *Pentace triptera*, and the water-lily *Barclaya*.

The felling which took place at Pengkalan Rajah at the time of our investigation prevented careful ecological analysis. I have no record of a raised bog, of *Sphagnum*, or of pole-forest. The Jurong forest seemed to be freshwater swamp-forest moving towards the first phase of peat swamp-forest, as it was represented at Pengkalan Rajah. Clearly, this had led through freshwater swamp-forest to the mangrove on the west coast of Johore. Topography and phytogeographical position must effect these initial stages of peat swamp-forest. Thus, even *Tristania*-banks on the Sedili Besar could subside into freshwater swamp-forest and, if isolated topographically, could initiate a minor peat swamp-forest. Such transitions evidently occurred, as one would expect, on a vaster scale in south Sumatra (Polak 1933, Sewandono 1938). The phytogeographical aspect involves the historic or geological. It is important because it is not clear that the peat of one floristic region is identical or ecologically equivalent with that of another. Every area of swamp-forest, therefore, needs its particular investigation. With the rapid destruction of lowland forest, many areas of original swamp-forest will have been annihilated without record. Hence I have put on record the few and imperfect observations that I was able to make.

The Riouw pocket

The centre of the peat swamp-forests of Sarawak is the mouth of the Rejang river. About 460 miles to the west, across the China Sea and roughly in the same latitude, there is the mouth of the comparatively tiny Sedili river. In the glacial period, as we are given to understand (Haile 1971), the sea receded to its present 100 m contour. A vast plain connected the Malay peninsula and Borneo. It was

broken by the mountains of the east coast islands of Malaya and of the Anamba and Natuna islands. Great rivers traversed this plain in a north easterly direction from the mountains of the Malayan mainland, Sumatra, Java, the Riouw Archipelago, and west Borneo. The plain must have been filled in great part with swamps of mangrove, *nipa*, and freshwater swamp-forest, possibly several hundred miles in extent and far greater than at present. This aggregate of swamp and river was, surely, a formidable barrier to the migration of plants and animals from the dry land on one side to the other. Thus these countries retain their floristic and faunistic peculiarities but enjoy a common heritage of such plants and animals that dwelt in the swamps or negotiated the peripheral uplands. With the return of the sea, making islands of the former mountains, the vegetation receded until present geography shows the narrowed swamp-lands of south Malaya, east Sumatra, and west Borneo. At its maximum return, about 40 m above its present level, the sea must have driven the swamp-forest even further inland. Now this basin is the region to which I have referred in my accounts of the geography of *Ficus* as the Riouw pocket (Corner 1958, 1969). I have sought to investigate it from the point of view of the swamp-forest, especially the dipterocarps (Symington 1943; Ashton 1964a, 1968) and *Ficus* (Corner 1965).

Firstly I note that, so far as is known, the Sedili region is a critical southernmost limit in Malaya for species which occur commonly or mainly on the east side of the peninsula. Thus:—

i. Absent apparently from the Sedili region:— *Anisoptera marginata*, *Cotylelobium malayanum*, *Dipterocarpus coriaceus*, *Hopea nutans*, and *Shorea macrantha*. All these occur in Borneo but only *A. marginata* is also in Sumatra, as it is in Singapore. *Fagraea fragrans*, common on the coast of Pahang, offers a similar problem. Thus, the flora of the Menchali F.R., just north of the Rompin river, is already different from that of the Sedili (Beveridge 1953).

ii. With the Sedili region as the southernmost Malayan limit:— *Dipterocarpus lowii*, *Dryobalanops aromatica*, *Shorea collina*, *S. exelliptica*, *S. foxworthyi*, *S. materialis*, *S. resina-nigra*, *S. singkawang*, *S. sumatrana*; *Ficus beccarii*, *F. obpyramidata*, *F. stupenda*, *F. uncinata*, *F. uncinulata*, *Artocarpus gomezianus*. All these occur in Borneo except *S. collina*, *S. sumatrana* (which has there a close ally in *S. seminis*), and *A. gomezianus*.

Secondly I note that, for the peat swamp-forest of Sarawak and Brunei, 9 of the 15 species of dipterocarp are endemic to Borneo and that the others occur in Malaya though only *S. platycarpa* is in the Sedili region. Of the 26 species of *Artocarpus* and *Ficus* recorded by Anderson, there are five endemic species or varieties of *Ficus*, and the others are wide-spread on the Sunda shelf except *F. spathulifolia*, *F. tristaniifolia*, and *F. sundaica* var. *beccariana*; of these 26 species, 15 occur in the Sedili region.

Thirdly I note that 5 of the 22 species of dipterocarps in the Sedili region are Malayan endemics and that 15 occur in Borneo, though not in the peat swamp-forest. Of the 32 species of Moraceae in the Sedili region, 24 are widely distributed on the Sunda shelf; 3 occur only in Malaya and Borneo; 3 do not occur in Borneo but extend variously to the Philippines, Thailand, and Sumatra; *F. cucurbitina* occurs in the Sedili region, Borneo, and the Philippines; and *F. uncinulata* occurs in the Sedili region, Borneo, and the Natuna Isl.

This complexity has led me to the following analysis of the geographical routes by which the species arrived at the Riouw pocket.

i. Species of northerly distribution:— *Dipterocarpus grandiflorus*, *Vatica mengachapoi*; *Artocarpus gomezianus*, *F. spathulifolia* (cf. *F. depressa* and *F. glaberrima*, which avoid the Riouw pocket).

ii. Species of north easterly distribution, including the Anamba and Natuna islands and the Philippines:— *Dipterocarpus apterus*; *Ficus cucurbitina*, *F. stricta*, *F. uncinulata*; (cf. *Chisocheton pentandrus*, *Inocarpus*, *Myristica guattariifolia*, *Pandanus dubius*, ? *Quassia indica*).

iii. Species of Malaya and Borneo:— *Cotylelobium malayanum*, *Dipterocarpus coriaceus*, *D. sublanellatus*, *Shorea exelliptica*, *S. foxworthyi*, *S. macrantha*, *S. materialis*, *S. resina-nigra*; *Ficus delosyce*, *F. obpyramidata*, *F. subgelderi*.

Ashton (1972) observes that 57 species of dipterocarp reach their eastward limit at the Lupar river in west Borneo, and that the proto-Lupar of the glacial period seems to have been one of the formidable barriers to migration.

iv. Species of southerly distribution (Malaya, Sumatra, Riouw, Borneo):— *Anisoptera marginata*, *Dipterocarpus lowii*, *Dryobalanops oblongifolia*, *Hopea mengarawan*, *Shorea bracteolata*, *S. leprosula*, *S. macroptera*, *S. ovalis*, *S. platycarpa*, *S. singkawang*, *S. teysmanniana*, *Vatica maingayi*, *Ficus apiocarpa*, *F. bracteata*, *F. calophylla*, *F. deltoidea* var. *deltoidea*, *F. dubia*, *F. excavata*, *F. retusa* (not *F. microcarpa*), *F. ruginervia*, *F. stupenda*, *F. tristaniifolia*, and ? *F. acamptophylla* (Bangka, Borneo).

In this category I add the following list of freshwater swamp-forest trees:—

<i>Artocarpus kemando</i>	<i>Polyalthia hypoleuca</i>
<i>Blumeodendron tokbrai</i>	<i>Sandoricum emarginatum</i>
<i>Cantleya corniculata</i>	<i>Santiria laevigata</i>
<i>Cratoxylon arborescens</i>	<i>S. rubiginosa</i>
<i>Dacryodes macrocarpa</i>	<i>Sindora coriacea</i>
<i>Dialium patens</i> ,	<i>S. wallichii</i>
<i>D. playtysepalum</i>	<i>Stemonurus scorpioides</i>
<i>Durio carinatus</i>	<i>S. secundiflorus</i>
<i>Gymnacranthera eugeniifolia</i>	<i>Xylopia caudata</i>
<i>Koompassia malaccensis</i>	<i>X. fusca</i> (? Sumatra)
<i>Mezzettia leptopoda</i>	<i>X. maingayi</i>
<i>Mussaendopsis beccariana</i>	<i>Cyrtostachys lakka</i>
<i>Myristica lowiana</i>	<i>Salacca conferta</i>
<i>Parartocarpus venenosus</i> ssp. <i>forbesii</i>	<i>Pandanus helicopus</i>
<i>Parastemon urophyllum</i>	<i>P. corneri</i> (?)

v. Species of westerly distribution (Malaya, Sumatra):— *Shorea acuminata*, *S. lepidota*, *S. palembanica*, *S. sumatrana*, *Vatica stapfiana*, *V. wallichii*; *Ficus microsyce*.

vi. Bornean endemics:— *Cotylelobium burckii*, *Dryobalanops rappa*, *Hopea pentanervia*, *Shorea albida*, *S. inaequilateralis*, *S. longiflora*, *S. pachyphylla*, *S. rugosa*, *S. scabrida*; *Ficus callicarpides*, *F. deltoidea* var. *borneensis* and var. *motleyana*, *F. heteropleura* var. *hirta*, *F. supperforata*.

vii. Malayan endemics:— *Balanocarpus heimii* (apparently related to the two following species of *Hopea*), *Dipterocarpus cornutus*, *Hopea polyalthioides*, *H. resinosa*, *Shorea collina*, *Vatica stipulata* (Mt Ophir and Bt Tinjau Laut; cf. *Cratoxylon glaucum* from Mt Ophir, G. Arong near Mersing, Riouw Archipelago, Natuna Isl. and Borneo).

The occurrence of *B. heimii* in the Kota Tinggi Sedili region and in Singapore (Bt Timah) seems to have been overlooked by Symington.

viii. *Dryobalanops aromatica*. The distribution of this famous tree bears on the whole problem. It occurs on the east side of Malaya with its southern limit just north of G. Pantl, in Selangor, Sumatra, Riouw Archipelago, and east Sarawak to south west Sabah. It impinges on the Sedili region on the hillocks along the Jemaluang Road and on Bt Tinjau Laut. It surrounds and crosses the Riouw pocket except for the region of Singapore and south Johore. It has been considered to indicate early erosion surfaces, preceding the swamp-basin of the Riouw pocket,



Figure 17. Plan of the Riouw pocket (heavy line) with migration-routes (broken lines) in glacial periods; the Rejang and Sedili rivers shown at the northern extremities of the pocket.

but this is doubted by Ashton (1972); possibly the vegetation of the raised beach at Kahang in Johore may be relevant (Swan 1974). *Dryobalanops oblongifolia* has much the same distribution and, except that they do not occur in Sumatra or the Riouw Archipelago, the same holds for *Shorea foxworthyi*, *S. macrantha*, *Dipterocarpus coriaceus*, and *Cotylelobium malayanum*. *S. teysmanniana* occurs in Bangka, west and north Borneo, and only Selangor in Malaya. All these accompany geographically, if not ecologically, *D. aromatica*. The lofty *Koompassia excelsa* may be another instance.

ix. Ten of the dipterocarps in the Sedili region (eleven if *Anisoptera marginata* is added) occupy the arc of Malaya, Sumatra, and Borneo. This arc is the limit of the swamp-forest which drained the Riouw pocket. I note that the endemic *S. albida* of the peat swamp-forests of Sarawak and Brunei is allied with the more wide-spread *S. bracteolata* and that the Bornean *S. seminis* is the ally or *S. sumatrana* to complete this representation along the arc. Indeed, the arc seems to indicate the peripheral occurrence of the peat swamp-forest.

These ideas are conveyed roughly in Figure 17. For recent papers on quaternary shore-lines of west Malaysia I refer to Aleva (1973), Biswas (1973), Haile (1971), and Tjia (1970b).

Part V. List of vascular plants of the Sedili-region, Johore

The list is alphabetical for the families of flowering plants, with genera and species in the same order. Gymnosperms and ferns follow. The nomenclature of the Flora Malesiana has been followed and, where families have not yet been revised, names have been taken from standard Malayan works. For many specimens which have not been critically studied I have had to retain the names under which the specimens have been filed in the Singapore Herbarium. Thus sterile and unnumbered specimens, collected for ecological record, are often not included in lists of identification.

The revival of taxonomy after the Second World War has been part of the growth of internationalism. Money has been forthcoming to visit important and distant herbaria. Postal services have been so improved that types are readily lent. There is a much greater number of specimens for collation. The outcome is an almost new language for Malesian botany. Lack of these facilities in the past, coupled with the imperfect description of many species, led to a superfluity of names as the same species or genus was described again and again, almost country by country. The common *merambong* (*Scaevola*) has changed its name twice in the last twenty years, and the *medang* (*Elaeocarpus macrocerus*) twice in the last forty years. Finality is not in sight. Many genera will be reduced as breadth of mind increases in botanical wisdom, and many species need further assessment. Hence I have made a list of Malay names, as used on the Sedili rivers; many are specific and all are useful in the forest.

The main localities where I collected are numbered 1-10, as listed below. The numbers are given in the species-list after the number or date of collection, preserved in the Singapore Herbarium. The chief locality for riverside- and swamp-forest is the Sedili Besar (7) and the adjoining parts of its tributaries. Nos. 2-4 refer to these tributaries where they were crossed by the Jemaluang Road and where the swamp-forest adjoined the hillock-forest; this is represented mostly by nos. 4 and 5 and by Bt Tinjau Laut (10). S. Segun (6) was a *Saraca-stream* leading into swamp-forest with *Shorea lepidota* and *S. singkawang*.

1. Kota Tinggi-Mawai Road, mile 5-6, swamp-forest.
2. S. Kayu, Jemaluang Road.
3. S. Berassau, Jemaluang Road.
4. S. Kayu Ara, Jemaluang Road.
5. Jemaluang Road, mile 13-14, (partly kapur-forest).
6. S. Segun.
7. S. Sedili Besar.
8. S. Sedili Kechil.
9. Jason Bay (shore and forest).
10. Bt Tinjau Laut (kapur-forest).

The total number of species recorded for the Sedili-region is c. 1710, of which 1082 occurred in the swamp-forest (fresh - and saltwater). The proportion of monocotyledons to dicotyledons is low at 21-22%.

Specific representation of angiosperm families

Species	Specific number in brackets
100 or more	Orchidaceae (115), Euphorbiaceae (110), Rubiaceae (110).
50-99	Myrtaceae (65), Lauraceae (60), Annonaceae (58), Moraceae (57), Leguminosae (54), Palmae (50).
30-49	Clusiaceae (40), Meliaceae (c. 40), Melastomataceae (35), Diterocarpaceae (34), Cyperaceae (31), Myristicaceae (30), Gramineae (30), Zingiberaceae (30).
20-29	Myrsinaceae (28), Anacardiaceae (27), Caesalpinioideae (24), Apocynaceae (23), Araceae (23), Sapotaceae (23), Pandanaceae (22), Fagaceae (20), Papilionatae (20).
10-19	Sapindaceae (18), Sterculiaceae (18), Verbenaceae (18), Flacourtiaceae (15), Gesneriaceae (15), Tiliaceae (15), Liliaceae (14), Rhizophoraceae (13), Rutaceae (13), Acanthaceae (12), Burseraceae (12), Celastraceae (12), Dilleniaceae (12), Theaceae (12), Connaraceae (11), Elaeocarpaceae (11), Icacinaceae (11), Polygalaceae (11), Convolvulaceae (10), Mimosoideae (10), Piperaceae (10).
4-9	Combretaceae (9), Loranthaceae (9), Vitaceae (9), Lecythidaceae (8), Marantaceae (7), Urticaceae (7), Bombacaceae (6), Compositae (6), Loganiaceae (6), Menispermaceae (6), Rosaceae (6), Oleaceae (5), Proteaceae (5), Commelinaceae (4), Lythraceae (4), Symplocaceae (4), Taccaceae (4), Violaceae (4).
1-3	50 families.

Large genera (species-number in brackets)

Eugenia (c. 57), *Ficus* (46), *Bulbophyllum* (23), *Calophyllum* (19), *Dendrobium* (19), *Ardisia* (c. 18), *Shorea* (17), *Diospyros* (? 17), *Garcinia* (16), *Pandanus* (16), *Lithocarpus* (15), *Macaranga* (15), *Lindera* (13), *Baccaurea* (12), *Memecylon* (12), *Elaeocarpus* (11), *Polyalthia* (11), *Calamus* (10), *Daemonorops* (10), *Horsfieldia* (10), *Psychotria* (10), *Xanthophyllum* (10).

To these must be added *Aglaiia* and *Dysoxylon* in the range of *Calophyllum*.

List of families in the Sedili-region with total number of species and those of fresh-water swamp-forest

	Total		Swamp-forest	
	Dicot.	Monocot.	Dicot.	Monocot.
Acanthaceae	12		2	
Aizoaceae	1		0	
Amaranthaceae	1		0	
Amaryllidaceae		2		0
Anacardiaceae	27		16	

	Total		Swamp-forest	
	Dicot.	Monocot.	Dicot.	Monocot.
Annonaceae	58		49	
Apocynaceae	23		15	
Apostasiaceae		2		2
Aquifoliaceae	3		3	
Araceae		23		16
Araliaceae	5		4	
Asclepiadaceae	21		12	
Bignoniaceae	2		2	
Bombacaceae	6		4	
Boraginaceae	3		1	
Burseraceae	12		11	
Capparidaceae	1		1	
Casuarinaceae	1		0	
Celastraceae	12		7	
Clusiaceae	c. 40		25	
Combretaceae	9		3	
Commelinaceae		5		2
Compositae	6		0	
Connaraceae	11		8	
Convolvulaceae	10		5	
Cornaceae	3		3	
Crassulaceae	1		0	
Cucurbitaceae	4		3	
Cyperaceae		31		7
Dichapetalaceae	2		1	
Dilleniaceae	12		8	
Dioscoreaceae		3		3
Dipterocarpaceae	34		22	
Ebenaceae	? 18		11	
Elaeocarpaceae	11		5	
Ericaceae	2		1	
Erythroxylaceae	2		1	
Euphorbiaceae	110		71	
Fagaceae	20		13	
Flacourtiaceae	15		12	
Flagellariaceae		2		2
Gesneriaceae	c. 15		10	
Gonystylaceae	3		3	
Goodeniaceae	1		0	
Gramineae		30		3
Hernandiaceae	1		0	
Hypericaceae	3		2	
Hypoxidaceae		2		1
Icacinaceae	11		7	
Labiatae	1		0	
Lauraceae	c. 60		37	
Lecythidaceae	8		5	
Leguminosae				
Caesalpinioideae	24		12	
Mimosoideae	10		2	
Papilionatae	20		2	
Lentibulariaceae	1		0	
Liliaceae		14		12
Linaceae	2		2	
Loganiaceae	6		4	
Loranthaceae	9		7	
Lowiaceae		1		1
Lythraceae	4		1	
Magnoliaceae	3		1	
Malpighiaceae	2		1	
Malvaceae	3		0	
Marantaceae		7		2
Melastomataceae	c. 35		25	

	Total		Swamp-forest	
	Dicot.	Monocot.	Dicot.	Monocot.
Meliaceae	c. 40		26	
Menispermaceae	6		4	
Monimiaceae	1		1	
Moraceae	57		32	
Musaceae		2		7
Myristicaceae	30		25	
Myrsinaceae	c. 28		16	
Myrtaceae	c. 65		32	
Nepenthaceae	3		3	
Nymphaeaceae	1		1	
Ochnaceae	3		3	
Olacaceae	3		3	
Oleaceae	5		5	
Opiliaceae	2		1	
Orchidaceae		c. 115		101
Oxalidaceae	2		2	
Palmae		c. 50		37
Pandanaceae		22		18
Passifloraceae	1		0	
Piperaceae	c. 10		7	
Pittosporaceae	1			
Polygalaceae	11		8	
Proteaceae	5		3	
Rhamnaceae	3		2	
Rhizophoraceae	13		4	
Rosaceae	6		4	
Rubiaceae	c. 110		74	
Rutaceae	13		7	
Sabiaceae	3		0	
Santalaceae	1		0	
Sapindaceae	18		11	
Sapotaceae	23		17	
Sauraujaceae	1		0	
Schisandraceae	1		1	
Scrophulariaceae	2		0	
Simaroubaceae	2		0	
Solanaceae	1		1	
Staphyleaceae	1		1	
Stemonaceae		1		1
Sterculiaceae	18		11	
Styracaceae	1		1	
Symplocaceae	4		3	
Taccaceae		4		2
Theaceae	12		9	
Thymelaeaceae	3		3	
Tiliaceae	c. 15		9	
Ulmaceae	3		1	
Urticaceae	7		5	
Verbenaceae	18		8	
Violaceae	4		2	
Vitaceae	9		6	
Zingiberaceae		30		20
Totals	1285	346	794	230
Total angiosperms		1631		1024
Gymnospermae	9		6	
Pteridophyta	72		52	
Total vascular flora		1712		1082

Acanthaceae

- Acanthus ilicifolius* L.: mangrove; *jerujoh*.
Gymnostachyum ? : 29472, 29497 (2); herb in swamp-forest. See special notes.
Justicia johorensis J. Sinclair; s.n. 5.1.36 (5). *Gdns' Bull. Singapore* 15 (1956) 18.
J. uber Clarke: 30653 (6).
Justicia sp.: 32083 (2), 32501 (2).
Justicia sp.: 37051 (10).
Lepidagathis longifolia Wight: s.n. (4).
Peristrophe sp.: s.n. 28.4.35 (3).
Pseuderanthemum crenulatum Radlk.: 30782 (1).
Pseuderanthemum sp.: 30785 (1).
Staurogyne griffithiana Ktze: 36945 (10), (6).
S. kingiana Clarke: 28652 (8); herb, frequent in sandy coastal forest.

Aizoaceae

- Sesuvium portulacastrum* L.: coastal herb in mangrove; *beremi laut*, *geylang*. See special notes.

Amarantaceae

- Achyranthes aspera* L.: (9); coastal herb.

Amaryllidaceae

- Crinum asiaticum* L.: (9); in mangrove. See Corner, *Life of Plants* pl. 36a.
Pancratium maritimum L.: (9); coastal; *bakong*.

Anacardiaceae

- Buchanania lucida* Bl.: 23898 (7), 28460 (9), 36856 (7); *ketah udang*.
B. sessilifolia Bl.: 28981 (3), 29410 (5), 32428 (6); in swamp-forest and *kapur*-forest; *ketah udang*.
Camptosperma auriculata Hook. f.: *terentang*, *teruntang*.
C. squamata Ridl. in swamp-forest: *teruntang jantan*; (*C. minus* in *Wayside Trees of Malaya*).
Gluta malayana (Corner) Ding Hou: s.n. 9.6.34 (as *rengas* A), 7.2.35 (as *rengas* 1 and 2), 28.6.36 (3); in swamp-forest.
G. tavoyana Wall.: 37063 (10).
G. velutina Bl.: 24631 (7), 31448 (7); small tree -7 m, common along riverside; *rengas*, *r. ayer*. See special notes. Plates 4, 6.
G. wallichii (Hook. f.) Ding Hou: s.n. 3.2.35 (2) (as *rengas* 2, det. *Melanochyla nitida*, Plate 22); in swamp-forest. See *Melanorrhoea wallichii*.

- Mangifera foetida* Lour.: 34909 (4); tree -33 m, in hillock-forest; *machang utan*. See special notes. Plate 32.
- M. griffithii* Hook. f.: 34756 (7), 34756A (7), 34948 (1); in swamp-forest; *lekub*. See special notes. (*M. microphylla* in Wayside Trees of Malaya).
- M. lagenifera* Griff.: 34701, 34705 (7).
- M. quadrifida* Jack: 32203 (2), 32436 (7), 34946 (1), 34947 (1), 34970; tree -33 m, on *Tristania*-banks and in swamp-forest; *kolah*. See special notes. (*M. longipetiolata* in Wayside Trees of Malaya).
- M.* cf. *quadrifida*: s.n. 8.2.35 (5), 5.5.35 (4); *repat*.
- Mangifera* sp.: s.n. 31.12.34 (5); in *kapur*-forest.
- Melanochyla auriculata* Hook. f.: frequent in swamp-forest; *rengas*. See special notes. Plate 39.
- M.* aff. *auriculata*: 29364 (4).
- M. bracteata* King: 21340 (2), 32445 (7); in swamp-forest. Plate 21.
- M. densiflora* King: 31468 (3); in swamp-forest.
- Melanochyla* sp.: s.n. 6.8.39 (10). See special notes.
- Melanochyla* sp.: s.n. 3.10.34 (5), 7.10.34 (5).
- Melanorrhoea pubescens* Ridley s.n. (5); tree with scaly bark imbricating downwards, deciduous (Oct. 1936, April-May 1940); in dryer parts of the swamp-forest and in hillock-forest; *kerbau jalang*. (*Melanorrhoea* sp. of Wayside Trees Malaya).
- M. wallichii* Hook. f.; common in swamp-forest; *rengas*. See special notes. Plates 33-35.
- M. woodsiana* Scort.: 32187 (2), (4), (10); tree of hillock-forest; *rengas*. See special notes.
- Melanorrhoea* sp.: s.n. 5.2.35 (2); *rengas ayam*.
- Parishia* ? *insignis*: s.n. 16.6.34 (9, as Meliaceae A); in swamp-forest, very strongly buttressed; *bengong*.
- P.* ? *pubescens*: s.n. (7); on *Tristania*-bank; *bunot*.
- Pentaspadon motleyi* Hook. f.: s.n. 28.8.32 (7, as *Microstemon curtisii*); tree -25 m, without buttresses; bark reddish grey, flaky; frequent in swamp-forest.
- P. officinalis* Homes: 36844 (7), 36963 (7), s.n. 21.5.34 (4); large buttressed tree in swamp-forest, often by streams. See special notes.
- Semecarpus velutina* King: 32399 (2).
- Swintonia penangiana* King: 29365 (4), s.n. 6.8.39 (10); in *kapur*-forest. See special notes.

Annonaceae

- Alphonsea elliptica* Ridl.: 32312 (2), s.n. 10.6.34 (9, S. Tuenseh); tree -25 m, in hillock-forest and in sandy *Eugenia grandis* forest; *segun*.
- A. johorensis* J. Sinclair: 29934 (3), 29375 (4), 30864 (2), 32139 (2); tree -20 m; bark dark grey, finely rugulose and fissured; leaves with rank smell when crushed; in dryer part of swamp, in hillock- and in *kapur*-forest; *segun*. Apparently endemic to this region.
- Anaxagorea javanica* Bl. var. *javanica*: 29469 (4).
- A. javanica* var. *dipetala* Corner: 28972 (3), 29464 (4), 31932 (4, 5); shrub or small tree -5 m, flowering at 2 m; frequent to abundant in the dryer part of the swamp-forest; *dedahruang*. Apparently endemic to south Johore.

- Artabotrys suaveolens* Bl.: 31969 (2), 32497 (2); climber in swamp-forest.
- A. venustus* King: s.n. 24.6.35 (4); climber in swamp-forest, with rose-red fruits.
- A. wrayi* King: 32301 (2); climber in swamp-forest.
- Cyathocalyx pahangensis* (Henders.) J. Sinclair: 29014 (5), 29198 (4), 29432 (5), 29982 (7), 32080 (2), 36855 (7); tree -8 m; bark pale greyish, slightly lenticellate; inner bark yellowish, sweetly aromatic; flowers very fragrant; frequent in dryer parts of the swamp-forest and in *kapur*-forest; *bunga antoi*.
- C. ridleyi* (King) J. Sinclair: 21317 (2); common tree in dryer parts of the swamp-forest and in hillock-forest; *antoi*. Plate 10.
- Cyathostemma viridiflorum* Griff.: 29460 (4); climber in swamp-forest; cauliflorous almost from the ground.
- Desmos dasymaschala* (Bl.) Saff.: 28184 (4), 28499 (9), 28518 (9); small spreading tree -8 m, with flopping branches, not climbing, often gregarious or tufted; leaves generally with very glaucous undersides (not in 28499); common in dryer parts of the swamp-forest, by streams, and in *Eugenia grandis* forest; *lidah katak*.
- D. dasymaschala* var. *wallichii* (Hook. f.) Ridley; 28682 (4); as var. *dasymaschala*.
- D. dumosa* Saff.: 32145 (2); in dryer parts of the swamp-forest.
- Enicosanthum praestigiosum* J. Sinclair: 28449 (4, 5), 32017 (2), 32237 (2), 32765 (2), 36393 (2); tree in dryer parts of the swamp-forest and in *kapur*-forest. Apparently endemic in this region.
- Fissistigma fulgens* (Hook. f. et Th.) Merr.: s.n. 21.5.34 (7).
- F. kingii* (Boerl.) Burkill; 32197 (2), Sinclair 10674 (2); in dryer parts of the swamp-forest.
- F. lanuginosum* (Hook. f. et Th.) Merr.: 32199 (7); in dryer parts of the swamp-forest.
- F. latifolium* (Dunal) Merr.: s.n. 15.5.34 (4); streamside.
- F. manubriatum* (Hook. f. et Th.) Merr.: 28500 (9, S. Rhu Reba), 28646 (8, Kg Ladang); common in mangrove and in *Eugenia grandis* forest.
- Goniothalamus macrophyllus* (Bl.) Hook. f. et Th.: 28490 (9), 28554 (9), 28720 (1), (4), s.n. 10.10.36 (2); shrub or small tree -4 m; common in dryer parts of the swamp-forest.
- G. malayanus* Hook. f. et Th.: 28604 (9), 28739 (3), 29307 (1), 32156 (2), s.n. 27.3.32 (7), 1.4.34 (8); common in dryer parts of the swamp-forest and in *Eugenia grandis* forest; *jelunut*, *kenanga utan*. See special notes. Plate 21.
- G. ridleyi* King: 30869 (6), 32345 (2); tree -13 m; in swamp-forest.
- G. tapis* Miq.: s.n. 11.5.35 (4), 15.4.36 (1); treelet -4 m; in dryer parts of the swamp-forest and in *kapur*-forest; *jelunut*.
- Marsypopetalum pallidum* (Bl.) Kurz: 30729 (6), 32469 (2), 40350 (3, leg. Sinclair); treelet -3 m; common in swamp-forest.
- Meiogyne virgata* (Bl.) Miq.: s.n. 7.10.37 (2); treelet -3 m, by stream.
- Mezzettia leptopoda* (Hook. f. et Th.) Oliver: 29417 (5), 32073 (2), 32986 (7), s.n. 12.6.34 (9); tree -40 m, 75 cm thick at 2 m, often fluted at the base, not buttressed; frequent in swamp-forest and in *Eugenia grandis* forest.
- Mitrella kentii* (Bl.) Miq.: 32005 (2), 36820 (7), 36893 (7); big climber, the old branches becoming striate with tumid elongate brown lenticels more or less in longitudinal rows; in swamp-forest.
- Mitrephora maingayi* Hook. f. et Th.: Kostermans s.n. Aug. 1938; tree -15 m, in swamp-forest.

- Monocarpia marginalis* (Scheff.) J. Sinclair: 32320 (2); tree -25 m, frequent in swamp-forest.
- Oncodistigma monosperma* (Hook. f. et Th.) J. Sinclair: 32133 (2), 32160 (2); tree -10 m, in hillock-forest.
- Orophaea enterocarpa* Maingay: 32058 (2); tree -5 m, in swamp-forest.
- Oxymitra affinis* Hook. f. et Th.: 32494 (2); shrub becoming a climber; frequent in swamp-forest.
- O. filipes* Hook. f. et Th.: 29435 (5), 30692 (6), 31962 (2), s.n. 27.10.36 (2), 13.4.35 (7); treelet -5 m, becoming a small climber -10 m; in swamp-forest.
- O. glauca* Hook. f. et Th.: 32044 (2); in dryer parts of the swamp-forest.
- O. latifolia* Hook. f. et Th.: 29434 (5), s.n. 14.4.35 (2); climber in swamp-forest.
- Phaeanthus ophthalmicus* (Roxb.) J. Sinclair: s.n. 16.6.34 (9, S. Semandan); common treelet -3 m in sandy *Eugenia grandis* forest.
- Polyalthia angustissima* Ridley: s.n. 16.6.34 (9, S. Semandan); tree -20 m, trunk 20 cm thick; bark fuscous, rough with a thin blackish superficial layer; frequent in sandy coastal forest.
- P. brunneifolia* J. Sinclair: s.n. 10.2.35 (4), 13.5.35 (5), Sinclair 10160 (2); treelet -4 m, becoming cauliflorous; in swamp- and *kapur*-forest.
- P. bullata* King: s.n. 30.9.36 (7); treelet -3.5 m, occasional in the swamp-forest.
- P. cauliflora* Hook. f. var. *beccarii* (King) J. Sinclair: 29026 (5), 32069 (2), 36941 (10), 37069 (10); small tree, bark with transversely elongate tumid lenticels; scattered in hillock-forest. See special notes.
- P. cauliflora* var. *desmantha* (Hook. f. et Th.) J. Sinclair: 25978 (7), 28503 (9), 28600, 28601 (8), 28684 (4), 32101 (2), 32125 (2), 34739 (7), Sinclair 10597 (S. Dohol); tree -10 m; bark fuscous grey, with transversely elongate lenticels; crushed leaves with sour resinous smell; frequent in dryer parts of the swamp-forest and in *Eugenia grandis* forest.
- P. glauca* (Hook. f.) Boerl.: 29274 (7), s.n. 14.4.35 (2); tree -20 m; bark pale grey, smooth; fruits pinkish purple; frequent in swamp-forest. See special notes.
- P. hookeriana* King: 36859 (7), s.n. 7.6.37 (5); small tree -12 m; bark dark grey; in swamp-forest.
- P. hypoleuca* Hook. f. et Th.: 32189 (2); tree -20 m; in hillock-forest. See special notes. Plate 37.
- P. lateriflora* (Bl.) King: 32033 (2), 32169 (2), s.n. 28.8.32 (3); tree -20 m; common in swamp-forest.
- P. macropoda* King: 32067 (2); in swamp-forest, also on the ridge of G. Panti.
- P. sclerophylla* Hook. f. et Th.: 23894 (7), 25862 (7), 32799 (5); riverside tree; *mempisang*. See special notes. Plate 11.
- P. sumatrana* (Miq.) King: 28070 (8), 29330 (4), 36979 (7), s.n. 8.2.35 (5); tree -20 m; bark dull greyish, pallid, pustulate with tiny lenticels; fruits red-striped; frequent in swamp-, hillock-, and *kapur*-forest.
- Popowia pisocarpa* (Bl.) Endl.: 32446 (2); tree -8 m; frequent in swamp-forest.
- Pseuduvaria galeata* J. Sinclair: 29022 (5), 29194 (4), 29937 (3); small tree -8 m; bark fuscous grey with a thin hard black outer layer; frequent in dryer parts of the swamp-forest and in *kapur*-forest; *segun*. ? endemic in this region.
- P. macrophylla* (Oliver) Merr.: 21316 (1), 29438 (5), s.n. 5.1.36 (2), 11.10.36 (2); treelet -4 m; twigs blackish, stems whippy and used as fishing rods; in swamp-forest; *segun*.

- Trivalvaria nervosa* (Hook. f. et Th.) J. Sinclair: 29032 (5), 37070 (10), s.n. 3.8.39 (10); small bushy tree -13 m; bark dark grey; frequent in hillock-forest; *segun*.
- Uvaria cordata* (Dunal) Alst.: 31971 (2), s.n. 1.9.35, (1), 8.1.38 (7); low climber in swamp-forest.
- U. leptopoda* (King) J. Sinclair: 28443 (9, 7), 28580 (9), Kostermans s.n. Aug. 1938 (7); common climber in swamp-forest.
- U. pauciovulata* Hook. f. et Th.: 32128 (2); large climber in hillock-forest.
- Xylopiia caudata* Hook. f.: 28729 (2), 29413 (5), 36881 (7), s.n. 13.6.34 (9); graceful tree -20 m; frequent to very abundant in swamp-, hillock-, and *Eugenia grandis* forest, saplings common; *tempunai*. See special notes.
- X. elliptica* Maingay: 32403 (2); tree -17 m, in hillock-forest.
- X. ferruginea* Hook. f. et Th.: 31985 (2); tree -20 m, always stilted; bark ferruginous; scattered in swamp-forest, frequent in hillock-forest.
- X. ferruginea* var. *oxyantha* (Hook. f. et Th.) J. Sinclair; 36853 (7).
- X. fusca* Maingay: 36868 (7); tree -30 m, with stilts and loop-roots; frequent in swamp-forest; *jangkang*. See special notes. Plates 24, 35, 36; Figure 7.
- X. malayana* Hook. f. et Th.: 32403 (2); tree -27 m; scattered in dryer parts of the swamp-forest. See special notes.
- X. subdehiscens* (King) J. Sinclair: s.n. 23.6.34 (8); shrub -2 m; fruits with blood-red interior and grey-blue seeds; in swamp-forest. (I took this to be sapling *X. malayana*).
- Xylopiia* sp. ?: s.n. 13.4.35 (7); tree -20 m; in swamp-forest. See special notes.

Apocynaceae

- Alstonia angustifolia* DC: 21307 (1), 25855 (7), 31452 (7), 36897 (7); tree -23 m, without latex in the trunk; locally abundant in swamp-forest; *inggi burong*.
- A. angustiloba* Miq.: in swamp-forest.
- A. spathulata* Bl.: tree -30 m or more, buttressed, with knee-roots as in *Bruguiera*; frequent by streams in the swamp-forest; *pulai*.
- Anodendron candolleianum* Wight: lofty climber with rather slender stem; common in the swamp-forest.
- Cerbera manghas* L.: tree -20 m, common on rocky and sandy coasts; *buta-butua*, *pong-pong*. See special notes.
- C. odollan* Gaertn.: tree -20 m, common in *mempisang*- and *nipa-belts* and on *Tristania*-banks from K. Dohol to the estuary of the Sedili Besar, most abundant at the back of the mangrove; *buta-butua*.
- Chilocarpus cantleyi* King: 32060 (3).
- C. costatus* Miq.: 29950 (2); low climber in swamp-forest.
- C. decipiens* Hook. f.: 30726 (3), 31930 (5), 32093 (2).
- C. obtusifolius* Merr.: Kadim and Nur 501934 (Kuala Sedili).
- Dyera costulata* (Miq.) Hook. f.: (2), (3); scattered in dryer parts of the swamp-forest, frequent in hillock-forest; *jelutong*.
- Epigynum ridleyi* King et Gamble: 32141 (2); slender climber, ? rare.
- Kopsia singaporensis* Ridley: 21339 (2), 25999 (7), 28680 (4), 28730 (2), 28731 (2), 31959 (2), 32039 (2), 37067 (10); shrub or small tree -7 m, common in swamp-forest; *medang*. See special notes.
- Melodinus orientalis* Bl.: 31958 (2); large climber.

- Ochrosia oppositifolia* (Lamk) K. Schum.: 28611 (8, 9); frequent tree in coastal forest.
- Parameria polyneura* Hook. f.: 28967 (3); fairly large climber with pink flowers, in swamp-forest.
- Tabernaemontana corymbosa* Roxb.: 32333 (2); frequent small tree in swamp-forest.
- T. corymbosa* var. *kelsalli* King et Gamble: 32276 (5). See special notes.
- T. ? cylindrica* King et Gamble: (4); shrub -1.7 m, in hillock-forest.
- T. ? malaccensis* Hook. f.: (4); shrub -1 m.
- T. ? pauciflora* Ridley: 32468 (2).
- T. sphaerocarpa* Bl.: 30696 (6), 34741 (7).
- Urceola brachysepala* Hook. f.: 21310 (1), 30894 (1), 34744 (1); large climber in swamp-forest.
- Willughbeia coriacea* Wall.: 32000 (2); large climber, common in the swamp-forest.

Apostasiaceae

- Apostasia nuda* R. Br.: (2, 3).
- Nieuwiedia griffithii* Rchb. f.: 30721 (1), 32463 (2).

Aquifoliaceae

- Ilex cymosa* Bl.: tree -23 m; common on *Tristania*-banks and in *Eugenia grandis* forest; *mensirau*. See special notes.
- I. maingayi* Hook. f.: 30861 (2).
- I. malaccensis* Loessn.: 29992 (1).

Araceae

- Aglaodorum griffithii* Schott: common on mud under *nipa*.
- Aglaonema nebulosum* N.E. Br.: 32462 (2); frequent in swamp-forest.
- A. nitidum* (Jack) Kunth: 36967 (2); common in the swamp-forest.
- A. simplex* Bl.: 36947 (10), 37088 (10), (3); (these collections det. *Schismatoglottis brevicuspis* Hook. f.).
- Alocasia denudata* Engl.: common in the swamp-forest and in coastal forest; *kemuyang*.
- Amorphophallus bufo* Ridley: 30738 (6), (9); frequent in coastal forest with *Tacca leontopetaloides*.
- Anadendrum microstachyum* (Miq.) Bakh. f.: (7); frequent small climber in swamp-forest.
- A. ? latifolium*: (3).
- Cryptocoryne cordata* Griff.: 28633 (8), 32111 (2); common in mud along the river-side and by streams. See special notes.
- C. griffithii* Schott: (3), (7); common in shallow stream-beds of the swamp-forest; spathe bright yellow, the pallid white tube with faint pink stripes.
- Cryptocoryne* sp.: 32349 (2).
- Epiprennopsis media* (Zoll. et Mor.) Engl.: ? this record.

- Homalomena griffithii* (Schott) Hook. f. forma *kingiana* Furtado: 32056 (2).
H. kiahii Furtado: 32358 (2); forma *maculata* Furtado, 32146 (2).
H. pendula (Bl.) Bakh. f.: 36813 (7); (det. *H. rubra* Hassk.).
H. rostrata Griff.: 28612 (8), 36965 (7), (9); common in swamp and coastal forest.
H. sagittifolia Jungh. var. *angustifolia* Furtado: 29360 (3), (9).
Homalomena sp.: 30691 (6).
Piptospathe ridleyi N.E. Br.: 36932, 36933 (10), s.n. 12.4.36 (6); common small aroid on rocks by *Saraca*-streams.
Podolasia stipitata N.E. Br.: 29443 (1), 36966 (7), (8); thorny aroid with large hastate leaves, purple-brown spathes, cream-white spadix, red berries; in swamp-forest. Plate 40.
Pothos macrocephalus Scott.: 32104 (2).
P. scandens L.: 29247 (2), 32284 (2); common climber in swamp-forest.
Raphidophora beccarii Engl.: (3), (4).
R. minor Hook. f.: 24628 (7); commonly climbing on *rassau* (*Pandanus helicopus*); *pokok gegli*.
R. sylvestris (Bl.) Engl. forma *crassifolia*: 29318 (5), (4); climber in *kapur-forest*.
Schismatoglottis wallichii Hook. f. var. *oblongata*: 29987 (2).

Araliaceae

- Arthrophyllum ovalifolium* Miq.: common in secondary forest of swamp and dry land.
Arthrophyllum sp.: s.n. 24.6.35 (4); treelet -2 m, in swamp-forest.
Schefflera lanceolata Ridley: (7); common epiphyte of *Tristania*-banks.
S. subulata (Seem.) Vig.: common epiphyte of *Tristania*-banks and *mempisang*-belt.
S. tomentosa (Hassk.) Vig.: common epiphyte of *Tristania*-banks and swamp-forest; (*S. farinosa* (Bl.) Merr.).
S. venulosa (Seem.) Harms: 28556 (8); epiphyte in mangrove and *nibong*-swamps; *kuku bujang*.

Asclepiadaceae

- Asclepias curassavica* L.: (9), coastal weed; *bunga ekor mera*.
Dischidia R. Br.: creeping and hanging epiphytes on trees, mostly widely occurring.
D. benghalensis Colebr.
D. coccinea Griff.
D. collyris Wall.
D. aff. complexa Griff.: R.E. Holtum s.n. 10.2.48 (2); as at Jurong, Singapore. See special notes.
D. hirsuta (Bl.) Dcne.
D. nummularia R. Br. (*D. gaudichaudii*).
D. rafflesiana Wall.: very common in coastal forest.
Dischidia sp.: s.n. 11.4.36 (2); epiphyte in swamp-forest; corolla pale green with dark longitudinal stripes.
Finlaysonia obovata Wall.: 28647 (8); common creeper and scrambler over mud in mangrove: *buah pelir kambing* (? in mistake for *Sarcolobus*).

Hoya R. Br.: epiphytic climbers.

H. coronaria Bl.: common in coastal and mangrove forest.

H. diversifolia Bl.

H. ? diversifolia: s.n. 2.2.36 (6). See special notes.

H. lacunosa Bl.

H. latifolia G. Don.

H. parasitica Wall.

H. ? ridleyi King et Gamble: s.n. June 1934 (9). See special notes.

Hoya sp.: s.n. 27.7.39 (7); on riverside trees. See special notes.

Sarcolobus globosus Wall.: 23824 (7), (8), (9); frequent slender climber in fresh-water and brackish tidal reaches; *pelir kambing*.

Toxocarpus glabrescens Henders.: (7); climber.

Tylophora asthmatica W. et A.: 28528 (9); climber in secondary forest behind coastal *Casuarina*.

Bignoniaceae

Deplanchea bancana Scheff.: 29412 (5); in swampy ground by stream leading from kapur-forest.

Radermachera lobbii Miq.: 32385 (2): common locally.

Bombacaceae

Coelostegia griffithii Benth.: canopy tree -45 m, steeply and strongly buttressed; locally frequent in swamp-forest, readily identified from the long persistent fallen fruits; *punggai*. See special notes.

Durio griffithii (Mast.) Bakh.: 29004 (5); streamside in hillock-forest.

D. ? graveolens Becc.: s.n. 7.2.35 (3), (5); sterile specimens from hillock-forest, det. Kostermans; tree -35 m, buttressed -2 m high; bark fuscous rufous with lenticels 3-5 mm wide.

D. singaporensis Ridley: 29350 (6), 29572 (2), 36974 (7), s.n. 11.5.35 (5), (10); tree -25 m, not or scarcely buttressed; frequent in swamp-forest; *durian daun*. See special notes.

Kostermansia malayana Soegeng: 34673 (1), 36998 (7), 37100, 37111 (7), s.n. 11.5.35 (5), (2); big canopy tree, very strongly buttressed; bark fuscous rufous, fissured-flaky; leaves pale brownish beneath; frequent in swamp- and hillside-forest, in places locally dominant; *krepal*, *krepau*. See special notes. Plates 8, 36.

Neesia malayana Bakh.: tree -33 m, scattered in the swamp-forest, locally frequent, and in *Eugenia grandis* forest, easily recognised from the fallen fruits with irritant hairs; *apa apa*, *ha ha*. See special notes.

Boraginaceae

Ehretia sp.: 28713 (1).

Heliotropium indicum L.: 28529 (9); herb scattered in the grass-sward under *Casuarina*; *selaseh pasir*.

Ptelaeocarpa malaccensis Oliver: 36803 (7), 36916 (7), 36973 (7); slender climber in swamp-forest.

Burseraeae

- Canarium apertum* H. J. Lam: 28437 (7); tree, scattered in swamp-forest. See special notes.
- C. littorale* Bl.: 28501 (9), 28555 (9), 29011 (5), 29028 (5), 29327 (4), 36827 (7), 37071 (10), s.n. 13.5.34 (7), 15.4.36 (1); tree -20 m, frequent in swamp- and *Eugenia grandis* forest; kedongdong.
- C. patentinervium* Miq.: 32140 (2), 36906 (7); tree -17 m, scarce in swamp-forest.
- C. pilosum* Benn.: ? in the Sedili-region, frequent in the swamp-forest of Singapore with leaflets withering red. See special notes.
- Dacryodes laxa* (Benn.) H. J. Lam: s.n. 16.7.39 (7); in swamp-forest below Mawai.
- D. macrocarpa* H. J. Lam: 31949 (5), 34910 (5); tree -35 m, scarce in swamp-forest. See special notes.
- D. rostrata* (Bl.) H. J. Lam: 36858 (7), 36867 (7), 36970 (7); tree -27 m, in swamp-forest.
- Santiria apiculata* (Benn.) H. J. Lam: 29029 (5), 29031 (5), 29440 (5); generally a small tree frequent in swamp- and hillock-forest. See special notes.
- S. conferta* Benn.: 28708 (1), 32133 (2), 34703 (7); tree -20 m, in dryer parts of the swamp-forest. See special notes.
- S. laevigata* Bl.: 32398 (2), 36798 (7), 36804 (7), 36864 (7), 36895 (7), 36960 (7), s.n. 13.4.36 (2), 15.4.36 (2); tree -40 m, frequent in swamp-forest and on *Tristania*-banks. See special notes.
- S. rubiginosa* Bl.: 25993 (3), 30983 (2), 32307 (2), s.n. 7.10.34 (7), 31.12.34 (4), 18.2.37 (2), 3.7.38 (7); tree -40 m, fluted or with low buttresses, with loop-roots; common in swamp-forest, often as a canopy tree with *Cratoxylon arborescens*; *pasah*. See special notes.
- S. tomentosa* Bl.: 32377 (2), 34753 (7), 34913 (5); tree -25 m, frequent in swamp-forest.

Capparidaceae

- Crateva religiosa* Forest. f.; lax straggling tree -10 m, frequent along streamsides in swamp-forest; *kepayang ayer*. (*Crateva membranifolia* of Wayside Trees of Malaya).

Casuarinaceae

- Casuarina equisetifolia* L.: (9), coastal forest; *rhu*. Plates 26, 27.

Celastraceae

- Bhesa paniculata* Arn.: 28697 (1), 28742 (3), 29271 (7), 38697 (1); tree -20 m, with poor irregular crown; common in swamp-forest. (*Kurrimia paniculata* in Wayside Trees of Malaya).
- Euonymus javanicus* Bl.: 28480 (9), 29040 (5), 32322 (2); small tree -13 m, or shrub 1-2 m; abundant in dryer parts of the swamp-forest, in hillock-forest, and in *Eugenia grandis* forest. See special notes.
- Glyptopetalum quadrangulare* Prain: s.n. 9.2.35 (5); shrub -2 m, roots with yellow underbark (as in *Euonymus javanicus*); fruits depressed-globose, rose-pink; in hillock-forest.

- Kokoona ochracea* (Elm.) Merr.: 37249 (4).
- Loeseneriella macrantha* (Korth.) A. C. Smith: 21197 (7), 25951 (7), 28066 (8); frequent riverside climber on *putat*, *rassau*, and *jejawi* from Lubok Pusing to Bt Tiga; follicles flat, 2-3 together; *akar china*.
- Lophopetalum javanicum* (Zoll.) Turcz.: 37022 (1); tree -35 m, riverside, infrequent but striking in fruit.
- L. multinerviun* Ridley: 28092 (7), no fertile collections made; tree -27 m, with plank-like pneumatophores; frequent in freshwater tidal swamp-forest; *buah ulat*, *perupoh*. See special notes. Plates 14, 16, 17.
- Microtropis valida* Ridley: 32087 (2); shrub or small tree.
- Salacia chinensis* L.: s.n. 12.6.34 (9); big climber, stems -15cm thick; in *Eugenia grandis* forest.
- S. korthalsiana* Miq.: 36817 (7); big climber in swamp-forest.
- S. macrophylla* Bl.: 28966 (3), 30690 (6); shrub 1 m high (? becoming a climber), with pink flowers; in swamp-forest.
- S. oblongifolia* Bl.: 36548 (2); big climber in swamp-forest.

Clusiaceae

- Calophyllum* L. See special notes.
- Calophyllum canum* Hook. f.: 36891 (7); tree -30 m, no buttresses.
- C. curtisii* King: 30865 (2), 32324 (2); tree -50 m, with steep blunt buttresses -5 m high; in dryer parts of the swamp-forest, locally frequent.
- C. depressinerviun* Henders, et Wyatt-Smith: s.n. 7.10.34 (7); tree -20 m, without stilts or buttresses; scattered in swamp-forest with *Cratoxylon arborescens*.
- C. floribundum* Hook. f.: 28599 (8), 34748 (7), 34751 (7), 37387 (7); tree -17 m, without stilts and buttresses, flowering in December; frequent in swamp-forest.
- C. gracilimum* Henders, et Wyatt-Smith: 28998 (5); tree -13 m, without stilts and buttresses; fruiting in February; in hillock-forest.
- C. incrassatum* Henders, et Wyatt-Smith: 30977 (1), 34911 (5), s.n. 8.2.35 (5), 10.2.35 (5), 15.2.35 (2); tree -33 m, without stilts and buttresses; fruiting March-April; frequent in swamp-forest and *kapur*-forest.
- C. inophylloide* King var. *singaporense* Henders, et Wyatt-Smith: s.n. 28.8.32 (3), 8.2.35 (5), 14.5.35 (5), 21.5.35 (7); tree -40 m, with congested stilt-roots -2 m high, and loop-roots; wood hard, heavy; not infrequent in swamp-forest.
- C. inophyllum* L.: (9); common coastal tree; *bintangor*, *penaga laut*.
- C. kunstleri* King: 30877 (7), 34719 (7), 34752 (7); tree -20 m, without buttresses, but with loop-roots -45cm high; frequent in swamp-forest.
- C. macrocarpum* Hook. f.: 32240 (2), 37108 (7), s.n. 19.6.34 (7), (8); tree -37 m, without stilts and buttresses; not infrequent in swamp-forest; *bintangor bunut*.
- C. pulcherrimum* Wall.: 31990 (2), s.n. 9.2.35 (4), (7); tree -9 m, without stilts and buttresses; riverside and swamp-forest, frequent.
- C. retusum* Wall.: 29050 (1), (7), Sinclair s.n. (9); tree -40 m, without buttresses or stilts, but with loop-roots; in swamp-forest (formerly common in Singapore). See special notes.
- C. rubiginosum* Henders, et Wyatt-Smith: s.n. 28.10.32 (2); in hillock-forest.
- C. rupicolum* Ridley var. *elatun* Whitmore: 34706 (7), 34747 (7), s.n. 17.6.34 (8); small tree -10 m; riverside in *mempisang*-belt and on *Tristania*-banks, locally frequent. See special notes.

- C. sclerophyllum* Vesque: 34728 (7), s.n. 27.6.32 (7), 37.7.32 (7), 15.3.34 (7), 16.3.34 (9), 21.5.34 (7), 7.10.34 (7), 2.2.35 (1); tree -40 m, stilt-roots up to 4 m high on the trunk, copious; roots with λ -shaped pneumatophores -45 cm high; wood hard, heavy (sinking); abundant in the swamp-forest, often very large; *bintangor batu*, *b. jangkang*, *penaga darat*. Plates 10, 13, 22.
- C. soulattri* Burm.: 36806 (7, S. Gembut), s.n. 10.6.34 (9, S. Tuenseh); tree -30 m, without stilts and buttresses, but in swamp-forest with λ -shaped pneumatophores -30 cm high; riverside and frequent in *Eugenia grandis* forest; *bintangor sempang*.
- C. tenuivenium* Henders. et Wyatt-Smith: 32274 (1); in swamp-forest, ? endemic in this region.
- C. wallichianum* Planch. et Tr.: 30987 (1), s.n. 5.5.35 (4); tree -53 m in *kapur*-forest, -40 m in swamp-forest, without stilts and buttresses; in dryer parts of the swamp-forest and in *kapur*-forest. (*C. rufigemmatum* Henders. et Wyatt-Smith).
- Calophyllum* sp.: s.n. 30.4.34, 16.6.34 (9, S. Semandan); tree -15 m, with congested stilt-roots and loop-roots (30.4.34); frequent in sandy coastal forest and adjacent swamp-forest. (Henderson and Wyatt-Smith 1956, p. 350, n. 44).
- Garcinia* L. See special notes.
- G. atroviridis* Griff.: 36902 (7); in swamp-forest; *asam gelugor*.
- G. bancana* Miq.: 24627 (7), 29262 (2), 29406 (6), 34730 (7), s.n. 10.1.38 (7), 2.2.38 (7); tree-15 (-20) m, with few short stilt-roots or none; common in the *mempisang*-belt, rarely on *Tristania*-banks; *chepurah*, *cheret budak*.
- G. bancana* var. *curtisii* (Ridley) Whitmore: 25854 (7).
- G.* ? *eugeniaefolia* Wall.: s.n. 11.6.34 (9, S. Rhu Reba); tree -13 m, without stilt-roots; frequent in *Eugenia grandis* forest; *tulang dain*. See special notes.
- G. forbesii* King: 29291 (3), 36856 (7), 36964 (7); small tree, often with a few short stilt-roots; in swamp-forest, common; *kandis*.
- G. griffithii* T. And.: 32195 (2); frequent in the dryer parts of the swamp-forest and in hillock-forest; *kandis gajah*.
- G. hombroniana* Pierre: (9); in coastal forest, frequent; *bruas*.
- G. maingayi* Hook. f.: 21331 (2), ? 28667 (5), 31993 (2), ? 36829 (7), s.n. 20.1.35 (4); tree -20 m, stilted or not; frequent in dryer parts of the swamp-forest and in hillock-forest. See special notes. Plate 23.
- G. nervosa* Miq.: 25966 (7); tree -17 m, conspicuous from the long hanging leaves; scattered in *rassau*- and *mempisang*-belts, especially near K. Dohol; *asam garam*.
- G. nigrolineata* Planch.: 28072 (7, 8), 28498 (9), s.n. 13.5.34 (7); frequent in swamp forest and sandy coastal forest; *kandis*. See special notes.
- G. opaca* King var. *dumosa* Whitmore: 28653 (8), s.n. 18.4.32 (3), 7.2.35 (3); straggling treelet -3.5 m high, fruit cherry red; frequent in swamp-forest and in sandy coastal forest. (Gdns' Bull. Singapore 26, 1973, 277).
- G. parvifolia* Miq.: 28564 (8), 28577 (8), 32381 (2), 34716 (7), 34735 (7), 36878 (7); common small tree in swamp-forest.
- G.* ? *penangiana*: 31499 (5), 34940 (5), s.n. 9.9.34 (4), 31.12.34 (5), 8.2.35 (5), 30.5.37 (5); tree -23 m; frequent in dryer parts of the swamp-forest, in hillock-forest, and in *kapur*-forest. See special notes.
- G.* ? *rostrata*: 26198 (5), 28541 (9), 28665 (5), 30971 (1), 32020 (2), 34766 (7), s.n. 31.12.34 (5); tree -17 m, with stilt-roots; frequent in swamp-forest and in sandy coastal forest; *tulang dain*. See special notes. Plates 34, 39: Figure 6.

- G. urophylla* Scort.: 29204 (4); treelet -3 m, in dryer part of the swamp-forest.
Garcinia sp.: s.n. 25.11.34 (7, Tg Tebar). See special notes.
Mesua L. See special notes.
M. ferrea L.: (4, 5); tall tree in *kapur*-forest; *penaga*.
M. ferruginea Pierre: 23900 (7), 25973 (7), 26140 (7), 29272 (2), 31450 (7), 34733 (7), 36802 (7); shrub or small tree -7 m; common in rassau- and mempising-belts. See special notes.
M. kochummeniana Whitmore: 29430 (5), (7), s.n. 31.12.34 (5); tree -36 m; in swamp- and *kapur*-forest. See special notes.
M. lepidota Anderson: 32243 (2), s.n. 20.1.35 (4); tree -20 m, sometimes with stilts and loop-roots; common in swamp-forest. See special notes.
M. rosea (Ridley) Kosterm.: 29273 (7), 32122 (2); small tree -13 m; common in swamp-forest. See special notes.

Combretaceae

- Combretum squamosum* Roxb.: 31968 (2); climber in swamp-forest.
C. sundaicum Miq.: 37062 (10), (6); climber.
C. tetralophum Clarke: 25859 (7); common climber on *jejawi* by riverside.
Lumnitzera littorea (Jack) Voigt; mangrove and coastal creeks, common; *susop*, *teruntum*.
L. racemosa Willd.: as *L. littorea* but a smaller tree; infrequent by coastal creeks. Plates 29, 30.
Quisqualis indica L.: s.n. 12.5.35 (6); not in the swamp-forest.
Terminalia catappa L.: common in coastal forest; *ketapang*, *lingtak*.
T. citrina (Gaertn.) Roxb.: 31471 (2); tree -25 m, in swamp-forest.
T. phellocarpa King: 34743 (7), s.n. 13.5.35 (2), 24.6.35 (1); tree -30 m, not buttressed; crown rather flat-topped, with small leaves; fruits like small tough mangoes; flowering Nov.-Jan., fruiting May-Sept.; common in swamp-forest; *jelawai*, *mempelam babi*, *pelawai*, *telisai*.

Commelinaceae

- Aneilema vaginatum* R. Br.: 28457 (9); tufted herb, common in the sward under *Casuarina*.
Cyanotis vaga (Lour.) J. A. et J. K. Schultes: (9), coastal herb. See special notes.
Forrestia gracilis Ridley: s.n. 13.6.34 (9); common in *Eugenia grandis* forest.
F. marginata Hassk. and/or *F. mollis* Hassk.; (7), in dryer parts of the swamp-forest.

Compositae

- Erechtites hieracifolia* (L.) Raf.: (9), common in coastal scrub and under *Casuarina*.
E. valerianifolia (Wolf) DC.: (9), coastal; *sawi nggang*.
Pluchea indica (L.) Less.: shrub or small tree of mangrove; *beluntas*.

- Spilanthes urens* Jacq.: 28061, 28459 (9); rhizomatous herb of sand-dunes. See special notes. Plate 37.
- Tridax procumbens* L.: (9), coastal herb.
- Wedelia biflora* (L.) DC.: coastal herb; *serunai laut*.

Connaraceae

- Agelaea borneensis* (Hook. f.) Merr.: 29266 (7); climber in swamp-forest.
- A. macrophylla* (Zoll.) Leenh.: s.n. 18.6.34 (8); riverside climber.
- Cnestis palala* (Lour.) Merr. ssp. *diffusa* (Blco) Andreas; 29332 (4); big climber, fruit rose-red, seed black with bright pale yellow aril; in swamp-, hillock-, and kapur-forest.
- Connarus grandis* Jack: 25861 (7), 28488 (9), 32182 (2), s.n. 28.5.36 (7); large climber, fruit scarlet, seed black with orange-yellow aril; frequent in swamp-forest and on *Tristania*-banks from S. Kayu to Bt Tiga, and in coastal forest.
- C. monocarpus* L. ssp. *malayensis* Leenh.: 26138 (7), s.n. 1.5.32 (7); climber, fruit yellow, seed brown with orange-yellow aril; frequent on *Tristania*-banks.
- C. paniculatus* Roxb.: 25853 (7), 25895 (7); climber on *Tristania*-banks.
- C. semidecandrus* Jack: 31453 (7), 34755 (7); climber, scattered on *Tristania*-banks.
- Ellipanthus tomentosus* Kurz var. *gibbosus* (King) Leenh.: 28180 (7), 29199 (4), 32320 (2), 37072 (10); lax treelet -5 m high; frequent in swamp- and hillock-forest.
- Rourea mimosoides* (Vahl) Planch.: 25888 (7), 26059 (7), 32383 (2); climber in swamp-forest, on *Tristania*-banks, and growing over *putat* and *rassau*; *hujan panas*.
- R. minor* (Gaertn.) Leenh.: 25969 (7), 31459 (7), 32196 (2); big climber in swamp-forest and on *Tristania*-banks.
- Roureopsis asplenifolia* Schellenb.: 31978 (2), s.n. 16.5.32 (7); climber in swamp-forest and on *Tristania*-banks.

Convolvulaceae

- Argyreia ridleyi* Prain: 32457 (2), s.n. Feb. 1935 (1); common climber in swamp-forest.
- Erycibe aenea* Prain: 29308 (1), 37362 (5); climber in swamp-forest.
- E. albida* Prain: 28717 (1), (4); shrub -1 m, flowers fragrant, petals white and 2-lobed; in swamp-forest.
- E. maingayi* Clarke: 21332 (2), 29334 (4); climber in swamp- and kapur-forest. (*E. princei* Wall.).
- E. tomentosa* Bl. var. *hirsuta* (Hall. f.) Hoogl.: 32367 (2).
- Evolvulus alsinoides* L.: (9), common coastal herb.
- Merremia tridentata* (L.) Hall. f. ssp. *hastata* (Desr.) Ootstr.: 28656 (9), s.n. 12.6.34 (9); common in clearings behind *Casuarina*-forest.
- Ipomoea gracilis* R. Br.: (9); coastal dunes; *kangkong pasir*. (*I. littoralis* Bl.).
- I. pes-caprae* L.: (9); coastal dunes; *daun tapah kudah*.
- I. stolonifera* (Cyrill) J. F. Gmel.: (9), coastal dunes. (*I. carnosa* R. Br.).

Cornaceae

- Alangium ebenaceum* (Clarke) Harms var. *tutela* (Ridley) Kochumm.: 28980 (3), 36925 (7); tree -20 m, buttressed; scattered in swamp-forest. See special notes.
- Aralidium pinnatifidum* Miq.: 21325 (5), 28629 (8), 29256 (2), 29441 (5); frequent in dryer parts of the swamp-forest, in hillock- and *kapur*-forest, and in *nibong*-forest; *chengpok*.
- Mastixia* ? *trichotoma* Bl.: 28696 (1), 28974 (3), 29299 (3), 32204 (2), 32417 (2); tree -14 m; frequent in swamp-forest. See special notes.

Crassulaceae

- Bryophyllum calycinum* Salisb.; (9), coastal; *setabal*. (*Kalanchoe pinnata*).

Cucurbitaceae

- Alsomitra* sp.: s.n. 15.5.35 (7, S. Dohol); riverside climber, bare of leaves when fruiting; fruits like cartridge-cases, fuscous when ripe, dehiscent apically, not fleshy.
- Hodgsonia capniocarpa* Bl.: 29407 (1); frequent climber in dryer parts of the swamp-forest and in hillock-forest.
- Trichosanthes* ? *tricuspidata* Lour.: 32108 (2).
- T. wallichiana* Wight: very common climber in swamp-forest, especially in small clearings.

Cyperaceae

- Bulbostylis barbata* (Rottb.) Clarke: coastal on open dunes and in dune-hollows.
- Cyperus cyperoides* (L.) O.K.: in coastal scrub. (*Mariscus sieberianus*).
- C. cyperinus* (Retz.) Valck Sur.: in coastal scrub. (*M. cyperinus*).
- C. javanicus* Houtt.: coastal, dune-hollows and muddy creeks. (*M. albescens*).
- C. malaccensis* Lamk: 28526 (9, S. Diman); common sedge -1.7 m high, along the riverside in the tidal region between brackish and fresh water, occasionally in dune-hollows; *selimbu*. Plate 28.
- [*C. pedunculatus* (R. Br.) Kern: not seen at Jason Bay. (*Remirea maritime*)].
- C. polystachyos* Rottb.: coastal dune-hollows, tufted. (*Pycreus polystachyos*).
- C. radians* Nees et Mey.: coastal, on open dunes and in dune-hollows, tufted.
- C. stoloniferus* Retz.: 28079 (9); coastal, on open dunes, also in muddy or sandy places in advancing mangrove, very abundant; rhizomes subterranean with black corms.
- C. tenuiculmis* Boeck: s.n. 15.6.34 (9); forming swards under *Casuarina*, and in wet hollows in *Eugenia grandis* forest.
- Fimbristylis cymosa* R. Br. 28076 (9); coastal dune-hollows, often with seedling *Avicennia*.
- F. dichotoma* (L.) Vahl; coastal dune-hollows and muddy creeks.

- F. ferruginea* (L.) Vahl: 28075, 28077 (9); coastal, in wet brackish hollows and creeks.
- F. pauciflora* R. Br.: coastal dune-hollows, by streams in *Eugenia grandis* forest, and in swamp-forest.
- F. polytrichoides* (Retz.) R. Br.: coastal dune-hollows and muddy creeks.
- F. sericea* R. Br.: coastal, forming flat tussocks on open dunes; scarce at Jason Bay.
- Fuirena umbellata* Rottb.: coastal, in swampy places.
- Gahnia tristis* Nees: in secondary forest and waste land.
- Hypolytrum nemorum* (Vahl) Spreng.: sedge -1 m high, common on flood-banks of the river just above normal high tides.
- H. nemorum* var. *proliferum* (Boeck) Kern: sedge -45 cm high; common in swamp-forest.
- Mapania cuspidata* (Miq.) Uitt.: 29476 (7), 29985 (4); gregarious or solitary sedge; abundant in swamp-forest. See special notes.
- M. cuspidata* var. *petiolata* (Clarke) Uitt.: 30742 (6), 31945 (7), 32514 (2), s.n. 11.4.36 (2).
- M. enodis* (Miq.) Clarke: 29736 (2), 37106 (7); tufted sedge: common in swamp-forest.
- M. kurzii* Clarke: s.n. 9.9.34, 5.5.34; in hillock- and *kapur*-forest, not in the swamp.
- M. lorea* Uitt.: 28594 (8), 30683 (6), 30884 (7), 37074 (10), s.n. 3.8.31 (7), 5.5.35 (4); common in swamp-, hillock-, and *kapur*-forest, generally in dryer places than *Scirpodendron*.
- M. micropandanus* Holtt.: 29362 (4), 29989 (4), 32336 (2); in dryer parts of the swamp-forest, in hillock- and *kapur*-forest, locally common. See special notes.
- M. palustris* (Hassk.) F.-Vill.: 37057 (1); in hillock-forest.
- M. squainata* (Kurz) Clarke: s n. 10.4.36 (6).
- Rhynchospora corymbosa* (L.) Britt.: erect and *Scleria*-like; frequent in the *mempisang*-belt.
- Scirpodendron ghaeri* (Gaertn.) Merr.: forming thickets, common in the tidal parts of the river from the *nipa*-belt to the *mempisang*, also by streams in the swamp-forest (? as relics); *selengsen*.
- Scleria lithosperma* (L.) Sw.: 28157 (9); coastal.
- S. poaeformis* Retz.: 28507 (9); coastal in wet places behind *Casuarina*, like stands of *Iris*; *purun tikus*.
(Other species of *Scleria* came into clearings in the swamp-forest, but I failed to note them).
- Thoracostachyum bancanum* (Miq.) Kurz: common in the swamp-forest, easily mistaken for *Hypolytrum*.
- T. sumatranum* (Miq.) Kurz: (2), (7); frequent in the swamp-forest.

Dichapetalaceae

- Dichapetalum griffithii* (Hook. f.) Engl.: 30734 (6), (4); small shrub becoming a climber; in dryer parts of the swamp-forest.
- Dichapetalum* sp.: 31979 (2); (? identity; not listed by Leenhouts 1956).

Dilleniaceae

- Acrotrema costatum* Jack: 32144 (2); frequent suffrutescent herb, in dryer parts of the swamp-forest.
- Dillenia albiflos* Ridley: 26850 (7), 29300 (1), 29369 (4), 32016 (2), 36850 (7), 37059 (10), s.n. 31.12.34 (4), (5); small tree -17 m, rarely with a few stilt-roots; frequent in dryer parts of the swamp-forest and on hillocks; endemic to south east, or east, Johore.
- D. excelsa* (Jack) Gilg: 29335 (1), s.n. 27.3.32 (7); tree -27 m, without buttresses or stilts; flowering March-May (? not every year); frequent in swamp-forest.
- D. excelsa* var. *tomentella* (Mart.) Corner: 32190 (1); flowering in October: frequent in swamp-forest.
- D. grandifolia* Wall.: 26854 (7), s.n. 10.4.36 (6); tree -40 m, with prominent stilt-roots -3 m high; deciduous; flowers without petals; scattered in swamp-forest; *simpoh jangkang*. (*D. eximia* Miq.).
- D. indica* L.: frequent small tree on the banks of *Saraca*-streams and in the dryer parts of the swamp-forest; *peradun*.
- D. pulchella* (Jack) Gilg: tree -30 m, without buttresses or stilts, evergreen; frequent in the swamp-forest.
- D. reticulata* King: 30678 (6), (7); stilted tree as *D. grandifolia*, apparently impossible to distinguish when sterile; deciduous; flowers with yellow petals; scattered in swamp-forest; *simpoh jangkang*.
- D. suffruticosa* (Griff.) Martelli: 21189 (7), 32984 (7), 33546, 33547 (7); shrub or small tree, evergreen, often with some aerial roots from the branches; common on *Tristania*-banks between Mawai and Bt Tiga; *simpoh ayer*.
- Dillenia* sp.: s.n. 11.6.34 (9); S. Rhu Reba). See special notes.
- Tetracera arborescens* Jack: s.n. 29.11.32 (7); frequent climber on *Tristania*-banks; *mempelas asah*.
- T. fagifolia* Bl.: (8).
- T. indica* (Houtt.) Merr.: 28631 (8); common riverside climber on *Tristania*-banks and in the swamp-forest; *mempelas*.
- T. sarmentosa* (L.) Vahl (9); coastal climber, common; *mempelas gajah*.

Dioscoreaceae

- Dioscorea lamprocaula* Prain et Burkill: s.n. (7).
- D. pyrifolia* Kunth: 28735 (3); climber with ovate-cordate leaf, 5-7 basal veins; in swamp-forest.
- Dioscorea* sp.: 32120 (2), 32499 (2).

Dipterocarpaceae

- Balanocarpus heimii* King: 30863 (2), 30867 (2), 32025 (2), (4), (10); tree -55 m, frequent in hillock-forest and in the dryer parts of the swamp-forest, among the first to be felled; *chengal*, *penah*.
- Dryobalanops aromatica* Gaertn. f.: (4), (5), (10); tree -60 m, 34 m to the first branch, dominant on some hillocks and in the adjacent parts of the swamp-forest, at its southernmost occurrence in Malaya; *kapur*.

- D. oblongifolia* Dyer: 21181 (7), 32194 (2); tree -40 m, sharply buttressed, sometimes with a few arcuate stilt-roots; common in swamp-forest, and on *Tristania*-banks from Lubok Pusing upstream; general flowering in October 1936; *keladan*, *kuras*. Plate 7.
- Dipterocarpus apterus* Foxw.: s.n. 4.2.35 (2); tree -30 m, not buttressed; in dryer parts of the swamp-forest; *kruing gombang*.
- D. cornutus* Dyer: frequent in dryer parts of the swamp-forest.
- D. grandiflorus* Blanco: s.n. 2.4.34 (9), 23.6.34 (8); tree -40 m, without buttresses but the tree of 23.6.34 with large buttresses -2 m high; common in coastal climax-forest; *kuing*.
- D. ? hasseltii* Bl. (? *D. sublamellatus*): s.n. 2.6.34 (9), 2.6.34 (9); tree -35 m, not buttressed; frequent in *Eugenia grandis* forest; *kuing*. See special notes.
- D. lowii* Hook. f.: 37030 (5), s.n. 30.12.34 (5), 14.5.35 (5); tree -47 m, slightly buttressed; frequent canopy-tree with *Dryobalanops oblongifolia* in the swamp-forest, not seen south of mile 13 on the Jcmaluang Road, not along the Sedili rivers; *kruin sol*.
- D. sublamellatus* Foxw.: s.n. 9.2.35 (4); tree -45 m, buttressed -1.7 m; bark greyish fawn, irregularly flaky with oblong angular scales; frequent in dryer parts of the swamp-forest; *kruin sol* (erroneously according to Symington).
- Dipterocarpus* sp.: s.n. 9.9.34 (3); on stream-banks in swamp-forest. See special notes.
- Hopea mengarawan* Miq.: s.n. 27.5.34 (7); scattered in the swamp-forest; *merawan*. See special notes.
- H. ? mengarawan*: 30988 (1); locally frequent and gregarious in dryer parts of the swamp-forest; (det. *H. ? dyeriana*). See special notes.
- H. polyalthioides* Symington: 21342 (5); small tree -5 m; common in *kapur*-forest on the Jemaluang Road; *resak rambai*. See special notes.
- H. resinosa* Symington: 28478 (9), 28514 (9), 32323 (2), 36879 (7), 36911 (7), s.n. 9.9.34 (7), ? 31.12.34 (5), 6.2.35 (3); small tree 8-20 m; scattered or locally gregarious in swamp-forest and *Eugenia grandis* forest; *mengkedi*; endemic in east Pahang and east Johore. See special notes. Plate 15. See also p. 163.
- Shorea acuminata* Dyer: 29372 (4), s.n. 15.5.35 (4); tree -47 m; frequent in *kapur*-forest; *meranti rambai daun*. See special notes.
- S. bracteolata* Dyer: 29261 (2), s.n. 6.2.35 (3), (7); tree -30 m; frequent in swamp-forest, on *Tristania*-banks, and in hillock-forest; *meranti pa'ang*. See special notes.
- S. collina* Ridley: 30857 (2); tree -47 m, scarcely buttressed, with a very deep tap-root (-3.5 m long, 45 cm thick at 1 m from the trunk-base, as seen in an uprooted tree); in dryer parts of the swamp-forest.
- S. exelliptica* Meijer: 30853 (2), 33559 (4), (7); tree -57 m; frequent in the swamp-forest, especially the dryer parts, and in *kapur*-forest; *balau*. See special notes.
- S. foxworthyi* Symington: 33558 (4), (10); tree -47 m; frequent in *kapur*-forest; *balau*. See special notes.
- S. lepidota* (Korth.) Bl.: 21184 (7), s.n. 10.2.35 (4); tree -40 m; frequent in dryer parts of the swamp-forest, and on *Tristania*-banks from Lubok Pusing upstream; *meranti rambai daun*, usually *sengkawang* (but these names, though used locally, erroneous according to Symington; see *S. singkawang*). See special notes.

