

การศึกษาพืชที่มีระบบท่อลำเลียงบริเวณน้ำตกกะโรม
จังหวัดนครศรีธรรมราช
A STUDY OF VASCULAR PLANTS AT GAHROME FALLS
NAKHON SI THAMMARAT PROVINCE, THAILAND



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บัณฑิตวิทยาลัย มหาวิทยาลัยสงขลานครินทร์อนุมัติให้วิทยานิพนธ์ฉบับนี้เป็นส่วนหนึ่งของ
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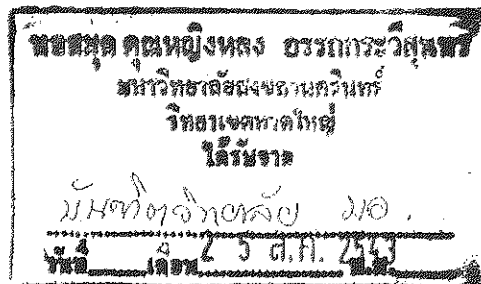
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บทคัดย่อ

ได้ศึกษาและเก็บรวบรวมพรรณพืชที่มีระบบท่อลำเลียงบริเวณอุทยานแห่งชาติเขาค้อ
น้ำตกกะโรม อำเภอลานสกา จังหวัดนครศรีธรรมราช จักจำแนกได้ 81 วงศ์ 174 สกุลและ
220 ชนิด ได้บรรยายลักษณะของพืชดังกล่าว พร้อมทั้งข้อมูลพื้นฐานทางด้านพฤกษศาสตร์ ได้แก่
นิเวศวิทยา การแพร่กระจายและช่วงเวลาของการออกดอกและผล เพื่อเป็นประโยชน์ในการ
ศึกษาค้นคว้าทางด้านพฤกษศาสตร์และวิทยาศาสตร์สาขาอื่นต่อไป

ABSTRACT

A list of vascular plants at Gahrome Falls, Khao Luang National
Park, Lansagah District, Nakhon Si Thammarat Province is given. It
consists of 81 families, 174 genera, and 220 species. Morphological
characteristics and basic botanical data, such as ecology, abundance,
and phenology of these plants are described. It is hoped to provide an
example for further botanical study and an aid to discovery in other
sciences.

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INTRODUCTION

Gharome Falls, Khao Luang National Park, is located in Lansagah District, Nakhon Si Thammarat Province, Thailand; about 32 kilometers west of Nakhon Si Thammarat and about 11 kilometers west of Lansagah (Figs 1 and 2).

My interest in the flora of Gharome Falls, Khao Luang National Park, started when I started my M.Sc. programme at the Prince of Songkla University (PSU). So, I was able to start active field work. The flora has proved to be more interesting and diverse than I originally thought. Aside from a few random collections by Kerr and Smitinand; Gharome Falls is botanically interesting and had never been studied in detail floristically. In addition to learning the flora of Gharome Falls and building the PSU herbarium, another purpose of this project was to produce a field guide for botanists and students.

CLIMATE

The climate of peninsular Thailand, in fact all of the lowland areas of Thailand and the Malay Peninsula, is monsoonal in nature. Khao Luang National Park is subject to a monsoon climate. A river flows all year round. It rains almost all year, in denuded peripheral areas without forest and the temperature is higher than in forested areas. The average temperature is about 23°C. In the primary evergreen forest at Gharome Falls, the average annual rainfall is about 3700 mm., It mostly rains from May to December. The climatological data and rainfall data in Nakhon Si Thammarat Province are shown in Tables 1 and 2

Table 1 : CLIMATOLOGICAL DATA FOR THE PERIOD 1951-1980*

Station NAKHON SI THAMMARAT	Elevation of station above MSL.												7 meters
Index Station 48 552	Height of barometer above MSL.												9 meters
Latitude 08° 28' N.	Height of thermomometer above ground												1.20 meters
Longitude 99° 58' E.	Height of Wind vane above ground												14.50 meters
	Height of rainauge												0.57 meters
	Jan	Feb	Mar	Apr	May	Jun	Jul	Agu	Sep	Oct	Nov	Dec	Year
Pressure(+ 1000 or 900 mbs.)													
Mean	11.98	11.36	10.61	09.19	08.05	08.07	08.24	08.24	08.79	09.81	10.81	11.58	09.70
Ext. Max.	20.42	18.50	18.69	15.84	14.24	14.24	14.40	13.90	15.10	15.50	16.91	17.80	20.42
Ext. Min.	04.55	04.62	03.43	02.25	02.25	01.10	02.40	02.28	01.84	06.10	01.89	04.86	06.10
Mean daily range	3.64	3.85	4.04	4.03	3.75	3.44	3.36	3.53	3.96	4.14	3.84	3.62	3.77
Temperature (°C.)													
Mean	26.1	26.9	28.0	28.7	28.5	28.5	28.1	28.0	27.7	27.0	26.1	25.9	27.5
Mean Max.	29.7	31.1	32.7	33.6	33.5	33.3	33.1	33.0	32.6	31.2	29.4	29.1	31.9
Mean Min.	21.8	21.7	22.1	23.1	23.7	23.6	23.1	23.2	23.0	22.9	22.7	22.4	22.8
Ext. Max.	34.6	35.4	38.0	37.1	37.3	37.7	36.5	37.1	36.6	35.0	34.2	32.6	38.0
Ext. Min.	17.2	17.2	17.8	18.6	20.2	20.7	19.4	19.5	19.4	20.2	18.0	17.1	17.1
Relative Humidity (%)													
Mean	83.0	80.0	78.0	79.0	80.0	77.0	77.0	77.0	80.0	84.0	86.0	85.0	81.0
Mean Max.	95.6	95.4	95.1	95.1	94.4	92.8	93.3	92.8	94.6	95.9	96.0	95.5	94.7
Mean Min.	66.1	60.6	57.0	57.7	59.6	57.5	57.0	57.5	59.2	67.0	73.4	71.4	62.0
Ext. Min.	42.0	36.0	30.0	37.0	38.0	34.0	37.0	27.0	38.0	42.0	46.0	50.0	27.0
Rainfall (mm.)													
Mean	201.6	50.9	43.9	95.1	163.0	84.8	112.4	105.3	152.7	341.7	609.7	468.3	2429.4
Mean rainy days	14.2	6.1	5.1	8.7	16.2	12.9	14.3	15.9	17.8	21.0	22.6	20.2	175.0
Greatest in 24 hr.	433.3	102.3	70.1	102.8	87.0	62.4	83.0	84.2	83.5	271.7	414.0	238.6	433.3
Day/Year	5/75	19/75	15/65	12/61	5/60	6/51	26/51	15/65	5/61	21/63	23/75	2/51	5/75

* Data from the Department of Meteorology, Songkla, Thailand

Table 2 : Rainfall data for the period 1971-1983 in Nakhon Si Thammarat Province (mm.)*

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1971	21.4	37.3	118.2	23.9	120.5	42.1	23.2	18.2	81.9	503.4	523.4	651.4	2261.3
1972	92.8	46.0	50.5	189.8	136.1	43.8	19.3	23.5	168.3	388.9	423.8	194.5	1817.3
1973	67.7	29.0	94.2	25.5	204.6	33.5	148.8	77.4	175.5	592.6	641.6	548.5	2639.0
1974	19.9	22.6	12.2	167.8	213.9	68.9	141.0	36.2	228.9	209.5	654.9	838.4	2613.5
1975	1239.5	158.5	44.7	34.5	317.0	974	99.7	110.6	270.1	335.5	616.9	266.2	3590.6
1976	37.5	0.1	8.5	149.4	159.7	66.0	177.7	104.3	105.7	316.3	1117.1	108.9	2351.2
1977	225.1	49.9	68.6	0.0	93.4	117.5	97.6	71.5	180.3	401.2	716.4	386.3	2437.8
1978	145.4	1.3	3.1	196.2	131.0	28.0	57.2	56.0	86.5	178.9	400.8	390.8	1675.2
1979	48.5	20.4	1.9	131.7	133.0	203.7	128.8	129.5	122.1	115.5	617.0	190.0	1842.1
1980	39.8	0.5	16.1	47.2	88.7	106.6	102.9	108.9	140.9	210.9	942.2	268.3	2072.1
1981	42.9	22.7	0.0	193.6	237.6	64.4	53.1	138.7	224.3	290.7	389.1	536.8	2193.8
1982	5.6	20.4	167.3	197.9	84.9	63.1	57.0	222.2	134.7	373.3	423.7	162.0	1912.1
1983	161.6	0.0	19.1	3.0	138.0	193.8	129.4	80.1	164.1	222.5	352.1	507.1	1970.8

* Data from the Department of Meteorology, Songkla, Thailand

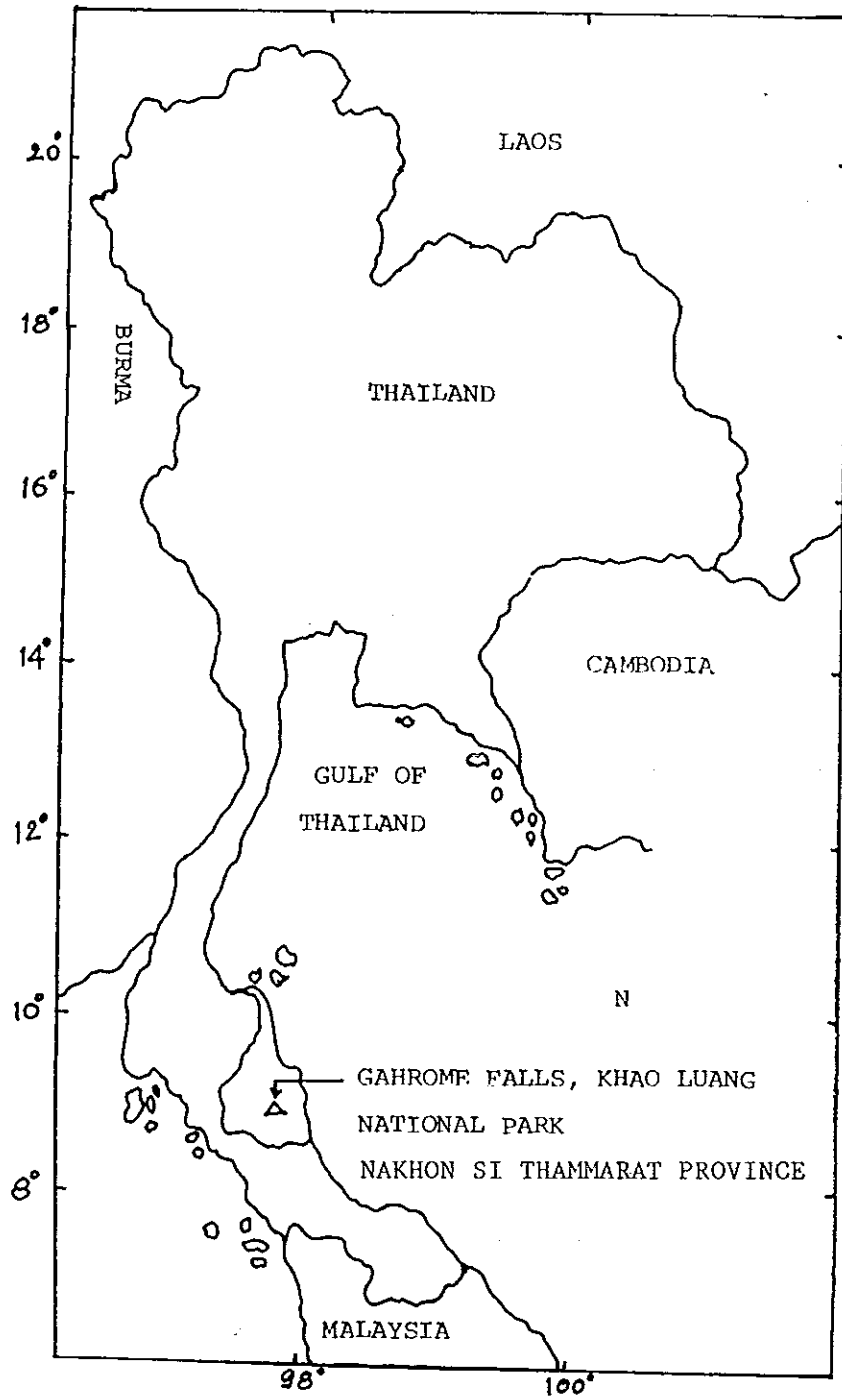


Fig. 1. Map of Thailand showing the location of Gahrome Falls, Khao Luang National Park