- S. leprosula* Miq.: s.n. 2.2.35 (1), 7.2.35 (3); tree -50 m; frequent in hillock-forest and the dryer part of the swamp-forest behind *Tristania*-banks, then arching over the river, buttressed up the bank, the rather flat-topped crown laden with epiphytes; *meranti tembaga*. See special notes.
- S. macroptera* Dyer: 30985 (1); tree -40 m, slightly buttressed; in swamp-forest.
- S. materialis* Ridley: 21182 (7); frequent large tree in the swamp-forest, among the first to be felled; *balau*.
- S. ovalis* (Korth.) Bl.: s.n. 2.2.35 (1), 10.5.35 (1); tree -47 m; frequent in the dryer part of the swamp-forest and in hillock-forest; *meranti kepong*. See special notes.
- S. palembanica* Miq.: 29331 (4), 29382 (4), s.n. 4.2.35 (1), 6.2.35 (3); tree -35 m; frequent in swamp-forest, especially the dryer parts, also in *kapur*-forest; *meranti gajah, m. pinang baik*. See special notes.
- S. parvifolia* Dyer: s.n. 2.2.35 (1); tree -35 m; frequent in hillock-forest; *meranti sarang punai*. See special notes.
- S. pauciflora* King: s.n. 2.2.35 (1); tree -20 m; in hillock-forest; *meranti samak*. See special notes.
- S. platycarpa* Heim: tree -35 m; common in the swamp-forest; *meranti paya*. See special notes.
- S. resina-nigra* Foxw.: s.n. 2.2.35 (1), 31.12.34 (3), (7); tree -55 m; occasional in dryer parts of the swamp-forest and in hillock-forest; *damar hitam*. See special notes. Plate 8. See also p. 163.
- S. singkawang* (Miq.) Burck: 21343 (5), 25996 (7), s.n. 31.12.34, (2), 2.2.35 (1), 1.9.35 (3); tree -40 m; frequent in swamp-forest, especially by streamsides, and in hillock-forest, as a dominant by the Sedili Besar above Bagan Limau; *meranti gajah, sengkawang, tengkawang*. See special notes.
- S. sumatrana* (v. Sl.) Symington: 21183 (7); tree -25 m, often with short buttresses; bark smooth; inner bark brownish; common in swamp-forest and on *Tristania*-banks; *damar mata kuching* (this name consistent, not *sengkawang* as given by Symington).
- Vatica maingayi* Dyer: 32418 (2), 37098 (5); in swamp-forest.
- V. stapfiana* (King) v. Sl.: 32063 (2); tree -15 m, in swamp-forest.
- V. stipulata* Ridley: 36928 (10). See p. 163.
- V. wallichii* Dyer: 21185 (7), 21189 (7), ? 28982 (3), 32438 (7), (8); tree -23 m, often short and crooked; common in the *mempisang*-belt with *Mesua ferruginea*, especially between Mawai and Bt Tiga, in swamp-forest, and on *Tristania*-banks; *resak, r. laru* (28928). See special notes. See also p. 163.

Ebenaceae

- Diospyros apiculata* Hiern: 29359 (3); tree- 10 m, in swamp-forest. See special notes.
- D. argentea* Griff.: 21322 (1), 28491 (9), s.n. 10.6.34 (9); treelet 3-5 m; common in dryer parts of the swamp-forest, in hillock-forest, and in *Eugenia grandis* forest; *segun*. See special notes.
- D. confertiflora* (Hiern); Bakh.: 28701 (1), 29254 (2); treelet -4 m; frequent in swamp- hillock-, and *kapur*-forest. See special notes.

- [*D. ferrea* (Willd.) Bakh. on rocky coasts, but ? not in the Sedili region].
- D. ? graciliflora* Hiern: 36936 (10).
- D. lanceifolia* Roxb.: 29373 (3), 34749 (7), (4), ? s.n. 10.6.34 (9); tree -17 m, with stilt-roots; in swamp-forest, ? in *Eugenia grandis* forest; *segun*.
- D. latisejala* Ridley: 37029 (5).
- D. maingayi* (Hiern) Bakh.: 28438 (7), 28666 (5); tree -20 m; frequent in swamp-forest. See special notes.
- D. ? malayana* Bakh.: 32396 (2), 32470 (2).
- D. nutans* King: 21312 (1), 29339 (4), 29442 (5), 32304 (2), 32365 (2); small tree -10 m, slender; bark black; twigs becoming corky-angular; frequent in swamp- and *kapur*-forest.
- D. oblonga* Wall.: 30883 (7).
- D. ? pahangensis* Bakh.: 32303 (2).
- D. styraciformis* King et Gamble: 30989 (1).
- D. sumatrana* Miq. var. *decipiens*: 32149 (2).
- Diospyros* sp.: 36926 (7).
- Diospyros* sp. s.n. 7.10.34; tree -13 m, in dryer part of the swamp-forest, with *Cratoxylon*. See special notes.
- Diospyros* sp.: s.n. 6.8.39 (10); tree -25 m, in *kapur*-forest. See special notes.

Elaeocarpaceae

- Elaeocarpus floribundus* Bl.: 32290 (2); tree -30 m, developing flowering coppice-shoots from the cut stump: this collection referred by Weibel to *E. acmossepalus* Ridley.
- E. griffithii* Masters: 28563 (9), 28602 (8), 32800 (7), 32987 (7); tree -20 m; very abundant on *Tristania*-banks; *jiremong*.
- E. macrocerus* (Turcz.) Merr.: 21192 (7), 25976 (7), 28164 (7), 31449 (7), 34724 (7), s.n. 30.5.37 (7); common tree with stilt-roots and pneumatophores in the *mem-pisang*-belt and swamp-forest; *medang jangkang*. See special notes. Plate 12.
- E. nitidus* Jack: 36834 (7), 36904 (7); in swamp-forest.
- E. paniculatus* Wall.: 24981 (7), 25957 (7), s.n. 1.7.39; common tree of *Tristania*-banks, occasionally with stilt-roots -45 cm high; *pinang punai*. (Treated as a form of *E. griffithii* by Weibel).
- E. petiolatus* Wall.: 36876 (7); common tree on *Tristania*-banks.
- E. polystachyus* Wall.: 32414 (2); in dryer parts of the swamp-forest.
- E. robustus* Roxb.: 25977 (7), 34726 (7), s.n. 10.11.40 (7); tree -13 m, abundant on *Tristania*-banks from Lubok Pusing upstream; *medang*.
- E. salicifolius* King: 36909 (7).
- E. sphaericus* (Gaertn.) K. Schum.: s.n. 10.4.36 (6), 8.1.38 (7), (9); tree -30 m, scattered in the swamp-forest, especially in *Salacca*-swamps.
- E. stipularis* Bl.: 29048 (1), 32024 (2), 36847 (7); in swamp-forest with low flattened and scarcely spreading stilt-roots -80 cm high and resembling *Macaranga puncticulata*; common in swamp- and hillock-forest.

Ericaceae

- Vaccinium acuminatissimum* Miq.: 25998 (7), 32045 (2), 32062 (2); common epiphytic shrub, sometimes rooting to the ground; in swamp-forest.
- V. bracteatum* Thunb.: coastal small tree with *Eugenia grandis* and *Terminalia catappa*. (*V. malaccense* of Wayside Trees of Malaya).

Erythroxylaceae

- Erythroxylon cuneatum* (Miq.) Kurz: 28476 (9); tree -23 m, characteristic of the *Eugenia grandis* forest; *inai inai*.
- Ixonanthes reticulata* Jack: 25898 (7), 28623 (8), s.n. 5.2.35 (2), (7); tree -33 m, buttressed; frequent in the *mempisang*-belt and in the swamp-forest; *inggi burong*. See special notes.

Euphorbiaceae

- Acalypha siamensis* Oliver: (9); coastal shrub; *pokok teh*.
- Agrostistachys gaudichaudii* M.A.: 32070 (2), 32318 (2), s.n. 14.6.34 (9); tree -13 m, often densely gregarious, in swamp-forest and *Eugenia grandis* forest.
- A. sessilifolia* Pax et Hoffm.: 32001 (2); shrub -3 m, seldom branched; common in swamp-forest.
- Alchornea rugosa* (Lour.) M.A.: 30973 (1), 32031 (2): in swamp-forest. (*A. javensis* M.A.).
- Antidesma brachybotrys* Airy Shaw: 28984 (3), 29433 (5); shrub or treelet -5 m, in swamp- and hillock-forest; (det. *A. stipulare* Bl.).
- A. cuspidatum* M.A.: 29424 (5), 36849 (7); tree -10 m; in the dryer parts of the swamp-forest.
- A. leucopodium* Miq.: 29347 (6), also CWL 288 (Kuala Sedili); a small riverside tree.
- A. neurocarpum* Miq.: 21314 (1), 28071 (8), 32361 (2), (7); small tree -6 m; common in swamp-forest. (*A. alatum* of Wayside Trees of Malaya).
- A. pachystachys* Hook. f. var. *palustre* Airy Shaw: 29043 (5), 29232 (5), 32155 (2); shrub or treelet -4 m; frequent in swamp-forest; (det. *A. tomentosum*).
- A. pahangense* Airy Shaw: 37080 (10); in *kapur*-forest.
- Antidesma* sp.: 30689 (6), 30872 (6).
- Aporosa falcifera* Hook. f.: 28694 (1); treelet -5 m, in swamp-forest.
- A. frutescens* Bl.: 28065 (8), ? 28723 (2), 31456 (7); tree -7 m, frequent in swamp-forest.
- A. lunata* (Miq.) Kurz: 21313 (1), s.n. 11.5.35 (4); tree -7 m; frequent in swamp- and *kapur*-forest. See special notes.
- A. nigricans* Hook. f.: s.n. 9.2.35 (5); tree -10 m; in hillock-forest. See special notes.
- A. prainiana* King: 29469 (1); tree -5 m; in the dryer part of the swamp-forest.
- A. pseudoficifolia* Pax: 29425 (5) 31999 (2); treelet -5 m, in swamp-forest. See special notes.
- A. symplocoides* (Hook. f.) Gage: 32351 (2), 37024 (5), s.n. 9.9.37 (7).

- Aporosa* spp.: 36843 (7) and 36848 (7).
- Austrobuxus nitidus* Miq.: 21348 (1); tree -10 m, in the dryer part of the swamp-forest. (*Longetia malayana* in Wayside Trees of Malaya).
- Baccaurea bracteata* M.A.: 28575 (8), 34745 (7), 37033 (5); tree -8 m, often with arcuate stilt-roots -1.7 m high; scattered in swamp-forest.
- B. brevipes* Hook. f.: 29017 (5), 29461 (4), 37023 (2); tree -6 m, frequent in hillock-forest; *rambai tikus*.
- B. hookeri* Gage: 32997 (7); tree -13 m, in swamp-forest. See special notes.
- B. ? javanica* (Bl.) M.A.: 29456 (7); tree -13 m, in swamp-forest. See special notes.
- B. lanceolata* (Miq.) M.A.: 36976 (7); in swamp-forest. See special notes.
- B. macrophylla* M.A.: 28172 (7), 36861 (7); in swamp-forest.
- B. motleyana* M.A.: s.n. 7.10.34; in swamp-forest with *Cratoxylon arborescens*, wild; *tampoi, tampal*.
- B. parviflora* M.A.: 28997 (5); common in hillock- and *kapur*-forest: *setambun*.
- B. racemosa* (Reinw.) M.A.: 28747 (3), 28750 (3), 34732 (7), 36977 (7), s.n. 15.7.40 (7); tree -13 m; common in the swamp-forest. See special notes.
- B. scortechinii* Hook. f.: 29408 (6); treelet -5 m, ramiflorous; common by *Saraca*-streams; *rambai tikus*. See special notes.
- B. sumatrana* (Miq.) M.A.: 36840 (7); tree -15 m, in swamp-forest. See special notes.
- B. ? velutina* Ridley: 32178 (2).
- Blumeodendron kurzii* (Hook. f.) J. J. Sm.: 28734 (2); small tree -13 m, without stilt-roots; leaves in false whorls of 5 at the ends of long twigs; ramiflorous; frequent in swamp-forest.
- B. tokbrai* (Bl.) Kurz: 31986 (2), 36787 (7), 36819 (7), 36877 (7); large tree, often stilted; frequent in swamp-forest. See special notes. Plate 19.
- Botryophora geniculata* (Miq.) Beumée: 32032 (2); swamp-forest.
- Breynia coronata* Hook. f.: (9); coastal shrub; *hujan panas*.
- B. vitis-idaea* (Burm.) C. E. C. Fischer: (9); coastal climber; *hujan panas*. (*B. rhamnoides* in Wayside Trees of Malaya).
- Bridelia ? cinnamomea* Hook. f.: 28983 (3); tree -17 m, in swamp-forest. See special notes.
- B. pustulata* Bl.: 21306 (1), 31445 (1); spiny treelet -5 m, in swamp-forest. See special notes.
- B. stipularis* (L.) Bl.: (4), (5); in secondary forest.
- Cephalomappa lepidotula* Airy Shaw: 28173 (7), 28951 (3); tree -20 m; locally common in swamp-forest, especially by streams. See special notes.
- Claoxylon indicum* (Reinw.) Hassk.: 28466 (9); shrub or small tree -5 m; frequent with *Guettarda* at the edge of *Eugenia grandis* forest behind *Casuarina*.
- Cleistanthus ? contractus* Airy Shaw: 32078 (2); (det. *C. aff. glaber* Airy Shaw).
- C. hirsutipetalus* Gage: 36828 (7).
- C. marcophyllus* Hook. f.: 29346 (6), 36826 (7); treelet -5 m; very abundant by streams in the forest.
- C. maingayi* Hook. f.: 29034 (5), 29042 (5), 32088 (2), 37031 (5); tree -8 m, frequent in hillock-forest. See special notes.
- C. myrianthus* (Hassk.) Kurz: 37109 (7); small tree, common in swamp-forest; fruiting gregariously in July 1940.
- C. podocarpus* Hook. f.: 29437 (5); treelet in swamp-forest.

- C. praetermissus* Gage: 29371 (4); tree -10 m, in *kapur*-forest.
- C. pseudopodocarpus* Jabl.: 28741 (3); shrub or treelet -5 m; twigs brown hairy; frequent in swamp-forest.
- Croton* ? *erythrostachys* Hook. f.: (5).
- C. heterocarpus* M.A.: 28190 (7), 36812 (7); treelet -6 m; common in tidal creeks behind the mangrove.
- C. laevifolius* B.: 21323 (1), 28695 (1), 29298 (3), 29343 (1), 29385 (4), 34737 (7), 37082 (10); shrub or small tree; very common in swamp-forest, especially by streams. See special notes.
- Dimorphocalyx murinus* Elm.: 29295 (3), 29296 (3), 37247 (5), 37248 (5); tree -13 m, frequent in swamp-forest. See special notes.
- Drypetes curtisii* (Hook. f.) Pax et Hoffm.: 29446 (5); treelet -3 m, in swamp-forest.
- Drypetes* sp.: (5); shrub 2 m.
- Elateriospermum tapos* Bl.: s.n. 5.5.35 (5), (4); tree -47 m, in *kapur*-forest, frequent; *prah*.
- Endospermum diadenum* (Miq.) Airy Shaw: 28670 (5), 29938 (3), (4), (5); in swamp-, hillock-, and *kapur*-forest, frequent; *menbulan*: *E. malaccense* of Wayside Trees of Malaya. See special notes. Plate 15.
- Euphorbia atoto* Forst. f.: (9); coastal herb.
- Excoecaria agallocha* L.: common mangrove tree; *buta buta*, *bebuta*.
- Galearia fulva* (Tul.) Miq.: 28591, 28592 (8); frequent small tree in swamp-forest. See special notes.
- Galearia* sp.: s.n. 10.6.34, 12.6.34, 13-6.34 (9); small tree in *Eugenia grandis* forest at S. Rhu Reba.
- Glochidion glomerulatum* (Miq.) Boerl.: 30895 (1), 32773 (1); common at the edge of the swamp-forest.
- G. leiostylum* Kurz: 28588 (8), 28679 (7), 32754 (2), 34675 (7), 36809 (7); rather common in swamp-forest; *senkam*, *tetimah*.
- G. lutescens* Bl.: 21309 (1); common in hillock-forest; *senkam*. (*G. laevigatum* of Wayside Trees of Malaya).
- G. littorale* Bl.: (9); coastal shrub; *selengsar*.
- G. rubrum* Bl.: 32488 (6); by *Saraca*-streams.
- G. sericeum* (Bl.) Zoll. et Mor.: 29946 (5), 32505 (2); common in dryer parts of the swamp-forest, in hillock-forest, and in secondary forest.
- G. superbum* Baill.: only in secondary forest by roads.
- Macaranga amissa* Airy Shaw: 32774 (2), s.n. 21.5.34 (7), 28.3.37 (7); common tree in swamp-forest, often with a few congested stilt-roots -1.7 m high. (*M. aff. populifolia* in Wayside Trees of Malaya).
- M. baccaureifolia* Airy Shaw: 29287 (3), 36997 (2), 37107 (7), s.n. April 1932 (3); tree -17 m, without stilts, deciduous in March, flowering with male catkins on the bare twigs; young fruits in April; common undergrowth tree in swamp-forest, often gregarious; *keropoh*. See special notes.
- M. gigantea* (Rchb. f. et Zoll.) M.A.: 36899 (7); frequent in openings in the swamp-forest.
- M. griffithiana* M.A.: 28567 (8), s.n. 17.8-32 (7), 30.5.37 (7); tree -25 m, fluted over the lateral roots; common in swamp-forest and re-growth; *kobing*, *mahang*. See special notes.
- M. hosei* King: 32294 (2), s.n. 6.2.37 (2); locally common in swamp-forest.

- M. hypoleuca* (Rchb. f. et Zoll.) M.A.: s.n. 16.1.38 (7); common in swamp-forest, especially in re-growth.
- M. javanica* Hook. f.; in secondary forest; *meseapat*. See special notes.
- M. kingii* Hook. f.: 32275 (2); rather scarce in the swamp-forest.
- M. pruinosa* (Miq.) M.A.: s.n. (7); tree -27 m, in swamp-forest. (*M. maingayi* in Wayside Trees of Malaya).
- M. puncticulata* Gage: tree -20 m, sometimes with stilt-roots; common in swamp-forest; *kobing*, *setudong*. (? *M. caladiifolia*). Plate 15.
- M. quadricornis* Ridley: 28689 (7), 32271 (2), 32388 (2), 32762 (2), 32797, 32780, 32781 (2), s.n. 11.4.37; shrub or tree -8 m, common in swamp-forest; *kobing*. (*M. ? tenuifolia* of Wayside Trees of Malaya). See special notes.
- M. recurvata* Gage: 29449 (5); tree -20 m, common in swamp-forest.
- M. tanarius* (L.) M.A.: 28472 (9); very common in the coastal zone between *Eugenia grandis* forest and *Casuarina*, not in old forest.
- M. trichocarpa* (Rchb. f. et Zoll.) M.A.: 32289 (2), 32510 (2), (7); common straggling climber in re-growth of swamp-forest.
- M. triloba* (Bl.) M.A.: common in openings in the swamp-forest and along the riverside; flowering as a shrub at 2 m; *kobing*.
- Mallotus dispar* (Bl.) M.A.: 29041 (5); shrub -2 m; leaves brownish beneath; fruit pale rusty brown with yellowish spines; scattered in hillock-forest; (det. *Coelodiscus subcuneatus*).
- M. ? korthalsii* M.A.: 31934 (5).
- M. oblongifolius* (Miq.) M.A.: 21327 (5), 29255 (2), 31992 (2), 32757 (2); common shrub or small tree in the dryer parts of the swamp-forest. (*M. porterianus* of Wayside Trees of Malaya).
- M. tiliifolius* (Bl.) M.A.: 28467 (9); common small tree in the coastal zone between *Eugenia grandis* forest and *Casuarina*.
- Mallotus sp.*: 32002 (2).
- Micrococca johorica* Airy Shaw: 36981 (7); treelet -3 m, frequent in the swamp-forest.
- Neoscortechinia forbesii* (Hook. f.) C. T. White: 29250 (7); tree -7 m, in swamp-forest; *beki*. See special notes.
- N. nicobarica* (Hook. f.) Pax et Hoffm.: 32341 (2), s.n. 5.2.35 (2); in swamp-forest. (*N. paniculata* Ridley). Plate 20.
- N. sumatrensis* S. Moore: 29283 (7), 29297 (3); tree -20 m, frequent in swamp-forest. See special notes.
- Omphalea bracteata* (Blco) Merr.: s.n. (1), (4), (5); climber in hillock-forest, rarely in the swamp-forest.
- Ostodes pendula* (Hassk.) A. Meeuse: 28616 (8), 32308 (2); tree -17 m, in hillock-forest. See special notes.
[*Ostodes ?* : s.n. 9.2.35 (5); shrub -2 m, in hillock-forest.]
- Phyllanthus gomphocarpus* Hook. f.: 29203 (4), 29467 (4), 30724 (3); shrub 1-3 m in the dryer parts of the swamp-forest and in *kapur*-forest.
- P. oxyphyllus* Miq.: 29415 (5), 29991 (4), 31935 (5); shrub 1-3 m, or a crooked treelet; in *kapur*-forest. (*P. frondosus* of Wayside Trees of Malaya).
- Phyllanthus sp.*: 32272 (1); climber with short leafy sprays; fruits red; in swamp-forest.
- Pimeleodendron griffithianum* (M.A.) Benth.: s.n. (4), (5); scattered tree in hillock-forest.

- P. macrocarpum* J. J. Sm.: s.n. 10.5.25 (1); large tree, very scattered in the swamp-forest; *prah*. See special notes.
- Ptychopyxis kingii* Ridley: 34710 (7); tree -8 m.
- Sapium baccatum* Roxb.: 36942 (10); in *kapur*-forest.
- S. indicum* Willd.: (7); small tree on freshwater and brackish tidal river-banks; *buah saminyak*. See special notes.
- Sebastiania chamaelea* (L.) M.A.: (9); coastal herb.
- Suregada glomerulata* (Bl.) Baill.: 32028 (2), (9); tree -13 m, generally coastal. See special notes.
- S. multiflora* (Juss.) Baill.: 28650 (8), 29384 (4); shrub -2 m; fruits rose-pink; in swamp-forest and in sandy swamp-forest by the coast, frequent.
- Synostemon bacciformis* (L.) G. L. Webster: 28456 (9); common coastal herb. (*Agyneia bacciformis*).
- Trigonostemon* aff. *borneensis* Merr.: s.n. 14.5.35 (5), 12-4.36 (6); shrub -2 m, unbranched; in swamp-forest; (det. *Ostodes*).
- T. longifolius* Baill.: (5); in *kapur*-forest.
- T. rufescens* Jabl.: 28999 (5), 29196 (4), 29428 (5); shrub or treelet with red sap; scattered in dryer parts of the swamp-forest, in hillock- and *kapur*-forest, from mile 11 northwards on the Jemaluang Road. See special notes.
- T. sumatranus* Pax et Hoffm.: 28713 (4), 30700 (2), 31953 (2), 32453 (2), 37032 (5); tree in swamp-forest. See special notes.
- T. villosus* Hook. f.: 28664 (5), (4); common treelet in *kapur*-forest and the dryer parts of the swamp-forest. See special notes.

Fagaceae

- Castanopsis fulva* Gamble: 37363 (5); tree -20 m, in hillock-forest.
- C. inermis* (Lindl.) B. et H.: 28709 (1), s.n. 12.5.35 (1), (2), (7); tree -27 m, often buttressed -1 m high; frequent in dryer parts of the swamp-forest, locally gregarious; *berangan*.
- C. johorensis* Soepadmo: 36869 (7); tree -10 m, in swamp-forest.
- C. malaccensis* Gamble: s.n. (7); *serta tangga*.
- C. megacarpa* Gamble: (7), (8); tree -30 m, buttressed; occasional in swamp-forest and *Eugenia grandis* forest; *seranta tangga*.
- Lithocarpus bennettii* (Miq.) Rehd.: 34746 (7), s.n. 11.2.35 (1), 15.7.40 (7); in swamp- and hillock-forest, not infrequent; *bereh*. See special notes.
- L. eichleri* (Wenzig) A. Cam.: 21328 (5), 28990 (4); tree -17 m, frequent in dryer parts of the swamp-forest. See special notes.
- L. elegans* (Bl.) Hatus.: 25893 (7); tree -7 m high; in *rassau*- and *mempisang*-belts, and on *Tristania*-banks; *beri*. (*Quercus spicata* in Wayside Trees of Malaya).
- L. encleisacarpus* (Korth.) A. Cam.: 32201 (2); in hillock-forest.
- L. ewyckii* (Korth.) Rehd.: 36885 (2).
- L. hystrix* (Korth.) Rehd.: 21329 (at mile 17, Jemaluang Road., Sedili Bridge), (2); tree -20 m with low stilt-roots; frequent in dryer parts of the swamp-forest. See special notes.

- L. kingianus* (Gamble) A. Cam.: s.n. leg. Ngadiman (7).
- L. kunstleri* (King) A. Cam.: 29035 (2), 32411 (2), (4); tree -13 m, with poor crown; uncommon in swamp-forest. See special notes.
- L. leptogyne* (Korth.) Soepadmo: 28959 (3), 28968 (3), 28986 (3); tree -23 m, with copious stilt-roots; common in swamp-forest along S. Berassau east of the Jemaluang Road, not seen elsewhere. See special notes.
- L. lucidus* (Roxb.) Rehd.: s.n. 10.2.35 (2), 18-2-37 (2); occasional in the dryer parts of the swamp forest.
- L. maingayi* Benth.) Rehd.: 32993: tree -20 m, in hillock-forest at mile 19 on the Jemaluang Road; ? the only collection from lowland forest.
- L. perakensis* Soepadmo: 32348 (2), s.n. 10.1.38 (7); tree -8 m; in dryer parts of the swamp-forest, not common.
- L. sundaicus* (Bl.) Rehd.: 25958 (3), 29457 (4), 29751 (7), s.n. 28.3.32 (7); frequent in the swamp-forest; *beri*.
- L. urceolaris* (Jack) Merr.: 28170, 28737, 28738 (3), 32279 (1); tree -25 m, sharply buttressed and somewhat stilted; frequent in swamp-forest. See special notes. (*Quercus craterophora* of Wayside Trees of Malaya).
- Lithocarpus incertae sedis*: see special notes.

Flacourtiaceae

- Casearia grewiaefolia* Vent. var. *deglabrata* K. et V.: 28519 (9), 28524 (9); tree -23 m, in sandy coastal forest by streams. See special notes.
- C. velutinos*a Ridley: 31938 (4), 32506 (2); shrub 1-2½ m, on stream-banks in swamp forest.
- Flacourtia rukam* Zoll.: 32347 (2).
- Homalium dasyanthum* (Turcz.) Warb.: 29458 (4); tree -13 m, not infrequent in swamp-forest. See special notes.
- H. longifolium* Benth.: 32364 (2), 34727 (7); tree -10 m, in swamp-forest.
- Hydnocarpus castanea* Hook. f. et Th.: 29338 (4), 30974 (1), 32415 (2); tree -20 m, in the dryer part of the swamp-forest and in *kapur*-forest.
- H. curtisii* King: 29036 (5), 29202 (4); small tree -7 m, in swamp-forest. See special notes.
- H. filipes* Selum.: 37105 (7); tree in swamp-forest.
- H. kunstleri* (King) Warb. var. *tomentosa* (King) Sleumer: 36837 (7); tree in swamp-forest.
- H. nana* King: 29206 (5); shrub -2 m, in hillock-forest.
- H. scortechinii* King: 32134 (2), 32364 (2).
- Ryparosa hulletti* King: 32171 (2), 32455 (2), 32756 (2), (6); small tree 6 m, stream-side.
- R. scortechinii* King: 21344 (5), 29007 (4); tree -13 m, common in the dryer parts of the swamp-forest and in hillock-forest. See special notes.
- Scaphocalyx spathacea* Ridley: 32332 (2); treelet -8 m, in swamp-forest.
- Scolopia spinosa* (Roxb.) Warb.: 29279 (7), 36901 (7); tree -13 m, with thorny twigs and sapling-stems; in swamp-forest.

Flagellariaceae

Flagellaria indica L.: in open places on the river-bank from Bt Tiga upstream on the Sedili Besar; *rotan dini*.

Hanguana malayana (Jack) Merr.: abundant in swamp-forest; *bakong ulu, keladi utan*. See special notes.

Gesneriaceae

Aeschynanthus obconica Clarke, *A. parvifolia* R. Br., *A. purpurascens* Hassk., *A. radicans* Jack, *A. wallichii* R. Br.; all these recorded from the Sedili Besar, but without special notes.

Cyrtandra lanceolata Ridley; 30651 (1), (6); among rocks by *Saraca*-streams.

C. pilosa Bl.: 32181 (2), s.n. 10.4.36 (6); shrub -1 m.

C. suffruticosa Ridley: 28961 (3), 29267 (7); epiphyte on low branches, common in the swamp-forest. See special notes.

Cyrtandra spp.: 28162 and 28416; in swamp-forest along the Jemaluang Road.

Cyrtandromoea grandis Ridley: 31937 (4); shrub 1-2 m high, by the road. See special notes.

Didissandra johorica Ridley: s.n. 12.1.36 (3), 28.6.36 (5), 23.4.38 (5); herb -75 cm high, in dryer parts of the swamp-forest and in hillock-forest. See special notes.

Didymocarpus platypus Clarke: common in hillock-forest; *sembong*.

Paraboea densifolia (Ridl.) Henders.: 30654 (6), 32540 (6), 30870 (6); herb -45 cm high, on rocks by *Saraca*-streams. See special notes.

P. pyrhaeflora Ridley: 32360 (2); by streams in hillock-forest.

Paraboea sp.: 32486 (1).

Gonystylaceae

Gonystylus bancanus (Miq.) Kurz: s.n. 27.7.39 (7). See special notes.

G. confusus Airy Shaw: 36830 (7); tree -10 m, in swamp-forest.

G. macrophyllus (Miq.) Airy Shaw: 34722 (7); tree -17 m, in swamp-forest.

Goodeniaceae

Scaevola taccada (Gaertn.) Roxb.: common coastal shrub; *merambong*. (*S. frutescens* in Wayside Trees of Malaya; *S. sericea* of others).

Gramineae

(I have followed the nomenclature of Gilliland 1971)

Centotheca lappacea (L.) Desv.: forest-paths.

Chrysopogon aciculatus (Retz.) Trin.: coastal.

C. orientalis (Desv.) A. Cam.: coastal.

Coelorachis glandulosa (Trin.) Stapf: 28527 (9); tall grass scattered in scrub behind *Casuarina* along the coast.

- Dactyloctenium aegyptiacum* (L.) P. Beauv.: coastal dunes, creeping.
- Digitaria heteranthera* (Hook. f.) Merr.: coastal dunes, with more or less superficial rhizome. (*D. dispar* Henn.).
- D. ? longiflora* (Retz.) Pers.: coastal dunes, with superficial rhizome.
- Eragrostis atrovirens* (Desf.) Trin.: coastal dunes, tufted.
- Heteropogon contortus* (L.) P. Beauv.: coastal.
- Imperata cylindrica* (L.) P. Beauv.: in vast wastes in old pepper and gambir land round the Sedili Kechil, also at Jason Bay; *lalang*.
- Isachne globosa* (Thunb.) O.K.: coastal, in wet hollows.
- Ischaemum muticum* L.: coastal dune-pioneer.
- Leersia hexandra* Sw.: in swampy places near the coast.
- Leptaspis urceolata* (Roxb.) R. Br.: leaves broad, 'seeds' hispid; in swamp-forest and *Eugenia grandis* forest, common; *rumput tai babi*.
- Lepturus repens* (G. Forst.) R. Br.: in mangrove.
- Oplismenus compositus* (L.) P. Beauv.: on forest-paths.
- Oryza minuta* J. S. Presl: occasional in swamp-forest.
- O. ridleyi* Hook. f.: occasional in tufts by pools, with *Barclaya* and *Salacca*, in the forest.
- Panicum repens* L.: 28062 (9); coastal dune-pioneer, with underground rhizome; *rumput dawai*. See special notes.
- Paspalum cartilagineum* J. S. Presl: coastal, forming rank tufts of yellow-green leaves in old dune-swards.
- P. orbiculare* Forst.: coastal, more or less tufted.
- P. vaginatum* Sw.: 28530 (9); coastal in wet dune-hollows, with underground rhizome; *rumput dawai*. See special notes. Plate 28.
- Perotis indica* (L.) O.K.: coastal, creeping in old dune-swards.
- Saccharum arundinaceum* Retz.: tall grass like sugar-cane, in dense tufts along deforested parts of the riverside; *tebrau*.
- Schizostachyum gracile* (Munro) Holtt.: s.n. 28.3.32 (7); bamboo -4 m long, stems 2 cm thick, often sprawling; common on *Tristania*-banks; *buloh*.
- S. zollingeri* Steud.: 30679 (6); bamboo -15 m tall, stem -10 cm thick; by *Saraca*-streams; *buloh*.
- Sphaerocaryum malaccense* (Trin.) Pilger: 28635 (8); riverside in *putat*- and *rassau*-belts, often submerged. See special notes.
- [*Spinifex littoreus* (Burm. f.) Merr.; coastal dune-pioneer, with underground rhizome, building large tussocks; not seen at Jason Bay].
- Sporobolus virginicus* (L.) Kunth: coastal dune-pioneer, with underground rhizome, building small tufts.
- Thuarea involuta* (Forst.) R. Br.: coastal dune-pioneer, with superficial light yellow stems and small light green leaves; fruit-head buried in the sand.
- Zoysia matrella* (L.) Merr.: coastal dune-pioneer, with underground rhizome, building up close swards persistent under *Casuarina*.

Hernandiaceae

- Hernandia nymphaeifolia* (Presl) Kubitzki (9); tree -20 m, common on rocky and sandy coasts without *Casuarina*, and in *Eugenia grandis* forest. (*H. ovigera* in Wayside Trees of Malaya).

Hypericaceae

- Cratoxylon arborescens* (Vahl) Bl.: 32162 (2), 34759 (7); large canopy tree without buttresses; common in the swamp-forest, in places more or less dominant; *geronggang*.
- C. formosum* (Jack) Dyer: tree -33 m, never as big as *C. arborescens*; common in swamp-forest and on *Tristania*-banks; *mampat*.
- C. ligustrinum* (Spach) Bl.: s.n. Aug. 1939 (10), (7); occasional on *Tristania*-banks, at the summit of Bt Tinjau Laut. See special notes.

Hypoxidaceae

- Curculigo latifolia* Dryand.: (2), (3); *lembah*. See special notes.
- C. villosa* (Kurz) Ridley: 32500 (2); common in coastal forest; *lembah*.

Icacinaceae

- Cantleya corniculata* (Becc.) Howard: CF 5826 (7, S. Gembut, 3.7.21); not collected by me in the Sedili region. See special notes.
- Gomphandra quadrifida* (Bl.) Sleum.: 29386 (4), s.n. 9.2.35 (4); shrub or treelet 1-4 m; cymes small, scorpioid, leaf-opposed, with white flowers; frequent in swamp-forest.
- G. quadrifida* var. *ovalifolia* (Ridley) Sleum.: 29322 (4); treelet -3 m, in *kapur*-forest; *buah sa-puteh*.
- Gomphandra* sp.: 31470 (4).
- Gonocaryum gracile* Miq.: 32393 (2), s.n. 24.6.35 (5); treelet -5 m, in swamp-forest.
- Iodes ovalis* Bl.: 28570 (8); small riverside climber; tendrils nodal, extra-axillary; fruit rose-pink, translucent; ? scarce.
- Medusanthera gracilis* (King) Sleum.: 32337 (2); shrub in hillock-forest.
- Phytocrene oblonga* Wall.: (1); climber at the edge of swamp-forest.
- Platea latifolia* Bl.: s.n. 15.5.35 (3); tree -30 m, stilted; scarce in swamp-forest; *medang*. See special notes. Plate 18.
- Stemonurus malaccensis* (Mast.) Sleum.: 28985 (3); tree -17 m, scattered in swamp-forest; *medang*. See special notes.
- S. scorpioides* Becc.: 29288 (3), 29475 (1), 31952 (2), 32374 (2), 34764 (7), s.n. 14.6.34 (9), Kostermans s.n. 1967 (7); tree -27 m, with peg-like pneumatophores; abundant in swamp-forest; *cheret budah*. See special notes.
- S. secundiflorus* Bl.: Sinclair 10569, Kadim and Noor 139 and 220, CWL 225; frequent in swamp-forest and on the new road to Kuala Sedili Besar.

Labiatae

- Leucas zeylanica* R. Br.: 28531 (9); herb, common under *Casuarina* and in coastal scrub; *ketumbit*.

Lauraceae

- Actinodaphne corneri* Furtado (? ined.): s.n. 9.2.35 (5), 13.4.35 (7), 28.4.35 (3), 9.7.39 (7), Sinclair 10846 (4); shrub or treelet 3-5 m, in swamp- and hillock-forest.
- A. glomerata* (Bl.) Nees: (5); shrub 3 m; twigs, petioles fulvous hairy; lamina subglaucous beneath; Kadim and Noor 190 (5), tree -20 m.
- A. maingayi* Hook. f.: s.n. 28.2.39 (7).
- A. malaccensis* Hook. f.: 21345 (6), 29270 (7); common in swamp-forest; (29270 also det. *A. areolata* Bl.).
- A. sesquipedalis* Hook f. et Th.: (3), (7); shrub or small tree with large subverticillate leaves and ant-inhabited buds; frequent in swamp-forest.
- Actinodaphne* sp.: 32386 (2).
- Alseodaphne bancana* (Miq.) Kosterm.: 21326 (5), 28748 (3), 29947 (5); common in dryer parts of the swamp-forest.
- A. coriacea* Kosterm.: 30981 (2); (det. *Dehaasia*).
- A. obovata* Kosterm.: 29370 (4); in kapur-forest.
- A. paludosa* Gamble: 28991 (5), 29444 (5); also det. *A. corneri* Kosterm., Reinwardtia 5 (1960) 343.
- Alseodaphne* sp.: 31982 (2); tree -17 m, in hillock-forest; (det. *Dehaasia*).
- Beilschmiedia glabra* Kosterm.: 28550 (9), 28551 (9, S. Semandan), 32424 (2), s.n. 26.3.32 (7); small riverside tree.
- B. kunstleri* Gamble: 28321 (9), (7); tree -13 m, on *Tristania*-banks, with the habit of *Notaphoebe panduriformis*.
- B. lumutensis* Gamble: 37081 (10); tree -7 m, in hill-forest.
- B. tonkinensis* Ridley: 28060 (9); common tree in coastal forest, generally inland from *Eugenia grandis*; urat kurus. Plates 26, 27, 31.
- Beilschmiedia* spp.: 29035 (5, as *Nothaphoebe*); 29423 (5, as *Cryptocarya*); 32066 (2, as *Cryptocarya*).
- Cassytha filiformis* L.; (9); common in coastal scrub; *chenkri*.
- Cinnanomum iners* Reinw.: 28957 (3), (2); tree -13 m; common in the dryer parts of the swamp-forest, also as a small tree in the dense swamp-forest.
- C. mollissimum* Hook f.: 29325 (4), 30885 (7); frequent small tree in swamp-forest.
- C. rhynchophyllum* Miq.: 36896 (7); frequent small tree in swamp-forest.
- Cryptocarya cinnamomifolia* Merr.: 28958 (3).
- C. crassinervia* Miq.: 32107 (2), 32356 (2).
- C. ferrea* Bl.: 34754 (7), Kadim and Noor 161 (3); tree -7 m.
- C. griffithiana* Wight: 29018 (5), 29416 (5), (3); scattered in kapur-forest.
- C. impressa* Miq.: 36835 (7), 36978 (7).
- C. kurzii* Hook. f.: 25972 (7); small tree; frequent on *Tristania*-banks, mostly upstream from Lubok Besar; *jiremong babi*.
- C. nitens* Bl.: 32397 (2).
- Cryptocarya* sp.: 28971 (3), 29289 (2), 32407 (2); (det. *Alseodaphne* and *Endiandra*).
- Cryptocarya* spp.: 32010 (2); 32161 (2, tree -20 m in swamp-forest); 32782 (7, in swamp-forest).

- Endiandra holttumii* Henders.: 28721 (7).
- E. ? macrophylla* (Bl.) Boerl.: 26052 (7), 28700 (1), 28718 (1), Sinclair 10592 (2); small tree in swamp-forest; see also *Notaphoebe reticulata*.
- E. maingayi* Hook. f.: Sinclair 10857 (9); tree -27 m, in sandy coastal forest.
- Lindera lucida* (Bl.) Boerl.: 28669 (5), (7); tree -13 m, in dryer parts of the swamp-forest and in hillock-forest.
- Lindera* sp.: 28520 (9); tree -25 m; buttresses sharp, spreading; trunk often swollen -1 m thick in the lower 2 m; common canopy-tree in *Eugenia grandis* forest; (det. *L. malaccensis*).
- Litsea costalis* (Nees) Kosterm.: 28715 (1); tree -17 m, in swamp-forest. (*L. megacarpa* in Wayside Trees of Malaya).
- L. ? costata* (Bl.) Boerl.: 32085 (2); see *L. sessilis*.
- L. firma* Hook. f.: 30788 (1); in the dryer part of the swamp-forest.
- L. gracilipes* Hook. f.: 28451, 28452 (7), (9); tree 7-20 m; stilt-roots in swamp-forest few, low, cylindric, -1 cm thick, up to 30 cm high; smoke of burning wood irritating; in swamp-forest.
- L. grandis* Hook. f.: 32177 (2); tree -17 m, in hillock-forest.
- L. johorensis* Gamble: 29282 (7), Sinclair 10552 (7); small tree -5 m, cauliflorous; in swamp-forest.
- L. ? kunstleri* Gamble; 29479 (4); treelet 3 m, in swamp-forest.
- L. lanceifolia* (Roxb.) Hook. f.: 32394 (2); treelet -5 m, in swamp-forest.
- L. lanceolata* (Bl.) Kosterm.: 30855 (2); treelet -5 m, in dryer part of the swamp-forest. (*L. sarawakensis*).
- L. maingayi* Hook. f.: 32164 (2); tree -20 m, in hillock-forest.
- L. perakensis* Gamble: 34709 (7); tree -10 m, in swamp-forest.
- L. sessilis* (Bl.) Boerl.: 28973 (3), 29233 (3), 29292, 29293 (3), 32085 (2), 32286 (2), s.n. 14.5.35 (5); treelet 3-5 m, very conspicuous in new leaf with tassels of limp, brownish ochre new leaves; frequent in swamp-forest. (*L. ellipticibacca* Merr.; see *L. ? costata*).
- L. teysmannii* Gamble; 30880 (7); tree -13 m, in swamp-forest.
- L. umbellata* (Lour.) Merr.: 32430 (2); in swamp-forest.
- Neolitsea* cf. *dealbata* (R. Br.) Merr.; s.n. 9.7.39 (7); tree -5 m (? sapling), in swamp-forest.
- Notaphoebe coriacea* Kosterm.: 25953 (7), 28175 (7), 28582 (9), 28590 (8), 28676 (7), 28722 (2), 28745 (3), 32431 (2), 36822 (7); tree 3-10 m; in the *mempisang*-belt, common. See special notes. Plate 21.
- N. nitidissima* Kosterm.: 32346 (2); tree -10 m, in swamp-forest.
- N. panduriformis* Gamble: s.n. 27.3.32 (7); small tree; leaves large, subsessile, auricled; panicles orange; conspicuous, but scattered, on *Tristania*-banks from Bagan Limau upstream; *medang*.
- N. reticulata* Gamble: 26052 (7), (2); frequent by muddy streams in the swamp-forest. See also *Endiandra ? macrophylla*.
- Phoebe cuneata* Bl.: 28159 (7), 28189 (7), 28589 (8); tree on *Tristania*-banks, scattered; *medang ketanah*.
- Phoebe* spp.: 30982 (2); 32372 (2).

Lecythidaceae

- Barringtonia asiatica* (L.) Kurz: common in coastal forest; *butun, putat laut*.
- B. conoidea* Griff.: 23895 (7), s.n. 25.1.31 (7); small riverside shrub -4 m, standing in the water as the *putat*-belt; *putat, p. ayer*. Plates 4, 6.
- B. filirachis* Payens: 21334 (2), 25890 (7), 28326 (9), 35560 (7); small tree -13 m; abundant in swamp-forest and on *Tristania*-banks. See special notes.
- B. macrocarpa* Hassk.: s.n. 5.5.35 (4); treelet -5 m, the hanging racemes with red rachis and pedicels; in swamp-forest; (also by streams round G. Pantii).
- B. macrostachya* (Jack) Kurz: 29027 (5), s.n. 12.3.37 (2); tree -7 m, sparingly branched; frequent in hillock-forest, occasional in the swamp. See special notes.
- B. racemosa* (L.) Spreng.: 21194 (7), 31455 (7); shrub or small tree -10 m; common on *Tristania*-banks in the tidal reaches, and at the back of the *mempisang*-belt, often with *Cerbera odollam*, not in the swamp-forest; *putat ayam*. See special notes.
- B. reticulata* (Bl.) Miq.: s.n. 1.4.34, 2.4.34 (8); tree -7 m; in swamp-forest, ? rare. (*B. sumatrana* in Wayside Trees of Malaya).
- B. scortechinii* King: 29491 (4), 36888 (7), s.n. 1.9.40 (2); tree -15 m, in swamp-forest, not abundant.

Leguminosae — Caesalpinioideae

- Bauhinia audax* de Wit: 32192 (2); climber in swamp-forest.
- B. bidentata* Jack: 25967 (7); climber, scattered on *Tristania*-banks.
- B. finlaysoniana* Benth.: 37021 (5).
- B. integrifolia* Roxb.: 37089 (10); big climber in hillock-forest. (*B. flammifera* Ridley).
- B. kockiana* Korth.: 28692 (1), 32050 (2); short climber, common in swamp-forest.
- Caesalpinia bonduc* L.: coastal climber, with hard grey seeds; *gorek, kelubu*.
- C. crista* L.; thorny climber, common in mangrove. (*C. uuga* Ait.)
- C. tortuosa* Roxb.: (6).
- Crudia caudata* Prain: 28606 (8); tree -8 m, scattered along the riverside; *kranji papan*. See special notes.
- C. wrayi* Prain: 28088 (8), 29280 (7), 29471 (3), 31955 (2), 36821 (7); small spreading tree 3-7 m high; racemes hanging; flowers white, common in swamp-forest, especially by streams; *katong*.
- Cynometra ramiflora* L.: 28614 (8), 36811 (7); mostly in or just behind mangrove, also riverside near Mawai, and on rocky and sandy coasts; *katong laut*.
- Dialium ? kingii* Prain: s.n. 5.5.34 (4); tree -33 m, *kapur*-forest; *kranji*. See special notes.
- D. maingayi* Baker: 36833 (7); tree -30 m.
- D. patens* Baker: 28724 (2), s.n. 21.5.34 (7); tree -27 m, buttressed; frequent in swamp-forest; *kuran*. Special notes.
- D. platysepalum* Baker: 36823 (7).
- D. wallichii* (Baker) Prain: 36908 (7), s.n. 27.5.35 (7), Sinclair 10559; tree -20 m, buttressed, with bark as in *D. patens*; frequent in swamp-forest.

- Intsia bijuga* (Colebr.) O.K.: large buttressed tree of sea-coast, mangrove, and riverside in the brackish reaches, nearly all cut down as one of the first trees to be felled, but frequent on the Sedili Kechil; *ipil*.
- I. palembanica* Miq.: 30858 (2), (5); large buttressed tree -45 m, in dryer parts of the swamp-forest and in hillock-forest; *merbau*.
- Koompassia malaccensis* Maing.: tree -50 m, strongly buttressed; common, if scattered, in the swamp- and hillock-forest; *kempas*.
- Peltophorum pterocarpum* (DC) Baker: frequent in coastal forest; *batai*.
- Saraca bijuga* Prain: 29409 (6), 29942 (1), 32124 (2); common along streams entering the swamp-forest; [referred to *S. indica* by Zuijderhoudt (1967), but all the trees of the Sedili region with typically 1-2 pairs of leaflets].
- Sindora coriacea* Maing.: (4); frequent large tree in dryer parts of the swamp-forest; *sepetir*. Plate 7.
- S. wallichii* Graham: frequent large tree in dryer parts of the swamp-forest; *sepetir*.
- Sympetalandra hildebrandii* v. Steenis: 31984 (2), s.n. 18.10.36 (2); tree -15 m; apparently rare. See special notes.

Leguminosae — Mimosoideae

- Entada phaseoloides* Merr.: large climber with enormous long flat pods; common on *Tristania*-banks; *kachang belurok*.
- E. spiralis* Ridley: 32150 (2); large climber with massive coiled pods; in dryer parts of the swamp-forest.
- Adenanthera pavonina* L.: on the rocky headlands of Jason Bay.
- Parkia speciosa* Hassk.: (7), (10); scattered in swamp-forest, more frequent in hillock- and *kapur*-forest; *petai*.
- Pithecellobium bubalinum* (Jack) Benth.: 37073 (10); in hill-forest.
- P. clypearia* (Benth.) Merr.: frequent in secondary forest; *petai belalang*.
- P. contortum* Mart.: frequent in coastal scrub.
- P. jiringa* (Jack) Prain: in dryer parts of the swamp-forest.
- P. kunstleri* Prain: in swamp-forest.
- Serianthes dihnyi* Fosberg: 28089 (8), (9); tree like the rain-tree, coastal, scarce. (*S. grandiflorum* Benth.)

Leguminosae — Papilionatae

- Canavalia rosea* (Sw.) DC: (9); coastal dune-pioneer; *kachang laut*. (*C. maritima*, *C. obtusifolia*).
- Dalbergia beccarii* Prain: 28655 (9), s.n. 16.5.32 (7); common small riverside creeper with delicate light green foilage, from Bt Tiga to Danau on the Sedili Besar, in *putat*- and *rassau*-belts; *hujan panas*.
- D. ferruginea* Roxb.: 28160 (9); straggling bushy creeper on rocks facing the sea; *guri*.
- [*D. forbesii* Prain: Teruya 395, 1181, 1192, as a climber in swamp-forest near Kota Tinggi; not found by me in the Sedili region.]
- D. parviflora* Roxb.: 28523 (9), 36875 (7), s.n. 27.3.32 (7), 29.7.32 (7); big climber with spiky stem; common in *mempisang*-belt and on *Tristania*-banks, but also in sandy forest near the sea. See special notes.

- D. stercoracea* Maingay; (9), coastal.
- Dalbergia* sp.: 25887 (7).
- Derris amoena* Ridley: 36841 (7).
- D. heptaphylla* (L.) Merr.: (7); *selunjut*. (*D. sinuata* Thw.)
- D. malaccensis* Prain: 28638 (9, S. Bahau), s.n. 17.7.32 (7); big riverside climber on freshwater and slightly brackish tidal banks; *tuba*, but the roots said to be of no use.
- D. uliginosa* Benth.: s.n. 31.7.32 (9), MS 829 (7); slender climber, common in mangrove and near the sea.
- Desmodium unbellatum* (Lour.) DC: common along the coast; *lemak ketam*.
- Fordia johorensis* Whitmore: 37065 (10), s.n. 3.8.39 (10); small tree -6 m, in hill-forest; racemes from small burrs on the trunk; flowers very fragrant of lily-of-the-valley.
- F. ngii* Whitmore: 32042 (2); small tree -7 m.
- Fordia* sp.: 37025 (5); (det. *Kunstleria corneri* Furtado, ? ined.).
- Inocarpus fagiferus* (Parkinson) Fosberg: 28640 (9, S. Bahau), 34704 (7, S. Gembut), s.n. 19.10.37 (7, S. Gembut); bush or small tree -8 m, often tufted; common in slightly brackish tidal swamp behind *nipa* and under *Bruguiera*; *kerepit*, *kopit*. See special notes.
- Kunstleria* (see under *Fordia* sp. 37025).
- Millettia atropurpurea* Benth.: (10); in *kapur*-forest.
- Pongamia pinnata* (L.) Pierre: (9); in coastal forest, occasional; *mempari*.
- P. pinnata* var. *xerocarpa* Merr.: 25988 (7), 29453 (7); common tree in *mempisang*-belt and on *Tristania*-banks from S. Gembut upstream on the Sedili Besar to shortly above Danau, in the freshwater tidal zone; conspicuous in new leaf from the bright yellow-green foliage; *mempari*.
- Pterocarpus indicus* Willd.: large buttressed tree of brackish tidal creeks round Jason Bay, formerly frequent; *seni*. See special notes.
- Sophora tomentosa* L.: occasional in coastal forest of Jason Bay; *longgundi*.
- Vigna marina* Merr.: (9); *kachang laut*.

Lentibulariaceae

- Utricularia flexuosa* Vahl: (8, 9); in side-streams of the Sedili Kechil and in S. Diman at Jason Bay.

Liliaceae

- Dianella ensifolia* Red.: common in swamp-forest; *chekri*.
- Dracaena congesta*?: s.n. 11.5.35 (4).
- D. elliptica* Thunb.; 32421 (2), 32758 (2), (7).
- D. graminifolia* Wall.: 28511 (9); herb -1.7 m high; fruit ochre-brown; more or less gregarious and common in *Eugenia grandis* forest.
- D. granulata* Hook. f.: 28719 (1), 32432 (7), (2); tree -13 m, scattered in the swamp-forest; *linjuang utan*, *setawar*. See special notes. Plate 25.
- D. maingayi* Hook. f.: tree of rocky coastal forest.
- D. porteri* Bak.: s.n. 15.6.34 (9); herb -1.7 m, in coastal forest.

- D. paludosa* Holtt.: 32306 (2).
D. singaporensis Ridley: (4); herb -45 cm high; frequent by streams.
Peliosanthes violacea Wall. (7).
P. viridis Ridley: (7).
Smilax calophylla Wall.: 28543 (9); small shrub -50 cm high; common in dryer parts of the swamp-forest and in *Eugenia grandis* forest.
S. leucophylla Bl.: frequent in swamp-forest, seldom flowering.
S. myosotiflora A.DC: (5); small twining climber.
S. setosa Miq.: scattered in swamp-forest, seldom flowering. (*S. barbata*).

Linaceae

- Ctenolophon parvifolius* Oliver: 36839 (7); tree -18 m, in swamp-forest.
Roucheria griffithiana Planch.: big climber, common in swamp-forest; *akar kekait*.

Loganiaceae

- Fagraea ceilanica* Thunb.: s.n. 16.6.34 (9), (4); common epiphyte in swamp-forest; *sepungga*.
F. racemosa Jack: 25949 (7), 32055 (2), 36874 (7); tree -13 m, common on *Tristania*-banks; flowering in July; *kopi utan, tengkok biawak*.
 [Gaertnera: see Rubiaceae].
Norrisia major Soler.: 33545 (7); tree -17 m, scattered on *Tristania*-banks, usually leaning over the water, See special notes.
Strychnos axillaris Colebr.: 29451 (5); hook-climber in swamp-forest.
S. ignatii Berg.: 29321 (4); large hook-climber in *kapur*-forest.
S. villosa Hill: 37110 (7); hook-climber in swamp-forest.

Loranthaceae

- Amyema beccarii* Dans.: 28510 (9); mistletoe in coastal forest.
Barathranthus axanthus Miq.: 29500 (2).
Dendrophthoe lanosa Danser; common in hillock-forest.
D. pentandra Miq.: 29414 (5); mistletoe on *Xylopia caudata*.
Elytranthe albida Bl.: 34725 (7).
Helixanthera cylindrica (Jack) Dans.: 30980 (1).
Macrosolen formosus (Bl.) Miq.: 26057 (7), 28953 (3), 32084 (2); scattered in swamp-forest.
Viscum orientale Willd.: frequent in swamp- and hillock-forest.
V. wrayi Gamble: 28992 (5), 30984 (1); mistletoe, common on *Calophyllum*, *Garcinia*, and *Mesua*.

Lowiaceae

- Orchidantha fimbriata* Holtt.: occasional in swamp-forest; crushed tissue smelling of banana.

Lythraceae

- Lagerstroemia ovalifolia* T. et B. var *exapiculata* Furtado et Montien: 34738 (7), s.n. 10.5.35 (1); scattered in swamp-forest; *bungor*. See special notes.
Pemphis acidula Forst.: (9), coastal forest and rocks; *mentigi*.
Sonneratia alba J. Smith: mangrove pioneer; *perepat* (*S. griffithii*).
S. caseolaris (L.) Engl.: *nipa*- and mangrove-swamps; *berembang*. (*S. acida*).

Magnoliaceae

- Aromadendron elegans* Bl.: 36940 (10) ;large tree in hill-forest.
Magnolia maingayi King: 31997 (2); treelet -5 m, in hillock-forest.
Talauma singaporensis Ridley: s.n. 8.2.35 (5); small tree -5 m; twigs softly grey-fawn hairy; in swamp-forest.

Malpighiaceae

- Brachylophon curtisii* Oliver: 32302 (2); shrub in swamp-forest.
Tristellateia australasiae A. Rich.: climber in coastal forest.

Malvaceae

- Hibiscus tiliaceus* L.: common in *nipa*-belt; *baru baru*, *bebaru*, *b. sungei*.
Sida cordifolia L.: (9); coastal herb.
Thespesia populnea L.: coastal tree; *baru baru laut*.

Marantaceae

- Donax grandis* (Miq.) Ridley: common in *Eugenia grandis* forest; *bemban*.
Phacelophrynium maximum (Bl.) K. Schum.: 37084 (10), s.n. 13.3.37 (2); in streambeds in the forest; the most southerly records in Malaya.
Phrynium basiflorum Ridley: 30680 (6); by *Saraca*-streams.
P. capitatum Willd.: 30677 (6), 32291 (2), 37090 (10).
P. gracile Holtt.: 29981 (7), s.n. 28.6.36 (4); apparently endemic in the Sedili region.
P. hirtum Ridley: s.n. 10.4.36 (6); by *Saraca*-streams. See special notes.
Stachyphrynium griffithii (Bak.) K. Schum.: frequent in dryer parts of the swamp-forest and in hillock-forest.

Melastomataceae

- Anplectrella anomala* (Stapf et King) Furtado: 30876 (7), 32061 (2); large climber, frequent in swamp-forest.
Blastus caudatus G. H. Spare: 29304 (1); shrub or treelet -3.5 m, frequent in swamp-forest, often by streams.
Dissochaeta gracilis (Jack) Bl.: s.n. 12.5.35 (6); climber, white petals.

- D. johorensis* Furtado: 32357 (2).
- D. punctulata* Hook. f.: 29377 (4); big climber in *kapur*-forest; petals white.
- Marumia nemorosa* (Jack) Bl.: 28571 (7); frequent on *Tristania*-banks; *kemunting akar, k. semut.* (*Macrolenes nemorosa*).
- Medinilla rubicunda* Jack var. *hasseltii* (Bl.) Bakh. f.: 26054 (7), 31980 (2); common epiphyte in the swamp-forest. (*M. hasseltii*).
- M. maingayi* Clarke: common epiphyte in the swamp-forest.
- [*M. pendens* Ridley: — ? in the Sedili region.]
- M. scandens* King: 32048 (2), 32456 (2), 32755 (2); root-climber; locally frequent in swamp-forest.
- Medinilla* sp.: 32791 (7); epiphyte; leaves for a long time purple beneath in swamp-forest.
- Melastoma molle* (Wall.) Ridley: s.n. 12.5.35 (6); shrub with red seeds; streamside in the forest.
- Memecylon amplexicaule* Roxb.: 30781 (1); tree -13 m, in swamp-forest.
- M. campanulatum* Clarke: 29021 (5), 29044 (5), 31942 (7), 32057 (2); in swamp- and hillock-forest.
- M. garcinioides* Bl.: 28733 (2), 29450 (5), 36980 (7); tree -17 m, frequent in swamp-forest; *delek*. See special notes.
- M. hepaticum* Bl.: 29251 (2), 29481 (4), 30882 (7), 30976 (1), 31961 (2), 32467 (2), s.n. 4.2.35 (4), 9.2.35 (5), ? 10.2.35 (5); shrub or treelet -7 m, laxly branched; bark greyish white; common in the swamp-forest; *delek*.
- M. heteropleurum* Bl.: 28683 (4), 29016 (5); tree -13 m, in swamp- and hillock-forest; *delek*.
- M. hullettii* King: 29243 (4), 29984 (7); treelet -5 m, branches drooping; fruit white then purplish blue; in swamp-forest.
- M. laevigatum* Bl.: (7); small tree on *Tristania*-banks and on stream-banks in the swamp-forest; *mangas*.
- M. maingayi* Clarke: 28702 (1), 29245 (2), 31981 (2), 32246 (2), 32311 (2), 32504 (2), 32759 (2), 36931 (10), (7); tree -7 m, often infested with *keringa*-ants; common in swamp- and hillock-forest; *delek*. (*M. wallichii* in *Wayside Trees of Malaya*).
- M. myrsinoides* Bl.: 25896 (7), 28562 (5), 28565 (5); tree -10 m, common by streams in the swamp-forest and on *Tristania*-banks; *nipis kulit*.
- M. paniculatum* Jack: 28603 (8), 32188 (2), 34734 (7); tree -10 m, frequent in swamp-forest; *mangas*. See special notes.
- M. subtrinervium* Miq.: 29459 (4), 31994 (2), 32079 (2), 34657 (4); treelet -5 m.
- Memecylon* sp.: 32170 (2).
- Ochthocharis borneensis* Bl.: 21195 (7); small shrub -1.5 m; petioles and young stems purple; common in the *mempisang-belt* especially from Lubok Pusing to K. Labek and below Mawai, *sendudok ayer*.
- O. sylvestris* Ridley: 30859 (2), 32116 (2), 37085 (10).
- Osbeckia* ? ; s.n. 11.5.35 (4); big climber in *kapur*-forest.
- Pachycentria tuberosa* Bl.: common epiphyte in swamp-forest.
- Plethiandra sessiliflora* Ridley: 29988 (3), 32395 (2).
- Pogonantha pulverulenta* (Jack) Bl.: 30790 (1), 32142 (2), 32316 (2).

- Pternandra coerulescens* Jack: 32119 (2), 32429 (2); small tree, scattered on *Tristania*-banks and by streams in the swamp-forest; *lidah katak*, *sial menaung*.
Sonerila caesia Stapf et King: 32509 (2).
S. picta Korth.: (6); by *Saraca*-streams, occasionally in the swamp-forest.
Sonerila sp.: 32053 (2).

Meliaceae

- Aglaiia angustifolia* Miq.: s.n. 15.4.36 (1); treelet -3.2 m, in swamp-forest.
A. argentea Bl.: 29492 (4); in hillock-forest.
A. hiernii King: 32041 (2), 32089 (2).
A. lanuginosa King: 29326 (5), 34939 (5); scattered in hillock-forest.
A. meliosmoides Craib: 28553 (9, S. Semandan).
A. odoratissima Bl.: 21319 (1), 29342 (1), 30687 (6), 32012 (2), 32081 (2), 32176 (2); small tree, frequent in dryer parts of the swamp-forest.
A. palembanica Miq.: 28517 (9).
A. cf. trichostemon C. DC: 32090 (2), 36883 (7), 36938 (10); tree -12 m, in swamp-and hillock-forest.
Aglaiia spp.: 29243 (2), (4); 29235 (4); 29303 (1), 29401 (6); 29452 (5), in *kapur*-forest; 32062 (2); 32184 (2); 34731 (7); 36939 (10); s.n. 15.10.35 (leg. Kiah), shrub.
Amoora rubiginosa Hiern: 32798 (7), 36818 (7); frequent tree of swamp-forest. See special notes. Plate 36.
Amoora spp.: 21347 (1); 32202 (2); 32283 (2).
Aphanamixis rohituka Pierre: 36884 (7).
Carapa granatum Koen.: in mangrove; *nyireh*.
C. moluccensis Lamk: 28067 (8), 32441 (7); common by the Sedili rivers in the upper part of the mangrove, in the *nipa-belt*, and on the banks behind the lower reaches of *jejawi* above and below Bt Tiga on the Sedili Besar; *nyireh batu*.
Chisocheton amabilis (Miq.) C. DC: 21199, 21199A (7), 28568 (9), 28595 (8), 28674, 28675 (7), 32434 (7); small riverside tree of the *mempisang-belt*, perhaps also of *Tristania*-banks, between Mawai and Bt Tiga on the Sedili Besar; flowering March-April; *tangisong burong*. See special notes.
C. erythrocarpus Hiern: 32402 (2); in swamp-forest.
C. pauciflorus King: 28714 (1); in swamp-forest.
C. paucijugus (Miq.) B. D. Jackson: 29445 (5), 32071 (2); in swamp-forest.
C. patens Bl.: 36986 (1); in swamp-forest.
C. penduliflorus Planch.: 32400 (2), s.n. 23.6.34 (8); in swamp-forest.
C. pentandrus (Blco) Merr. 28496 (9); common large tree in *Eugenia grandis* forest, and coastal climax forest.
C. princeps Hemsl.: 29285 (2), (7); in swamp-forest.
C. sarawakensis (C. DC) Harms: 21350 (1), 29311 (1), 29465 (4); in swamp-forest.
Chisocheton spp.: 29404 (6); 30698 (6).
Dysoxylon cauliflorum Heim: 25857 (7), 28685 (4), 29478 (4), 36889 (7), (5); common in swamp-forest. [These specimens have recently been identified by D. J. Mabberley as *D. sericeum* (Bl.) Adelb.]

- D. costulatum* Miq.: 29427 (5), 29462 (4); tree -13 m, scattered in the *mempisang*-belt and on *Tristania*-banks.
- D. dumosum* King: 29019 (5), 29241, 29242 (2), 30733 (6), 31987 (2), 32138 (2), 32465 (2); treelet 3-5 m; frequent in swamp- and hillock-forest.
- D. euphlebiun* Merr.: 28960 (3).
- D. flavescens* Hiern: 29306 (1).
- D. macrothyrsun* Miq.: 24630 (7), 26058 (7), 28952 (3), 34715 (3), 34723 (7), s.n. 29.1.33 (7), 3.10.34 (7), 2.2.38 (7). (? *D. excelsum* Bl.).
- Dysoxylon* spp.: 28706 (1); 28969 (3); 28989 (5), in dryer parts of the swamp-forest and in *kapur*-forest; 32127 (2); 32352 (2); 32772 (1); 36842 (7); 37099 (7), 30561; s.n. 18.10.36 (2, leg. Kiah).
- Sandoricun* sp.: 29363 (4) in *kapur*-forest.

Menispermaceae

- Cocculus ovalifolius* DC: 28468 (9); slender climber, common at the seaward edge of *Eugenia grandis* forest, on *Guettarda* etc.
- Fibraurea ochroleuca* Miers: 28566 (8); common riverside climber; *sekunyit*.
- Hypserpa cuspidata* Miers: 28573 (8); riverside creeper; leaves yellow-green; fruit yellow then red.
- Limacia velutina* Miers: in dryer parts of the swamp-forest.
- Pericampylus incanus* Miers: 29746 (mile 1, Jemaluang Road); climber, leaves glaucous beneath; common in dryer parts of the swamp-forest and in hillock-forest; *akar mempening*.
- Stephania* ? : s.n. 11.5.35 (5); small climber in *kapur*-forest.

Monimiaceae

- Kibara chartacea* Bl.: 29286 (7); treelet -4 m, in swamp-forest. See special notes.

Moraceae

- Artocarpus anisophyllus* Miq.: (6); scattered in dryer parts of the swamp-forest and in hillock-forest.
- A. dadah* Miq.: 32185 (2), s.n. Jan. 1936 (3); tree -25 m, scattered in dryer parts of the swamp-forest and in hillock-forest; *chempedak ayer, tampang*.
- A. elasticus* Reinw.: tree -40 m, strongly buttressed; frequent in coastal forest, occasional in dryer parts of the swamp-forest and in *kapur*-forest; *terap*.
- A. gomezianus* Wall.: s.n. 12.6.34, 13.6.34 (9, S. Rhu Reba); tree -20 m, not or slightly buttressed; scarce in coastal forest; *tempulut*. See special notes.
- A. integer* (Thunb.) Merr. var. *silvestris* Corner: 32988 (5), s.n. Oct. 1936 (2), (10); tree -50 m, not buttressed; bark brown; inner bark pale ochraceous; in hillock-forest, scattered.
- A. kemando* Miq.: s.n. 3.2.35 (2), 7.2.35 (3), 18.6.34 (8); tree - 30 m. not infrequent in swamp-forest and coastal forest; *chempedak ayer, pudu*. See special notes.
- A. maingayi* King: s.n. 5.5.35 (4); in *kapur*-forest.

- A. nitidus* Trec. ssp. *griffithii* (King) Jarrett: 21349 (1); tree -20 m, frequent in swamp-forest; *tampang*. See special notes.
- A. rigidus* Bl.: (6); not in the swamp-forest.
- FICUS* subgen. *Urostigma* (Gasp.) Miq.
- F. annulata* Bl.: 32008 (2), s.n. 2.2.35 (1); scarce in swamp-forest; *ara jantong*.
- F. benjamina* L.: s.n. 10.4.36 (6); very large strangling fig in dry forest, roots descending for 25 m.
- F. binnendykii* Miq.: 28641 (7); scarce in swamp-forest; *beringin*.
- F. binnendykii* var. *coriacea* Corner: s.n. 11.3.37 (2), 31.2.34 (7); occasional in dryer parts of the swamp-forest and in hillock-forest.
- F. bracteata* Wall.: 24626 (7), 28619 (8); frequent epiphyte rooting to the ground, not strangling, in swamp-forest and on *Tristania*-banks, especially between Lubok Pusing and L. Besar.
- F. calophylla* Bl. var. *malayana* Corner: 21190 (7), 28634, 28657 (9), s.n. 26.3.32 (7); common large strangling fig of the riverside in freshwater zones, in swamp-forest, and coastal.
- F. consociata* Bl. var. *murtoni* King: 28540 (9), 28632 (8), 31970 (2), s.n. 2.4.34 (8), 7.2.35 (7); common large strangling fig, distributed as *F. calophylla*; young leaves pinkish to purplish brown hairy.
- F. crassiramea* Miq.: 21188 (7); common large strangling fig, riverside and swamp-forest, from Danau downstream to Bt Tiga on the Sedili Besar, the main root-trunk developing strong buttress-roots parallel with the river, without stilt-roots.
- F. cucurbitina* King: 29473 (2), s.n. 31.12.34 (3); large strangling fig with irritant hairs; in swamp-forest, rare; (elsewhere in Malaya, only from Kuantan).
- F. delosyce* Corner: 21337 (2), 28178 (7), 28607 (8), 36800 (7), s.n. 9.6.34 (7); very large strangling fig, common in swamp-forest.
- F. dubia* Wall.: (9), in coastal forest.
- F. elastica* Roxb.: Tg. Besar, Sedili Besar, two very large trees, possibly planted, but the fruits ripening reddish orange and, perhaps, with insects.
- F. globosa* Bl.: 31954 (2), 36873 (7), s.n. 27.7.32 (7); common slender climber in *rassau*- and *mempisang*-belts.
- F. kerkhovenii* Val.: 28673 (7), 32074 (2), 32779 (7), s.n. 17.6.34 (8); very large strangling fig, frequent in swamp- and hillock-forest, seldom fruiting. (Johore Fig of Wayside Trees of Malaya).
- F. microcarpa* Linn. f.: forming the *jejawi*-belt connecting the *rassau*- and *nipa*-belts, as scattered big strangling fig-trees in the swamp round Jason Bay, and on the rocky coast. (*F. retusa* in Wayside Trees of Malaya). Plate 5.
- F. microsyce* Ridley: 28544 (9), 32247 (2), s.n. 31.7.32 (7); small climber in swamp-forest and mangrove, often with galled buds.
- F. pisocarpa* Bl.: 28319 (7); riverside strangling fig, rather small, infrequent.
- F. retusa* L.: 28626 (8), 36872 (7), s.n. 28.3.32 (7), 21.5.34 (7), 19.6.34 (8), 13.4.36 (7); epiphytic, rooting 20 m to the ground, not strangling, crown small, fairly abundant in the swamp-forest, often rooted into tidal freshwater. (*F. truncata* Miq., not *F. retusa* auctt. = *F. microcarpa* Linn. f.).
- F. stricta* Miq.: 32297 (9, S. Rhu Reba), Sept. 1972; fairly large strangling fig, the strangling roots flattened and shell-like round the host-trunk; in swamp-forest round Jason Bay.
- F. stupenda* Miq. var. *minor* Corner: 37027 (5).

- F. subgelderi* Corner var. *rigida* Corner: 23899 (7), 30791 (2); strangling fig in swamp-forest.
- F. sundaica* Bl.: 28537, 36799 (7); large strangling fig with many stilt-roots, common in mangrove and freshwater tidal zone. (*F. indica* of Wayside Trees of Malaya).
- F. sumatrana* Miq. var. *circumscissa* Corner: 29937 (7).
- F. sumatrana* Miq. var. *microsyce* Corner: 32241 (2).
- F. virens* Ait. var. *glabella* (Bl.) Corner: s.n. 13.6.39 (7), (8); scarce on the Sedili Besar (at Mawai), frequent on the Sedili Kechil.
- F. xylophylla* Wall.: 28658 (9); large epiphyte, not strangling, coastal.
- FICUS* subgen. *Pharmacosycea* Miq.
- F. vasculosa* Wall. var. *acuminata* Miq.: s.n. 11.3.37 (2), a single sapling; (the typical form of this common species not found in the Sedili region, but var. *acuminata* also on G. Pantl).
- FICUS* subgen. *Ficus* sect. *Ficus*
- F. aurata* Miq. var. *longipilosa* Corner: 29387, 32313 (2); in hillock-forest. (*F. chrysocarpa* of Wayside Trees of Malaya).
- F. deltoidea* Jack var. *deltoidea*: 32147 (7), 32250 (2), s.n. 22.6.34 (8), H. M. Burkill 1846 (7); common bushy epiphyte on high trees in swamp-forest; limited in Malaya to the east from Rompin to Singapore (Corner 1969). (*F. diversifolia* in Wayside Trees of Malaya).
- F. glandulifera* Wall.: 33000 (7); sapling only.
- F. grossularioides* Reinw.: (6); not in the swamp-forest. (*F. alba* of Wayside Trees of Malaya).
- FICUS* subgen. *Ficus* sect. *Kalosyce* (Miq.) Corner
- F. apiocarpa* Miq.: 21186, 31463 (1), 31957 (7); frequent climber in swamp-forest, locally abundant.
- F. ruginervia* Corner: 28446 (9), 32796 (7); common climber in dryer parts of the swamp-forest and in hillock-forest.
- FICUS* subgen. *Ficus* sect. *Rhizocladus* Endl.
- F. excavata* King: 29990 (1), Sinclair 9978 (1); slender inconspicuous climber of swamp-forest, curiously rare in the Sedili region.
- F. recurva* Bl. var. *bridelioides* Corner: s.n. 13.4.36 (7); riverside climber, scattered.
- F. recurva* var. *ribesioides* (Wall.) King: 28605 (8).
- F. sagittata* Vahl: 28487 (9); common root-climber of dry coastal forest, possibly overlooked in the swamp-forest.
- F. trichocarpa* Bl.: 32006 (2); frequent climber in hillock-forest, scarce in the Sedili region.
- F. uncinulata* Corner: 30699 (2), 32007 (2); slender climber; no other records from Malaya but frequent in Borneo.
- F. urnigera* Miq.: 25948 (7, Bagan Limau); root-climber, rare in the Sedili region.
- FICUS* subgen. *Ficus* sect. *Sycidium* Miq.
- F. obscura* Bl. var. *borneensis* (Miq.) Corner: 28084, 28086 (7), 28587 (8), 28618 (8), 28906 (3); epiphytic shrub, rooting to the ground; common in swamp-forest and on *Tristania*-banks.