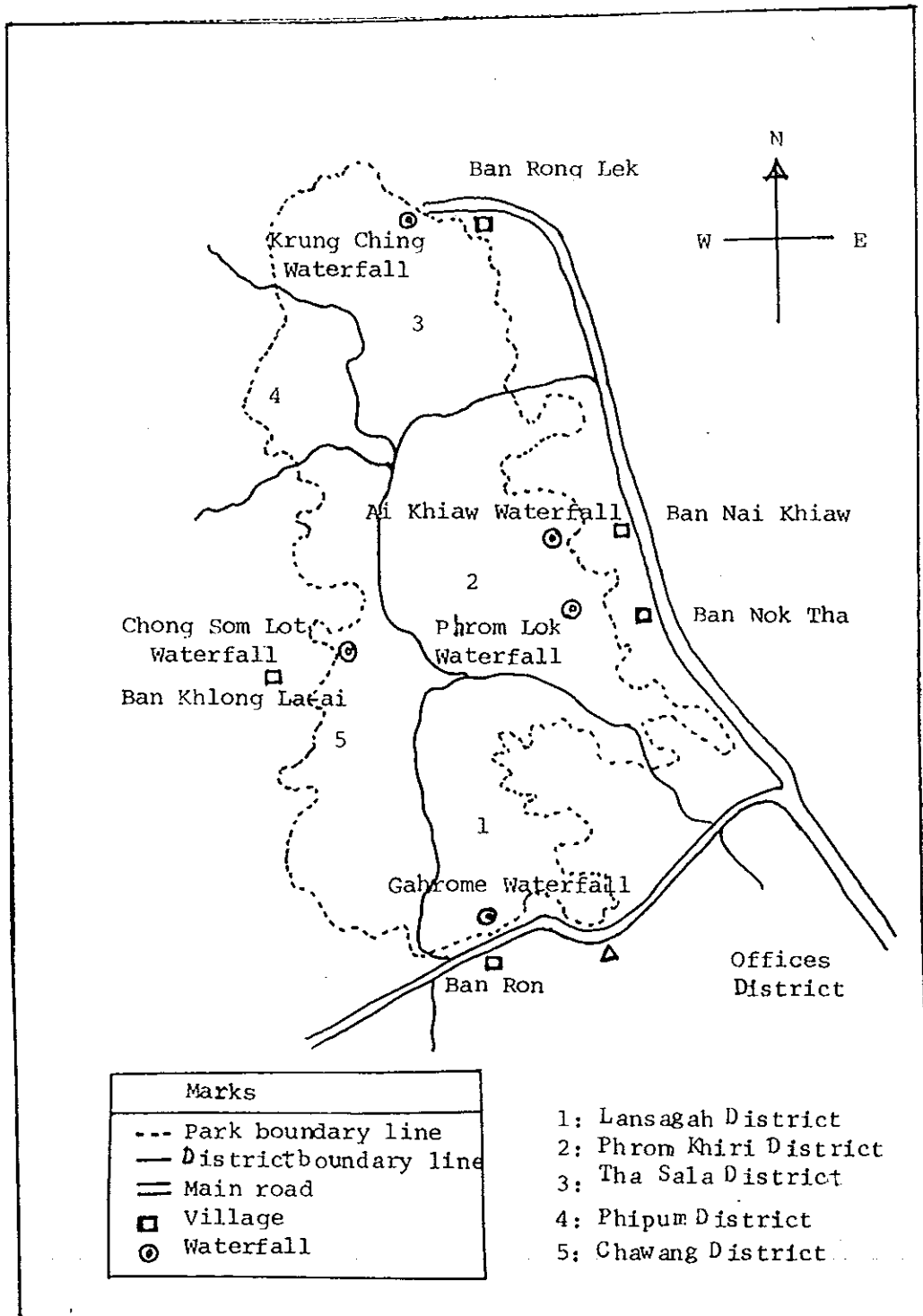


Fig. 2 Map of Khao Luang National Park Nakhon Si Thammarat Province

VEGETATION

Gharome Falls is a primary evergreen forest on granitic bedrock in a mountainous area and with undulating foothills. A river flows all year round, and the maximum elevation, at Khao Luang is 1,835 m. In general, the vegetation of Gharome Falls consists of many plants along the streams, shaded to partly open areas in the primary evergreen forest. All of these species are common, not common to rare and not found in the same places. Some areas, especially those along the rivers on the edge of Gharome Falls, with trees, treelets, shrubs, herbs and epiphytes, for example : *Anaxagorea javanica* Bl. var. *javanica* (Annonaceae) *Ilex cymosa* Bl. (Aquifoliaceae), *Dillenia indica* L (Dilleniaceae), *Baccaurea ramiflora* Lour. (Euphorbiaceae), *Aeschynanthus radicans* Jack (Gesneriaceae), *Hoya diversifolia* Bl. (Asclepiadaceae) etc.

Woody climbers are common, not common to rare in the primary evergreen forest, include : *Aganosma wallichii* G. Don (Apocynaceae), *Combretum foliatum* Craib (Combretaceae), *Erycibe griffithii* Cl. (Convolvulaceae), *Bauhinia integrifolia* Roxb. ssp. *integrifolia* (Leguminosae-Caesalpinioideae), *Mussaenda villosa* Wall. ex G. Don (Rubiaceae) *Gnetum latifolium* Bl. var. *funiculare* (Bl.) Mgf. and *Gnetum tenuifolium* Ridl. (Gnetaceae)

The understorey of the primary evergreen forest varies. In general, the most common understorey species, example shrubs and treelets, in shaded places are : *Ixora javanica* (Bl.) DC. (Rubiaceae) and *Pseuderanthemum crenulatum* (Wall. ex. Lindl.) Radlk var. *crenulatum* (Acanthaceae)

The ground flora in the primary evergreen forest is very variable, that is in the least disturbed, most shaded, and rocky places in the forest, shaded to partly open area in the primary evergreen forest. Some common ground species are : *Psychotria sarmentosoides* Val. (Rubiaceae), *Elettariopsis curtisii* Bak. (Zingiberaceae), *Scleria lithosperma* (L.) Sw. var *lithosperma* (Cyperaceae) *Kaempferia pulchra* Ridl (Zingiberaceae) etc.

Several ferns were found in open places, for example : *Cheilanthes tenuifolia* (Burm.) Sw. (Vittariaceae), *Blechnum orientale* L. (Blechnaceae) etc.

Melastoma malabathricum L. (Melastomataceae), *Jasminum scandens* L. (Oleaceae), *Greenea corymbosa* (Jack) K. Sch. (Rubiaceae), are some common shrubs, climbers and treelets along the margins of the forest.

THE SCOPE OF STUDY

The scope of this flora is to study and collect vascular plants from 100-450 m elevation in the primary evergreen forest along the river and 100 m on each side of it, at Gharome Falls.

PURPOSE

1. To study the vascular flora at Gharome Falls in the primary evergreen forest.
2. To describe some of these vascular plants from Gahrome Falls.
3. To study the ecology, abundance, and phenology of these plants.
4. To build the PSU herbarium collections.
5. To produce a field guide for botanists and students.

Review of Literature

In 1928 A.F.G. Kerr visited Wat Kiriwong, which lies at the foot of Kao Luang, a high mountain in Nakhon Si Thammarat Province. In this forest he found numerous trees, such as :

1. *Dipterocarpus* sp.(Yang) (Dipterocarpaceae)
2. *Sterculia* sp.(Sam rong) (Sterculiaceae)
3. *Shorea* sp.(Takien sui) (Dipterocarpaceae)
4. *Bouea* sp.(Mapring) (Anacardiaceae)
5. *Mesua ferrea* (Nak but) (Guttiferae)
6. *Pavonia* sp.(Kaw) (Malvaceae)
7. *Cinnamomum* sp. (Samun laweng) (Lauraceae)
8. *Calophyllum* sp. (Ta hon) (Guttiferae)
9. *Arenga saccharifera* (Rang kai) (Palmae)
10. *Oncosperma horrida* (Bayai) (Palmae)

Tem Smitinand (1961) collected the following vascular plants at Khao Luang, Nakhon Si Thammarat Province :

1. *Melodorum bicolor* Hk. f. et Thoms. (Annonaceae)
2. *Salomonina aphylla* Griff. (Polygalaceae)
3. *Ryparosa wrayi* King (Flacourtiaceae)
4. *Chisocheton macrophyllus* King (Meliaceae)
5. *Cassia hirsuta* Linn. (Leguminosae)
6. *Dialium platys epalum* Baker (Leguminosae)
7. *Pogonantha pulverulenta* Blume (Melastomataceae)
8. *Hoya coriacea* Blume (Asclepiadaceae)

9. *Hoya maingayi* Craib (Asclepiadaceae)
10. *Cyrtandra despar* DC. (Gesneriaceae)
11. *Didymocarpus kompsoboea* C.B. Clarke (Gesneriaceae)
12. *Peperomia kotana* C.DC. (Piperaceae)
13. *Piper kurzii* Ridl. (Piperaceae)
14. *Piper flavimarginatum* C. DC. (Piperaceae)
15. *Myristica laurina* Blume (Myristicaceae)
16. *Dimorphocalyx ovalis* Ridl. (Euphorbiaceae)
17. *Gelonium tenuifolium* Ridl. (Euphorbiaceae)
18. *Baccaurea scortechinii* Hk. f. (Euphorbiaceae)
19. *Odontochilus calcaratus* Hk. f. (Euphorbiaceae)
20. *Cirrhopetalum vaginatum* (Lindl.) Rehb. f. (Orchidaceae)

There are no other reports of botanical studies on or around Khao Luang apart from these two. They cover thirty collections altogether which must represent only a very small fraction of the total flora of the area.

MATERIALS AND METHODS

Materials

1. Plant press 30 x 45 cm, newspapers, cardboard, aluminium drying plates, felt and sponge pads, knife, plant clippers, plastic bags, pencils, and note books.

2. Kerosene ovens and electrical ovens

3. Hand-lens and dissecting microscope

4. Poisoning agent :

Formula : 95 % ethyl alcohol (C_2H_5OH) 1000 cc.

 Mercuric chloride ($HgCl_2$) 20 gm

5. Materials for mounting herbarium specimens :

5.1 Paper herbarium sheets, 29 x 42 cm

5.2 White paper covers, 29.5 x 42.5 cm

5.3 Brown paper covers, 30 x 44 cm

5.4 Labels, 10 x 18 cm

5.5 Needles and thread

5.6 Glue

6. Photographic equipment :

6.1 Camera "Coshina"

6.2 Film for black & white and colour slides..

Methods

1. A field survey of vascular plants was undertaken and specimens with flowers or fruits were collected. Also field notes on the morphology of each specimen including habit, colour of leaves and flowers, habitat, and elevation were taken as well as photographs of some species.

2. The specimens collected were identified with the aid of various taxonomic references and comparison with specimens in the Herbarium of the Department of Biology, Faculty of Science, Prince of Songkla University (PSU).

3. The keys are based on significant morphological characters. Keys to genera and species and a description of each species were made. These were supplemented by drawings and photographs of an example of some families.

4. Dry plant specimens were mounted on herbarium sheets and labeled. The first duplicates were deposited in the Herbarium of the Department of Biology, Faculty of Science, Prince of Songkla University (PSU)

Period of Study

From January 1985 to December 1985

RESULTS

The study of the vascular plants at Gahrome Falls, Khao Luang National Park throughout the year resulted in collections representing 81 families, 174 genera, and 220 species. The specimens were identified with the aid of available taxonomic literature; Flora of Java, Flora of British India, Forest Flora of British Burma, Flora of Malay Peninsula, Flora of Malaya, Flora of Thailand, Flora of Malesiana, Tree Flora of Malaya, and other texts, mostly from journals.

Table 3 : List of the vascular plant groups at Gahrom Falls

Plant Groups	Families	Genera	Species
Monocotyledons	13	38	41
Dicotyledons	52	116	154
Gymnospermae	1	1	3
Pteridophytes	15	19	22
Total	81	174	220

TAXONOMIC PART

ANGIOSPERMAE

Dicotyledoneae

Acanthaceae

Herbs or treelets. Leaves opposite, entire, exstipulate, often in unequal opposite pairs. Flowers showy, bisexual, irregular. Inflorescence terminal or axillary, spikate or cymose. Calyx-lobes 4-5, corolla-lobes 5, often 2-lipped, tube cylindric. Stamens 2-4, epipetalous. Ovary superior, 2-loculate, ovules 2-many, placentation axile. Capsule loculicidal.

Key to genera

1. Herbs; calyx-lobes linear, corolla-tube yellowish, lobes whitish-yellowish; capsule 4-seeded..... *Justicia*
1. Treelets; calyx-lobes lanceolate; corolla-tube purple to lilac, lower lip with blue dots; capsule 8-seeded..... *Pseuderanthemum*

Pseuderanthemum crenulatum (Wall. ex. Lindl.) Radlk var. *crenulatum*

Treelet 1-1.5 m tall, 0.5-1 cm diam., mostly unbranched. Blades elliptic, 2-5 x 6-12 cm, apex acuminate, base acute, glabrous, dark green above, green underneath, drying dull black; secondary nerves 5-7 pairs. Petioles glabrous, 0.5-2 cm long. Racemes terminal, slender, 6-12 cm long. Calyx-lobes lanceolate, 2-3 x 1.5-2 mm, green. Corolla salverform, purple to lilac, tube 3-3.5 cm long, lobes rounded, lower lip with blue dots. Stamens : filaments filiform, anthers black, glabrous. Ovary glabrous, 2-loculate, 4-ovuled in each locule. Capsule 1.5-1.8 cm long, 8-seeded.

HABITAT : Shaded rock areas, primary evergreen forest, alt. 200 m; specimen : Ramsri 2

FLOWERING : February-March, FRUITING : March-May

ABUNDANCE : Common

DISTRIBUTION : Cambodia, Malay Peninsula (Ridley, 1923)

Justicia ptychostoma Wall. ex Nees

Herb about 50-70 cm tall. Blades elliptic or lanceolate, 10-20 x 5-7.5 cm, apex acuminate, base acute, margin undulate, pubescent, dark green above, light green underneath, drying dull green; secondary nerves 5-6 pairs. Petioles glabrous, 4-8 cm long. Spikes axillary and terminal, 7-10 cm long. Bracts ovate, 1 x 3 mm. Calyx-lobes linear, 2 x 0.5 mm, green. Corolla-tube 0.8-10 mm long, yellowish, lobes whitish-yellowish. Stamens : filaments filiform, anther cells oblique. Ovary glabrous, 2-loculate, 2-ovuled in each locule. Capsule 1-1.5 cm long, 4-seeded.