- F. parietalis* Bl.: 32007 (2), 32433 (7), 36985 (7); frequent climber in swamp-forest, often epiphytic.
- F. sinuata* Thunb.: 28085 (7), 28512 (9), 28515 (9), 29045 (5), 29389 (5), 29735 (2), 31928 (3), 32458 (2), s.n. 3.4.34 (7), 13.4.34 (7); shrub or treelet in swamp- and hillock-forest, frequent.
- F. sinuata* var. *oblonga* Corner: 21338, 29023, 32502 (2).
- F. uniglandulosa* Wall: 29447 (5); epiphytic shrub in hillock-forest.
- FICUS* subgen. *Ficus* sect. *Sycocarpus* Miq.
- F. beccarii* King: (1); geocarpic fig of hillock-forest.
- F. fistulosa* Reinw.: small cauliflorous tree by streams in the dryer part of the swamp-forest and in hillock-forest.
- F. fistulosa* var. *angustifolia* Corner: 25983 (7).
- F. lepicaarpa* Bl.: 29349 (6); small tree of *Saraca*-streams, not in the swamp-forest.
- F. obpyramidata* King: 29997 (7), (2, 6); small cauliflorous tree -5 m, on *Tristania*-banks between Danau and Bagan Limau on the Sedili Besar; scarce.
- F. schwarzii* Koord.: (6), (10); cauliflorous tree of *Saraca*-streams. (*F. niquelii* of Wayside Trees of Malaya).
- F. scortechinii* King: 29258 (2); small tree of streams and hillsides in hillock-forest.
- F. uncinata* Becc. var. *strigosa* Corner: Sinclair 9980 (4), (6); geocarpic fig in hillock-forest. (*F. geocarpa* of Wayside Trees of Malaya).
- Parartocarpus venenosus* (Zoll. et Mor.) Becc. ssp. *forbesii* (King) Jarrett: 32185 (2), s.n. Feb. 1935 (1), (4); canopy tree in swamp- and coastal forest, *tengayun*. See special notes. Plate 33.
- Streblus taxoides* (Heyne) Kurz: 28668 (5), (10); small thorny tree -5 m, often bushy; common in hillock-forest, entering the periphery of the swamp-forest; *merlimau*. (*Phyllochlamys wallichii* of Wayside Trees of Malaya).

Musaceae

- Musa gracilis* Holtt.: frequent swampy ground at the edge of the forest and by open streams, (? not in the swamp-forest).
- M. violascens* Ridley: at forest-edges and by open streams.

Myristicaceae

- Gymnacranthera bancana* (Miq.) J. Sinclair: 29945 (5), 32193 (2); in *kapur*-forest.
- G. eugeniifolia* (A.DC) J. Sinclair: 29955 (2), 36909 (7); in swamp-forest.
- G. eugeniifolia* var. *griffithii* (Warb.) J. Sinclair: 29499 (2), 32157 (2); often with stilt-roots.
- G. forbesii* (King) Warb.: 28712 (1), (2), 28970 (3), 36866 (7), 36918 (7), 36961 (7); common in the swamp-forest.
- Horsfieldia brachiata* (King) Warb.: 25991 (7), 28707 (1), 28963 (3), 29466 (7), 32281 (2), 34708 (7), 36791 (7), s.n. 28.3.32 (3), 7.10.34 (7); common in the swamp-forest.
- H. brachiata* var. *sumatrana* (Miq.) J. Sinclair: 32064 (2).
- H. bracteosa* Henders.: 29310 (1), 36789 (7), s.n. 1.9.35 (1), 16.7.39 (7).

- H. crassifolia* (Hook. f. et Th.) Warb.: 32105 (2), s.n. 12.4.36 (7); with short-stilt-roots; in swamp-forest.
- H. flocculosa* (King) Warb.: 32314 (2); apparently rare.
- H. grandis* (Hook. f.) Warb.: 36831 (7).
- H. irya* (Gaertn.) Warb.: 25856 (7), 25964 (7), 28493 (9); common in the *mempisang*-belt; *pianggu*. See special notes.
- H. macrocoma* Warb. var. *canarioides* (King) J. Sinclair; 34742, 36924 (7).
- H. polysphaerula* (Hook. f.) J. Sinclair: 29366 (4), 31976 (2), 32109 (2); often with cylindrical stilt-roots -2 m high; frequent in the swamp-forest, also in *kapur*-forest.
- H. superba* (Hook. f. et Th.) Warb.: 28703 (1), s.n. 23.6.34 (8), (7): in the dryer parts of the swamp-forest.
- H. wallichii* (Hook. f. et Th.) Warb.: s.n. 30.12.34 (4).
- Horsfieldia* sp.: s.n. 28.4.35 (3); tree -13 m, with stilt-roots. See special notes.
- Knema conferta* (King) Warb.: 28505 (9), 32034 (2), 34714 (7).
- K. furfuracea* (Hook. f. et Th.) Warb.: s.n. 28.8.32 (7), (4).
- K. glaucescens* Jack: 28176 (7), 28962 (3), 29275 (7), 31951 (2), 32384 (2); common in the *mempisang*-belt, often with stilt-roots.
- K. glaucescens* f. *rubens* J. Sinclair: 29403 (6).
- K. glaucescens* var. *cordata* J. Sinclair: 29015 (5), 29419 (5), 29436 (5), 29477 (4); in hillock-forest.
- K. glaucescens* var. *patentinervia* J. Sinclair: 28649 (8), 31951 (2), 36935 (10), s.n. 16.7.39 (7).
- K. intermedia* (Bl.) Warb.: 21333 (2), 28453 (9), 29252 (7), 29268 (7), 36392 (2); with stilt-roots; common in the *mempisang*-belt and in swamp-forest. See special notes.
- K. latericia* Elm.: 28711 (1), 28975 (3), 29277 (7), 29290 (3), 29420 (5).
- K. laurina* (Bl.) Warb.: 28615 (8), 32334 (2), 32379 (2), 36927 (10), 37078 (10).
- K. malayana* Warb.: 28440 (9), 28504 (9), s.n. 14.4.35 (3).
- K. mandaharan* (Miq.) Warb.: s.n. 28.8.32 (7).
- K. plumulosa* J. Sinclair: 29367 (4), 29944 (1), 30972 (1), 31473 (5), 32130 (2), Kep. F.n. 53930 (7); often with stilt-roots; common in the swamp-forest. (*K. cantleyi* of Wayside Trees of Malaya).
- Myristica cinnamomea* King: 28671 (4), s.n. 16.7.39 (7); common in hillock-forest.
- M. crassa* King: 34912 (5), 36919 (7); with stilt-roots.
- M. elliptica* Wall.: 25954 (7), 26055 (7), 28322 (9), 28584 (8), 29402 (6), 32004 (2), 34729 (7), s.n. 10.5.35 (1); very common in swamp-forest, especially in the *mempisang*-belt; *tabah*, *tajam penggali*. See special notes. Plate 14.
- M. guattariifolia* DC: 28512 (9), s.n. 20.6.34 (9); coastal.
- M. iners* Bl.: 28186 (7), 36863 (7), s.n. 2.3.38 (7); with stilt-roots; frequent in swamp-forest. Plate 36.
- M. lowiana* King: 36880 (7); with stilt-roots; scattered in swamp-forest. See special notes. Plates 24, 38.
- M. maingayi* Hook. f.: 36900 (7).
- M. maxima* Warb.: 34740 (7).

Myrsinaceae

- Aegiceras corniculatum* (L.) Bloc: 28648 (8); in mangrove; *lemak ketam*.
- Ardisia andamanica* Kurz; 28620 (8); tree -10 m; common on the riverside. See special notes.
- A. colorata* Roxb.: 28323 (9), 32373 (2); shrub in swamp-forest.
- A. crispa* (Thunb.) DC: small coastal shrub, common: *mata ayam*.
- A. elliptica* Thunb.: (9); common shrub or tree -10 m; on the sandy coast, in *Eugenia grandis* forest, and in swampy scrub near the coast; *mata pelandok*, *mempenai*.
- A. foliosa* Furtado: 32330 (2).
- A. lanceolata* Roxb.: 21321 (1), (7); tree -13 m, flowering as a shrub; common locally in swamp-forest.
- A. miqueliana* Scheff.: 32076 (2), 32236 (2).
- A. ngadimanii* Furtado: 32092 (2).
- A. odontophylla* King et Gamble: 31943 (4), s.n. 28.4.35 (3).
- A. pachysandra* Mez.: 29197 (4), s.n. 5.5.35 (4); treelet -4 m; branches slightly dilated at the base; in dryer parts of the swamp-forest, in hillock- and *kapur*-forest.
- A. ? solanacea* Roxb.: 29000 (5); tree -7 m; branches dilated at the base; in dryer parts of the swamp-forest and in *kapur*-forest.
- A. teysmanniana* Scheff.: 36894 (7).
- A. tuberculata* Wall.: 28174 (7), 29276 (7), 36810 (7); shrub -3 m; common in the *mempisang* belt.
- A. ? wrayi* King: 29422 (5), 36949 (10); herb or shrub -2 m high; frequent in swamp- and hillock-forest. See special notes.
- Ardisia* sp.: 29012 (5), tree -13 m, in hillock-forest. See special notes.
- Ardisia* spp.: 30871, (6), 36929 (10); 32165 (2); 32410 (2).
- Embelia amentacea* Wall.: 31991 (2).
- E. canescens* Jack: 28613 (8); climber in scrub on hillock.
- E. coriacea* Wall.: 25894 (7), 32151 (2); big climber, frequent on *Tristania*-banks.
- E. dasythyrsa* Miq.: 30893 (1).
- E. garciniaefolia* Wall.: 32014 (2).
- Labisia punctata* (Reinw.) Airy Shaw: 32172 (2); herb, frequent in swamp-forest. (*L. pothoina*).
- Maesa ramentacea* Wall.: 28558 (8), 32021 (2); sprawling bushy climber in swamp-forest, often in clearings.
- Tetrardisia corneri* Furtado: s.n. (3), (7). (Gdns' Bull. Singapore 17, 1958, 306).

Myrtaceae

- Decaspermum fruticosum* Forst.: 28691 (1), 36394 (7); common in dryer parts of the swamp-forest.
- Eugenia anisosepala* Duthie: 36917 (7).
- E. atronervia* Henders.: 29328 (4), s.n. 2.2.35 (1), 1.9.40 (2); tree -12 m, with low flattened stilt-roots; in the dryer parts of the swamp-forest and in *kapur*-forest.

- E. castanea* Merr.: 28977 (3), 29249 (4); treelet -5 m, in swamp-forest.
- E. cerina* Henders.: 28546 (9), 29049 (1), 36790 (7), 36962 (7), s.n. 4.2.35 (1); tree -23 m, common in swamp-forest, on *Tristania*-banks, and in coastal forest; *dendulang, dulang dulang, nenulang*. See special notes.
- E. cerina* var. *turbinata* Henders.: 23897 (7), s.n. 27.3.32 (7).
- E. chlorantha* Duthie: 32484 (1); tree -17 m, by *Saraca*-streams.
- E. chloroleuca* King: s.n. 24.6.34 (4); treelet -2 m (fertile) in the dryer part of the swamp-forest.
- E. claviflora* Roxb. var. *maingayi* King: 31940 (4); treelet -5 m.
- E. conglomerata* Duthie var. *paniculata* Henders.: 29368 (4); large tree with steep narrow buttresses; in *kapur*-forest.
- E. cumingiana* Vidal: 36824 (7), s.n. 10.6.34 (9), 12.6.34 (9), 19.6.34 (8); tree -17 m, sometimes with stilt-roots; in swamp-forest and commonly in *Eugenia grandis* forest. See special notes.
- E. curtisii* King: 28622 (8), s.n. 18.6.34 (8); tree -17 m; frequent riverside tree on the Sedili Kechil. See special notes.
- E. densiflora* Duthie: 28073 (9), 28465 (9); tree -13 m; flowers white or pink; flowering gregariously in June; common in *Eugenia grandis* forest; *jambu ayer*.
- E. cf. duthieana*: s.n. 15.5.35 (5); in *kapur*-forest.
- E. dyeriana* King: 37096 (2); in hillock- and *kapur*-forest.
- E. fastigiata* Koord. et Val.: 32342 (2), s.n. 29.1.33 (7), 28.3.33 (7); tree -17 m, on river-bank and in swamp-forest, distributed as *E. cerina*.
- [*E. filiformis* Duthie ?].
- E. garcinifolia* King: 31469 (2), s.n. 10.2.35 (4); tree -34 m, buttressed; in swamp-forest. See special notes.
- E. grandis* Wight: common in the sandy coastal belt, replacing *Casuarina* and building its own coastal belt; *jambu laut, ubah*. See special notes. Plate 27.
- E. grata* Wight: 32409 (2), s.n. 13.5.34 (7), 9.7.39 (7); tree -17 m, often with a few arcuate stilt-roots -75 cm high; frequent in swamp-forest.
- E. griffithii* Duthie: 29970 (mile 17, Jemaluang Road); on the *Tristania*-bank.
- E. kiahii* Henders.: 29400 (2), 32036 (2); tree -12 m, with stilt roots; in swamp-forest.
- E. kiahii* var. *angustifolia* Henders.: 36921 (7); tree -30 m, with stilt-roots.
- E. kunstleri* King: 29301 (1), 36920 (7); tree -20 m, in dryer parts of the swamp-forest and in hillock-forest. See special notes.
- E. leptostemon* (Korth.) Miq.: 28979 (3), s.n. 28.5.39 (7); tree -20 m, common by streams in the swamp-forest. See special notes.
- E. leucoxydon* Miq.: 28557 (8); tree -17 m, in the upper reaches of the mangrove; *kelat puteh*. See special notes.
- E. longiflora* (Presl) F.-Vill.: 21311 (1), 28637 (9), 29312 (7), s.n. 21.5.34 (7); tree -23 m, often strongly stilted; frequent on *Tristania*-banks, in swamp- and hillock-forest. See special notes. Plate 23.
- E. muelleri* Miq.: 21196 (7), 28325 (9), 32444 (7); tree of low straggling habit, not or slightly stilted; in the *mempisang*-belt, more or less submerged at high tides, and in the swamp-forest behind the mangrove. (*E. venulosa* in Wayside Trees of Malaya).

- E. napiformis* Koord. et Val.: 32132 (2); tree -12 m in swamp-forest, -30 m with fluted base in hill-side forest; bark dull warm brown, fissured and flaky.
- E. ngadimaniana* Henders.: 32152 (2); tree -20 m, in hillock-forest.
- E. nigricans* King: 28497 (9), 28522 (9); tree -23 m, sometimes with stilt-roots; common in sandy coastal forest; *kelat samak*. See special notes.
- E. oblata* Roxb.: 36805 (7); tree -13 m, stilt-roots -1 m high; in swamp-forest.
- E. oleina* Wight: 28081 (7, S. Kambau), 28513 (9), s.n. 14.6.34 (9); tree -13 m, often with stilt-roots or shortly buttressed, with loop-roots; on stream-banks and in *Eugenia grandis* forest.
- E. pachyphylla* Kurz: 28078 (8); tree in sandy coastal forest.
- E. palembanica* (Miq.) Merr.: 28549 (9), s.n. 16.6.34 (9); tree -13 m, common in coastal forest, especially in scrub (? conserved for use of the bark in tanning); *kelat samak*.
- E. papillosa* Duthie: 21315 (1), 32328 (2), s.n. 9.7.39 (7); tree -23 m, with stilt-roots and loop-roots; common in swamp-forest. See special notes.
- E. pauper* Ridley: 28978 (3), 30697 (6); tree -7 m; stilt-roots -50 cm high, few, slender, spreading; in swamp-forest and by *Saraca*-streams.
- E. polyantha* Wight: 32392 (2); tree -20 m, in swamp-forest.
- E. polyantha* var. *sessilis* Henders.: 32413 (2); tree -12 m, in swamp-forest.
- E. ? pseudoformosa* King: s.n. 9.9.34 (5); common small tree of *Saraca*-streams round G. Panti. See special notes.
- E. pseudosubtilis* King: 21336 (2), 28583 (8), 28609 (8), 28746 (3), 29935 (3), 32096 (2), s.n. 3.2.35 (5); tree -23 m, in swamp-, hillock-, and *kapur*-forest; flowering Feb. and Sept.; old leaves turning dull orange-yellow; *kelat*.
- E. quadribracteata* Henders.: 30986 (1); tree -20 m, in dryer parts of the swamp-forest.
- E. ridleyi* King: 29047 (1), 29200 (4); tree with dark blue young leaves; in dryer parts of the swamp-forest.
- E. rugosa* (Korth.) Merr.: 26190 (7), 28521 (9), s.n. 6.8.39 (10); big tree, very abundant and subdominant in coastal sandy forest at Jason Bay.
- E. scortechinii* King: s.n. 26.3.32 (7), 17.7.40 (7); riverside tree -17 m, frequent upstream from Danau on the Sedili Besar; *jambu*.
- E. spicata* Lamk.: 28561 (8), s.n. 1.5.32 (7), 15.6.34 (9); common small tree of *rassau*- and *mempisang*-belts and of *Tristania*-banks; *kelat gelam*, *k. nasi nasi*, *k. nenasi*. See special notes.
- E. subdecussata* Duthie: 29941 (1), 36836 (7); tree -25 m, in dryer parts of the swamp-forest.
- E. subhorizontalis* King: s.n. 18.4.32 (3), 6.2.35 (4), May 1935 (3); tree -14 m; stilt-roots -1.2 m; bark rufous orange, papery flaky; frequent in swamp-forest; ? seldom flowering *kelat gelam*. Plate 15.
- E. syzygioides* (Miq.) Henders.: 28525 (9), s.n. 12.6.34 (9); large tree of *Eugenia grandis* forest. (*E. cymosa* in Wayside Trees of Malaya). Plate 32.
- E. tetraptera* (Miq.) Henders. var. *pseudotetraptera* (King) Henders.: 32018 (2), 30.9.36 (7); tree -10 m, in swamp- and hillock-forest.
- E. tumida* Duthie: 34707 (7), 37086 (10); tree -8 m, stilted as *E. longiflora* in the swamp-forest but not so strongly.

- E. valdevenosa* Duthie: 28327 (7), 31474 (1), 32369 (2), 36882 (7); tree -13 m, frequent in swamp-forest; *kelat jambu*. See special notes.
- Eugenia* sp.: 32282, s.n. 18.2.37 (as *Eugenia* A), (1); tree -20 m, slightly buttressed, without stilt-roots, in dryer parts of the swamp-forest.
- Eugenia* sp.: 28995 (5), 29319 (4), s.n. 5.5.35 (4).
- Eugenia* spp.: s.n. 7.10.34 (7); s.n. 25.11.34 (Tg. Temelak); s.n. 15.5.35 (4).—*Eugenia* A, 6.8.39 (10); *Eugenia* A, 7.8.39 (10); *Eugenia* B, 6.8.39 (10); see special notes.
- Pseudoeugenia perakensis* Scort.: 32106 (2); slender tree -7 m, in swamp-forest.
- P. singapurensis* King: 21346 (1) 28179 (7), 28548 (9), 29248 (2); slender tree -13 m, sometimes with short stilt-roots; frequent in swamp-forest and in the wetter parts of sandy coastal forest. See special notes.
- Rhodamnia cinerea* Jack: 28585 (8); scattered on river-banks and by streams in swamp-forest; *menpoyan*. (*R. trinervia* in Wayside Trees of Malaya).
- Rhodomirtus tomentosa* Wight; occasional in secondary scrub at Jason Bay; *kemunting*.
- Tristania* ? *merguensis* Griff.: s.n. 13.4.36 (9); sapling 7 m; in swamp-forest; curiously absent from most of the Sedili region. Plates 24, 34.
- [*T. obovata* King; ? on rocky headlands of Jason Bay.]
- T. ? pontianensis* Henders.: 31939 (4); tree -35 m, scattered in hillock- and *kapur*-forest. See special notes.
- T. sunatrana* Miq.: 24629 (7), 31451 (7), 34717 (7), (3); tree -23 m; common on raised river-banks in the tidal region and up to the *Saraca*-streams; *pelawan*. See special notes. Plates 1, 3, 14.
- Tristania* sp.: s.n. 31.12.34 (5); tree -40 m, in hillock-forest. See special notes.

Nepenthaceae

- Nepenthes ampullaria* Jack, *N. gracilis* Korth., *N. rafflesiana* Jack: in swamp-forest, more often in the dryer parts and in regrowth.

Nymphaeaceae

- Barclaya motleyi* Hook. f.: 32049 (2), (3), (7); common in muddy places by streams in the swamp-forest, often submerged.; *hati hati*.

Ochnaceae

- Brackenridgea hookeri* (Planch.) A. Gray: 28993 (5); tree -20 m = petals white; scattered in dryer parts of the swamp-forest and in *kapur*-forest. See special notes.

[*Euthemis leucocarpa* Jack; ? (I have not record.)]

- Gomphia serrata* (Gaertn.) Kanis: 25974 (7), 32991 (5); common shrub or small tree on *Tristania*-banks, especially above Bagan Limau on the Sedili Besar; flowers yellow, young leaves pink.

- Neckia serrata* Korth.: herb, common in hillock-forest.

Olacaceae

- Ochanostachys amentacea* Mast.: not infrequent in the swamp-forest but big trees scarce.
- Scorodocarpus borneensis* Becc.: 29388 (7), 32038 (2), 34945 (5), (4); large tree, all parts smelling of garlic when bruised; frequent in dryer parts of the swamp-forest; *kulim*.
- Strombosia maingayi* (Mast.) Whitmore: 28404 (4), 29264 (7), 29496 (2); tree -23 m, common in the swamp-forest and in *Eugenia grandis* forest; *ketaling*. See special notes.

Oleaceae

- Jasminum ? maingayi*: s.n. 11.10.36 (2); slender twiner in undergrowth by streams.
- Linociera insignis* Clarke: 34702 (7), 36922 (7).
- L. peludosa* King et Gamble: 32325 (2).
- L. pauciflora* Clarke: 28083 (7), 29281 (7); tree -20 m, rather common in the swamp-forest.
- Myxopyrum nervosum* Bl.: 32382 (2)

Opiliaceae

- Champereia manillana* (Bl.) Merr.: occasional in-swamp-forest.
- Lepionurus sylvestris* Bl.: 32406 (2), s.n. 11.6.34 (9); shrub on *Tristania*-banks above Lubok Besar on the Sedili Besar; *common* in *Eugenia grandis* forest.

Orchidaceae

(see special notes)

- Acriopsis javanica* Reinw.: (7).
- Aerides odoratum* Lour.: (7), (9).
- Agrostophyllum bicuspidatum* J. J. Sm.: 30727 (3).
- Anaectochilus geniculatus* Ridley: (2), (3).
- Appendicula cornuta* Ridley, *A. densifolia* Ridley (7), *A. lucida* Ridley (7), *A. pendula* Bl. (6).
- Bromheadia alticola* Ridley (7), *B. aporoides* Rchb. f.
- Bulbophyllum acuminatum* Ridley, *B. adenopetalum* Lindl. 30792 (1), *B. alcicorne* Par. et Rchb. f. 26137 (7), *B. apodum* Hook. f. 29994 (3) and 31956 (2), *B. botryophorum* Ridley, *B. carunculaelabrum* Carr. (7), *B. cleistogamum* Ridley, *B. concinnum* Hook. f., *B. epicriantes* Hook. f. 28163 (7), *B. lasianthum* Lindl. 28169 (7), *B. limbatum* Lindl., *B. macranthum* Lindl., *B. pileatum* Lindl., *B. pulchellum* Ridley, *B. purpurascens* Teysm. et Binn., *B. restrepia* Ridley, *B. rugosum* Ridley, *B. sessile* (Koen.) J. J. Sm., *B. singaporeanum* Schltr, *B. stella* Ridley, *B. subumbellatum* Ridley, *B. tenuifolium* (Bl.) Lindl., *B. vaginatum* (Lindl.) Rchb. f.
- Calanthe pulchra* (Bl.) Lindl.: common in swamp-forest; *lembah*.
- C. veratrifolia* R. Br.: common in coastal forest.
- Camarotis adnata* (Ridley) Holtt.

- Ceratostylis subulata* Bl.
Chamaeanthus laciniatus Carr: (7).
Cheirorchis major Carr: 9.3.36 (1).
Claderia viridiflora Hook. f.: (7), in swamp-forest, frequent.
Coelogyne cumingii Lindl.: 30783 (1).
C. testacea Lindl.: (7).
Cymbidium finlaysonianum Lindl.: chiefly coastal.
Dendrobium acerosum Lindl., *D. aloifolium* (Bl.) Rchb. f., *D. callibotrys* Ridley, *D. carnosum* (Bl.) Rchb. f., *D. comatum* (Bl.) Lindl., *D. crocatum* Hook. f., *D. crumenatum* Sw., *D. fugax* Schltr., *D. indivisum* (Bl.) Miq., *D. indragiriense* Schltr., *D. kelsallii* Ridley, *D. leonis* (Lindl.) Rchb. f., *D. lonchophyllum* Hook. f., *D. pandaneti* Ridley, *D. plicatile* Lindl., *D. prostratum* Ridley, *D. salaccense* (Bl.) Lindl. s.n. 11.10.36 (2), *D. secundum* (Bl.) Lindl. common on rocky coast, *D. spurium* (Bl.) J. J. Sm.
Dendrochilum album Ridley 32098 and 32476 (2), *D. longifolium* Rchb. f. (7), *D. spathulatum* Ridley 25899 (7).
Didymoplexis ornata (Ridley) J. J. Sm.: 30660 (6).
Eria floribunda Lindl., *E. gracilis* Hook. f. 30728 (3), *E. neglecta* Ridley common on sengkawang trees (*Shorea*), *E. nutans* Lindl., *E. pannea* Lindl., *E. pudica* Ridley, *E. teysmannii* J. J. Sm., *E. velutina* Lindl. 29995 (3), *E. vestita* Lindl. 31464 (3) and 36928 (7).
Eulophia graminea Lindl.: (9); in coastal sand-dunes.
E. squalida Lindl.: s.n. 12.1.36 (3); frequent in swamp-forest.
Galeola kuhlii Rchb. f., 32191 (2).
Gastrodia javanica (Bl.) Endl.: s.n. 12.4.36 (9).
Geodorum citrinum Jacks.: (7).
Grammatophyllum speciosum Bl.: common throughout the Sedili region; *ekor gajah*, *nibong palai*.
Habenaria singapurensis Ridley (2, 7), *H. sumatrana* Schltr 37087 (10).
Hylophila mollis Lindl.: (2, 3, 7); in swamp-forest.
Liparis gibbosa Finet (7, 8), *L. wrayi* Hook. f. (7).
Nervilia punctata (Bl.) Schltr: (2, 3).
Oberonia flabellata Holtt. 28162 (7), *O. miniata* Lindl. 25989 (7), *O. rhizophoreti* J. J. Sm. (7).
Phalaenopsis fuscata Rchb. f.
Phreatia secunda (Bl.) Lindl.
Plocoglottis gigantea (Hook. f.) J. J. Sm.: in dryer parts of the swamp-forest and in kapur-forest, frequent.
P. javanica Bl.: 12.5.35 (6).
Podochilus lucescens Bl., *P. microphyllus* Lindl.
Pomatocalpa latifolium (Lindl.) J. J. Sm.
Robiquetia spathulata (Bl.) J. J. Sm.
Sarcanthus halophilus (Ridley) J. J. Sm., *S. machadonis* (Ridley) J. J. Sm.
Sarcochilus johorensis Holtt.: C. E. Carr s.n. Oct. 1932 (7).
Sarcostoma javanicum Bl.
Schoenorchis secundiflora (Ridley) J. J. Sm.

- Taeniophyllum culiciferum* Ridley, *T. filiforme* J. J. Sm., *T. obtusum* Bl.
Thelasis carinata Bl. 32464 (2), *T. micrantha* (Brongn.) J. J. Sm., *T. triptera* Rchb. f.
 s.n. 5.1.36 (3).
Thrixspermum acuminatissimum (Bl.) Rchb. f.
T. amplexicaule (Bl.) Rchb. f.: 28461 (9), (7); scrambling over *putat* and *rassau*
 along the rivers, and on coastal bushes, common.
T. arachnites (Bl.) Rchb. f.: frequent on rocky coasts.
T. carinatifolium (Ridley) Schltr, *T. corneri* Holtt. (7), *T. recurvatum* (Hook. f.)
 Car 30656 (6).
Vanilla griffithii Rchb. f.: (9), common along the rocky coast.

Oxalidaceae

- Dapania racemosa* Korth.: 25995 (7), 31965 (2), (10); large climber, common in
 swamp-forest, also hillock- and *kapur*-forest.
Sarcotheca laxa (Ridley) Knuth var. *hirsuta* Veldk.: 29009 (4), 29025 (5), 29380 (4),
 31922 (5); shrub or spindly tree -5 m; frequent in dryer parts of the swamp-
 forest, often on stream-banks, also in hillock-forest; apparently endemic in this
 region. See special notes.

Palmae

- Areca latiloba* Ridley: 28987 (4).
A. montana Ridley: 28687 (4), 28988 (4), (2); frequent at these parts of the
 Jemaluang Road.
Arenga hastata (Becc.) Whitmore: 25867 (7).
A. westerhoutii Griff.: s.n. Aug. 1939 (10); *langkap*.
Calamus exilis Griff.: 29999 (2), 31446 (7); *rotan lilin*.
C. flabellatus Becc.: 32475 (2), 32768 (2).
C. flabelloides Furtado: 29284 (2); in hillock-forest; ? endemic.
C. giganteus Becc.: 29474 (4), (2), (3); frequent in dryer parts of the swamp-forest.
C. javensis Bl. var. *peninsularis* Becc.: s.n. 17.3.37 (2).
C. mawaiensis Furtado s.n. 12.3.37 (2); ? endemic.
C. paspalanthus Becc.: 30875 (6), 32387 (2); *rotan batu*.
C. ramosissimus Griff.: 28539 (9); in coastal forest.
C. riparius Furtado: 32310 (2); ? endemic.
C. tumidus Furtado: 294747 (4); *rotan manau lilin*.
Caryota mitis Lour.: in dryer parts of the swamp-forest, common; *tukas*.
Cornera lobbiana (Becc.) Furtado: 29493 (4), s.n. 1.11.40 (4); stem short, -1.5 m
 high. See special notes.
Cyrtostachys lakka Becc.: frequent in swamp-forest; *linau*.
Daemonorops angustifolius (Griff.) Mart.: 29550 (7), 29749 (1), 32173 (2), s.n.
 27.3.32 (7); common on *Tristania*-banks; *rotan manau, r. tawar*.
D. geniculatus (Griff.) Mart.: 29283 (4).
D. kunstleri Becc.: 29748 (7).

- D. lasiospathus* Furtado: 29482 (4), 29494 (4); solitary, erect. stem -2 m.
- D. leptopus* (Griff.) Mart.: 32412 (2).
- D. longipes* (Griff.) Mart.: 28598 (8); common in swamp-forest.
- D. periacanthus* Miq.: 29317 (1), 32280 (2).
- D. periacanthus* var. *macrocarpus* Furtado: 28645 (8).
- D. sabut* Becc.: 29485, 29486 (2); locally frequent.
- D. verticillaris* (Griff.) Mart.: 29484 (4), 29748 (7), 30780 (1), 32174 (2); common in swamp-forest.
- Eugeissona tristis* Griff.: (4, 5); common in hillock- and *kapur*-forest, but not seen at Bt. Tinjau Laut; *bertam*.
- Iguanura geonomaeformis* Mart. 28743 (3), 29001 (7), 32167 (2).
- I. polymorpha* Becc.: common in swamp-forest.
- I. wallichiana* (Mart.) Hook. f.: very common in swamp-forest, especially with *Cratoxylon arborescens*; stems used as sticks for nipa-attap, at 5 cts. per 100 stems.
- J. Teysmannia altifrons* (Rchb. f. et Zoll.) H. Moore: (3, 4, 5); abundant in dryer parts of the swamp-forest, in hillock- and *kapur*-forest, from S. Berassau northwards along the Jemaluang Road, not south of this, not in the main Sedili region, not on Bt. Tinjau Laut; *daun payong*.
- Korthalsia paludosa* Furtado: 32344 (2).
- Licuala ferruginea* Becc.: 28688 (4).
- L. kiahii* Furtado: 32137 (2); in hillock-forest.
- L. lanuginosa* Ridley: 30739 (6), 37068 (10).
- L. longecalycata* Furtado: 32401 (2); in swamp-forest.
- L. spinosa* Wurmb.: 28485 (9), s.n. 16.5.32 (7); in low breaks in *Tristania*-banks from Mawai down to Bt. Tiga, common in *Eugenia grandis* forest.
- L. triphylla* Griff.: 37079 (10), s.n. 5.1.36 (7).
- Livistona kingiana* Becc.: in swamp-forest; *kapau*, *kepau*.
- L. saribus* (Lour.) Chev.: in swamp-forest, frequent; *serdang*.
- Nenga macrocarpa* Scort.: 29482B (4), 37060 (10); in hillock- and *kapur*-forest: *muring*.
- Nipa fruticans* Wurmb.: *nipa*.
- Oncosperma filamentosum* Bl.: *nibong*. See special notes.
- O. horridum* (Griff.) Scheff.: *bayas*.
- Pholidocarpus macrocarpus* Becc.: 32371 (2); *kapau*, *serdang* (? by mistake).
- Pinanga disticha* (Roxb.) Bl.: 29314 (1); common in the swamp-forest.
- P. limosa* Ridley: 29316 (1); solitary, -1 m high.
- P. malaiana* (Griff.) Mart.: 29219 (4), 29240 (2), 32423 (2); tufted, stems -4 m high; *muring* (as *Pinanga* and *Nenga*).
- P. pectinata* Becc.: 29313 (1), 29239 (7), (6); tufted or solitary, stems -8 m high; common in the swamp-forest.
- P. simplicifrons* (Miq.) Becc.: 29315 (1), 32166 (2); common in the swamp-forest.
- Pinanga* sp.: 30659 (6).
- Plectocomia griffithii* Becc.: (1).
- Ptychoraphis singaporensis* Becc.: (3, 4, 5); frequent in hillock-forest.
- Salacca conferta* Griff.: common in the swamp-forest; *asam paya*, *a. kelugi*.

Pandaneace

(see special notes)

- Freycinetia angustifolia* Bl.: 28074 (8), 28617 (8), 30784 (1), 32354 (2), 32435 (7), s.n. 23.3.40 (7); common riverside climber; *selengsen akar*. See special notes.
- F. confusa* Ridley: 30886 (7); common in the swamp-forest; leaf narrow, glaucous beneath.
- F. corneri* B. C. Stone: 34672 (1), 34938 (5); stout climber, leaves 2-3.5 cm wide; common in the dryer parts of the swamp-forest (also on G. Panti); ? endemic in s.e. Johore and Singapore.
- F. inbricata* Bl.: 28181 (5), 32380 (2), s.n. 13.4.36 (2).
- F. javanica* Bl.: s.n. 17.3.34 (7), 2.2.38 (7); common in swamp-forest.
- F. rigidifolia* Hemsl.: 29738 (5); leaves subglaucous beneath.
- Pandanus affinis* Kurz: slender pandan with orange-red syncarps; common in *nipa*-belt and mangrove, below Bt. Tiga on the Sedili Besar; *rassau tikus*. (*P. aurantiacus*).
- P. alticola* Holtt. et St. John: common epiphytic pandan with narrow grassy leaves, in swamp- and hillock forest.
- P. atrocarpus* Griff.: 32238 (2), 32273 (2); common large pandan -35 m high, with abundant short loop-roots as pneumatophores; syncarps blackish brown; in freshwater swamp and on *Tristania*-banks; *mengkuang*.
- P. corneri* Kanehira: by streams in *nipa* and mangrove swamps; easily known from the almost stemless habit with unbroken, shortly acute leaves like swords: (now called *P. rostratus* Martelli).
- P. dubius* Spreng.: 28463 (8); pandan -13 m high, much branched, with broad leaves, solitary; occasional on the coast. See special notes.
- P. echinodermops* Holtt. et St. John: 28483 (9), 28579 (8), 31948 (7), 33694 (7); short, more or less decumbent, pandan in thickets in stream-beds and hollows behind the *nipa*-belt and in *Eugenia grandis* forest, common; *selengsen*, *siakum*. See special notes.
- P. epiphyticus* Martelli: 29979 (mile 17, Jemaluang Road); not in the swamp or coastal forest of the main Sedili region ? southernmost record in Malaya. See special notes.
- P. helicopus* Kurz: 28161 (7), 29238 (2), s.n. 25.1.31 (7), 13.5.34 (7), 30.5.37 (7), 16.7.40 (7); the common *rassau* on the freshwater tidal river-banks. See special notes. Plates 1, 4, 5.
- P. kamii* B. C. Stone: 28482 (9), 29490 (1), 29737 (2); apparently stemless pandan forming large dense thickets; common in the swamp-forest and in *Eugenia grandis* forest; *pandan*. See special notes. Plate 5.
- P. malayanus* B. C. Stone: 28627 (8), 31203 (2), 32512 (2); slender pandan, stems -5 m high; by sluggish streams and ponds in the swamp-forest. usually standing in the water, common; *rassau tikus*. See special notes.
- P. odoratissimus* Linn. f.: 32763 (2), s.n. 5.6.34 (9); the common and very spinous sea-shore pandan, with large heads of compound fruits ripening red. See special notes.
- P. parvus* Ridley: 29996 (7), 32477 (2), s.n. 30.9.36 (7); dwarf pandan with short broad leaves; locally abundant in swamp-forest. See special notes.
- P. pentadon* Ridley: 29391 (4), 29998 (2), 32168 (2), 32482 (1); low prostrate pandan in dense thickets along the swifter streams in the swamp-forest, often immersed in the water; *rassau tikus*. See special notes.

- P. recurvatus* St. John: s.n. 16.6.34 (9), 8.4.36 (7), (10); slender pandan -5 m tall, branched, often in thickets, the narrow leaves glaucous beneath; syncarps solitary, pendent, bluish grey; in dryer parts of the swamp-forest and in hillock-forest. (*P. ornatus*).
- P. scortechinii* Martelli: 28744 (3), 29237 (1), ? 29238 (2), 29361 (3), 29997 (3), 32102 (2), 32460 (2), 36923 (7), s.n. 7.2.35 (3); small pandan with stilt-roots, gregarious but not forming thickets by streams in the swamp-forest, common. See special notes.
- P. yvonii* Solms: 28576 (8), 29390 (4), 32278 (2), 32513 (2), s.n. 2.4.34 (8); rather slender pandan -5 m tall, in loose thickets in the swamp-forest and with *P. helicopus*, common, especially on the Sedili Kechil; *rassau tikus*. See special notes.

Passifloraceae

- Adenia singaporeana* Wall.: common in hillock-forest. [*A. macrophylla* (Bl.) Koord. var. *singaporeana* (Wall.) de Wilde, in *Flora Malesiana* ser. 1, 7, 1972, 429.]

Piperaceae

- Piper* ? *boehmeriaefolium* Wall.: 32121 (2), (1).
- P. caninum* Bl.: 28492 (9), 31977 (2), 32471 (2); common small epiphytic climber in swamp-forest and *Eugenia grandis* forest.
- P. miniatum* Bl.: 28165 (7); common epiphyte in the swamp-forest; *kadoh*.
- P. ? muricatum*: s.n. 28.4.35 (7), (3); frequent epiphyte in swamp-forest.
- P. pedicellosum* Wall.: 28536 (9); big climber, stem -12 cm thick; in *Eugenia grandis* forest: *sireh murai*.
- P. porphyrophyllum* N. E. Br.: frequent small climber in swamp-forest.
- P. ramipilum* DC: 32335 (2).
- P. stylosum* Miq.: 30731 (6).
- Piper* spp.: 32023 (2); 32136 (2).

Pittosporaceae

- Pittosporum ferrugineum* Ait.: (9), scattered in coastal forest.

Polygalaceae

- Trigonistrum hypoleucum* Miq.: 34713 (7).
- Xanthophyllum affine* Korth.: 28188 (7), 28610 (8), 29341 (1), 32099 (2), 32100 (2), 32996 (7), 36794 (7); tree -13 m, common in swamp-forest and on the riverside; *lemak berok*. See special notes.
- X. bullatum* King: (4, 5); treelet -3 m.
- X. curtisii* Ridley: 36832 (7).
- X. ellipticum* Korth.: 25963 (7); small tree; leaves small, dark glossy green; fruit bright orange; on *Tristania*-banks, scarce: *lemak berok*.
- X. maingayi* Benn.: 36852 (7).
- X. malayanum* Meijden: 32094 (2), 32419 (2), 33137 (2); tree 4-10 m with pinkish or purplish flowers; in swamp- and hillock-forest.

- X. obscurum* Benn.: 32205 (2); tree -18 m, in swamp-forest.
X. pulchrum King: 29321 (5), 37246 (4); treelet -4 m, with stilt-roots. See special notes.
X. stipitatum Benn.: 36907 (7).
X. wrayi King: 29205 (3), s.n. 7.2.35 (3); treelet -4 m, in swamp-forest; *lemak berok*. See special notes.

Proteaceae

- Helicia attenuata* (Jack) Bl.: Sinclair 40294 (Sedili bridge, Jemaluang Road); riverside.
H. petiolaris Benn.: 25965 (7); frequent on *Tristania*-banks at Bagan Limau, Sedili Besar; fruits blue.
H. robusta (Roxb.) R. Br.: s.n. 27.3.32 (7); shrub or small tree; riverside, common in the freshwater tidal region; *putat ulu*.
H. rufescens Prain: 30856 (2), 32065 (2), 32327 (2); tree -20 m, in dryer parts of the swamp-forest.
Heliciopsis velutina (Prain) Sleumer: 37097 (2); tree -13 m, in swamp-forest.

Rhamnaceae

- Colubrina asiatica* Brongn.: coastal.
Ventilago malaccensis Ridley: frequent climber on *Tristania*-banks.
Zizyphus calophylla Wall.: 25851 (7); common climber on *rassau* and on *Tristania*-banks; *kuku lang*.

Rhizophoraceae

(see special notes)

- Anisophyllea corneri* Ding Hou: 29324 (4), 36999 (7); tree -10 m; frequent in hillock- and *kapur*-forest. See special notes.
A. disticha (Jack) Baillon: frequent treelet in dryer parts of the swamp-forest.
Bruguiera cylindrica (L.) Bl.: mangrove. (*B. caryophylloides* Bl.)
B. parviflora (Roxb.) W. et A.: mangrove; *lenggadai*.
B. gymnorrhiza (L.) Lamk: mangrove; *tumu*.
B. sexangula (Lour.) Poir.: mangrove; *busing*. (*B. eriopetala* W. et A.)
Carallia brachiata (Lour.) Merr.: 28677 (7), 28678 (7), 29418 (5), 30889 (7), 32760 (2), 36795 (7), 36857 (7); tree -17 m, frequent in swamp-forest and on *Tristania*-banks. See special notes.
Ceriops tagal (Perr.) C. B. Robinson: mangrove; *tengar*. (*C. candolleana* Arn.)
Gynotroches axillaris Bl.: 25889 (7), 32163 (2); tree -15 m, scattered on *Tristania*-banks, as the slender form (Ridley, Fl. Mal. Pen. I); *mata keli*.
Kandelia candel (L.) Druce: mangrove; *menkadai*. (*K. rheedii* W. et A.)
Pellacalyx axillaris Korth.: 32035 (2); tree -20 m, scattered in swamp-forest; *buloh buloh*, *membuloh*. See special notes.
Rhizophora apiculata Bl.: mangrove; *akit*, *bakau*. (*R. conjugata* Arn.)
R. mucronata Lamk: mangrove; *bakau laut*, *belukap*.

Rosaceae

- Parastemon urophyllum* A.DC.: 25952 (7), 25970 (7); small tree on *Tristania*-banks, above Lubok Besar on the Sedili Besar.
- Parinari corymbosa* (Bl.) Miq.: 28495 (9); tree -33 m, in *Eugenia grandis* forest; batu, membatu, m. laut.
- P. costata* (Korth.) Bl.: 34674 (7), 34765 (7), 36915 (7), s.n. 8.9.35 (5); tree -30 m, in swamp-forest, not common.
- P. nannodes* Kosterm.: 29329 (4), 31466 (3), 34712 (7), 36898 (7), 37245 (4), s.n. 4.2.35 (1); tree -20 m; common in swamp-forest and in kapur-forest.
- P. oblongifolia* Hook. f.: 36910 (7); in swamp-forest.
- Pygeum lampongum* Miq.: 21308 (2); tree -10 m, in swamp-forest. See special notes.

Rubiaceae

- Anthocephalus cadamba* (Roxb.) Miq.: frequent in re-growth in dryer parts of the swamp-forest.
- Argostenma johorensis* Ridley; s.n. 28.4.35 (3); herb; peduncle and corolla pinkish white; in swamp-forest.
- Aulacodiscus prennoides* Hook f.: 29443 (5), 30695 (6), 32285 (2), 32408 (2); tree -8 m, frequent in swamp-forest. See special notes.
- Borreria hispida* Hook. f.: (9); coastal herb. [*B. articularis* (Linn. f.) F. N. Williams].
- Canthium confertum* Korth.: 28542 (9), 32426 (2), 32485 (1); tree -10 m, frequent in swamp-forest and on the rocky coast.
- C. didymum* Gaertn.: 25852 (7), 32340 (2). See special notes.
- C. glabrum* Bl.: 28532 (9), 34763 (7).
- C. hirtellum* Ridley: 32047 (2).
- C. horridum* Bl.: 29752 (5), 32422 (2); low spreading climber with paired hooks; in swamp-forest.
- Canthium* sp.: 32378 (2).
- Cephaelis griffithii* Hook. f.: (4); shrub -1 m, in dryer parts of the swamp-forest.
- C. singapurensis* Ridley: s.n. 14.5.35 (4).
- Chasalia curviflora* Ridley: 28955 (3), 31989 (2), 32114 (2); common shrub -3 m in swamp-forest.
- Coptophyllum capitatum* Miq. (6); by *Saraca*-streams.
- Diplospora malaccensis* Hook. f.: 28168 (7), 28533 (9), 31458 (7); common in swamp-forest; kayu baki, kopi utan.
- Gaertnera obesa* Hook. f.: 32110 (2), (7); treelet -7 m, common in the swamp-forest.
- G. schizocalyx* Bremek.: 32015, 32507 (2); shrub in swamp-forest.
- Gardenia griffithii* Hook. f.: (3).
- G. tentaculata* Hook. f.: 25959 (7); small shrub, common on *Tristania*-banks.
- G. tubifera* Wall.: 24625 (7), 25971 (7), 28736 (3), 32368 (2), 32440 (7); tree -13 m, common on *Tristania*-banks, mostly above K. Dohol on the Sedili Besar and disappearing 1-2 miles above Mawai, none downstream; pakan heran.
- Gardeniopsis longifolia* Miq.: 28686 (4), 32029 (2), 32315 (2); shrub or treelet -4 m; corolla pale pinkish white; common in dryer parts of the swamp-forest and in hillock-forest.

- Guettarda speciosa* L.: coastal; *kampar*.
- Gynochthodes sublanceolata* Miq.: common small climber in swamp-forest.
- Hedyotis capitellata* Wall.: 28693 (1); common in openings in the dryer parts of the swamp-forest and in hillock-forest.
- H. pinifolia* Wall.: coastal herb.
- Hydnophytum formicarum* Jack: common epiphyte; *kepala berok*.
- Ixora concinna* Hook. f.: 32043 (2), 32143 (2); tree -12 m, frequent in the swamp-forest. See special notes.
- I. congesta* Roxb.: 25968 (7), 32226 (1), 32326 (2), s.n. 1.9.35 (1); shrub or small tree 1-6 m; common in swamp-forest.
- I. grandifolia* Zoll. et Mor.: 25892 (7), 28578 (8), 28628 (8), 31944 (4), 32052 (2), 32277 (2), 32498 (2), 35559 (7), s.n. 3.4.37 (7), 11.4.36 (2), 6.10.36 (2), 11.10.36 (2); bushy tree -10 (-20) m, common in the *mempisang*-belt and in swamp-forest. See special notes.
- I. grandifolia* var. *lancifolia* Corner: s.n. 9.3.36 (6), 10.4.36 (6); tree of *Saraca*-streams.
- I. javanica* (Bl.) DC: 25960, 25961 (7); on *Tristania*-banks.
- I. javanica* var. *retinervia* Corner: 29020 (5), 29939 (3), 32359 (2); occasional in hillock- and *kapur*-forest.
- I. lobbii* King et Gamble: 28166 (7), 30787 (1), 32292 (2), 32293 (2), 32495 (2); shrub or spindly tree -7 m; common locally in swamp-forest and by streams in hillock-forest. See special notes.
- I. pendula* Jack: 32317 (2); tree -7 m, in hillock-forest.
- I. umbellata* Koord. et Val.: 28489 (9), 30685 (6); shrub or small tree 3-8 m; flowers white, very fragrant; common in *Eugenia grandis* forest and along *Saraca*-streams.
- Jackia ornata* Wall.: 32305 (2), (7); tree -27 m, 30-38 cm thick at 2 m, often fluted at the base; frequent in swamp-forest.
- Lasianthus chryseus* Ridley: 32487 (1).
- L. ellipticus* Wight: 29936 (3); treelet -5 m; in *kapur*-forest.
- L. griffithii* Wight: 32481 (1).
- L. maingayi* Hook. f.: 32338 (2).
- L. stipularis* Bl. 29986 (2), (3); shrub -2 m.
- Lasianthus* sp.: 32244 (2).
- Lecananthus erubescens* Jack: 28454 (9), 30860 (2), 31966 (2), (7); slender epiphyte or creeper, common in swamp-forest.
- Lucinaea membranacea* King: 32030 (2), (4).
- L. morinda* DC: 28068 (8), 28596 (8); root-climber on riverside trees, with pendent flowering sprays -30 cm long, frequent; *akar subong 'che minah*.
- Morinda citrifolia* L.: coastal.
- M. ridleyi* King: climber in swamp-forest.
- M. umbellata* L.: ?
- Mussaenda glabra* Vahl: 32200 (2), 36912 (7); scrambler in open places along the river, from Bt Tiga upstream on the Sedili Besar; *balek adap*.
- M. mutabilis* Hook. f.: 29340 (1); frequent climber in dryer parts of the swamp-forest.

- Mussaendopsis beccariana* Baill.: 35562 (7), s.n. 12.3.37 (2); tree -27 m, common in swamp-forest; *malbera*. See special notes. Plates 25, 34.
- Myrmecodia armata* DC: common epiphyte.
- Nauclea maingayi* Hook. f.: 25900 (7), 28621 (8), 32183 (2), 36816 (7), s.n. 19.6.34 (8); tree -20 m, common on *Tristania*-banks and in the swamp-forest; *bengkai*, *bengkal*. See special notes.
- N. subdita* (Miq.) Merr.: 31465 (3); bush or small tree -7 m, very common along the banks of the Sedili Besar above Bagan Limau; *gedembah*. See special notes.
- Neonauclea sp.*: 32985 (7); shrub or treelet -5 m, riverside. See special notes.
- Ophiorrhiza singapurensis* Ridley: 29294 (3), (7); herb, abundant in swamp-forest.
- Paederia verticillata* Bl.: 30772 (3), 36914 (7).
- Pavetta indica* L.: 34602, 34603 (2); frequent in dryer parts of the swamp-forest.
- P. naucleiflora* Don: s.n. 23.6.34 (8); shrub 2 m, in sandy coastal forest.
- P. tomentosa* Roxb.: 28597 (8), 29448 (5), (2); frequent in swamp-forest. (See Corner, Gdns' Bull. Singapore 10, 1939, 48).
- Pavetta spp.*: (4): (specimens in the Singapore Herbarium).
- Petunga roxburghii* DC: 28477 (9), 32366 (2); tree -20 m, occasional in swamp-forest, common in *Eugenia grandis* forest; *membras*. See special notes. Plate 26.
- P. venulosa* Hook. f.: 28450 (9), 29201 (4); bush or tree -7 m, in the dryer part of the swamp-forest. See special notes.
- Prismatomeris tetrandra* K. Schum.: 25858 (7); tree -7 m, on *Tristania*-banks, scattered.
- Prismatomeris sp.*: s.n. 14.4.35 (2).
- Psychotria angulata* Korth.: 28509 (9); shrub 2 m, *Eugenia grandis* forest.
- P. griffithii* Hook. f.: (4).
- P. helferiana* Hook. f.: 36950 (10).
- P. maingayi* Hook. f.: 32115 (2).
- P. obovata* Wall.: 28608 (8), (9); common small root-climber, riverside; flowering in June.
- P. ridleyi* King et Gamble: 25994 (7); common epiphyte in swamp-forest.
- P. rostrata* Bl.: (3).
- P. sarmentosa* Bl.: 32474 (2).
- P. ? stipulacea* Wall.: (3).
- Psychotria sp.*: 29940 (3), epiphytic bush at c. 20 m on a tree in swamp-forest; stem-base and roots grey-green, swollen, fleshy, tuberous; not climbing; ? rare (found only once).
- Psychotria sp.*: 32295 (2).
- Randia auriculata* K. Schum.: 28158 (7), 32376 (2), 36886 (7); root-climber, scattered in swamp-forest.
- R. binata* King et Gamble: 32037 (2), ? 32459 (2); climber.
- R. fragrantissima* Ridley: frequent small tree in swamp-forest.
- R. kuchingensis* Wyatt-Smith: 32153 (2); tree -10 m, in hillock-forest.
- R. longiflora* Lamk: common climber with hooked thorns, mangrove; *kuku lang*.
- R. ? oppositifolia* (Roxb.) Koord.: 28954 (3); epiphytic bush in swamp-forest. See special notes.
- R. ? penangiana* King: 29333 (4); large climber with hooks, in *kapur*-forest.

- R. scortechinii* King et Gamble: 32131 (2), 36930 (10); small tree in hillock- and kapur-forest.
- Rennellia elongata* Ridley: 37053 (10); in kapur-forest.
- R. speciosa* (Wall.) Hook f.: 29030 (5), 32309 (2), (4); in hillock-forest; *mengkudu rinba*.
- Saprosma glomerulatum* King et Gamble: 29269 (7), 29439 (5), 32072 (2), 32159 (2), s.n. 30.12.34 (4); shrub or small tree -13 m, twigs foul-smelling when broken; common in swamp-forest and kapur-forest; *kentut kentut, sekentut*.
- Scyphiphora hydrophyllacea* Gaertn.: (8, 9); mangrove; *chingam*.
- Streblosa pubescens* Ridley: 32355 (2).
- Tarennia appressa* (King) Corner: 30878 (7); shrub or treelet in swamp-forest.
- T. costata* Miq.: 32425 (2); tree -12 m, in swamp-forest.
- T. fragrans* Bl.: 24624 (7), 25962 (7), 28569 (8), 36814 (7); shrub or treelet, scattered on *Tristania-banks* below Mawai on the Sedili Besar, common on the Sedili Kechil.
- T. longifolia* (Don) Ridley: 28732 (2), 32248 (2), s.n. 18.6.34 (8), 28.6.36 (3); treelet 2-4 m, with deflexed panicle; frequent in swamp-forest.
- T. mollis* Wall.: 28705 (1), 29383 (4), 31998 (2), (7); tree -10 m, common in swamp-forest. See special notes.
- T. stellulata* Ridley: (5); treelet -4 m, frequent in swamp-forest.
- Timonius flavescens* (Jack) Baker: 32148 (2); frequent small tree by streams in the swamp-forest.
- T. wrayi* King et Gamble: 29326 (4); tree -17 m, in kapur-forest. See special notes.
- Uncaria* Schreb.: climbers with flattened sprays of opposite leaves, with axillary hooks not developed on the uppersides; leaves withering red; *akar kait kait, a. kekait*.
- U. attenuata* Korth.: common in *rassau*- and *jejawi*-belts along the river.
- U. glabrata* (BP.) D.C.: ?
- U. ovalifolia* Roxb.: 34762 (7).
- U. pedicellata* Roxb.: s.n. 21.6.34 (8); very abundant on the banks of the Sedili Kechil.
- U. pteropoda* Miq.: frequent in swamp-forest.
- U. scleroptera* Roxb.: frequent in *rassau*- and *jejawi*-belts along the river.
- Urophyllum corymbosum* Korth.: 28976 (3), 30681 (6); shrub in swamp-forest.
- U. glabrum* Jack: 28651 (8), 29498 (2), 32242 (2), 32473 (2); shrub -4 m, abundant in the swamp-forest.
- U. hirsutum* Hook. f.: 30786 (1), 32075 (2).
- U. ? macrophyllum* Korth.: 29948 (4); treelet -4 m, sparingly branched; in swamp-forest.
- U. streptopodium* Wall.: 28699 (1), 29480 (4), 36943 (10), (7); treelet -5 m; stem 2-5 cm thick, monopodial; common in swamp-forest.
- U. trifurcum* Pears.: 36870 (7).
- Urophyllum* sp.: 28964 (3); shrub or treelet -5 m, frequent in swamp-forest.
- Urophyllum* sp.: 32113 (2).
- "Rubiaceae s.n. 7.7.35 (4)"; (specimen put at the end of Rubiaceae in the Singapore Herbarium).

Rutaceae

- Acronychia porteri* Hook. f.: 32375 (2), 32420 (2).
- Atalantia monophylla* DC: 28458 (9), (8); tree -14 m, with thorny twigs; common in *Eugenia grandis* forest; *merlimau*. (*A. spinosa* of Wayside Trees of Malaya).
- Clausena excavata* Burm.: 28473 (9); tree -10 m, with nauseous smell from the crushed twigs and leaves; common in young *Eugenia grandis* forest.
- Evodia glabra* Bl.: 31927 (5); tree -20 m; bark pinkish grey, creviced; inner bark pale pinkish orange; wood yellowish white; in hillock-forest.
- E. roxburghiana* (Champ.) Benth.: 21200 (7), 28508 (9); tree -13 m; bark as *E. glabra*: in swamp-forest and in wet hollows or water-courses in *Eugenia grandis* forest; *inggi burong*.
- Glycosmis chlorosperma* (Spreng.) Tanaka: 29038 (4), 30975 (1), 31975 (2), 32239 (2), s.n. 11.6.34 (9); shrub or treelet 3-10 m, frequent in swamp-forest and in *Eugenia grandis* forest. (*G. pentaphylla* in Wayside Trees of Malaya).
- G. decipiens* B. C. Stone: s.n. 10.2.35 (5); shrub -1.7 m. (*Phoenicimon rubiginosum* Ridley).
- Luvunga scandens* B. Ham.: 32439 (2), s.n. 19.10.37 (7); big climber with spiny stem, in swamp-forest.
- Merope angulata* (Willd.) Swingle: thorny bush in mangrove; *limau lilang*. (*Paramignya angulata* in Wayside Trees of Malaya).
- Paramignya lobata* Burkill: s.n. 13.4.36 (7); climber with thorny stems and orange-yellow petioles; fruit tomato-red; not infrequent in swamp-forest.
- P. scandens* (Griff.) Craib: s.n. 17.3.34 (7); scrambler low down in the forest, not infrequent in swamp-forest; juice of root said by Malays to be an infallible cure for sore nose and throat and 'ulat dalam kepala'; *sakit rastong*.
- Tetractomia major* Hook. f.: 35561 (7); tree -20 m, with narrow monopodial crown; in swamp-forest (Botanical Reserve, Sedili Besar, upper boundary, chain 15).
- T. tetrandra* (Roxb.) Craib: 28725, 28726, 28727 (2), 36797 (7); tree -23 m, with pneumatophores; frequent in swamp-forest; *medang*. See special notes. Plates 7, 36.

Sabiaceae

- Meliosma lanceolata* Bl.: 32086 (2).
- M. pinnata* (Roxb.) Walp. ssp. *ridleyi* (King) Beus.: 29411 (5); tree -17 m, in *kapur*-forest. See special notes.
- M. sumatrana* (Jack) Walp.: s.n. 14.4.35 (2); treelet -5 m, common in hillock-forest. See special notes.

Santalaceae

- Scleropyrum ridleyi* Gamble: 29348 (6); treelet -5 m, cauliflorous; by *Saraca*-streams.

Sapindaceae

- Allophylus cobbe* L. var. *velutina* Corner; 28470 (9); tree -7 m, in young *Eugenia grandis* forest, frequent. See special notes.
- Dimocarpus longan* Lour. ssp. *malesianus* Leenh.: 32405 (2); tree -10 m, in hillock-forest; *mata kuching*, *pedaru*. See special notes.

- Dodonaea viscosa* Jacq.: 28455 (9); shrub or small tree -7 m; common in coastal forest of *Casuarina* and secondary forest with *Hibiscus tiliaceus*.
- Guioa bijuga* (Hiern) Radlk.: 32249 (1); tree -13 m, at the edge of the swamp-forest; several trees in fruit in Feb. 1937.
- G. pleuropteris* (Bl.) Radlk.: 28082 (7), (9); in secondary forest and on rocky coasts.
- Lepisanthes* Bl.: see special notes.
- L. rubiginosa* (Roxb.) Leenh.: 28486 (9), (7); in swamp-forest and commonly in *Eugenia grandis* forest; *mertajam*. (*Erioglossum rubiginosum* of Wayside Trees of Malaya).
- L. senegalensis* (Poir.) Leenh.: 32350 (2); tree -17 m, in hillock-forest.
- L. tetraphylla* (Vahl) Radlk.: 28494 (9), 28593 (8), 28996 (5), 32496 (2), s.n. 11.6.34 (9), 9.2.35 (5); treelet -5m, cauliflorous; young leaves white, drooping; common in swamp-forest by riversides, in hillock-forest, and in *Eugenia grandis* forest.
- Mischocarpus sumatranus* Bl.: 25975 (7), 28320 (9); tree -11 m, scattered on *Tristania*-banks upstream from Bagan Limau on the Sedili Besar.
- Nephelium eriopetalum* Miq.: 36845 (7).
- N. glabrum* Noronh.: 25980 (7), 32442 (7); tree -25 m; inner bark green just below the surface even in old trees; frequent on *Tristania*-banks and in dryer parts of the swamp-forest; general fruiting in March 1937; *redan*.
- N. cf. herveyi* Ridley: 32118 (2), 36838 (7).
- N. rubescens* Hiern: 26136 (7), 28572 (8), 28574 (8), 28625 (8); tree -20 m; scattered on *Tristania*-banks on the Sedili Besar, common on the Sedili Kechil; general flowering in June 1934.
- Pometia pinnata* Forst f. *alnifolia* (Bl.) Jacobs: 29302 (1); tree -30 m, strongly and sharply buttressed -4 m high; common in swamp-forest; *kasai*. See special notes. Plates 9, 36.
- Trigonachras acuta* Radlk.: 28630 (8); tree -23m, common along the Sedili Kechil from Kg Ladang upstream to S. Lebai Kator; general flowering at the end of June 1934; *tangisong burong*.
- Xerospermum muricatum* Radlk.: 29260 (2), 32186 (2), 32339 (2); tree -20 m, frequent in the swamp-forest; *kikir buntal*.
- Xerospermum* sp.: s.n. 12.6.34, 14.6.34 (9); tree -20m; fruits ripening yellow; common in wet hollows and by water-courses in *Eugenia grandis* forest; *geringgong*.
- Xerospermum* sp.: s.n. 13.4.35 (7); tree -20 m; fruits ripening yellow with yellow pulp; common in swamp-forest; *kikir buntal*. See special notes.

Sapotaceae

- Chrysophyllum lanceolatum* (Bl.) DC: 34943 (5); tree -20 m, monopodial; in *kapur*-forest.
- Ganua kingiana* (Brace) w.d. Assem: s.n. 6.8.39 (10); tree -25 m, common on Bt. Tinjau Laut.
- G. motleyana* (de Vr.) Pierre: 28442 (9), 32154 (2), (7); tree -47m, with knee-roots; common in swamp-forest; *bengkku*. See special notes. Plates 7, 34.
- Madhuca hirtiflora* H. J. Lam: 29037 (5), (4); scattered in dryer parts of the swamp-forest and in hillock-forest; *nyatoh*. See special notes.
- M. sericea* (Miq.) H. J. Lam var. *ridleyi* Ng: s.n. 10.2.35 (1).

- M. sessiliflora* v. Royen: 28994 (5), 29024 (5), 29429 (5), s.n. 24.6.35 (4); small tree 2-7m; common locally in swamp-, hillock-, and *kapur*-forest about mile 13-14 Jemaluang Road; apparently endemic in this region. See special notes.
- M. tomentosa* H. J. Lam: 21330 (5), 31996 (2), 32129 (2), 32390 (2), 36934 (10); small tree 3-12 m; frequent in swamp-, hillock-, and *kapur*-forest; *nyatoh*. See special notes.
- M. tubulosa* H. J. Lam: 29039 (4); in the dryer part of the swamp-forest; *nyatoh*.
- M. utilis* H. J. Lam: 32019 (2), 32992 (5).
- Madhuca* sp.: 29305 (1); tree -20 m, in swamp-forest; *nyatoh*. See special notes.
- Palaquium clarkeanum* King et Gamble: (5); in *kapur*-forest.
- P. confertum* H. J. Lam: 30789 (1); tree -33m, sharply and steeply buttressed -2 m; in the dryer part of the swamp-forest.
- P. gutta* (Hook.f.) Baill.: (5); scattered in dryer parts of the swamp-forest; *taban*, *getah taban*.
- P. hexandrum* (Griff.) Engl.: 37076 (10); tree -50 m, in *kapur*-forest. See special notes.
- P. macrocarpum* Burck: 29305 (1); tree -20 m, in the dryer parts of the swamp-forest; also det. *P. leiocarpum* Boerl.
- P. obovatum* (Griff.) Engl.: 21324 (1), 28639 (8); tree -30m; not infrequent in dryer parts of the swamp-forest and in *nibong*-forest at the back of the mangrove; *nyatoh*.
- P. semaram* H. J. Lam: 28516 (9), 36793 (7), s.n. 18.2.37 (2); tree -50m, steeply buttressed -3 m high; scattered in swamp-forest and as a canopy-tree in *Eugenia grandis* forest; *semaram*, *sundek*.
- P. sukoei* Fischer: 29320 (4), 29379 (4), 31995 (2), 32990 (5), s.n. 15.5.35 (4); tree -27m, frequent in hillock- and *kapur*-forest.
- P. xanthochyllum* Pierre: 25891 (7), 25990 (7), 29265 (7), 34718 (7), 34758 (7), 36796 (7); tree -35 m, with strong stilt-roots; common in swamp-forest and in the *mempisang*-belt; *bengka*, *bengku*, *jangka tinggi*, *suntai*. See special notes. Plates 13, 17, 35.
- Palaquium* sp.: s.n. 9.9.34 (4) as Sapotaceae A. See special notes. Plate 20.
- Planchonella maingayi* (Clarke) v. Royen: 21318 (1), 28624 (8); tree -23 m, fluted at the base; frequent in swamp-forest. (*Lucuma maingayi*).
- P. obovata* (R. Br.) Pierre; common on the sandy and rocky coast of Jason Bay; *lisi*.
- Pouteria malaccensis* (Clarke) Baehni: 29468 (4); tree -33 m, sharply and steeply buttressed -3.3 m high, the buttresses often forked; in *kapur*-forest, occasional in the swamp-forest and with a few stilt-roots -2 m high. (*Lucuma malaccensis*).
- P. paucinervia* Erlee: 34721 (7); tree -17 m, frequent in swamp-forest.

Saurauiceae

- Saurauia tristyla* DC: 32027 (2), 37077 (10), (6); small tree -7 m; flowers pink, mostly ramiflorous; common by *Saraca*-streams.

Schisandraceae

- Kadsura cauliflora* Bl.: s.n. 13.6.34 (9), 27.3.39 (7); cauliflorous climber with pinkish purple fruits; in swamp-forest and in *Eugenia grandis* forest.

Scrophulariaceae

Cyrtandromoea: see under Gesneriaceae.

Herpestis monniera HBK.: on mud under *nipa*; *beremi*, *beremiu*.

Limnophila erecta Benth.: 32051 (2); common aquatic herb, more or less submerged, by the edge of the Sedili Besar from K. Dohol downstream to a short way below Bt. Tiga; *rumput ekor kucing*. (See Sinclair, Gdns' Bull. Singapore 22, 1967, 229).

Simaroubaceae

Brucea javanica (L.) Merr.: s.n. 10.7.36. (*B. amarissima* in Wayside Trees of Malaya).

Eurycoma longifolia Jack: (8); in hillock-forest; *penawa pahit*.

Quassia indica (Gaertn.) Noteboom: 28547 (9); treelet -5 m; common in wetter parts of the sandy coastal forest, especially by streams, often tufted; *piandong*. See special notes.

Solanaceae

Solanum parasiticum Bl.: 32503 (2), (7); compact little epiphyte with white flowers, in deeper parts of the swamp-forest, frequent.

Staphyleaceae

Turpinia sphaerocarpa Hassk.: 28690 (1), 28710 (1); tree -20 m, frequent in swamp-forest. See special notes.

Stemonaceae

Stichoneuron caudatum Ridley: 28716 (1), 30684 (6), 32761 (2), 37056 (10); herb -70 cm; leaves silvery beneath; inflorescence pale greenish white; flowers opening one at a time; filaments purple, anthers yellow; locally frequent in the swamp-forest.

Sterculiaceae

Byttneria brevipes Ridley: s.n. 14.5.35 (5); treelet 3 m, in swamp-forest.

B. maingayi Mast.: 32443 (2).

Commersonia bartramia (L.) Merr.: in secondary forest; *menkirai*.

Heritiera elata Ridley: (7); large buttressed tree, rather frequent in swamp-forest by the Sedili Besar.

H. littoralis Ait.: (9); mangrove and sea-coast, frequent; *dungun*.

H. simplicifolia (Mast.) Kosterm.: 37026 (5), s.n. 30.12.34 (5), 2.2.35 (1); tree -30 m, buttressed; in dryer parts of the swamp-forest, in hillock- and in *kapur*-forest: *bengkulang*. See special notes.

H. sumatrana (Miq.) Kosterm.: s.n. 7.2.35 (3), 16.7.39 (7); buttressed tree of swamp-forest; *bengkulang daun tujoh*.

- Leptonychia glabra* Turcz.: 29259 (2), 29336 (4), 32082 (7); shrub -3 m; fruiting April 1935; flowering May 1935; in hillock- and *kapur-forest*; See special notes. (? *L. heteroclita* Sch.)
- Pterospermum javanicum* Jungh.: s.n. 11.6.34, 12.6.34 (9), 2.2.35 (1), (7); tree -30 m, buttressed; frequent in swamp-forest, common in *Eugenia grandis* forest; *letop letop*. See special notes.
- Scaphium macropodum* (Miq.) Beumée: 36860 (7), 36862 (7), s.n. 5.5.35 (1), 13.5.35 (5), 2.5.37 (7), (10); tree -40 m, buttressed; frequent in the swamp-forest; *kembang samangkok*. See special notes. (*S. affine* in Wayside Trees of Malaya).
- S. linearicarpum* (Mast.) Pierre: s.n. 10.2.35 (2), (4), (10); tree as *S. macropodum*; in the dryer parts of the swamp-forest (? only as saplings), and in hillock-forest; *kembang samangkok*.
- Sterculia bicolor* Mast.: 32437 (2), 36801 (7), 36808 (7), s.n. 28.3.37 (7); tree -27 m, frequent in swamp-forest. See special notes.
- S. brachycarpa* Ridley: 36905 (7).
- S. coccinea* Jack: frequent shrub or treelet in swamp-forest. (*S. laevis* in Wayside Trees of Malaya).
- S. macrophylla* Vent.: 28471 (9), 36892 (7); tree -20 m, frequent in swamp-forest and in *Eugenia grandis* forest; fruiting in June 1934. See special notes.
- S. cf. rostrata* Ridley: 34658 (4).
- S. rubiginosa* Vent.: 28663 (5); in hillock- and *kapur-forest*.
- S. cf. scortechinii* King: 29323 (4), 29378 (4); tree -13 m, frequent in *kapur-forest*. See special notes.

Styracaceae

- Styrax crotonoides* Clarke: 28704 (1), 29246 (1), 30688 (6), 32095 (2), 36937 (10); tree - 13 m, in dryer parts of the swamp-forest, in hillock- and *kapur-forest*; *medang*. See special notes.

Symplocaceae

- Symplocos barringtoniifolia* Brand: 29013 (5), 29374 (4); tree -17 m, in hillock- and *kapur-forest*. See special notes.
- S. celastriifolia* Griff.: 28069 (8), 28080 (7), 28636 (8), 36807 (7); tree -17 m, common in riverside forest with *Ilex cymosa*; flowers white, very fragrant; no Malay name.
- S. odoratissima* (Bl.) Choisy var. *odoratissima*: 32404 (2).
- S. rubiginosa* Wall.: 29263 (7); tree -10 m, in swamp-forest. See special notes.
- Symplocos sp. ?*: s.n. 3.2.35 (2); tree -23 m, in swamp-forest. See special notes.

Taccaceae

- Tacca chantrieri* André: frequent in swamp-forest; *pelali urat*. (*T. verspertilio*).
- T. integrifolia* Ker-Gawl: common in swamp- and hillock-forest; *pelali urat*. (*T. cristata*).
- T. leontopetaloides* (L.) O.K.: 28462 (9); solitary plant scattered along the sea-front beneath *Casuarina*, rather scarce; *toyok*. See special notes. Plate 31.
- T. palmata* Bl.: 28474 (9); flowers dull purple; frequent in *Eugenia grandis* forest. Plate 31.

Theaceae

- Adinandra acuminata* Korth.: 30979 (1), 32040 (2), 32391 (2); tree -10 m, in swamp-forest; *tiup tiup, tetiup*.
- A. corneriana* Kob.: 29010 (5), 29376 (4), 29426 (5), 30854 (2), 32011 (2); tree -10 m, frequent in dryer parts of the swamp-forest, in hillock-and *kapur*-forest. See special notes.
- A. sarosanthera* Miq.: 23896 (7), 25992 (7), 28581 (8), 28728 (2), 29977 (5), 30881 (7), 34720 (7), 36788 (7); buttressed tree in swamp-forest and on *Tristania*-banks, rather scattered. See special notes. (*A. lamponga* in Wayside Trees of Malaya). Plate 20.
- Adinandra sp.*: 28559 (8); tree -17 m, in mangrove (Kg Ladang, Sedili Kechil).
- Adinandra sp.*: 36786 (7).
- Eurya acuminata* DC: 29309 (1), 32003 (2); tree -13 m, in high swamp-forest; *mempadi*.
- Gordonia ? multinervia* King: 37064 (10).
- G. singaporeana* Wall.: 29253 (2), 34757 (7); tree - 27 m, fairly abundant in swamp-forest; *tiup tiup*. See special notes.
- Ploiarium alternifolium* (Vahl) Melchior: small stilted tree frequent in the *mempisang*-belt; *riang riang, reriang*. See special notes. Plates 11, 40.
- Pyrenaria acuminata* Planch.: 31964 (2); tree -13 m, occasional in swamp-forest.
- P. kunstleri* King: 32077 (2); small tree as *P. acuminata*.
- Ternstroemia bancana* Miq.: 28740 (3), 30888 (7), 32158 (2), 32245 (2), 34736 (7), 36815 (7), s.n. 27.3.32 (7); common tree in swamp-forest. See special notes.
- T. elongata* (Korth.) Koord.: 29244 (2), 32416 (2), (4); in swamp-forest.