HABITAT : Shaded rocky places, primary evergreen forest, alt. 250 m; specimen : Ramsri 99

FLOWERING : August-October, FRUITING : September-November

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Ridley, 1923)

Anacardiaceae

Trees, often with a clear resin which turns black on exposure, very poisonous. Leaves simple, spirally arranged, exstipulate. Inflorescence terminal or axillary, paniculate. Flowers small, unisexual or bisexual. Calyx-lobes and petals 3-5. Ovary 1-to 3-loculate, placenta-

tion basal. Fruit a drupe.

Key to genera

1. Stamens 5, style 1; carpels 3, united*Drimycarpus*
 1. Stamens 8-10, styles 5; carpels 5, free*Buchanania*

Drimycarpus luridus (Hk. f.) Hou

Tree 5-7 m tall, 8-10 cm in diam., branchlets glabrous. Blades lanceolate, 6-12 x 2.5-5 cm, apex acuminate, base cuneate, margins undulate, dark green above, green and glaucous underneath; secondary nerves 12-13 pairs, strongly reticulated. Petioles 1-1.5 cm long. Inflorescence (Hou, 1978) 4-29 cm long, often terminal, sometimes axillary. Male flowers sessile or subsessile. Calyx-lobes triangular, 0.5-0.7 mm long; petals ovate, 1.5-2 x 0.6-1 mm, pale greenish-yellow or yellow; stamens unequal in length. Infructescence axes yellowish. Drupes yellowish-green outside, whitish inside, about 1.5 x 1 cm. Sap pale yellow, a bad skin irritant.

HABITAT : Partly open area along the river, margins of the primary evergreen forest, alt. 150 m; specimen : Maxwell 85-408

FLOWERS : Not seen, FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : Sumatra, Malay Peninsula, Borneo (Hou, 1978)

Buchanania sessifolia Bl.

Tree 10-15 m tall, 20-25 cm in diam. Blades thinly coriaceous, oblanceolate or lanceolate, 6-18 x 2.5-6.5 cm, apex acute, base narrowed, margin entire, glabrous, dark green above, green underneath; secondary nerves 8-10 pairs, midrib conspicuous. Petioles 1-3 cm long. Inflorescence axillary, panicles. Calyx-lobes triangular, 0.5-1 mm long, yellowish-green, persistent. Petals elliptic to oblong, 2 x 1 mm, light yellowish. Stamens : filaments 1-1.5 mm long, whitish, anthers sagittate, 0.6-0.7 mm long, brownish. Ovary light yellowish, style yellowish-green. Drupes light green, 9 x 7 mm.

HABITAT : Shaded, primary evergreen forest, alt. 150 m;
specimen : Maxwell 85-858

FLOWERING : August-October, FRUITING : September-November

ABUNDANCE : Not common

DISTRIBUTION : Laos, Malay Peninsula, Sumatra, and Borneo (Hou, 1978)

Annonaceae

Shrubs, treelets, or trees. Leaves simple, alternate, exstipulate, entire. Inflorescence opposite to the leaves, axillary. Flowers solitary or in clusters. Sepals 3; petals 6, two-seriate (3 + 3). Stamens numerous, spirally arranged. Ovaries several to many free, placentation parietal. Fruits usually dry or fleshy carpels. Seeds with ruminant endosperm.

Key to genera

1. Treelets 1-5 m tall, blade apex acute; ovary globose
 2. Inflorescence opposite to the leaf, sepals ovate, petals oblong to lanceolate; carpels dehiscent.....*Anaxagorea*
 2. Flowers solitary, axillary, sepals lanceolate, petals linear; carpels indehiscent*Polyalthia*
1. Trees 7-20 m tall, blade apex acuminate; ovary oblong, cylindrical or ovoid
 3. Inflorescence cauliflorous or axillary, flowers numerous
 4. Inflorescence cauliflorous; sepals orbicular, petals ovate *Stelechocarpus*
 4. Inflorescence axillary; sepals ovate, petals linear
 5. Carpel 1; ovary ovoid or cylindrical
 6. Sepals 5-10 mm long, petals obtuse at apex, 3-4.5 cm long; ovary cylindrical *Cyathocalyx*
 6. Sepals 1.5 mm long, petals acute at apex, 8-10 mm long; ovary ovoid *Mezzettia*
 5. Carpels 3-5; ovary oblong *Orophea*
 3. Flower axillary, solitary *Goniothalamus*

Anaxagorea javanica Bl. var. *javanica*

Treelet 3.5-5 m tall, 3 cm in diam., bark greyish. Blades coriaceous, elliptic or oblong, 6.5-17.5 x 3-6.5 cm, apex acute or acuminate, base slightly acute, both surfaces glabrous, dark green above, green underneath; secondary nerves 8-10 pairs. Petioles 0.5-1 cm long.

Inflorescence fragrant, 1-4 flowers, terminal or opposite to the leaves. Sepals ovate, apex acute, 5-6 x 3-4 mm, pubescent, green. Petals oblong to lanceolate, apex acute, 1-1.5 x 0.5-0.8 cm, outside yellow, inside pale yellow. Stamens numerous, filaments flat, 3 mm long, anthers triangular. Ovary orbicular, pubescent. Ripe carpels tomentose, dehiscent, seeds 2, black.

HABITAT : Shaded areas in the primary evergreen forest, alt. 300-350 m; specimen : Ramsri 54

FLOWERING : April-May, FRUITING : May-June

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula, Borneo, Java (Sinclair, 1955)

Cyathocalyx sumatranus Scheff.

Tree 15-20 m tall, about 20 cm in diam. Blades coriaceous, oblong or lanceolate, 14-30 x 5-10.5 cm, apex acuminate, base cuneate, margin undulate, glabrous, dark green above, green underneath; secondary nerves 12-18 pairs, sunken above, prominent underneath. Petioles 1 cm long, stout. Inflorescence axillary on stout woody peduncles, fragrant. Sepals ovate, acute, 5-10 mm long, pale brown. Petals linear, obtuse, 3-4.5 cm long, light yellowish, tomentose. Stamens numerous. Ovary cylindrical, glabrous.

HABITAT : Open margins of the primary evergreen forest along the river, on granitic rock, alt. 200-250 m; specimen: Maxwell 85-888

FLOWERING : August-September, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Sinclair, 1955)

Goniothalamus subevenius King

Tree 7-10 m tall, 8-10 cm in diam. Blades subcoriaceous, oblong, 12-20 x 3-6 cm, apex acuminate, base acute, glabrous, dark green above, light green underneath; secondary nerves 10-12 pairs inconspicuous. Petioles 1-1.5 cm long, glabrous. Flowers solitary, axillary, pedicels 1-1.5 cm long, green. Sepals ovate, 4 x 5 mm, green. Petals coriaceous, lanceolate, acute, 1.5-2 x 1-1.5 cm, yellow-greenish. Stamens : anthers orbicular, appendages broad, Ovaries oblong, carpels ovoid; ripe carpels green.

HABITAT : Shaded area, primary evergreen forest, alt. 200-300 m;
specimens : Maxwell 85-863 and Ramsri 3

FLOWERING : March-September, FRUITING : September-October

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Sinclair, 1955)

Mezzettia leptopoda (Hk. f. & Th.) Oliv.

Tree 10-15 m tall, 18-20 cm in diam., bark greyish. Blades coriaceous, oblong or elliptic, 12.5-15 x 4-5 cm, apex acuminate, base acute, glabrous, dark green above, green underneath; midrib broad and flattened above, raised underneath; secondary nerves 8-10 pairs. Petioles

7-8 mm long. Inflorescence axillary, 2-4 flowers. Pedicels 1-1.5 cm long, greenish, pubescent. Sepals ovate, acute, 1.5x1 mm, greenish yellow. Petals linear, acute, 8-10 x 1-2.4 mm, greenish yellow, both sides tomentose. Stamens 9-14, filaments about 1 mm long, anthers introrse. Ovary ovoid, glabrous, greenish. Flowers slightly fragrant.

HABITAT : Primary evergreen forest, alt. 150-200 m; specimen: Maxwell 85-298

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula and Borneo (Sinclair, 1955)

Orophea cuneiformis King

Tree 8-10 m tall, 8-10 cm in diam. Blades subcoriaceous, oblong or elliptic, 9-12 x 3-4 cm, apex acuminate, base rounded, dark green above, green underneath; secondary nerves 7-8 pairs, midrib tomentose. Petioles 3-4 mm long. Flowers axillary, 2-4 flowers. Pedicels 0.5-1.5 cm long, brown tomentose. Bracts numerous, linear or lanceolate. Sepals ovate, apex acuminate, 3 x 2-2.5 mm, pale brown tomentose. Petals obovate, 3 x 2.5 mm, pale greenish, apex greenish, base whitish-pinkish to pink, tomentose. Staminodes 3. Stamens 6, anthers flat, appendages broad. Ovaries oblong, tomentose, carpels cylindrical.

HABITAT : Shaded, moist, rocky place along a stream in the primary evergreen forest, alt. 200-250 m; specimen : Maxwell 85-861

FLOWERING : August-September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula (Sinclair, 1955)

Polyalthia bullata King

Treelet about 1 m tall, branches golden hair. Blades thinly coriaceous, lanceolate or oblong, 9-19 x 2-4 cm, apex acute, base cordate and auricle, glabrous, dark green above, light green underneath; midrib sparsely golden hairy underneath; secondary nerves 25-30 pairs, sunken above, prominent underneath. Petioles 3-4 mm long, pubescent. Flowers solitary, axillary. Pedicels 2-2.5 cm long, pale light green, pubescent. Sepals lanceolate, apex obtuse, 5-6 x 2-2.5 mm, pale light green, outside pubescent, inside glabrous. Petals 6, linear, 2-5-3 x 0.2-0.3 cm, light yellow, reddish at the base, pubescent. Stamens numerous, anther appendages orbicular. Ovaries orbicular, tomentose. Fruits suborbicular, tomentose, 0.8 x 0.7 cm.

HABITAT : Shaded areas, primary evergreen forest, alt. 300-350 m; specimens : Maxwell 85-693 and 85-718

FLOWERING : June-July, FRUITING : July-August

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula (Sinclair, 1955)

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

Tree 7-10 m tall, 6-8 cm in diam. Blades subcoriaceous, oblong or lanceolate, 15.5-19 x 5-6 cm, apex acuminate, base acute, dark green above, green underneath; secondary nerves 10-12 pairs, conspicuous underneath. Petioles 4-6 mm long. Inflorescence cauliflorous, pedicels 4.5-5 cm long. Sepals coriaceous, orbicular, 3 x 3.5 mm, brown. Petals ovate, 8-9 x 7-8 mm, outside pink, inside yellow. Stamens light yellow. Ovaries ovoid, pinkish, tomentose. Fruits ellipsoid, 3.5 x 2 mm, pubescent.

HABITAT : Shaded, primary evergreen forest, alt. 250-300 m;
specimen : Ramsri 30

FLOWERING : March-April, FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : Sumatra (Sinclair, 1955)

Apocynaceae

Trees or woody climbers, laticiferous. Leaves simple, opposite. Flowers bisexual, regular, in cymes. Calyx-tube short, lobes 5. Corolla-tube usually long and salver-shaped, lobes 5. Stamens 5, epipetalous. Ovary superior, 2-carpellate. Placentation axile or parietal. Fruits drupaceous or capsulate.

Key to genera

1. Woody climbers; inflorescence axillary or terminal,
2. Corolla yellow; anthers sagittate or ovoid

3. Inflorescence axillary; calyx-lobes triangular, 1-1.5 mm long, ciliate; corolla-tube 4-7 mm long, anthers ovoid *Willughbeia*
3. Inflorescence terminal; calyx-lobes lanceolate, 10-10.5 mm long, tomentose; corolla-tube 6-8 mm long, anthers sagittate *Aganosma*
2. Corolla white; anthers orbicular *Novetia*
1. Trees; inflorescence terminal.
4. Blades lanceolate to oblong; calyx-lobes acute, 0.5 mm long, corolla-tube 5-6 mm long *Hunteria*
4. Blades elliptic; calyx-lobes obtuse, 0.8 mm long, corolla-tube 8-9 mm long *Wrightia*

Aganosma wallichii G. Don

Woody climber, latex white. Blades subcoriaceous, elliptic or ovate, 8.5-11 x 3.5 cm, apex shortly acuminate, base obtuse or rounded, dark green above, light green underneath; secondary nerves 6-7 pairs. Petioles 1.5-2 cm long. Inflorescence terminal, cymose, 6-8 cm long, 10 cm wide. Bracts lanceolate, 4 x 1.5 mm. Calyx-lobes lanceolate, acuminate, 1.5-2 cm long, yellowish-green, tomentose. Corolla-tube cylindric, 6-8 mm long, light yellowish-green, lobes white. Stamens: filaments about 1 mm long, anthers sagittate. Ovary obovoid, many-ovuled. Flowers fragrant.

HABITAT : Open thicket along the river, primary evergreen forest, alt. 350-400 m; specimen : Maxwell 85-679

FLOWERING : June-August, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Burma, W. Malaysia (Kerr, 1939)

Hunteria zeylanica (Retz.) Gard. & Thw.

Tree 6-8 m tall, about 15 cm in diam. Blades subcoriaceous, lanceolate or oblong, 6-12 x 2-4 cm, apex caudate, base acute, dull green above, light green underneath; secondary nerves numerous, inconspicuous. Petioles 5-10 mm long. Inflorescence terminal, cymose, 1-1.5 cm long. Calyx-lobes ovate, acute, 1 x 0.5 mm, greenish. Corolla-tube 5-6 mm long, lobes 3-3.5 mm long, pale yellow. Stamens : filaments short, about 0.5 mm long, anthers sagittate. Ovary ovoid, 1 x 0.5 mm. Style slender, 5-7 mm long. Fruits globose, yellow or orange, 2-seeded.

HABITAT : Open thicket, rocky place along the river, primary-evergreen forest, alt. 250-300 m; specimen : Maxwell 85-675

FLOWERING : June-August, FRUITING : July-September

ABUNDANCE : Common

DISTRIBUTION : S. India, Ceylon, Sumatra, Burma, Andamans, Malay Peninsula, Indo-China (Ridley, 1923 & Kerr, 1939)

Nouettea cochinchinensis Pierre

Woody climber. Blades subcoriaceous, ovate, 9.5-14x5.5-9 cm, apex acute, base cordate, green above, light green underneath; secon-

dary nerves 5-9 pairs. Petioles 0.8-1 cm long. Calyx-lobes lanceolate, 1.5-2 mm long, greenish, tomentose. Corolla-tube 1.5 cm long, lobes 5-7 mm long, white. Stamens : filaments short, about 0.4 mm long, anthers orbicular, maroon. Ovary ovoid, style slender. Seed not seen.

HABITAT : Open place, margins of the primary evergreen forest along the river, alt. 350-400 m; specimen : Maxwell 85-680

FLOWERING : June-July, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Indo-China (Kerr, 1939)

Willughbeia edulis Roxb.

Woody climber with tendrils, sap white. Blades thinly coriaceous, elliptic, 7-14.5 x 2.5-4.5 cm, apex acuminate, base acute, margin entire, dark green above, green underneath; secondary nerves 15-20 pairs, parallel. Petioles 0.6-1 cm long. Inflorescence axillary, cymose. Peduncle short, 2-4 mm long. Calyx-lobes triangular, 1-1.5 mm long, ciliate, green. Corolla-tube 4-7 mm long, lobes about as long, yellow. Stamens : filaments glabrous, 1 mm long, anthers ovoid. Ovary orbicular, puberulous, style filiform, about 2 mm long, stigma conic.

HABITAT : Shaded area, primary evergreen forest, alt. 200-250 m; specimen : Ramsri 102

FLOWERING : June-August, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Assam, Burma, Malay Peninsula (Kerr, 1939)

Wrightia leaevis Hk. f.

Tree 8-10 m tall, 10-15 cm in diam, latex white. Blades membranous, elliptic, 6.5-10.5 x 3-5 cm, apex caudate, base cuneate or acute, dark green above, light green underneath; secondary nerves 4-7 pairs. Petioles 3-5 mm long. Inflorescence terminal, cymose. Pedicels 0.5-1.4 cm long. Calyx-lobes ovate, obtuse, 1 x 0.8 mm, green. Corolla-lobes 8-9 mm long, orange. Stamens : filaments about 1.5 mm long, anthers pale yellow. Ovary ovoid, pubescent, many-ovuled.

HABITAT : Shaded area, primary evergreen forest, alt. 200-250 m; specimen : Maxwell 85-393

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula, Sumatra (Kerr, 1939)

Aquifoliaceae

Tree. Leaves alternate, simple, exstipulate. Flowers in axillary, cymose or fasciculate. Calyx-lobes 4-5, persistent. Petals and stamens as many as sepals. Ovary 4-to 6-loculate, stigma persistent. Fruits drupaceous, fleshy.

Ilex cymosa Bl.

Tree 8-10 m tall, 8-10 cm in diam., bark lenticellate. Branchlets pale brown. Blades elliptic or oblong, 6.5-12.5 x 2.5-4 cm, apex acuminate, base acute, dark green above, green and glabrous underneath; secondary nerves 6-8 pairs. Petioles 1-1.5 cm long. Inflorescence axillary, cymose. Calyx-lobes orbicular, ciliate, 1 x 1 mm, green, persistent. Corolla-lobes ovate, apex obtuse, 1.5 x 1 mm, light yellowish. Stamens : filaments whitish, anther light brown. Ovary light yellow, stigma persistent. Fruits ovoid, 3 x 2.5 mm, green.

HABITAT : Margin of the primary evergreen forest near the river, alt. 200-250 m; specimens : Ramsri 100 and Maxwell 85-195

FLOWERING : January-February, FRUITING : August-September

ABUNDANCE : Common

DISTRIBUTION : Malaya, Sumatra, Java and Borneo (Kiew, 1978)

Araliaceae

Treelets. Leaves alternate, palmate, very large, prickly. Flowers 5-merous, bisexual, in umbels. Calyx small, 5-toothed. Petals and stamens typically 5. Disc present. Ovary inferior, 8- to 12-loculate, with one ovule in each locule. Fruit a berry or a drupe.

Trevesia valida Craib

Treelet 1-3 m tall, stems mostly unbranched, prickly. Blades palmate, 6-lobed, each lobe elliptic-liked, 24-26 x 5.5-6 cm, apex acuminate, margin serrate, green above, light green underneath; main nerves 7 ; secondary nerves 7-8 pairs, inconspicuous. Petioles 24-30 cm long. Inflorescence behind the leaves, 50-60 cm long, raceme of umbels, each umbel with about 40-60 flowers. Peduncles green, pedicels 1-2 cm long. Calyx-lobes 1-2 mm long. Petals 6-8 mm long, valvate. Stamens 5, anthers pale yellow. Ovary orbicular, 8-loculate, yellow.

HABITAT : Shaded, rocky place along a stream in the primary evergreen forest, alt. 250-300 m; specimen : Ramsri 40

FLOWERING : March-May, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Peninsular Thailand

Aristolochiaceae

Herbs. Leaves simple, alternate, exstipulate. Flowers bisexual. Perianth tubular, regular or irregular. Stamens 5-many. Ovary inferior, 4-to 6-loculate. Placentation axile. Fruits capsular.

Thottea tomentosa (Bl.) Hou

Terrestrial herb, stems 5-20 cm tall, scabrous. Blades coriaceous, suborbicular, 11.5-14 x 8.5-9.5 cm, apex obtuse or acute, base

cordate, dark green above, pale light greenish underneath, strongly nerved underneath; secondary nerves 6-7 pairs. Petioles 0.5-3 cm long, scabrous. Inflorescence from leafless nodes on the main stem; peduncle 5-7 cm long, pale yellowish-whitish. Perianth 5-7 x 7 mm, outside maroon, inside dark maroon. Stamens 6, filaments glabrous, 1-1.5 mm long, anthers oblong, orange. Ovary pubescent, style about 1.5 mm long.

HABITAT : Shaded area, primary evergreen forest, alt. 200-250 m; specimen : Maxwell 85-379

FLOWERING : March-April, FRUITING : June-October

ABUNDANCE : Common

DISTRIBUTION : India, Bangladesh, Burma, Vietnam, and Malaysia (Phuphathanaphong, 1985)

Asclepiadaceae

Creeping, climbing, hanging, epiphytic or erect herbs, mostly laticiferous. Leaves opposite, thin or fleshy. Flowers regular, bisexual. Inflorescence axillary, cymose. Calyx 5-lobed. Corolla 5-lobed. Stamens 5. Corona present. Ovary superior, 2-carpellate.

Key to genera

1. Erect herb; blades not fleshy, linear to lanceolate
..... *Pentasachme*
1. Creeping, hanging or epiphytic herbs; blades fleshy, thick, elliptic, lanceolate or nearly orbicular
2. Blades elliptic or lanceolate; corolla rotate, pale yellow,

- corona yellowish-orange *Hoya*
2. Blades suborbicular; corolla urceolate, maroon, corona dark pink *Dischidia*

Dischidia nummularia R. Br.

Epiphyte or creeping on a tree trunks. Blades fleshy and thick, suborbicular, 0.8-1.2 x 1-1.2 cm, pale yellow-greenish above, very pale greenish underneath, sessile. Inflorescence axillary, flowers 1-2, pedicel 2 mm long. Calyx-lobes 1-2 mm long, dark pinkish. Swollen part of corolla-tube 2-3 x 2-3 mm, maroon, stamens dark pink. Corona dark pink.

HABITAT : Open margins of the primary evergreen forest along the river, alt. 150-200 m; specimen : Maxwell 85-319

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : NE. India, Burma, Indo-China, Sumatra, Malaya, Java, Borneo, Philippines, New Guinea and Australia (Kerr, 1951; Rintz, 1980)

Hoya diversifolia Bl.

Epiphytic creeper on tree trunks, rooting at the node. Blades fleshy, thick, elliptic or lanceolate, 1.5-8 x 1-1.2 cm, apex acute, base acute, dark green above, green underneath; secondary nerves 4-6 pairs, inconspicuous. Inflorescence axillary, peduncle 6 cm long,

pedicels 1-1.5 cm long. Calyx-lobes 0.5 x 1 mm. Corolla rotate, pale yellow. Corona yellowish-orange.

HABITAT : Shaded area, primary evergreen forest, alt. 200-250 m; specimen : Ramsri 88

FLOWERING : June-July, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Sumatra, Borneo, Java, Burma, Cambodia (Kerr, 1951; Rintz, 1980)

Pentasachme caudatum Wall. ex Wight

Erect herb 35-37 cm tall. Blades linear or lanceolate, 5-8 x 0.3-0.8 cm, apex caudate, base acute, dark green above, greenish underneath, sessile; secondary nerves inconspicuous. Inflorescence axillary, cymose, flowers 1-4, pedicels 0.5-0.7 cm long, slender. Calyx-lobes 0.5 x 1.5 mm, green. Corolla-lobes 0.5-0.7 cm long, white. Corona whitish. Stamens adnate to the style. Ovary puberulous, 2-celled.

HABITAT : Partly open place on granitic rock in the river primary evergreen forest, alt. 400-450 m; specimen : Maxwell 85-494

FLOWERING : March-May, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Assam, Burma, Malay Peninsula (Kerr, 1951)

Balsaminaceae

Fleshy, succulent herbs. Leaves simple, opposite or whorled. Flower bisexual, axillary, solitary or cymose, irregular. Sepals and petals 5. Stamens 5, connate. Ovary superior, 5-loculate. Placentation axile. Ovules many. Capsule fleshy, loculicidal.

Impatiens exilipes Hf. f. ex Ridl.

Stems decumbent, fleshy, rooting at nodes, pinkish-greenish, nodes darker. Branches glabrous, 20-30 cm tall. Leaves opposite. Blades lanceolate, 2-4 x 0.5 x 1 cm, apex acuminate, base acute, margin serrate, dark green above, light green underneath. Petioles 2-8 mm long. Pedicels 2.5-4 cm long, pinkish. Sepals ovate, apex acuminate, spur pinkish. Petals obovate, violet, upper two with white claws, capsule 1-1.2 x 0.2-0.3 cm, green.

HABITAT : Open, moist area on bedrock along the river, primary evergreen forest, alt. 400-450 m; specimen : Maxwell 85-497

FLOWERING : April-May, FRUITING : May-June

ABUNDANCE : Not common

DISTRIBUTION : Malaysia, Penang (Shimizu, 1970)

Begoniaceae

Succulent herbs, stems rhizomatous. Leaves alternate, base oblique. Inflorescence axillary. Flowers unisexual, sepals and petals

4-5. Stamens numerous, connate. Ovary inferior, 3-loculate, ovules numerous. Placentation axile. Fruits capsular.

Begonia curtisii Ridl.

Succulent herb, stem erect, 15-20 cm tall, pale brownish-whitish. Blades ovate, 5-12 x 1-5.5 cm, apex acute or rounded, base oblique, green above, light green underneath; main nerves 5-6 from base. Petioles 2.5-7 cm long, pale brownish-whitish. Inflorescence axillary, peduncle light greenish, succulent. Sepals 8-10 x 4-5 mm. Petals 2 x 3-4 mm, whitish, larger ones sometimes with red vertical lines. Stamens : filaments 2-3 mm long, anthers yellow. Ovary ovoid, style 3, stigma yellow. Capsules green; winged, reddish.

HABITAT : Partly shaded thicket on granite, margins of the primary evergreen forest along the river, alt. 100-200 m; specimens : Maxwell 85-889 and 85-853

FLOWERING : August-September, FRUITING : September-October

ABUNDANCE : Not common

DISTRIBUTION : Peninsular Thailand

Campanulaceae

Herbs. Leaves alternate, exstipulate. Flowers axillary, cymose, regular or irregular. Calyx-lobes 5, corolla-tube campanulate. Stamens 5. Ovary inferior, 2 - to 5-loculate. Ovules numerous, placentation axile, style 1. Capsule or berry, indehiscent.

Pentaphragma begoniifolium (Roxb. ex Jack) Wall. ex G. Don

Fleshy herb, up to 30 cm tall, not branched. Blades ovate, 12.5-16.5 x 7.5-8, apex obtuse or acute, base oblique, margin serrate, dark green above, dull dark green underneath; main nerves 4-5 from base. Petioles 2-2.5 cm long. Inflorescence axillary, cymose. Bracts ovate. Sepals villous, outside pale yellow-whitish. Petals glabrous, pale yellow-whitish, often with violet blots. Stamens : filaments 1.5-2 mm long, anthers linear. Ovary ovoid, setose, style short, about 1.5 mm long, stigma capitate.

HABITAT : Shaded, rocky place in the primary evergreen forest, alt. 400-425 m; specimen : Maxwell 85-499

FLOWERING : April-May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula (Ridley, 1923)

Cardiopteridaceae

Twining herbs or vines. Leaves simple, alternate. Flowers bisexual, paniculate. Fruits winged, seed linear, stigma and style persistent.

Cardiopteris quinqueloba (Hassk.) Hassk.

Branching vine. Blades ovate, 5.5-8 x 5.5-7.5 cm, apex acuminate, base subcordate to cordate, glabrous, dark green above, light green

underneath; nerves 6-7 from the base. Petioles 4-7 cm long. Panicle opposite to the leaf, peduncles 5.5-7 cm long. Flowers white (Sleumer, 1972). Tepals ovate, apex obtuse, 1-1.5 cm long, yellowish-whitish. Infructescence axes green. Fruits obovoid-ellipsoid, winged, greenish when young, drying light brown. Seed 1, linear. Style 5-9 mm long, persistent.