Thymelaeaceae

- Aquilaria beccariana* van Tiegh.: 29008 (4), 29195 (4), 29381 (4), 29470 (3); small spindly tree -7 m, scattered in the swamp-forest and on the riverside. See special notes.
- A. malaccensis* Lamk: 37083 (10), (9); tree -30m, in hillock- and *kapur*-forest, scattered in *Eugenia Grandis* forest; *kayu gaharu*. See special notes.
- Phaleria capitata* Jack: 28481 (9), 32776 (2), Sinclair 10851 (9), Kadim and Noor 196 (?9); small cauliflorous treelet -5m; in swamp-forest and common in *Eugenia grandis* forest. See special notes.

Tiliaceae

- Brownlowia argentata* Kurz: 28643 (8), (9); shrub or small tree -10 m, in the *nipa*-belt and in the upper part of the mangrove, common; flowering June-July; *dungun*.
- B. tersa* (L.) Kosterm.: 28644 (8); bush -2 m high, spreading under mangrove trees in their upper reaches along the Sedili Kechil; *dungun*. (*B. lanceolata* in Wayside Trees of Malaya).
- Grewia antidesmaefolia* King: 28064 (8), 28586 (8), 32775 (4), 36972 (7); tree -13 m, frequent in swamp-forest and on *Tristania*-banks.
- G. blattaefolia* Corner: 28545 (9), 31500 (1), 32059 (2), 32480 (1); tree -13 m, frequent in swamp-forest and coastal forest. See special notes.

- G. fibrocarpa* Mast.: 28063 (8), 29278 (7), 31472 (4), 32508 (2); shrub or treelet -5 m, frequent in swamp-forest; *asani damat, kelentek nyamok*.
- G. hirsuta* (Korth.) Kochummen: 30670 (7), 32009 (2), 34760 (7); tree -17 m. See special notes. (*G. omphocarpa* Miq.)
- G. tomentosa* Juss.: in coastal forest; *chenderai*.
- G. umbellata* Roxb.: 28475 (9), 31960 (2); climber with rather spiky stem; in the dryer parts of the swamp-forest and in secondary forest; *akar letop*. (*G. acuminata* Juss.)
- Grewia* sp.: 36913 (7).
- Pentace corneri* Kosterm.: s.n. 5.5.35 (5); tree -57 m, in *kapur*-forest. See special notes.
- P. triptera* Mast.: 36968 (7), 37104 (7); tree -47m, scattered in the swamp-forest. See special notes. Plate 35.
- Pentace* sp.: s.n. 8.2.35 (5); tree -17 m, by stream in hillock-forest; *medang*.
- Schoutenia accrescens* Mast.: 36846 (7), 36975 (7), 37250 (4), (10); tree -20 m, frequent in dryer parts of the swamp-forest and in hillock- and *kapur*-forest.
- S. accrescens* var.: 28681 (4), 29006 (4); tree -17m, common on stream-banks in the dryer parts of the swamp-forest and along *Saraca*-streams in hillock-forest. See special notes.
- S. corneri* Roekmowarti-Hartono: 29978 (5), 37361 (5); small stream-side tree.
- S. glomerata* King: 29463 (4), s.n. 12.5.35 (6); tree -13 m, common along *Saraca*-streams. See special notes.
- Triumfetta repens* (Bl.) Merr. et Rolfe: (9); coastal herb, forming mats with the branches rooting as short runners.

Ulmaceae

- Gironniera nervosa* Planch.: 28672 (4); common in hillock- and *kapur*-forest.
- G. parvifolia* Planch.: 31983 (2).
- Trema orientalis* (L.) Bl.: 28698 (1); shrub or small tree, common in hillock-forest; *mendarong*.

Urticaceae

- Elatostema* sp.: 30694 (6). (This genus not in the swamp-forest).
- Poikilospermum cordifolium* (Barg. Petr.) Merr.: s.n. 26.3.32 (7); frequent big climber with large leaf, in swamp-forest and on *Tristania*-banks.
- P. microstachys* (Barg. Petr.) Merr.: 30723 (3), 31967 (2); common small climber in the swamp-forest.
- P. scortechinii* (King) Merr.: 28484 (9); common small climber with aerial roots, in the undergrowth of the swamp-forest and in *Eugenia grandis* forest.
- P. suaveolens* (Bl.) Merr.: 28506 (9); common large climber along the rivers and in *Eugenia grandis* forest; *akar lundong, a. setahun*. See special notes.
- Pouzolzia indica* Gaud.: 28502 (9); herb -60 cm high, very common in scrub behind *Casuarina*.
- Procris* sp.: 30675 (6), 32112 (2), 32461 (2), s.n. 12.5.35 (6); epiphytic, with fleshy green stem; not infrequent in the swamp-forest.

Verbenaceae

- Avicennia*: see special notes.
- Callicarpa farinosa* Bl.: 30730 (6), (7); tree -17m, frequent in swamp-forest.
- Clerodendron ? brevifolium* Ridley: s.n. 9.6.34 (7); in swamp-forest. See special notes.
- C. buchanani* Roxb.: 30000 (3); shrub -2 m, locally frequent in the swamp-forest. See special notes.
- C. deflexum* Wall.: (4); in dryer parts of the swamp-forest.
- C. inerme* (L.) Gaertn.: mangrove, frequent.
- C. myrmecophilum* Ridley: (4). in the dryer part of the swamp-forest.
- C. ? paniculatum* L.: s.n. 28.4.35 (3).
- C. villosum* Bl.: frequent at the edge of the forest; *pakai panggil*.
- Peronema canescens* Jack: 36890 (7).
- Premna divaricata* Wall.: 32999 (7).
- P. obtusifolia* R. Br.: (9); coastal shrub; *buas buas, bebuas*. (*P. corymbosa* of Wayside Trees of Malaya).
- P. trichostoma* Miq.: 21193 (7); common riverside creeper over *putat, rassau, rengas*, and *jejawi*, from Lubok Pusing down to Bt Tiga on the Sedili Besar; *ara lumut*.
- Vitex clarkeana* Gamble: 28187 (7), 28642 (8), 33693 (7), 34711 (7); riverside shrub or small tree in freshwater and brackish tidal zones. See special notes.
- V. ovata* Thunb.: (9), creeper on sand-dunes, scarce at Jason Bay; *demundi, lenggadi*. See special notes.
- V. pubescens* Vahl: in dryer parts pf the swamp-forest and in coastal scrub, frequent; *leban*.
- V. peralata* King: 32771 (1); tree -23 m, in the swamp-forest and on *Tristania*-banks from Bt. Tiga upstream to *Saraca*-streams, common; flowering April 1937; *kayu gah*.

Violaceae

- Rinorea anguifera* (Lour.) O.K.: 31931 (5), 31936 (5), 36871 (7); shrub or small tree 2-5m, common in swamp- and hillock-forest.
- R. horneri* (Korth.) O.K.: 32046 (2), 32362 (2), s.n. 15.4.36 (1), 11.10.36 (2); shrub -2 m high, frequent in swamp- and hillock-forest.
- R. javanica* (Bl.) O.K.: 37028 (5); tree -5 m, in hillock-forest.
- R. lanceolata* (Wall.) O.K.: 32135 (2); shrub -5 m high, in hillock-forest.

Vitaceae

- Leea indica* L.: in secondary forest in swampy ground; *mali mali, memali*.
- Pterisanthes coriacea* Korth.: common climber in swamp-forest.
- Vitis furcata* Lamk. 28469 (9), 28560 (8); climber with small fleshy coriaceous leaves; in mangrove and *Eugenia grandis* forest.
- V. gracilis* Wall.: 28552 (9); small climber, common in swamp-forest; *nyaru*.
- V. japonica* Thunb.: 29949 (2), 31974 (2); common climber in dryer parts of the swamp-forest.

- V. ? lawsonii*: s.n. 12.6.34 (9); climber with flat ribbon-like stems; common in *Eugenia grandis* forest.
V. mollissima Wall.: 28479 (9), s.n. 13.5.35 (5); common climber in swamp- and hillock-forest; fruits clear pink, distinctly irritant on eating.
V. pyrrhodasy Miq.: 29455 (7); frequent climber in swamp-forest.
V. ? trifolia L.: (8).

Zingiberaceae

(see special notes)

- Achasma macrocheilos* Griff.: 29993 (5), 31476 (4), 37061 (10); common in dryer parts of the swamp-forest and in coastal forest; *tepus*.
A. megalocheilos Griff.: 30891, 30892 (6); *tepus*.
A. pauciflorum (Ridl.) Holtt.: 30890 (6).
A. sphaerocephalum (Bak.) Holtt. var. *petiolatum* Holtt.: 30745 (6).
Alpinia javanica Bl.: (1); in swamp-forest.
Amomum hastilabium Ridley: 30744 (6).
A. uliginosum Koen.: s.n. 15.6.34 (9); in coastal forest.
A. xanthophlebium Bak.: 32180 (2).
Boesenbergia plicata Holtt.: (1); in swamp-forest.
B. prainiana (Bak.) Scheff.: 32389 (2), 37052 (10), s.n. 5.1.36 (5).
Camptandra parvula (King) Ridley var.: 30874 (6), (4); frequent in dryer parts of the swamp-forest and on rocks in *Saraca*-streams.
Costus speciosus (Koen.) Sm.: in open swampy places.
Elettariopsis curtisii Bak.: s.n. 8.9.35 (5); in *kapur*-forest, generally gregarious, common.
Geocharis aurantiaca Ridley: 32446 (2), 32454 (2), 32777 (mile 2, Jemaluang Road); apparently endemic in Johore.
Globba leucantha Miq.: 32097 (2), s.n. 10.4.36 (6); common in swamp-forest.
G. marantina L.: 28538 (9); coastal forest, frequent.
G. patens Miq.: 30693 (6). (*G. aurantiaca* Miq.).
G. pendula Roxb.: s.n. 11.10.36 (2); occasional in swamp-forest.
G. variabilis Ridley: 37055 (10), (1).
G. variabilis ssp. *pusilla* Lim: 32013 (2).
Hedychium longicornutum Bak.: frequent epiphyte, usually low down, in the swamp-forest, with fleshy roots; *lemboyang utan*.
Hornstedtia leonurus (Koen.) Retz.: 30746 (6).
H. phaeochoana K. Schum.: 31946 (4); apparently the only collection of this Bornean species from Malaya.
Languas melanocarpa (T. et B.) Burk: (9); common in *Eugenia grandis* forest.
Phaeomeria maingayi (Bak.) K. Schum.: 36969 (7).
P. venusta Ridley: 32778 (mile 2, Jemaluang Road).
Plagiostachys albiflora Ridley: 30657 (6), 37091 (10).
Scaphochlamys erecta Holtt.: 31941 (4).

- S. klossii* (Ridley) Holtt.: 28965 (3), 29983 (3), 30743 (6), 31963 (2), s.n. 14.5.35 (5); gregarious in damp hollows in the swamp-forest, common; apparently endemic to G. Pantl and the Sedili region.
- S. klossii* var. *minor* Holtt.: 30743 (6), s.n. 5.8.37 (10).
- Zingiber puberulum* Ridley: 31477 (4).
- Z. puberulum* var. *chryseum* Ridley: 30658 (6).
- Z. wrayi* Prain: 37054 (10).

Unidentified Trees

(see special notes)

Gymnospermae

- Cycas rumphii* Miq.: coastal, chiefly in the *Terminalia*-zone; *paku laut*.
- Gnetum gnemon* L.: 32331 (2).
- G. gnemon* var. *brunonianum* (Griff.) Mgf: 28654 (8), s.n. 24.6.34, 28.6.34 (8); shrub or treelet -1.5 m, frequent in sandy coastal forest; *cheperai*.
- G. gnemonoides* Brongn.: 29431 (5), 30879 (7), 31972 (2), 36792 (7); climber in swamp-forest.
- G. latifolium* Bl. var. *funiculare* (Bl.) Mgf: 28177 (7), 28535 (9), 32427 (2); big cauliflorous climber with fragrant 'flowers'; common in swamp-forest and *Eugenia grandis* forest.
- G. microcarpum* Bl.: 29454 (7), 31454 (2), 32998 (7); big climber on *Tristania*-banks and in hillock-forest.
- Podocarpus motleyi* (Parl.) Dumm.: 21341 (2); tree -27 m, in swamp-forest. See special notes.
- P. neriifolius* D. Don: 32288 (2), 34750 (7), s.n. 12.6.34 (9); tree -25m, frequent in swamp-forest, on *Tristania*-banks, and in *Eugenia grandis* forest; getting new leaves May-June; *setada*.
- P. polystachyus* R.Br.: (2), (9); tree -20 m, chiefly coastal and in mangrove; *setada*.
- P. wallichianus* Presl: 30877 (7); tree of swamp-forest, scattered. (*P. blumei* in Wayside Trees of Malaya).

Pteridophyta

- Abacopteris triphylla* (Sw.) Ching: 36395 (1). [*Pronephrium triphyllum* (Sw.) Holtt., 1972].
- Acrostichum aureum* L.; with *nipa* and mangrove; *piai raya*.
- Angiopteris evecta* (Forst.) Hoffm.: in stream-valleys in the dryer parts of the swamp-forest and in hillock-forest.
- Antrophyum callifolium* Bl.: (2), (3).
- Asplenium borneense* Hook. 36948 (10).— *A. glaucophyllum* v.A.v.R.— *A. macrophyllum* Sw. (3, 8), chiefly on the rocky coast.— *A. nidus* L., abundant in all parts.
- Athyrium esculentum* (Retz.) Copel.
- Belvisia callifolia* (Chr.) Copel.: (2).
- Blechnum finlaysonianum* Hook. et Grev.— *B. orientale* L.

- Ceratopteris thalictroides* (L.) Brongn.: common by the riverside in open muddy places in the freshwater tidal reach of the Sedili Besar from K. Dohol down to the beginning of the *nipa*-belt.
- Cyathea latebrosa* (Wall.) Copel.: 32198 (2), frequent in swamp-forest.
- C. obscura* (Scort.) Copel.: 36946 (10).
- C. squamulata* (Bl.) Copel.: 32179 (2).
- Davallia denticulata* (Burm.) Mett.— *D. solida* (Forst.) Sw., coastal.
- Drymoglossum piloselloides* (L.) Presl.
- Drynaria quercifolia* (L.) J. Sm.
- Gleichenia laevigata* (Willd.) Hook., forest edges.— *G. linearis* (Burm.) Clarke, forest-edges and riverside.— *G. linearis* var. *altissima* Holtt.: 31447 (7), in swamp-forest.
- Humata heterophylla* (Sm.) Desv.: 30862 (2), 31988 (2).— *H. repens* (Linn.f.) Diels.
- Hymenophyllum denticulatum* Sw.— *H. polyanthos* Sw.— *H. serrulatum* (Presl) C. Chr., low down on tree-trunks, buttresses and pneumatophores; common.
- Isoloma divergens* (Hook et Grev.) J.Sm.: in swamp-forest.
- Lindsaea scandens* Hook.: 31933 (5). [*L. parasitica* (Roxb.) Hieron, f. Kramer 1967].
- Lomariopsis cochinchinensis* Fée: common in freshwater swamp-forest, especially in clearings.
- Lycopodium cernuum* L.: (2, 3, 7); in clearings; *rumput sesuroh*, *suroh suroh*.
- L. laxum* C. Presl, *L. nummularifolium* Bl.; frequent epiphytes.
- L. phlegmaria* L., *L. squarrosun* Forst.; frequent epiphytes; *ekor tikus*.
- Lygodium borneense* v.A.v.R.: 26053 (7), (2, 3); frequent in swamp-forest; apparently the only localities in Malaya.
- L. circinnatum* (Burm.) Sw., *L. flexuosum* (L.) Sw., in clearings.
- Microsorium punctatum* (L.) Copel.: 30740 (6).
- Nephrolepis biserrata* (Sw.) Schott; coastal, abundant.
- Ophioglossum pendulum* L.: epiphytic with *Asplenium nidus*.
- Photinopteris speciosa* (Bl.) Presl: (6).
- Phymatodes crustacea* (Copel.) Holtt.; common on high branches in the swamp-forest.— *P. scolopendria* (Burm.) Ching.— *P. sinuosa* (Wall.) J.Sm.
- Platycterium coronarium* (Koen.) Desv.: common; *passu petri*.
- P. ridleyi* Christ: frequent on high branches in the swamp-forest, often on dead limbs.
- Pilotum* sp.: epiphytic, not infrequent.
- Pteris ensiformis* Burm.: coastal, abundant.
- Pyrosia adnascens* (Forst.) Ching, (9), coastal.— *P. angustata* (Sw.) Ching.— *P. longifolia* (Burm.) Morton.— *P. nummularifolia* (Sw.) Ching.
- Schizaea dichotoma* L.: frequent in dryer parts of the swamp-forest.
- S. digitata* (L.) Sw.: frequent in hillock-forest.
- Schizoloma ensifolium* (Sw.) J.Sm.: [*Lindsaea ensifolia* Sw. f. Kramer 1967].
- Selliguea heterocarpa* Bl.
- Stenochlaena palustris* (Burm.) Bedd.: common in the swamp-forest and in clearings.
- Syngamma alismifolium* (Pr.) J.Sm.
- Taenitis blechnoides* (Willd.) Sw.— *T. interrupta* Hook. et Grev.

Tectaria barberi (Hook.) Copel.— *T. semibipinnata* (Wall.) C.Chr.— *T. singaporeana* (Wall.) Ching, 32068 (2).

Teratophyllum aculeatum (Bl.) Mett.: in hillock-forest.

T. ludens (Fée) Holtt.; common in freshwater swamp-forest.

T. rotundifoliatum (R. Bonap.) Holtt.: 28141 (8).

Thelypteris chlamydochora (Rosenst.) Ching: 32117 (2). [*Mesophlebion chlamydochorum* (Rosenst.) Holtt., 1975].

T. crassifolia (Bl.) Ching: (7).

T. motleyana (Hook.) Holtt.: 37075 (10). [*Mesophlebion motleyanum* (Hook.) Holtt., 1975].

Trichomanes aphilebioides Chr.: 30652 (6).— *T. obscurum* Bl.

Vittaria ensiformis Sw.

Postscript

In an article which is in press, Ashton reduces four species of dipterocarp, given in the List of Vascular Plants of the Sedili-region (p. 111 and 112) to synonymy. Thus *Hopea resinosa* Sym. becomes *H. pachycarpa* (Heim) Sym.; *Shorea resina-nigra* Foxw. becomes *S. longisperma* Roxb.; *Vatica stipulata* Ridl. becomes *V. hullettii* Ridl; and *V. wallichii* Dyer becomes *V. pauciflora* (Korth.) Bl. See P.S. Ashton 1978, Flora Malesiana Precursores: Dipterocarpaceae, Gdns' Bull. Singapore vol. 31, part 1.



Part VI. Special notes on plants from Johore and Singapore

Struck with the paucity of information on living plants in Malaysia, I made field-notes on nearly every collection. Included here are such notes as have not been incorporated in *Wayside Trees of Malaya* or in the post-war accounts of Annonaceae and Myristicaceae (Sinclair), *Calophyllum* (Henderson and Wyatt-Smith), and *Eugenia* (Henderson). Some of these notes were attached to the herbarium-specimens but others were retained with my diaries of expeditions to the swamp-forest. The following concern, chiefly, the bark which to the practiced eye is the most important field-character. For a general account of bark I refer to the illustrated descriptions by Wyatt-Smith (1954) and for microscopic analysis to the papers by Whitmore (1962, 1963) who took up this subject for his doctoral thesis.

Acanthaceae

Gymnostachyum ?, SFN 29472, 29497.— herb -1 m high, nodes swollen; leaves not falling off on picking; corolla pale greenish yellow with the upper petal-lobe pink and with a pink stripe leading from it into the tube.

Aizoaceae

Sesuvium portulacastrum L.— I have entered this plant in my list because it needs to be checked. I have an emphatic note that I did not find it in the streams entering Jason Bay. According to the *Flora Malesiana* (ser. 1, 4, 1951, 272) it has not been reported from Borneo. The absence may be significant.

Anacardiaceae

For the identification of many specimens I am indebted to Dr. Ding Hou.

Camposperma macrophylla (Bl.) Hook.f.:— SFN 36625, Pengkalan Rajah, Pontian, Johore; tree -40 m, trunk 60 cm thick at 1.7 m; crown wide but often lax and thin (resembling that of *Jackia*, but the leaves withering red); buttresses none; stilt-roots -1.2 m high, subcylindric, spreading; pneumatophores as loop-roots -45 cm high, not abundant; bark drab ochre to brownish, shallowly rugose-fissured, not scaly; inner bark rich pinkish brown, very thick, with copious grey gummy sap.

This was a fairly common tree in the peat-swamp at Pontian, easily distinguished from the other two species of *Camposperma* by the stilt-roots and the red old leaves.

Gluta velutina Bl.:— inflorescence, pedicels and calyx green; petals pink, white at the base; stamens white; ovary pale greenish white; style white; young leaves reddish pink; fruit 7-8 cm wide, light brown, scurfy, with a few irregular pleats and ridges from the base, subglobose; sap thick, opalescent, slowly turning reddish then black on exposure, slightly irritant.— Plates 4, 6.

This characteristic riverside tree occurred from Bt Tiga upstream to Bagan Limau on the Sedili Besar between the *putat* and *rassau*-belts, with a maximum development about Mawai. It requires tidal mud with little tolerance of brackish water. The fact that the trees are seldom cut, on account of the poisonous sap, may favour their abundance.

Mangifera foetida Lour.:— SFN 34909: tree - 33 m, bole cylindrical; bark light grey, shallowly rugose-fissured; young leaves violet; mature leaves stiff, flat, obtuse, rather shiny, yellow-green with yellow veins; wild, but ? identity.

M. griffithii Hook.f.: SFN 34948: leaves very coriaceous, bullate, dark shiny green; fruit 9–10 × 6–7 cm, ovoid, not tipped, rounded in end-view, ripening dull green with white or pale yellowish, soft, fibreless flesh, fragrant; stone slightly flattened or almost cylindrical, pale yellowish, slightly grooved, very thick and strong, without fibres; flesh sweet, with a sour smack, like *binjai*; well-known locally as *lekub*.

M. aff. parvifolia Boerl. et Koord.:— SFN 26193, Jurong, Singapore; tree -27 m; crown dense, dark; young leaves dull pinkish purple; flowers mostly on the twigs behind the leaves, very fragrant; petals cream-white; timber specimen taken.

This was a fairly common tree at Jurong, where it must now be extinct. It flowered gregariously in March 1933.

M. quadrifida Jack.:— SFN 32203, 34946, 34947: tree -20 m; said by Malays to have fruit like that of *M. foetida* but sweet, round, plump, ripening green with yellow fibrous flesh and round stone; flowers cream-white; well known locally as *kolah*.— SFN 32436: tree -33 m, bole cylindrical; crown large, dome-shaped, heavy; bark fawn brown, slightly fissured with short shallow longitudinal lenticel-fissures, not scaly or rugose; inner bark brownish yellow, darkening on exposure, like yellow custard just below the dead bark; leaves very stiffly coriaceous, dark green, dark yellowish green beneath; inflorescence with pale green branches; calyx pale greenish; petals 4, cream-white, with 4–7 faint yellow rays, tipped reddish; disc and filaments white, anthers purple; flowers fragrant; called *lekub* (? in error).

Melanochyla sp.— s.n. 6.8.39 (as *Melanochyla* A) Bt Tinjau Laut, c. 350 m, on ridges in the *kapur*-forest: tree -13m, bole cylindrical; bark pale greyish buff, smooth, entire, with persistent leaf-scars; inner bark pinkish brown; field-note says 'just like *M. auriculata*'; compare *M. aff. auriculata* SFN 29364.

Melanorrhoea wallichii Hook.f.:— tree -40 (-50) m, 60–70 cm thick at 2 m, slightly buttressed or not; bark greyish brown to pale reddish grey, slightly fissured and ridged, thinly flaky in small oblong angular pieces, often black-spotted from exuding gum; inner bark light reddish brown to pinkish brown; sap scant, watery reddish, slowly blackening on exposure; heart-wood deep red-brown; crown rather high and narrowly dome-shaped, the limbs often twisted and gnarled, for a long time monopodial.

I have often supposed that the black spots on the trunk mark cracks in the bark caused by the swaying of the trunk in the wind.

M. woodsiana Scort.:— s.n. 6.8.39 (as *rengas* A), Bt Tinjau Laut, 300–400 m alt., fairly common in the upper *kapur*-forest: tree -45 m, fluted at the base; bark rich brown, narrowly and rather shallowly rugose-fissured, not scaly but bits breaking off and leaving black marks; inner bark pale pinkish with white opalescent latex; specimen sterile, ? identity.

Melanorrhoea sp.:— *rengas* A, Jurong, Singapore : tree -33 m, without buttresses; bark greyish brown, closely and regularly fissured and transversely cracked, with small oblong regular scales flaking off from below upwards.— Plate 34.

Pentaspadon officinalis Homes:— described in *Wayside Trees of Malaya* and the roots figured in my *Life of Plants* (plate 13b). The species flowered gregariously twice a year in the Sedili region, about April and October.

Swintonia penangiana King:— s.n. 6.8.39 (tree B, tree C), Bt. Tinjau Laut, 250–400 m alt., common canopy-tree in the upper *kapur*-forest: tree -40 m, sharply buttressed -1.2 m; bark warm brown to orange-brown, dippled-scaly; inner bark

pale pinkish brown, with a little ochre-brownish gum; wood pale pink; trunks like *Pometia*: det. Ding Hou.

Annonaceae

Sinclair (1955) records 38 genera and 198 wild species for the Malay Peninsula. Of these, 25 genera and 58 species occurred in the Sedili region, where four species or varieties appear to have been endemic, namely *Alphonsea johorensis*, *Anaxagorea javanica* var. *dipetala*, *Enicosanthum praestigiosum*, and *Pseuduvaria galeata*. Climbers number 17 species. Sinclair remarks that arborescent species do not occur in genera with climbing species, but *Desmos* seems to be an exception. Some species of *Desmos* are certainly climbers but I studied *D. dasymaschala* carefully and observed that it was a small spreading tree with flopping, not scandent, branches.

The family makes up a considerable part of the smaller trees of the swamp-forest where none seems to have a particular habitat except *Polyalthia sclerophylla* of the *mempisang*-belt and *Xylopiya fusca*. Many of the small trees grew as well in the hillock-forest. They are recognisable from the monopodial habit, distichous leaves on the side-branches, smooth or lenticellate trunks not flaky or fissured, the sourly resinous smell of the crushed leaves or cut bark, and the way in which the branches of the main stem are set at right angles to the subtending leaf. *Mezzettia leptopoda* and *Polyalthia hypoleuca* may enter the canopy and in large trees their trunks may become fluted at the base. Generally, however, with the exception of *Xylopiya malayana*, there are no buttresses. Stilt-roots occur in *Goniothalamus malayanus* (at least when growing in flood-regions), conspicuously in *Xylopiya fusca* of the swamp-forest, and in *X. ferruginea* whether in the swamp or hillside forest. Pneumatophores are conspicuous as upright pegs or posts in *Polyalthia sclerophylla*, and in *P. hypogaea* which did not occur in the Sedili region, and as loop-roots in *Xylopiya fusca*. *X. malayana* may have short stilt-roots.

Cyathocalyx ridleyi (King) J. Sinclair:— tree -20 m, cylindrical from the base; bark light buff to greyish cream, smooth, becoming finely cracked, often faintly pustular with small lenticels 1-2 mm wide, more or less in longitudinal rows; inner bark pale yellowish ochraceous, dark green just below the surface and reddish below the green layer, faintly aromatic.— Plate 10.

This was a striking monopodial tree. The crown was limited to the upper third or quarter of the trunk, very much as in saplings of *Anthocephalus*. The branches first ascended, almost vertically, then sagged as they lengthened, and finally hung downwards before abscission. Thus the crown was almost spherical and appeared to consist of enormous pinnate leaves, such as occur in *Aglaia*.

Enicosanthum praestigiosum J. Sinclair:— tree -15 m, without buttresses or stilt-roots; bark fuscous grey, smooth then narrowly fissured from greyish white lenticels, leaf-scars persistent; inner bark pale straw-ochraceous, with fine wavy lines; cauliflorous with thick woody leafless twigs arising from swollen bosses -15 cm wide on the trunk almost from the ground.

Goniothalamus malayanus Hook.f. et Th.:— tree -6 m, rarely as much as 17 m, often tufted; stilt-roots -2m high, cylindrical, congested, more or less perpendicular, no loop-roots; bark silvery grey or slightly buff, smooth, with faint leaf-scars, slightly pustulate with small lenticels 1 mm wide, more or less in short vertical rows; inner bark fawn-ochraceous or pinkish, with broad pallid white rays expanding into the cortex, strongly radially striate.— Plate 21.

Mitrella kentii (Bl.) Miq.:— big climber, not uncommon in the swamp-forest, identifiable from the old twigs (5-15 mm thick) becoming longitudinally striate from rows of elongate brown lenticels with tumid lips.

Polyalthia cauliflora var. *beccarii* (King) J. Sinclair. I have noted that this is very like *v. cauliflora* but differs in having pale greyish lilac petals and anther-tops and cream-coloured stigmata. The young leaves are pale greenish white and develop in dangling tassels.

P. glauca (Hook.f.) Boerl.:— tree 20 m, bole -30 cm thick at 1.7 m, without buttresses but with slight fluting extending up to 1.2 m and passing into horizontal roots rising occasionally as irregular loops 30–45 cm high, no copious pneumatophores; bark pale greyish white, often pinkish, very smooth, ultimately breaking into very thin small papery flakes, with faint leaf-scars; inner bark pale yellowish or pinkish, -12 mm thick, not sclerotic; wood white.

P. hypoleuca Hook.f. et Th.:— SFN 36689, Pengkalan Rajah, Pontian, Johore: tree -33m, monopodial; crown small, dense, shortly conical; branches curving shortly up, then gradually down and finally up again; bole rather slender, cylindrical or slightly fluted at the base; without special roots; bark dull greyish drab, often brownish, slightly rough and pocked, not scaly; inner bark pale ochraceous or brownish, tough, laminate, easily separating into concentric layers; leaves glaucous beneath; flowers axillary; petals dull yellow; stamens green, falling off in the late afternoon; fruits 1–5 from a flower, 1-seeded.— Plate 37.

This tree was very abundant in the peat-swamp forest at Pontian where it entered into gaps in the canopy with its narrow crown. There was a general flowering in early 1939. The species was well known locally as *tepis*. At Jurong, Singapore, I did not see trees taller than 20 m. In the Sedili region it occurred in hillock-forest and I had no record from the swamp-forest.

P. sclerophylla Hook.f. et Th.:— tree -15 m, monopodial; crown conical; pneumatophores -70 cm high, unbranched, narrowly conical, peg-like, upright, copious; deciduous Feb.-April; new leaves pale olive buff (not scarlet as given by Sinclair); flowers March-May, with dull purple-brown petals; fruits ripening red to black, May-July.— Plate 11.

I am not satisfied with the identification of this very characteristic tree of the freshwater tidal riverside mud. Sinclair does not mention the pneumatophores, and he identified with it SFN 29588 (*P. Duchong Laut*, rocky coastal forest) which, at the time of collection, I thought was different. My notes on SFN 29588 are as follows:— tree -13 m in rocky coastal forest, scarce; bark fuscous, finely and irregularly creviced; inner bark pale fawn-ochraceous; wood pale yellowish white; flowers rather fragrant; sepals green; petals yellowish with a dull pinkish crimson splash at the base; ovaries cream-white.

This may be *P. lateriflora* with short leaves on the rocky coast. I note that the tree of *P. purpurea* Ridley, that grew on a dry lawn near the Bandstand Hill in the Singapore Botanic Garden, seemed identical with *mempisang* of the Sedili rivers but, as would be expected, produced no pneumatophores.

Xylopia caudata Hook.f.— tree -20 m, with small-leaved graceful crown; bole cylindrical, 23 cm thick at 2 m, without stilt-roots and pneumatophores; bark light to dark grey, smooth, entire; inner bark and wood pallid yellowish, faintly aromatic; fruit flushed purple, splitting open with lurid pink interior and bluish seeds; well known locally, the wood splitting easily and making good firewood, even when green.

X. fusca Maingay:— tree -35 m; bole -75 cm thick at 2-3m, tapering downwards and strongly stilted; stilt-roots up to 4m high on the trunk, more or less flattened vertically near the trunk but cylindrical for most of their length, passing steeply into the soil and rather crowded, branching freely before entering the soil with similar cylindrical and fastigiate lateral roots; loop-roots forming semicircles or steep loops with perpendicular sides, up to 1 m high, -7 cm thick, spreading round the bole

for distances up to 20 m, often very close as masses of hoops, soon developing from saplings, the loop formed by downgrowth of the root-apex, light yellow to pale fawn-buff, soon with prominent lenticels, the inner bark as on the trunk but not or scarcely sclerotic; bark light greyish yellow to pale pinkish brown (? when wet), always pale, smooth, entire, with persistent leaf-scars half girdling the trunk, becoming slightly fissured and rather coarsely tuberculate with pustular brownish lenticels up to 2 cm wide, particularly conspicuous near the base of the trunk; inner bark pale yellowish, granular or gritty with many, very hard, small, irregular, pale yellowish sclerotic masses -2 mm wide, stripping fairly easily, with a strong resinous-aromatic smell; wood rather soft, easily axed, pale yellowish throughout; crown monopodial and conical, then dome-shaped but rather open with a few wide-spreading limbs, often brownish from the young leaves; mature leaves pointing forward along the twig; young leaves densely brown silky beneath.—Plates 24, 35, 36: Figure 7.

This was a common and very characteristic tree of the freshwater swamp-forest in Singapore and the Sedili region. It grew with *Palaquium xanthochyuum*, often co-dominant along muddy channels though never so big. It seemed to prefer the stream-swamps above the tidal effect. Some trees had massive trunks and low stilt-roots, possibly in the less flooded places, and others had the high stilt-roots attached to the trunk which tapered into the comparatively slender tap-root. The stilts and loop-roots rarely carried epiphytes. Systematists dealing with herbarium-specimens have missed the real nature of the tree.

SFN 32403 has been called var. *sessiliflora* Kochummen et Whitmore (Fed. Mus. J. 13, 1968, 135) because of the shortly pedicellate flowers.

X. malayana Hook.f. et Th.:— tree -27 m; bole 30 cm thick at 2 m; buttresses 1-3, -1.2 m high, low, thin, spreading, simple; stilt-roots rare, occasionally 1-3 small cylindric roots from heights up to 40 cm on the trunk; pneumatophores none; bark light greyish yellow to yellowish buff, often tinged pinkish brown, entire, with persistent leaf-scars, becoming rough with small erumpent lenticels; inner bark pale yellowish, with slight sclerotic masses (not gritty as in *X. fusca*), very aromatic; crown conical, monopodial; flowers white, without scent; young leaves not brown silky. Compare *X. subdehiscens* as a juvenile state.

*Xylopi*a sp. ? :— s.n. 13.4.35, S. Sedili; tree -20 m; bole 20 cm. thick at 2 m; stilt-roots -1.3 m high, cylindric to more or less arcuate, striding but rather crowded; bark dull rufous brown, slightly and shortly longitudinally cracked, not fissured, smooth; inner bark pale pinkish, rather coarsely veined with rays, minutely granular-sclerotic, thick, resinous-aromatic.

I have not traced this specimen in Sinclair's works; it was sterile.

Apocynaceae

Cerbera manghas L.:— coastal species with pink eye to the corolla and smaller glossier leaves than *C. odollani*; persisting for a long time in *Eugenia grandis* forest and growing up to 14 m, but without seedlings in this forest.

Kopsia singaporensis Ridley:— shrub or small tree -7 m; crown more or less conical; stilt-roots and pneumatophores absent; bark greyish buff, rather silvery, entire but rather uneven and bumpy or subtuberculate, becoming slightly flaky in small pieces; inner bark pale yellowish, thin, with small ochraceous sclerotic particles; wood white; corolla 3.5-4 cm wide across the open limb, white with crimson eye; 6-7.5 cm wide in SFN 28731; with pink eye in SFN 28680; flowering gregariously Jan.-Feb. throughout the swamp-forest, and again Sept.-Oct.

Though occasionally cultivated, this plant would repay more attention. The large-flowered specimen (SFN 28731) was exceptionally handsome but I found only one specimen (near S. Kayu, Jemaluang Rd) and never obtained seeds. SFN 28680 (mile 12, Jemaluang Rd) seemed to me a different species or variety distinguished by the smaller leaves, longer and more slender petioles, more slender inflorescences, different venation, and pink eye to the corolla. It has been classified by Markgraf (1972) as *K. singapurensis*, though queried by Timmerman (1959).

Tabernaemontana corymbosa var. *kelsalli* King et Gamble:— young twigs and petioles dark green, old twigs silvery greyish; leaves rather deep green, yellowish green beneath, slightly bullate, vertical pairs of leaves tending to be unequal; inflorescence pseudoterminal or axillary; peduncle dark green, forked once, with a median flower-cluster (1–4 flowers) or without, the lateral clusters with 3–6 flowers; flowers facing down, scarcely fragrant; pedicels pale green; sepals yellow-green with recurved tips; corolla 35–45 mm wide, white with very faint, narrow, yellow eye, the tube -25 mm long and pale yellowish white.

Aquifoliaceae

Ilex cymosa Bl.:— tree -27 m; bole 35 cm thick at 2m, without buttresses or stilt-roots; bark greyish white to white, more or less tuberculate with lenticels, not scaly or fissured; inner bark ochre-brownish, c.10 mm thick, coarsely granular-sclerotic; wood white, with large vessels; flowers white; berries reddish purple then black.

This common and characteristic tree of *Tristania*-banks, well known as *mensirau*, was especially abundant as a small tree -13m high between Lubok Besar and Danau in a very swampy stretch of the Sedili Besar. I was surprised to find later that it grew to a much larger tree abundantly in *Eugenia grandis* forest where, in wetter places, it was co-dominant.

Araceae

My list is probably incomplete because many specimens were collected without number and I have been unable to consult them. I use the names given by Dr. C. X. Furtado, but have followed Nicolson (1969) for *Aglaonema*.

Cryptocoryne cordata Griff.:— growing in the mud by the Sedili Besar in the freshwater region, often along the foot of *Tristania*-banks, generally submerged 30–200 cm at low water, rarely exposed at low tide; leaves purplish beneath; limb of spathe bright ochre-yellow, deeper round the mouth of the tube; tube -45 cm long, white; ? flowers not reaching the surface of the water.

Asclepiadaceae

Dischidia aff. *complexa* Griff.:—Jurong, Singapore; S. Kayu, Jemaluang Rd.

This was not infrequent as a slender climbing epiphyte at Jurong. It has not been found elsewhere in Singapore and is now extinct. Holttum collected it at S. Kayu, but I never saw it myself in the Sedili region. In 1933 I brought living plants of this very rare species to the Royal Botanic Gardens at Kew, but they aroused no interest and in 1938 I learnt that they no longer existed. There is a dried specimen from Jurong in the Singapore Herbarium and, perhaps, the material that I put in alcohol. The species resembles *D. rafflesiana* in having pitchers but they were smaller and the whole plant was much more delicate.

Hoya ? diversifolia Bl.:— s.n. 2.2.36: climbing on *Saraca*; leaves green; pedicels pale pink, deep rose-red at the apex; sepals pale pink; corolla and corona pale cream, the corona-lobes with a narrow pink edge; anthers pale cream: this plant grown in the Singapore Botanic Garden.

Hoya ? ridleyi King et Gamble:—s.n. June 1934; common climber low down in *Eugenia grandis* forest, forming aerial root-balls of masses of tufted roots; leaves narrow, rather small and thin.

Hoya sp.:— s.n. 27.7.39, S. Sedili; leaves pale green without any red or purple; flower pinkish white, fragrant; pedicels and outside of sepals with pinkish purple spots; corona white, with purple inner points.

Bombacaceae

Coelostegia griffithii Benth.— buttresses to 4 m high, branching at 0.5-2 m above ground; bark greyish rufous to dull rufous brown, entire, then slightly lenticellate-fissured, not flaky; inner bark pale pinkish yellow, white in the buttresses, stripping.

This canopy-tree is strictly monopodial; the leader persists until the tree begins to die back from the top. The main branches are numerous but rather short and at a wide angle from the trunk; thus the crown is rather narrowly dome-shaped. It occurred in the swamp-forest at the rate of 2 large trees per hectare, but might be locally gregarious.

Durio singaporensis Ridley:— bark fuscous rufous, nearly smooth; inner bark pink, with a reddish layer under the dead bark (as in *Neesia*); leaves coppery beneath; ramiflorous, the flowers with white petals and smelling of sour milk; flowering March–April, fruiting July–Oct.

This is a very distinct species with round, narrowly spinous fruit and no aril to the seed. I followed Bakhuizen v.d. Brink in reducing it to *D. oblongus* Mast. (Corner 1939, 305; Wayside Trees of Malaya), but this seems to have been a mistake. Wyatt-Smith (1954) distinguishes *D. oblongus* by the hairy petals, in contrast with the scaly outside of those of *D. singaporensis*, and by the arillate seed. Kostermans (1958) also keeps them apart, though next to each other in his key, and he emphasizes the ovate petals, which I had also emphasized for *D. singaporensis*. The question still seems open, as there is still doubt also with several species of *Durio*. Whether there are two species or varieties, it is clear that the aril has been lost in *D. singaporensis*; the elaborate aril, as a generic feature, could not have been evolved independently and *de novo* in *D. oblongus*.

Kostermansia malayana Soengeng, Reinwardtia 5 (1959) 2.— This magnificent tree, which is probably still preserved in the Mersing-Jemaluang forest and on Gunong Panti, used to be frequent in the swamp-forest of the Sedili, Johore and Tiram rivers. Soengeng has given a full description. It comes between *Durio* and *Coelostegia* and, in my opinion, the three genera could be reduced to *Durio*. The trees were well known as *krepal* or *krepau*. They resembled *Coelostegia* in the very prominent buttresses which in hillside forest might reach up to 7 m high but were generally not more than 4–5 m in the swamp-forest. The tree flowered rarely. There was a group of several trees on a hillock to the east of the Jemaluang Road shortly after it left the Mawai Road, and I used to examine these trees several times a year from 1932 onwards. I saw no flowers or fruits until there was a general flowering of the species in March 1940 when, with the aid of a monkey which climbed up the stem of a creeper, I obtained the first flowering specimens. I had noted a general fruiting in September 1932 when I first found the species at Ulu Tiram (Wayside Trees of Malaya p. 437). The thorny fruits are at once recognised by their splitting almost to the base in a star-like manner and their persistence for a long time after the seeds have fallen at the ends of the copious

twigs; hence the manuscript name *C. ramealis* which I wrote on the herbarium specimens. The white petals (5, occasionally 6-7) have a few yellow spots which turn brown; the flowers have scarcely any scent; the seeds have no aril. Kostermans misidentified the fruiting specimen SFN 26060 as *D. singapurensis*, which differs in every detail.

Kostermansia was dominant on a small hill covered with original forest in Ulu Tiram Estate (Plates 8, 36). From the fruits on the twigs, I counted c. 30 big tree, 40-50 m high, in c. 2 hectares, with many smaller trees and saplings. There were several uprooted trees in this forest. They had no tap-roots, but many slender roots, up to 5 cm thick, passed from the base of the trunk and the undersides of the main lateral roots vertically into the ground.

Neesia malayana Bakh.— tree -33 m, 23 m to the first branch; bole 60-70 cm thick at 3 m, some cylindric from the base, others fluted or with slight buttresses -2 m high; no stilt- or loop-roots; bark greyish brown to dark red-brown on the mature bole, darker and almost blackish brown higher on the trunk and on the main branches, faintly tuberculate with paler brown lenticels 2-4 mm wide often in longitudinal rows up to 3 m along the bole, then the bark becoming rather flaky and tessellately cracked (especially on the branches); inner bark 10-15 mm thick, deep pink-brown to bright purple-red, the outer bark flaking off on cutting; scattered in the swamp-forest along with many trees with stilts and pneumatophores, solitary, occasionally entering the canopy; bark-photograph, see my Life of Plants plate 15.

Burseraceae

Canarium apertum H. J. Lam:— tree -27 m, buttressed -1.7 m, without stilts or loop-roots; bark light fawn-grey or pinkish, slightly flaky; inner bark with light yellow gum and very penetrating resinous smell; leaves stiffly coriaceous.

C. littorale Bl.— tree -20m, not or slightly buttressed; bark pale pinkish grey, pustulate with lenticels 1-3 mm wide; gum greyish, scant; fruit edible, mesocarp sour and stringent but sweetening on chewing, kernel nutty; very variable in size of tree when flowering and in leaf-character (Leenhouts 1959).

C. pilosum Benn.— tree -30 m; bole 30 cm thick at 2 m, cylindric from the base; bark pale greyish white, rather copiously flaky in thin, papery, irregular, and rather large pieces, not fissured, with small scattered pustular lenticels 1-2 mm wide; inner bark pale pinkish brown, not stripping, with dark greyish resinous-aromatic gum; wood pale yellowish white; leaflets withering scarlet.

The trunk resembled that of *Santiria laevigata* but seemed not to become buttressed and it had more flaky bark, more deeply coloured inner bark, and gum which flowed readily.

Dacryodes macrocarpa H. J. Lam:—tree -35 m, with spreading flattened arcuate stilt-roots -2.5 m high, giving off numerous smaller subcylindric stilt-roots; loop-roots apparently none; bark fawn brown, somewhat fissured and flaky with thin elongate angular pieces, slightly pustulate with lenticels 2-4 mm wide; inner bark yellowish, with strong resinous smell and scant clear gum; wood yellowish white, hard; flowering Oct. 1936; photo in Flora Malesiana ser. 1, 5, 227, f.11.

Santiria apiculata Benn.— tree -20 m, often fertile at heights from 4 m, not buttressed; bark pale grey, slightly flaky in small pieces, slightly pustulate; inner bark pinkish, with scant colourless gum; leaves often trifoliate; fruits cream-white then pink to purple, commonly empty or with insects; leaflets withering scarlet.

S. conferta Benn.— tree -20m, not buttressed; bark pale greyish fuscous, finely creviced and fissured, not flaky; inner bark pinkish, with scant grey gum, faintly resinous-aromatic; leaf-stalks rusty scurfy.

S. laevigata Bl.— tree -40 m, with spreading branches and large crown; buttresses -2 m high; without loop-roots; bark pale greyish, rather flaky in angular pieces; inner bark pinkish, slightly resinous-aromatic, with scant gum; leaflets withering scarlet; often as a small tree without buttresses.

S. rubiginosa Bl.— tree -40 m, becoming fluted at the base -2 m high, occasionally with low buttresses spreading as narrow flanges over the ground, old trees becoming knobbed and bossed on the trunk; loop-roots -60 cm high, 8 cm thick, tuberculate with numerous lenticels, the bark rather lurid greenish yellow, with gum, not numerous; bark greyish or brownish yellow, thinly flaky in small irregular pieces, with numerous tumid lenticels 2-6 mm wide; inner bark pale yellowish, with greyish white gum slowly darkening on exposure, slightly resinous-aromatic; crown large, rounded, compact.

S. tomentosa Bl.— tree -40 m, buttressed or fluted to 2 m high; loop-roots -30 cm high, scattered, often indistinct; bark fawn buff, flaky in irregular oblong pieces, slightly lenticellate-pustulate; inner bark pinkish, with white sticky latex, scarcely resinous-aromatic; twigs, buds, rachis, and undersides of the veins fawn hairy; leaves not resinous-aromatic when crushed.

Celastraceae

Euonymus javanicus Bl.— small tree -13 m, flowering and fruiting as a shrub 1-2 m high; bark greyish buff or silvery grey, flaking in small oblong pieces with curling edges, tuberculate with thick, corky, tumid, yellowish buff lenticels more or less longitudinally elongate or in rows, the outer bark papery-tough and easily stripping off to show the vivid orange-yellow inside; inner bark pink, purplish pink next the outer bark; wood pale brownish yellow; leaves greenish brown beneath; petals greenish red with white fimbriate edges, purple-brown at the base; capsules pink, pyriform-angled.

This little tree or shrub can soon be recognised in the forest from the opposite leaves with brownish undersides and from the outer bark with vivid orange-yellow inner layer. *Glyptopetalum quadrangulare* has a similar yellow inner bark but 4-angled twigs and leaves not brownish beneath.

Lophopetalum multinervium Ridley:— tree -30 m, not or slightly buttressed -1.3 m high; crown monopodial, rather straggling and open; pneumatophores developing as broad flattened conical pegs from the uppersides of the widely spreading lateral roots, becoming upright planks -2 m high with blunt apex and thickened sides, often very densely crowded in the more tidal or flooded regions, bark as on the trunk but more lenticellate; bark greyish brown, for a long time smooth, with persistent leaf-scars, developing elongate lenticel-fissures, the intervals entire or creviced and with scattered pustular lenticels eventually confluent into new fissures; inner bark pale pinkish brown, fairly thick, soft, easily stripping; wood pale yellowish; leaves often eaten by insects; sepals and petals green; disc dull rose-pink or purplish; fruits not found; buds often galled.— Plates 14, 16, 17.

This was one of the striking trees of the freshwater tidal forest. The tall plank-like pneumatophores might be set so closely that it was impossible to edge between them. In dryer parts of the swamp-forest they were much shorter, -20 cm high.

Clusiaceae

Calophyllum L.— My collections have been identified by Henderson and Wyatt-Smith (1956), who have incorporated my field-notes in their descriptions. They say that *Calophyllum* is the dominant genus of big trees in east Johore. They record 19 species, out of c. 50 in Malaya, for the Sedili region but give several more for

the regions of Rompin, Mersing and Jemaluang, and these may well occur in the Sedili region. *Shorea*, with 18 species in the region seemed to me to be the really dominant genus. Most species have fissured bark and lack buttresses. In the field-chart given by Henderson and Wyatt-Smith, at the end of their paper, 3 species are given with buttresses, 3 with stilt-roots, and 4 with pneumatophores as loop- or knee-roots. They seem to have omitted my field-note on *C. curtisii* with steep buttresses (SFN 30865) and my records of knee-roots for *C. soulattri* (s.n. 10.6.34) and their *Calophyllum* sp. 44 with both stilt- and knee-roots (s.n. 30.4.34). Flooding certainly affects the development of these roots but it is also clear that the property of developing them is possessed only by a small number of species. *C. inophylloides* and *C. sclerophyllum* are striking examples. The pneumatophores are λ -roots except in *C. kunstleri* for which I noted true loop-roots as in *Xylopia fusca*; the root-apex first ascends, then descends without degenerating into the abortive tip of the λ -root. The pneumatophores are highly lenticellate and air can easily be blown through them.

C. retusum Wall.— tree -40 m; bole cylindric from the base, 70 cm thick at 2 m; loop-roots -45 cm high, -2 cm thick, copious, dull brown, with prominent, transversely elongate, lenticels; bark dull brown, tinged purplish to vinaceous fuscous, lenticellate-fissured with tumid and deep purplish lenticels on the bole, not rugose; inner bark pale brown to pinkish brown, darkening on exposure, rather thick, soft, easily stripping, slowly oozing a greyish or yellowish gum; no loop-roots observed on the trees at Jurong, Singapore.

C. rupicolum var. *elatum* Whitmore, Gdns' Bull. Singapore 26 (1973) 270.— This variety is said to be distinguished by the greater stature of the trees -18 m high, and by the larger leaves. In citing the Sedili collections, Whitmore has overlooked the fact that the trees were small, -10 m high, and grew on the river-banks.

C. sclerophyllum Vesque.— for a comparable case of stilt-roots in this species, see Ashton (1964, pl. 32).— Plates 10, 13, 22.

Garcinia L.— Identification of Malaysian specimens has been handicapped since the thirties because much of the herbarium-material at Singapore has been on loan in the Bogor Herbarium, waiting revision. In this uncertainty I have had to use several names as current at Singapore without knowing if they are correct.

Species of *Garcinia* are common in the undergrowth of the swamp-forest, contrary to the remark in the Tree Flora of Malaya vol. 2. Several are conspicuous from their stilt-roots and one, which I call *G. ? rostrata*, for its stilts and pneumatophores. For correct identification, male and female flowers and fruits are necessary, though the trees are more often sterile, but this implies that they can be identified from leafy twigs. I studied the barks and found that they were useful in distinguishing several of the small-leaved species. I prepared this key:—

Latex white; inner bark yellowish white. Trees without stilts.

Bark yellowish fuscous, finely fissured *G. ? eugeniaefolia*

Bark yellowish brown, tuberculate *Garcinia* sp.
(SFN 28087, 28094)

Latex yellow. Trees often with stilts.

Bark dull yellowish, often brownish or pinkish, more or less smooth;

pneumatophores often present *G. ? rostrata*

Bark dark fuscous brown or chocolate brown, becoming finely fissured and flaky in small subcircular pieces or in oblong pieces;

pneumatophores absent. *G. bancana*, *G. forbesii*, *G. nigrolineata*

G. bancana Miq.— collections from Jurong, Singapore; tree -20 m, bole 25 cm thick at 1.5 m; stilt-roots arising at heights up to 60 cm, slender, spreading; pneumatophores none; bark dark greyish brown, brittle, with longitudinal and transverse fissures, breaking up into square or oblong, rather thick scales; inner bark dark red-brown, not stripping; latex yellow, fairly copious; wood pallid ochraceous.

About the three collections from Pontian, Johore, I am not sure, but Henderson's notes on SFN 36618 (det. *G. cf. hombroniana*) agree, thus:— slender tree -17 m; bark dark chocolate brown, lightly cracked with small oblong pieces; inner bark deep rich red-pink; latex yellow.

G. ? eugeniaefolia:—s.n. 11.6.34 (as *Garcinia A*); tree -13m, without stilts or buttresses; bark yellowish fuscous, rather finely fissured; inner bark pale yellowish; latex white, scant; leaves caudate-acuminate.

G. forbesii King:— I have notes that this may also be stilted in the montane forest at Cameron Highlands.

G. maingayi Hook.f.— tree -20 m; stilt-roots -1.2 m high, rounded, congested; bark rufous brown, entire, with persistent leaf-scars, slightly pimply with small lenticels 2-4 mm wide; inner bark deep ferruginous brown, thick, not stripping; latex dull ochre-yellow, semi-opaque, fairly copious.

A similar tree, collected by me in swamp-forest at Ulu Tiram, Johore, SFN 28667, as a 5 m treelet, is called *Garcinia 3* in the Tree Flora of Malaya vol. 2. SFN 36829 is given as *Garcinia A2* in the Tree Flora. I have noted that *G. maingayi* may be stilted in montane forest away from streams (SFN 33240, Fraser's Hill, Pahang).

G. nigrolineata Planch.— tree -17 m; bole 20 cm thick at 1.7 m; stilt-roots -1.2 m high, slender, scarcely flattened, very numerous, but absent from trees in dryer parts of the swamp-forest; bark dark fuscous brown to dark reddish brown, becoming finely fissured and slightly flaky with small subcircular scales, not rugose or tuberculate; inner bark pale yellowish to pinkish buff, thin, easily stripping; latex yellow, rather watery; twigs often with 1-2 pairs of scale-leaves (-5 mm long) at the outset.

I refer here the collection Corner s.n. 15.4.34 (Mandai Road, Singapore), which had this typical bark except that the inner bark was light red-brown. The fruits were those of *G. nigrolineata*, thus:— fruit 25-35 × 20-27 mm, ellipsoid, shortly and truncately rostrate with papillate stigma immersed, ripening pale dull watery apricot-orange, never globose. It was a tree 13 m high without stilts.

I refer here, also, the collection Corner s.n. 13.5.34 (Mawai), which represented a frequent tree in the swamp-forest. Fertile specimens were not obtained, but it seemed identical with SFN 26198 (Jurong) and SFN 28098 (Mandai Road). My notes were:— tree -20 m, 23 cm thick above the stilts; stilt-roots up to 4 m high, the larger arcuate-flattened, not crowded; bark dark fuscous brown, even, entire, then slightly flaky with small rounded irregular pieces; latex yellow; *kedundong*.

I am not certain, now, if *G. nigrolineata* differs in bark from *G. parvifolia* (Corner 1939a).

G. ? penangiana:— tree -23 m; bole 50 cm thick at 2 m, becoming fluted at the base, without buttresses or stilts; crown very dense; bark chocolate or purple brown, blackish when moist, becoming flaky with rather large, oblong, angular pieces displaying the light fawn new bark and thus mottled; inner bark reddish pink or rich orange-brown, thick, soft, not stripping; latex white, oozing in small drops; wood yellow-brown; flowers fragrant; sepals pale cream; petals light primrose yellow; stamens and ovary cream; fruit crimson-red, with 1-2 large seeds 3.8 × 3 cm

surrounded by transparent, white or yellowish, thin jelly, fruit-wall smelling resinous; flowering Dec.–Feb., fruiting sparsely April–May, but also fruiting in Oct. 1936.

This tree, with striking mottled bark recalling *Ochanostachys*, has been referred in the Singapore Herbarium to *G. hombroniana* by Whitmore, but for me it was certainly not that well-known coastal species. The collection H. M. Burkill 1854 (new road to K. Sedili) appears to be this species, also, though identified in the Singapore Herbarium as *G. opaca* by Whitmore.

G. ? rostrata:— tree -25 m, -33 m in the peat swamp-forest at Pontian, Johore, monopodial; stilt-roots -1.5 m high, subcylindric to flattened and arcuate, rather wide-spreading, often branched; pneumatophores -60 cm high, 1 cm thick, λ -shaped, with greyish yellow lenticellate bark, often forming a dense 'forest' round the base of the trunk; bark light fawn brown, pinkish fawn, or fawn-ochraceous, always with a distinct clay-yellow tone, with persistent leaf-scars, entire, smooth, then creviced and slightly elongate-lenticellate or not; inner bark pinkish white to pinkish brown, usually deeper rufous brown near the outside, (pale yellow, SFN 28541), rather thin, rather gritty from sclerotic particles; latex deep bright yellow (SFN 26097, 28665, 36687), yellow (SFN 36613, 36615), opaque, gummy; sepals and reflexed petals greenish yellow, the petals cream-white in SFN 26097, 36629, 36687; stigma becoming dull red to purple (? after pollination).— Plates 34, 39: Figure 6.

This was one of the typical trees in the swamp-forest of Singapore and south Johore, recognisable from the smooth bark with dull yellowish cast, the stilts and the pneumatophores. It was very common in the peat-swamp at Pontian, where it was large enough to become a canopy-tree. There was a general flowering at Pontian in early July 1939, where the name *kachang kachang* was in use for it among the wood-cutters.

The collection Corner s.n. 31.12.34 may belong to *G. ? eugeniaefolia*; it had white latex which turned yellowish very slowly after some hours of exposure.

The pneumatophores of the trees at Jurong, Singapore (SFN 26097), were of two kinds. Mostly they were steep λ -shaped roots arising from the main lateral roots travelling horizontally in the humus. They produced 1-3 descending laterals which ramified in the humus. Some ascending roots, however, had no such descending laterals but produced a cluster of 3-6 ascending roots some of which had short ascending branches.

Garcinia sp.— SFN 28087, 28094, Mandai Road, Singapore; tree -7 m; bole 10 cm thick at 1.7 m, without stilt-roots; bark light yellowish fawn or yellowish rufous brown, tuberculate with rather tumid-corky lenticels 1-3 mm wide and elongating longitudinally 4-6 mm, often in confluent vertical series 2-3 cm long, not or scarcely fissured, entire or slightly flaky; inner bark pale yellowish white, stripping with difficulty; latex white, watery, scant, sticky; male flowers with large convex yellow-orange sticky stigma, fragrant, somewhat of vanilla; female stigma large, yellow.

Garcinia sp.— s.n. 25.11.34, Tg Tebar, near Tg Sedili Besar; tree -10 m; bole 18 cm thick at 2 m, without stilts or buttresses; bark light grey-buff to smoky grey, finely and irregularly fissured, flaky in thin, narrow, elongate, and irregular pieces, often with a darker line separating the dead bark from the new; inner bark reddish pink with narrow white rays; latex white, thick, fairly copious; fruit ripening dull ochraceous; in muddy ground among rocks with *Terminalia catappa*, at the foot of cliffs.

Bark and habitat suggest *G. hombroniana*, but not the fruit. The latex of *G. hombroniana* is given as white or yellow in the Tree Flora of Malaya vol. 2, but I never saw a tree with yellow latex.

Mesua ferruginea Pierre.— This common small tree or bush with white bark and irregular habit grew on the freshwater tidal mud with *rassau* or at the front of the *mempisang*-belt; it was impossible, except at low water, to trace its origin. On the Sedili Besar it occurred from Bt Tiga upstream to Bagan Limau and was most abundant below Mawai. On the Sedili Kechil it was even commoner and I frequently noticed that low branches, spread over the water and exposed to swift floods, had narrower, almost lanceolate, leaves as happens with so many riparian plants. With pale green young leaves and the old leaves silvery, glancing, and pointing almost vertically down, it was easy to recognise. Some collections which I made have been referred by Whitmore (Gdns' Bull. Singapore 26, 1973, 279) to *Mesua* aff. *assamica*, without apparently consulting my field-notes, but I can hardly believe that they are the same as this inland tree of hill-forest. Strangely this common species had no Malay name; indeed, it was not recognised by Malays on either of the Sedili rivers.

M. kochummeniana Whitmore:— My field-notes on the type of this species, quoted in part by Whitmore, seem to be missing.

M. lepidota Anderson:— tree -20 m, without stilts or buttresses; bark dull greyish brownish, somewhat dipped-scaly with short oblong flakes, not fissured or rugose; inner bark pinkish brownish, giving out a scant, watery, pale yellowish brownish gum; wood pale pinkish brownish; pedicels pale greenish yellow; sepals greenish white; petals, filaments, and ovary white (no pink colour); flowering at the end of January 1937.

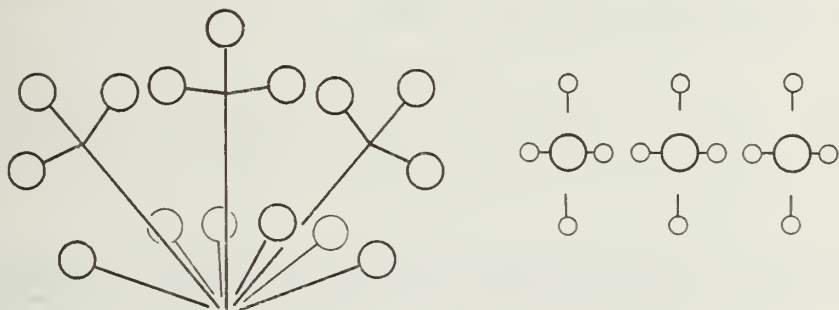


Figure 18. *Mesua lepidota*; diagram of the construction of the terminal inflorescence.

These notes refer to SFN 32243. My second collection (s.n. 20.1.35) was from a tree with sparse stilt-roots up to 1 m high and loop-roots 25–40 cm high. Possibly this species flowers only once a year.

I was greatly struck by the terminal inflorescences of SFN 32243 which had 15 flowers in 3 sets. Each set had 5 flowers of which two were single and lateral at the base of the set, and three were in a pedunculate trichasium (Figure 18). The three trichasia were erect and set in the same plane, like the three crucifixes, surrounded by the ring of six basal flowers. My field-note says 'Tree of Calvary'. On some twigs the terminal inflorescence was reduced to 6–9 flowers in an umbel; that is to say, the trichasia were reduced to the terminal flower of each, or they were not formed; when present, these terminal flowers had longer pedicels. Below the terminal inflorescences there were axillary clusters of 5 flowers.

M. rosea (Ridley) Kosterm.— This was a common tree in the freshwater swamp-forest of the Sedili Besar. It had rather long leaves and pink flower-pedicels, though the flower was white in all parts. I noted for SFN 29273 that several trees were flowering in the middle of April 1935 and for SFN 32122, collected on 19 Oct. 1936, that several trees were in flower-bud. Possibly this species has a double flowering every year. I did not notice stilts or loop-roots.

Commelinaceae

Cyanotis vaga (Lour.) J. A. et J. H. Schultes:— According to R. Seshagiri Rao (1964), this is the correct name for *C. barbata*.

Compositae

Spilanthes urens Jacq.— sand-dune creeper with superficial horizontal stem, or rhizome, with fleshy leaves; flowers pallid white or cream, in small heads; creeping among *Ischaemum muticum*, *Canavalia*, and *Ipomoea*, and on the open dune as a pioneer.— Plate 37.

This is the only Malayan record of this peculiar species, and I found it only on the sand-spits between the mouth of S. Tuenseh and that of S. Semandan on Jason Bay. It is known also from north Borneo (v. Steenis in Gdns' Bull. Singapore 17, 1958, 273).

Cornaceae

Aralidium pinnatifidum Miq.— bark yellowish grey, entire, with faint leaf-scars, becoming uneven with light brown pustular lenticels 2–4 mm wide; inner bark pale yellowish, with ochraceous sclerotic rays; wood with long wide rays; occupying a variety of habitats from *nibong*-forest behind the mangrove to inland *kapur*-forest.

Alangium ebenaceum (Clarke) Harms var. *tutela* (Ridley) Kochummen. Fed. Mus. J. 13 (1968) 133.— tree -20 m; buttresses -70 cm high, sharp, spreading; bark pale fawn buff, eventually thinly and slightly flaky in subcircular, angular, scaling pieces; inner bark fawn brownish, green just below the surface, fairly thick; wood yellowish drab throughout, hard; flowers white, with heavy sickly scent. [*A. javanicum* (Bl.) Wang.]

Mastixia ? trichotoma Bl.— tree -14 m; bole 20 cm thick at 2 m, cylindrical; bark greyish buff to light grey, slightly fissured, slightly dippled scaly with small pieces; inner bark pale yellowish, green just below the surface, slightly sclerotic-gritty; wood yellowish white throughout.

Cyperaceae

Every Malesian botanist is indebted to the late J. H. Kern for his meticulous revision of this family for the Flora Malesiana (ser. 1, vol. 7). The genera of importance in the swamp-forest are *Hypolytrum*, *Mapania*, *Scirpodendron*, and *Thoracostachyum*. The monotypic *Scirpodendron* and some species of *Mapania* are so like *Pandanus* in outward appearance that it is impossible to distinguish them in the forest without inflorescences (lateral in *Mapania*, terminal in *Scirpodendron* and *Pandanus*). I remark that I never saw in Malaya such robust specimens of *Scirpodendron* as I later encountered in the Solomon Islands near the eastern end of its distribution between Ceylon and Samoa. The local name for *Scirpodendron* and similar Cyperaceas was *selengsen*.

Cyperus pedunculatus (R.Br.) Kern:— Concerning this characteristic pioneer of sand-dunes, which used to be known as *Remireia maritima*, Kern has discussed its systematic position and the strange construction of the 'nut' (Acta Botanica 7, 1958, 795).

Mapania cuspidata (Miq.) Uitt.— This is the common species with broad petiolate leaf; var. *petiolata* has a relatively longer lamina, stouter petiole, and narrower leaf-sheath. The plants are erect, never decumbent. The old part of the stem dies away and the leafy upper part comes to stand, like a small pandan, on slender stilt-roots up to 45 cm high. To add to the resemblance, the inflorescences are often more or less hidden in the leaf-sheaths.

M. micropandanus Holtt.— This is just like a miniature pandan. It grows to 45 cm high. The older part of the stem (5–10 mm thick) dies away and leaves the upper part standing on the slender adventitious roots. The stem commonly becomes more or less horizontal with the leafy bud upturned; thus, it appears to creep on stilts 20–30 cm high. It has been found, also, on P. Tioman and, according to Kern its nearest ally may be *M. graminea* Uitt. of east Borneo.

Dilleniaceae

Wormia with dehiscent fruit and arillate seeds is no longer distinguished from *Dillenia*, chiefly because the nature of the fruits is not known in several species (Hoogland 1952). In this respect it is the primitive element, however, and among the species of *Wormia* the inflorescence appears to be most complicated and, perhaps, least reduced.

Dillenia albiflos Ridley.— tree -17 m, without buttresses, occasionally with 1–3 stilt-roots -1 m high; bark rufous brown, uneven and dippled; inner bark pinkish brown, thick; wood deep pink brown to reddish brown throughout, hissing on cutting; inflorescences terminal, hanging, gradually elongating -50 cm, with 1–3 (-4) branches and up to 30 flowers in all; peduncle (to the first flower) 7–18 cm long; pedicels 5–30 mm long, shortening distally, distichous; bracts 3–35 mm long, shortening distally; open flowers 4–5 cm wide, opening one at a time along the branches in the early morning; sepals cream-white internally; petals white, falling off c. 1pm; stamens cream-colour; styles white; fruit developed from every flower, white, dehiscent; aril white (?).

This species calls for investigation. Its exact distribution in Malaya, where it is endemic, needs determination because, like *Pandanus epiphyticus*, *Dipterocarpus lowii* or *Ficus cucurbitina*, it ties with the flora of Sarawak and shows the penetration of this element into that of Malaya. So far as known, it occurs in the swamp- and hillock-forest from Ayer Hitam and Kluang to Endau, Mersing, and the Sedili region. I recall no collections south west of Kota Tinggi or from G. Pantii itself; it was certainly not in Singapore. It was sufficiently common at Rengam to have been

enumerated by Cousens (Malayan Forester 14, 1951, 131, as *Wormia beccariana*). It is easily recognised from the trunk as *Dillenia* and, specifically, by the winged petiole distinct from the lamina. I have noted that, unlike most trees, taller trees bear larger leaves, but there must be a limit, and old trees have not been studied. Its nearest ally is *D. beccariana* of Sarawak to which, on a report from C. E. C. Fischer at Kew, I had reduced *D. albiflos* (Corner 1939). Hoogland distinguishes *D. beccariana* by the unbranched inflorescence (which occurs also in *D. albiflos*), by the larger flower (6 cm wide), the yellow petals, and the longer rigid hairs on the carpels. However, P. S. Ashton looked into the colour of the flowers for me in Sarawak and reported *in litt.* that the petals were white. Hence I am still uncertain of the specific distinction.

D. grandifolia Wall.— see Whitmore, Gdns' Bull. Singapore 24, 1969, 3.

D. pulchella (Jack) Gilg:— tree -33 m, 23 m to the first branch; bole 80 cm thick at 1.7 m, without buttresses or stilts; bark greyish brown to pinkish grey, finely fissured and breaking off in small subrectangular pieces.

This tree was scarce at Jurong, Singapore, and I saw but one specimen which showed, however, the size that it could attain, given the opportunity. At Pontian, Johore, it was rather frequent in the peat-swamp but not more than 23 m high.

Dillenia sp. ? :— s.n. 11.6.34 (as simpoh A), Jason Bay, S. Rhu Reba; tree -17 m, without stilts or buttresses; bark reddish brown, somewhat papery-flaky in small curling pieces; inner bark pink, coarsely veined; wood pale ochre; blaze hissing on cutting; leaves elliptic-obovate, with 8-9 pairs of lateral veins; scattered in wet parts of the *Eugenia grandis* forest. (? *D. pulchella*).

Dipterocarpaceae

The names which I use are those given me by my lamented friend C. F. Symington. The sterile specimens were named more or less to his satisfaction. The Malay names which I give were used consistently on the Sedili River, though they do not all agree with those advocated by Symington.

Dipterocarpus ? *hasseltii* Bl.— The damar of this tree was extracted for caulking. In a bole 20-25 cm thick a cut would be made 8-14 cm deep and up to 20 cm high and the bottom of the cut would be scooped out to make a basin. Then a fire was lit in the hollow for 15 minutes. In 24 hours there would be a puddle of greyish gum that remained liquid for two weeks. If left for a week, the hollow would fill with gum.

D. lowii Hook.f.— trunk becoming slightly fluted-buttressed; bark pale greyish buff, somewhat lenticellate, rather shaggy-flaky with oblong fibrous pieces; leaves stiffly coriaceous with upcurled sides.

Dipterocarpus sp. (9.9.34).— Tree -30 m, not buttressed; bark grey, with rather deep hoop-marks, pustulate with lenticels 3-5 mm wide, not scaly; leaves not matched by Symington.

Hopea mengarawan Miq.— tree -30m, with a few buttress-like stilt-roots -1.5 m high, or without stilts in dry forest; bark fuscous brown, fissured, rather roughly flaky; inner bark pallid wood-white to yellowish, easily stripping, separated from the hard outer bark by a characteristic wavy brown line.

H. ? *mengarawan* (30988).— tree -50 m, with rounded buttresses -2 m high; bark dark grey, deeply and narrowly rugose-fissured (as in *Fagraea fragrans*); wood pale yellowish throughout; crown like that of *kapur*; leaves resinous aromatic when crushed.

H. polyalthoides Symington.—small tree-5 m; bark fawn-brown, slightly creviced, smooth; inner bark pinkish, thin, flaking off on cutting in thin pieces with the outer bark breaking away.

H. resinosa Symington.— tree 8–20 m, with flattened arcuate stilt-roots -3 m high, copious, sometimes with tufts of small cylindric stilt-roots, but no stilt-roots in dry soil; no loop-roots; bark dark fuscous or blackish, entire, then somewhat fissured with narrow subtumid lenticels more or less in longitudinal rows; inner bark pale pinkish buff, stripping; wood yellowish.

Shorea acuminata Dyer.— tree -47 m, with buttresses -2 m high; bark dark fuscous to dull pinkish brown, inconspicuously roughened and scaly with irregular angular pieces, not or slightly fissured; inner bark deep purplish brown, thick; heart-wood dark pinkish brown; buds and large subsistent stipules inhabited by ants.

S. bracteolata Dyer.— tree -30 m, buttressed -3m or scarcely at all; bark fuscous, irregularly and shallowly fissured-flaky, scarcely rugose, not pustulate, or with lenticels 1–2 mm wide; inner bark cream-white, laminated with concentric ochraceous sclerotic zones.

S. exelliptica Meijer.— tree -57m, trunk 75 cm thick at 2.5 m high, buttressed to 2.3 m; bark greyish rufous, becoming rather irregularly flaky and subrugose; inner bark pale pinkish, yellowish next the sap-wood; leaves brownish silvery shite beneath.

This is *S. ? elliptica* Burck of Symington (see Ashton 1964).

S. foxworthii Symington.— tree -47 m, 65 cm thick at 5 m high, buttresses -4 m high, sharp and scarcely spreading; bark dull fawn brown, thinly flaky with oblong angular pieces (especially over the buttresses), sometimes more or less rugose-fissured at first and scaling off when mature; inner bark pallid yellowish, fairly thick; sap-wood yellowish tan, narrow; heart-wood dull rich brown, hard; leaves silvery beneath.

This was a common canopy-tree in the *kapur*-forest. It differed from the other species of *balau*, *S. exelliptica*, in the yellowish, not pink, inner bark.

S. lepidota (Korth.) Bl.— tree -40m, slightly buttressed; bark fuscous fawn, becoming rather coarsely rugose-fissured; inner bark dark reddish fuscous; heart-wood pinkish brown; fallen leaves coppery beneath.

S. leprosula Miq.— tree -50m, buttressed -3 m; bark light brown, rather distantly rugose-fissured; inner bark deep pink.

S. ovalis (Korth.) Bl.— tree -47 m, with very thick buttresses -2.7 m high, or slight or none (? immature trees); bark greyish fuscous to chocolate brown, smooth, entire, with hoop-marks, then rather finely rugose-fissured; inner bark brown, deep pinkish brown to blood-red just below the surface, blaze with bacony streaks.

One tree that I measured at mile 5½ on the Kota Tinggi-Mawai Road was 47 m high and the trunk above the buttresses was 165 cm thick; possibly this was the stoutest trunk that I saw in the Sedili region, but compare *Mesua kochummeniana*. There was a general flowering of *S. ovalis* in May 1935.

S. palembanica Miq.— tree -35 m, buttressed 1–2 m high; bark light fawn buff or greyish buff, becoming irregularly fissured flaky, not rugose, pustulate with small lenticels 1–4 mm wide; inner bark pink to pinkish brown; heart-wood dark brown.

For this species Symington gives the vernacular names *sengkawang* or *tengkawang* but, on the Sedili rivers, these names were used for *S. singkawang* or, possibly by confusion, for *S. lepidota*.

S. parvifolia Dyer.— tree -35 m, with low buttresses; bark with elongate lenticel-fissures, not flaky; inner bark pinkish brown, dull blood-red just below the dead outer bark, blaze with bacony streaks.

S. pauciflora King.— tree -20 m, not buttressed (? immature); bark rufous greyish, flaky with thin rectangular pieces, somewhat fissured, not rugose; inner bark thick, soft, deep brown-pink, blood-red just below the dead outer bark.

S. platycarpa Heim.— tree -35 m, buttressed; bark grey-brown, fissured; inner bark pinkish to purplish brown, reddish near the outside, blaze with bacony streaks.

S. resina-nigra Foxw.— tree -55m, 35m, to the first branch, buttresses 3-4 m high; bark greyish fawn, rather flaky and fissured, not rugose; inner bark pallid yellowish; damar blackening on exposure— Plate 8.

S. singkawang (Miq.) Burck.— tree -45 m, fluted at the base or with buttresses -2 m high; bark rufous grey to fuscous grey, rugose-fissured, not or slightly flaky; inner bark pinkish white or pallid buff-white.

When growing by the Sedili Besar this tree recalled *neram* (*Dipterocarpus oblongifolius*) with flattened and twisted trunk leaning over the river and the branches laden with epiphytes. I think that it was confused by Malays with *S. lepidota*.

S. sumatrana (V.Sl.) Symington.— I used to recognise this tree from a characteristic small toadstool that grew on the fallen leaves.

Vatica wallichii Dyer.— tree -23m, often short and crooked, without buttresses or stilt-roots; bark fuscous brown to pale grey, often white from a distance, smooth, with leaf-scars; inner bark yellowish, dark fuscous below the outer dead bark (flaking off on cutting), slightly resinous-aromatic (distinctly so in 28982); wood yellowish white; both flowering and fruiting specimens found in March 1932.

Ebenaceae

Diospyros L.— A dozen or more species of *Diospyros* occur in the swamp-forest, as trees up to 20 m, treelets and, almost, shrubs. The smaller are generally known as *segun*. The botanist recognises them from the dark grey or black bark which, in the blaze, gives a brittle and coal-like outer layer; the inner bark varies in colour and these differences seem to be important. Thus, I drew up the following key:—

Inner bark pink to deep red; *D. apiculata*, *D. argentea*, *D. maingayi*,
Diospyros sp. (6.8.39), *D. sp.* (1.7.39), (also *D. dictyoneura* and
D. helferi, not in the Sedili region).

Inner bark white to yellowish or pale ochre.

Inner bark quickly turning deeper yellow on exposure; *D. lanceifolia*,
D. siamang, *Diospyros* sp. (7.10.34).

Inner bark not deepening on exposure; *D. confertiflora*, *D. nutans*,
D. wallichii.

Buttresses are seldom and but slightly developed as in *D. maingayi*. Stilt-roots occur in *D. lanceifolia* and *D. siamang* which also has loop-roots as pneumatophores, but it does not appear to have been found in the Sedili region.

D. apiculata Hiern:— SFN 29359; tree -10 m; trunk 5 cm thick, no stilt-roots; bark dull black, shortly and shallowly longitudinally creviced, subtuberculate, with faint leaf-scars; inner bark pinkish brown beneath the coal-black dead bark; wood pinkish white; corolla white.

D. argentea Griff.— bark greyish black, carbonaceous, rather distantly fissured and subrugose; inner bark pinkish buff, not changing colour on exposure; wood white.

D. confertiflora (Hiern) Bakh.— treelet 3–4 m; twigs drooping, phyllomorphic, with small leaves; bark greyish brownish, rather finely and shallowly fissured; inner bark pallid whitish, thin; sepal 3–4, green; petals pinkish; fruit orange when ripe.

D. lanceifolia Roxb.— SFN 29373; tree -17 m; bole 10 cm thick at 2 m; stilt-roots -45 cm high, the lower stout and flattened, the upper narrow and cylindrical, not spreading; bark coal-black, finely, closely, and shortly fissured or creviced, somewhat rugose-fissured towards the base of the trunk, not tuberculate or scaly; inner bark pallid whitish, quickly turning deep yellow on exposure, stripping, coal-black and brittle at the surface; wood pallid whitish, quickly turning deep yellow on exposure; flowers mostly on the twigs behind the leaves, occasionally in the leaf-axils, not on the trunk; compare SFN 26167 (Jurong, Singapore).

In the collection s.n. 10.6.34 (as *segun* B, S, Tuenseh, Jason Bay) the inner bark was light brownish and, apparently, did not change colour on exposure. This tree, which may not be *D. lanceifolia*, was scattered in *Eugenia grandis* forest where it grew to a height of 20 m.

D. maingayi (Hiern) Bakh.— tree -20 m; bole 20 cm thick at 2 m; buttresses -60 cm high, often low and inconspicuous; crown often narrow and irregular; bark greyish black or coal-black, rather coarsely rugose, eventually flaking in long narrow brittle strips; inner bark -5 mm thick, deep blood-red beneath the brittle coal-black outer bark, very fibrous, stripping, with red sap; wood pallid yellow, then deeper yellow on exposure; fruit ochraceous yellow when ripe.

D. nutans King:— SFN 29339, 29442; tree -10 m; bole cylindrical, slender; bark black, slightly and narrowly rugose-fissured, not scaly or fibrous, somewhat knobbly; inner bark pallid yellowish beneath the coal-black outer layer, not deepening on exposure; wood pallid yellowish, not deepening on exposure; fruits in the axils of old leaves or just behind on the bare twigs, not on the branches or trunk.

I am not certain about the identity of all the numbers that I give under this name. SFN 29442 has been determined as *D. pauciflora*. In SFN 21312, 32304, and 32365 the twigs became strongly and irregularly angular with corky outgrowths.

D. siamang Bakh.— SFN 26167 and s.n. 15.1.33 (Jurong, Singapore), SFN 36623 (Pontian, Johore); tree -33m; bole 40 cm thick at 1.5 m, cylindrical or slightly fluted at the base; stilt-roots few, at the base of the bole; pneumatophores as loops -45 cm high, or as knee-roots, rather congested, -6 cm thick, with bark as on the trunk but the coal-black outer bark very thin and not fissured, strongly tuberculate-rugose with lenticels 1-2 cm long; bark dark blackish grey, finely, closely, and shallowly fissured, with faint large transverse lenticels; inner bark light yellowish brown, with a thin brittle coal-black outer layer; wood pallid white, quickly turning light yellow on exposure to the air as the inner bark; crown narrow, thin, poorly and irregularly developed.

This remarkable species, which I may have found once in the Sedili region, though not at the Mandai Road in Singapore, occurred at Jurong (Singapore) at the rate of one large tree, or two small ones, per acre. It was cauliflorous but, instead of inflorescences, there were often very dense bunches of galled twigs.

Diospyros sp.:— s.n. 6.8.39 (as *Diospyros* A, Bt. Tinjau Laut); tree -25 m, monopodial, without buttresses; bark coal-black, closely rugose-fissured; inner bark dull drab pink; wood pale yellow, not deepening on exposure.

Diospyros sp.:— s.n. 1.7.39, in peat-swamp, Pengkalan Raja, Pontian, Johore; tree -20 m, with a few stilt-roots -70 cm high, not buttressed; bark coal-black,

slightly fissured; inner bark reddish; common locally but all trees sterile at the time of collection.

Diospyros sp.—s.n. 7.10.34 (Mawai, Johore); tree -13 m; bole 30 cm thick at 2 m, slightly fluted at the base; no stilts or loop-roots; bark fuscous brown, nearly black, rather finely longitudinally flaky with narrow fissured pieces and shreds, sparsely pustulate with lenticels 3–5 mm wide; inner bark pale yellow, coal-black and brittle at the surface, not stripping; wood pallid white; inner bark and wood quickly turning deep yellow on exposure.

Elaeocarpaceae

Elaeocarpus macrocerus (Turcz.) Merr.— tree -25 m, buttressed and with numerous stilt-roots -2 m high; pneumatophores -1.7 m high, as loop-roots or λ-shaped, the tops often capitate or knobbed; bark pinkish brown, smooth; prostrate trunks proliferating new stems eventually established as independent trees; flowers fragrant, April-June.— Plate 12.

The name of this striking and characteristic tree of the freshwater tidal swamp-forest has been changed from *E. obtusus* to *E. littoralis* and, now, to *E. macrocerus*; let us hope that it is final, but for the record in botanical research these earlier names must be remembered.

Erythroxylaceae

Ixonanthes reticulata Jack.— tree -33 m; buttresses -2.7 m high, not spreading widely, the bole sometimes merely fluted at the base; bark light grey to pinkish brownish, smooth, entire, with faint hoop-marks; inner bark deep blood-red or blackish red, rather thick, very astringent, not stripping, much paler on the buttresses.

The fallen leaves of a peculiar ochre-brown and the intense colour of the inner bark identify this tree. Some trees have a slight tendency to form stilt-roots.

Euphorbiaceae

The importance of this family is shown by the large number of species, c.110, reported so far from the Sedili region. For Malaya and Singapore, the Tree Flora of Malaya vol. 2 gives 371 spp. and the odd remark that 'only a few species are common in permanent swamps'. About sixty species occurred in the swamp-forest round the Sedili rivers, where they made a considerable part of the undergrowth. The family has been badly in need of taxonomic repair which in recent years has been undertaken by Airy Shaw whose numerous papers, unfortunately almost without illustration, are cited in the Tree Flora; one must consult, also, his Euphorbiaceae of Borneo (Airy Shaw 1975). From these I have gleaned many name-changes and new species, and I add many field-notes which had not been consulted. The family is bedevilled with microgenera and it seems that the wood cannot yet be seen for the trees.

Aporosa lunata (Miq.) Kurz:— tree -7 m; bark dark grey, entire, slightly pustulate with irregular and somewhat elongate lenticels; inner bark pinkish brown, thin; leaves large, coriaceous, with sunken veins; twigs and lower sides of the leaves brown hairy; styles ochre-yellow; fruit pink.

A. nigricans Hook.f.— tree -10 m, without stilts; bark greyish white, finely longitudinally creviced, slightly flaky in small oblong pieces, not truly fissured or scaly; inner bark pale brownish, very thin; wood pallid tan, very dense; racemes on the twigs behind the leaves, not on the trunk.

A. pseudoficifolia Pax:— tree -5 m, without stilts; bark pale greyish brown, slightly fibrous and fissured; inner bark pale brownish, very thin; wood pale yellowish brownish throughout; flowers in sessile clusters on the branches behind the leaves; bark and wood recalling *Baccaurea*.

Austrobuxus Miq.— The identity of this genus, hidden for over a century in Buxaceae, has been discovered by v. Steenis (Blumea 12, 1964, 362). *A. nitidus* Miq. is the tree so long and well known as *Longetia malayana*. An effort to conserve *Longetia* failed; so *Austrobuxus* perpetuates distastefully the error, or folly, of Miquel. Of the type v. Steenis wrote 'though it is sterile but for a single flower bud, this brought to light the surprising fact that it is no Buxacea, but manifestly a common Euphorbiaceous Malaysian tree'.

A. nitidus Miq.— collection from Jurong, Singapore; tree -22 m; bole 25 cm thick at 1.7 m without buttresses, but narrowly fluted up to 1 m high; bark greyish brown, slightly rugose-fissured, slightly flaky; inner bark pale pinkish brown, c. 6 mm thick, not stripping; latex none; wood rather deep pinkish brown, with a narrow outer ring of whitish sap-wood c. 6 mm wide.

Baccaurea Lour.— The bark is given as 'red to orange brown' in the Tree Flora of Malaya vol. 2 p. 63. I never saw truly red bark in any species, though this colour comes in spuriously through red corticolous algae or lichens, as on coconut-trunks; in a few species it is orange brown but in the majority it is fawn brown to greyish brown.

B. hookeri Gage:— tree -13 m; bark light fawn, fibrous-scaly in small pieces; fruit on the twigs behind the leaves.

B. ? javanica (Bl.) M.A.— tree -13 m, fluted at the base; bark light fawn, very thinly dipped-flaky; fruit in racemes from the twigs behind the leaves; seeds 1-2 per fruit, with bluish lilac pulp.

B. lanceolata (Miq.) M.A.—SFN 36976; small tree -7 m; bark pale grey, slightly fibrous, almost smooth; inner bark pale ochraceous, thick; fruits borne only on the trunk from ground-level up to 3 m high, 1-seeded, pale green ripening dull cream-white; seeds with white pulp.

B. racemosa (Reinw.) M.A.— tree -13 m; bark pale buff, greyish when old, finely creviced and flaky in small pieces; inner bark pale yellowish, very thin; wood pale yellowish tan, hard, fine-grained; flowers pale yellow, sour-scented; fruit 1-3-seeded, cherry red, fruiting racemes green and hanging from the twigs behind the leaves; seeds with purple-blue pulp.

This frequent small tree much resembles *B. motleyana* in general appearance. The collection s.n. 15.7.40 (Danau, Sedili Besar), if it belongs here, represented a very common under-storey tree of the swamp-forest, which had a general and heavy fruiting at that time.

B. scortechinii Hook.f.— In Wayside Trees of Malaya I carefully distinguished this species from *B. parviflora* to which it has been reduced by Airy Shaw (Kew Bull. 26, 1972, 220) and so-called in the Tree Flora of Malaya. There is surely some mistake here.

B. sumatrana (Miq.) M.A.— tree -15 m; bark rufous fawn, finely fissured-flaky; fruits on the leafy twigs, 2-seeded; seeds with rich orange-red pulp.

Blumeodendron tokbrai (Bl.) J. J. Sm.— tree -23 m, without buttresses; stilt-roots -2.5 m high, spreading; pneumatophores none; bark grey to pale pinkish brown, rather smooth, slightly longitudinally fissured; inner bark deep pinkish brown; latex none; leaf-blade jointed with a slight clongate swelling to the large thick

petiole, leaves usually in alternating whorls of 3; fruits 2.8–3.6 cm long, slightly broader, depressed globose with 3 slightly depressed sutures, rounded triangular in end-view, with a vestige of the style, glabrous, ripening pale yellow; exocarp 1.5 mm thick, rather dry; endocarp 3 mm thick, woody, dehiscent on the tree; seeds 1–3 per fruit, covered with thin, pale yellow pulp, with a beery smell.— Plate 19.

Bridelia ? *cinnamomea* Hook.f.— tree -17 m; bole 15 cm thick at 2 m, rather copiously branched above, without stilts; bark pale pinkish fawn, inclining to silvery buff, slightly flaky with inconspicuous angular scales, faintly pustulate with small, rather scattered lenticels; inner bark pinkish fawn; sap-wood narrow, yellow; heart-wood rich pink-brown; twigs and petioles light brown hairy; flowers pale cream-yellow, the sepals greenish yellow; wood very handsome.

B. pustulata Bl.— treelet -5 m, trunk 7.5 cm thick at 2 m; stilt-roots few, low, spreading, up to 20 cm high on the trunk; thorns -5 cm long, simple or 2–3-fid, set along the trunk up to 3.5 m high (? abortive roots); bark light grey, silvery, smooth; inner bark reddish, thin.

Cephalomappa lepidotula Airy Shaw:— tree -20 m; bole 30 cm thick at 2 m, without stilts; bark fuscous fawn or dull greyish brown, closely pimply with small lenticels 1–3 mm wide, entire; inner bark pale brown, fairly thick, rather hard and dry; crown dense, dark, brownish from the brown scurfy undersides of the leaves; petiole geniculate; lamina serrulate, with a gland on each side of the base of the midrib underneath.

With these field-characters I had no difficulty in recognising this tree.

Cleistanthus maingayi Hook.f.— tree -8 m; bark greyish green becoming chocolate-brown, scaling in irregular pieces with pale new bark; inner dark pallid greenish white; wood pinkish; leaves rather glaucous beneath; young leaves pale green; twigs and petioles brown hairy; several trees getting new leaves and flowers in Feb. 1935, but others with mature fruit.

Croton laevifolius Bl.— This common shrub was always observed to flower gregariously about February and to fruit about May. I did not record a second flowering in the year. The inner bark smells faintly of eucalyptus. The species has been called *C. oblongus* Burm.f., but I have seen no proof (Corner 1939).

Dimorphocalyx murinus Elm.— SFN 29295, 29296; tree -13 m, without stilts or buttresses; bark light greyish fawn, rather silvery, slightly but closely pimply with small lenticels, somewhat dippled or pocked, very thin (paper-thick); inner bark pale orange to deep orange-brown in young tree, reddish orange in old trees, rather thick, not sclerotic; wood pale yellowish tan. See notes under *Ostodes*.

Endospermum diadenum (Miq.) Airy Shaw.— This is the species so long known as *E. malaccense*; it is another of Miquel's *coups de grace*. Large trees were common in the hillock-forest along the Jemaluang Road but many were felled because the wood was used for match-sticks.

Galearia Zoll. et Mor.— This genus is referred to Pandaceae by Forman (Kew Bull. 26, 1971, 153). I have noted that treelets of *Galearia* have scale-leaves on the main stem and foliage leaves only on the branches, as in *Glochidion*.

Glochidion glomerulatum (Miq.) Boerl.— This was recorded by Polak (1933, as *G. palustre*) as common with *Elaeocarpus macrocerus* (as *E. littoralis*) in the swamp-forests of Sumatra. I did not find this association in the Sedili region where the *Elaeocarpus* grew near the tidal river-banks and the *Glochidion* round the periphery of the swamp-forest.

Hymenocardia sp.— SFN 26100, Jurong, Singapore; tree -13 m; bole 10 cm thick at 1.2 m, without buttresses or special roots; bark dull greyish, slightly brownish,

finely and shallowly fissured, flaking with small thin elongate pieces (much as in *Jackia ornata*); inner bark rich brown or reddish brown, thin; wood whitish; latex none.

Under this name I filed provisionally specimens of a small tree that was scattered in the undergrowth at Jurong, but which I never saw elsewhere.

Macaranga baccaureifolia Airy Shaw:— The many species of *Macaranga* in Malaya are evergreen and, perhaps, ever-leaving. This species of the freshwater tidal swamp-forest is therefore exceptional. In February, when the river was subsiding after the monsoon rains, there became noticeable in the flat swamp-forest behind the *men-pisang*-belt many undergrowth trees completely bare of leaves which lay beneath them as a fresh brown litter. From the bare twigs green male catkins began to hang down, recalling the hazel (*Corylus*) of Europe. Then the new leaves came out in March and fruits began to ripen in May and June. The identity of the tree puzzled me for many years until, at the Singapore Herbarium in 1972, I found that it had been named by Airy Shaw. Deciduousness is often associated with cold or dry seasons. Here is a truly deciduous tree in the undergrowth of tropical swamp-forest where the climatic effect is a slight improvement in drainage. What of its allies? The species has been found also in Borneo.

M. griffithiana M.A.— This species built dense stands of secondary forest up to 23 m high on old logging sites by the Sedili Besar. It is given as a small bushy tree in the Tree Flora of Malaya vol. 2, which applies to its early growth. It has been reduced to a subspecies of the Bornean *M. motleyana* M.A. (Whitmore, Kew Bull. 29, 1974, 448).

M. javanica Hook.f.— I refer to the plant described in Wayside Trees of Malaya., for which I spent much time in ascertaining the botanical name. It is called *M. heynei* by Whitmore (1967, 1969), which differs merely in details of the bracteoles of the male flowers. I considered, and still consider, the difference too trivial for specific distinction if, indeed, it is so reliable. Similarly *M. lacinata* is a northern variation of *M. javanica*.

M. quadricornis Ridley:— According to Whitmore (1969), this has a disjunct distribution in Malaya, for it is known from the mountains of the main range and from south east Johore. He suggests in explanation that it has evolved from the complex of *M. triloba* independently in both places. In the same year, however, Cockburn (1969) reported *M. quadricornis* from G. Mandi Angin in Trengganu. This proves that knowledge of the distribution of common plants in Malaya is still insufficient for theorising. I have noted many other examples of apparent disjunction such as *Lithocarpus maingayi* and, in varying degree, *L. kingianus*, *L. kunstleri*, *L. perakensis*, and *L. urceolaris*, for which a double origin is so unlikely that it can be ruled out. And there are the instances of *Antidesma brachybotrys*, *A. pahangense*, *Castanopsis fulva*, *Ficus urnigera*, *Garcinia maingayi*, *Homalium dasyanthum*, *Vatica stipulata*, and *Zingiber wrayi*. Such are relics of the past history of the Sedili region where Bt. Tinjau Laut and G. Panti are opposing markers. Indeed, the distribution of *Dryobalanops aromatica* must be part of the problem. In the case of the montane plants that occur also on the seashore, without intervention, such as *Baeckia frutescens*, *Styphelia (Leucopogon) malayana*, and *Vaccinium bracteatum (V. malaccense)*, ecological factors may enter as well as historical.

Neoscortechinia forbesii (Hook.f.) C. T. White:— tree -7m, without stilt-roots; bark pinkish grey to brownish, entire, pustulate with numerous small, light brown lenticels 1-2 mm wide, more or less in longitudinal rows; inner bark pale yellowish brown, reddish below the outer bark.

N. sumatrensis S. Moore:— tree -20 m; bole 20 cm thick at 2 m, slightly fluted at the base, without stilts or pneumatophores; bark fuscous brown to grey, entire or

creviced, with faint leaf-scars, often closely pustulate with small, round, dirty white lenticels; inner bark light brownish ochraceous, somewhat gritty, breaking off without stripping; wood yellowish throughout; fruit grey-hairy.

Ostodes pendula (Hassk.) A. Meeuse:— This species, which has usually been known as *O. macrophylla*, is called *Fahrenheitia pendula* in the Tree Flora of Malaya vol. 2. The differences between *Fahrenheitia*, *Ostodes*, and *Dimorphocalyx* have been set out by Airy Shaw (Kew Bull. 20, 1966–67, 409), but they do not seem to me more than sections of a genus such as *Streblus*, *Ficus*, or, indeed, *Tacca*.

Pimeleodendron macrocarpum J. J. Sm.— tree c. 30 m high; bole 40 cm thick at 2 m, cylindrical from the base; bark fuscous fawn, uneven and rather rough, with short shallow anastomosing fissures, slightly flaky with small, rather thin, irregular pieces, (trunk uniformly fissured, rough, and flaky); inner bark pallid fawn-ochraceous with numerous fine darker fibres, pallid reddish brown near the surface; latex white, rather watery, not copious; fruits set in 2's and 3's on the twigs behind the leaves, facing downwards, green turning yellow (? orange when ripe).

I found two trees, one at mile 5–6 on the Kota Tinggi Mawai Rd, the other in the swamp-forest at S. Dohol. Local forest-guards called it *perah*, doubtless from the resemblance to *Elateriospermum*.

Sapium indicum Willd.— There were a few trees behind the police-station at Mawai. Thence, downstream to the *nipa*-belt, there were scattered trees, mainly along the tributaries of the main river. The species has been transferred to *Excoecaria* by Airy Shaw (1975), who gives the trunk as thorny, though I never noticed this.

Suregada Roxb.— *Gelonium* is reduced to this genus. The Tree Flora of Malaya vol. 2 treats *S. glomerulata* as a synonym of *S. multiflora* but it seemed to me that there were two species in the Sedili region and I have retained them.

Trigonostemon rufescens Jabl.— shrub or small tree -8 m high; trunk -15 cm thick at the base; branches few, straggling, more or less erect with the leaves clustered spirally at the ends, often in rosettes; bark fuscous greyish or yellowish, finely fissured or creviced, often pustulate with rather large transverse lenticels; inner bark pinkish brownish, with a hard, almost carbonaceous, blackish layer near the surface; wood cream-white, rather hard and dense; sap blood-red, fluid (not gummy), scant in the bark of old stems, copious in younger stems and twigs (reminiscent of Myristicaceous sap); monoecious with bisexual racemose inflorescences, at first axillary with female flowers then becoming male in the lower part of the raceme, the distal part fruiting and breaking off, then the racemes persisting on the branches and trunk as scattered male inflorescences -5 cm long though some cauline inflorescences (even only 12 cm above the ground) with a terminal female flower; female flowers 1–4 per raceme, one always terminal, 1–2 flowers open at a time, the corolla twice as big as in the male flowers; male flowers axillary from bracts in the lower part of the inflorescence, developing after most or all of the female flowers set fruit, also on the short cauline inflorescences; sepals green; petals blood-red to deep crimson in male and female flowers; filaments and anthers pale greenish yellow, then pinkish; ovary and styles pale greenish yellow; disc pallid yellow; fruiting sepals becoming reddish, much enlarged and enclosing the capsule.

T. sumatranus Pax et Hoffm.— tree 8–20 m high (small tree in Tree Flora of Malaya vol. 2); bark pinkish grey to silvery, entire except for more or less longitudinally elongate lenticels; inner bark rather thin, deep pink to purplish pink, with faint bacony streaks; wood soft, pinkish white; flower-pedicels pale pink to rose-red; sepals greenish; petals deep orange, reddening on the outside; stamens and styles yellow; glands pale pink.

T. villosus Hook.f.— treelet -5 m, laxly branched; bark greyish black, carbonaceous, with fine anastomosing rugose fissures; inner bark reddish, with copious blood-red sap; corolla dull crimson; stamens creamy yellow.

Fagaceae

With the help of Soepadmo's revision of this family in the Flora Malesiana and his citation of collections (1971), I record from the Sedili region 5 species of *Castanopsis*, 14 of *Lithocarpus*, and 7 of uncertain identification as listed below. The absence of *Quercus* s.str. may be significant. They were frequent trees, rarely exceeding 25 m high, but often sterile, in which case field-characters of habit, bark, and fallen leaves were useful in identification. I note the following points:—

Buttressed; *L. bennettii*, *L. urceolaris*, *L. ? cyclophorus* (7.2.35),

L. ? javensis, *Pasania* A (18.2.37); in most species the bole was cylindrical from the base.

Stilted; *L. hystrix*, *L. leptogyne* (also pneumatophores), *L. urceolaris*.

Inner bark deep pink, red, or purple; *L. bennettii*, *L. ? cantleyana*,

L. ? ewyckii, *L. ? javanica*; most species with pale brownish inner bark.

Oaks can be recognised from the very wide medullary rays and, generally, the ease with which the bark breaks off the wood in cutting the blaze. The species which seemed most readily to withstand flooding was the riverside *L. elegans*. The occurrence of the mountain *L. maingayi* is remarkable.

Lithocarpus bennettii (Miq.) Rehd.— tree -30 m; buttresses -1 m high, spreading; no stilt-roots; crown with rather steeply ascending limbs; bark greyish white, pustulate with numerous small lenticels; inner bark deep wine-red to dull mangosteen-purple, -15 mm thick, stripping easily; wood pallid brownish, with very wide rays and vessels.

L. eichleri (Wenzig) A. Cam.— tree -17 m, not buttressed; bark greyish to brownish, pustulate with pallid lenticels 2–4 mm wide, scattered or in vertical rows, becoming finely creviced, with persistent leaf-scars; inner bark pale brownish, rather hard and sclerotic; wood pallid drab.

L. hystrix (Korth.) Rehd.— tree -20 m; bole 25 cm thick at 2 m; stilt-roots -1 m high, spreading, subarcuate; buttresses none; bark greyish white, with persistent leaf-scars, slightly pustulate with scattered lenticels 2–3 mm wide; inner bark pallid yellowish tan; wood soft; twigs and undersides of the leaves brown hairy.

L. kunstleri (King) A. Cam.— tree -13 m, with poor and malformed crown, no stilt-roots; bark greyish fawn, with faint leaf-scars, somewhat pustulate with small whitish lenticels 1–2 mm wide, the lenticels elongating transversely; inner bark pale brownish drab, thin; twigs olivaceous hairy.

L. leptogyne (Korth.) Soepadmo:— tree -23 m; bole 35 cm thick at 4 m; stilt-roots -4 m high, the main stilts flattened and arcuate, the smaller subcylindrical, often fastigate, forming a dense thicket round the trunk; pneumatophores as slender unbranched erect roots or λ-shaped, abundant in very swampy places; bark chocolate brown to paler fuscous fawn, closely pustulate with tubercular lenticels 2–5 mm wide, more or less in vertical rows, with faint leaf-scars, becoming slightly fissured and flaky; inner bark brown, fairly thick; wood yellowish buff throughout; leaves silvery beneath; flowering in February.

This remarkable tree, which in its thicket of stilt-roots resembles species of *Calophyllum*, is figured in Flora Malesiana ser. 1, 7, fig. 29, p. 378 (representing SFN 28959). The collections SFN 28968 and 28986 were made on the following

day in the same place and from identical trees, but 28968 is referred by Soepadmo (1971) to *L. sundaicus* and 28986 has been omitted; both were tentatively named *Pasania ? sundaica-lamponga* in the Singapore Herbarium.

L. urceolaris (Jack) Merr.— tree -25 m; buttresses -1m high, rather low, spreading, tending to form tufts of cylindrical stilt-roots; bark brownish grey, dull, coarsely tuberculate with rather tumid lenticels 3-5 mm wide, leaf-scars faint; inner bark pale fawn tan, fairly thick; wood pallid tan-buff throughout; leaves greyish green on both sides or silvery beneath; flowering and at the same time with nearly mature fruits in February.

A tree of this which I planted from seed in the Singapore Botanic Garden still stands near the library.

L. ? cantleyana:—s.n. 15.4.36 (7); tree -27 m, fluted at the base; bark as in *L. eichleri* but the inner bark deep pink with bacony streaks in the blaze; in swamp-forest.

L. ? cyclophorus: — s.n. 7.2.35 (S. Berassau near the Jemaluang Road, as *Pasania 1*); tree -30 m; bole 50 cm thick at 2 m; buttresses -2.5 m high, spreading, rather sharp; bark light fawn brown, inclining to pale rufous, irregularly flaky with small, rather fibrous, longitudinal pieces, subpustulate with small lenticels, without leaf-scars; inner bark pallid tan; tending to sucker from the base; several big trees locally in the swamp-forest, but sterile.— The herbarium specimen was taken from a sucker-shoot, but I noted that the leaves on the crown were the same.

L. ? cyclophorus:— s.n. 3.2.35 (mile 17, Jemaluang Road, as *Pasania 1*); tree - 30 m; bole 40 cm thick at 2 m, cylindric from the base; bark greyish white, leaf-scars faint, rather closely tuberculate with small lenticels; apparently merely 2-4 fruits per inflorescence.

L. ? ewyckii:—s.n. 16.634 (S. Semandan, Jason Bay, as *Pasania 1*); tree -23 m; bole 35 cm thick at 2 m; buttresses slight; bark pinkish grey, faintly rugose-fissured, not flaky or lenticellate; inner bark pinkish brown, thick, lurid reddish immediately below the dead outer layer, easily breaking off; leaves subglaucous beneath; *berangan babi*.

This tree was frequent in old *Eugenia grandis* forest along the coast and the only oak that I saw in that forest.

L. ? gracilis:— s.n. 10.5.35 (mile 5½, Kota Tinggi Mawai Road, as *Pasania ? omalacos, ? cytorrhyncha*); tree -23 m, cylindric from the base; bark light grey, somewhat pustulate, entire; in dryer parts of the swamp-forest.

L. ? javensis: — s.n. date ? (3 miles below Mawai, as *Pasania costata*); tree -23 m; bole 45 cm thick at 2 m; buttresses few, sharp, -½ m high; bark light greyish fawn, faintly lenticellate-fissured, nearly smooth, with persistent leaf-scars; inner bark deep red-brown, thick; *berangan babi*; frequent in hillock-forest.

Pasania A:— s.n. 18.2.37 (S. Kayu, in swamp-forest); tree -40 m with big spreading crown; buttresses -1.2 m high, some as broad flat stilts; bark light brown, slightly pustulate with elongate lenticels; inner bark brownish bistre, darkening on exposure, very thick; leaves rather yellow-green beneath, not silvery.

Flacourtiaceae

Casearia grewiaefolia Vent. var. *deglabrata* K. et V.— tree -23 m, cylindric from the base; bark light grey or greyish buff, smooth, then slightly pustulate with small lenticels more or less in vertical rows, finally slightly lenticellate-fissured; leaf-scars persistent; inner bark pale pink, not or hardly stripping, -4 mm thick; wood pale ochre throughout, fairly hard.

Casearia sp.— SFN 32517 (Mandai Road, Singapore); shrub -2 m; young leaves pale pinkish fawn; fruits brilliant orange; seeds white, aril red.

Homalium dasyanthum (Turcz.) Warb.— tree -13 m; bole 20 cm thick at 2 m, cylindrical from the base; bark light brownish drab to drab white, strongly marked with transversely elongate, tumid, white, crowded lenticels 3–12 × 3–4 mm, sometimes united in bands, the outer bark thin and stripping like cherry-bark; inner bark pale ochraceous, greenish under the outer bark, thin; wood yellowish tan throughout; calyx and corolla pale green; filaments greenish white, often becoming rose-pink at the ends; anthers dull orange; glands dull yellow; ovary greenish.

This tree, easily recognised from the whitish, pustulate and banded bark, was not uncommon along the S. Kayu Ara. According to Sleumer (Flora Malesiana ser. 1, 5, 1954, 56) the species is known otherwise from limestone hills. In the Tree Flora of Malaya it is given as coastal, sometimes on limestone, and common in the north west of Malaya.

Hydnocarpus curtisii King:— tree -7 m, scraggily branched; bark pale drab fawn-grey, with fairly numerous, small, transversely elongate lenticels; inner bark pale ochraceous tan, thin; wood pinkish brown; inflorescences male (with small ovary) or female (with staminodes) on the same tree; sepals pallid white, or green (male); petals and filaments cream-white; anthers yellow, vibrating; ovary cream-white.

Of the 7 species of *Hydnocarpus* in Malaya, 6 occur in the Sedili region.

Ryparosa scortechinii King:— tree 4–13 m; bole 3–13 cm thick at 2 m, cylindrical from the base, cauliflorous; bark greyish rufous fawn, smooth, then somewhat fissured with elongate, pustular, longitudinal lenticels; inner bark yellowish, with ochraceous sclerotic particles, rather thick; wood pallid white; racemes 1–3 on small knobs on the trunk (not from the branches), from 15 cm above the ground upwards, hanging, -14 cm long, the rachis black-hairy; petals, stamens, and ovary pale greenish yellow, becoming orange-ochraceous; ovary becoming black-hairy on fertilisation; sepals black-hairy; flowers with a faint musty smell.

According to Sleumer the sepals and ovary are rusty hairy but in the living state the hairs are black (? very dark purple from anthocyanin), and the black-hairy young fruit is characteristic.

Flagellariaceae

Hanguana malayana (Jack) Merr.— By this name I mean the common lily-like plant of the forest, that we used to call *Susum malayanum*. In the Flora Malesiana (ser. 1, 4, p. 249) it is equated with the aquatic *Susum anthelminthicum* to which the description largely refers. I am not convinced that they should be made into one species, though structural differences may be slight. I have seen hundreds of plants of the forest *S. malayanum* in the swamp-forest, where they vary in numerous ways, but I never saw in the Sedili region the aquatic *S. anthelminthicum*, though there were abundant opportunities for it in the muddy open back-waters and sluggish streams, where I saw it later in Trengganu and Sarawak. In such places, even at the brink of the water, *S. malayanum* never ventured to become *S. anthelminthicum*.

In the forest *S. malayanum* was solitary or with short, inconspicuous stolons it built small colonies. Some plants were big, with long leaves, and they sometimes developed a second rosette above the first on a distinct stem; yet this was not necessarily the habit of old plants. Some of these were distinguished by the long petioles. In some plants the leaves were deep purple beneath, in others pale green; and in some places all the leaves were longitudinally silvered in blurred stripes. Some plants had tall spreading panicles; others had them so compact as almost

to be capitate. The bigger plants occurred in the deep humus of wet forest, the smaller on hill-sides; yet I was not convinced that they were merely ecological diversifications. I recommend the species for cultivation and autecological research.

Gesneriaceae

Cyrtandra suffruticosa Ridley:— Epiphytic bush at heights up to 10 m in shady places in the swamp-forest; leafy stems freely hanging up to 120 cm long, arising from a congested rhizome creeping on the support; roots rarely reaching the ground; leaves hanging vertically down; bracts pale green, more or less suffused dull purple on the inner side; pedicel and calyx pale pink; corolla 40–45 × 25 mm, white, with 2 longitudinal brown patches at the base of the three corolla-lobes next the stamens, a brown patch at the base of the stamens, and a large pinkish purple patch on each of the other two petal-lobes (these patches often confluent).

Cyrtandromoea Zoll.— This genus has been transferred to Scrophulariaceae by B. L. Burtt (Bull. bot. Surv. India 7, 1965, 73).

Didissandra johorica Ridley:— s.n. 23.4.38 (mile 14, Jemaluang Road); herb -75 cm high; stem purplish; leaves dark green, whitish beneath, fleshy; flowers axillary; peduncles purple; corolla dingy white, suffused brownish purple on the upper side, the lower side of the throat bright yellow with two brown longitudinal bars.

Paraboea densifolia (Ridley) Henderson:— This herb grows in thick tufts on rocks in *Saraca*-streams and it is strongly attached by fibrous roots. It marks the change from swamp-forest, where it does not occur, to the swifter *Saraca*-streams that are the upper tributaries of the Sedili Besar. It can also be found on boulders in the forest, possibly as relics of former stream-beds.

Gonystylaceae

Gonystylus bancanus (Miq.) Kurz:— SFN 36657; tree -40 m; bole cylindrical, no stilts or pneumatophores; crown compact, dark; bark dark tawny brown to rich brown, fissured, cracking transversely into oblong flakes, becoming shaggy-scaly (like old trees of *Cratoxylon arborescens*); inner bark pinkish, thick, dry; wood pale yellow throughout; leaves dark glossy green, coriaceous, spirally arranged, upstanding, with upcurled sides.

This was a common tree in the peat-swamp at Pontian, Johore, and known locally as *kayu gatal*. When the bark dries and the outer layer is broken away, the surface of the inner bark becomes finely hairy from minute and irritating fibres. Young trunks suggest *Eugenia*, old ones *C. arborescens*. In the Sedili region it was remarkably uncommon.

Gramineae

Panicum repens L.— This is one of the few real dune-binders on the Malayan coasts. The rhizome lies up to 60 cm deep and sends up the more superficial branches which end in inflorescences. The deep rhizome develops swollen internodes and becomes artichoke-like. Most herbarium-specimens do not show this feature.

Paspalum vaginatum Sw.— This is another coastal grass with deep rhizome. Round Jason Bay it grew in the wet hollows of sand-spits and, especially, by streams in the forest where it formed close swards, up to 60 cm high, under *Avicennia*, and *Sonneratia* near the mouths of streams. The inflorescence has 2(-3) short deflexed branches.— Plate 28.

Sphaerocaryum malaccense (Trin.) Pilger:— small grass on the riverside mud in the freshwater zone, submerged at high tide and, in places, at low tide, often in masses round the bases of *putat* and *rassau*; leaves pinkish purple beneath; panicle very small, with solitary florets.

This was also a common grass of forest-paths. Perhaps the *putat*-belt was its original habitat.

Gymnospermae

Podocarpus motleyi Dumm.— tree -27 m; bole 35 cm thick at 2 m, cylindrical from the base; bark fuscous, slightly and distantly fissured, slightly fibrous-flaky, inclined to become dippled; inner bark reddish brown, rather thick.

This tree was scattered through the swamp-forest and occasionally entered the canopy. At S. Kayu I saw three large trees in a distance of c. 150 m. Saplings were more frequent.

Hypericaceae

Cratoxylon arborescens (Vahl) Bl.— This tree was gregariously dominant in parts of the swamp-forest, though for what reason I never discovered. Seedlings and saplings were often abundant. With monopodial growth they penetrate to the canopy and develop large, heavy, rounded crowns which, in age, lose the monopodial character. Unlike so many swamp-forest trees, this species lacks buttresses, stilt-roots, and pneumatophores. The bark of saplings is rather coarsely rugose-fissured but this bark is scaled off from below upwards and the mature trunk develops the shaggy-flaky bark. Besides being a typical swamp-forest tree, this species occurs in lowland and montane forest.

C. formosum (Jack) Dyer:— The trees on the Sedili Besar were all of the larger variety, as mentioned in *Wayside Trees of Malaya*. The point is overlooked in the *Tree Flora of Malaya* vol. 2, where the bark is given, not as fissured, but as papery-flaky which seems wrong.

C. ligustrinum (Spach) Bl.— This species is reduced to *C. cochinchinense* (Lour.) Bl. in the *Flora Malesiana* ser. 1, 8, 1974, 7. This may satisfy the herbarium but not the student of living trees. It does not resolve the ecological, geographical, and structural differences so apparent to the field-botanist. The mistake is perpetuated in the *Tree Flora of Malaya* vol. 2, where the bark of *C. ligustrinum* is ascribed to *C. cochinchinense* and my account of *C. cochinchinense* is omitted.

Hypoxidaceae

Curculigo latifolia Dryand.— This common herb with plicate leaves is either very variable or has distinct forms. Particularly noticeable in the swamp-forest of the Sedili region was a form with long-petiolate leaves reaching 2 m high. The genus would repay critical study by means of transplants and the raising of seedlings.

Icacinaceae

Cantleya corniculata (Becc.) Howard:— trees at Jurong, Singapore; tree -23 m high; bole 30 cm thick at 1.5 m, without buttresses but occasionally slightly thickened over the main lateral roots; without pneumatophores; branches ascending, then outcurving; bark dark grey, entire, nearly smooth, then somewhat longitudinally fissured with elongate lenticels (as in *Calophyllum*), not scaly; inner bark pale ochraceous, rather soft, -12 mm thick, not stripping; wood pale yellowish throughout, with a faint sweet smell; leaves subcoriaceous, the veins more or less invisible.

This is illustrated in the Flora Malesiana (ser. 1, 7, 1971, 51–53) as a lofty tree with strong blunt buttresses. I did not find the tree in the Sedili region, though there is the record from S. Gembut which is a tributary of the Sedili Besar. It was frequent, however, at Jurong though not so large as recorded in the Flora Malesiana.

Platea excelsa Bl. var. *riedeliana* (Becc.) Sleumer:— SFN 36686, Pontian, Johore; tree -33 m; stilt-roots -2.3 m high, flattened, arcuate; loop-roots -45 cm high, abundant round the base of the trunk; bark warm brown, smooth, entire, then with fine faint transverse wrinkles closely set; inner bark ochraceous sclerotic; crown small; leaves spirally arranged, upstanding; buds brown scurfy, petioles and midribs slightly so.— Plate 18.

P. latifolia Bl.— tree -30 m; stilt-roots -2.3 m high, rather congested, the larger arcuate-flattened, the smaller subcylindric; bark fuscous brown, slightly fissured, slightly pustulate with small scattered lenticels, with persistent leaf-scars, for the most part smooth; inner bark pallid brownish tan, without smell or latex; leaves rather distant, with upcurled sides; fruit solitary, axillary, shortly pedicellate, ripening purple to black.— Plate 18.

Stemonurus malaccensis (Mast.) Sleumer:— tree -17 m; bole 20 cm thick at 2 m, cylindric from the base; bark greyish fawn tinged pinkish, smooth, entire except for rather distant lenticels 2–3 mm wide, tending to be in vertical rows, with faint leaf-scars; inner bark yellowish, with abundant ochraceous sclerotic particles or strands; wood yellowish throughout; leaves coriaceous, dark green, veins almost invisible; fruit shiny green but the distal third dull grey-green.

S. scorpioides Becc.— tree -27 m, flowering as a sapling at 4 m; bole 45 cm thick at 2 m, cylindric from the base; pneumatophores -45 cm high, 1–2.5 cm thick, peg-like, cylindric, obtuse, fleshy, as the ends of λ -roots branched below ground, abundant in swamp-forest; bark light brownish buff to light greyish brown, rather finely and closely pustulate with whitish lenticels 2–3 mm wide, more or less in vertical rows, with faint leaf-scars and irregular hoop-marks; inner bark -20 mm thick, yellowish, green below the surface (even on old trunks), with coarse ochraceous sclerotic strands and zones; wood yellowish throughout, fairly hard; leaves thick, fleshy, glossy, with faint oblique veins; buds thickly covered with hard brownish yellow resin breaking into dust on the opening leaves; twigs rather thick, green, hoary from the resinous bloom; fruit with green proximal half and pale greenish white conical distal half.

The presence of this frequent tree was told by the resin-capped buds, green twigs, and fleshy leaves of saplings, as well as by the distinctive pneumatophores; it is a xeromorph of swamp-forest.

Lauraceae

For a general account of this family and its genera I refer to Kostermans (1957). Many of my notes, attached to herbarium-specimens long on loan, have not been available to me. The only instances of stilt-roots that I met were in *Litsea gracilipes* and *Notaphoebe coriacea*. Strong buttresses occurred in *Lindera* sp. (SFN 28520) which was a dominant tree, with strangely swollen trunk, in *Eugenia grandis* forest.

Hexapora curtissi ? :— SFN 26196, 4.3.33, Jurong, Singapore; tree -23 m; bole 30 cm thick at 1.7 m, cylindric from the base; bark greyish white (white from a distance), apparently smooth but cracking into small thin irregular pieces; inner bark deep vinous brown, c. 12 mm thick, with numerous pale brown sclerotic granules or masses, not stripping; wood pale yellowish brown.

Notaphoebe coriacea Kosterm.— shrub or tree -10 m; trunk conically thickened downwards; stilt-roots present or not; some plants with small leaves, others with large; see my Life of Plants pl. 13a.— Plate 21.

This common and characteristic small tree, that often developed thickets in the tidal muddy creeks of the Sedili Besar, I had identified as *N. kingiana* var. *glabrescens* Gamble, but it appears to be this species of Kostermans. I was puzzled by its variability and, hence, the number of collections which I made; it needs fuller enquiry.

Lecythidaceae

Barringtonia Forst.

The collections in the Singapore Herbarium have been named by the recent monographer Payens (1967). Of the eight species recorded from the Sedili region, *B. asiatica*, *B. conoidea*, *B. macrostachya*, and *B. racemosa* have special habitats; the others appear to occur indiscriminately in the swamp-forest where only *B. filirachis* is common. The ecology of the genus deserves study, how it infiltrates from coast to montane forest. Several species have the stems or trunks thickened conically at the base, e.g. *B. conoidea*, *B. acutangula*, and *B. racemosa*.

B. filirachis Payens.— Small tree -13 m, trunk 15 cm thick at 2 m; branches gnarled, crooked, looping, with slender twigs; no buttresses, stilt-roots, or pneumatophores; bark fawn brown, or tinged orange or rufous, entire, then slightly fissured-flaky, not or slightly pustulate, without leaf-scars; inner bark pale yellowish to pinkish brown, stripping easily, fairly thick; inflorescence very slender, hanging; petals and stamens crimson pink; calyx bifid, greenish white; fruit 4-angled; flowering mainly April-May. Johore, Sumatra.

B. macrostachya (Jack) Kurz.— Tree -7 m, sparsely branched with no compact crown; bark brownish grey, smooth; inflorescence hanging; flowers rose-red; fruit rose-purple.

B. racemosa (L.) Spreng.— Small tree -10 m, trunks often thickened conically at the base; leaves of many plants yellow-veined on the upperside; flowers fragrant, nocturnal; petals white, the fallen corollas floating downstream; restricted to small openings, or niches, in the riverside vegetation in the freshwater or somewhat brackish tidal reaches, with many old and moribund specimens along the edge of the encroaching forest.

Leguminosae

Crudia Schreb.— Pollen of this genus has been recorded from Tertiary deposits in Borneo (Muller 1972). In the discussion which followed the delivery of this paper, there was doubt of the identification. Both *C. caudata* and *C. wrayi*, however, were locally abundant on the Sedili region, and it is not unlikely that, during the Tertiary extension of these and neighbouring rivers, *Crudia* might have been better represented than its present, almost relict, occurrence.

C. caudata Prain:— always a small tree -8 m high; twigs and fruit brown villous; bark dark fuscous, smooth; inner bark pinkish brown, thin; wood pinkish yellowish; seen only on the Sedili Kechil, but locally abundant.

Dalbergia parviflora Roxb.— This stout climber, rooted in the soft freshwater tidal mud by the river, developed into large impenetrable thickets. It threw up several stems on which massive, woody, and conical thorns developed up to 5 cm long, generally set in 2's and 3's. Old stems, trailing on the mud, were often the only passage over its treacherous surface, for a foot could usually be inserted between the clusters of thorns. This climber certainly needs ecological study.

Dialium kingii ? :— s.n. 5.5.35, S. Kayu Ara, in kapur-forest; tree 33 m high; bole 30 cm thick at 2 m; buttresses -1.2 m high, sharp, spreading; bark pinkish grey, drab, smooth, entire, but here and there pimply with small, irregular, very crowded

lenticels; inner bark pinkish brownish, with copious thin red sap soon clotting into thick reddish black sticky masses; wood pale tan; leaves brown hairy beneath (not golden hairy).

D. patens Baker:— tree -27 m; bole 30 cm thick at 2 m; buttresses -1.7 m high, sharp, not branched; bark pale to dark fawn brown, drying to pinkish fawn, closely pimply with 1-2 mm lenticels, with persistent leaf-scars, in old trees scaling off in small pieces (as in *Koompassia malaccensis*); inner bark pinkish fawn, rather thin, with thin blood-red sap darkening on exposure; wood as hard as iron.

Inocarpus fagiferus (Parkinson) Fosberg:— For the occurrence of this plant in Malaya I refer to my early account under the name *I. edulis* (Corner 1939, p. 269).

Ormosia macrodisca Baker:— s.n. 4.3.33, Jurong, Singapore; tree -17 m; bole 25 cm thick at 1.7 m, cylindric from the base; bark with a thin papery grey-brown superficial layer, easily peeling off in places to show the green under-bark, smooth, then shallowly fissured; inner bark pale yellowish brown, stripping easily, smelling of raw potato; wood pale yellowish.

A single tree was found, which may have been the last on Singapore Island.

Pterocarpus indicus Willd.— At S. Sebung, on Jason Bay, there were many, strongly buttressed, big trees of this species, well over 30 m high, growing along the river-bank in the region of *nipa*, *Sonneratia*, and *Bruguiera*, just where the bank sloped on to the muddy flat. The trees were well known locally as *sena* and that they were wild within the memory of man was confirmed by the local record given to me by Harun bin Awang Kechil. I did not record the tree from other rivers leading into Jason Bay.

Sympetalandra hildebrandii v. Steenis:— This was described recently with SFN 31984 as the type (Blumea 22, 1975, 166). I collected, also, a fallen fruit on G. Panti at c. 300 m alt. (Oct.1935), which was referred to *S. borneensis* in the Tree Flora of Malaya vol. 1, 1972, 274.

Liliaceae

Dracaena granulata Hook.f.— tree 8-13 m high; trunk 45 cm thick at 2 m, dividing at a height of 2-3 m into several branches; stilt-roots as cylindric adventitious roots -30 cm high at the base of the trunk; branches more or less pendent, like sprays of *Freycinetia*; bark greyish buff, finely creviced to narrowly and shortly fissured, not scaly but somewhat scrobiculate; inner bark greenish white, very thin; wood white, soft; fruit 28 mm wide, subglobose, succulent, carrot-red, solitary or paired on the lax terminal inflorescence.— Plate 25.

Looking at the feet of trunks, I was astonished to come upon this arborescent monocotyledon.

Smilax L.— I refer to the monograph by Koyama (1960).

Linaceae

Ctenolophon parvifolius Oliver:— tree -33 m, buttressed; pneumatophores as knee-roots (as in *Ganua*); bark grey-brown, more or less scaly; inner bark red, very thick, dry, fibrous.

These are Henderson's field-notes on SFN 36607. The tree was fairly common in the peat-swamp at Pontian, Johore, but scarce in the Sedili region, and absent, apparently, from the swamp-forest of Jurong and the Mandai Road in Singapore. The twigs evidently resemble those of *Gynotroches*, under which the specimens were doubtfully placed in the Singapore Herbarium.

Loganiaceae

Fagraea crenulata Maingay:— I note the absence of this tree from the regions of Pontian, Singapore and the Sedili rivers. I note also the absence of *F. fragrans* from the Sedili region; it occurs further north in the coastal swamp-forest of Pahang.

Norrisia major Soler.— tree -17 m, monopodial, usually laden with epiphytes; bark rather orange-rufous, inclining to fuscous, rather cracked and fissured, rugged; inner bark pale yellowish white; twigs annulate at the nodes; leaves dark green, glossy, with upcurled sides; young leaves pale green, old leaves withering yellow, set in two rows by petiolar twisting.

It was on a tree of this species that so many epiphytes were counted (p. 27).

Lythraceae

Lagerstroemia ovalifolia var. *exapiculata* Furtado et Montien:— I noticed in this tree that the living cambium showed as a characteristic fuscous purple line on cutting the blaze, not the result of oxidation on exposure.

Magnoliaceae

Aromadendron nutans Dandy:— SFN 36626, Pontian, Johore; tree -17 m, monopodial; bole cylindrical from the base, no special roots; bark ochre-buff, slightly cracked, otherwise smooth; inner bark light brownish ochre, thick, rather sclerotic-gritty; wood yellowish white.— Plate 9.

Marantaceae

The Malayan species have been monographed by Holttum (1951).

Phacelophrynium maximum (Bl.) K. Schum.— This appears to be common in the intermittent swamps along the *Saraca*-streams on the east of the main range. Its southern limit seems to be set at S. Kayu on the Jemaluang Road and at Bt. Tinjau Laut. It did not occur in the main area of swamp-forest round the Sedili rivers and I did not find it round the foot of G. Pantii. See *Phrynium basiflorum*.

Phrynium basiflorum Ridley:— This beautiful plant, which we called 'Tiger Stripes' because of the dark green stripes on the leaves, was common by *Saraca*-streams and on muddy banks in the forest (? stream-remains) round the foot of G. Pantii. It did not occur in the main swamp of the Sedili region and I did not find it on Bt. Tinjau Laut. Thus it impinges on *Phacelophrynium maximum* without intermixing. According to Holttum it is closely allied with *Phrynium hirtum* of much wider distribution.

Melastomataceae

Memecylon L.— This genus was in much confusion in the Singapore Herbarium. Furtado (1963) has disentangled several problems, but further study is needed into the habit of the trees and the colour of flowers and fruits. The genus made up a great deal of the undergrowth of the swamp-forest. With very thin bark, that seemed to avoid the need for pustular lenticels, and hard wood, the species gave the appearance of slow growth, but of this I have seen no proof.

M. garcinioides Bl.— tree -17 m; bole 20 cm thick at 2 m, cylindrical from the base; bark fuscous, paler with age, closely and narrowly rugose-fissured, becoming flaky with thin narrow fibrous strips and losing the rugose appearance; inner bark

very thin, pinkish; wood fuscous drab throughout, hard as iron; fruit grey-green then yellow.

M. paniculatum Jack:— tree -10 m; bark fuscous, finely rugose-fissured, not flaky; inner bark pinkish fawn, very thin; wood very hard; fruit ripening mauve-purple; leaves rather fleshy (as in *Fagraea racemosa*).

Meliaceae

I have been unable to find most of the copious notes which I made on this family.

Amoora rubiginosa Hiern:— tree -25 m; bole 40 cm thick at 2 m, cylindrical from the base or shortly buttressed, main lateral roots often protruding strongly, but no stilts or loop-roots; crown open, with wide-spread limbs leafy only at the ends; leaves coppery beneath; bark light pinkish brown to greyish brown, flaky in rounded-angular pieces 2-3 cm wide; inner bark pale pinkish brown, 10-12 mm thick, stripping easily; latex copious, white; wood pallid yellowish.— Plate 36.

Chisocheton Bl.— The collections have been named by Dr. D. J. Mabberley in the course of his revision of the genus. I am indebted to him also for the following notes. *C. anabilis*, which was the commonest species by the Sedili rivers, is restricted to the swamp-forests of Malaya, Sumatra, and Borneo; in the Sedili region it seemed restricted to the *mempisang*-belt. *C. erythrocarpus* is a more or less coastal species of Malaya and Borneo. *C. pauciflorus* is a Malayan endemic and is the wide-spread leptocaul ally of *C. perakensis* (Maxwell's Hill). *C. paucijugus*, of Malaya, Sumatra, and Borneo, is to be regarded as a subspecies of *C. pentandrus* which belongs typically to the more monsoon climate of the Philippines, Moluccas, and Java. In Malaya, typical *C. pentandrus* has been found only in the coastal forest of Jason Bay. *C. patens* is spread from Burma to the Moluccas. *C. penduliflorus* is a pachycaul treelet of Malaya and south Thailand. *C. princeps* is a Malayan pachycaul with sarcotestal seed and is close to the Bornean *C. polyandrus* Merr. with arillate seed. *C. sarawakensis* is wide-spread in Malaya and Borneo. On the whole, these collections from the Sedili region seem to me to indicate the derivation of its flora from the China sea rivers of the glacial period.

C. anabilis (Miq.) C.DC.— tree -10 m, no special roots; bark dark fuscous grey, finely cracked, slightly pustulate; inner bark pinkish reddish below the thin black superficial layer; fruit pink then rose-red, splitting into 3 parts, flesh white; seeds chestnut-brown, with a rich orange-yellow aril on the side about the hilum.

Monimiaceae

Kibara chartacea Bl.— treelet -4 m, without stilts; bark light grey, shallowly creviced-fissured, scarcely rugose, not scaly or tuberculate; inner bark pale greenish white, very thin; wood white, soft, with wide primary rays, easily fracturing longitudinally; ripe receptacles yellowish pink, lobed; 'seeds' black, slightly shiny.

Moraceae

No species of *Artocarpus*, seven of which are recorded for the Sedili region, seems peculiar to the swamp-forest. With *Ficus* (46 species recorded and the doubtfully wild *F. elastica*) there are certainly riverine species but such characteristic examples as *F. ischnopoda*, *F. oligodon*, and *F. racemosa* did not occur in the Sedili region. Among the strangling figs, *F. calophylla*, *F. consociata*, *F. crassiramea*, *F. delosyae*, *F. retusa*, *F. sundaica*, and *F. microcarpa* are certainly common in the swamp-forest but not limited to it. The root-climbers *F. apiocarpa*, *F. excavata*,

and *F. uncinulata* appear to be restricted to the swamp-forest, and the small tree *F. obpyramidata* is strictly riparian. No species of *Ficus* was endemic to the region but *F. uncinulata* has not been collected elsewhere in Malaya, though known from Borneo and the Natuna Islands. *F. cucurbitina*, described originally from Borneo, has been collected also near Kuantan. That *Ficus* should have so many species in the region is a taxonomic device; *Ficus* is treated as one big genus whereas the genera of many other families such as Annonaceae, Euphorbiaceae, Lauraceae, or Rubiaceae correspond rather with sections of *Ficus*. The largest and most impressive element of *Ficus* by the river and in the swamp-forest was the subgen. *Urostigma* with the strangling figs. Biologically they provide an immense amount of food; ecologically by destroying big trees they hasten the turn-over of the forest. It was the custom of Chinese wood-cutters to leave many large strangling figs in the belief that they were haunted or spiritual, though it is true that they may be difficult and dangerous to fell. At the foot of many left in clearings there would be a little altar with places for joss-sticks. I did not meet this reverence among Malays, though it is known in Borneo.

Artocarpus gomezianus Wall.— tree -20 m, not or slightly buttressed; bark fuscous blackish, rather flaky and fissured; inner bark pinkish, thick; wood very tough, used for axe-handles etc.; (flowering in Oct., Trengganu).

A. kemando Miq.— tree -30 m; bole 35-45 cm thick at 1.5 m, cylindric or with slight spreading buttresses -30 cm high; bark dark greyish brown to dark grey, finely creviced, then rough with rather short, shallow, elongate, lenticel-fissures 5-15 mm long, not pustular or flaky; inner bark dark brown-ochre, fairly thick, easily stripping; latex white, copious, thick, quickly coagulating; wood pallid white; scattered in the swamp-forest, nowhere abundant, apparently not a canopy-tree.

A. nitidus Trec. ssp. *griffithii* (King) Jarrett:— This species has been known in Malaya, where it is a familiar tree, as *A. gomezianus* var. *griffithii*. That this is a mistake was shown by Jarrett (1960) who transferred it to *A. nitidus* but, as the fruit of this species ripens brown, often brown velvety, with yellow flesh, I doubt if this disposition is final. I have seen living fruits of *A. nitidus* ssp. *borneensis* (Merr.) Jarrett and they are certainly not those of the Malayan tree. The fruits of *A. nitidus* ssp. *lingnanensis* (Merr.) Jarrett have, however, the pink flesh of the Malayan tree; possibly ssp. *lingnanensis* and ssp. *griffithii* are a separate species for which the name *A. parvus* Gagnep. may be correct, if inappropriate.

Ficus microcarpa Linn. f.— For this common and much cultivated tree with pointed leaves the name *F. retusa* L. has been employed wrongly for over 150 years (Corner 1960). Puzzled with this point of the leaf, I found the type and I confess that I was so disturbed that the Devil tapped my shoulder and said 'Destroy it' for no one seemed to know of its existence; it is still, however, in the rooms of the Linnean Society of London.

I did not understand the natural occurrence of *F. microcarpa* until I had explored the Sedili river. There used to be, before roads were widened and rustic tenements eliminated, large trees of *jejawi* in most coastal villages. They stood by muddy creeks, often where tongkangs unloaded timber, and there they spread with such pillar-roots as they were allowed, for the young aerial roots were commonly cut off for tooth-brushes. Beneath them often stood the simple altar with joss-sticks, and I fancied they were planted by wood-cutters, who had risen to timber-merchants, in propitiation of the spirits of the forest. Now I know that they were relics of the primeval swamp-forest, conserved in unwritten veneration. They were not the recent invasions of young trees such as infest, for instance, Fort Canning in Singapore.

Jejawi had a particular habitat in the tidal reaches of the Sedili Besar. It coincided with *putat* (*Barringtonia conoidea*) in longitudinal distribution though it developed in the *rassau*-belt immediately behind that of *putat*. It formed a

straggling bush or small tree composed of obliquely ascending limbs, loosely and widely ramified with drooping ends. There was no trunk because, as a strangler, it started epiphytically in the heads of *rassau* and slowly developed the limbs from which the copious aerial roots descended. These roots could develop into pillar-roots to support the extension of the plant in the mempising-belt, but they did not succeed where the lower part of the plant was inundated at high tide; at such times the branches appeared to rise from the water.

Jejawi occurred along the Sedili Besar from Tanjong Besar, near the upper limit of the mangrove, upstream to Bagan Limau where the belts of *putat* and *rassau* began to fail and the river-side steepened into *Tristania*-banks. Its main development lay between Bt. Tiga and Bt. Prah, especially in the long straight stretch of the river just above Bt Tiga. Here its branches ascended to 10 m and the loose crowns had a span of 20-30 m. It was smothering *rassau*, which was here deteriorating near the downstream limit of its occurrence, and it was arching over the water and shading the bushes of *putat*. Above Mawai it developed no great size and, at its upper limit at Bagan Limau, it was merely a sprawling and insinuating bush with thick gnarled branches of considerable age, clearly not a newcomer. Yet, except for a large tree under which the river-boats were tied just below the jetty at Mawai, there were no large trees on the river-front. They developed, apparently, only inside the swamp-forest in the *nibong-berembang* region (*Oncosperma* and *Sonneratia*) along tributaries and small coastal rivers where, perhaps, there was firmer and less inundated soil for the pillar-roots to take hold and support the extending crown. Such was the exceptionally large tree that I found by S. Rhu Reba at Jason Bay, as mentioned in *Wayside Trees of Malaya*. In 1972, when this coastal forest had been more or less cleared or decimated, I saw numerous large trees of *jejawi* beside the creeks, not a few with improvised altar and joss-sticks. The big tree at Mawai seems to have been a relic.

I conclude that *F. microcarpa* of the swamp-forest is a species of tidal river-banks, mainly in the brackish region. It has, however, other habitats. It grows in the rocky coastal forest where it may be dwarfed on the sea-ward rocks into a sprawling bush, and it occurs on limestone hills where brackishness cannot be a factor. In Ceylon, *F. microcarpa* occurs in forest far inland to an altitude of 2000 m. In Malaya it has never been found in inland or montane forest, except on the limestone hills. The species is widely distributed from India and south China to Australia, New Caledonia, the Solomon Islands, and Micronesia, mainly as a coastal plant, but as var. *naumannii* it extends inland to heights of 1000 m in the Solomon Islands. Structural differences are slight; yet it seems that there must be ecological varieties. In this connection I note an account of *F. microcarpa* (as *F. nitida* Bl.) by Hickson (1889). A rock called Batu Kapal lay at the north end of Limbe Island off the north east extremity of Celebes. The rock stood about 100 ft high in the sea with precipitous basalt sides and the top more or less covered with guano from frigate-birds and boobies. The only plant on the rock was *F. nitida* which Hickson said was *Urostigma microcarpa* Miq.

Parartocarpus venenosus (Zoll. et Mor.) Becc. ssp. *forbesii* (King) Jarrett; This is a striking, yet hardly common, tree of both swamp-forest and that of *Eugenia grandis*. It was easily recognised from the pale greyish or yellowish white, strongly lenticellate, bark, the wide-spreading roots with similar bark, the absence of stilt-roots and pneumatophores, and by the copious white latex. The spiny syncarps resemble small durians, but have abundant latex when unripe. The stout and superficial main roots sent many small crowded lateral roots perpendicularly for 2-3 m into the soil, without a strong tap-root (Plate 33). Thus from bark and roots, stumps of this tree could be recognised in recently deforested areas and, from a study of these in Singapore and south Johore, I estimated that there were

2-4 large trees per hectare. Saplings did not seem to be commoner. Adult trees developed a large, dense, rather uneven, dark crown. Though reduced to *P. venenosus* by Jarrett, I think this is a distinct species.

Myristicaceae

The Malayan species have been revised by Sinclair (1958) who incorporated my field-notes in the descriptions. From the collections which he lists it can be seen that most numbers (c.180) were made by King's collector Kunstler, then by Ridley (c. 150), and thirdly by myself (c. 135), but I must have examined in the forest several hundred trees in the course of checking my notes. Sinclair (1958a) gives many useful photographs of barks.

For the family in Asia and Australasia Sinclair describes c. 155 species, namely *Gymnacranthera* 6, *Horsfieldia* c. 40, *Knema* 37, and *Myristica* 72. For the Malay peninsula the numbers are as follows, with those of the Sedili region in brackets:—*Gymnacranthera* 4 (3), *Horsfieldia* c. 19 (10), *Knema* 20 (9), and *Myristica* 11 (8). Of 54 species, that is, 30 occurred in the Sedili region.

Horsfieldia irya (Gaertn.) Warb.— tree -20 m (-27 m on the Sedili Kechil), monopodial with the slightly drooping branches only in the upper part of the trunk, often conspicuous from the rusty orange male inflorescences on the bare branches behind the leaves; pneumatophores as gyrose knee-roots; flowering April-June; fruits ripening in 2½ months; common in the *mempisang*-belt; on the Sedili Besar from some distance below Bt Tiga upstream to K. Dohol and a few scattered trees up to Lubok Pusing, with the maximum development from a mile or two below Mawai to a mile or two above.— Tall trees were cut for poles, masts, and so on, which might have accounted for the smaller size of the trees on the Sedili Besar.

Horsfieldia sp.— s.n. 28.4.35, S. Berassau, Jemaluang Road; tree -13 m; stilt-roots -1.3 m high, subcylindric, rather congested; loop-roots -60 cm high, as long arcs or as λ-shaped pneumatophores, clustered round the tree-base; bark yellowish grey, somewhat pustulate with slightly transverse lenticels becoming creviced, not rugose or flaky; inner bark pale pinkish brown; sap watery pink; leaves slightly fleshy, glaucous beneath; standing in a marshy stream; not cited by Sinclair but identified by him as *H. brachiata* var. *brachiata*.

Knema intermedia (Bl.) Warb.— tree -20 m; bole 30 cm thick at 2 m, commonly with rather slender stilt-roots -2.3 m high, usually from the underside of leaning trees; loop-roots as simple loops or branched once, -60 cm high, 3 cm thick, abundant round some trees, scarce or absent from others; bark dull madder brown, entire, nearly smooth but subtuberculate with abundant lenticels 2-4 mm wide; inner bark light pinkish brown, rather thin, stripping; sap watery reddish brown, issuing from the medullary rays; wood pallid yellowish throughout; leaves more or less glaucous beneath.

I noted that trees with and without stilt-roots occurred side by side, and that others in the same swamp-forest had but slightly developed stilts. Thus it is not clear that their development is merely facultative.

Myristica elliptica Hook.f. et Th.— This was generally a rather small tree -15 m high in the *mempisang*-belt but bigger trees -30 m occurred in the swamp-forest to suggest that those of the *mempisang*-belt persisted through this stage in the development of the swamp-forest. Many of the larger trees developed wide loop-roots (Plate 14).

M. lowiana King:— This developed into one of the large, if uncommon, trees of the swamp-forest, easily recognisable from the black rugose-fissured bark and, in most cases, from the wide-spreading stilt-roots up to 2.5 m high. As usual, in dryer parts of the swamp, the stilts were shorter, even absent.— Plates 24, 38.

Myrsinaceae

Ardisia Sw.— Several species have been described or re-defined by Furtado (Gdns' Bull. Singapore 17, 1959, 279-311). I have taken the names that are on the specimens in the Singapore Herbarium, but several collections remain unidentified.

A. andamanica Kurz — tree -10 m, monopodial; branches slightly swollen at the base; pedicels and calyx bright pink; petals paler pink.

A. ? wrayi:— herb or shrub -2 m, unbranched, the leaves only at the top of the stem, rather succulent, especially the stem and pedicels; leaf-edge crenulate; petals pale mauve.

Ardisia sp.— SFN 29012, mile 14, Jemaluang Road; tree -13 m; trunk 13 cm thick at 1.7 m, cylindric from the base; branches vertically dilated at their junction with the stem, unbranched; bark light greyish drab, rather pustulate with small, crowded or scattered, rounded lenticels; inner bark deep reddish fawn, thick, with prominent rays forked centripetally; wood pale brownish; inflorescences terminal on the branches.

Ardisia sp.— SFN 36609, Pontian, Johore; shrub -2 m; peduncle and pedicels pale pink; flower-buds cream-yellow; frequent by stream-sides.

Myrtaceae

Eugenia L.— In the wide sense of this genus, which is thus comparable with *Ficus*, *Elaeocarpus* and *Macaranga*, it becomes the largest genus of trees in Malaya. Henderson (1949) in his invaluable revision of the Malayan collections gives 138 species, of which some 55 occur in the Sedili region. They make up a great deal of the smaller trees 3-30 m high in the forest, and there are no parts of the fresh-water swamp-forest where they are not conspicuous. Henderson managed to identify most of the sterile material, for which I am indebted, because with so many species identification in the forest is often uncertain and fertile material is often not available. Concerning the distinction between *Eugenia* and *Syzygium*, which I retain as one genus, I refer to the recent analysis by Schmid (1972), who favours their separation; the difficulty then is that they cannot be enumerated from sterile material unless the actual species are known. A point which needs more thorough investigation is the character of the bark.

Bark-colour is more vivid after rain. Dry weather evaporates capillary water, admits air, and dulls, pales, or silvers the brighter hues. After rain white, grey, brown, black, pink, orange, and reddish trunks are conspicuous. In the swamp-forest various orange-brown trunks then stand out. For instance, the sharply buttressed trunks of *Pometia* with pinnate leaves, the stilt-rooted trunks of *Dillenia* with large dentate leaves, the hard trees of *Tristania* with scrolls of peeling bark, and the papery-flaky barks of certain species of *Eugenia*. Thus I was led to study the colour, scaling, fissuring, and ridging of barks and the obvious features of the inner bark shown by the blaze. I have felt for many years that specific alliances in *Eugenia* cannot be determined without the bark-characters which need, of course, microscopic study for understanding. Henderson has included in his specific descriptions these gross bark-characters for nearly 80 species which I collected in Malaya. I give now a tentative grouping of these species, but I must warn against errors that can arise, particularly with the smooth barks of trees in the open, when the bark is coloured by lichens; they may be habitual infections but, when present, one should search for the uninfected bark in the forest. I distinguish 5 categories of bark, thus:—

1. Bark orange, orange-brown, or rufous brown (varying greyish, especially in young trees), papery-flaky with the flakes separable into translucent pieces (?)

one or a few cells thick); *kelat gelam* (*kelat* from the astringent bark, *gelam* from the resemblance with *Melaleuca* and the use of such bark for caulking and as a styptic).

E. attenuata (*E. penangiana*), *E. cerina* (*E. punctulata*), *E. grata*, *E. kunstleri*, *E. oleina*, *E. papillosa*, *E. pauper*, *E. polita*, *E. subhorizontalis*, *E. spicata*.

The species are widely separate in Henderson's account, as in those of others, but the question is whether this very remarkable bark is not more indicative of affinity than the floral marks.

Possibly there should come in this list, though placed in the next group 2, *E. curtisii*, *E. ? pseudoformosa* and *Pseudoeugenia*. I notice that species of group 1 often have stilt-roots.

2. Bark intensely pink-brown, red-brown, reddish, or rich grey-brown, in some cases fissured or scaly, not papery-flaky.

E. atronervia, *E. castanea*, *E. chlorantha*, *E. conglomerata*, *E. curtisii*, *E. duthieana*, *E. dyeriana*, *E. filiformis*, *E. glauca*, *E. napiformis*, *E. nemestrina*, *E. oblongifolia* (see group 3), *E. palembanica*, *E. pseudocrenulata*, *E. pustulata* (? group 3), *E. ? pseudoformosa*, *E. rugosa*, *E. syzygioides* (*E. cymosa*).

In this manifold group the species with grey-brown or rufous brown bark should be distinguished.

3. Bark pale pinkish, greyish pinkish, brownish pinkish, or brownish.

E. caudata, *E. cumingiana*, *E. densiflora*, *E. fastigiata*, *E. grandis* (see group 4), *E. griffithii* (see group 4), *E. helferi*, *E. hemsleyana*, *E. leptostemon* (see group 5), *E. linocieroides*, *E. longiflora*, *E. microcalyx* (see group 5), *E. millsii*, *E. ngadimaniana*, *E. nigricans* (see group 5), *E. oblongifolia* (see group 2), *E. pachyphylla*, *E. pahangensis* (? group 5), *E. pearsoniana*, *E. polyantha* (see group 5), *E. pseudo-subtilis* (see group 5), *E. ridleyi*, *E. salictoides*, *E. stapfiana*, *E. subdecussata*, *E. tahanensis* (? group 5), *E. tumida*, *E. virens*, *Eugenia* sp. (SFN 30315).

I note that strongly stilt-rooted trees of *E. longiflora* in swamp-forest have rich orange-brown bark, though not papery-flaky, possibly the result of growth in deep shade.