HABITAT : Open, disturbed place in the primary evergreen forest, alt. 150-200 m; specimen : Maxwell 85-402

FLOWERS : Not seen, FRUITING : March-April

ABUNDANCE : Not common

DISTRIBUTION : Assam, W. Bengal, Burma, N. & S. Vietnam, Yunnan, W. Malaysia (Sleumer, 1972)

Chloranthaceae

Herbs. Leaves simple, opposite. Blades serrate, stipulate. Flowers terminal, spikate, mostly bisexual. Ovary inferior, 1-loculate, ovule 1. Fruit a fleshy drupe.

Chloranthus elatior R. Br. ex Link

Herb about 50-100 cm tall, glabrous, nodes swollen. Blades thin, elliptic, 10-15 x 3.5-6.2 cm, apex acuminate, base acute, margin shortly serrate, dark green above, green underneath; secondary nerves 10-12 pairs. Petioles 3-8 mm long. Spikes slender, 2-2.5 cm long, 4-6 branches. Bracts ovate, apex obtuse, 1 mm long, white. Fruits drupaceous,

globose, 4 x 4 mm, white, 1-seeded.

HABITAT : Shaded, primary evergreen forest, alt. 150-200 m;
specimen : Ramsri 20

FLOWERING : January-December, FRUITING : January-December

ABUNDANCE : Common

DISTRIBUTION : SE. Asia (Ridley, 1924)

Combretaceae

Woody climbers or trees. Leaves simple, alternate or opposite, entire, exstipulate. Inflorescence axillary or terminal, racemose or paniculate. Flowers bisexual, regular, sepals 4-5, petals 4-5, stamens 4-5. Ovary inferior, 1-loculate, style free. Fruits capsular, winged or drupaceous, 1-seeded.

Combretum foliatum Craib

Woody climber. Blades coriaceous, ovate or elliptic, 4.5-11.5 x 2.5-6 cm, apex acute, base obtuse, glabrous, dark green above, green underneath; secondary nerves 5-7 pairs. Petioles 4-6 mm long. Inflorescence axillary or terminal, in racemes or panicles. Bracts lanceolate, pilose, 1-1.5 mm long. Calyx-lobes 5, triangular, apex acuminate, 1 x 1.3 mm, light yellowish. Petals 5, orbicular, 1 x 1 mm, white. Stamens 5, filaments white, 3.5-4 mm long, anthers ovoid, light yellow. Ovary globose, villous, greenish. Fruits capsular, winged, pale yellowish, 1-seeded.

HABITAT : Open area in the primary evergreen forest along the river, on granite rock, alt. 150-200 m; specimens : Maxwell 85-391 and 85-878

FLOWERING : March-April, FRUITING : August-September

ABUNDANCE : Not common

DISTRIBUTION : Peninsular Thailand

Convolvulaceae

Vines or woody climbers. Leaves simple, alternate, exstipulate. Flowers regular, bisexual, in cymes or solitary, axillary. Calyx-lobes 5, corolla-tube funnel or salver-shaped. Stamens 5, epipetalous. Ovary 2-loculate, each with two ovules, placentation axile, style 1, stigma 2-lobed or capitate. Fruits capsular, globose.

Erycibe griffithii Cl.

Woody climber. Blades subcoriaceous, elliptic, 3.5-9.5 x 2.5-5 cm, apex acuminate, base acute, dark green above, green underneath; secondary nerves 6-8 pairs. Petioles 5-7 mm long. Inflorescence axillary, racemose, flowers 4-8, pedicels 3-4 mm long. Calyx-lobes orbicular, 1 x 1.5 mm, ciliate, pubescent, brownish. Corolla-lobes salver-shaped, 2 x 1 mm, pale yellow. Stamens: filaments about 1.5 mm long, anthers brown. Ovary globose, stigma conic, whitish.

HABITAT : Open thicket, on granite along the river, margin of the primary evergreen forest, alt. 150-200 m; specimen : Maxwell 85-876

FLOWERING : August-September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Lower Burma, Indo-China, Malaysia, Malay Peninsula
(Ooststroom, 1953)

Cucurbitaceae

Vine with tendrils. Leaves simple, alternate, exstipulate. Inflorescence racemose or solitary. Flowers, unisexual. Calyx and corolla 5-lobed. Stamens 3-5, anthers free or united. Ovary inferior, carpels 3, 1 locule. Placentation parietal. Fruits berried or capsular.

Melothria perpusilla (Bl.) Cogn. var. *subtruncata* Cogn.

Vine with tendrils. Blades ovate, 10.5-13.5 x 6.5-7.5 cm, apex acute, base cordate, upper surface scabrous, dark green above, light green underneath, nerves 3 from the base. Petioles 3-4 cm long, scabrous. Male flowers : calyx-tube campanulate, 5-lobed, 2.5-3.5 x 1.5-2.5 mm, corolla flat, 5-lobed, light orange, stamens 3, united, light-yellowish; anthers 1-1.5 mm long. Female flowers : corolla-lobes light orange; ovary subglobose, pubescent, greenish; style 3-4 mm long, light yellowish, stigmas 3, subglobose, light yellowish. Fruits ellipsoid, 7-9 mm in diam., green and turning red.

HABITAT : Open thicket, disturbed place along a trail in the primary evergreen forest, alt. 300 m; specimen : Maxwell 85-1028

FLOWERING AND FRUITING : November

ABUNDANCE : Not common

DISTRIBUTION : India, Ceylon, and the Philippines (Craib, 1931)

Dilleniaceae

Trees. Leaves simple, exstipulate, spirally arranged. Flowers solitary, terminal, bisexual, regular, showy. Sepals 5, free, persistent. Petals 5, yellow or white, imbricate. Stamens numerous. Fruits dehiscent or indehiscent, seeds not arillate.

Key to species

1. Carpels 8 to 10, sepals ovate, tomentose, petals yellow; petioles tomentose *Dillenia ovata* Wall ex Hook. f. & Thoms.
1. Carpels 14 to 18, sepals orbicular, glabrous, petals white; petioles glabrous *Dillenia indica* L.

Dillenia indica L.

Tree 15-20 m tall, 10-20 cm in diam. Branchlets tomentose. Blades coriaceous, oblong or obovate, 15-14 x 6-8 cm, apex acute or obtuse, base acute, margin serrate, glabrous and dark green above, pubescent and green underneath; secondary nerves 25-30 pairs, conspicuous. Petioles glabrous, 4-6 cm long. Flowers solitary, terminal, 15-20 cm in diam. Sepals orbicular, green, fleshy. Petals thin, obovate, white. Stamens in 2 distinct groups, outer curved and inner reflexed at the apex. Carpels 14-18, fruiting sepals thick, yellowish

green. Fruit indehiscent, globose, 6-8 cm in diam.

HABITAT : Margins of primary evergreen forest near the river,
alt. 100-150 m; specimen : Ramsri 90

FLOWERING : July-September, FRUITING : August-October

ABUNDANCE : Not common

DISTRIBUTION : India, Burma, Indo-Chino, Sumatra, Malay Peninsula,
Java and Borneo (Hookland, 1972)

Dillenia ovata Wall ex Hook. f. & Thoms.

Tree 8-12 m tall, 8-20 cm in diam. Branchlets tomentose. Blades coriaceous, ovate or elliptic, 14-22 x 8-12 cm, apex rounded to obtuse, base rounded to acute, margin serrate, pubescent and dark green above, tomentose and green underneath; secondary nerves 15-20 pairs. Petioles tomentose, 2-4 cm long. Flowers solitary, terminal, 12-15 cm in diam. Sepals ovate, thick, green, tomentose outside. Petals thin, obovate, yellow. Stamens in 2 distinct groups, outer curved and inner reflexed at the apex. Carpels 8-10. Fruits indehiscent, globose, 3-5 cm in diam. dull yellow.

HABITAT : Primary evergreen forest in open or shaded places,
alt. 100-150 m; specimen : Ramsri 22

FLOWERING : March-May, FRUITING : March-June

ABUNDANCE : Not common

DISTRIBUTION : Indo-China, Sumatra, Malay Peninsula (Hookland, 1972)

Dipterocarpaceae

Trees, often large. Leaves simple, alternate, exstipulate, blades entire. Flowers bisexual, regular. Inflorescence paniculate. Sepals 5, free. Petals 5, contorted, connate or free. Stamens 5-many, free. Ovary 3-loculate, placentation axile. Fruits mostly a one-seeded nut, usually winged by 2-5 enlarged persistent sepals.

Parashorea stellata Kurz

Tree about 20 m tall, about 30 cm in diam. Bark smooth, greyish. Blades thinly coriaceous, lanceolate, 16-18 x 4.5-5.3 cm, apex acute, base cuneate, dark green above, green underneath, glabrous; secondary nerves 8-10 pairs, tertiary nerves very slender, midrib prominent underneath. Petioles glabrous, 1.5-1.8 mm long. Panicle (Ashton, 1982) terminal or axillary, 15 cm long, slender, many-flowered, branched. Flower buds 2 x 2 mm. Sepals ovate, apex acute. Petals white. Stamens subequal, yellow, filaments short, about 1 mm long, broad, anthers linear-oblong. Nuts globose, 1.7-2 mm in diam., yellowish-greenish, apex often reddish, wings subequal, about 5.5-6.5 cm long.

HABITAT : Open margins of the primary evergreen forest along the rocky river, alt. 150 m; specimen : Maxwell 85-1022

FLOWERS : Not seen, FRUITING : November

ABUNDANCE : Not common

DISTRIBUTION : S. Burma, Indo-China, and Malaysia (Ashton, 1982)

Ebenaceae

Treelets or trees. Leaves alternate, simple, entire, exstipulate. Flowers axillary, solitary or in cymose, unisexual, 3-7 merous. Sepals

persistent. Corolla-tube various, lobes distinct. Stamens free on the corolla-tube. Staminodes present in female flowers. Ovary superior. Fruit a berry.

Key to species

1. Blades glabrous, petioles glabrous or pubescent; inflorescence cymose
 2. Petioles pubescent, 12-13 mm long
..... *Diospyros pilosanthera* Blanco
 2. Petioles glabrous, 1-1.5 mm long
..... *Diospyros wallichii* King & Gamble ex King
1. Blades pubescent, petioles tomentose; flower solitary
..... *Diospyros fulvopilosa* Flet.

Diospyros fulvopilosa Flet.

Treelet or tree, 4-6 m tall, 6-8 cm in diam. Blades thin, lanceolate or oblong, 4-7 x 1.5-3.5 cm, apex acute, base obtuse, pubescent on both surfaces, dull dark green above, dull green underneath; secondary nerves 8-10 pairs, tertiary nerves inconspicuous. Petioles 2-4 mm long, tomentose. Female flower solitary, 4-merous. Pedicels 1.5-2 mm long, pubescent. Calyx campanulate, outside pubescent, inside glabrous, persistent. Fruiting calyx green. Fruits ellipsoid, 1-1.3 x 0.5-0.8 cm, pubescent, greenish, stalk 2-4 mm long.

HABITAT : Open area in the primary evergreen forest along the river, rocky place, alt. 300-350 m; specimen : Maxwell 85-299

FLOWERS : Not seen, FRUITING : March-June

ABUNDANCE : Common

DISTRIBUTION : Peninsular Thailand

Diospyros pilosanthera Blanceo

Tree 10-15 m tall, 20-25 cm in diam. Blades coriaceous, oblong, 25-29 x 7.5-10 cm, apex acute or obtuse, base obtuse or rounded, glabrous on both surfaces, dark green above, green underneath; secondary nerves 10-19 pairs, conspicuous on lower surface, tertiary nerves inconspicuous. Petioles 12-13 mm long, pubescent. Male flowers cymose, 4-merous, pedicels 3-4 mm long, tomentose. Calyx campanulate, lobes 3-4 mm long, pubescent on both surfaces, green. Corolla-lobes salver-shaped, lobes 1-1.2 mm long, outside tomentose, inside glabrous, corolla buds light yellowish-green; open corolla pale yellow-whitish. Flowers slightly fragrant. Fruits ovoid, 2-3.5 x 1.5-2.5 cm, tomentose.

HABITAT : Shaded, rocky area along the river, margin of the primary evergreen forest, alt. 250-300 m; specimens : Maxwell 84-242 and 85-883

FLOWERING : August-September, FRUITING : September-October

ABUNDANCE : Common

DISTRIBUTION : Cambodia, Vietnam, Malay Peninsula, Indonesia, Philippines (Phengkhlai, 1981)

Diospyros wallichii King & Gamble ex King

Tree 6-12 m tall, 8-15 cm in diam. Blades coriaceous, oblong or lanceolate, 20-28 x 7-11 cm, apex acute, obtuse or acuminate, base obtuse or acute, glabrous and dark green above, pubescent and green underneath; secondary nerves 12-18 pairs, prominent on lower surface, tertiary nerves inconspicuous. Petioles 1-1.5 mm long, glabrous. Male flowers in axillary, cymose, 4-merous; pedicels 1-1.5 mm long, pubescent. Calyx campanulate, 3-4 mm long, pubescent outside, pale light greenish. Corolla salver-shaped, 7-12 mm long, inside glabrous, outside pubescent, pale yellow, lobes dull orangish. Fruits ellipsoid or ovoid, 2-3 x 2-2.5 cm, tomentose.