4. Bark pale buff or greyish buff (distinctly yellowish as in *Vitex pubescens*).

E. flosculifera, *E. garciniifolia*, *E. griffithii* (see group 3), *E. grandis* (see group 3), *E. oblata*, *E. valdevenosa* (see group 5), *E. verecunda*.

With the exception of *E. flosculifera* and *E. griffithii*, the inner bark of these species is dark purple-brown.

5. Bark pale grey, silvery, or whitish (not yellowish, pinkish, or brownish).

E. claviflora, *E. cumini*, *E. kemamanensis*, ? *E. kiahii*, *E. leptostemon* (see group 3), *E. leucoxydon*, ? *E. microcalyx* (see group 3), *E. muelleri*, *E. nigricans* (see group 3), *E. perakensis*, *E. polyantha* (see group 3), *E. pseudoformosa* (see group 2), *E. pseudosubtilis* (see group 2), *E. pseudosyzygioides*, *E. valdevenosa* (see group 4), *Eugenia* sp. (SFN 28995, 29319), *Eugenia* sp. (SFN 30300).

I note, in addition to these 5 groups the following features:—

a. Inner bark intense pink-brown, red-brown, purple, or vinaceous:—

E. atronervia, ? *E. claviflora*, *E. duthieana*, ? *E. garciniifolia*, *E. glauca*, *E. grandis*, *E. hemsleyana*, *E. linocieroides*, *E. nemestrina*, *E. ngadimaniana*, *E. nigricans*, *E. oblongifolia*, *E. pahangensis* var. *fraseri*, *E. palembanica*, *E. pseudocrenulata*, *E. rugosa*, *E. valdevenosa*, *E. verecunda*.

b. Inner bark or wood changing colour on exposure:—

i. Inner bark turning mauve or purple; *E. kunstleri*, *E. polyantha*, *E. rugosa*.

- ii. Inner bark and, usually, the sap-wood darkening to drab brown or fuliginous; *E. curtisii*, *E. filiformis*, *E. microcalyx*, *E. pseudosyzygioides*, *E. pustulata*.

In Table 1, there are listed species with buttresses (6), with stilt-roots (15), and with loop-roots (3).

As canopy-trees, over 30 m high, I noted in the Sedili region *E. conglomerata* and *E. glauca* of kapur-forest, and *E. grandis*, *E. rugosa*, and *E. syzygioides* of coastal forest. The swamp-forest of Singapore adds *E. nemestrina*, that of the Sedili *E. garciniifolia*.

E. cerina Henders.— tree -23 m, slightly fluted-buttressed or, in swamp-forest, with flattened arcuate stilt-roots -1.7 m high and then with loop-roots -45 cm high; bark orange to reddish brown, papery-flaky; inner bark pallid fawn to pale pinkish brown; as *E. punctulata* in Wayside Trees of Malaya.

This common riverside tree, known from its blunt ovate leaves, occurred on the Sedili Besar mainly from Lubok Pusing upstream; none occurred below K. Dohol. Yet it occurred also inside the main swamp-forest. Possibly it cannot tolerate much tidal influence.

E. cuningiana Vidal.— tree -17 m; in swamp-forest with slender stilt-roots -1 m high, no buttresses; bark pinkish brown, slightly flaky and ridged; inner bark pale pinkish; heart-wood pinkish brown.

E. curtisii King.— tree -17 m, fluted at the base, bole 35 cm thick at 2 m; bark pinkish fawn to pale rufous, very slightly papery-flaky, appearing smooth, with persistent leaf-scars; inner bark pale brownish, turning fuliginous on exposure; wood yellowish, fuliginous on exposure; frequent along the Sedili Kechil, not seen by the Sedili Besar.

E. garciniifolia King.— This large tree has great similarity with *E. grandis*. In my field-notes I wrote '? inland ancestor or derivative'. It flowered June-July in 1936.

E. grandis Wight:— I give here some notes which concern the thesis that trees without buttresses have, generally, tap-roots which are absent from buttressed trees. In October 1936 many big trees of this species were cut down and the stumps extracted along the Serangoon Road in Singapore. I examined thirty. The bases of the trees were 70-170 cm in diameter. As usual, they were slightly fluted over the main lateral roots which were very numerous; the flutings projected up to 30 cm from the trunk, and there were no true buttresses. None of the trees had a tap-root, even a vestige of one. The ground where the trees grew was raised on a slight hillside and was not stony or swampy; hence a tap-root could easily have developed. I conclude that *E. grandis* lacks both tap-root and buttresses. Compare *E. garciniifolia* with sharp spreading buttresses -2.7 high in the swamp-forest.

E. kunstleri King:— tree -20 m; bole 35 cm thick at 2 m, often fluted at the base; crown much branched, bushy; bark pale rufous to orange-rufous, thinly and later rather thickly papery-flaky, slightly pustulate; inner bark pale pinkish or brownish buff, turning mauve or brown-ochraceous on exposure; wood pallid yellowish buff.

E. leptostemon (Korth.) Miq.— tree -20 m; bole 20 cm thick at 2 m, often slightly buttressed; bark light grey to slightly pinkish fawn, slightly pustulate, smooth; inner bark pale pinkish fawn.

E. leucoxylon Miq.— tree -17 m; bole 26 cm thick at 2 m, slightly fluted at the base, without stilts or loop-roots; bark light grey, smooth, entire, with persistent leaf-scars, eventually slightly fissured-flaky; inner bark fawn-drab.

E. longiflora (Presl) F.-Vill.— in swamp-forest with conspicuous, flattened, arcuate stilt-roots -2.7 m high, but no loop-roots; flowering gregariously in March 1932.

E. nigricans King:— tree -23 m; bole 40 cm thick at 2 m, narrowly buttressed or fluted, occasionally with short stilt-roots; bark pale pinkish grey, very smooth, then slightly fissured flaky; inner bark deep purple-brown, thick, easily stripping, very astringent; heart-wood red-brown; like *E. palembanica* in bark, signified by the Malay name, often growing together.

E. papillosa Duthie:— This species, described in Wayside Trees of Malaya, was easily recognised from the reddish-orange bark and the large leaves. The arcuate-flattened stilt-roots were usually up to 1.7 m high but in the swamps of Saraca-streams in Kemaman I met trees with stilts up to 4 m high. Round the base of the tree there were abundant loop-roots -45 cm high.

E. ? pseudoformosa King:— tree -7 m, with open sympodial crown; trunk 10 cm thick at 1.5 m, without stilts or buttresses; bark fuscous rufous to orange-brown, scaly-flaky (not papery-flaky); inner bark pale pinkish fawn; leaves lanceolate, subsessile, with cordate base, rather large.

E. spicata Lamk:— tree -10 m, often less; bole 15-20 cm thick, often more or less horizontal, twisted and gnarled, subtriangular in cross-section; branches low and spreading; bark rufous orange, thinly papery-flaky; inner bark pale fawn, very thin.

This was a characteristic small tree of the river-side, with spreading and insinuating habit that led to its falling over. On the Sedili Besar it occurred from Bt Tiga upstream to Bagan Limau. Between Bt Tiga and Mawai it grew mostly where the *Tristania*-banks dipped into the *mempisang*-belt, whence it projected horizontally over the water. Between Lubok Pusing and Bagan Limau it grew in the *rassau*-belt and resembled in habit the scraggy specimens of *F. microcarpa*. It was a fire-fly tree and, with *Gluta velutina*, marked the river-banks at night. Concerning papers by Dr. and Mrs. Buck (1966, 1968), Haneda (1966) for New Guinea, and Bassot and Polunin (1967).

E. valdevenosa Duthie:— tree -13 m, without buttresses or stilt-roots; bark pale grey, often tinged yellowish or pinkish, smooth or very finely fissured; inner bark deep pink-brown, red-brown, or blood-red, not stripping; heart-wood pink-brown, very hard, not eaten by insects, rotting very slowly, valued locally for houses; common with *Cratoxylon arborescens* and *Melanorrhoea wallichii* in the swamp-forest, recognised from the pale bark with deeply coloured inner bark.

Eugenia sp.— SFN 37730, Pontian, Johore; tree -27 m, 13 m to the first branch, very like *E. grandis* in shape, bark, and leaves; buttressed shortly -70 cm high; bark brownish buff, flaky with thin, angular, rather large pieces, not fissured; inner bark pale brown.

Eugenia sp.— s.n. 6.8.39 (as *Eugenia* A) Bt. Tinjau Laut, in *kapur*-forest, frequent at 250 m alt.; tree -27 m; buttresses -70 cm high, sharp; bark warm brown (reddish brown from a distance), slightly creviced, barely scaly, appearing very smooth and even from a distance; inner bark intensely purple-brown.

Eugenia sp.— s.n. 7.8.39 (as *Eugenia* A), Bt. Tinjau Laut, in *kapur*-forest, frequent at 250 m alt.; tree -27 m; buttresses slight; bark bright fawn-brown, slightly purple-lenticellate, appearing smooth; inner bark pale pinkish brownish; wood yellow-brown.

Eugenia sp.— s.n. 6.8.39 (as *Eugenia* B), Bt Tinjau Laut, in *kapur*-forest, frequent at 250 m alt.; tree -27 m or more; buttresses very slight; bark fawn-brown, shallowly fissured, scaly with rather thin, oblong flakes, not ridged; inner bark pale pinkish brown; wood pinkish brown.

Pseudoeugenia singaporensis King:— tree -13 m; bole 20-25 cm thick at 2 m, sometimes buttressed -45 cm high; stilt-roots -1 m high, slender, subarcuate, formed

in very swampy ground; bark reddish brown, or rufous tawny, smooth then somewhat rugose-fissured and slightly flaky (not papery-flaky); inner bark pinkish fawn to deep purple-brown; wood pale pinkish fawn, very hard.

Tristania ? merguensis Griff.— tree -30 m; bole 30 cm thick at 1.5 m, without buttresses or special roots; bark light greyish or brownish, fibrous-flaky, scaling off in small oblong pieces or in large scrolls, exposing the smooth, dark brown, new bark (deep red to almost blood-red on the twigs and branches); inner bark thin, pale yellowish; wood pallid yellowish; young leaves and twigs thinly tomentose with caducous ferruginous down, soon glabrous; leaves on saplings (-3 m high) and on coppice-shoots large, subsessile, auricled (as in *T. subauriculata*).— Plates 24, 34.

Though common at Jurong, Singapore, I never found fertile specimens and have not satisfactorily identified this tree. It did not occur in the forest on the Mandai Road and I saw only one sapling in the Sedili region and that was in the swamp-forest near Jason Bay. Thus it indicates for the Jurong forest a distinct phytogeographical position, emphasized by the occurrence of *Mangifera* aff. *parvifolia*, *Alseodaphne ? pendulifolia*, and the tree tentatively referred to *Hymenocardia*. I have seen saplings of *T. maingayi* on Penang Hill which appeared to be identical with the Jurong plant. Compare, however, *T. pontianensis*, which I took to be the same as the Jurong plant.

The trees at Jurong were mostly up to 20 m high, with many saplings of all sizes, but occasionally there were big trees entering the canopy at a rate of 1(-2) per hectare. Trees of all sizes were spindly, the trunk dividing into a few, steeply ascending, repeatedly dividing, and almost fastigiate branches, giving a broken and rather flat-topped crown of distinctive appearance. It was the form of a tree that could just penetrate into the canopy but was unable to make a commanding dome. The trunks of old trees could be mistaken for those of *Cratoxylon arborescens* (smaller opposite leaves, red gum in the bark).

T. pontianensis Henders.— tree -23 m, without buttresses; bark buff yellowish to greyish, rather scaly and fissured, seldom peeling in scrolls except on the twigs with orange-brown new bark; old leaves withering red; calyx dull rusty reddish tomentose; petals yellowish white; stamens and ovary pale yellow; flowers faintly fragrant of vanilla.

This was, perhaps, the commonest tree in the peat-swamp forest at Pontian, Johore. There was a general flowering in early July 1939. On seeing this plant at Pontian, I took it to be the same as *T. ? merguensis* at Jurong, though the bark of the Pontian trees did not peel in such obvious scrolls and the twigs were not deep red-brown. If not identical, the two must be very close.

T. ? pontianensis Henders.— SFN 31939, mile 15 Jemaluang Road; tree -35 m; bole 60 cm thick at 2 m, cylindrical from the base or very slightly buttressed; bark pale greyish white with oblong pinkish streaks and patches of new bark, very smooth and soft like soft leather, the old greyish white or greyish buff bark peeling in thin scrolls 30-120 cm long, collecting round the base of the trunk; crown sympodial with a few large ascending limbs and heavy, dark green foliage of leathery and more or less erect leaves; pedicels and calyx green; petals white; stamens yellow; disc pale yellowish; style green; flowers with a slight scent of honey.

This collection was referred to *T. pontianensis* by Henderson but it differed in the bark and in the green calyx. It may be the same as *Tristania* sp. (Corner s.n. 31.12.34); both were trees of hillock-forest, not of the peat-swamp.

T. sumatrana Miq.—This is the characteristic tree of the raised river-banks along the Sedili rivers; it is described in *Wayside Trees of Malaya*. The orange trunks curving over the river collect at the base the scrolls of old bark. Young trees have

silvery grey bark before it peels off to reveal the orange mature bark. The yellowish green crown was always flecked with scarlet from the withering leaves. The tree did not occur in the flat swamp-forest. It flowered twice a year, June-August and November-January or February.

Tristania sp.— s.n. 31.12.34, mile 13 Jemaluang Road, scattered canopy-tree in hillock-forest on laterite soil; tree -40 m; bole 60 cm thick at 2 m, cylindrical from the base; trunk forking into two, rather flattened and twisted, equal branches at 20 m above ground (as in *T. sunatrana*); crown with rather open and candelabra-appearance (as in *T. ? merguiensis*); bark pale pinkish white to pale pinkish fawn (not orange), very smooth, entire, then the old bark peeling in long scrolls collecting at the base of the trunk, the new bark appearing as a piece of naked wood; inner bark thin, pallid yellowish white, green just below the surface (even at the base of old trees); heart-wood pinkish brown.

This handsome tree must be near to *T. pontianensis* but is distinguished by the smooth pink bark. My notes say 'cf. SFN 24967', the notes on which I have been unable to trace.

Ochnaceae

Brackenridgea hookeri (Pl.) A. Gray:— tree -20 m; bole 22-25 cm thick at 2 m, often twisted and flanged at the base of leaning trees, not truly buttressed; bark rufous fawn, shallowly and closely rugose-fissured, becoming slightly flaky in small oblong pieces; inner bark rich pinkish brown; sap-wood yellow, thin; heart-wood pinkish brown.

Olacaceae

Strombosia maingayi (Masters) Whitmore:— tree -23 m; bole 18-35 cm thick at 2 m, rather slender, cylindrical from the base, no pneumatophores; bark very thin (paper-thick), dull greyish brown to dull chocolate brown, entire then flaking in rather large roundish pieces leaving faint flattened scars (as in *Ochanostachys* but not so flaky), slightly roughened with small scattered lenticels 1-2 mm wide; inner bark light brownish, -6 mm thick, green just below the surface (even in old trees), stripping easily; wood pale yellow, heart-wood grey brown to pinkish brown, very hard but splitting easily, the trunk splitting on felling.

SFN 29264 differed in the dull reddish brown, slightly tuberculate, and entire bark with the inner bark pinkish brown and dull reddish (not green) below the surface. The tree was 10 m high and probably immature.

Orchidaceae

The Sedili list of c. 115 species is certainly incomplete because I seldom had time to search for orchids. I gathered merely what I came across in flower or, if of unusual growth, I brought living plants to the Singapore Botanic Garden where my lamented friend C. E. Carr had initiated the alcohol-collection as he did also at Kew with Mr. Summerhayes. Few dried specimens were made. I stayed twice with Carr at his bungalow at Tembeling in Pahang and made expeditions with him to S. Cheka, S. Teku, Fraser's Hill and Brastagi in Sumatra. Thus I learnt much about Malayan orchids, and he made several trips with me to the Sedili river, Gunong Panti, and Jurong. I did not collect fully the orchids at Mandai Road in Singapore. The poor orchid-flora at Pontian, Johore, was real because both Henderson and I collected all that we could find.

The Malayan orchids have been revised by Holttum (1953, 1957), and I have followed his nomenclature.

Oxalidaceae

Sarcotheca laxa (Ridley) Knuth var. *hirsuta* Veldk.—spindly shrub or tree -5 m; stem 6–7 cm thick at 1.2 m, cylindrical from the base; bark rufous fawn, finely creviced, with persistent leaf-scars, otherwise smooth and entire; inner bark pinkish fawn, rich red-brown below the dead bark; wood pinkish white; leaves subglaucous beneath, young leaves pink; sepals pink; petals rose-red; filaments and ovary pale greenish, anthers yellow; fruit 18×14 mm (living), ellipsoid, pulpy, rose-red to purple, then black.

S. laxa appears to be endemic to the Malay peninsula and this variety to the Sedili region. *Var. laxa* is said to reach 23 m but var. *hirsuta*, of which I saw many specimens, is very much smaller. It was a graceful little tree, tolerant of shade, that I raised from seed in the Singapore Botanic Garden but with many others it was lost after the war.

Palmae

Except for *nipa*, with its counterpart in *rassau*, palms were not as conspicuous in the swamp-forest as pandans. I have no accurate assessment and I do not know of a satisfactory method. I certainly did not pay sufficient attention to the thickets of rotans and *asam paya* (*Salacca*) for which I record but one species. The main palms were *nipa*, *nibong*, *bayas*, *serdang*, *palas*, *rotan*, *asam paya*, and *Pinanga*. Concerning *nibong* I note the remark by Vincent (1962) that it 'occurs in pure stands covering considerable areas, e.g. Kuala Sedili F.R.'. As observed by Polak (1933), *nibong* occurs with *nipa* in the boundary between mangrove and freshwater swamp. Concerning *Cornera*, if this genus is distinct from *Calamus*, I note that it has been misconstrued by Whitmore in his *Palms of Malaya* (p. 50) for he gives two, not three, species in Malaya; see Furtado (*Gdns' Bull. Singapore* 14, 1955, 518).

Pandanaceae

For the identifications in this family I am indebted to Dr. B. C. Stone (1967–1971, especially his papers in the *Malayan Nature Journal* vol. 19 and 21). It was soon evident on my excursions to the Sedili Besar that *Pandanus* was important because there was no part of the swamp-forest where its species did not occur. Collection of these massive plants is difficult and identification is hampered by the fragments suitable for herbarium-sheets, though I had no difficulty in recognising most species in the forest from their habits of growth. Hence I devoted much time to their study, with copious field-notes and photographs. My material was studied, apparently, by Holttum and St. John, whose works I know only through the references in Stone's papers; if I had been informed, my notes would have been made available.

Freycinetia angustifolia Bl.—flowering March–April, fruiting June, on the Sedili Kechil; syncarps $2\text{--}2.5 \times 0.6\text{--}0.8$ cm, pink to dull orange red, soft and mucilaginous when ripe.

Pandanus Stickm.—Stone records c. 55 species from the Malay peninsula, many of very local occurrence. For the Sedili region I record 16 species which fall vegetatively into the following 5 categories:—

1. with stout branching trunks; *P. atrocarpus* (swamp-forest), and *P. dubius* and *P. odoratissimus* of the sea-coast.
2. with thinner, or slender, often sparingly branched trunks; *P. helicopus*, *P. affinis*, *P. malayanus*, *P. recurvatus*, *P. scortechinii*, and *P. yvanii*.
3. apparently stemless, tufted, with long leaves; *P. kani* (freshwater swamp-forest), *P. corneri* (in the mangrove and *nipa* stretches of the river).

4. short tufted species in dwarf thickets; *P. echinodermops*, *P. parvus*, *P. pentodon*.

5. epiphytes; *P. alticolus*, *P. epiphyticus*.

To judge from the occurrence of *P. corneri*, *P. dubius*, *P. echinodermops*, *P. epiphyticus*, *P. kamii*, *P. pentodon* and *P. scortechinii*, the affinity of the pandan-flora is with that of Borneo, though many Bornean species are absent, just as many species of west and north Malaya. Pandans are not exterminated during timber-cutting and the Sedili region still offers the opportunity for their ecological study, particularly in regard to the establishment of seedlings and the development of thickets by branching in a sort of soboliferous manner. Ripe fruits seemed generally to occur in the drier periods from June to August. Pollination may be by beetles which frequent the fragrant male inflorescences (? the female) or by wind, as in the case of *P. helicopus* in which the pollen detaches in clouds. There is, therefore, the possibility of hybridisation and the need to examine sterile specimens in the forest. *Pandanus* illustrates well the evolution of leptocaul species both in the forest undergrowth and as epiphytes such as *P. alticola*.

P. atrocarpus Griff.— This common species of greater size than any other Malayan pandan seems not to occur in Borneo where *P. gibbsianus* and *P. obovoideus* are allied (Stone 1968b).

P. corneri Kanehira:— This is easily recognised from the tufts of erect sword-like leaves without the broken pendent tip of so many others and its habitat in brackish tidal swamps. It is known from south Malaya, Singapore, Sarawak, and north Borneo (Stone 1971).

P. dubius Spreng.— solitary, -13 m high; trunk much branched, rather thorny, sappy, soft; stilt-roots -2 m high, stout; leaves 1.2–2 m \times 14–18 cm; bracts yellow; female head solitary, fragrant, full of beetles.

Scattered trees occurred in the coastal forest south of Tg Sedili Kechil and they seem to be the only instance of the species on the mainland. It is known from P. Tioman, P. Tulai, P. Chibeh, and P. Tenggol (off Dungun). This small arc appears to be the western limit of the species which extends eastwards in increasing abundance and becomes the commonest sea-shore pandan in the Solomon Islands (Stone 1968). The roots are figured in my Life of Plants plate 12c.

P. echinodermops Holtt. et St. John:— short pandan forming thickets of low flopping stems becoming leafless for heights of 1–1.7 m; leaves 70–130 cm long, not broken, not glaucous beneath, with obtuse tip; syncarps solitary or 3–4 on an erect stalk, red; more or less immersed at high tide, submerged in floods.

P. epiphyticus Martelli:— This pandan used to be the most remarkable sight on the road from Kluang to Mersing. It stood erect on the branches of most large trees, obliquely or variously hanging and upcurving, as if a contortionist. The forest has now been felled or extracted and one must travel far off the road to see it. It did not occur in the main region of the Sedili or on G. Pantl, but at the bridge at the 17th mile on the Jemaluang Road it was abundant; this appears to have been its southern limit in Malaya. It is common in Sarawak where it grows also on coastal rocks and cliffs, but I never saw it on any part of the east coast of Malaya or on the islands off Mersing, Pahang and Trengganu (Stone 1971). When I spoke of its distribution to the late F. N. Chasen, curator of Raffles Museum, he drew my attention to the similar distribution of the squirrel *Sciurus nigrovittatus johorensis* and that of some tree-rats, which may distribute the seeds.

Young plants begin with a creeping stem, fixed by adventitious roots to the branch or trunk of the host, and then later the erect free stems develop. Some become top-heavy and lean over, even fall off (to judge from the débris in the

forest), but those which manage to hold on curve up and re-establish themselves with more roots.

P. helicopus Kurz:— This species likes the low muddy flats by tidal rivers or flooded areas (as at Tasek Bera) and seems intolerant of brackish water. Above Danau, on the Sedili Besar, it was restricted to scattered thickets. I never saw such large specimens as occur in Sarawak where the stems grew to 17 m high.

P. kamii B. C. Stone:— tufted in dense thickets, apparently stemless, with very long leaves; stems $-50 \times 8-11$ cm, decumbent, much branched, silvery white; leaves 5–8 m long, 8–10 cm wide (when flattened), unbroken or the old leaves broken about $\frac{1}{4}$ of their length from the tip, not glaucous, the leaf-base orange brown; syncarp solitary, massive, trigonous-cylindric, more or less pendent, ripening red.— Plate 5.

This is the common pandan that forms massive thickets in the freshwater swamp-forest. I had assumed that it was *P. immersus* Ridley, though immersed only in exceptional floods, but Stone (1971) distinguishes the two species.

P. malayanus B. C. Stone:— short pandan with slender stems -5 m high, sparsely branched, not in thickets; leaves 35–45 cm long on young stems, up to 90 cm on mature stems, rarely broken, subglaucous beneath, the midrib smooth; fruits solitary, pendent: (now treated as a variety of *P. militaris*).

On the river-front there is the stout *P. helicopus*. Within the swamp-forest, by the small streams and in the muddy hollows, there is this slender species which I took to be *P. militaris*. According to Stone (1968b), *P. malayanus* is a problematic species in need of further study.

P. odoratissimus Linn.f.— The name of this common coastal pandan has at last been settled (Stone 1967a); it has been called *P. fascicularis* and *P. tectorius*. It has a thornless variety, occasional on sea-coasts, which may have been the origin of plants cultivated in villages for mat and basket work; it is *P. spurius* Miq. (Stone 1968a). I am doubtful of SFN 32763 which occurred in the forest far inland in the Sedili region.

P. parvus Ridley:— dwarf pandan; leaves $40-70 \times 7-10$ cm, short, broad, with wavy edges and down-pointing tip, glaucous beneath or not (SFN 32477).

P. pentodon Ridley:— short pandan forming thickets; stems -2 m long, 2–3 cm thick, decumbent, mostly prostrate on the mud, the ends more or less erect for 30–60 cm, whitish, scarcely thorny, concealed by the leaves; leaves c. $120 \times 1.7-2$ cm (when flattened), more or less glaucous beneath, midrib smooth, not broken but drooping; syncarp solitary, erect, swathed in bracts.

This resembles in habit *Scirpodendron*, which does not grow in these upper and swifter streams. I noted for SFN 29391 that it had simple, bifid, or quadrifid stigmata.

P. scortechinii Martelli:— stem -2 m high, 1.5 cm thick, weakly erect, often flopping and uncurving, sparingly branched, with slender stilt-roots at the base; leaves not glaucous beneath; syncarps 1–3 on a spike, frequent; male plants never encountered.

This was a common plant in the freshwater swamp-forest. Young stilted specimens resembled the stouter pandans in miniature. Stone referred here SFN 29238, but I am not at all certain. Though frequent in the swamp-forest it rarely fruited, unlike typical *P. scortechinii*. It resembled more *P. helicopus* with the more slender habit of *P. yvannii*; I thought it might have been one or other of these two species developed in shade. My notes on SFN 29238 are as follows:— stems -7 m high, gregarious, appearing solitary but probably soboliferous, not developing

thickets, unbranched or the older stems sparingly branched near the top; leaves -150 cm long, eventually broken; syncarp solitary, pendulous.

P. yvanii Solms:— stems -5 m high, 2 cm thick, light ochre-yellow then chocolate brown in the leafless part, frequently branched with straggling and often drooping branches, rather stoutly spiny in the lower part of the trunk; aerial roots 2–2.5 cm thick, rather stout, with very shaggy root-cap, very spiny, descending perpendicularly; leaves 70–120 × 1.8–2 cm (when flattened), not broken, not glaucous, midrib with few spines in the basal half of the leaf; syncarps solitary, pendent, ripening orange-brown.

This species occurred in small inlets of the *rasau*-belt, especially on the Sedili Kechil, and by streams and pools in the forest with *P. pentodon*. It is clearly less light-demanding than *P. helicopus*.

Polygalaceae

Xanthophyllum Roxb.— I have noted that the young leaves are pale green on emergence in *X. affine*, *X. curtisii*, and *X. maingayi*, but purplish pink in *X. obscurum*.

X. affine Korth.— tree 4–13 m; bole cylindrical from the base; bark fuscous grey, entire, slightly pustulate with small round lenticels, with faint leaf-scars; inner bark dull ochraceous straw-colour, stripping; leaves subglaucous beneath, with a gland at the base of the lamina on each side of the midrib; flowers pale yellow; fruit ochre.

This little tree was very common on the banks of the Sedili Kechil. On the Sedili Besar it occurred on the *Tristania*-banks and inside the swamp-forest. There was always a gregarious flowering in June, but some trees flowered in October.

X. ? ellipticum:— Jurong, Singapore; tree -17 m; bole 23 cm thick at 1.7 m, fluted at the base, with large superficial roots spreading horizontally for some distance and tending to become loop-roots; bark dull pinkish brown, with a very thin greyish superficial layer cracking into very small irregular flakes, not tuberculate, with faint leaf-scars; inner bark pale pinkish brown, not very thick, not stripping; wood dull ochraceous fawn with pinkish brown heart-wood; roots with the same thin greyish superficial flaky layer, but with vivid reddish pink inner bark; crown thin, scant, composed of a few erect subfastigate branches; rare, merely two specimens seen side by side.

X. pulchrum King:— SFN 29321; treelet -4 m, with a few cylindrical stilt-roots -45 cm high; bark light greyish, finely creviced longitudinally, with scattered, white, scarcely prominent, lenticels; inner bark and wood pale yellowish.

X. wrayi King:— treelet -4 m; sepals cream-buff, the two lateral sepals pale lilac; petals white, the two upper with yellow spots near the base; flowering in February.

Rhizophoraceae

For a modern and excellent account of mangrove trees, see Flora Malesiana ser. 1, vol. 5, 1958, 429–493. Apart from noting the occurrence of the species, I did not pay detailed attention to the mangrove in the Sedili region. The *Rhizophora*-forest near Kuala Sedili Besar stood over 35 m high and was practically uncut in 1939.

Anisophyllea R. Br.— This genus has been placed in Lecythidaceae, Rhizophoraceae, and in its own family. It has the one-seeded fruit with hypocotylar embryo of *Barringtonia* and from this tendency the viviparous embryo of *Rhizophora* may have originated.

A. corneri Ding Hou:— Tree -10 m, without buttresses or stilts; bark fawn-brown, smooth, entire; inner bark brownish yellow, reddish below the dead outer bark, thin; wood yellowish tan, hard.

The trees on the Sedili were small, but Ding Hou records them up to 23 m high from other parts of Malaya, where the species is endemic. It is *Aniosophyllea* sp. in *Wayside Trees of Malaya*, p. 125.

Carallia brachiata (Lour.) Merr.— tree -23 m; bole cylindrical from the base, without stilts; bark rather rufous brown, uneven from the lighter brown, corky-tumid lenticels 3–6 mm wide, often in longitudinal rows; inner bark brownish, thin; wood somewhat rufous brown, with well-marked, wide and long medullary rays.

This is *C. lucida* of *Wayside Trees of Malaya*. Ding Hou describes the species as a large tree occasionally with stilt-roots (*Flora Malesiana* ser. 1, 5, 1958, 485, f. 31.32). I never saw such trees in the Sedili region where the species was frequent in the wetter parts of the swamp-forest. However, smaller trees -13 m high were common in the peat-forest at Pontian, Johore, and they frequently had stilt-roots up to 30 cm high. SFN 28677 and 28678 are referred to *Pellacalyx saccardianus* in the identification List 4 (*Flora Malesiana*), but to judge from my field-notes this cannot be so. I did not record this species of *Pellacalyx* from the Sedili region.

Pellacalyx axillaris Korth.— This small tree has no stilt-roots or buttresses, but it develops small loop-roots (λ -roots) up to 25 cm high, as pneumatophores in the swamp-forest.

Rosaceae

Parinari corymbosa Bl.— tree -33 m; bole 55 cm thick at 2 m, slightly fluted-buttressed; bark greyish white, flaking in fairly large, irregular, angular pieces separating from below upwards, eventually almost smooth and becoming pustulate with minute scattered lenticels; inner bark pink-brown to red-brown, persistently green just below the dead outer bark, not stripping; wood very hard.

This was one of the big dominant trees in *Eugenia grandis* forest. There was a general flowering in June–July 1934. The species is also called *Maranthes corymbosa* (Kostermans 1965b).

P. costata (Korth.) Bl.— tree -30 m; bole 35 cm thick at 2 m, scarcely buttressed; bark silvery drab white to greyish, slightly pimply with small lenticels 1 mm wide, becoming irregularly cracked and slightly flaky; inner bark orange-brown, thick, rather fibrous-sclerotic, with a strong smell of milk (as durian-flowers), not stripping; wood pallid yellowish, with large vessels, very hard.

P. nannodes Kosterm.— tree -20 m; bole 25 cm thick at 2 m, cylindrical from the base; bark greyish fuscous, finely and closely tessellately cracked, not rugose or pustulate or scaly; inner bark dark reddish brown, rather thick, with a smell of bugs, the outer bark brittle; wood pallid dull reddish brown throughout, very hard and heavy; petals white; filaments pinkish lilac; anthers yellow.

This species had been known as *P. asperulum* until the new identification by Kostermans (1965a); it was altered in the same year into *Cyclandrophora nannodes* (Kosterm.) Kosterm. et Prance as a split from *Parinari* (Kostermans 1965b). He refers SFN 34712 (not 37412) to *C. excelsa* (Jack) Kosterm.

Pygeum Gaertn.— This genus has been reduced to *Prunus* by Kalkman (1965). The microscopic structure of fruit and seed should be studied for this step will be a considerable simplification. I have retained *Pygeum* for the specimens are thus filed in the Singapore Herbarium.

P. lanpongum Miq.— tree -10 m; bark fuscous, smooth, entire, with persistent leaf-scars; inner bark pallid pinkish white, very thin, stripping; fruit green when ripe, in Feb. 1935.

Rubiaceae

Aulacodiscus premnoides Hook.f.— tree -8 m; bole 8 cm thick at 2 m, cylindrical, without stilts; bark fawn-drab, entire, slightly roughened and uneven; inner bark pale pinkish fawn, fairly thick; wood pale tan brownish.

This tree resembles saplings of *Anthocephalus cadamba*. The long spreading branches, which are themselves unbranched or but sparingly, occur only in the upper metre of the stem. The inflorescences are in the axils of the old leaves and on the bare parts of the branches.

Canthium didymum Gaertn.— SFN 32258 (Scudai, Johore); tree -7 m; primary branches decussate; secondary branches regularly alternate, one at a node, along the appanate leafy sprays; flowers 8 mm wide, green with yellow anthers, many galled; leaves dull dark green; bark pale to dark grey, slightly creviced, not scaly; inner bark pale yellowish white; wood pale yellowish tan.

Ixora L.— I refer to my detailed account of this genus in Malaya (Corner 1941) and to the descriptions in *Wayside Trees of Malaya*. The species flowered gregariously in the Sedili region February–March and again September–October.

I. concinna Hook.f.— tree -12 m; bark fuscous brown, pustulate with tumid brown lenticels 2–3 mm wide, becoming finely rugulose, transversely creviced, and rather tessellately scaly; inner bark pale pinkish tan; wood pale buff.

I. grandifolia Zoll. et Mor.— This common small tree was especially abundant by the river between Mawai and S. Dohol. It flowered in February and about July. I have a record of gregarious fruiting in October.

I. lobbii King et Gamble:— My collections represented forms 7 and 8 of my notes on *Ixora* (Corner 1941), with the large flowers. The bark was chocolate-brown and cracked.

Morinda rigida Miq.— SFN 26111, Jurong, Singapore; lofty climber -25 m long; twigs leafy for a considerable length, the leaves not bunched; wholly glabrous; bud-scales thinly waxy, often with 1–2 small orange-waxy secretions at their tips; lamina 7–12 × 2.6–5 cm, elliptic, shortly and obtusely acuminate, gradually attenuate to the narrowly cuneate base, thinly coriaceous; lateral veins 7–11 pairs, more or less invisible in the living leaf, or faintly on the upperside; midrib pale pinkish on both sides of the young leaves, yellowish in mature leaves, raised on the upperside; petiole 10–18 × 2–3 mm; umbels terminal, composed of (1-) 3–4 heads, 1–2 fruiting; heads 16–22 mm wide, composed of 7–9 flowers; peduncles of heads 10–20 × 2–2.5 mm; calyx-tubes projecting 2–5 mm; fruit-heads yellowish white with dark green sutures.

Mussaendopsis beccariana Baill.— tree -27 m; bole fluted-butressed 1.5–3.5 m high, the buttresses -35 cm wide and spreading over the lateral roots, with many small roots descending into the soil from the main laterals; without tap-root, stilt-roots, or pneumatophores; crown open, often irregular and ill-formed, the trunk dividing into 2–3 main, ascending, often twisted and flattened, branches, rarely with monopodial trunk; bark light greyish brownish, smooth, then thinly flaky in small rectangular pieces; inner bark pale yellow, rapidly fuliginous on exposure, -12 mm thick, rather soft; wood pale brown.— Plates 25, 34.

This distinctive tree of the freshwater swamp-forest is distributed from Perak to Singapore, Riouw, Sumatra and Borneo.

Nauclea maingayi Hook.f.— tree -20 m; bole cylindric from the base; bark fuscous grey to blackish, slightly transversely fissured, pustulate with subelongate lenticels more or less in rows; inner bark light pinkish, turning reddish on exposure.

N. subdita (Miq.) Merr.— This grew into a small upright tree 3–4 m high, but in places up to 7 m, with spreading horizontal branches. On the Sedili Besar a few specimens occurred just above K. Dohol, but it was an upstream sun-loving plant. It became very abundant from Bagan Limau up to the bifurcation of the river into S. Ampang and S. Sedili. It was conspicuous where the banks shallowed into the water and it developed, apparently as a first coloniser, where mud was accreting. Thus it took the place of *Barringtonia conoidea* (*putat*) above the tidal limit. It was profuse in shallow open back-waters, and was well known as *gedemba*, though apt to be confused with *Neonauclea*.

Neonauclea sp.— SFN 32985, S. Dohol. frequent on the river-banks; shrub or treelet -5 m; leaves withering scarlet; often confused by Malays with *N. subdita*.

Petunga roxburghii DC.— tree -20 m; bole 25 cm thick at 2 m, without buttresses or stilts; bark greyish brown, finely longitudinally fissured, slightly flaky, easily stripping; inner bark pale brownish; common under *Eugenia grandis* in the sandy forest behind *Casuarina*, the leafy branches appearing as pinnate leaves, well known as *membras*.— Plate 26.

P. venulosa Hook.f.— bush or small tree -7 m; stem 7 cm thick at 1.5 m; bark fuscous brown to pallid greyish, narrowly fissured-flaky in thin, elongate, rather shaggy pieces; inner bark pale yellowish brownish, thin; wood pale yellowish brownish.

Randia sp.— SFN 28954, S. Berassau near the Jemaluang Road, 6.2.35; epiphytic bush at c. 10 m high on a small tree in the swamp-forest; stem short, c. 30 cm long, clasping the host-trunk with lateral roots and sending one long root perpendicularly to the ground (as in an incipient strangling fig); branches 5–6, more or less horizontal, up to 4 m long, spreading freely, 1–3 basal nodes often with scale-leaves, the leaves subtending the inflorescences also as scale-leaves or much reduced in size; inflorescences axillary, singly at every second node and only from the upper side of the branch; flowers white, turning dull cream to pale ochraceous yellow, lasting several days, opening one or two at a time but eventually all the flowers of the inflorescence open together.

I met the one specimen of this remarkable plant, which I took at first sight to be an epiphytic fig such as *F. obscura*. In the position of the inflorescence it resembled *R. anisophylla* and *R. scortechinii*.

Tarenna Gaertn.— I refer to my notes on this genus (Corner 1939).

T. mollis Wall.— bark rich chestnut-brown, peeling in very small pieces; inner bark pale greenish, deeper green just below the surface; wood white; surprisingly abundant in parts of the swamp-forest, especially along muddy streams.

Timonius wrayi King et Gamble:— tree -17 m; bark fawn-yellowish, rather closely rugose-fissured and transversely rugulose, pustulate with rather prominent lenticels more or less in vertical rows; inner bark pallid pinkish ochraceous tinged brownish; wood fawn ochraceous throughout.

Rutaceae

Tetractomia tetrandra (Roxb.) Craib:— tree -30 m; bole 35 cm thick at 2 m, cylindric from the base or very slightly buttressed; main lateral roots superficial, forming irregular loops, pustulate with lenticels, and developing knee-roots as pneumatophores -45 cm high; crown narrow, interrupted, often very small, ? monopodial; bark cream-buff or buff-white, inclining to greyish buff, even, entire,

becoming slightly pimply with lenticels, with faint leaf-scars; inner bark creamy or ochraceous buff, thick, homogenous, green just below the surface, sourly aromatic; wood yellowish, hollow; leaves more or less opposite, with geniculate petiole.— Plates 7, 36.

This tall slender tree was not difficult to recognise from the meagre crown, the pale bark with sourly aromatic smell, and the leaves. It had been known as *T. holttumii* Ridley. At Pontian, Johore, it was frequent in the peat-forest and all the trees had the pneumatophores.

Sabiaceae

Meliosma Bl.— This genus has been revised in great detail by Beusekom (1971).

M. pinnata (Roxb.) Walp. ssp. *ridleyi* (King) Beus.— tree -17 m, fluted-butressed at the base; bark pinkish brownish grey, slightly creviced-fissured, with persistent leaf-scars and short transverse rows of more or less transversely elongate lenticels; inner bark pinkish brown; wood pinkish brown; twigs and petioles fulvous hairy; petals white; anthers orange; ovary with rose-red hairs towards the apex; apparently K4 C3 A2 G1 in falling phyllotaxis at the floral apex.

M. sumatrana (Jack) Walp.— treelet -5 m; leaves erect, very oblique to the stem; leaflets fleshy-coriaceous, pale green; fruits ripening yellow.

Sapindaceae

Allophylus L.— See Corner (1939a) and Leenhouts (1967) for this intricate and wide-spread species.

Dimocarpus Lour.— Leenhouts (1971) has revised the conception of this genus as distinct from *Nephelium*, and includes in it the Malayan *mata kuching* (*N. malaiense*) with the longan as one large species *D. longan* Lour. Yet I venture to say that no Malay would mistake the *mata kuching* for the longan, and no one would pay the same price. My own impression of the living trees in Malaya was that specifically they were distinct, but I have not studied their complexity in Thailand, Indochina, and China.

Lepisanthes Bl.— This genus has been revised by Leenhouts (1969) and enlarged to cover *Aphania*, *Erioglossum*, and *Otophora*. Thus it embraces 24 species of the Old World tropics. The common little *L. tetraphylla* can often be recognised from its limp white new leaves.

Pometia Forst.—In his treatment of this genus, Jacobs (1962) makes *P. alnifolia* of the swamp-forest a *forma alnifolia* of the river-side and wide-spread *P. pinnata*. I am not sure of the reduction to the status of *forma*, and the matter should be investigated in the field. The following are my notes on *f. alnifolia*.

Big trees reach 35 m high in the canopy of the swamp-forest and they have sharp, spreading and undivided buttresses -2.3 m high; occasionally they may have slight stilt-roots. The trunk and branches have characteristic thickened arcs which encircle a third or less of the stem and give an annulate appearance. These arcs are present in the wood as bands with a knobby surface against the bark. They may correspond with leaf-scars. The trunk divides into two or three main branches which build a fairly dense sympodial crown. Smaller trees with slender trunks are commoner in the forest and may be the ascendent saplings. The Chinese woodcutters said that the timber was hard but would not split.— Plates 9, 36.

Xerospermum sp.— s.n. 13.4.35, Sedili Besar; tree -20 m; bole 20 cm thick at 2 m, cylindrical from the base; bark dark fuscous brown, smooth, entire, or slightly tuberculate from lenticels; inner bark reddish brown.

Sapotaceae

There have been so many changes in generic concepts in this family that it is becoming difficult to follow specific nomenclature. No two specialists seems to agree, and I begin to wonder if there is not a single genus *Sapota*.

Ganua motleyana (de Vr.) Pierre— tree -47 m, generally not more than 35 m; bole cylindrical, dividing into 2-3 main ascending limbs, with rather open, sympodial crown; knee-roots as in *Bruguiera*, generally copious, lenticellate, with thick white latex; bark pale grey to greyish white, pustulate with brown lenticels 2-4 mm wide, with hoop-marks, not fissured or scaly.— Plates 7, 34.

I may have confused more than one species under this name. Thus SFN 26158 (Jurong, Singapore), which I took to be *G. motleyana*, is named *Madhuca* sp. by F. S. P. Ng in the Singapore Herbarium. If there is a complex of two or three species, it is not clear how they differ ecologically.

Madhuca hirtiflora H. J. Lam:— tree -13 m; bole 13 cm thick at 2 m, slightly fluted at the base; bark greyish fuscous, rather pallid, slightly tuberculate with tumid, shortly elongate, lenticels, otherwise entire; inner bark pinkish, with fairly thick, white latex; wood pale pinkish yellowish; crown compact, dense, regular, with Terminalia-branching; general flowering in January-February 1935; referred to *Ganua* in the Tree Flora of Malaya 1 (1972) 398.

M. sessiliflora v. Royen:— small tree 2-7 m, flowering almost as a shrub; bark dark chocolate-brown to dull rufous fawn, slightly tuberculate with small lenticels, otherwise entire, with persistent leaf-scars; inner bark pinkish brown; latex white, rather watery; wood pallid yellowish; young leaves and twigs woolly with fulvous caducous hairy down; corolla white; calyx fulvous hairy; common locally; general flowering May-June 1935.

M. tomentosa H. J. Lam:— small tree 3-12 m, flowering almost as a shrub; bark light grey, slightly pustulate with rather large, brown lenticels 3-5 mm wide; inner bark pinkish fawn; leaves glabrous, chartaceous; corolla white; flowering in February.— SFN 21330 as the type of *M. paludosa* v. Royen.

Madhuca sp.— SFN 29305, mile 5½ Kota Tinggi Mawai Road, Johore, in swamp, 10. 5. 35; tree -20 m; bole 28 cm thick at 2 m, slightly buttressed -45 cm high; bark fuscous, rather uneven and rough, somewhat fissured, not pustulate; inner bark pinkish brownish; latex white, rather thin; heart-wood pale fuscous brown; fruits green (ripe), rather large.

Palaquium hexandrum (Griff.) Engl.— tree -50 m, sharply and steeply buttressed -2 m high; bark light brown, becoming light grey and dippled-flaky with rather large scales (as in *Intsia*); latex white.

I mistook the trunk of this tree at first sight for that of *merbau*. A tree in the swamp-forest at Mandai Road, Singapore, had a few cylindrical stilt-roots, but I did not meet with the species in the swamp-forest of the Sedili region.

P. ridleyi King et Gamble:— SFN 36699, Pontian, Johore; tree -40 m; buttresses -1 m high, thin, prominent, spreading; trunk slotted with hollows (as in *Adina*); crown dense, dark green; bark fuscous brown, smooth, then slightly cracked longitudinally and breaking into small inconspicuous oblong scales; inner bark pale pink, thick; latex white; pedicels and sepals green; corolla white; flowers faintly fragrant of vanilla, often galled.

The peculiarity of the trunk is not mentioned in the Tree Flora of Malaya vol. 1.; yet I saw it in several trees in the peat-swamp at Pontian where it was not common.

P. xanthochyllum Pierre:— tree -35 m, occasionally -45 m; bole 70–80 cm thick at 2 m; trunk dividing into several large ascending limbs, with small spires of foliage on the copious twigs; crown convex, even, fairly compact; stilt-roots 1–7 m high, much flattened vertically, widely arching, branching copiously near the ground, often producing bundles or mats of small roots lying on the mud and floating on the water, without loop-roots or distinctive pneumatophores; bark dark grey to greyish brown, slightly to distinctly fissured, flaky; inner bark pink or reddish, fairly thick, stripping; latex white, copious, very sticky.— Plates 13, 17, 35.

This common tree of the freshwater swamp-forest took two forms. In the *mempisang*-belt it developed copiously the bundles or mats of small roots over the mud and to a certain extent the stilt-roots. Then, in the swamp-forest with seasonal flooding, the stilt-roots were much more evident, reaching even to 7 m high while the root-bundles were often not formed. I have illustrated the manner of development of the stilt-roots in my Life of Plants pl. 12b.

Palaquium sp.— s.n. 9.9.34, mile 11, Jemaluang Road, Johore; tree -23 m; bole 30 cm thick at 3 m; stilt-roots -3 m high, flattened, arcuate then descending almost vertically, rather fastigiate; bark fuscous fawn, lenticellate-fissured; inner bark pallid yellowish; latex white, in drops from the blaze, smeary, opaque, not copious.— Plate 20.

One sterile tree was found by a stream at the base of a hillock about 7 m from where the stream dilated into the swamp-forest. The leaves were rather large and resembled those of *Dillenia* to which genus Mohamad Nur was convinced that it belonged. The specimen was placed at the end of Sapotaceae as ‘? *Pouteria malaccensis*’.

Simaroubaceae

Quassia indica (Gaertn.) Nootboom:— This is a characteristic little tree of freshwater and brackish creeks from Madagascar through Indo-Malesia to the Solomon Islands, but in the Malay peninsula it seems to be known merely from the east coast of Johore and south Pahang. It can be mistaken for *Inocarpus*, which has red sap in the bark. The species has been known for 170 years as *Samadera indica* until this genus was reduced to *Quassia* by Nootboom (1962).

Staphyleaceae

Turpinia sphaerocarpa Hassk.— tree -20 m; bole 35 cm thick at 2 m; buttresses -1.7 m high, short, sharp, steep; no special roots; bark light grey, becoming closely and deeply rugose-fissured, not flaking; inner bark pale yellow, with abundant ochraceous sclerotic particles, fairly thick; wood yellowish white; flowers pale creamy yellow; leaves opposite with 3–5 leaflets.

The Sedili specimens were identified as *T. laxiflora* Ridley by v.d. Linden but are not mentioned as such in the Flora Malesiana ser. 1, vol. 6, 1960, 57. Whitmore has annotated them as *T. sphaerocarpa* with which I agree for they were originally identified as *T. latifolia* Ridley, now reduced to *T. sphaerocarpa*.

Sterculiaceae

Heritiera Ait.— Kostermans (1959) has reduced *Tarrietia* to *Heritiera*.

H. simplicifolia (Mast.) Kosterm.— tree -30 m; bole 85 cm thick at 2 m; buttresses -2.7 m high, wide-spreading, thin; bark reddish brown to light rufous, rugose-fissured, the dead greyish bark flaking off in oblong pieces; inner bark pinkish to rich orange-brown, rather closely and finely laminate, dry, hard, -8 mm thick,

stripping; heart-wood pale rufous brown; leaflets 3-5, even on trees -23 m high, or solitary; crown dense.

H. sumatrana (Miq.) Kosterm.— similar to *H. simplicifolia* but leaflets 5-7, twigs and petioles brown hairy; seen only in the swamp-forest.

Leptonychia Turcz.— The position of this genus in Sterculiaceae is doubtful because the seeds have the construction of Elaeocarpaceae or Tiliaceae (Corner, *Seeds of Dicotyledons*, 1976). Compare *Paragrewia* in Tiliaceae (R. Seshagiri Rao, *J. Bombay Nat. Hist. Soc.* 51, 1953, 671).

L. glabra has greenish flowers and green capsules dehiscing to show the two black seeds with red arils.

Pterospermum javanicum Jungh.— This large tree can be recognised among the strongly buttressed by the brownish undersides of the leaves and the vivid magenta-pink bacony streaks in the blaze. It becomes one of the dominant trees in *Eugenia grandis* forest. It flowered generally about April and again about October.

Scaphium macropodum (Miq.) Beumée:— tree -40 m; bole 50-70 cm thick at 2 m; buttresses 1-3 m high, 1-2 m wide, spreading; no special roots; bark fuscous rufous, shallowly rugose-fissured, slightly flaky, often with abundant, brown, rather tumid lenticels 2-4 mm wide, the bark on the upper part of the trunk and on the main branches often more deeply coloured; inner bark pinkish with broad brownish rays, up to 18 mm thick, deep blood red beneath the dead outer bark, but this colour disappearing from old trunks, the inner bark stripping and the outer breaking off; flowering February-June, ? mostly in May, ? not yearly; leaf-change in August 1939 on Bt. Tinjau Laut.

A tree over 30 m high was blown down and uprooted in the swamp-forest near the Kota Tinggi Mawai road. Besides buttresses up to 1.5 m high, it had two tap-roots, one barely 1.7 m long, stout and with a few lateral roots, and the other much longer, stouter, and penetrating deeply into the soil with many lateral roots. Thus this tree of the swamp-forest has buttresses and not one, but two, tap-roots in defiance of the thesis that buttressed trees lack tap-roots. Moreover in this wet habitat it is deciduous.

Sterculia bicolor Mast.— tree -27 m, deciduous, without buttresses; bark greyish buff, slightly flaky in round patches showing the brownish new bark, tuberculate-lenticellate; inner bark rich pink-brown, with hard rays.

This species shed its leaves about March-April when the fruits had ripened. It occurred on the Sedili Besar from c. 2 miles above Bt Tiga upstream and chiefly just behind the *mempisang*-belt.

S. macrophylla Vent.— tree 15-23 m; bole 30-40 cm thick at 5 m; buttresses 1-2.2 m high, branched; crown rather flat, with wide-spread limbs; bark pinkish grey to pale rufous, silvery grey in old trees, slightly fissured, with rather tumid lenticels, with persistent leaf-scars; inner bark pinkish brown, with bacony streaks in the blaze, -15 mm thick, green just below the surface, stripping; wood yellowish white.

This tree is deciduous. In the forest on the Mandai Road, Singapore, where it was not infrequent, trees shed their leaves 12-17 April 1933 and developed pinkish new leaves from 24 April onwards. I illustrated this species in my *Life of Plants* plate 24.

S. cf. scortechinii King:— tree -13 m; bole 18 cm thick at 1.3 m, cylindrical from the base; bark silvery buff, pustulate with scarcely crowded, brownish lenticels 2-3 mm wide, with faint leaf-scars; inner bark reddish brown, thick, blaze without bacony streaks; leaves brownish beneath; calyx pale pink, internally rose-red.

Styracaceae

Styrax crotonoides Clarke:— tree -13 m, bole cylindrical; bark greyish pinkish fawn, very smooth and even, then slightly creviced, with faint leaf-scars; inner bark rufous fawn, thick, firm; leaves pale rusty scurfy beneath.

Symplocaceae

For the identification of specimens of *Symplocos* I am indebted to H. P. Nooteboom, and refer with pleasure to his monograph (1975).

Symplocos barringtoniifolia Brand:— tree -17 m, 18 cm thick at 2 m, bole cylindrical; bark dull grey-brown, often pale, smooth, then closely and finely dotted with small, dark brown, lenticels 1–2 mm wide, leaf-scars faint; inner bark pale pinkish or brownish; wood yellowish throughout; fruits greenish white (nearly ripe), slightly pulpy; leaves rather fleshy, coriaceous, not glaucous.

S. rubiginosa Wall.— tree -10 m, with cylindrical bole; bark light greyish buff, smooth, even or slightly pustulate with very small lenticels; inner bark pallid yellowish white.

Symplocos sp.—s.n. 3.2.35 (as tree A); tree -23 m; bole 35 cm thick at 2 m, cylindrical; bark greyish to light brownish grey, rather faintly and coarsely tuberculate with lenticels, without leaf-scars; inner bark pallid wood-tan, rather thick, smelling of coconut-milk; wood cream-white throughout; branches subverticillate in threes; leaves pale green.

The specimen was sterile. The trunk resembled that of *Lithocarpus* but lacked the hoop-marks or leaf-scars.

Taccaceae

I refer to the monograph by Drenth (1972). The Malayan species are mostly common and easily recognised, but have been little collected.

Tacca leontopetaloides (L.) O.K.— This has usually rather yellowish green leaves, stem, and flowers. A variety at Jason Bay, near S. Diman, had the stem and petioles closely striped blackish purple with similar mottling between the stripes; the flowers were green with purple filaments to the stamens; the dissection of the leaf was also different.— Plate 31.

Theaceae

Adinandra Jack:— I rely on the monograph by Kobuski (1947).

A. corneriana Kob.— tree -10 m, without buttresses or stilts; bark dull greyish fawn, closely tuberculate with scarcely prominent lenticels 2–4 mm wide; inner bark pinkish brown; wood drab yellowish throughout; leaves hairy, serrate; pedicels and sepals pale brownish cream; petals cream-white; apparently endemic to the Sedili region.

A. sarosantha Miq.— tree -27 m; bole 35–50 cm thick at 2.5 m; buttresses -1.7 m high in swampy ground, sharp, but absent from trees in drier ground; bark fuscous chocolate, finely and shortly fissured-creviced, with persistent leaf-scars, slightly pustulate with small lenticels towards the base of the trunk; inner bark pinkish fawn, rather gritty; wood white, rather soft, splitting; twigs rather strongly 4-angled, in some cases almost winged, rather flattened; crown rather dense, dark, irregular, the leaves more or less upturned; flowers pendent, solitary, axillary; petals cream-white, the corolla dropping off with the stamens; fruit 18–25 mm wide, ripening brown.— Plate 20.

It is not clear from my field-notes if this tree flowers seasonally or is more or less in continuous flower and fruit. I collected both flower and fruit from the same trees in February 1935 and noted that there were three rather large trees in flower, scattered along a distance of half a mile. This is *A. macrantha* and, as in Wayside Trees of Malaya, *A. lanponga*.

Gordonia singaporeana Wall.— tree -27 m; bole 25–30 cm thick at 2 m, cylindrical from the base or slightly fluted-butressed, without stilts; crown usually scraggy with more or less erect branches; bark greyish buff, then tessellate with blackish fibrous pieces peeling off to show the pale new bark, becoming slightly fissured; inner bark deep red-brown, rather fibrous, thick.— This bark seems characteristic of the genus.

Ploiarium alternifolium (Vahl) Melchior:— This is called *Archytaea vahlii* in Wayside Trees of Malaya; it is no more alternifoliate than a mango-tree. In the Sedili region it was a frequent small tree of the *mempisang*-belt with copious slender stilt-roots set as in a besom, up to 2.7 m high. I never saw by the Sedili the large trees, up to 25 m high, as occurred in the peat-forest at Pontian, Johore. There these large trees much resembled *Tetramerista*, which lacks stilt-roots and has much thicker bark.— Plates 11, 40.

A short article by Wyatt-Smith (1951) records a study of a natural and almost pure stand of *A. vahlii* in Ayer Panas Forest Reserve, Malacca. It was swamp-forest with *Alstonia spathulata* and *Cratoxylon arborescens*. The trees of *A. vahlii* were 10–13 m high. In the course of 16 years, and in spite of thinning, many of these trees died. He concludes that the trees reached generally a maximum girth of 30–45 cm, and that they represented a seral stage from swamp-forest.

Ternstroemia bancana Miq.— tree -20 m; bole 25 cm thick at 2 m, cylindrical from the base; bark silvery greyish buff, or slightly pinkish, tuberculate with fairly crowded, tumid, brown lenticels 3–5 mm wide, more or less in vertical rows, without leaf-scars; inner bark lurid rufous ochraceous, fairly thick; wood white; sepals green; petals cream-white then pinkish distally; filaments and ovary cream-white; pollen brilliant orange.*

Tetramerista glabra Miq.— SFN 36696, Pontian, Johore; tree -33 m; bole cylindrical; loop-roots -45 cm high, not copious; crown rather narrow, with *Terminalia*-branching; bark fawn-brown, fissured, slightly scaly in small pieces, the bark of old trunks deeply rugose-fissured (as in *Ploiarium* but with broader ridges); inner bark pale pinkish white, thick, dry, spongy, soft, fibrous; inflorescences green; flower-buds dull brownish crimson; sepals and petals green, tinged crimson on the outside; frequent at Pontian but not found in the Sedili region or in Singapore.

Thymelaeaceae

Aquilaria beccariana v. Tiegh.— The Sedili specimens are cited by Ding Hou in the Flora Malesiana ser. 1, vol. 6, 1960, 13. *A. beccariana* is there given as a tree -20 m high but the Sedili trees, of which I saw many and cultivated two in my garden in Singapore, were sparingly branched and spindly little trees. I figured the fruits in my account of the durian theory under the name of *Gyrinopsis* sp. (Ann. Bot. Lond. n.s. 13, 1949, 367).

A. malaccensis Lamk:— The Sedili collections are *A. malaccensis*, not *A. microcarpa* which differs in flower, fruit and seed, such as are usually not available in the forest. For *A. microcarpa*, Ding Hou cites only Singapore for the Malay peninsula. I note here that, as an experiment, I stripped the bark off a tree of *A. ? microcarpa* in the forest on the Mandai Road, Singapore, from almost ground-level up to a height of 10 m, thus exposing all the wood in the lower half of the

* All these collections from the Sedili region have now been transferred to a new species *T. corneri* H. Keng, *Gdms' Bull., Singapore*, 29 (1977) 143.

trunk. In a few weeks new bark began to grow in countless spots all over the bared wood, apparently from the ends of the medullary rays, and after 7-8 months the bark was wholly renewed and sealed without any evident damage to the tree, which had remained in full leaf throughout the period.

Phaleria capitata Jack:— small tree -5 m; bark dark greyish brown, smooth, very tough, stringy, stripping; inner bark white; wood white, fibrous; flowers white, fragrant, in masses on small tubercles on the trunk and branches, almost from ground-level.

This was wild round Jason Bay in the swamp-forest and in the *Eugenia grandis* forest, though I never saw it in the forest up either of the Sedili rivers. It illuminates a point in phytogeography. The distribution of the species is given by Ding Hou (Flora Malesiana ser. 1, vol. 6, 1960, 21, f. 7); it is roughly a parabola opening north west with Luzon, Waigeo Island, Celebes, Java, the west coast of Sumatra, and Ceylon as the periphery, and Jason Bay as an eccentric focus. Thus it bears on the problem of the Riouw pocket from a south easterly direction. When I found the species at Jason Bay, I was aware of its importance for I was familiar with the genus from a plant cultivated on the Bandstand Hill in the Singapore Botanic Garden. Ding Hou suggested that the collections from Jason Bay might have come from plants escaped from cultivation, but the species was not cultivated in the Malay peninsula, for which reason it was omitted from my Wayside Trees of Malaya; there were none in the villages round Jason Bay. The mistake has been copied and extended in the Tree Flora of Malaya (vol. 2, 384) with the remark 'known in Malaya from only two collections'. There are four in the Singapore Herbarium and, of course, the number of collections is not a measure of natural abundance. I saw many specimens of *P. capitata* in the forest, as I could have informed the author of this mistake when he was working at Cambridge. I grew plants of *P. capitata* from seed collected at Jason Bay, but whether they have survived in the Botanic Garden I do not know. Compare the distribution of *Aquilaria beccariana*, *Inocarpus*, and *Quassia indica*.

Tiliaceae

Brownlowia Roxb.— Kostermans (1961) has revised the genus and discovered the name-change for *B. lanceolata*.

Grewia L.— I still use this genus in the wide sense, which Hutchinson employed in his Genera of Flowering Plants vol. 2 (1967). Others prefer to split off *Microcos* L. on floral grounds which to me are subgeneric. I think that seed-structure will be critical.

G. blattaefolia Corner:— bark dark rufous brown, rather pustulate with lenticels in more or less vertical rows, with persistent leaf-scars, eventually slightly creviced; inner bark pale pinkish; wood pinkish white, soft.

G. hirsuta (Korth.) Kochummen:— tree -17 m, without buttresses or stilts; bark fuscous brown, slightly uneven and bumpy, entire; inner bark pinkish brownish, thick; wood white, turning brownish on exposure.

Pentace Hassk.— The genus has been revised by Kostermans (1964).

P. corneri Kosterm.— tree -57 m; bole 70 cm thick at 3 m; buttresses -1.2 m high, rather slight and low, none in some trees over 30 m high; bark fuscous rufous, narrowly and rather distantly lenticellate-fissured, the lenticels often discrete and rounded, eventually rugose-fissured in the lower part of the trunk and slightly scaly with small oblong pieces; inner bark bright pink-red, the dead outer bark pink-brown; wood pallid brown, sap-wood yellowish; leaves very glaucous beneath.

Several huge trees of this species were found in the kapur-forest on a hillock just south of S. Kayu Ara on the Jemaluang Road. They were sterile and the specimen was collected from a branch knocked off in felling kapur; I fear that all

this forest has been destroyed, but the species has been collected also in Borneo; there is no other collection from the Malay peninsula. Three of the four Bornean collections were sterile but fruiting material was obtained in Sarawak in the month of March (? year). It seems that the species may flower as rarely as *P. triptera*, and that it is a relic of the land-connection between Borneo and Malaya.

P. triptera Mast.— tree -47 m; buttresses -1.7 m high, prominent; bark rich orange-brown, fissured-flaky; inner bark bright pinkish red; fruiting in July 1939, 1940, but no fruits seen in previous years from 1930; the crown entirely pink from the 3-winged fruits.

Pentace sp.— s.n. 8.2.35, mile 13½ Jemaluang Road, by stream in hillock-forest; tree -17 m; bole 15 cm thick at 2 m, cylindrical from the base; bark chocolate-brown, smooth, entire, scarcely pustulate, with persistent leaf-scars; inner bark pinkish fawn, with numerous narrow white bacony streaks in the blaze, closely concentrically laminate near the cambium; leaves glaucous beneath, 3-veined, few lateral veins, rather diamond-shaped, with geniculate petiole; not mentioned in Kosterman's monograph, ? not *Pentace*.

Schoutenia accrescens var.— SFN 28681, 29006; tree -17 m; bole 18 cm thick at 2 m, cylindrical from the base or slightly fluted; bark rufous brown, slightly tuberculate with scattered and rather longitudinally elongate lenticels 2-4 mm wide, slightly flaky, not or scarcely fissured; inner bark deep pinkish brown, fairly thick, stripping; heart-wood pinkish brown, hard; leaves powdery white beneath at first, then glabrescent and pale green (not brown); flowers with light yellow perianth turning pinkish; ovary and stamens cream-yellow; disc dull ochre; fruiting calyx greenish white, 5-lobed, 2.5-3 cm wide.

This tree, distinguished by the leaves not being coppery brown beneath but powdery white when young, was common about mile 12 on the Jemaluang Road. I did not see it elsewhere. In February 1935 several trees were changing leaf with pale green (not pink) new leaves and they were flowering at the same time. I had collected fruit from these trees in January 1935. SFN 28681 is labelled *S. mastersii* var. *glabra* Henders. ms. The variety was not understood by Roekmowati-Hartono (1965).

S. glomerata King:— bark fuscous rufous, faintly and closely pimply, otherwise entire; inner bark pinkish brown, rather thick, reddish beneath the dead outer layer.

Urticaceae

Poikilospermum suaveolens (Bl.) Merr.— The stems of this robust climber, and probably those of *P. cordifolium*, were used on the Sedili Besar for the purpose of keeping fire. The stems were chopped into lengths of c. 50 cm, decorticated by hitting with a piece of wood or the back of a parang, sun-dried, tied into bundles with the slender stem of a climber, and stored in the floating houses on the river. Such a dried piece of stem, when lit at one end and placed with the other slightly elevated, would smoulder slowly until it had completely burnt up; when the smouldering end was blown upon it would glow brightly and ignite paper, straw or chaff. This means was more reliable than matches in the damp situation of these houses. The vessels in the wood are large and long and must serve as air-passages for the continuous smouldering. Thus, upstream from Mawai, this climber was not so abundant by the river.

Verbenaceae

Avicennia L.— I did not study the genus in any detail. For an account of the structure and seedlings of four Malayan species I refer to Tan and Hsuan Keng (1969).

Clerodendron ? brevifolium Ridley:— finely villous; leaves elliptic, crenulate, long-stalked; inflorescence as a long racemose panicle.

C. buchanani Roxb.— shrub -2 m high, thick and woody at the base, all parts with a foetid smell (like *Premna*); lower leaves with the lamina 30×25.5 cm and petioles 23×0.5 cm; inflorescence terminal, as a corymbose panicle with immersed growing point, flowering above, fruiting below, with green axis and dull red branches and pedicels; calyx dull red, becoming fleshy, pinkish purple, and reflexed in fruit, but only slightly enlarged; corolla rose-red, fading pale pink, the petals turned up and the stamens turned down; filaments pink, anthers dull purplish; style dark rose-red, with darker stigma; fruit vivid blue-green.

Vitex clarkeana Gamble:— shrub or small tree -8 m high, often more or less horizontal over the water's edge; corolla white with mauve lip; fruit often covered with green powder (as if *Pleurococcus*).

This small tree occurred on the muddy banks behind the *nipa*-belt and then upstream in the *mempisang*- belt to the limit of normal tides at Lubok Pusing on the Sedili Besar. Occasionally it occurred with *Tristania*, possibly on banks that had slipped into the river, but it was also abundant by the muddy stream S. Kayu in the swamp-forest. It would flower gregariously about July.

V. ovata Thunb.— Concerning this common and highly characteristic pioneer of coastal dunes, I argued that it was not *V. trifolia* L. (Corner 1939b). More recently v. Steenis has argued that it should be called *V. trifolia* ssp. *littoralis* (Blumea 8, 1957, 516). What we need to know is whether the two will hybridise and whether such hybrids occur naturally.

Zingiberaceae

I have followed the account of the Malayan species by Holttum (1950), though name-changes must, alas, follow as genera are more critically reviewed (Burt and Smith 1972). For *Globba* I have followed the work of Lim (1972).

Unidentified trees

Corner s.n. 31.12.34 (5); tree -7 m; bole 10 cm thick at 1.7 m; bark rather warm brown, finely shallowly and irregularly fissured, with fine short transverse crevices, faintly and distantly tuberculate; inner bark pallid pinkish; no latex or gum; leaves excentrically peltate; in hillock-forest. ? Euphorbiaceae, ? sapling.

Corner s.n. 21.1.35 (7, near Mawai, as Tree A); 22 m high; bole 25 cm thick at 2 m, cylindrical from the base; bark fuscous to dark greyish brown, flaky in small oblong pieces $2-5 \times 1.5$ cm, slightly rugose-fissured, slightly shaggy; inner bark pale brown, stripping easily, rather fibrous and thin; wood yellowish, soft and coarsely fibrous; flowers greenish in terminal panicles on the bare twigs; in swamp-forest near the river.

Corner s.n. 8.2.35 (5, in *kapur*-forest, as Tree A); 20 m high; bole 25 cm thick at 2 m; stilt-roots -1.2 m high, flattened, arcuate, with dark madder-brown bark; bark rather chocolate-brown, drab, faintly and sparsely pustulate with small lenticels 1-2 mm wide, more or less in rows, slightly flaky in thin angular pieces, not fissured; inner bark pallid ochraceous, rather sclerotic; would yellowish throughout; leaves simple; *kedondong*.

Corner s.n. 15.4.35 (1, in swamp-forest, as Tree A); 30 m high; leaves small dark green, opposite. ? *Cratoxylon*.

Corner s.n. 12.5.35 (1, in swamp-forest, as *medang* 1); 20 m high, bole cylindrical from the base; bark fuscous grey, narrowly and irregularly rugose-fissured, rough, subtuberculate, rather rugged, not scaly or lenticellate; inner bark ochraceous, closely granular with small sclerotic particles; wood yellowish, hard; leaves opposite; inflorescence as terminal panicles; fruit ripening blue.

Corner s.n. 6.8.39 (as Tree A, Bt Tinjau Laut); 20 m, bole cylindrical from the base; bark light greyish brownish, slightly dippled scaly, pustulate; inner bark thick, intensely rich pink; wood yellowish, hard; crown with a complete leaf-change, the new leaves appearing before all the old had fallen, veins impressed on the upper side of the leaf.

Pteridophyta

My list of c. 70 species is incomplete. My collections were named by Holttum but the names in critical genera were provisional, and I have had no opportunity to consult my specimens, if any were kept. I have perused Holttum's monograph on Malayan ferns (1954) and extracted what was germane but few details of collections or particular localities are given for the lowlands. I have followed his nomenclature but it is clear from recent papers that much of this will change for the Flora Malesiana; and in the welter of synonymy arising from the splitting and re-arrangement of genera, the ecologist will be bewildered. Unfortunately there are very few Malay names to serve as a stand-by. The late Mr Alston prepared a list of species of *Selaginella* which I have not been able to consult and no species is recorded, in consequence, for the Sedili region.

One fact emerges. It is that the swamp-forest is not a prime place for pteridophytes; primitive species or genera are lacking or poorly represented; most are advanced and particulate. The fact makes one wonder what became of the palaeozoic fern-flora in the swamps. Did it become epiphytic on the primitive flowering plants or, with pteridosperms, was it exterminated? *Nipa* and *piai raya* are still dumb.