HABITAT : Open area, rocky place, shaded place along the river, primary evergreen forest, alt. 250-400 m; specimens : Maxwell 85-678, 85-306 and 84-503

FLOWERING : March-July, FRUITING : February-June

ABUNDANCE : Common

DISTRIBUTION : India, Malay Peninsula (Phengkhlai, 1981)

Elaeocarpaceae

Trees. Leaves spirally arranged, simple, serrate or entire. Inflorescence axillary, cymose. Sepals 4-5, valvate. Petals 4-5. Stamens 20-30. Ovary sessile, 2-loculate, style glabrous, ovules many. Fruit drupaceous.

Elaeocarpus petiolatus (Jack) Wall. ex Kurz

Tree 15-20 m tall, 15-20 cm in diam., twigs glabrous. Blades elliptic, 6-16 x 4.5-8 cm, apex acuminate, base obtuse, glabrous, dark green above, green underneath; secondary nerves 5-7 pairs. Petioles 3-7.5 cm long, glabrous. Inflorescence axillary, paniculate, 5-10 cm long, pedicels 0.8-1.3 cm long. Sepals lanceolate, 6 x 2.5 mm, pubescent, pale greenish-yellow. Petals oblong, 5.5 x 2 mm, pubescent. Stamens 20-30, filaments 3.5-4 mm long, anthers linear, pale yellowish. Ovary ovoid, glabrous, 2-loculate, style glabrous, disc present.

HABITAT : Partly open margins of the primary evergreen forest, alt. 100-200 m; specimens : Maxwell 85-668 and 84-474

FLOWERING : June-July, FRUITING : August-November

ABUNDANCE : Not common

DISTRIBUTION : China, India, Burma, Laos, Cambodia, Vietnam, Malay Peninsula, Indonesia (Phengkhlai, 1981)

Erythroxylaceae

Trees. Leaves simple, alternate, stipulate, entire. Flowers bisexual, regular, axillary clusters, 5-merous. Stamens 10, united in a tube at the base. Ovary 3-to 4-loculate, ovules 1-2 in each locule. Fruit drupaceous, 1-seeded.

Erythroxylum cuneatum (Miq.) Kurz

Tree 8-10 m tall, 8-10 cm in diam. Bark brown, twigs drying black. Blades subcoriaceous, elliptic or obovate, 2.5-6 x 1.5-2.5 cm, apex obtuse, base acute, dark green above, pale green underneath, midrib prominent on both surfaces; secondary nerves inconspicuous. Petioles 4-5 mm long. Inflorescence axillary, clusters. Sepals 5, green. Petals 5, white. Stamens 10, connate at the base; filaments pale yellow, anthers yellow. Ovary 3-loculate, styles 3. Fruits drupaceous, elliptic to oblong, yellow-reddish, juicy.

HABITAT : Open place, primary evergreen forest near the river, alt. 100-150 m; specimen : Ramsri 77

FLOWERING : February-May, FRUITING : March-June

ABUNDANCE : Not common

DISTRIBUTION : Throughout Malaysia except New Guinea (Cockburn, 1972)

Euphorbiaceae

Herbs, shrubs, treelets or trees, often laticiferous. Leaves simple, alternate or spiral, stipulate. Flowers usually small in clusters, spikate, racemose or paniculate; terminal, axillary, cauliflorous or from branches, unisexual, regular. Perianth 5-merous, disc often present. Stamens 1-many. Ovary superior, 2-to 3-loculate, ovules 1-2 in each locule, styles 2-3. Fruit a drupe or a capsule, 2-to 6-lobed or not lobed.

Key to genera

1. Ovary 2-ovuled; inflorescence always axillary, ramiflorous and cauliflorous in dense clusters; stamens usually equal or double number of sepal
 2. Flowers with petals *Actephila*
 2. Flowers without petals
 3. Male flowers axillary or on branches behind leaves, clusters or solitary
 4. Fruit a capsule, 6-lobed, white, often with a pinkish hue; 8 mm in diam *Glochidion*
 4. Fruit a fleshy drupe, light greenish and turning orangish; 2.5 cm in diam *Drypetes*
 3. Male flowers cauliflorous or axillary, in spikes, racemes, or panicles
 5. Fruit a drupe, fleshy, indehiscent
 6. Ovary glabrous; fruits slightly flattened
..... *Antidesma*
 6. Ovary pubescent; fruits ovoid or ellipsoid
.....:..... *Baccaurea*
 5. Fruit a capsule, dehiscent *Aporosa*
1. Ovary 1-ovuled; inflorescence on trunk and branches, axillary, or terminal, spikate, racemose, or paniculate; stamens often numerous within involucre bracts
 7. Flowers without perianth *Euphorbia*
 7. Flowers with sepals, and sometimes petals
 8. Flowers with petals

- 9. Stamens opposite to sepals; fruit a drupe
 - 10. Flowers in raceme, terminal, pendulous; petals ovate, green, tomentose *Galearia*
 - 10. Flowers in fascicles, axillary; petals oblong, yellow, pubescent *Microdesmis*
- 9. Stamens alternate to sepals; fruit a capsule
 - 11. Inflorescence terminal; capsules slightly 3-lobed, brownly scaly..... *Croton*
 - 11. Inflorescence on trunk and branchlets; capsules deeply 3-lobed, smooth *Trigonostemon*
- 8. Flowers without petals
 - 12. Capsule 2-lobed or not lobed, with light yellowish spines or not
 - 13. Capsule not lobed, with light yellowish spines (bristly)
..... *Chaetocarpus*
 - 13. Capsule 2-lobed, lacking spines.....
..... *Sapium*
 - 12. Capsule 3-to 4-lobed, with red spines .. *Mallotus*

Actephila excelsa (Dalz.) M. A. var. *javanica* (Miq.) Pax. & Hoffm.

Treelet 2-5 m tall, about 5 cm in diam., glabrous. Blades subcoriaceous, elliptic or lanceolate, 15-30 x 4-12 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 10-12 pairs, prominent on both surfaces, tertiary nerves and

reticulations conspicuous underneath. Petioles glabrous, 3-9.5 cm long. Male flowers (Ridley, 1924) axillary, clusters, bracts broadly ovate. Sepals ovate or broad lanceolate, pubescent. Petals narrow, 0.5 cm long, disc annular. Stamens free. Female flowers many or solitary. Ovary subglobose, glabrous, styles 3, pubescent. Capsule green, 3-lobed, about 1.5-2.5 cm in diam. Seeds triangular.

HABITAT : Shaded, rocky place along a stream; primary evergreen forest, alt. 200 m; specimens : Maxwell 84-384 and 85-403

FLOWERS : Not seen, FRUITING : April

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia (Whitmore, 1973)

Antidesma

Key to species

1. Inflorescence terminal, paniculate.
..... *Antidesma martabanicum* Presl
1. Inflorescence axillary, spikeate.
 2. Midrib and secondary nerves glabrous underneath; stipules ovate *Antidesma neurocarpum* Miq.
 2. Midrib and secondary nerves pubescent underneath; stipules lanceolate ... *Antidesma montanum* Bl.

Antidesma martabanicum Presl

Treelet or tree up to 7 m tall, 6-12 cm in diam., twigs tomentose. Blades lanceolate or oblong, 14-26 x 4-8 cm, apex acuminate, base cuneate to obtuse, dark green above, green underneath; secondary nerves 8-12 pairs, raised underneath, midrib and nerves pubescent underneath. Petioles tomentose, 0.3-0.6 cm long. Stipules large, ovate to lanceolate, apex acuminate; about 0.8-1 cm long, pubescent. Inflorescence terminal, paniculate, tomentose, rachis green. Sepals 3-4, light yellow-greenish. Stamens 3-4, filaments light yellowish, anthers pale yellow, disc glabrous. Ovary glabrous, green. Fruit greenish and turning reddish, ellipsoid, 2-2.5 mm long.

HABITAT : Open and shaded areas; primary evergreen forest, alt. 150-300 m; specimens : Maxwell 85-489 and 85-481

FLOWERING : May, FRUITING : May-November

ABUNDANCE : Common

DISTRIBUTION : Lower Burma (Airy Shaw, 1972), Peninsular Thailand

Antidesma montanum Bl.

Treelet about 1.5 m tall. Blades elliptic or lanceolate, 10-18 x 3.5-6 cm, apex acuminate, base acute, dark green above, green underneath; secondary nerves 6-8 pairs, prominent, midrib and nerves pubescent. Petioles pubescent, 0.3-0.5 cm long. Stipules lanceolate, apex acuminate; 1.5-2 mm long. Male inflorescence axillary, spikate, solitary or branched, slender, pubescent, rachis light yellow, pubescent, 0.8-2

cm long. Calyx light yellow, pubescent. Stamens 5, filaments whitish, 2 mm long, anthers light yellow. Female spikes (Ridley, 1924) solitary, 7.5 cm long. Calyx 5-lobed, pubescent. Ovary glabrous, stigma short. Fruit a drupe, subglobose, about 2 cm long.

HABITAT : Shaded, rocky area along a stream; primary evergreen forest, alt. 250 m; specimen : Maxwell 85-313

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Malaysia, Burma, Indo-China, S. China (Whitmore, 1973)

Antidesma neurocarpum Miq.

Treelet 3.5 m tall, 1.5-2 cm in diam. Blades elliptic or oblong, 5-12 x 2-3.5 cm, apex acuminate, base acute, glabrous, dark green above, light green underneath, drying reddish brown; secondary nerves 7-8 pairs, prominent below. Petioles pubescent, 2-4 mm long. Stipules ovate, apex acuminate, 0.5-1 x 0.3-0.7 cm, light greenish, persistent. Inflorescence (Whitmore, 1973) axillary, spicate. Male spikes (Ridley, 1924), slender, pubescent, about 2 cm long, flowers minute. Sepals 5, pubescent. Disc glabrous. Stamens 5. Female spikes solitary. Ovary glabrous. Fruit a drupe, ovoid, reddish-yellow, 0.7-1 cm long, slightly flattened when dry, pedicels 1.5-3 mm long.

HABITAT : Mostly shaded place, primary evergreen forest, alt. 250-325 m; specimen : Ramsri 28 and Maxwell 85-508

FLOWERS : Not seen, FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia, Sumatra, Borneo (Whitmore, 1973)

Trigonostemon

Key to species

1. Blades oblong or oblanceolate; male flowers : pedicels pinkish-whitish, petals yellow with red base, stamens 3
..... *Trigonostemon aurantiacus* (Kurz ex Teij. & Binn.) Boerl.
1. Blades elliptic or obovate; male flowers; pedicels light green, petals white, stamens 5
..... *Trigonostemon pachyphyllus* A.S.

Trigonostemon aurantiacus (Kurz ex Teij. & Binn.) Boerl.

Treelet 2-3 m tall, 3-4 cm in diam. Blades coriaceous, oblong or oblanceolate, 11-20 x 5-7 cm, apex blunt acuminate, base cuneate, glabrous, dark green above, light green underneath; secondary nerves 8-10 pairs. Petioles glabrous, 1 cm long. Inflorescence on trunk and branchlets. Male flowers : pedicels pinkish-whitish. Sepals light yellowish. Petals yellow with red base. Stamens 3, light yellowish. Female flowers (Airy Shaw, 1972) : petals orange-yellow. Capsule deeply 3-lobed, smooth, glabrous, dark brown when dry, up to 1.5 cm in diam.

HABITAT : Shaded, rocky place along a stream; primary evergreen forest, alt. 250 m; specimen : Maxwell 85-312

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : N. Malaysia, Java (Airy Shaw, 1972)

Trigonostemon pachyphyllus A.S.

Treelet 1-3 m tall, 1.5-4 cm in diam. Leaves alternate. Blades coriaceous, elliptic or obovate, 17-24 x 7.5-9.5 cm, apex acuminate, base cuneate, margin entire, glabrous, dark green above, light green underneath; secondary nerves 8-10 pairs. Petioles glabrous, stout, 2-3 cm long. Inflorescence from trunk and branches. Male flowers : pedicels light green; sepals light green, margin white, apex violet, petals white. Stamens 5, filaments green, anthers light yellow. Female flowers (Airy Shaw, 1972): red, ovary tomentose, styles 5, entire, free, thick.

HABITAT : Shaded, rocky place; primary evergreen forest, alt. 300 m; specimen : Maxwell 85-518

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Peninsular Thailand.

Aporosa aurea Hk. f.

Tree 7-12 m tall, 10-20 cm in diam. Blades coriaceous, elliptic or lanceolate, 11-16 x 3-6 cm, apex acuminate, base acute, glabrous, dark green above, light green underneath; secondary nerves 5-6 pairs, raised underneath. Petioles glabrous, 1-2 cm long. Male spikes (Ridley, 1924) stout, 3 cm long, glabrous. Sepals 4, rounded, glandular. Female spikes short; flowers sessile. Ovary flask-shaped, glabrous, yellowish-green. Style long bifid. Fruits globose, green and turning red, about 7-9 mm in diam. Seeds orbicular.

HABITAT : Shaded, primary evergreen forest, alt. 200 m;
specimens : Ramsri 12, and Maxwell 85-155

FLOWERS : Not seen, FRUITING : February-March

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia, Sumatra, Borneo (Whitmore, 1973)

Baccaurea ramiflora Lour.

Tree 8-13 m tall, 8-15 cm in diam. Leaves simple, spirally arranged. Blades thin, elliptic or lanceolate or oblanceolate, 12-15.5 x 3-4 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 5-6 pairs, reticulate cross-nervules. Petioles glabrous, 2-3.5 cm long. Inflorescence racemose, pendulous, from branches behind the leaves and cauliflorous, tomentose, about 8-10 cm long; peduncles whitish. Tepals linear to oblong, apex obtuse,

1.5-2 mm long, light yellowish, tomentose. Stamens : filaments and anthers light yellowish. Ovary ovoid, pubescent, stigmas 3. Male flowers unknown. Fruits ovoid or ellipsoid, about 2.5 x 2 cm, red, fleshy, 3-loculate, pericarp thick. Seeds ovate, acute.

HABITAT : Shaded area, primary evergreen forest, alt. 250-300 m; specimens : Ramsri 82 and Maxwell 85-869

FLOWERING : September, FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia, S. China (Whitmore, 1973)

Chaetocarpus castanocarpus (Roxb.) Thw.

Tree 5-6 m tall, about 10 cm in diam. Bark greyish-brown, lenticellate. Leaves simple, spiral. Blades coriaceous, ovate or oblong, 8.5-12 x 3-5 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 6-7 pairs, midrib raised underneath. Petioles glabrous, 4-7 mm long. Male flowers (Ridley, 1924) : in heads, pedicels short, thick, bracts clusters, pubescent, sepals oblong, blunt. Capsules globose, covered with light yellowish spines, 1-1.5 cm in diam.

HABITAT : Partly open disturbed area in the primary evergreen forest, alt. 200 m; specimens : Maxwell 84-28 and 85-1034

FLOWERS : Not seen, FRUITING : November

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula, India, Ceylon, Assam, Burma, Sumatra, Borneo (Whitmore, 1973)

Croton argyratus Bl. var. *argyratus*

Tree 5-10 m tall, 15-20 cm in diam., bark smooth. Blades coriaceous, elliptic to ovate, 8-14 x 5-8 cm, apex acuminate, base acute, pubescent and silvery scaly underneath, dark green above, silvery scaly underneath; secondary nerves 6-8 pairs, 4-nerved from the base. Petioles tomentose, 1-13 cm long. Inflorescence terminal, racemose, tomentose, erect, about 25 cm long. Male flowers : pedicels tomentose, 3 mm long, yellowish-green. Calyx ovate, 3 mm long, pubescent, yellowish-green. Stamens villous, filaments 3-4 oblong, tomentose, 4 mm long, silvery greenish, ovary globose, villous, greenish. Capsules subglobose, 1.5x 1 cm, slightly 3-lobed, pale greyish-green and brownish scaly.

HABITAT : Open margins along a rocky stream, primary evergreen forest, alt. 200 m; specimens : Maxwell 84-3 and 85-1033

FLOWERING : June, FRUITING : November

ABUNDANCE : Common

DISTRIBUTION : Throughout W. Malaysia, Burma (Whitmore, 1973)

Drypetes oxyodonta A. S.

Tree about 8 m tall, about 6 cm in diam. Leaves spirally arranged. Blades ovate or oblong, 6.5-14 x 2-4.3 cm, apex acuminate, base asymmetric acute, margin serrate, dark green above, green underneath; secondary nerves 5-6 pairs and midrib raised underneath. Petioles glabrous, 2-4 mm long. Fruits fleshy drupes, subglobose, 2.5 cm in diam., 2-celled, light greenish and turning orangish, axillary or on branches behind leaves.

HABITAT : Shaded , rocky place near the river, primary ever-green forest, alt. 250 m; specimen : Maxwell 85-695

FLOWERS : Not seen, FRUITING : July

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia (Whitmore, 1973)

Euphorbia synadenium Ridl.

Erect herb with copious white latex. Leaves alternate. Blades coriaceous, fleshy, oblanceolate, 9-11 x 4-5 cm, apex obtuse, base cuneate, dark green above, pale light green underneath; midrib visible; secondary nerves invisible. Petioles glabrous, 1-1.5 cm long. Inflorescence solitary, unisexual. Involucral bracts light yellowish, gland dark yellowish. Male inflorescence (Ridley, 1924) on a peduncle with 2 bracts, bracts ovate, pubescent, involucre pink, lobes thick, suborbicular, greenish, calyx green, glands 10. Stamen solitary. Female inflorescence : involucre smaller, glands flat, surrounded by calyx.

Ovary subglobose, styles 3, subulate. Capsules dark green. Seeds orbicular, flat.

HABITAT : Shaded, rocky place near the river, primary evergreen forest, alt. 250 m; specimens : Ramsri 14 and Maxwell 84-488

FLOWERS : Not seen, FRUITING : March

ABUNDANCE : Common

DISTRIBUTION : Perak, Penang, Selangor (Airy Shaw, 1972)

Galearia fulva (Tul.) Miq.

Treelet about 5 m tall, 8 cm in diam. Blades elliptic or oblong, 14.5-20.5 x 6 cm, apex bluntly acuminate, base obtuse, glabrous, except midrib and nerves pubescent underneath, dark green above, green underneath; nerves 7-8 pairs. Petioles pubescent, 4-6 mm long. Inflorescence terminal, pendulous, racemose, tomentose, about 30 cm long. Peduncle greenish-brown, pedicels green. Male flowers : clustered, calyx-lobes ovate, acute, 1 mm long, tomentose, green. Stamens : filaments glabrous, anthers pubescent. Female flowers (Ridley, 1924) shorter and larger, tomentose. Ovary ovoid, tomentose, stigma very short. Fruits (Whitmore, 1973) 7 x 5 mm, laterally compressed, angular, 2-loculate.

HABITAT : Shaded, rocky area along a stream; primary evergreen forest, alt. 300 m; specimen : Maxwell 85-867

FLOWERING : September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Lower Burma (Whitmore, 1973)

Glochidion wallichianum M.-A.

Treelet 1.5-2 m tall, branchlets pubescent. Blades subcoriaceous, elliptic or oblong, 3.5-14 x 2.5-5.5 cm, apex acuminate, base oblique, acute, glabrous, dark green above, green underneath; secondary nerves 7-8 pairs, midrib and nerves pubescent. Petioles pubescent, 1-3 mm long. Male flowers : axillary, clusters; pedicels filiform, pubescent, 6-8 mm long, light green; tepals linear or oblong, 2 mm long, outside light green, inside whitish; anthers blackish. Female flowers (Ridley, 1924): sepals very short, triangular, pubescent. Ovary pubescent, 3- to 4-celled. Fruits 6-lobed, 8 mm in diam., tomentose, white, often with a pinkish hue.

HABITAT : Partly shaded, disturbed place, margins of the primary evergreen forest, alt. 150 m; specimens : Maxwell 84-281 and 85-980

FLOWERING : September, FRUITING : October

ABUNDANCE : Not common

DISTRIBUTION : Selangor, Penang, Sumatra, Borneo (Whitmore, 1973)

Mallotus oblongifolius (Miq.) M.-A.

Treelet about 5 m tall, branches slender, puberulous. Leaves alternate. Blades thin, elliptic or oblong, 7-14.5 x 2.5-5 cm, apex

caudate, base rounded or slightly cordate, margin slightly serrate, glabrous, dark green above, yellow green underneath; secondary nerves 7-8 pairs, raised underneath. Petioles puberulous, slender, 1.5-6.7 cm long. Flowers (Whitmore, 1973) on elongated inflorescence, about 13 cm long. Male racemes (Ridley, 1924) slender, pedicels slender, sepals lanceolate, glabrous. Stamens about 20. Female racemes about 8 cm long, calyx spathaceous, obliqued, ovary pubescent, styles (Hooker, 1885) very large, recurved, connate below. Capsules 3-4 lobes about 10 mm in diam., yellow with red spines.

HABITAT : Shaded place in the primary evergreen forest, alt. 300 m; specimen : Ramsri 26

FLOWERS : Not seen, FRUITING : April

ABUNDANCE : Common

DISTRIBUTION : Burma, Andamans, Indo-China, and throughout Malaysia (Airy Shaw, 1972; Whitmore, 1973)

Microdesmis caseariifolia Pl.

Treelet 4-6 m tall, 6-15 cm in diam., young branches and young leaves pubescent. Blades subcoriaceous, oblong or lanceolate, 11-14 x 3.7-4.5 cm, apex caudate, base slightly oblique, acute, margin serrulate, dark green above, green underneath; secondary nerves 4-5 pairs, prominent underneath. Petioles pubescent, 5 mm long. Flowers in fascicles; pedicels pubescent, green or pale yellowish. Male flowers : very small, sepals ovate, 1 mm long, pubescent, yellow; petals oblong, 2 mm long, pubescent,

yellow. Stamens : filaments 1-1.5 mm long, yellow. Female flowers : minute; sepals ovate; 1 mm long, pubescent, yellow; petals ovate to oblong, 1.5 mm long, pubescent, yellow. Ovary green, stigma white. Immature fruit green. Fruits (Whitmore, 1970) rounded, 7 mm in diam., red. Seeds black.

HABITAT : Shaded , rocky area; primary evergreen forest, alt. 200 m; specimens : Maxwell 85-273 and 85-317

FLOWERING : March, FRUITING : March-April

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia, S. China, Burma, Indo-China, Sumatra , Borneo, Philippines (Whitmore, 1973)

Sapium baccatum Roxb.

Tree 15-20 m tall, 25-40 cm in diam., bark black and rough, sap white. Blades elliptic or ovate, 7.5-16 x 3-7 cm, apex acuminate, base rounded or obtuse, margin entire, glabrous, dark green above, green underneath; secondary nerves 8-10 pairs, midrib coral red, raised underneath, sunken above. Petioles glabrous, coral red, 2-6.5 cm long. Inflorescence terminal, racemes in spreading panicles. Male panicles clusters, calyx cup-shaped, about 1 mm long, yellow-greenish. Stamens 2, filaments 3-3.5 mm long, anthers reddish. Female panicles (Ridley, 1924) shorter; calyx cup-shaped, 3-lobed. Ovary elliptic style very short. Fruit 2-lobed, 8-10 mm in diam., greenish.

HABITAT : Partly open area, and shaded place; margins of the primary evergreen forest, alt. 100-250 m; specimens : Maxwell 85-383 and 85-670

FLOWERING : April-May, FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION : India, Burma, S. China, Indo-China, Malay Peninsula, Andamans, Sumatra (Airy Shaw, 1972)

Fagaceae

Trees. Leaves simple, alternate, stipulate. Flowers minute, unisexual, numerous in elongated catkins. Tepals usually 6-lobed. Male flowers : stamens 6-12, free. Female flowers : Ovary superior. Fruits 1-seeded nut within a cupule. Seed with large embryo, no endosperm.

Lithocarpus

Key to species

1. Blades elliptic, petioles 1-1.3 cm long, tepals orbicular; cupule almost enclosing fruits *Lithocarpus macphailii* (Hend.) Barn.
1. Blades oblong, petioles 3-6 mm long, tepals triangular; cupule saucer-shaped *Lithocarpus elegans* (Bl.) Hatus. ex Soep.

Lithocarpus elegans (Bl.) Hatus. ex Soep.

Tree about 20 m tall, about 20 cm in diam., twigs slender, pubescent. Blades coriaceous, oblong, 6-14 x 3-5 cm, apex acuminate, base acute, margin entire, glabrous, dark green above, grey-light greenish underneath; midrib raised underneath; secondary nerves 10-15 pairs, conspicuous on both surfaces. Petioles 3-6 mm long. Stipules triangular, 2 x 1 mm. Inflorescence erect, panicle of spikes, rachis light yellowish. Tepals triangular, apex acuminate, 1 x 0.5 mm, tomentose, light yellowish. Stamens 6, filaments 1 mm long, white, anthers grey. Cupule saucer-shaped, 1.5-2 x 0.2-0.3 cm, grey-greenish. Fruits 2 x 1 cm, glossy green.

HABITAT : Partly open area in the primary evergreen forest, alt. 150 m; specimen : Maxwell 85-860

FLOWERING AND FRUITING : August-September

ABUNDANCE : Not common

DISTRIBUTION : India, Indo-China, Throughout Malaysia (Cockburn, 1972)

Lithocarpus macphailii (Hend.) Barn.

Tree about 20 m tall, about 20 cm in diam., twigs slender, lenticelate, glabrous. Blades subcoriaceous, elliptic, 12-19 x 5-9 cm, apex acuminate, base cuneate and slightly decurrent, glabrous, dark green above, silvery-green underneath; midrib prominent on both surfaces; secondary nerves 12 pairs, prominent underneath. Petioles 1-1.3 cm

long. Male inflorescence axillary and terminal, in groups of spikes, rachis yellow-whitish. Tepals orbicular, 0.8 x 0.5 mm, tomentose, yellow-whitish. Stamens 6, anthers yellow-whitish. Cupule 2 x 2.5 cm, almost enclosing fruit, pale yellowish-greyish, stalk with distinct rings. Fruit glabrous, about 2 x 2.5 cm.

HABITAT : Partly open area, primary evergreen forest, alt. 250 m; specimen : Maxwell 85-671

FLOWERING AND FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Sumatra (Cockburn, 1972), Peninsular Thailand.

Flacourtiaceae

Climbers, shrubs or trees. Leaves simple, alternate, stipulate. Flowers (Ridley, 1922) small, unisexual, cymose or racemose, regular, sepals 3-6, petals 5 or absent. Stamens 5-numerous, styles free or connate. Ovary superior, 1-loculate, ovules numerous, parietal placentation. Fruits baccate, fleshy, endospermous. Seeds 1-many.

Ryparosa javanica (Bl.) Kurz

Tree about 15 m tall, about 20 cm in diam., branchlets glabrous. Blades coriaceous, elliptic, 29-34 x 11-12 cm, apex acute, base acute, margin entire, dark green above, pale light greenish underneath; secondary nerves 5-6 pairs, midrib and secondary nerves prominent underneath.

Petioles 4.5-6 cm long. Inflorescence (Whitmore, 1972) racemose. Calyx-lobes 3-4, recurved. Petals 4-5, overlapping, recurved. Infructescence pendulous, rachis glabrous, light brownish. Fruits globose, 1.5 x 1.8 cm, grey-brownish with lighter coloured lenticels, pubescent, with a thin pulp, 1-seeded.