Part VII. Malay names in the Sedili region

- akar china* Loeseneriella macrantha
a. kait kait, a. kekait Roucheria, Uncaria
a. laka Dalbergia parviflora
a. letop Grewia umbellata
a. lundong Poikilospermum suaveolens
a. mempening Pericampylus incanus
a. setahun Poikilospermum suaveolens
a. subong 'che minah Lucinaea morinda
akit Rhizophora apiculata
antoi Cyathocalyx see also *bunga antoi*
apa apa Neesia
api api Aeschynanthus, Loranthaceae,
 Avicennia
ara Ficus (especially stranglers)
a. jantung Ficus annulata
a. lumut Premna trichostoma
asam damat Grewia fibrocarpa
a. garam Garcinia nervosa
a. gelugor Garcinia atroviridis
a. kelugi, a. paya Salacca

bachang utan see *machang utan*
bakau Rhizophora
b. laut Rhizophora mucronata
bakong Crinum asiaticum
b. ulu Hanguana
balek adap Mussaenda glabra
balau Shorea exelliptica, S. foxworthyi,
 S. materialis
baru baru laut Thespesia
baru baru (bebaru) sungei Hibiscus
 tiliaceus
batai Peltophorum pterocarpum
batang buring Iguanura
batu Parinari corymbosa
bayas Oncosperma horridum
bebuas Premna obtusifolia
bebulan Endospermum
bebuloh Pellacalyx
bebuta Cerbera, Excoecaria

beki Neoscortechinia
belukap Rhizophora mucronata
beluntas Pluchea
bembau Donax
bengka, bengku Ganea motleyana,
 (Palaquium xanthochymum)
bengkai, bengkal Nauclea maingayi
bengkulang Heritiera simplicifolia
b. daun tujuh H. sumatrana
bengong Parishia ? insignis
berangan Castanopsis inermis
b. babi Lithocarpus
berembang Sonneratia caseolaris
beremi, beremiu Herpestis
b. laut Sesuvium
bereh, beri Lithocarpus bennettii,
 L. elegans
beringin Ficus binnendijkii
bertam Eugeissona tristis
bintangor Calophyllum
b. batu C. sclerophyllum
b. bunut C. macrocarpum
b. jangkang C. sclerophyllum
b. sempang C. soulattri
bruas Garcinia hombroniana
buah pelir kambing Sarcolobus, ?
 Finlaysoniana obovata
b. saminyak Sapium indicum
b. saputeh Gomphandra quadrifida
b. ulat Lophopetalum multinervium
buas buas Premna obtusifolia
bulan bulan Endospermum
buloh Schizostachyum
buloh buloh Pellacalyx
bunga antoi Cyathocalyx pahangensis
b. ekor mera Asclepias curassavica
bungor Lagerstroemia ovalis
bunot Parishia pubescens
busing Bruguiera sexangula

- buta buta* Cerbera, Excoecaria
butun Barringtonia asiatica
chekri Dianella
chempedak, c. utan Artocarpus integer
c. ayer Artocarpus dadah, A. kemandu
chenderai Grewia tomentosa
chengai, chengal Balanocarpus heimii
chengpok Aralidium pinnatifidum
chenkri Cassytha filiformis
cheperai Gnetum gnemon var.
 brunonianum
chepura Garcinia bancana
cheret budak Garcinia bancana,
 Stemonurus scorpioides
chingam Scyphiphora
dalu api Aeschynanthus, Loranthaceae
damar hitam Shorea resina-nigra
d, mata kuching S. sumatrana
daun payong J. Teysmannia
d. tapah kudah Ipomoea pes-caprae
dedahruang Anaxagorea
delek Memecylon
demundi Vitex ovata
dendulang Eugenia cerina
dulang dulang Eugenia cerina
dungun Brownlowia, Heritiera littoralis
durian daun Durio singaporensis
ekor gajah Grammatophyllum
e. kuching Limnophila erecta
e. mera Asclepias curassavica
e. tikus Lycopodium (epiphytic)
gaharu Aguilaria malaccensis
gapis Saraca
gedembah Nauclea subdita
gegeli Rhabdophora minor
gelugor Garcinia atroviridis
geringgong Nephelium rubescens,
 Xerospermum spp.
geronggang, geronggong Cratoxylon
 arborescens
getah taban Palaquium gutta
geylang Sesuvium
gorek Caesalpinia bonduc
guri Dalbergia ferruginea
ha ha Neesia
hati hati Barclaya
hujan panas Breynia, Dalbergia beccarii,
 Rourea mimosoides
inai inai Erythroxylon cuneatum
inggi burong Alstonia angustifolia,
 Evodia roxburghiana, Ixonanthes
 reticulata
ipil Intsia bijuga
jada Millettia hemsleyana
janbu Eugenia
j. ayer E. densiflora
j. laut E. grandis
jangka tinggi Palaquium xanthochymum
jangkang Xylopiia ferruginea, X. fusca
jarum jarum Pavetta
jawi jawi, jejawi Ficus microcarpa
jelawai Terminalia phellocarpa
jelunut Goniothalamus
jelutong Dyera costulata
jenjarum Pavetta
jerujoh Acanthus ilicifolius
jiremong Elaeocarpus griffithii
j. babi Cryptocarya kurzii
kachang belurok Entada phaseoloides
k. laut Canavalia rosea, Vigna marina
kadoh Piper miniatum
kait kait Roucheria, Uncaria
kampar Guettarda
kandis Garcinia forbesii, G. nigrolineata,
 G. parvifolia
k. gajah G. griffithii
kangkong pasir Ipomoea gracilis
kapau Livistona kingiana, Pholidocarpus
kapur Dryobalanops aromatica
kasai Aglaia, Pometia
katong Crudia havilandii
k. laut Cynometra ramiflora
kayu baki Diplospora
k. gah Vitex peralata
k. gaharu Aquilaria malaccensis
k. gatal Gonystylis bancanus

- k. manis* Cinnamomum iners
kedi Engelhardtia serrata
kedongdong Canarium, various
 Meliaceae
kedundong Garcinia sp.
kekait see akar kait *k.*
keladan Dryobalanops oblongifolia
keladi utan Hanguana
kelat Eugenia
k. gelam, k. nasi nasi, k. nenasi E. oleina,
 E. papillosa, E. spicata,
 E. subhorizontalis
k. jambu E. valdevenosa
k. puteh E. leucoxyton
k. samak E. nigricans, E. palembanica
kelentek nyamok Grewia fibrocarpa
kelubu Caesalpinia bonduc
kembang samangkok Scaphium
kempas Koompassia malaccensis
kemunting Rhodomyrtus
k. akar, k. semut Marumia nemorosa
kemuyang Alocasia denudata
kenanga utan Goniiothalamus malayanus
kentut kentut Saprosmia
kepala berok Hydnophytum
kepau Livistona kingiana, Pholidocarpus
kepayang ayer Crateva religiosa
kerbau jalang Melanorrhoea pubescens
kerepit Inocarpus
keropoh Macaranga baccaureifolia
kertah udang Buchanania
ketaling Strombosia
ketapang Terminalia catappa
ketumbit Leucas zeylanica
kikir buntal Xerospermum muricatum
kobing Macaranga
kolah Mangifera quadrifida
kopi utan Canthium, Diplospora,
 Fagraea racemosa
kopit Inocarpus
kranji Dialium
k. papan Crudia caudata
krepal, krepau Kostermansia
kruing, kuing Dipterocarpus
k. gombang Dipterocarpus apterus
k. sol Dipterocarpus lowii
kuku bujang Schefflera venulosa
k. lang Randia longiflora, Zizyphus
kulim Scorodocarpus
kuran Dialium patens
kuras Dryobalanops oblongifolia
langkap Arenga westerhoutii
leban Vitex pubescens
lekub Mangifera griffithii
lemak berok Xanthophyllum
l. ketam Aegiceras, Desmodium
 umbellatum
lembah Calanthe, Curculigo
lempoyang various Zingiberaceae
lenggadai Bruguiera parviflora
lenggadi Vitex ovata
letop letop Pterospermum javanicum
lidah katak Pternandra coerulescens
limau lilang Merope angulata
linau Cyrtostachys lakka
lingtak Terminalia catappa
linjuang utan Dracaena granulata
longgundi Sophora tomentosa
machang utan Mangifera foetida
mahang Macaranga
malbera Mussaendopsis
mali mali Leea indica
mampat Cratoxylon formosum
mangas Memecylon levigatum,
 M. paniculatum
mata ayam Ardisia crispa
m. keli Gynotroches
m. kucing Dimocarpus longan
m. pelandok Ardisia elliptica
medang Elaeocarpus spp., Kopsia,
 Lauraceae, Platea, Styra
 crotonoides, Tetractomia
m. jangkang Elaeocarpus macrocerus
m. ketanah Phoebe cuneata
memali Leea indica
membatu, m. laut Parinari corymbosa
membras Petunga roxburghii

- membulan* Endospermum, Macaranga
populifolia
membuloh Pellacalyx
mempadi Eurya acuminata
mempari Pongamia
mempelam babi Terminalia phellocarpa
mempelas Tetracera indica
m. asah Tetracera arborescens
m. gajah Tetracera sarmentosa
mempenai Ardisia elliptica
mempening Lithocarpus
mempisang Polyalthia, P. sclerophylla
mempoyan Rhodamnia
mempoyang various Zingiberaceae
mendarong Trema orientalis
mengkedi Hopea resinosa
mengkuang Pandanus atrocarpus
mengkudu Morinda citrifolia
m. rimba Rennellia
menjarum Pavetta
menkadai Kandelia
menkirai Commersonia
mensirau Ilex cymosa
mentigi Pemphis
merambong Scaevola
meranti Shorea spp.
m. gajah S. singkawang
m. kepong S. ovalis
m. pa'ang S. bracteolata
m. paya S. platycarpa
m. pinang baik S. palembanica
m. rambai daun S. acuminata, S. lepidota
m. samak S. pauciflora
m. sarang punai S. parvifolia
m. tembaga S. leprosula
merawan Hopea mengarawan
merbatu Parinari
merbau Intsia bakeri
merlimau Atalantia, Streblus taxoides
mertajam Lepisanthes rubiginosa
meseapat Macaranga javanica
misi Planchonella obovata
muring Nenga, Pinanga
nasi nasi, nenasi Eugenia spicata
nenulang Eugenia cerina
ngjulong Agrostistachys
nibong Oncosperma filamentosum
n. palai Grammatophyllum
nipa Nipa fruticans
nipis kulit, Memecylon, M. myrsinoides
nyaru Vitis gracilis
nyatoh Madhuca, Palaquium
nyireh Carapa granatum
n. batu C. moluccense
pakai panggilan Clerodendron villosum
pakan heran Gardenia tubifera
paku laut Cycas rumphii
palas Licuala
pandan Pandanus, P. kamii
pasah Aglaia, Santiria rubiginosa
passu petri Platycerium
pechah periok Ixora
pedaru Dimocarpus longan
pedandang Trichosanthes wallichiana
pelali urat Tacca integrifolia, T.
vespertilio
pelawan Tristania
pelawai Terminalia phellocarpa
pelir kambing Finlaysonia, Sarcolobus
penaga Calophyllum, Mesua
p. darat Calophyllum sclerophyllum
p. laut C. inophyllum
penah Balanocarpus heimii
penara, penarahan, Myristicaceae
penawa pahit Eurycoma
peradun Dillenia indica
perah Elateriospermum,
Pimeleodendron
perepat Sonneratia alba
perupoh Lophopetalum multinervium
petai Parkia speciosa
p. belalang Pithecellobium clypearia
petaling Ochanostachys, Strombosia
piai raya Acrostichum aureum
piandong Quassia indica
pianggu Horsfieldia irya

- pinang buring* Iguanura
p. punai Elaeocarpus
pokok gegli Raphidophora minor
p. teh Acalypha siamensis
pong pong Cerbera manghas
pudu Artocarpus kemando
pulai Alstonia spathulata
punggai Coelostegia
purun tikus Scleria, S. poaeformis
putat Barringtonia, B. conoidea
p. ayam B. racemosa
p. ayer B. conoidea
p. laut B. asiatica
p. ulu Helicia robusta

rambai Baccaurea motleyana
r. tikus B. brevipes, B. scortechinii
rassau Pandanus helicopus
r. tikus Pandanus spp.
redan Nephelium glabrum
rengas Gluta, Melanochyla,
 Melanorrhoea
r. ayam Melanorrhoea sp.
r. ayer Gluta velutina
r. kerbau jalang Melanorrhoea
repat Mangifera cf. quadrifida
rieriang Ploiarium
resak r. laru Vatica wallichii
r. rambai Hopea polyalthioides
rhu Casuarina equisetifolia
riang riang Ploiarium
rotan Calamus, Daemonorops
r. batu Calamus paspalanthus
r. dini Flagellaria
r. lilin Calamus exilis
r. manau lilin Calamus tumidus
r. tawar Daemonorops angustifolius
rumput dawai Panicum repens, Paspalum
 vaginatum
r. ekor kucing Limnophila erecta
r. sesuroh Lycopodium cernuum
r. tai babi Leptaspis urceolata

sakat epiphytes in general
sakit rastong Paramignya scandens

saminyak Sapium indicum
sawi nggang Erechtites valerianifolia
segun Alphonsea, Diospyros, Polyalthia,
 Pseuduvaria, Trivalvaria; this name
 given to small trees with slender
 whippy stems and black bark, that
 served as fishing rods.
sekentut Saprosmia
sekunyit Fibraurea ochroleuca
selaseh pasir Heliotropium indicum
selengsar Glochidion littorale
selengsen Mapania, Scirpodendron
 (? Pandanus echinodermops)
s. akar Freycinetia
selimbu Cyperus malaccensis
seluna, selumba Jackia
selunjut Derris heptaphylla
semaram Palaquium semaram
sembong Didymocarpus
sena Pterocarpus indicus
senambun Baccaurea parviflora
sendok sendok Endospermum
sendudoh ayer Ochthocharis borneensis
sengkawang Shorea lepidota, S.
 palembanica, S. singkawang
senkam Glochidion leiostylum, lutescens
sepetir Sindora
sepungga Fagraea ceilanica
seranta tangga Castanopsis megacarpa
serdang Livistona seribus, Pholidocarpus
serentang tikus Buchanania sessiliflora
serta tangga Castanopsis megacarpa
serunai laut Wedelia biflora
sesuroh Lycopodium cernuum
setabul Bryophyllum calycinum
setada Podocarpus neriifolius,
 P. polystachyus
setambun Baccaurea parviflora
setawar Dracaena granulata
setudong Macaranga puncticulata
siakum Pandanus echinodermops
sial menaung Pternandra
simpoh Dillenia
s. ayer D. suffruticosa
s. jangkang D. grandifolia, D. reticulata

- sireh murai* Piper pedicelloseum
sol Dipterocarpus lowii
sundek Palaquium semaram
suntai Palaquium xanthochymum
suroh suroh Lycopodium cernuum
susop Lumnizera littorea

tabah Myristica elliptica
taban Palaquium gutta
tajam penggali Myristica elliptica
tampal Baccaurea scortechinii
tampang Artocarpus nitidus ssp.
 griffithii, A. dadah
tampoi Baccaurea motleyana
tangisong burung Chisocheton,
 Dysoxylon, Trigonachras, (Ficus
 apiocarpa, F. ruginervia).
tebrau Saccharum arundinaceum
teh Acalypha siamensis
telingga gajah Macaranga gigantea
telisai Terminalia phellocarpa
tempulut Artocarpus gomezianus

tempunai Xylopia caudata
tengar Ceriops tegal
tengayun Parartocarpus venenosus ssp.
 forbesii
tengkawang see sengkawang
tengkok biawa Fagraea racemosa
tepis Polyalthia hypoleuca
tepus Achasma macrocheilos
terap Artocarpus elasticus
terentang, teruntang Camptosperma
t. jantan C. squamata
teruntun Lumnizera
tetimah Glochidion leiostylum
tetiup, tiup tiup Adinandra, Gordonia
toyok Tacca leontopetaloides
tuba Derris malaccensis
tukas Caryota mitis
tulang dain Garcinia ? rostrata, G.
 eugeniaefolia
tumu Bruguiera
ubah Eugenia grandis
urat kurus Beilschmiedia tonkinensis

References

- Airy Shaw, H. K. 1975 The Euphorbiaceae of Borneo. Kew Bull. Additional Series IV.
- Aleva, G. J. J. 1973 Aspects of the historical and physical geology of the Sunda Shelf essential to the exploration of submarine tin placers. Geol. Mijnb. 52, 79-91.
- Anderson, J. A. R. 1958 Observations on the ecology of the peat-swamp forests of Sarawak and Brunei. Proc. Symp. Humid Tropics Vegetation, Tjiawi (Indonesia), UNESCO Science Co-operation Office, S. E. Asia, 141-148.
- Anderson, J. A. R. 1963 The flora of the peat swamp forest of Sarawak and Brunei, including a catalogue of all recorded species of flowering plants, ferns and fern-allies. Gdns' Bull. Singapore 20, 131-228.
- Anderson, J. A. R. 1964 The structure and development of the peat swamps of Sarawak and Brunei. J. Trop. Geogr. 18, 7-16.
- Ashton, P. S. 1964a Manual of the dipterocarp trees of Brunei State. Oxford University Press.
- Ashton, P. S. 1964b Ecological studies in the mixed dipterocarp forests of Brunei State. Oxford Forestry Memoirs n. 25, 1-75.
- Ashton, P. S. 1968 Manual of the dipterocarp trees of Brunei State and Sarawak Supplement). Borneo Literature Bureau, Kuching.
- Ashton, P. S. 1972 The Quaternary geomorphological history of Western Malaysia and lowland forest phytogeography. Trans. 2nd Aberdeen-Hull Symposium on Malesian ecology (1971); Department of Geography, University of Hull; 35-62.
- Bassot, J.-M. and I.V. Polunin 1967 Synchronous flashing of fireflies in the Malay Peninsula. Sci. Rep. Yokosuka City Mus. 13, 18-22.
- Beusekom, C. F. van 1971 Revision of *Meliosma* (Sabiaceae). Blumea 19, 355-529.
- Beveridge, A. E. 1953 The MENCHALI forest reserve. Malay. Forest. 16, 87-93.
- Biswas, B. 1973 Quaternary changes in sea-level in the South China Sea. Geol. Soc. Malaysia Bull. 6, 229-256.
- Buck, J. and E. Buck 1966 Biology of the synchronous flashing of fireflies. Nature 211, 562-564.
- Buck, J. and E. Buck 1968 Mechanism of rhythmic synchronous flashing of fireflies. Science 159, 1319-1327.
- Burgess, P. F. 1969 Preliminary observations on the autecology of *Shorea curtisii* Dyer ex King in the Malay Peninsula. Malay Forest. 32, 438.
- Burkill, I. H. 1927 Botanical collectors, collections and collecting places in the Malay Peninsula. Gdns' Bull. S. S. 4, 113-202.
- Burt, B. L. and R. M. Smith 1972 Key species in the taxonomic history of Zingiberaceae. Notes R. Bot. Gdn Edinburgh 31, 177-227.
- "Cactus" 1954 Water, water everywhere. Malay. Forest. 17, 184-194.
- Chew Wee Lek 1963 Florae Malesianae Precursores, XXXIV. A revision of the genus *Poikilospermum* (Urticaceae). Gdns' Bull. Singapore 20, 1-104.
- Cockburn, P. F. 1969 Gunong Mandi Angin, Trengganu; a botanical visit. Malay. Nat. J. 22, 164-170.
- Corner, E. J. H. 1935 The seasonal fruiting of agarics in Malaya. Gdns' Bull. S. S. 9, 79-88.
- Corner, E. J. H. 1938 The systematic value of the colour of withering leaves. Chronica Botanica 4, 119-121.

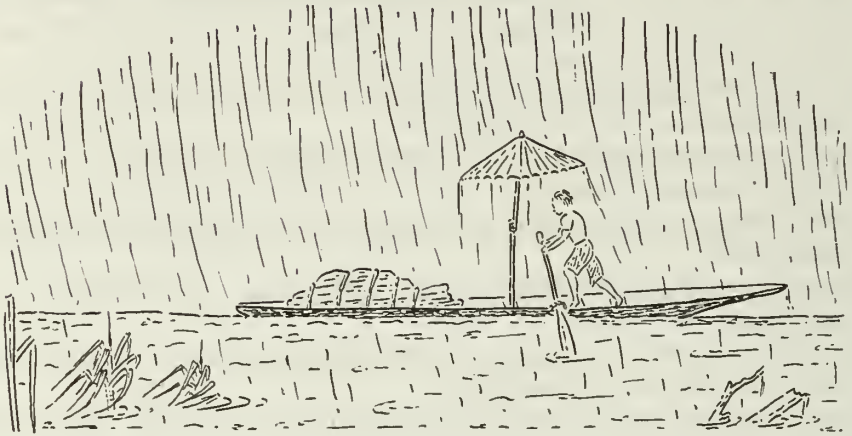
- Corner, E. J. H. 1939a Notes on the systematy and distribution of Malayan phanerogams, I. Gdns' Bull. S. S. 10, 1-55.
- Corner, E. J. H. 1939b Notes on the systematy and distribution of Malayan phanerogams, III. Gdns' Bull. S. S. 10, 239-329.
- Corner, E. J. H. 1940 Wayside Trees of Malaya. (2nd ed. 1952). Government Printing Office, Singapore.
- Corner, E. J. H. 1941 Notes on the systematy and distribution of Malayan phanerogams, IV; *Ixora*. Gdns' Bull. S. S. 11, 177-235.
- Corner, E. J. H. 1958 An introduction to the distribution of *Ficus*. Reinwardtia 4, 15-45.
- Corner, E. J. H. 1960 Taxonomic notes on *Ficus* Linn., Asia and Australasia. Gdns' Bull. Singapore 17, 368-404.
- Corner, E. J. H. 1964 The life of plants. Weidenfeld and Nicolson, London.
- Corner, E. J. H. 1968 A monograph of *Thelephora*. Nova Hedwigia Beih. 27, 1-110.
- Corner, E. J. H. 1969 The complex of *Ficus deltoidea*; a recent invasion of the Sunda Shelf. Phil. Trans. Roy. Soc. London B 256, 281-317.
- Drenth, E. 1972 A revision of the family Taccaceae. Blumea 20, 367-406.
- Fitch, F. H. 1949 Evidence for recent emergence of the land in east Pahang. J. Malay. Br. R. As. Soc. 22, 115-122.
- Furtado, C. X. 1963 Notes on some Malaysian Melastomaceae. Gdns' Bull. Singapore 20, 105-122.
- Gibson Hill, C. A. 1952 Tongkang and lighter matters. J. Malay. Br. R. As. Soc. 25, 84-110.
- Gilliland, H. B. 1971 Grasses of Malaya. Revised Flora of Malaya, vol. III. Government Printing Office, Singapore.
- Gobbett, D. J. and C. S. Hutchison 1973 Geology of the Malay Peninsula. Wiley-Interscience, New York, London.
- Haile, N. S. 1971 Quaternary shore lines in West Malaysia and adjacent parts of the Sunda Self, INQUA, special volume.
- Haile, N. S. 1971 Quaternary deposits and geomorphology of the Sunda Shelf off Malaysian shores. INQUA, special volume.
- Haneda, Y. 1966 Synchronous flashing of fireflies in New Guinea. Sci. Rep. Yokusuka City Mus. 22, 1-8.
- Henderson, M. R. 1949 The genus *Eugenia* (Myrtaceae) in Malaya. Gdns' Bull. Singapore 12, 1-293.
- Henderson, M. R. and J. Wyatt-Smith 1956 *Calophyllum* L. Gdns' Bull. Singapore 15, 285-376.
- Hewitt, B. R. 1967 The occurrence, origin and vegetation of lowland peat in Malaya. Proc. Linn. Soc. N.S.W. 92, 58-66.
- Hickson, S. 1889 A naturalist in North Celebes.
- Hill, R. D. 1966 Changes in beach form at Sri Pantai, north east Johore, Malaysia. J. Trop. Geogr. 23, 19-27.
- Holtum, R. E. 1950 The Zingiberaceae of the Malay Peninsula. Gdns' Bull. Singapore 13, 1-249.
- Holtum, R. E. 1951 The Marantaceae of Malaya. Gdns' Bull. Singapore 13, 254-296.
- Holtum, R. E. 1954 Ferns of Malaya. Revised Flora of Malaya, vol. II. Government Printing Office, Singapore.

- Holttum, R. E. 1957 Orchids of Malaya. Revised Flora of Malaya, vol. I. (1st ed. 1953). Government Printing Office, Singapore.
- Hoogland, R. D. 1952 A revision of the genus *Dillenia*. *Blumea* 7, 1-145.
- Jacobs, M. 1962 *Pometia* (Sapindaceae), a study in variability. *Reinwardtia* 6, 109-144.
- Jarrett, F. M. 1959 Studies in *Artocarpus* and allied genera, III. *J. Arn. Arb.* 40, 113-368.
- Jarrett, F. M. 1960a *idem*, IV. *J. Arn. Arb.* 41, 73-140.
- Jarrett, F. M. 1960b *idem*, V. *J. Arn. Arb.* 41, 320-340.
- Jenik, J. 1967 Root adaptations in West African trees. *J. Linn. Soc. (Bot.)* 60, 25-29.
- Kalkman, C. 1965 The Old World species of *Prunus* subgen. *Laurocerasus* including those formerly referred to *Pygaeum*. *Blumea* 13, 1-115.
- Kobuski, C. E. 1947 Studies in Theaceae XV. A review of the genus *Adinandra*. *J. Arn. Arb.* 28, 1-98.
- Kostermans, A. J. G. H. 1957 Lauraceae. *Reinwardtia* 4, 193-256.
- Kostermans, A. J. G. H. 1958 A monograph of the genus *Durio* Adans. (Bombacaceae). Part II. Species of Burma, Malaya, Sumatra. *Comm. Forest Res. Inst. Indonesia* n. 62.
- Kostermans, A. J. G. H. 1959a The genus *Durio* Adans. (Bombac.). *Reinwardtia* 4, 47-153.
- Kostermans, A. J. G. H. 1959b A monograph of the genus *Heritiera* Aiton (Stercul.). *Reinwardtia* 4, 465-583.
- Kostermans, A. J. G. H. 1961 A monograph of the genus *Brownlowia* Roxb. (Tiliaceae). *Forest Res. Inst. Bogor* n. 73.
- Kostermans, A. J. G. H. 1964 A monograph of the genus *Pentace* Hassk. (Tiliaceae). *Forest Res. Inst. Bogor* n. 87.
- Kostermans, A. J. G. H. 1965a New species of *Parinari* Aubl. (Rosaceae-Chrysobalanoideae). *Reinwardtia* 7, 47-61.
- Kostermans, A. J. G. H. 1965b A monograph of *Maranthes* Bl. and *Cyclandroprora* Hassk. (Chrysobalanaceae) of the Asiatic and Pacific area. *Candollea* 20, 103-142.
- Koyama, T. 1960 Materials towards a monograph of the genus *Smilax*. *Quart. J. Taiwan Mus.* 13, 1-61.
- Kunkel, G. 1965 Der Standort: Kompetenzfactor in der Stelzwurzelbildung. *Biol. Centralbl.* 84, 641-651.
- Leenhouts, P. W. 1956 *Florae Malesianae Praecursores XII. Dichapetalum*. *Reinwardtia* 4, 75-87.
- Leenhouts, P. W. 1959 A monograph of the genus *Canarium* (Bursерaceae). *Blumea* 9, 275-475.
- Leenhouts, P. W. 1967 A conspectus of the genus *Allophylus* (Sapindaceae). *Blumea* 15, 301-358.
- Leenhouts, P. W. 1969 A revision of *Lepisanthes* (Sapindaceae). *Blumea* 17, 33-91.
- Leenhouts, P. W. 1971 A revision of *Dimocarpus* (Sapindaceae). *Blumea* 19, 113-131.
- Lim Siew-Ngo 1972 Cytogenetics and taxonomy of the genus *Globba* L. (Zingiberaceae) in Malaya, I: Taxonomy. *Notes R. Bot. Gdn Edinburgh* 31, 241-269.

- Lowe, R. 1963 The height of buttresses in relation to size of stem and crown. *J. W. Afr. Sci. Ass.* 8, 6-17.
- Markgraf, F. 1972 Identification lists of Malaysian specimens, n. 42. *Flora Malesiana*, Leiden.
- Medway, Lord 1972 Phenology of a tropical rain-forest in Malaya. *Biol. J. Linn. Soc.* 4, 117-146.
- Muller, J. 1972 Palynological evidence for change of geomorphology, climate, and vegetation in the Mio-Pliocene of Malesia. *Trans. 2nd Aberdeen-Hull Symposium on Malesian ecology, 1971; University of Hull;* 6-34.
- Nicolson, D. H. 1969 A. revision of the genus *Aglaonema* (Araceae). *Smithsonian Contr. Bot.* n. 1.
- Nooteboom, H. P. 1962 Generic delimitation in Simaroubaceae tribus Simaroubeae and a conspectus of the genus *Quassia* L. *Blumea* 11, 509-528.
- Nooteboom, H. P. 1975 Revision of the Symplocaceae of the Old World (New Caledonia excepted). *Universitaire Pers*, Leiden.
- Oldeman, R. A. A. 1970 L'architecture de la vegetation forestière des fleuves et criques Guyanais. *Centre ORSTOM Cayenne, Cote B* 46, 1-14.
- Payens, J. P. D. W. 1967 A monograph of the genus *Barringtonia* (Lecythidaceae). *Blumea* 15, 157-263.
- Polak, E. 1933 Ueber Torf und Moor in Niederlandische Indien. *Verh. K. Akad. Wet. Amsterdam* 30, n.3, 1-85.
- Roekmowati-Hartono 1965 A monograph of the genus *Schoutenia* Korth. (Tiliaceae). *Reinwardtia* 7, 91-138.
- Schmid, R. 1972 A resolution of the *Eugenia-Syzygium* controversy (Myrtaceae). *Am. J. Bot.* 59, 423-436.
- Seshagiri Rao, R. 1964 Indian species of Commelinaceae. — Miscellaneous notes. *Notes R. Bot. Gdn Edinburgh* 25, 179-189.
- Sewandono, M. 1938 Het Veengebied van Bengkalis. *Tectona* 31, 99-135.
- Sinclair, J. 1955 A revision of the Malayan Annonaceae. *Gdns' Bull. Singapore* 14, 149-516.
- Sinclair, J. 1958a A revision of the Malayan Myristicaceae. *Gdns' Bull. Singapore* 16, 205-472.
- Sinclair, J. 1958b *Florae Malesianae Precursores XX*. The genus *Gymnacranthera* (Myristicaceae) in Malaysia. *Gdns' Bull. Singapore* 17, 96-120.
- Sinclair, J. 1961 *Florae Malesianae Precursores XXXI*. The genus *Knema* (Myristicaceae) in Malaysia and outside Malaysia. *Gdns' Bull. Singapore* 18, 102-327.
- Sinclair, J. 1968 *Florae Malesianae Precursores XLII*. The genus *Myristica* in Malesia and outside Malesia. *Gdns' Bull. Singapore* 23, 1-536.
- Sinclair, J. 1974 The genus *Horsfieldia* (Myristicaceae) in and outside Malesia, I. *Gdns' Bull. Singapore* 27, 133-141.
- Sinclair, J. 1975 *idem* II. *Gdns' Bull. Singapore* 28, 1-181.
- Soepadmo, E. 1971 Identification lists of Malaysian specimens. Fagaceae, n. 41. *Flora Malesiana*, Leiden.
- Stone, B. C. 1967a Studies of Malesian Pandanaceae I. *Gdns' Bull. Singapore* 22, 231-257.
- Stone, B. C. 1967b *idem* II. *Fed. Mus. J.* 12, 105-110.

- Stone, B. C. 1968a Pandanus Stickm. in the Malay Peninsula, Singapore and Lower Thailand, Part 3. Mal. Nat. J. 21, 1-16.
- Stone, B. C. 1968b *idem*, Part 4. Mal. Nat. J. 21, 125-141.
- Stone, B. C. 1970a Malayan climbing pandans — the genus Freycinetia in Malaya. Mal. Nat. J. 23, 84-91.
- Stone, B. C. 1970b Studies in Malesian Pandanaceae, XI. Fed. Mus. J. 15, 199-202.
- Stone, B. C. 1971 Studies in Malesian Pandanaceae, VIII, IX. Fed. Mus. J. 13, 138-154.
- Swan, S. B. St. C. 1967 Maps of two indices of terrain, Johor, Malaya. J. Trop. Geogr. 25, 48-57.
- Swan, S. B. St. C. 1974 A raised beach at Kahang, Johor, Peninsular Malaysia. J. Trop. Geogr. 38, 55-60.
- Symington, C. F. 1943 Foresters' manual of dipterocarps. Malayan For. Rec. n. 16.
- Tan Ah See and Hsuan Keng 1969 Comparative morphological studies of four species of Avicennia (Verbenaceae) in Singapore. J. Singapore Nat. Acad. Sci. 1, 8-29.
- Tay, T. H. 1969 The distribution, characteristics, uses, and potential of peat in West Malaysia. J. Trop. Geogr. 29, 58-63.
- Timmerman, E. H. L. 1959 Identification lists of Malaysian specimens, n. 5, Kopsia. Flora Malesiana, Leiden.
- Tjia, H. D. 1970a Monsoon-control of the eastern shore-line of Malaya. Geol. Soc. Malaysia Bull. 3, 9-15.
- Tjia, H. D. 1970b Quaternary shorelines of the Sunda land, South East Asia. Geol. Mijnb. 49, 135-144.
- Torrey, J. G. and D. T. Clarkson 1975 The development and function of roots. Academic Press Inc. (London) Ltd.
- Vincent, A. J. 1962 A note on *Oncosperma filamentosa* Bl. (nibong). Malay. Forest. 25, 150-154.
- Whitmore, T. C. 1962 Studies in systematic bark morphology, I. New phytol. 61, 191.— *idem*, II. New Phytol. 61, 208.— *idem*, III. Gdns' Bull. Singapore 19, 321.
- Whitmore, T. C. 1963 Studies in systematic bark morphology, IV. New Phytol. 62, 161.
- Whitmore, T. C. 1967 Studies in Macaranga. Malay. Nat. J. 20, 89-99.
- Whitmore, T. C. 1969 First thoughts on species evolution in Malayan Macaranga. (Studies in Macaranga III). Biol. J. Linn. Soc. 1, 223-231.
- Whitmore, T. C. 1973 Palms of Malaya. Oxford University Press.
- Wyatt-Smith, J. 1951 *Archytaea vahlii* Choisy (riang riang). Malay. Forest. 14, 36-38.
- Wyatt-Smith, J. 1954 Suggested definitions of field-characters. Malay. Forest. 17, 170-183.
- Wyatt-Smith, J. 1959 Peat swamp forest in Malaya. Malay. Forest. 22, 5-32.
- Wyatt-Smith, J. 1961 A note on the freshwater swamp, lowland and hill forest types of Malaya. Malay. Forest. 24, 110-121.
- Wyatt-Smith, J. 1964 A preliminary vegetation map of Malaya with descriptions of the vegetation types. J. Trop. Geogr. 18, 200-213.

- Wycherley, P. R. 1967 Rainfall probability tables for Malaysia. R. R. I. M. Planting Manual n. 12.
- Zuijderhoudt, G. F. P. 1967 A revision of the genus *Saraca* (Legum.-Caes.) *Blumea* 15, 413-425.



INDEX

- Abacopteris triphylla 161
 Acalypha siamensis 114
 Acanthus ilicifolius 95
 Achasma macrocheilos 35, 160
 megalocheilos 160
 pauciflorum 160
 sphaerocephalum var. petiolatum 160
 Achyranthes aspera 95
 Acriopsis javanica 141
 Acronychia porteri 152
 Acrostichum 52
 aureum 14, 42, 161, 224
 stands of 32
 Acrotrema costata 74
 costatum 110
 Actinodaphne sp. 76, 123
 areolata 123
 corneri 123
 glomerata 123
 maingayi 76, 123
 malaccensis 123
 sesquipedalis 123
 var. venosa 76
 Adenantha pavonina 58, 126
 Adenia macrophylla var. singaporeana
 see A. singaporeana
 singaporeana 146
 Adenoncos sumatrana 79, 86
 Adina 216
 Adinandra 64, 87, 219
 sp. 157
 acuminata 32, 157
 lamponga 157
 corneriana 32, 157, 219
 dumosa 53
 lamponga (*see also* A. sarosanthera)
 220
 macrantha 220
 sarosanthera 18, 21, 27, 157, 219,
 pl. 20
 Adinobotrys erianthus 76
 Aegiceras corniculatum 137
 Aerides odoratum 141
 Aeschynanthus obconica 120
 parvifolius 27, 75, 120
 purpurascens 120
 radicans 120
 wallichii 75, 120
 Agelaea borneensis 74, 107
 macrophylla 107
 Aglaia 45, 64, 70, 92, 167
 spp. 131
 angustifolia 37, 131
 argentea 131
 hernii 131
 lanuginosa 131
 meliosnoides 131
 odoratissima 131
 palembanica 131
 salicifolia 44
 cf. trichostemon 35, 131
 Aglaodorum griffithii 14, 32, 100
 Aglaonema 60, 170
 nebulosum 100
 nitidum 73, 100
 pictum 73, 86
 simplex 35, 100
 Agrostistachys 53
 gaudichaudii 114
 sessilifolia 75, 114
 Agrostophyllum bicuspidatum 79, 141
 Agyneia bacciformis *see* Synostemon
 bacciformis
 Alangium ebenaceum 26
 var. tutela 26, 74, 108, 178
 havilandii 24
 javanicum *see* A. ebenaceum var.
 tutela
 Alchornea javensis *see* A. rugosa
 rugosa 114
 villosa 75
 Allophylus 215
 cobbe 58
 var. velutina 152
 Alocasia denudata 73, 100
 Alphonsea elliptica 96
 johorensis 32, 96, 167

- Alpinia javanica* 160
Alseodaphne 123
 sp. 123
 bancana 123
 coriacea 123
 corneri 123
 obovata 32, 123
 paludosa 123
 ? *penduliflora* 62, 64, 67, 68, 69, 76
 ? *pendulifolia* 206
Alsomitra sp. 108
Alstonia 61
 angustifolia 68, 69, 72, 99
 angustiloba 99
 spathulata 20, 23, 24, 25, 60, 62, 72, 99, 220
Amomum hastilabium 82, 160
 uliginosum 160
 Xanthophlebium 82, 160
Amoora 70
 spp. 131
 rubiginosa 21, 22, 26, 63, 67, 70, 77, 131, 198, pl. 36
Amorphophallus bufo 100
Amyema beccarii 128
Anadendrum? *latifolium* 100
 microstachyum 100
 montanum 73
Anaetochilus geniculatus 79, 141
Anaxagorea 39
 javanica var. *dipetala* 96, 167
 var. *javanica* 96
Aneilema vaginatum 106
Angiopteris evecta 161
Anisophyllea 211
 sp. 212
 corneri 32, 147, 212
 disticha 80, 147
Anisoptera marginata 64, 74, 85, 86, 88, 89, 90
Anodendron candolleianum 72, 99
Anplectrella anomala 129
Anplectrum viminale 77
Anthocephalus 167
 cadamba 27, 148, 213
Anthocleistus 24
Antidesma 45
 sp. 114
 alatum see *A. neurocarpum*
 brachybotrys 114, 187
 cuspidatum 114
 leucopodium 114
 ? *montanum* 75
 neurocarpum 114
 pachystachys var. *palustre* 114
 pahangense 34, 35, 37, 114, 187
 salicinum 44
 stipulare see *A. brachybotrys*
 tomentosum see *A. pachystachys*
Antrophyum callifolium 161
ants, keringa 130
ants/termites 59, 123, 181
Aphanamixis rohituka 77, 131
Aphania 215
Apocynaceae 70
Aporosa spp. 115
 falcifera 114
 frutescens 40, 114
 lunata 32, 114, 184
 nigricans 114, 184
 prainiana 114
 pseudoficifolia 114, 185
 symplocoides 114
Appendicula sp. 79
 cornuta 141
 densifolia 141
 lucida 79, 141
 pendula 141
Apostasia nuda 100
Aquilaria beccariana 157, 220, 221
 malaccensis 22, 35, 82, 157, 220
 microcarpa 220
 ? *microcarpa* 220
Aralidium pinnatifidum 32, 108, 178
Archytaea vahlii see *Ploiarium alternifolium*
Ardisia 64, 92
 sp./spp. 78, 137, 202
 andamanica 137, 202
 colorata 137
 crispa 58, 137
 elliptica 51, 58, 137
 foliosa 137
 lanceolata 137
 miqueliana 137
 ngadimanii 137
 odontophylla 137
 pachysandra 32, 137
 ? *solanacea* 32, 137
 teysmanniana 137
 tuberculata 17, 68, 78, 137
 ? *wrayi* 35, 137, 202

- Areca latiloba* 143
montana 31, 32, 143
Arenga hastata 143
westerhoutii 34, 35, 143
Argostemma johorensis 148
Argyreia ridleyi 74, 107
Aromadendron elegans 35, 129
nutans 22, 70, 77, 86, 87, 197, pl. 9
Artabotrys suaveolens 97
venustus 97
wrayi 97
Arthrophyllum sp. 101
ovalifolium 73, 101
Artocarpus 70, 88, 198
anisophyllus 132
dadah 132
elasticus 21, 26, 32, 35, 58, 63, 77, 87, 132
gomezianus 58, 88, 132, 199
var. griffithii 199
integer var. *silvestris* 35, 132
kemando 21, 26, 40, 58, 63, 67, 68, 77, 87, 89, 132, 199
maingayi 26, 132
nitidus 199
ssp. borneensis 199
ssp. griffithii 77, 133, 199
ssp. lingnanensis 199
parvus 199
rigidus 133
scortechinii 63, 77
Asclepias curassavica 101
Asplenium borneense 34, 35, 161
glaucophyllum 82, 161
macrophyllum 161
nidus 28, 82, 161, 162
tenerum 82
Atalantia monophylla 58, 152
spinosa *see* *A. monophylla*
Athyrium esculentum 161
Aulacodiscus premnoides 148, 213
Austrobuxus 70, 185
nitidus 68, 75, 115, 185
Avicennia 11, 24, 52, 108, 159, 192, 222
Baccaurea 64, 70, 92, 185
sp. 75
bracteata 26, 115
? bracteata 75
Baccaurea brevipes 115
hookeri 115, 185
? javanica 115, 185
kunstleri 75
lanceolata 115, 185
macrophylla 115
motleyana 115, 185
parviflora 32, 115, 185
racemosa 115, 185
scortechinii 115, 185
sumatrana 115, 185
? velutina 115
Baeckia frutescens 187
Balanocarpus heimii 32, 35, 89, 110
balau 6
Barathranthus axanthus 128
Barclaya 13, 19, 87, 121
flowering 30
motleyana 79
motleyi 140
Barringtonia 58, 64, 70, 194, 211
acutangula 14, 195
ssp. spicata 42
asiatica 51, 58, 125, 195
conoidea (*see also putat*) 6, 11, 14, 32, 42, 45, 46, 125, 195, 199, 214
filirachis 18, 125, 195
flowering 30
macrocarpa 125
macrostachya 125, 195
racemosa 14, 17, 18, 45, 125, 195
ever-flowering 31
reticulata 40, 125
scortechinii 125
spicata 42
sumatrana *see* *B. reticulata*
- Terminalia formation 1
composition of flora 58
rocky shore 58
sea-front 53, 54
Batrachospermum 40
Bauhinia audax 125
bidentata 18, 125
flammifera *see* *B. integrifolia*
finlaysoniana 125
integrifolia 35, 125
kockiana 125
Begonia sinuata 45
Beilschmiedia spp. 123
glabra 18, 123
kunstleri 18, 76, 123
lumutensis 34, 35, 123
tonkinensis 50, 52, 58, 123, pl. 26, pl. 27, pl. 31

- Belvisia callifolia 37, 161
berok 8
 Bhesa paniculata 73, 103
 flowering 30
 Blastus caudatus 129
 Blechnum 45
 finlaysonianum 161
 orientale 45, 82, 161
 Blumeodendron calophyllum 37
 kurzii 115
 tokbrai 21, 26, 62, 67, 68, 70, 75, 89,
 115, 185, pl. 19
 Boesenbergia plicata 160
 praineana 35, 160
 Borreria articularis *see* B. hispida
 hispida 57, 148
 Botryophora geniculata 115
 Brachylophon curtisii 129
 Brackenridgea hookeri 79, 140, 207
 Breynia coronata 115
 rhamnoides *see* B. vitis-idaea
 vitis-idaea 115
 Bridelia cinnamomea 75
 ? cinnamomea 115, 186
 griffithii 75
 pustulata 26, 115, 186
 stipularis 115
 Bromheadia alticola 141
 aporoides 141
 finlaysoniana 79
 Brownlowia 221
 argentata 14, 157
 lanceolata (*see also* B. tersa) 221
 tersa 157
 Brucea amarissima *see* B. javanica
 javanica 155
 Bruguiera 24, 54, 99, 127, 196, 216
 special localities 32
 caryophylloides *see* B. cylindrica
 cylindrica 147
 eripetala *see* B. sexangula
 gymnorrhiza 147
 parviflora 147
 sexangula 54, 147
 - *Sonneratia forest* 71
 Bryophyllum calycinum 108
 Buchanania 42
 fruiting 31
 lucida 18, 20, 30, 31, 58, 95
 flowering 29
 flowering and fruiting 31
 sessilifolia 18, 20, 29, 39, 95, pl. 1
 flowering 29
 Bulbophyllum 92
 Bulbophyllum Sp. (Sect. Aphanobulbum)
 79
 acuminatum 79, 141
 adenopetalum 141
 alcicorne 141
 apodum 79, 141
 botryophorum 79, 141
 carunculaelabrum 141
 cleistogamum 141
 concinnum 141
 cuspidipetalum 37
 epicriantes 141
 lasianthum 141
 limbatum 141
 macranthum 141
 membranifolium 37
 pileatum 79, 141
 pulchellum 27, 79, 141
 purpurascens 28, 79, 141
 restrepia 79, 141
 rugosum 141
 sessile 28, 79, 141
 singapurianum 141
 stella 141
 subumbellatum 141
 tenuifolium 141
 vaginatum 28, 79, 141
 Bulbostylis barbata 108
buttresses, account 23 *et seq.*
 Buxus sempervirens 22
 Byttneria brevipes 155
 maingayi 155
 Caesalpinia bonduc 125
 crista 125
 tortuosa 125
 nuga *see* C. cristata
 Calamus (*see also* rotan) 64, 92, 208
 spp. 80
 exilis 143
 flabellatus 143
 flabelloides 143
 giganteus 143
 holttumii 37
 javensis var. peninsularis 143
 mawaiensis 143
 paspalanthus 143
 ramosissimus 143
 riparius 143
 tumidus 143

- Calanthe johorensis* 37
pulchra 79, 141
veratrifolia 141
- Callicarpa farinosa* 82, 159
- Calophyllum* 6, 10, 22, 23, 24, 40, 64, 92, 104, 165, 173, 189, 193
flowering 29, 31
sp. 105, 174
austrocoriaceum 36
canum 104
curtisii 26, 104, 174
depressinervium 104
floribundum 63, 67, 70, 73, 104
fragrans 24
gracillimum 104
incrassatum 21, 32, 63, 73, 104
inophylloide 26, 174
inophylloides var. *singaporensis* 21, 73, 104
inophyllum 51, 58, 104
kunstleri 26, 104, 174
macrocarpum 18, 21, 104
molle 73
pulcherrimum 18, 104
retusum 21, 26, 63, 67, 68, 70, 73, 104, 174
rubiginosum 104
rufigemmatum see *C. wallichianum*
rupicolum 18
 var. *elatum* 104, 174
sclerophyllum 21, 26, 31, 105, 174,
 pl. 10, pl. 13, pl. 22
 leafing 30, 31
scriblifolium 85
soulattri 21, 26, 105, 174
tenuivenium 105
wallichianum 21, 32, 67, 68, 70, 74, 105
- Camarotis adnata* 79, 141
- Camptosperma* 6, 165
flowering 30
auriculata 40, 63, 67, 68, 70, 72, 86, 95
macrophylla 25, 70, 72, 85, 165
minus see *C. squamata*
squamata 20, 51, 63, 64, 70, 72, 86, 95
- Camptandra parvula* 160
- Canarium apertum* 103, 172
littorale 20, 32, 35, 103, 172
odontophyllum 73
patentinervium 103
pilosum 63, 67, 68, 70, 73, 103, 172
- Canavalia* 50, 54, 178
maritima see *C. rosea*
obtusifolia see *C. rosea*
rosea 57, 126
- Canthium* sp. 148
confertum 58, 148
didymum 148, 213
glabrum 148
hirtellum 148
horridum 148
- Cantleya corniculata* 64, 67, 68, 76, 89, 122, 193
- Carallia brachiata* 18, 64, 70, 80, 147, 212
lucida see *C. brachiata*
- Carapa* 11
granatum 131
moluccensis 14, 32, 39, 131
- Caryota* 64
mitis 54, 143
- Casearia* sp. 75, 191
grewiaefolia var. *deglabrata* 119, 190
lobbiana 75
velutinoso 119
- Cassytha filiformis* 123
- Castanopsis* 189
spp., flowering 30
fulva 118, 187
inermis 26, 75, 118
johorensis 118
malaccensis 118
megacarpa 26, 118
- Casuarina* 6, 50-54, 56, 57, 85, 102, 106, 108, 115, 117, 120-122, 138, 153, 156, 158, 214, pl. 26, pl. 27, pl. 28
felled for firewood 53
saplings 54
seedlings 50, 53
foreshore 54
forest 49, 50, 52, 54, 107, pl. 26, pl. 27
fringe 53
stand 54
 & *sand-spit* 51
 -strips 55
equisetifolia 50, 103
- Centotheca lappacea* 120
- Cephaelis griffithii* 148
singaporensis 148
- Cephalomappa lepidotula* 115, 186
- Ceratopteris* 42
thalictroides 162

- Ceratostylis subulata 142
 Cerbera 17
 odollam 3, 14, 16, 17, 18, 99, 125
 flowering 30
 manghas 51, 58, 99, 169
 Ceriops candolleana *see* C. tagal
 tagal 147
 Chamaeanthus laciniatus 79, 142
 Champereia manillana 141
 Chasalia curviflora 148
 Cheirorchis filiformis 79
 major 142
 Cheiroleuria 36
 bicuspis 37
 chengal 34
 Chilocarpus cantleyi 99
 costatus 99
 decipiens 99
 obtusifolius 99
 Chisocheton 64, 70, 198
 spp. 131
 amabilis 17, 131, 198
 flowering 30
 erythrocarpus 131, 198
 patens 131, 198
 pauciflorus 131
 paucijugus 131, 198
 penduliflorus 131, 198
 pentandrus 58, 89, 131, 198
 perakensis 198
 princeps 131, 198
 polyandrus 198
 sarawakensis 131, 198
 Chrysophyllum lanceolatum 32, 153
 Chrysopogon aciculatus 120
 orientalis 120
 Cibotium barometz 36, 37
 Cinnamomum iners 123
 mollisimum 32, 123
 rhyncophyllum 123
 Claderia viridiflora 79, 142
 Clausena excavata 152
 Claoxylon indicum 115
 Cleistanthus? contractus 115
 aff. glaber 115
 hirsutipetalus 115
 macrophyllum 115
 maingayi 115, 186
 myrianthus 115
 podocarpus 115
 praetermissus 32, 116
 pseudopodocarpus 116
 Clerodendron ? brevifolium 159, 223
 buchanani 159, 223
 deflexum 82, 159
 inermis 159
 myrmecophilum 159
 ? paniculatum 159
 villosum 82, 159
 climbers, woody 69
 Cnestis palala 32, 74
 ssp. diffusa 107
 Cocculus ovalifolius 132
 Coelodiscus subcuneatus *see* Mallotus
 dispar
 Coelogyne cumingii 142
 testacea 142
 rochussenii 79
 Coelorachis glandulosa 44, 120
 Coelospermum scandens 81
 Coelostegia 51, 64, 70, 87, 171
 griffithii 20, 25, 63, 73, 86, 102, 171
 ramealis 172
 Colubrina asiatica 147
 Combretum squamosum 106
 sundaicum 35, 106
 tetralophum 17, 106
 Commersonia bartramia 155
 Connaraceae 70
 Connarus 18
 grandis 18, 107
 flowering 30
 monocarpus 18
 ssp. malayensis 74, 107
 paniculatus 18, 107
 semidecandrus 18, 74, 107
 Copaifera palustris 24
 Coptophyllum capitatum 148
 Cornera 208
 lobbiana 143
 Corybas mucronatus 37
 Costus speciosus 160
 Cotylelobium burckii 89
 malayanum 88, 89, 90
 Crateva membranifolia *see* C. religiosa
 religiosa 103
 flowering 30
 ? Cratoylon 223
 Cratoxylon 19, 22, 23, 40, 52, 71, 113
 arborescens 6, 20, 21, 58, 61, 62, 66,
 67, 68, 70, 76, 89, 103, 104, 115,
 122, 144, 192, 193, 205, 206, 220,
 pl. 34

- flowering* 30
special localities 31
 cochinchinense 193
 formosum 18, 21, 52, 58, 62, 76, 87, 122, 193
deciduous 31
flowering and leafing 30
pioneer seedlings 52
 glaucum 89
 ligustrinum 34, 35, 76, 122, 193
 Crinum asiaticum 95
 Croton? erythrostachys 116
 heterocarpus 116
 laevifolius 35, 75, 116, 186
 flowering and fruiting 30
 oblongus 186
 Crudia 195
 caudata 76, 125, 195
 havilandii 40
 wrayi 51, 125, 195
 Cryptocarya 123
 sp./spp. 76, 123
 cinnamoniifolia 123
 crassinervia 123
 ferrea 123
 griffithiana 32, 76, 123
 impressa 123
 kurzii 13, 18, 123
 nitens 123
 Cryptocoryne sp./spp. 100
 flowering 30
 special localities 32
 cordata 100, 170
 griffithii 100
 Ctenolophon 23, 87
 parvifolius 26, 70, 77, 128, 196
 Ctenopteris moultoni 37
 Curculigo latifolia 122, 193
 villosa 122
 Cyanotis barbata 178
 vaga 57, 106, 178
 Cyathea glabra 82, 86
 latebrosa 82, 162
 obscura 34, 35, 162
 squamulata 162
 Cyathocalyx pahangensis 32, 97
 ramuliflorus 67, 72
 ridleyi 22, 32, 97, 167, pl. 10
 Cyathostemma viridiflorum 72, 97
 Cycas rumphii 50, 58, 161
 Cylandrophora excelsa 212
 nannodes 212
 Cyclophorus acrostichoides 28
 Cymbidium finlaysonianum 28, 142
 Cynometra ramiflora 58, 125
 Cyperus cyperinus 108
 cyperoides 108
 Cyperus haspan 31
 javanicus 57, 108
 malaccensis 54, 108, pl. 28
 pedunculatus 51, 108, 179
 polystachyos 57, 108
 radians 57, 108
 sphacelatus 74
 stoloniferus 57, 108
 tenuiculmis 108
 Cyrtandra spp. 120
 lanceolata 120
 pilosa 120
 suffruticosa 120, 192
 Cyrtandromoea 155, 192
 grandis 120
 Cyrtostachys 36, 54, 65, 67, 68, 70
 lakka 37, 54, 70, 80, 89, 143
 Dacrydium 85
 Dacryodes incurvata 73
 laxa 103
 macrocarpa 20, 25, 89, 103, 172
 flowering 31
 rostrata 20, 73, 103
 Dactylocladus 85
 stenostachys 24
 Dactyloctenium aegyptiacum 57, 121
 Daemonorops (*see also rotan*) 65, 92
 spp. 80
 angustifolius 18, 143
 geniculatus 143
 kunstleri 143
 lasiospathus 144
 leptopus 68, 80, 144
 longipes 144
 periacanthus 144
 var. macrocarpus 144
 sabut 144
 verticillaris 144
 Dalbergia sp. 127
 beccarii 16, 126
 leafing 30
 ferruginea 58, 126
 forbesii 126
 havilandii 76
 parviflora 16, 17, 18, 126, 195
 stercoracea 127

- Dapania 68
 racemosa 35, 80, 143
 Davallia *denticulata* 162
 solida 28, 162
 Decaspermum *fruticosum* 78, 137
 Delima *sarmentosa* 110
 Dendrobium 92
 acerosum 28, 142
 aloifolium 28, 79, 142
 bifarium 79
 callibotrys 142
 calycopsis 79
 carnosum 79, 142
 comatum 79, 142
 crocatum 142
 crumenatum 58, 79, 142
 fugax 142
 indivisum 142
 indragiriense 142
 kelsallii 142
 leonis 79, 142
 lonchophyllum 79, 142
 pandenate 142
 plicatile 79, 142
 prostratum 79, 142,
 salaccense 142
 secundum 58, 142
 spurium 28, 79, 142
 Dendrochilum *album* 142
 longifolium 79
 spathulatum 142
 Dendrophthoe *lanosa* 128
 pentandra 128
 Dendrotrophe *buxifolia* 81
 Deplanchea *bancana* 36, 73, 102
 Derris 6
 amoena 127
 heptaphylla 16, 42, 127
 malaccensis 18, 127
 sinuata 127
 uliginosa 14, 17, 127
 Desmodium *umbellatum* 58, 127
 Desmos 167
 dasyaschala 97, 167
 var. *dasyaschala* *see* var.
 wallichii
 var. *wallichii* 97
 dumosa 72, 97
 Dialium *spp.* 26
 ? *kingii* 33, 125, 195
 maingayi 125
 patens 21, 51, 67, 68, 70, 76, 89, 125,
 196
 platycephalum 21, 70, 76, 89, 125
 wallichii 21, 70, 76, 125
 Dianella *ensifolia* 76, 127
 Dichapetalum *griffithii* 109
 Didissandra *johorica* 120, 192
 Didymocarpus *platypus* 120
 Didymoplexis *ornata* 142
 Digitaria *dispar* 57 (*see also* D.
 heteranthera)
 heteranthera 121
 ? *longiflora* 57, 121
 Dillenia 40, 70, 110, 179, 180, 202, 217
 sp. 180
 albiflos 26, 33, 35, 37, 110, 179, 180
 beccariana 180
 excelsa 18, 21, 31, 110
 flowering 30
 fruiting 31
 var. *tomentella* 110
 eximia *see* D. *grandifolia*
 grandiflora 24
 grandifolia 21, 26, 37, 74, 110, 180,
 187
 deciduous 31
 indica 110
 pulchella 21, 67, 70, 74, 110
 ? *pulchella* 180
 reticulata 21, 26, 37, 87, 110
 deciduous 31
 suffruticosa 18, 51, 53, 64, 110
 ever-flowering 31
 Dimocarpus 215
 longan 215
 sp. *malesianus* 152
 Dimorphocalyx 188
 murinus 116, 186
 Dioscorea *sp.* 110
 lamprocaula 110
 pyrifolia 110
 Diospyros 92, 182
 sp. 35, 70, 74, 113, 182, 183, 184
 apiculata 112, 182
 argentea 112, 182, 183
 confertiflora 33, 112, 182, 183
 coriacea 74
 dictyoneura 182
 ferrea 113
 ? *ferrea* 58
 ? *graciliflora* 35, 113
 helferi 182
 lanceifolia 26, 33, 74, 113, 182, 183

- latisejala* 113
oblonga 74, 113
maingayi 26, 37, 74, 113, 182, 183
 ? *malayana* 113
nutans 33, 113, 182, 183
 ? *pahangensis* 113
pauciflora 183
siamang 26, 37, 63, 67-70, 74, 182, 183
styraciformis 113
sumatrana 113
wallichii 182
- Diplospora malaccensis* 148
Dipodium pictum 37, 86
Dipteris conjugata 37
lobbiana 45
Dipterocarpus 23
sp./spp. 21, 35, 111, 180
apterus, 89, 111
coriaceus 88, 89, 90
cornutus 89, 111
grandiflorus 26, 58, 88, 111
 ? *hasseltii* 52, 58, 111, 180
lowii 21, 87, 88, 89, 111, 179, 180
oblongifolius (*see also neram*) 14, 40, 42, 44, 182
sublamellatus 26, 87, 89, 111
 ? *sublamellatus* 111
- Dischidia* *sp.* 101
benghalensis 101
coccinea 73, 101
collyris 73, 101
aff. complex 64, 73, 101, 170
gaudichaudii *see* *D. nummularia*
hirsuta 73
aff. hirsuta 101
nummularia 27, 73, 101
rafflesiana 58, 73, 101, 170
- Disepalum anomalum* 36, 86
Dissochaeta gracilis 129
johorensis 130
punctulata 33, 130
- Dodonaea viscosa* 50, 153
Donax grandis 35, 129
Dracaena *sp.* 76
congesta? 127
elliptica 127
graminifolia 127
granulata 26, 127, 196, pl. 25
maingayi 58, 127
paludosa 128
porteri 127
singaporensis 128
- Drymoglossum piloselloides* 28, 162
Drynaria quercifolia 28, 82, 162
Dryobalanops
aromatica (*see also kapur*) 7, 32, 33, 35, 88, 89, 90, 110, 187
oblongifolia 6, 18, 21, 23, 26, 39, 86, 87, 89, 90, 111, pl. 7
flowering 31
special localities 31
rappa 89
Dryopteris crassifolia 35
Drypetes 45
sp. 116
curtisii 116
pendula 75
riparia 44
Duabanga 46
grandiflora 46
moluccana 45
sonneratioides 46
Durio 171
carinatus 85, 89
graveolens 73
 ? *graveolens* 102
griffithii 102
oblongus 171
singaporensis 3, 35, 73, 102, 171, 172
Dyera costulata 99
cauliflorum 33, 131
costulatum 17, 18, 132
dumosum 132
euphlebium 132
 ? *excelsum* 132
flavescens 132
sericeum 33, 131
lowii 24, 45
Dysoxylon 45, 70, 92,
spp. 132
angustifolium 44
cauliflorum (*see also* *D. sericeum*) 33
macrothyrsum 21, 132
flowering 31
sericeum 131
Ehretia *sp.* 102
Elaeocarpus 23, 92, 186, 202
sp./spp. 75
flowering 30
acmossepalus *see* *E. floribundus*
floribundus 113
griffithii 18, 26, 39, 40, 64, 70, 75, 113
littoralis *see* *E. macrocerus*
macrocerus 11, 17, 20, 21, 24, 26, 39, 42, 87, 91, 113, 184, 186, pl. 12
flowering 30

- (*E. macrocerus*)
fruiting 31
special localities 31
mastersii 75, 86
nitidus 113
obtusus *see* *E. macrocerus*
paniculatus 18, 26, 113
petiolatus 19, 113
polystachyus 75, 113
robustus 13, 19, 113
salicifolius 113
sphaericus 21, 113
stipularis 26, 113
Elateriospermum 188
tapos 33, 116
Elatostema sp. 158
elephants and sand hollows 53
Elettarrhopsis curtisii 33, 160
Ellipanthus tomentosus 36
tomentosus var. *gibbosus* 35, 107
Elytranthe albida 128
Embelia 68
amentacea 137
? *amentacea* 78
canescens 137
coriacea 19, 78, 137
dasythyrsa 137
garciniaefolia 137
Endiandra 123
holttumii 124
? *macrophylla* 124
maingayi 123
Endospermum pl. 15
diadenum 33, 75, 116, 186
malaccense *see* *E. diadenum*
Engelhardtia 86
nudiflora 76, 86
serrata 70, 76, 86
Enicosanthus praestigiosum 33, 97, 167
Entada phaseoloides 19, 126
flowering 30
spiralis 126
Epigynum ridleyi 99
Epipremnopsis media 100
Eragrostis atrovirens 57, 121
unioloides 44
Erechtites hieracifolia 106
valerianifolia 106
Eria floribunda 79, 142
gracilis 142
neglecta 79, 142
nutans 79, 142
pannea 79, 142
pudica 28, 142
pulchella 79, 86
teysmannii 142
velutina 79, 142
vestita 28, 142
Erioglossum 215
rubiginosum *see* *Lepisanthes rubiginosa*
Erycibe aenea 107
albida 107
griffithii 74
maingayi 33, 107
princei *see* *E. maingayi*
tomentosa var. *hirsuta* 107
Erythroxyton cuneatum 58, 114, pl. 27
Eugeissona 34
tristis 33, 144
Eugenia 42, 64, 66, 67, 92, 165, 193
bark characters 202
coastal species 52
flowering 30
sp./spp. 27, 33, 58, 62, 63, 64, 78, 140, 203, 205, pl. 36
A, B, 140, 205
anisosepala 137
atronervia 27, 137, 203
attenuata 203
brantiana 78
castanea 138, 203
caudata 203
cerina 13, 19, 21, 27, 37, 40, 42, 51, 68, 70, 78, 138, 203, 204
flowering 30
var. *turbinata* 67, 138
chlorantha 138, 203
chloroleuca 138
? *claviflora* 203
var. *maingayi* 138
conglomerata 27, 33, 203, 204
var. *paniculata* 138
cumingiana 27, 78, 137, 203, 204
cumini 203
curtisii 138, 203, 204
cymosa *see* *E. syzygioides*
densiflora 42, 43, 44, 58, 138, 203
duthieana 203
cf. duthieana 33, 138
dyeriana 33, 138, 203
fastigiata 19, 42, 138, 203
filiformis 138, 203, 204
flosculifera 203

- garciniifolia* 27, 138, 203, 204
glauca 203, 204
grandis 24, 49-53, 58, 96-100, 102-106, 108, 111, 112, 114-118, 121, 123, 124, 127, 129, 131, 132, 137-139, 141, 159, 160, 161, 169, 180, 203-205, 214, pl. 27
base of trees 204
forest 50, 52-56, 58, 141, 144-146, 148-150, 152-154, 156-158, 169-171, 183, 190, 194, 200, 212, 218, 221, pl. 26, pl. 27, pl. 32
coastal, relics of 50
composition 58
seedlings 50
grata 27, 138, 203
griffithii 138, 203
helferi 203
hemsleyana 203
kemamanensis 203
kiahii 27, 70, 138, 203
var. angustifolia 78, 138
kunstleri 78, 138, 203, 204
leptostemon 21, 27, 138, 203, 204
leucoxydon 138, 203, 204
linocieroides 203
longiflora 19, 27, 78, 138, 139, 203, 204, pl. 23
microcalyx 78, 203, 204
millsii 203
muelleri 17, 19, 27, 42, 64, 67, 78, 138, 203
napiformis 139, 203
nemestrina 24, 78, 86, 203, 204
ngadimaniensis 139, 203
nigricans 21, 23, 27, 58, 139, 203, 205
oblata 27, 43, 139, 203
oblongifolia 203
oleina 23, 27, 78, 139, 203
pachyphylla 78, 138, 203
pahangensis 203
var. fraseri 203
palembanica 53, 58, 139, 203, 205
papillosa 21, 27, 37, 78, 87, 138, 203, 205
pauper 27, 139, 203
pearsoniana 203
penangiana *see* *E. attenuata*
perakensis 203
polita 203
polyantha 139
var. sessilis 139
pseudocrenulata 27, 78, 203
pseudoformosa 203
? pseudoformosa 139, 203, 205
pseudosubtilis 21, 33, 40, 42, 139, 203
pseudosyzygioides 203, 204
punctulata *see* *E. cerina*
pustulata 203, 204
quadribracteata 139
ridleyi 139, 203
rugosa 34, 35, 58, 70, 78, 139, 203, 204
salictoides 203
scortechinii 19, 139
spicata 16, 19, 37, 42, 139, 203, 205
flowering 30
stapfiana 203
subdecussata 139, 203
subhorizontalis 27, 139, 203, pl. 15
syzygioides 58, 139, 203, 204, pl. 32
tahanensis 203
tetraptera var. *pseudotetraptera* 139
tumida 27, 35, 78, 139, 203
valdevenosa 42, 140, 203, 205
venulosa *see* *E. muelleri*
verecunda 203
virens 203
Eulophia *graminea* 57, 79
squalida 79, 142
Euonymus javanicus 70, 73, 103, 173
Euphorbia atoto 57, 116
Eurya 64
acuminata 157
Eurycoma longifolia 155
Euthemis leucocarpa 79, 86, 140
Evodia glabra 152
roxburghiana 152
Evolvulus alsinoides 57, 107
Excoecaria 188
agallocha 116
Fagraea auriculata 77
ceilanica 33, 77, 128
crenulata 197
fragrans 88, 180, 197
racemosa 19, 64, 77, 128
flowering 30
Fahrenheitia 188
pendula 188
Fibraurea ochroleuca 132
Ficus 8, 70, 88, 92, 188, 198, 199, 202
Subgen. Ficus sect. *Ficus* 134
sect. Calosyce 134
sect. Rhizocladus 134
sect. Sycidium 134
sect. Sycocarpus 135
Subgen. Pharmacosyceae 134
Subgen. Urostigma 133
? acamptophylla 89

(Ficus)

- alba *see* *F. grossularioides*
 albipila 64, 77
 annulata 133
 apiocarpa 77, 89, 134, 198
 aurata var. longipilosa 134
 beccarii 88, 135
 benjamina 133
 binnendijkii 19, 77, 133
 var. coriacea 133
 bracteata 19, 77, 89, 133
 callicarpides 89
 calophylla 19, 21, 40, 42, 58, 70, 77,
 133, 198
 var. malayana 133
 chrysoarpa *see* *F. aurata* var.
 longipilosa
 consociata 19, 21, 58, 77, 198
 var. murtoni 133
 crassiramea 19, 21, 40, 42, 58, 133,
 198
 cucurbitina 88, 89, 133, 179, 199, pl. 8
 delosyce 21, 58, 89, 133, 198
 deltoidea var. borneensis 89
 var. deltoidea 27, 89, 134
 var. kunstleri 44
 var. motleyana 89
 depressa 88
 diversifolia *see* *F. deltoidea* var.
 deltoidea
 dubia 58, 89, 133
 elastica 133, 198
 excavata 77, 89, 134, 198
 fistulosa 77, 135
 var. angustifolia 135
 geocarpa *see* *F. uncinata* var. strigosa
 glaberrima 88
 glandulifera 134
 globosa 16, 17, 19, 77, 133
 grossularioides 77, 134
 heteropleura var. hirta 89
 indica *see* *F. sundaica*
 ischnopoda 45, 198
 kerkhovenii 133
 lepicaarpa 11, 135
 microcarpa (*see also jejawi*) 3, 11, 17,
 18, 42, 43, 46, 58, 77, 89, 133, 198,
 199, 200, 205
 var. naumannii 200
 microsyce 77, 89, 133
 miquelii *see* *F. schwarzii*
 nitida 200
 obpyramidata 19, 43, 44, 88, 89, 199
 obscura 214
 var. borneensis 19, 77, 134
 oligodon 198
 obpyramidata 135
 parietalis 135
 pendens 36, 37
 pellucido-punctata 77
 pisocarpa 19, 133
 racemosa 198
 recurva 27
 var. bridelioides 134
 var. ribesioides 77
 retusa L. 18, 19, 77, 89, 133, 198, 199
 retusa auctt. (*see F. microcarpa*)
 ruginervia 77, 89, 134
 sagittata 134
 var. minor 77
 schwarzii 135
 scortechinii 135
 sinuata 135
 var. oblonga 135
 spathulifolia 86, 88
 stricta 58, 70, 77, 89, 133
 stupenda 88, 89
 var. minor 133
 subgelderii 89
 var. rigida 134
 sumatrana 21
 var. circumscissa 134
 var. microsyce 134
 sundaica 19, 21, 40, 42, 134, 58, 77,
 198
 var. beccariana 88
 supperforata 89
 trichocarpa 77, 134
 tristaniifolia 70, 77, 86, 87, 88, 89
 truncata 133
 uncinata 88
 var. strigosa 135
 uncinulata 88, 134
 uniglandulosa 135
 urnigera 134, 187, 199
 vasculosa var. acuminata 134
 villosa 77
 virens var. glabella 40, 134
 xylophylla 58, 77, 134
 Fimbristylis cymosa 57, 108
 Fimbristylis dichotoma 57, 108
 dura 44
 ferruginea 54, 109
 Fimbristylis pauciflora 74, 109
 polytrichoides 54, 109
 sericea 51, 57, 109
 Finlaysonia obovata 101
 fire-fly plants 14, 16, 205

- Fissistigma fulgens* 97
kingii 97
lanuginosum 97
latifolium 97
manubriatum 97
- Flacourtia rukam* 75, 119
- Flagellaria, flowering* 30
indica 68, 75, 120
- flora
 estuaries, structure and zonation 54, 55
 ravine cliffs 54
 shelving rocks 54
- flowering and printing period* 28 *et seq.*
- Fomes lamaoensis* 3
pectinatus 37
- Fordia* sp. 127
johorensis 34, 35, 127
ngii 127
- Forrestia gracilis* 106
marginata 106
mollis 106
- Freycinetia* 196
anquistifolia 80, 145, 208
confusa 80, 145
corneri 37, 80, 145
imbricata 145
javanica 80, 145
rigidifolia 145
- Fuirena umbellata* 109
- fungi and Casuarina* 50
- Gaertnera* 128, 81
 sp.
obesa 33, 148
schizocalyx 148
- Gahnia tristis* 109
- Galearis* 186
 sp. 116
fulva 75, 116
- Galeola kuhlii* 79, 142
- Ganua* 70, 216
 sp. 81
kingiana 34, 35, 37, 153
motleyana 20, 21, 22, 24, 24, 27, 40, 61, 63, 66, 67, 68, 69, 71, 81, 153, 216, pl. 7, pl. 32, pl. 34
- Garcinia* 22, 24, 45, 60, 92, 105, 174
- Garcinia* A2, 3, 175
- Garcinia* A *see* G. ? *eugeniaefolia*
 sp./spp. 58, 74, 106, 174, 176
atroviridis 105
bancana 17, 19, 26, 68, 70, 74, 105, 174, 175
flowering 30
 var. *curtisii* 105
cataractalis 44
 ? *eugeniaefolia* 105, 174, 175, 176
forbesii 26, 67, 74, 105, 174, 175
gaudichaudii 67, 74
- Garcinia griffithii* 105
havilandii 24
hombroniana 58, 105, 176
hombroniana 74, 175
maingayi 26, 105, 175, 187, pl. 23
nervosa 17, 19, 105
nigrolineata 26, 40, 70, 74, 105, 174, 175
opaca 176
 var. *dumosa* 105
parvifolia 74, 105, 175
 ? *penangiona* 33, 175, 105
fruiting 31
 ? *rostrata* 26, 67, 68, 70, 74, 105, 174, 170, pl. 34, pl. 39
scortechinii 74
uniflora 45
urophylla 106
- Gardenia* 45
griffithii 148
tentaculata 18, 19, 44, 148
 special localities 32
tubifera 19, 31, 42, 148
flowering 30
fruiting 31
- Gardeniopsis longifolia* 33, 148
- Gastrodia javanica* 142
- Gelonium* 188
- Geocharis aurantiaca* 160
- Geodorum citrinum* 142
- Gironniera nervosa* 33, 158
parvifolia 82, 158
- Gleichenia* 64
laevigata 162
linearis 162
 var. *altissima* 162
- Globba* 223
aurantiaca see G. *patens*
leucantha 160
marantina 160
patens 160
pendula 160
variabilis 35, 160
 ssp. *pusilla* 160

- Glochidion 186
 glomerulatum 116, 186
 laevigatum *see* G. lutescens
 leiostylum 75, 116
 littorale 116
 lutescens 75, 116
 palustre 186
 rubrum 116
 sericeum 75, 116
 superbum 116
- Gluta malayana 20, 25, 35, 95
 rengas 14, 41
 flowering 29
 tavoyana 33, 35, 95
 velutina (*see also* rengas) 11, 14, 39,
 43, 45, 95, 165, pl. 4
 fireflies 205
 flowering 30
- Gluta wallichii 95, pl. 22
- Glycosmis Chlorosperma 152
 decipiens 152
 pentaphylla *see* Cj. chlorosperma
- Glyptopetalum quadrangulare 103, 173
- Gnetum 68
 gnemon 161
 var. brunonianum 161
 flowering 30
 gnemonoides 19, 82, 161
 latifolium var. funiculare 82, 161
 microcarpum 161
 forma silvestre 82
- Gomphandra sp. 122
 quadrifida 122
 var. ovalifolia 33, 122
- Gomphia serrata 19, 140
- Goniotalamus spp.
 flowering 30
 macrophyllus 97
 malayanus 22, 25, 40, 72, 97, 167,
 pl. 21
 ridleyi 72, 97
 tapis 33, 97
- Gonocaryum gracile 122
- Gonystylus 71, 85, 87
 bancanus 26, 70, 75, 85, 120, 192
 confusus 75, 120
 macrophyllus 120
- Gordonia 87
 ? multinervia 35, 157
 singaporeana 21, 157, 220
- Grammatophyllum speciosum 142
- Grewia 221
 sp. 158
 acuminata *see* G. umbellata
 antidesmifolia 19, 40, 157
 fruiting 31
 blattaeifolia 82, 157, 221
 fibrocarpa 40, 158
 hirsuta 158, 221
 omphocarpa *see* G. hirsuta
 tomentosa 42, 158
 umbellata 82, 158
- Guettarda 51, 115, 132
 speciosa 58, 149
- Guioa bijuga 153
 pleuropteris 58, 153
- Gymnacranthera 64, 87, 201
 bancana 33, 78, 135
 eugeniifolia 26, 70, 85, 89, 135
 var. griffithii 21, 37, 78, 135
 forbesii 21, 135
- Gymnostachyum 95, 165
- Gynochthodes lanceolata 81
 sublanceolata 149
- Gynotroches 70
 axillaris 19, 80, 147
- Gyrynopsis sp. 220
- Habenaria singapurensis 142
 sumatrana 35, 142
- Hanguana 68
 anthelminthica 45
 malayana 75, 120, 191
- Hedyotis auricularia 44
 capitellata 149
 pinifolia 149
- Hedychium longicornutum 160
- Helicia attenuata 147
 petiolaris 19, 147
 robusta 13, 17, 147
 rufescens 147
- Heliciopsis velutina 147
- Heliotropium indicum 102
- Helixanthera cylindrica 128
- Heritiera 217
 elata 21, 27, 81, 87, 155
 littoralis 58, 155
 simplicifolia 21, 27, 155, 217, 218
 deciduous tree 31
 sumatrana 27, 155, 218
- Hernandra nymphaeifolia 58, 121
 ovigera *see* H. nymphaeifolia

- Herpestis monniera 32, 155
 Heteropogon contortus 121
 Hexapora ? curtisii 64, 68, 76, 194
 Hibiscus 17, pl. 26
 tiliaceus 14, 43, 44, 51, 58, 129, 153
 ever-flowering 31
 special localities 32
 Histiopteris incisa 82
 Hodgsonia capniocarpa 108
 Homalium dasyanthum 119, 187, 191
 longifolium 119
 Homalomena 45, 60, 101
 angustifolia 44
 confusa 44
 deltoidea 36
 griffithii 44
 forma kingiana 101
 kiahii *forma maculata* 101
 pendula 101
 rostrata 101
 rubra *see* H. pendula
 sagitifolia 73
 var. angustifolia 73, 101
 Homonoia 45
 riparia 44
 Hopea 89
 ? *dyeriana* 111
 mengarawan 21, 26, 33, 64, 67, 74,
 86, 87, 89, 111, 180
 ? mengarawan 180
 nutans 88
 pachycarpa 163
 pentanervia 89
 polyalthioides 33, 89, 111, 181
 resinosa 26, 89, 111, 163, 181, pl. 15
 Hornstedtia leonurus 82, 160
 phaeochoana 160
 scyphiophora 82
 Horsfieldia 67, 68, 70, 92, 201
 sp. 26, 136, 201
 brachiata 135
 var. sumatrana 135
 bracteosa 78, 135
 crassifolia 26, 78, 136
 flocculosa 136
 grandis 78, 136
 irya 6, 11, 16, 17, 23, 24, 26, 39, 45,
 136, 201
 flowering 30
 macrocoma 64
 var. canarioides 78, 136
 polyspherula 26, 33, 63, 68, 69, 78,
 136
 subglobosa 78
 superba 78, 136
 wallichii 136
 Hoya 102
 spp. 58, 73, 102, 171
 coronaria 102
 diversifolia 102
 ? diversifolia 171
 lacunosa 73, 102
 latifolia 102
 parasitica 102
 ? *ridleyi* 102, 171
 Humata heterophylla 162
 repens 28, 162
 Hydnocarpus 191
 castanea 33, 119
 curtisii 119, 191
 filipes 119
 kuntleri *var. tomentosa* 119
 nana 119
 scortechinii 119
 Hydnohytium 28
 formicarum 81, 149
 Hygrophila 45
 saxatilis 44
 Hylophila mollis 79, 142
 Hymenocardia 206
 Hymenocardia? 69
 sp./sp.? 64, 69, 75, 186
 Hymenophyllum denticulatum 162
 neesii 28
 penangianum 37
 polyanthos 28, 162
 serrulatum 28, 162
 Hypolytrum 179
 nemorum 17, 18, 19, 109
 var. proliferum 109
 Hypserpa cuspidata 132
 Iguanura geonomaeformis 144
 polymorpha 144
 wallichiana 144
 ikan parang 8
 Ilex 64
 sp. 72
 cymosa 13, 19, 39, 43, 51, 72, 100,
 156, 170
 macrophylla 72
 maingayi 100
 malaccensis 100
 Illicium 36
 peninsulare 37

- Imperata cylindrica 121 *see*
 also *alang*
 Inocarpus 89, 217, 221
 edulis 196
 fagiferus 50, 127, 196
 Inocybe 50
 Intsia 216
 spp. 26
 bijuga 58, 126
 palembanica 21, 126
 Iodes ovalis 122
 Ipomoea 50, 54, 178
 carnosa see I. stolonifera
 gracilis 57, 107
 littoralis see I. gracilis
 pescaprae 57, 107
 stolonifera 57, 107
 Irvingia malayana 81
 Isachne globosa 121
 Ischaemum 53
 muticum 54, 57, 121, 178
 Isoloma divergens 37, 162
 ovatum 37
 Ixonanthes 17
 reticulata 17, 21, 26, 87, 114, 184
 Ixora 45, 213
 flowering 29, 31, 213
 concinna 149, 213
 congesta 81, 149
 flowering 30
 grandifolia 17, 29, 149, 213
 flowering 29
 var. lancifolia 149
 javanica 18, 19, 43, 149
 var. retinervia 33, 149
 lobbii 149, 213
 flowering 30
 var. stenophylla 43, 44
 pendula 149
 umbellata 149
 J. Teysmannia 34
 altifrons 33, 144
 Jackia 165
 flowering 30
 ornata 63, 68, 69, 70, 81, 149, 187
 Jada 44, 45,
 patches 41
 Jasminum ? *maingayi* 141
jejawi 3, 11, 12, 16-18, 32, 39, 104, 106,
 131, 199, 200, *pl.* 5
 special localities 32
 banks 39
 stretches 32
 -belt 11, 12, 17, 133, 151
 Justicia *sp.* 95
 johorensis 95
 uber 95
Johore fig see Ficus kerkhovenii
 Kadsura cauliflora 154
 Kalanchoe pinnata *see* Bryophyllum
 calycinum
 Kandelia 32
 candel 147
 rheedii see K. candel
kapur 180
 dominance 35
 -forest 32, 34, 36, 95-98, 101-102,
 104-109, 111-119, 122-123, 126-128,
 130-132, 135-140, 143, 144, 147-
 151, 154-158, 160, 166, 178, 181,
 195, 204, 205, 221-223
 flora 32, 33
 -trees 7
kerah 9, 10
 Kibara chartacea 132, 198
 Knema 16, 67, 68, 70, 201
 cantleyi see K. plumulosa
 conferta 78, 136
 curtisii 68
 var. paludosa 78
 furfuracea 136
 glaucescens 17, 26, 136
 forma rubens 136
 var. cordata 136
 var. patentinervia 35, 78, 136
 intermedia 17, 26, 63, 68, 69, 78, 136,
 201
 latericia 136
 laurina 35, 37, 136
 malayana 78, 136
 mandaharan 136
 plumulosa 26, 136
 Kokoona ochracea 104
 Koompassia 22, 70
 excelsa 90
 malaccensis 22, 24, 26, 33, 40, 51, 62,
 67, 70, 76, 89, 126, *pl.* 34
 leafing 30
 flowering 30
 Kopsia singaporensis 35, 72, 99, 169, 170
 flowering 29, 30, 31
 Korthalsia paludosa 144
 Kostermansia 24, 87, 172, *pl.* 8, *pl.* 36
 fruiting and flowering 29
 malayana 20, 25, 102, 171

- Kunstleria 127
 corneri 127
 curtisii 76
 ridleyi 76
 Kurrimia paniculata *see* Bhesa paniculata
 Labisia 68
 pothoina *see* L. punctata
 punctata 78, 137
 Lagerstroemia ovalifolia 21, 42, 43
 var. exapiculata 129, 197
 speciosa 42, 43
lalang 53, 121
 Languas melanocarpa 160
 Lasianthus sp. 149
 chryseus 149
 ellipticus 33, 149
 griffithii 81, 149
 maingayi 149
 stipularis 149
 Lecananthus erubescens 81, 149
 Leea 45
 gigantea 45
 indica 159
 Leersia hexandra 121
 Lepidagathis longifolia 95
 Lepidogyne longifolia 79
 Lepionurus sylvestris 19, 141
 Lepisanthes 153, 215
 fruticosa 81
 rubiginosa 153
 senegalensis 153
 tetraphylla 33, 153, 215
 Leptaspis urceolata 76, 121
 Leptonychia 218
 glabra 33, 156, 218
 heteroclita 156
 Leptospermum 36
 forest 29
 flavescens 37
 Lepturus repens 121
 Leucas zeylanica 122
 Leucopogon malayanus *see* Styphelia
 malayana
 Licuala 34, 208
 ferruginea 144
 kiahii 144
 lanuginosa 35, 144
 longecalycata 144
 spinosa 17, 18, 19, 110, 144
 triphylla 35, 144
 Limacia velutina 130
 Limnophila 42
 erecta 155
 Lindera 92
 sp. 26, 124, 194
 lucida 76, 124
 malaccensis 33, 76, 124
 Lindsaea 45
 borneensis 37
 ensifolia *see* Schizoloma ensifolium
 lucida 45
 parasitica *see* L. scandens
 scandens 83, 162
 Linociera insignis 141
 ? insignis 79
 paludosa 141
 pauciflora 79, 141
 Liparis gibbosa 79, 142
 tricallosa 37
 wrayi 79, 142
 Lithocarpus 64, 70, 92, 189, 219
 sp. 26
 andersonii 24
 bennettii 21, 26, 61, 63, 67, 68, 75, 87,
 118, 189
 ? cantleyana 189, 190
 ? cyclophorus 26, 189, 190
 eichleri 118, 189, 190
 elegans 17, 19, 75, 118, 189
 enclisacarpus 75, 118
 ewyckii 118
 ? ewyckii 189, 190
 ? gracilis 190
 hystrix 26, 118 189
 ? javanica 189
 ? javensis 26, 189, 190
 kingianus 119, 144, 187
 kunstleri 119, 187, 189
 leptogyne 21, 26, 87, 119, 189
 lucidus 119
 maingayi 119, 187, 189
 perakensis 119, 187
 sundaicus 19, 119, 190
 urceolaris 21, 23, 26, 87, 119, 187,
 189, 190
 wenzigianus 24
 wrayi 36, 37
 Litsea sp. 76
 costalis 124
 ? costata 124

(Litsea)

- ellipticibacca *see* *L. sessilis*
 ferruginea 76
 firma 76, 124
 ? kunstleri 124
 lanceifolia 124
 lanceolata 124
 gracilipes 26, 64, 70, 76, 124, 194
 grandis 76, 124
 johorensis 124
 machilifolia 76
 maingayi 124
 megacarpa *see* *L. costalis*
 perakensis 124
 sarawakensis *see* *L. lanceolata*
 sessilis 124
 teysmannii 124
 umbellata 124
- Livistona kingiana 144
 saribus 144, 208
- Loeseneriella macrantha 16, 104
- Lomariopsis cochinchinensis 162
- Longetia 185
 malayana *see* *Autrobuxus nitidus*
- Loniceria 6
- Lophathrum gracile 44
- Lophopetalum 3, 62, 70
 javanicum 104
 multinervium 20, 21, 24, 26, 39, 60,
 61, 63, 67, 73, 104, 173, pl. 14,
 pl. 16, pl. 17
 flowering 30
- Loxocarpus holttumii 37
- Lucinaea membranacea 149
 morinda 81, 149
- Lucuma maingayi *see* *Planchonella*
 maingayi
 malaccensis *see* *Pouteria malaccensis*
- Lumnitzera 11
 littorea 54, 58, 106
 racemosa 58, 106, pl. 29, pl. 30
- Luvunga scandens 152
- Lycopodium cernuum 64, 162
 laxum 28, 162
 nummularifolium 162
 phlegmaria 83, 162
 scabrum 83
 squarrosus 83, 162
- Lygodium 64
 borneense 162
- circinnatum 162
 flexuosum 162
- Macaranga 64, 92, 117, 187, 202
 amissa 26, 116
 baccareifolia 31, 116, 187
 deciduous 31
 flowering and fruiting 29, 30
 leafing 30
 caladiifolia 117
 conifera 75
 gigantea 75, 116
 griffithiana 21, 75, 116, 187
 heynei 187
 hosei 116
 hypoleuca 75, 117
 javanica 117, 187
 laciniata 187
 maingayi *see* *M. pruinosa*
 motleyana 187
 aff. populifolia see *M. amissa*
 pruinosa 70, 75, 117
 puncticulata 26, 63, 68, 70, 75, 113,
 117, pl. 15
 quadricornis 117, 187
 recurvata 75, 117
 tanarius 117
 ? tenuifolia *see* *M. quadricornis*
 trichocarpa 75, 117
 triloba 75, 86, 117
 triloba *complex* 187
- Macrolenes nemorosa *see* *Marumia*
 nemorosa
- Macrosolen formosus 281
- Madhuca sp. 154, 216
 hirtiflora 154, 216
 paludosa 216
 sericea 153
 sessiliflora 33, 154, 216
 tomentosa 35, 154, 216
 tubulosa 154
 utilis 154
- Maesa ramentacea 78, 137
- Magnolia maingayi 129
- Malaxis micrantha 80
- Mallotus sp. 117
 dispar 117
 floribundus 42, 43
 ? korthalsii 117
 oblongifolius 117
 porterianus *see* *M. oblongifolius*
 tiliifolius 58, 117
- Mangifera 19, 23
 sp. 72, 96

- foetida 96
 ? foetida 58, 166, pl. 32
 griffithii 96, 166
 lagenifera, *flowering* 29, 96
 longipetiolata *see* M. quadrifida
 microphylla *see* M. griffithii
aff. parvifolia 62, 64, 67, 68, 69, 72,
 166, 206
 quadrifida 72, 96, 166
cf. quadrifida 33
- mangrove 11, 45
reaches 32, 39
relics 54
-belt 11, 13
- Mapania 53, 179
 sp. 31, 74
 cuspidata 109, 179
 var. petiolata 109, 179
 enodis 74, 109
 graminea 179
 kurzii 33, 109
 lorea 33, 35, 74, 109
 micropandanus 33, 109, 179
 palustris 35, 37, 109
 squamata 109
- Maranthes corymbosa 212
- Mariscus
 albescens *see* Cyperus javanicus
 cyperinus *see* C. cyperinus
 sieberianus *see* C. cyperoides
- Marumia nemorosa 19, 130
 rhodocarpa 77
- Marsypopetalum pallidum 97
- Mastixia trichotoma 74
 ? trichotoma 108, 178
- Medinilla sp. 130
 hasseltii (*see also* M. rubicunda
 var. hasseltii) 27
 maingayi 27, 130
 pendens 130
 rubicunda *var. hasseltii* 37, 77, 130
 scandens 130
- Medusanthera gracilis 122
- Meiogyne virgata 97
- Melaleuca 203
- Melanochyla 70
 sp. 25, 34, 96, 166
 auriculata 72, 96, 166, pl. 39
aff. auriculata 33, 96, 166
 bracteata 96, pl. 21
 densiflora 96
- kunstleri 72
 nitida 95, 96
- Melanorrhoea 70, 71
 sp. 64, 72, 96, 166, pl. 34
 aptera 25
 deciduous 31
 leafing 31
 ? aptera 96
 pubescens 31
 wallichii 20, 22, 40, 61-63, 66-69,
 71, 72, 86, 87, 96, 166, 205, pl. 33,
 pl. 34, pl. 35
 flowering 29
 wallichii *forest* 62
 transition 66
 woodsiana 35, 96, 166
 forest, phase leading to lowland
 dipterocarp 71
- Melastoma molle 130
- Meliosma 215
 lanceolata 152
 pinnata *ssp. ridleyi* 33, 152, 215
 sumatrana 45, 152, 215
- Melodinus orientalis 99
- Memecylon 22, 64, 70, 92, 197
 sp. 77, 130
 amplexicaule 130
 campanulatum 130
 garcinioides 130, 197
 hepaticum 130
 heteropleurum 130
 hullettii 130
 laevigatum 19, 130
 maingayi 33, 35, 130
 myrsinoides 19, 130
 paniculatum 40, 130, 198
 subtrinervium 130
 wallichii *see* M. maingayi
- Mempisang 6, 11, 109, 168
leaf-fall & inflorescences 29
special localities 32
-belts 11-13, 16-18, 24, 29, 32, 39,
 42, 66, 99, 101, 104-106, 109,
 112-114, 118, 124-127, 130-133, 136,
 138, 139, 149, 154, 177, 187, 198,
 201, 205, 217, 218, 220, 223, pl. 4,
 pl. 11
habitual members 17
- Merope angulata 152
- Merremia tridentata
ssp. hastata 107
- Mesophlebion chlamydephorum *see*
 Thelypteris chlamydephora
 motleyanum *see* T. motleyana

- Mesua 106
 aff. assamica 177
 ferrea 33, 106
 (Kayea) *ferruginea* 13, 19, 39, 42,
 106, 112, 177
 fruiting 30
 kochummeniana 33, 106, 177, 181
 lepidota 26, 106, 177
 rosea 29, 106, 178
 flowering 29
 Metroxylon 45
 Mezzettia leptopoda 20, 72, 86, 89, 97,
 167
 Micrococca johorica 117
 Microcos 221
 Microsorium punctatum 28, 162
 Microstemon curtisii *see* Pentospadon
 motleyi
 Microtropis valida 104
 Millettia atropurpurea 34, 35, 127
 hemsleyana (see also jada) 41, 42, 43
 Mischocarpus sumatranus 19, 153
 Mitragyne 24
 Mitrella kentii 68, 72, 97, 167
 Mitrephora maingayi 97
 Monocarpia marginalis 98
 Morinda citrifolia 149
 ridleyi 81, 149
 rigida 68, 81, 213
 ? *rigida* 40
 umbellata 149
 Musa gracilis 135
 violascens 135
 Mussaenda glabra 19, 149
 mutabilis 149
 Mussaendopsis 22, 24, 70, 71
 flowering 30, 31
 beccariana 21, 27, 63, 66, 67, 68, 69,
 81, 89, 150, 213, pl. 25, pl. 34
 Myristica 22, 201
 cinnamomea 78, 136
 crassa 21, 26, 87, 136
 elliptica 17, 24, 26, 78, 136, 201, pl. 14
 flowering 30
 guattariifolia 58, 89, 136
 indica, fruiting 30
 iners 21, 23, 26, 63, 78, 87, 136, pl. 36
 lowiana 21, 23, 26, 36, 37, 51, 62, 67,
 68, 69, 78, 89, 136, 201, pl. 24,
 pl. 38
 maingayi 26, 136
 maxima 136
 -*Horsfieldia* spp. 63
 -*Horsfieldia* group 60
 Myrmecodia 28
 armata 150
 tuberosa 81
 Myxopyrum nervosum 141
 Nauclea maingayi 19, 21, 86, 150, 214
 subdita 39, 43, 44, 150, 214
 Naucoria 50
 Neckia serrata 140
 Neesia 64, 70, 86, 171
 flowering 30
 malayana 20, 73, 102, 172
 Nenga 34, 60, 68, 70, 144
 macrocarpa 33, 35, 144
 pumila 80
 Neolitsea *cf. dealbata* 124
 Neonauclea 214
 sp. 150, 214
 Neoscortechinia 85
 forbesii 117, 187
 fruiting 30
 nicobarica 26, 117, pl. 20
 paniculata see N. *forbesii*
 sumatrensis 117, 187
 Nepenthes ampullaria 37, 78, 140
 gracilis 37, 78, 140
 rafflesiana 37, 78, 140
 Nephelium 215
 flowering 29
 eripetalum 153
 glabrum 19, 21, 51, 81, 153
 fruiting 30
 cf. herveyi 153
 malaiense 215
 rubescens 19, 21, 30, 81, 153
 Nephrolepis biserrata 83, 162
 neram 41-45, 182
 & *pelawan*, transition 41
 streams 40
 -rivers 14, 40, 42-45
 & Saracca-streams, transition 41
 Nipa fruticans (*see also nipa*) 144
 Nervillia punctata 80, 142
 nibong
 -*berembang* region 200
 -*forest* 108, 154, 178
 -*swamps* 101

- Nieuwiedia griffithii* 72, 100
nipa 3, 6, 13, 14, 16, 18, 19, 39, 40, 42-44, 46, 47, 52, 54, 88, 100, 144, 155, 161, 208, 224
 forest 19
 stretches 32
 reaches 39
 -belt 11, 13, 14, 16, 17, 32, 39, 44, 45, 99, 129, 131, 133, 145, 157, 162, 188, 223
 special localities 31
 -swamps 129, 145
 -zone 42
 Norrisia 28
 major 19, 27, 128, 197
 Notaphoebe 123
 coriacea 17, 26, 45, 124, 194, pl. 21
 special localities 31
 kingiana var. *glabrescens* 195
 nitidissima 124
 panduriformis 19, 123 124
 reticulata 123, 124
 Oberonia sp. 80
 flabellata 142
 miniata 142
 rhizophoreti 142
 Ochanostachys 176, 207
 amentacea 21, 141
 Ochrosia borbonica 58
 oppositifolia 100
 Ochthocharis borneensis 17, 130
 sylvestris 35, 130
 Omphalea bracteata 117
 Oncodistigma monosperma 98
 Oncosperma 20, 70, 200
 filamentosum (*see also nibong*) 14, 144, 208, pl. 27
 horridum 60, 62, 80, 144, 208
 Ophioglossum pendulum 28, 162
 simplex 37
 Ophiorrhiza singapurensis 150
 Oplismenus compositus 121
 Orchidantha fimbriata 128
 Ormosia macrodisca 64, 76, 196
 Orophaea enterocarpa 98
 Oryza minuta 121
 ridleyi 121
 Osbeckia ? 130
 sp. 33
 Osmelia maingayi 75
 Ostodes 118, 186, 188
 Ostodes ? 117
 macrophylla 188
 pendula 117, 188
 Otophora 215
 Oxymitra affinis 98
 biglandulosa 72
 borneensis var. *sumatrana* 72
 filipes 98
 glauca 98, 172
 latifolia 98
 Pachycentria tuberosa 27, 37, 78, 130
 padang-terrace 56
 Paederia verticillata 150
 Palaquium sp. 10, 27, 154, 217, pl. 20
 burckii 70, 81
 clarkeanum 33, 154
 confertum 21, 27, 154
 gutta 154
 hexandrum 27, 34, 35, 81, 154, 216
 leiocarpum 81, 154
 macrocarpum 21, 27, 154
 obovatum 21, 154
 ridleyi 70, 81, 85, 86, 216
 rostratum 27, 81
 semaram 21, 27, 58, 70, 81, 154
 sukoei 33, 154
 xanthochymum 16, 20, 21-23, 27, 31, 39, 50, 60, 61, 62, 66-68, 70, 71, 81, 86, 87, 154, 169, 217, pl. 13, pl. 17, pl. 35
 flowering 30
 special localities 31
 var. *sessiliflora* 169
 xanthochymum *forest* 62
 transition 66
 Pancratium maritimum 95
 Pandanus 6, 22, 24, 64, 92, 179, 208, 209
 affinis 14, 39, 45, 145
 alticola 80, 145, 209
 atrocarpus 19, 27, 37, 62, 65, 67-70, 80, 145, 208, 209, pl. 38
 aurantiacus *see* P. *affinis*
 corneri 45, 145, 208, 209, *see also* P. *rostratus*
 corneri ? 89
 dubius 50, 58, 89, 145, 208, 209
 echinodermops 145, 209
 epiphyticus 7, 145, 179, 208
 distribution 209
 fascicularis 210

- (Pandanus)
 gibbsianus 209
 helicopus (*see also rassau*) 3, 11, 13, 15, 16, 27, 31, 43, 45, 46, 89, 101, 145, 146, 201, 209, 211, pl. 1, pl. 4
 flowering 30
 fruiting 31
 ? helicopus 80
 immersus 210
 kamii 37, 60, 80, 145, 208, 209, 210, pl. 5
 malayanus 13, 16, 27, 39, 145, 208, 210, *see also* P. *militaris*
militaris and variety 210
 obovoideus 209
 odoratissimus 45, 50, 58, 80, 145, 208, 210, pl. 30
 ornatus *see* P. *recurvatus*
 parvus 145, 209, 210
 pentodon 145, 208-211
 recurvatus 34, 37, 54, 148, 208
 rostratus 145
 scortechinii 146, 208, 210
 spurius 210
 tectorius 210
 yvanii 13, 16, 27, 146, 208, 210, 211
 Panicum *brevifolium* 44, 45
 repens 57, 121, 192
 Paphiopedilum *bullenianum* 37
 Paraboea sp. 120
 densifolia 120, 192
 pyrrhaeflora 120
 Paragrewia 218
 Paramapania *parvibracteata* 37
 Parameria *polyneura* 72, 100
 Paramignya *angulata* *see* *Merope*
 angulata
 lobata 152
 scandens 152
 Parartocarpus 22, 24, 36, 51, 69, 70
 venenosus 201
 ssp. forbesii 21, 37, 68, 77, 89, 135, 200, pl. 33
 Parastemon *urophyllum* 19, 70, 80, 87, 89, 148
 Parinari 87, 212
 asperulum *see* P. *nannodes*
 corymbosa 148, 212
 costata 21, 80, 148, 212
 nannodes 21, 33, 148, 212
 oblongifolia 21, 80, 148
 Parinarium *corymbosum* 58
 Parishia sp/spp. 25, 63, 72
 insignis 86
 ? *insignis* 96
 ? *pubescens* 19, 96
 Parkia *speciosa* 21, 26, 31, 35, 76, 126
 deciduous 31
 Pasania A, 189, 190
 costata 190
 ? *cytorrhyncha* 190
 ? *omalakos* 190
 ? *sundaica-lamponga* 190
 Paspalum 54
 cartilagineum 57, 121
 conjugatum 44, 45
 orbiculare 57, 121
 vaginatum 51, 54, 57, 121, 192, pl. 28
 Pavetta spp. 150
 indica 81, 150
 naucleiflora 150
 tomentosa 150
 Pelawan 41
 -reach 43
 Peliosanthes sp. 76
 violacea 128
 viridis 128
 Pellacalyx 212
 axillaris 19, 27, 80, 147, 212
 saccardianus 212
 Peltophorum *pterocarpum* 58, 126
 Pemphis *acidula* 54, 58, 129
 Pentace 221, 222
 sp. 158, 222
 corneri 29, 158, 221
 strychnoides, *flowering* 29
 triptera 22, 27, 62, 82, 87, 158, 222, pl. 35
 flowering 29
 Pentaspadon 87
 motleyi 96
 officinalis 11, 20, 25, 96, 166
 deciduous 31
 flowering 29-31
 pepper 5
 Pericampylus *incanus* 132
 Peristrophe sp. 95
 Peronema *canescens* 159
 Perotis *indica* 121
 Petunga *roxburghii* 52, 214
 venulosa 214
 Phacelophrynium 35
 maximum 34, 35, 129, 197

- Phaeanthus ophthalmicus* 98
Phaeomeria maingayi 160
 venusta 160
Phaius tankervilleae 37
Phalaenopsis fuscata 142
Phaleria capitata 157, 221
Phellinus (*Fomes*) *rimosus* 50
Phoebe spp. 124
 cuneata 19, 124
 declinata 85
Phoenicimon rubiginosum 152
Pholidocarpus 20
 macrocarpus 144
Photinopteris speciosa 162
Phragmites 6
Phreatia secunda 142
Phrynium basiflorum 129, 197
 capitatum 35, 129
 gracile 129
 hirtum 37, 129, 197
Phyllanthus sp. 117
 frondosus *see* *P. oxyphyllus*
 gomphocarpus 33, 117
 oxyphyllus 33, 117
Phyllochlamys wallichii *see* *streblus taxoides*
Phymatodes crustacea 162
 scolopendria 162
 sinosum 28
 sinuata 83, 162
Physostelma wallichii 73
Phytocrene bracteata 76
 oblonga 122
Pimeleodendron griffithianum 75, 117
 macrocarpum 118, 188
Pinanga 64, 144, 208
 sp. 144
 disticha 144
 limosa 144
 malajana 144
 pectinata 144
 symplicifrons 144
Pinus 6
Piper spp. 146
 ? *boehmeriaefolium* 146
 caninum 146
 flavimarginatum 80
 miniatum 80, 146
 ? *muricatum* 146
 nigrum 80
 pedicellosum 146
 porphyrophyelum 146
 ramipilum 146
 stylosum 37, 146
Piptospatha ridleyi 35, 101
Pithecellobium bubalinum 35, 126
 clypearia 126
 confertum 76
 contortum 126
 ellipticum 76
 jiringa 126
 kunstleri 126
Pittosporum ferrugineum 58, 146
Plagiostachys albiflora 35, 160
Planchonella maingayi 21, 27, 81, 154
 obovata 58, 154
Platea excelsa 70, 86
 var. *riedeliana* 26, 76, 194, pl. 18
 latifolia 21, 26, 76, 122, 194, pl. 18
Platyцерium coronarium 28, 83, 162
 ridleyi 27, 162
Plectocomia griffithii 144
Plethiandra sessiliflora 130
Pleurococcus 223
Plocoglottis sp. 37
 gigantea 35, 142
 javanica 80, 142
Ploiarium 17, 70, 220
 alternifolium 17, 27, 82, 157, 220,
 pl. 11, pl. 40
Pluchea indica 106
pneumatophores 23 *et seq.*
Podocarpus 6
 blumei *see* *P. wallichianus*
 motleyi 22, 193, 161
 neriifolius 19, 22, 58, 161
 leafing 30
 polystachyus 58, 161
 wallichianus 22, 70, 82, 161
Podochilus lucescens 142
 microphyllus 142
Podolasia stipitata 40, 101, pl. 40
Pogonanthera pulverulenta 130
Pogonatherum paniceum 44
Poikilospermum spp. *flowering* 30
 amoenum 19
 cordifolium 158, 222
 microstachys 158

- (Poikilospermum)
 scortechinii 82, 158
 suaveolens 158, 222
- Polyalthia 92
 angustissima 72, 98
 brunneifolia 33, 98
 bullata 98
 cauliflora var. beccarii 35, 98, 168
 var. cauliflora 168
 var. desmantha 98
 glauca 63, 67-69, 72, 85, 98, 168
 hookeriana 98
 hypoleuca 20, 68, 70, 72, 85, 89, 98,
 167, 168, pl. 37
 lateriflora 72, 98, 168
 macropoda 36, 98
 purpurea 168
 sumatrana 33, 98
 sclerophylla (*see also mempising*) 6,
 11, 16, 17, 24, 39, 42, 45, 62, 72,
 98, 167, 168, pl. 11, pl. 13
- Polystichopsis hasseltii 37
- Pomatocalpa latifolium 142
- Pometia 22, 34, 60, 61, 62, 66, 167, 202
 alnifolia 215
 pinnata 45, 86, 215
 forma alnifolia 21, 27, 62, 67, 68,
 70, 81, 153, 215, pl. 9, pl. 36
- Pongamia pinnata 42, 58, 127
 var. xerocarpa 17, 19, 127
 leafing 30
- Popowia hirta 72
 pisocarpa 98
- Pothos latifolia 68, 73
 macrocephalus 101
 scandens 101
- Pouteria malaccensis 27, 33, 154
 paucinervia 154
- Pouzolzia indica 158
- Premna 223
 corymbosa *see* P. obtusifolia
 divaricata 159
 obtusifolia 159
 trichostoma 16, 159
 flowering 30
- Prismatomeris 18
 sp. 150
 tetrandra 19, 150
- Procris sp. 158
- Pronephrium triphyllum *see* Abacopteris
 triphylla
- Prunus 212
 arborea *see* Pygaeum griffithii
 grisea *see* Pyg. lanceolatum
- Pseuderanthemum sp. 95
 crenulatum 95
- Pseudoeugenia 70, 203
 perakensis 140
 singaporensis 27, 78, 140, 205
- Pseuduvaria galeata 33, 98, 167
 macrophylla 33, 98
- Psilotum sp. 162
- Psychotria 92
 sp./spp. 150
 angulata 150
 griffithii 150
 helferiana 35, 150
 maingayi 81, 150
 obovata ? 81, 150
 ridleyi 150
 rostrata 150
 sarmentosa 150
 ? stipulacea 150
- Ptelaeocarpa malaccensis 102
- Pteridium aquilinum 37
- Pteris asperula 37
 ensiformis 162
 tripartita 83
- Pterisanthes coriacea 82, 159
- Pterocarpus indicus 26, 56, 127, 196
- Pterospermum 52, 87
 javanicum 21, 27, 58, 156, 218
 flowering 29-31
- Pternandra capitellata 45
 coerulescens 19, 40, 77, 131
 echinata 77
- Ptunga roxburghii 58, 150, pl. 26
 venulosa 150
- Ptychopyxis kingii 118
- Ptychoraphis singaporensis 33, 144
 putat 9, 12, 13, 14, 16, 39, 40, 41, 43,
 104, 107, 125, 193, 199, 200, 214,
 pl. 4, pl. 6
 -belt 11, 13, 14, 16, 121, 125, 126, 193,
 199, pl. 5
 -rassau belts 40
- Pycreus polystachyos *see* Cyperus
 polystachyos
- Pygaeum 212
 griffithii 37, 80, 86
 lampongum 148, 213
 lanceolatum 80

- Pyramidanthe prismatica 72
 Pyrenaria acuminata 157
 kunstleri 157
 Pyrrosia adnascens 162
 angustata 83, 162
 longifolia 28, 162
 nummularifolia 162
 Quassia 217
 indica 155, 217, 221
 ? indica 89
 Quercus 189
 craterophora *see* Lithocarpus
 urceolaris
 spicata *see* L. elegans
 Quisqualis indica 106
 Radermachera lobbii 102
 Randia sp. 214
 anisophylla 214
 auriculata 81, 150
 binata 150
 clarkei 81
 fragrantissima 150
 kuchingensis 150
 longiflora 14, 150
 macrophylla 81
 ? oppositifolia 150
 penangiana 33
 ? penangiana 150
 scortechinii 35, 151, 214
 Raphidophora beccarii 101
 minor 16, 101
 sylvestris 33, 73
 forma crassifolia 101
rassau 3, 6, 9, 11, 13, 14, 16, 18, 39,
 40, 41, 43, 104, 107, 147, 193, 200,
 208, pl. 4
 special localities 32
 stand 42
 -banks 16
 -belt 15, 16, 18, 32, 105, 106, 118,
 121, 126, 133, 139, 151, 165, 199,
 205, 211, pl. 4, pl. 5
 -thickets 12, 18, 39
 Remirea maritima *see* Cyperus
 pedunculatus
rengas 12, 14, 15, 16, 39, 43, pl. 4, pl. 6
 flowering 29
 Rennellia elongata 33, 35, 151
 speciosa 151
 Rhizophora 13, 54, 211, pl. 28
 apiculata 54, 147
 conjugata *see* R. apiculata
 mucronata 54, 147
 occurrence 32
 Rhizophora-forest 211
 Rhodamnia cinerea 140
 trinervia *see* R. cinerea
 Rhodomyrtus 53
 tomentosa 140
 Rhynchospora corymbosa 17, 109
 Rinorea anguifera 31, 159
 horneri 159
 javanica 159
 lanceolata 159
river-mouths, new siting 51
 Robiquetia spathulata 142
roots, role in swamp-forest 46
 stilt-, 22 et seq.
rotans 9, 10, 52, 208
 Roucheria griffithiana 77, 128
 Rourea 18
 mimosoides 16, 17, 19, 107
 minor 19, 74, 107
 Roureopsis 18
 asplenifolia 19, 107
rubber 5
 Ryparosa hullettii 119
 scortechinii 119, 191
 Saccharum arundinaceum 43, 121
 Salacca 13, 20, 52, 60, 62, 65, 67, 68, 70,
 121, 208
 conferta 80, 89, 144
Salacca-swamps 113
 Salacia chinensis 104
 korthalsiana 104
 macrophylla 104
 oblongifolia 104
 Salix 6
 Salomonina cantoniensis 45
 Samadera indica *see* Quassia indica
 Sandoricum sp. 33, 132
 ? emarginatum 77, 86, 89
 Santiria apiculata 70, 73, 103, 172
 conferta 103, 172
 griffithii 73
 laevigata 19, 21, 25, 67, 68, 69, 70, 73,
 89, 103, 172, 173, pl. 34, pl. 37
 rubiginosa 21, 25, 63, 67, 68, 70, 73,
 89, 103, 173, pl. 34

- (Santiria)
 tomentosa 21, 25, 70, 73, 103, 173
- Sapium baccatum 34, 35, 118
 discolor 75
 indicum 45, 118, 188
- Sapota 216
- Saprosma glomerulatum 33, 151
 quadrifidum var. ? 33
- Saraca 6, 171
 bijuga (*see also* Saraca-streams) 11, 45, 126
 indica 126
 -streams 6, 11, 13, 16, 40, 42, 45, 91, 101, 110, 120, 129, 131, 135, 138, 139, 148, 149, 152, 154, 158-160, 192, 197, 205
- Sarcanthus halophilus 142
 machadonis 142
- Sarcochilus berkeleyi 37
 johorensis 142
- Sarcolobus 101
 globosus 14, 102
- Sarcostoma javanicum 28, 80, 142
- Sarcotheca laxa 208
 var. hirsuta 143, 208
 var. laxa 208
- Saurauia tristyla 35, 154
- Scaevola 51, 91, pl. 26
 frutescens *see* S. taccada
 sericea *see* S. taccada
 taccada 58, 120
- Scaphium affine *see* S. macropodum
 linearicarpum 35, 156
 macropodum 21, 24, 27, 30, 31, 35, 156, 218
 deciduous 31
- Scaphocalyx spathacea 119
- Scaphochlamys erecta 160
 klossii 161
 var. minor 35, 161
- Schefflera cephalotes 64, 73, pl. 34, pl. 37
 farinosa *see* S. tomentosa
 lanceolata 101
 subulata 17, 19, 73, 101
 tomentosa 19, 101
 venulosa 101
- Schismatoglottis brevicuspis 35, 100
 wallichii var. oblongata 101
- Schizaea dichotoma 162
 digitata 162
- Schizoloma ensifolium 162
- Schizostachyum chilianthum 19
 gracile 121
 zollingeri 121
- Schoenorchis secundiflora 80, 142
- Schoutenia accrescens 31, 35, 158, 222
 corneri 158
 glomerata 11, 45, 158, 222
 mastersii var. glabra *see* S. accrescens
- Scirpodendron 14, 17, 52, 54, 109, 179, 210
 ghaeri 109
- Sciurus nigrovittatus johorensis *see* squirrels
- Scleria 109
 lithosperma 109
 multifoliata 44
 poaeformis 109
 ? purpuracens 44, 45
- Scleroglossum debile 37
- Scleropyrum ridleyi 152
- Scolopia spinosa 119
- Scorodocarpus borneensis 21, 33, 141
- Scyphiphora hydrophyllacea 151, pl. 30
- Sebastiania chamaelea 57, 118
- Securinega virosa 42, 43, 44
- Selaginella 224
- Selliguea heterocarpa 28, 162
- Semecarpus velutina 96
- Serianthes dilmyi 58, 126
 grandiflorum 126
- Sesuvium 51
 portulacastrum 51, 95, 165
- Shorea 22, 92, 142, 174
 flowering 30
 forest 62
 leafing 30
 spp. 39
 acuminata 33, 89, 111, 181
 albida 85, 89, 90
 bracteolata 19, 87, 89, 90, 111, 181
 collina 24, 88, 89, 111
 curtisii, fruiting 29
 ? elliptica 181
 exelliptica 21, 33, 87, 88, 89, 111, 181
 ? eximia 74
 foxworthyi 33, 35, 88, 89, 90, 111, 181

- gratissima 74
 inaequilateralis 89
 lepidota 14, 19, 21, 89, 91, 111, 181, 182
 leprosula 89, 112, 181
 longiflora 89
 longisperma 163
 macrantha 88, 89, 90
 macroptera 61, 63, 74, 89, 112
 materialis 88, 89, 112
 ovalis 89, 112, 181
 pachyphylla 89
 palembanica 19, 21, 33, 87, 89, 112, 181
 parvifolia 112, 182
 pauciflora 112, 182
 platycarpa 21, 40, 51, 61, 63, 67, 68, 70, 74, 86, 88, 89, 112, 182
 resina-nigra 88, 89, 112, 163, 182, pl. 8
 rugosa 89
 var. uliginosa 85
 scabrida 89
 seminis 88, 90
 singkawang 14, 21, 39, 87, 88, 89, 91, 111, 112, 181, 182
 sumatrana 19, 21, 39, 87, 88, 89, 90, 112, 182
 teysmanniana 85, 89, 90
 Sida cordifolia 129
 Sindora 19, 23
 coriacea 21, 31, 89, 126, pl. 7
 deciduous 31
 leafing 30
 wallichii 21, 76, 89, 126
 Sloanea javanica 59
 Smilax 196
 barbata *see* S. setosa
 calophylla 37, 128
 leucophylla 128
 myosotiflora 128
 setosa 128
 Solanum parasiticum 27, 155
 Sonerila sp. 131
 caesia 131
 costulata 35
 picta 131
 Sonneratia 17, 24, 52, 54, 192, 196, 200
 forest 19
 -belt 24
 acida see S. caseolaris
 alba 54, 129, pl. 28
 caseolaris 14, 32, 40, 44, 56, 129
 stands 32
 griffithii *see* S. alba
 and *fire-flies* 205
 Sophora tomentosa 127
 South Johore, seasons 28-30
 Spatholobus sp. 76
 Sphaerocaryum malaccense 14, 121, 193
 Sphagnum 85, 87
 Spilanthes 51
 urens 57, 107, 178, pl. 37
 Spinifex 51
 littoreus 121
 Sporobolus virginicus 57, 121
 squirrels & tree-rats
 distributional pattern 209
 Stachyphrynium griffithii 129
 Staurogyne griffithiana 35, 95
 kingiana 95
 Stemonurus 23
 malaccensis 122, 194
 scorpioides 21, 26, 76, 89, 122, 194
 secundiflorus 21, 70, 76, 89, 122
 Stenochlaena palustris 83, 162
 Stephania ? 132
 Sterculia bicolor 81, 156, 218
 deciduous 31
 flowering 30
 brachycarpa 156
 coccinea 33, 64, 68, 81, 156
 laevis *see* S. coccinea
 macrophylla 21, 27, 31, 63, 81, 156, 218
 deciduous 31
 cf. rostrata 156
 rubiginosa 33, 81, 156
 cf. scortechinii 33, 156, 218
 Stephania sp. ? 33
 Stichoneuron caudatum 35, 155
 Streblosa pubescens 151
 Streblus 188
 elongatus 77
 taxoides 33, 35, 135
 Strombosia 23, 40, 70, 87
 maingayi 21, 60, 67, 79, 141, 207
 Strychnos axillaris 128
 ignatii 33, 128
 villosa 128
 Styphelia (Leucopogon) malayana 187
 Styrax crotonoides 35, 156, 219

- Suregada 188
 glomerulata 58, 118, 188
 multiflora 118, 188
 Susum anthelminthicum 191
 malayanum 191
 Swintonia penangiana 33, 34, 35, 96, 166
 schenkii, *flowering* 29
 Sympetalandra 36
 borneensis 196
 hildebrandii 37, 126
 var. steenis 196
 Symplocos 40, 219
 sp. 156, 219
 barringtoniifolia 33, 82, 156, 219
 celastrifolia 40, 156
 odoratissima var. odoratissima 156
 rubiginosa 156, 219
 Syngamma alismifolium 37, 162
 borneensis 37
 minima 37
 Synostemon bacciformis 57, 118
 Syzygium 202
 Tabernaemontana corymbosa 72, 100
 var. kelsalli 100, 170
 ? cylindrica 100
 ? malaccensis 100
 ? pauciflora 100
 sphaerocarpa 100
 Tacca 188
 chantrieri 156
 cristata *see* T. integrifolia
 integrifolia 82, 156
 leontopetaloides 100, 156, 219, pl. 31
 palmata 52, 156, pl. 31
 vespertilio *see* T. chantrieri
 Taeniophyllum sp. 28
 culciferum 143
 filiforme 80, 143
 obtusum 80, 143
 Taenitis blechnoides 83, 162
 interrupta 162
 Talauma 64
 lanuginosa 77
 singaporensis 60, 62, 77, 129
 Tarenna 214
 appressa 81, 151
 costata 151
 fragrans 19, 151
 longifolia 81, 151
 mollis 151, 214
 stellulata 151
 Tarrietia 217
 Tectaria barberi 163
 grandidentata 37
 semibipinnata 163
 singaporeana 163
 Teratophyllum aculeatum 163
 ludens 83
 rotundifoliatum 163
 Terminalia catappa 51, 58, 106, 114, 176
 citrina 106
 phellocarpa 20, 21, 22, 74, 87, 106
 -zone 161
 Ternstroemia bancana 157, 220
 corneri 220
 elongata 33, 157
 Tetracera 42
 akara 42, 44, 74
 arborescens 19, 74, 110
 fagifolia 110
 indica 19, 42, 44, 110
 scandens 110
 sylvestris *see* T. akara
 Tetractomia 22, 24, pl. 7
 holttumii *see* T. tetrandra
 major 70, 81, 152
 tetrandra 27, 70, 81, 152, 214, pl. 36
 Tetramerista 70, 85, 87, 220
 glabra 27, 82, 85, 196, 220
 Tetrardisia corneri 137
 Teysmannia 34
 altifrons 33, 144
 Thecostele secunda 37
 Thelasis carinata 143
 micrantha 80, 143
 triptera 80, 143
 Thelephora ramarioides 50
 Thelypteris chlamytophora 83, 163
 crassifolia 28, 163
 motleyana 34, 163
 Thespesia populnea 58, 129
 Thoracostachyum 179
 bancanum 74, 109
 sumatranum 109
 Thrixspermum acuminatissimum 143
 amplexicaule 16, 143
 arachnites 58, 143
 carinatifolium 143
 corneri 143
 recurvatum 143
 Thuarea involuta 57, 121

- Timonius 60
 flavescens 37, 51, 68, 70, 81, 151
 wallichianus 81
 wrayi 33, 151, 214
- Toxocarpus *glabrescens* 73, 102
 griffithii 73
- Trema *amboinensis* 82
 orientalis 158
 tomentosa 82
- Trichoglottis *lanceolaria* 37
- Trichomanes *aphlebioides* 37, 163
 motleyi 83
 obscurum 83, 163
- Trichosanthes ? *tricuspidata* 108
 wallichiana 108
- Tridax *procumbens* 107
- Trigonachras *acuta* 39, 153
- Trigoniastrum *hypoleucum* 146
- Trigonostemon 34
 borneensis 118
 longifolius 33, 118
 rufescens 33, 118, 188
 sumatranus 118, 188
 villosus 33, 118, 189
- Tristania 6, 41, 71, 86, 96, 202, 223,
 pl. 3
 sp. 140, 206, 207
 grandifolia 86
 maingayi 206
 aff. maingayi 86
 ? *merguensis* 22, 62, 64, 67, 68, 70, 78,
 86, 140, 206, 207, pl. 24, pl. 34
 obovata 86, 140
 pontianensis 70, 78, 86, 206, 207
 ? *pontianensis* 33, 140, 206
 spathulata 37
 subauriculata 206
 sumatrana (*see also pelawan*) 6, 11,
 18, 19, 30, 37, 39, 41, 44, 46, 86,
 140, 206, 207, pl. 14
 flowering 29
 -bank 7, 11, 13, 16, 18, 32, 39, 40,
 57, 87, 99, 100, 103, 104, 107, 111,
 113, 118, 121-128, 130, 131, 133,
 134, 138-141, 143-151, 153, 156-
 159, 161, 170, 200, 205, 211, pl. 1,
 pl. 3, pl. 14
 flora 18-19
- Tristellateia *australasiae* 129
- Triumphetta *repens* 158
- Trivalvaria *nervosa* 35, 99
- Turpinia *latifolia* 217
 laxiflora 217
 sphaerocarpa 27, 155, 217
- Tylophora *asthmatica* 102
- Uncaria 8, 68, 151
 attenuata 16, 151
 glabrata 151
 ovalifolia 81, 151
 pedicellata 151
 pteropoda 151
 scleroptera 16, 151
- Urceola *brachysepala* 100
 torulosa 72
- Urnularia *flavescens* 72
- Urophyllum 60
 sp. 151
 corymbosum 151
 glabra 81, 151
 hirsutum 151
 ? *macrophyllum* 151
 streptopodium 35, 81, 151
 trifurcum 151
- Urostigma 199
 microcarpa 200
- Utricularia *flexuosa* 127
- Uvaria *cordata* 99
 leptopoda 72, 99
 pauciovulata 99
- Vaccinium *acuminatissimum* 114
 bracteatum 37, 58, 114, 187
 malaccense *see* V. *bracteatum*
- Vandellia *crustacea* 45
- Vanilla *griffithii* 58, 80, 143
- Vatica 70
 hullettii 163
 maingayi 89, 112
 mengachapoi 88
 pauciflora 163
 stapfiana 89, 112
 stipularis 34
 stipulata 35, 89, 112, 163, 187
 wallichii 13, 19, 21, 42, 63, 68, 69, 74,
 85-87, 89, 112, 163, 182
 fruiting 30
- Ventilago *malaccensis* 147
- Vetiveria *nemoralis* 44
- Vigna *marina* 57, 127
- Viscum *orientale* 128
 wrayi 128

- Vitex clarkeana* 14, 17, 19, 31, 159, 223
 ovata 57, 159, 223
 peralata 19, 27, 159
 flowering 30
 pubescens 27, 159
 trifolia *see* *V. ovata*
 ssp. littoralis 223
- Vitis glaberrima* 82
 furcata 159
 gracilis 159
 hastata 82
 japonica 82, 159
 ? *lawsonii* 160
 mollissima 82, 160
 novemfolia 82
 pyrrhodasys 160
 ? *trifolia* 160
- Vittaria ensiformis* 28, 83, 163
- Wedelia biflora* 51, 57, 107
- Willughbeia coriacea* 72, 100
 glaucina 86
 grandiflora 86
- Wormia* 179
 beccariana *see* *Dillenia albiflos*
- Xanthophyllum* 92, 211
 affine 19, 80, 146, 211
 flowering 31
 fruiting 31
 bullatum 146
 curtisii 146, 211
 ellipticum 146
 ? *ellipticum* 80, 211
- kingii* 19
 maingayi 146, 211
 malayanum 146
 obscurum 147, 211
 pulchrum 27, 147, 211
 stipitatum 147
 wrayi 147, 211
- Xerospermum, flowering* 29
 sp. 153, 215
 muricatum 21, 153
- Xylopia* 70
 sp. 99, 169
 caudata 68, 72, 89, 99, 128, 168
 ceriifolia 24
 elliptica 99
 ferruginea 24, 25, 99, 167
 var. oxyantha 99
 fusca 6, 20, 24, 25, 39, 60, 61, 62, 67, 68, 71, 72, 99, 167-169, 174, *pl.* 24, *pl.* 35, *pl.* 36
 forest 66
 special localities 31
 maingayi 89
 malayana 99, 167, 169
 staudtii 24, 25, 61, 63, 67, 68
 subdehiscens 99, 169
- Zingiber puberulum* 82, 161
 var. chryseum 161
 wrayi 34, 35, 161, 187
- Zizyphus calophylla* 16, 17, 19, 147
 elegans 80
- Zoysia matrella* 121



Plate 1. The Sedih Besar near Bagan Kijang, 1932: *Tristania sessilifolia* and, on the right, a clump of *Pandanus hellicopus*.



Plate 2. Sedili Besar, 1932. Upper, between Bt Perah and Bt Tiga with Bt Tinjau Laut in the distance.— Centre, Tg Rambutan.— Lower, floating house at Danau.



Plate 3. Upper, S. Dohol near the Jemaluang Road, with *Tristania* (left).— Lower, a *Tristania*-bank on the Sedili Besar, 3 miles below Mawai.



B

G

G

Plate 4. The Sedili Besar near Bt Perah, 1932. Upper, *rassau*-belt with *putat* (*Barringtonia conoidea*) at the water-front. *Pandanus helicopus* behind, and *rengas* (*Gluta velutina*) between.— Lower, *rassau*, *putat* (B), and *rengas* (G), with the *mempisang*-belt behind.



Plate 5. Upper, the Sedili Besar near Bt Tiga with *jejawi* (*Ficus microcarpa*) smothering the belts of *putat* and *rassau*.— Lower, *Pandanus kamii* in the freshwater swamp-forest.



Plate 6. Upper, an old tree of *rengas* (*Gluta velutina*) in the slime, at low water below Mawai.— Lower, *putat* (*Barringtonia conoidea*) at half tide.



Plate 7. Left, *Dryobalanops oblongifolia* by a wood-cutter's track in freshwater swamp-forest, with several trees of *Gania motleyana* in the background and slender trees of *Tetractomia* on the right, S. Kayu, 1935.— Right, *Sindora coriacea* in the dryer part of the swamp-forest.

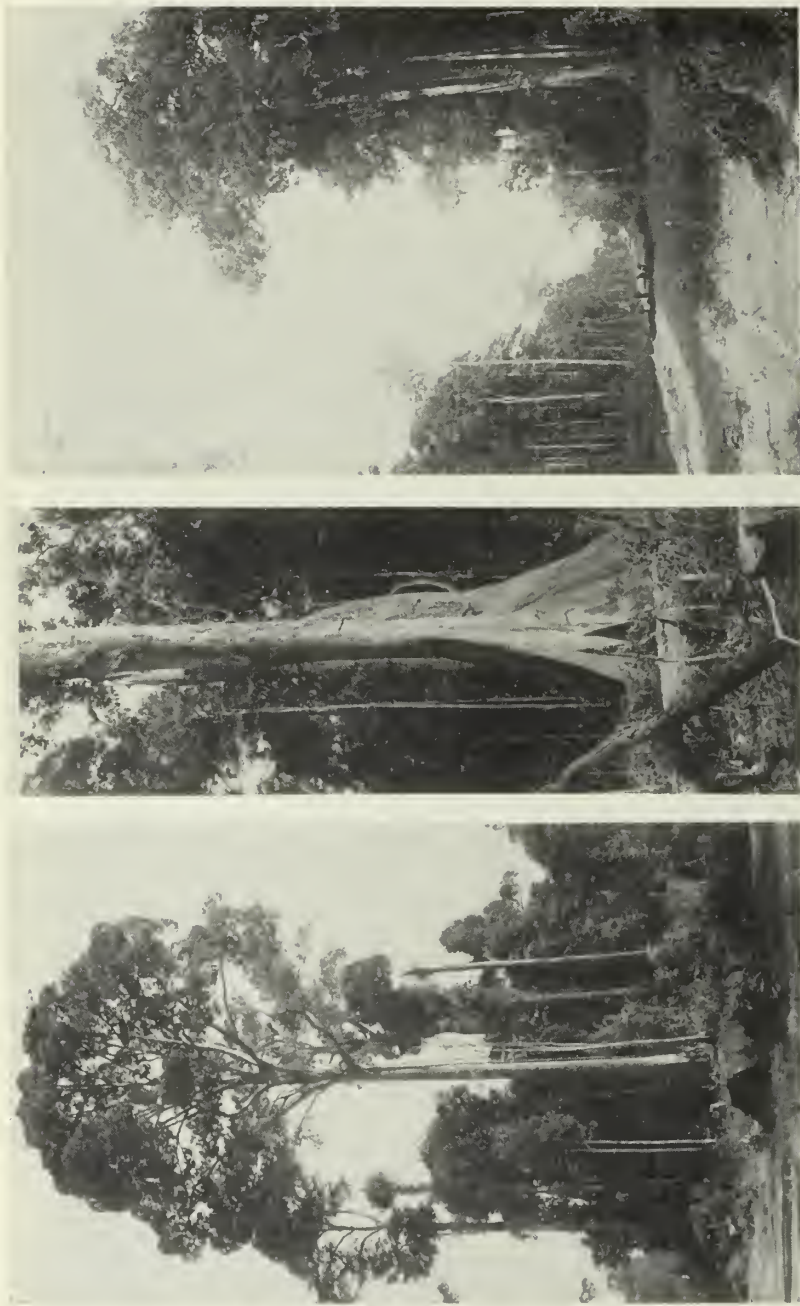


Plate 8. Left, *Shorea, resina-nigra* (with *Ficus cucurbitina* as incipient strangler), by the Jemaluang Rd, mile 13.— Centre, *Kostermanisia*.— Right, the Jemaluang Rd under construction, 1932.

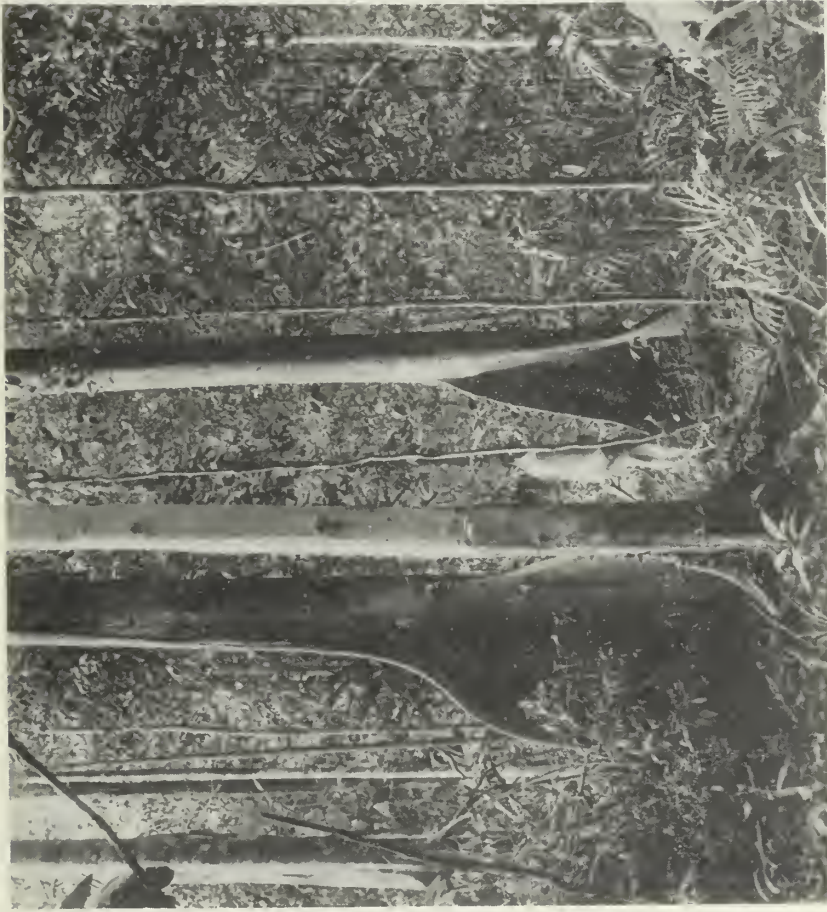
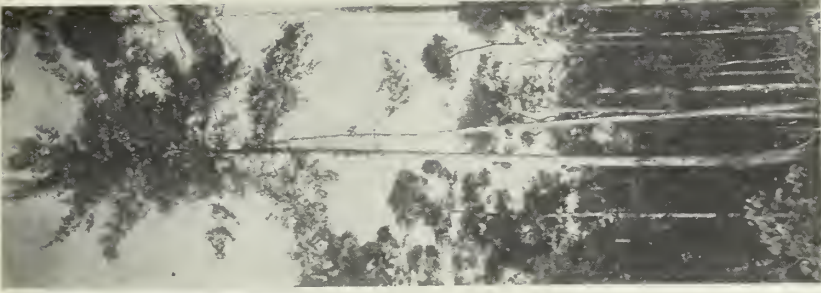


Plate 9. Left, *Pometia pinnata* f. *alnifolia* in the freshwater swamp-forest, Sedili Besar 1934, with the buttresses aligned.— Right, *Aromadendron nitans* in the peat swamp-forest, Pontian 1939.

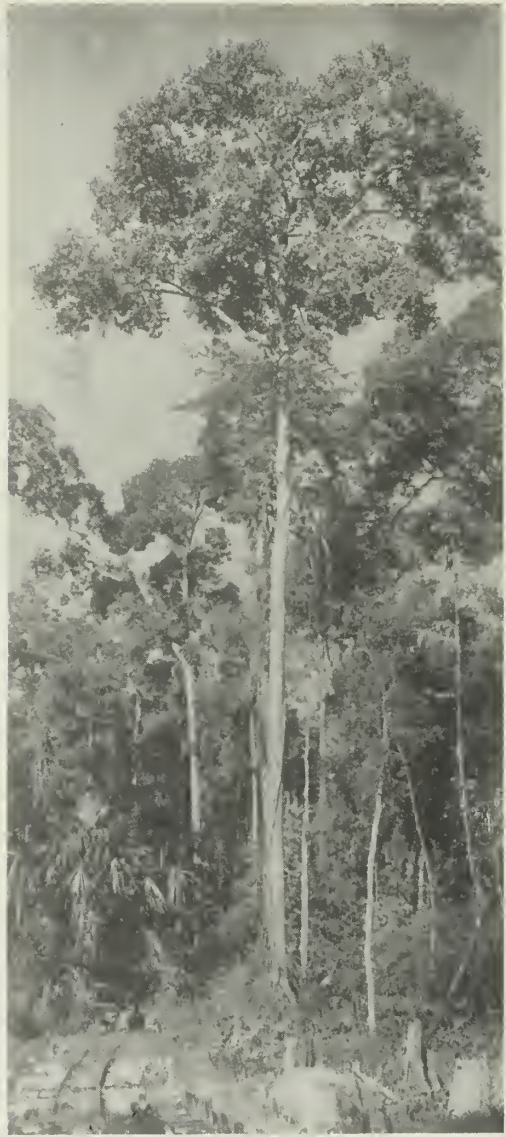


Plate 10. Left, *Cyathocalyx ridleyi* with monopodial crown, in hilllock-forest, Jemaluang Road mile 13½, 1935.— Right, *Calophyllum sclerophyllum* in the freshwater swamp-forest, S. Kayu 1935.



Plate 11. Upper, pneumatophores and trunks of *Polyalthia sclerophylla* at low tide near Mawai.— Lower stilt-roots of *Ploiarium alternifolium* in the mempisang-belt, with Hassan, near Mawai.



Plate 12. *Elaeocarpus macrocerus*, stilt-roots and pneumatophores in the freshwater swamp-forest, with Hassan, near Mawai; the lower figure showing four (actually five) buttressed trunks arisen from one prostrate trunk.



Plate 13. Upper, mat of aerial roots of *Palaquium xanthochyllum*, with erect pneumatophores of *Polyalthia sclerophylla*, by the Sedili Besar.— Lower, loop-root pneumatophores of *Calophyllum sclerophyllum* in the freshwater swamp-forest.



Plate 14. Upper, a *Tristiana*-bank on the Sedili Besar at low water, with *Tristiana sumatrana* (left) and *Lophopetalum multinervium* (centre).— Lower, *Myristica elliptica*, base of trunk (left) and loop-roots, in the freshwater swamp-forest.



Plate 15. Upper, stilt-roots of *Macaranga puncticulata* (centre) and *Endospermum* (on each side), Mawai 1934.— Lower, stilt-roots of *Hopea resinosa* (left) and *Eugenia subhorizontalis* (right), with the forest-guard Ibrahim, S. Berassau 1935.



Plate 16. *Lophopetalum multinervium* (central sunlit trunk) with pneumatophores, in the freshwater swamp-forest near Mawai 1931.



Plate 17. Left, pneumatophores of *Lophopetalum multinervium* in the freshwater swamp-forest at Jason Bay. — Right, still-roots of *Palaquium xanthochyllum*, with *Awar-ti*, in the freshwater swamp-forest, S. Kayu.



Plate 18. Left, stilt-roots of *Platea latifolia*, with Awan-ti S. Berassau 1935.— Right, stilt-roots of *Platea excelsa* var. *riedeltiana*, Pontian 1939.



Plate 19. Stilt-roots of *Blumeodendron tokbrai*. Left, at S. Berassau 1935, with Awan-ti.—
Right, in peat swamp-forest at Pontian 1939.



Plate 20. Left, buttressed trunk of *Adinandra sarosanthera*, S. Kayu 1935.— Centre, stilt-roots of *Palaquium*, sp. ? (s.n. 9 Sept. 1934, Jemaluang Road).— Right, stilt-roots of *Neoscortechinia nicobarica* in freshwater swamp-forest near Mawai.

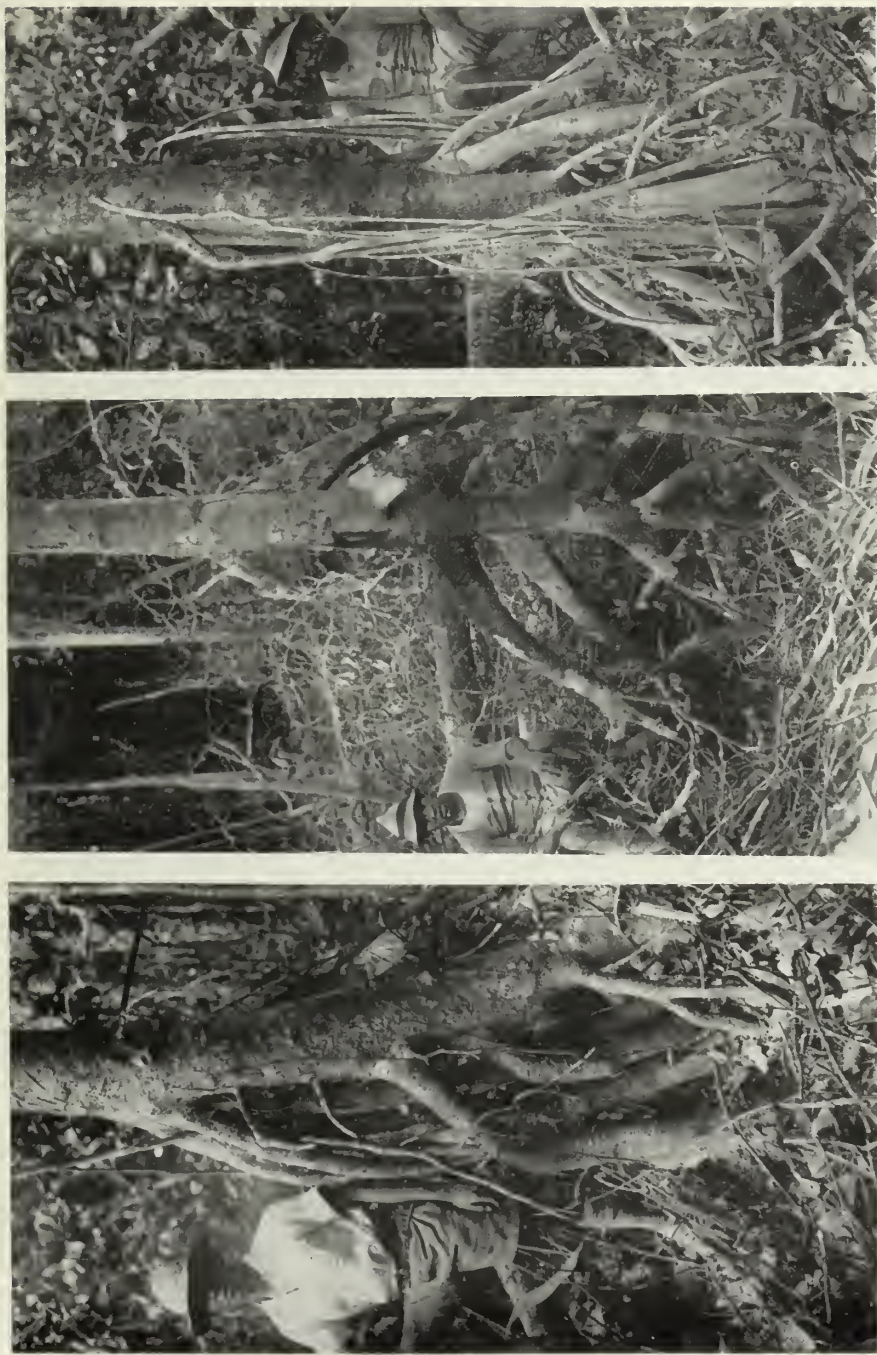


Plate 21. Stilt-roots, S. Kayu 1935. Left, *Notaphoebe coriacea* (SFN 28722) with Awan-ti.—
Centre, *Melanochyla bracteata* (SFN 21340) with Mussib.— Right, *Goniothalamus malayanus*
(SFN 28739) with Mussib.

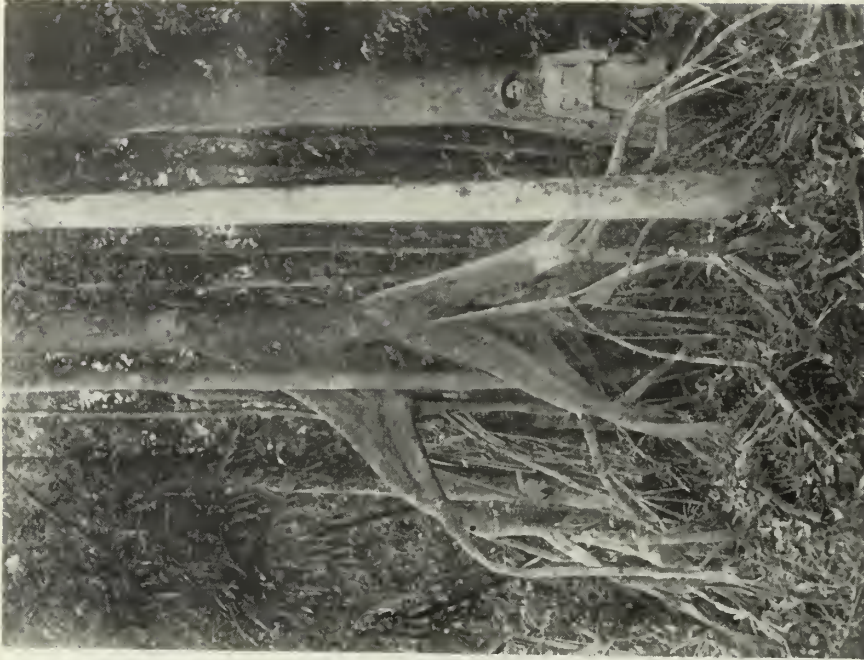


Plate 22. Left, stilt-roots of *Calophyllum sclerophyllum*, Mawai 1934, with Hassan.— Right, stilt-roots of *Gluta wallichii* ? (s.n. 3 Feb. 1935, S. Kayu) with the forest-guard Che' Ali.



Plate 23. Left, stilt-roots of *Eugenia longiflora* (s.n. 21 May 1934, Mawai) with Hassan.—
Right, stilt-roots of *Garcinia mangayai* with the forest-guard Ibrahim, S. Kayu Ara 1935.



Plate 24. Jurong, Singapore, 1932. Left, *Xylocarpus fusca* with stilt-roots and loop-roots.—
Centre, *Myristica lowiana*, sapling.— Right, *Tristantia ? merguensis*, blaze at 1.3m.

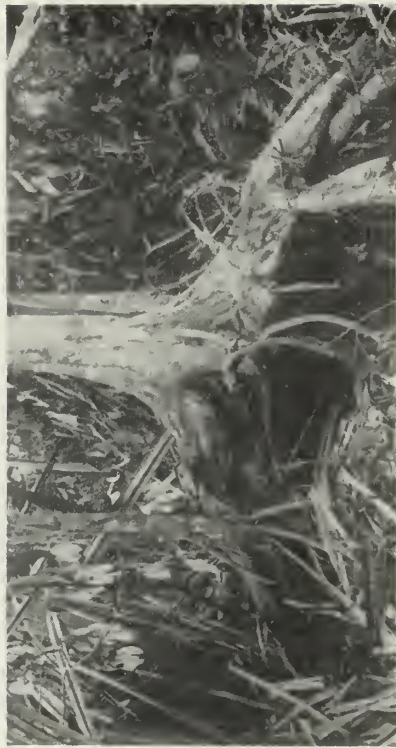


Plate 25. Left, *Dracaena granulata* (SFN 28719) in freshwater swamp-forest near Mawai.—
Upper right, Jemaluang Road, 1935.— Lower right, *Mussaendopsis beccariana*, Jurong 1932.



Plate 26. Jason Bay 1934. Upper, coastal abrasion at S. Rhu Reba with the *Casuarina*-forest cut back to a single file against *Eugenia grandis* forest (on the right); *Beilschmiedia tonkinensis* as the dark crown in the distance between the *Casuarina*-trees.— Lower, *Petunga roxburghii* (on the right) in young *Casuarina*-forest, with *Hibiscus* and *Scaevola* on the left, S. Tuensch.



Eg

Ec

C

Eg

O C

B

Plate 27. Jason Bay 1934. Upper, *Casuarina*-forest developing just south of S. Tuensch.— Centre, clearing at S. Rhu Reba with remains of *Eugenia grandis* forest (in the centre) and *Casuarina* on the right.— Lower, clearing at S. Rhu Reba with intact transect of *Eugenia grandis* forest, the sea on the left, two old *Casuarina*-trees embedded in the forest; B, *Beilschmiedia tonkinensis*; C, *Casuarina*; Ec, *Erythroxylon cuneatum*; Eg, *Eugenia grandis*; O, *Oncosperma filamentosum*.



Plate 28. Jason Bay, S. Diman 1934, with young forest of *Sonneratia alba*. Upper, near the river-mouth with *Casuarina*, a sward of *Paspalum vaginatum*, and seedlings of *Rhizophora*.— Lower, further inland with *P. vaginatum* in the foreground and *Cyperus malaccensis* behind.



Plate 29. Upper, Tg Temalak across Telok Temalak.— Centre, the coast near Tg Gemoh.— Lower, the coast between Tg Temalak and Tg Tebar with *Lumnitzera racemosa* at the stream-mouth, 1934.



Plate 30. Upper, the stream as in Plate 29, with *Lumnitzera racemosa* on both sides, *Pandanus odoratissimus* (centre), and a bush of *Scyphiphora* (right).— Lower, the coastal frontage of *L. racemosa*, as in Plate 29.



Plate 31. Jason Bay 1934. Left, *Beilschmiedia tonkinensis*.— Centre, *Tacca leontopetaloides*, the form with purple-streaked stem.— Right, *Tacca palmata*.



Plate 32. Jason Bay 1934, with Haron. Left, *Mangifera ? foetida* in dry climax-forest.—
Centre, *Eugenia syzygioides* in *E. grandis* forest.— *Ganua moileyana* in the freshwater swamp-
forest, the blaze at 1.3 m.



Plate 33. Upper, the relic of the peat swamp-forest at Pengkalan Rajah, Johore, 1939.—
Centre, stump of *Melanorrhoea wallichii* at Jurong, 1933.— Lower, an uprooted tree of
Parartocarpus venenosus ssp. *forbesii* at Jurong, 1933.



Gr G Gr G G T S G K G G C M Sr M6

Plate 34. Jurong, Singapore, 1932, the forest profile during felling C, *Cratogeomys arborescens*, with surrounding small trees of *Melanorrhoea wallichii*; G, *Ganua molleyana*; Gr, *Garcinia ? rostrata*; K, *Koompassia malaccensis*; M, *Melanorrhoea* sp.; Mb, *Mussaendopsis beccariana*; S, *Santiria laevigata* with epiphytic *Schefflera cephalotes*; Sr, *Santiria rubiginosa*; T, *Tristania ? merguensis*.



P

Pt



M X

P

M

Plate 35. Mandai Road, Singapore, the forest in process of felling in 1940. M. *Melanorrhoea wallichii*; P, *Palaquium xanthochymum*; Pt, *Pentace triptera*; X, *Xylopia fusca*.



P X E M

Plate 36. Upper, forest of *Kostermansia* with nine canopy trees, Ulu Tiram, Johore 1932.— Lower left, peat swamp-forest at Pontian 1939; *Amoora rubiginosa* with pinnate leaves (on the left) and *Tetractomia tetrandra* with small dense crown on the top of the tall slender trunk (on the right).— Lower right, freshwater swamp-forest, Mandai Road 1940; E, *Eugenia* sp. (SFN 37133); M, *Myristica iners*; P, *Pometia pinnata* f. *alnifolia*; X, *Xylopia fusca*.

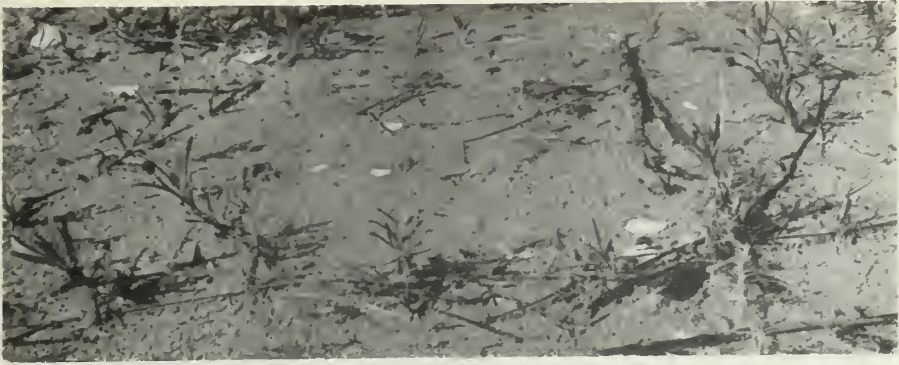


Plate 37. Upper, *Spilanthes urens* at S. Tuenseh, Jason Bay 1934.— Lower Left, *Polyalthia hypoleuca* at Pontian, 1939.— Lower right, *Schefflera cephalotes*, epiphytic on the trunk of *Santiria laevigata* and supplanting the crown, at Jurong 1932.



Plate 38. *Myristica lowiana*, with *Pandanus atrocarpus*, at Jurong 1932.



Plate 39. Upper, *Garcinia ? rostrata* at Pontian 1939.— Lower, *Melanochyla auriculata* in freshwater swamp-forest near Mawai 1934.



Plate 40. Upper, *Ploiarium alternifolium* in incipient peat swamp-forest at Pontian 1939.—
Lower, *Podolasia stipitata* near Mawai 1937, with L. Moysey.









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