HABITAT : Shaded rocky area along the river, primary evergreen forest, alt. 200 m; specimen : Maxwell 85-874

FLOWERS : Not seen, FRUITING : August-September

DISTRIBUTION : Perak, Selangor, Pahang, Andamans, Sumatra, Java, and Borneo (Whitmore, 1972)

Gesneriaceae

Terrestrial, creeping or hanging herbs. Leaves simple opposite. Flower showy, bisexual, axillary, irregular, in racemes. Calyx 5-lobed, corolla 5-lobed, stamens 2-4, epipetalous. Ovary superior, 1-loculate, parietal placentation. Fruits capsulate, seed numerous, minute.

Key to genera

1. Creeping or hanging herbs; flowers solitary, axillary
..... *Aeschynanthus*
1. Terrestrial herbs; inflorescence axillary or behind the leaves
or on leafless nodes
 2. Inflorescence axillary; calyx-lobes oblong, 3-3.5 mm long,
greenish. *Paraboea*

2. Inflorescence behind the leaves or on leafless nodes; calyx-lobes lanceolate, 2.5-3 mm long, maroon.
 *Rhyncholechum*

Aeschynanthus radicans Jack

Creeping, hanging herbs on tree trunks and branches, sometimes on large boulders, pubescent. Blades fleshy, elliptic to ovate, 2-3.5 x 1.2-2 cm, apex acute, base rounded, margin entire, pale light green above, very pale whitish-greenish underneath. Petioles villous, 2-3 mm long. Flowers axillary, solitary, pedicels tomentose, 3-4 mm long. Calyx-tube villous, 1.6-2 cm long, light greenish-whitish and turning pale maroonish; lobes acute, 0.7-1 cm long. Corolla-tube cylindric, 3-5 cm long; lobes acute, curved, pubescent, throat dark red with yellowish blotches. Stamens 4, filaments whitish, anthers light yellowish. Ovary cylindric, puberulous. Fruit a capsule, cylindric, slender, 27-30 cm long.

HABITAT : Mostly shaded place near the river, primary evergreen forest, alt. 300-350 m; specimens : Maxwell 85-685 and 84-226

FLOWERING : June-July, FRUITING : August-September

ABUNDANCE : Common

DISTRIBUTION : Malacca, Perak, Pahang, and Malay Peninsula (Ridley, 1923)

Paraboea glabra (Rild.) Burt

Terrestrial herbs on rocks. Leaves spiral. Blades ovate, 7.5-9 x 4.5-5.5 cm, apex obtuse, base rounded, margin serrate, hispid on the upper surface, dark green above, grey-whitish underneath; secondary nerves 5-6 pairs, prominent underneath. Petioles pubescent, 2-5 cm long, pale brown. Inflorescence axillary; peduncle pubescent, 9-12 cm long, pale brown or pale yellow. Pedicels 8-10 mm long, whitish-pale yellow. Calyx-tube short, 1-2 mm long, whitish-pale yellow; lobes oblong, 3-3.5 mm long, greenish. Corolla-lobes orbicular, 9-10 x 10 mm, whitish with faint pinkish hue. Stamens 2, anthers whitish. Ovary conical, stigma and style whitish.

HABITAT : Mostly shaded, moist areas on large granite boulders along the river, margins of the primary evergreen forest, alt. 100-200 m; specimens : Maxwell 85-877 and Sirirugsa 328

FLOWERING : August-September, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Peninsular Thailand.

Rhyncholechum ellipticum DC.

Herbs. Blades lanceolate, 25-29 x 5-7 cm, apex acute, base cuneate, margin serrate, pubescent on both surfaces, dark green above, pale light green underneath. Petioles pubescent, 1.5-2 cm long. Inflorescence behind the leaves and leafless nodes, peduncles tomentose, maroon; pedicels tomentose. Calyx-tubes 1.5 mm long, lobes lanceolate, apex

acuminate, 2.5-3 mm long, maroon. Corolla-lobes orbicular, 2 x 1.5 mm, throat white, below two lower lobes dark pinkish, glabrous. Stamens 4, filaments stout, anthers reddish-brown. Ovary ovoid, stigma and style whitish.

HABITAT : Shaded area in the primary evergreen forest, alt. 300-350 m; specimens : Maxwell 85-395 and 85-709

FLOWERING : April-July, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : India, Indo-China (Craib and Kerr, 1962), Peninsular Thailand.

Guttiferae

Trees or shrubs with yellow or white sap. Leaves simple, opposite, exstipulate. Blades coriaceous secondary nerves numerous, inconspicuous, entire. Inflorescence axillary or terminal. Flowers regular, unisexual or bisexual. Sepals and petals 4, imbricate. Stamens many, connate. Ovary superior, 1-to many-loculate. Placentation axile or basal. Fruit a drupe or a berry.

Garcinia

Key to species

1. Inflorescence axillary; blades elliptic, apex caudate or cuspidate.
2. Sepals ovate, petals oblong; fruits ellipsoid, 2 x 1.5 cm
..... *Garcinia parvifolia* (Miq.) Miq.

2. Sepals orbicular, petals orbicular; fruits globose, 1 x 1.2
cm *Garcinia eugeniaefolia* Wall. ex T. And.

1. Inflorescence terminal; blades ovate to elliptic, apex acute.
..... *Garcinia hombroniana* Pierre

Garcinia eugeniaefolia Wall. ex T. And.

Tree 6-10 m tall, about 15 cm in diam., sap yellow. Blades elliptic, 7-10 x 2.5-3.5 cm, apex caudate, base acute, dark green above, green underneath, midrib prominent on both surfaces; secondary nerves inconspicuous. Petioles 6-8 mm long. Inflorescence axillary. Male flowers : pedicels 7-8 mm long, sepals 4, orbicular, outer pairs smaller; petals 4, orbicular. Female flowers not seen. Fruits globose, about 1 x 1.2 cm, greenish. Stigma persistent.

HABITAT : Shaded and partly open area near the river, primary evergreen forest, alt. 125-150 m; specimens : Maxwell 84-487 and Sirirugsa 331

FLOWERING : June-August, FRUITING : August-November

ABUNDANCE : Common

DISTRIBUTION : Langkawi, Kedah, Penang, Perak, Trunnganu, Pahang, Singapore (Whitmore, 1972)

Garcinia hombroniana Pierre

Tree 8-15 m tall, 15-25 cm in diam., old bark sap reddish, young bark sap whitish, lenticellate. Blades ovate or elliptic, 11.5-15.5 x

5.5-7.8 cm, apex acute, base obtuse, dark green above, green underneath; secondary nerves inconspicuous, midrib broad, flat, raised on both surfaces. Petioles 1-2 cm long. Male inflorescence terminal; pedicels 5-10 mm long, red-maroon. Male flowers : sepals orbicular, red-maroon; petals ovate, apex obtuse, about 10 x 7 mm, yellow. Stamens yellow. Female flowers not seen. Fruit subglobose, 3.5 x 4.5 cm, outside green, inside whitish-pale yellow, sap white, fruiting calyx light green.

HABITAT : Margins of the primary evergreen forest near the river, open area along the river, alt. 150-375 m; specimens : Maxwell 85-167 and 85-300

FLOWERING : January-February, FRUITING : February-March

ABUNDANCE : Common

DISTRIBUTION : Kedah, Perak, Pahang, and Nicobars (Whitmore, 1972)

Garcinia parvifolia (Miq.) Miq.

Tree 15-30 m tall, about 25 cm in diam., bark dark brown with yellow sap. Blades elliptic, 7-10 x 1.5-3.5 cm, apex acuminate or cuspidate, base acute, dark green above, dull green underneath; secondary nerves inconspicuous on both surfaces, midrib raised on lower surface. Petioles 5-8 mm long. Inflorescence axillary. Male flowers : pedicels 4-5 mm long, light yellow greenish, sepals ovate, 2.5 x 2 mm, pale yellowish; petals oblong, 4-5 mm long, yellowish; anthers brownish. Fruits elliptic, 2 x 1.5 cm, immature green, mature orangish, little juicy.

HABITAT : Shaded and open area along the river, primary evergreen forest, alt. 150-350 m; specimens : Maxwell 85-318 and 85-721

FLOWERING : February-April, FRUITING : March-July

ABUNDANCE : Common

DISTRIBUTION : Throughout Malaya, Sumatra, Borneo (Whitmore, 1972)

Labiatae

Erect herbs, mostly aromatic. Stems and branches 4-angled. Leaves simple opposite and decussate, exstipulate. Flowers bisexual, irregular. Inflorescence terminal and axillary. Calyx 5-lobed, corolla 5-lobed and two-lipped. Stamens 4, epipetalous. Ovary superior, 2-carpellate, 2-loculate, 1-ovulate, axile placentation, style simple. Fruits consisting of four nutlets.

Hyptis capitata Jacq.

Erect herb, aromatic, pubescent. Blades lanceolate, 11-15 x 3-4 cm, apex acute, base cuneate, margin serrate, dark green above, green underneath; secondary nerves about 7 pairs. Petioles 1-3 cm long. Inflorescence axillary, flowers numerous, in solitary globular heads, 0.8-1.5 cm in diam. Peduncles green, 4-5.5 cm long. Bract linear or lanceolate, 3-5 mm long, pilose, green. Calyx 3-4 mm long, green. Corolla 4-5 mm long, white; upper lip (Backer, 1965) violet-dotted with rounded central lobe and minute, lower lip with brownish violet margins.

Stamens 4, free, anthers brown. Ovary 4-lobed, style white. Nutlets (Keng, 1978) ovoid, 1.2-2 mm long, brown.

HABITAT : Partly open, wet place along a small stream in the primary evergreen forest, alt. 300-350 m; specimens : Maxwell 85-1030 and Sirirugsa 973

FLOWERING AND FRUITING : November-February

ABUNDANCE : Not common

DISTRIBUTION : Malaysia, Hainan, and tropical America (Keng, 1978)

Lauraceae

Trees or shrubs. Leaves simple, alternate. Inflorescence racemose or paniculate. Flowers axillary, regular, bisexual or unisexual. Perianth 6-lobed, imbricate. Stamens 6-9, filaments flat, anthers 2-4 valves. Ovary 1-loculate, 1-ovulate. Fruits a drupe, fleshy. Seed without endosperm.

Phoebe declinata (Bl.) Nees

Tree about 15 m tall, about 30 cm in diam. Blades subcoriaceous, lanceolate or elliptic to lanceolate, 7-12 x 2-4 cm, apex acuminate, base acute, margin entire, dark green above, grey-green underneath; midrib raised under surface; secondary nerves 7-10 pairs, conspicuous. Petioles slender, 5-20 mm long. Inflorescence axillary, paniculate, slender, 6-8 cm long; peduncles glabrous, 3-5 cm long, yellowish. Tepals

6, lanceolate, 2-2.5 mm long, yellowish, outside pubescent, inside tomentose. Stamens 6, filaments about 1 mm long, glabrous, yellow; anthers light yellow. Ovary globose, light yellowish. Fruits a drupe, globose, 5-7 x 4-5 cm, dark reddish.

HABITAT : Mostly open areas, margins of the primary evergreen forest, disturbed places, alt. 250 m; specimen : Maxwell 85-676

FLOWERING AND FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION : Singapore, W. Malaysia (Ridley, 1924)

Lecythidaceae

Trees. Leaves simple, spirally arranged, exstipulate. Inflorescence terminal, spikate. Flowers showy, regular, sepals and petals 4-6. Stamens numerous, connate, disc present. Ovary inferior, 2-to 6-loculate, ovules 1-many in each locule, placentation axile. Fru. berry, fleshy, calyx persistent.

Barringtonia pendula (Griff.) Kurz

Tree 8-10 m tall, 15-35 cm in diam. Blades oblong, 17-30 x 6.5-10.5 cm, apex acute or acuminate, base acute, margin serrate, dark green above, green underneath; secondary nerves 12-14 pairs. Petioles 2.4-4 cm long. Inflorescence behind the leaves, pendulous, 18-20 cm long. Calyx-lobes 4, about 4 x 5 mm, apex obtuse, dark green. Petals 4, orbicular, about 8 x 9 mm, imbricate, outside brownish green, inside

light brown. Stamens : filaments 4-5 cm long, white, anthers yellowish. Style 4-6 cm long, pink. Fruit ovoid, 4-4.5 x 2.5-3 cm, outside dark maroonish, inside pale yellow-whitish.

HABITAT : Shaded area, primary evergreen forest, alt. 250-300 m; specimens : Ramsri 51 and Maxwell 85-745

FLOWERING : March-May, FRUITING : June-July

ABUNDANCE : Common

DISTRIBUTION : Throughout W. Malaysia, China, Burma, Sumatra, Borneo (Whitmore, 1973)

Leeaceae

Erect shrubs or treelets without tendrils. Leaves alternate, pinnately compound; leaflets opposite, serrate, stipules prominent. Inflorescence opposite to the leaf, cymose, with many flowers. Flowers bisexual, regular, 4-5 merous, calyx and corolla with distinct lobes. Stamens united into a tube, epipetalous. Ovary superior, 3-to 6-loculate, 1 ovule in each locule, style short. Fruit a berry.

Leea indica (Burm. f.) Merr.

Shrub or treelet 2.5-4 m tall, 2-6 cm in diam., glabrous, node swollen. Leaves 2-to 3-pinnate, leaflets 6-many. Stipules elliptic, 4 x 2 cm, green with red blots. Blades of leaflets subcoriaceous, ovate to oblong, 9-18 x 4.5-7 cm, apex caudate, base acute, margin serrate, dark green above, green underneath; secondary nerves 6-12

pairs, midrib and secondary nerves raised underneath. Petioles 0.6-3 cm long, green with reddish lenticels. Inflorescence opposite to the leaf, cymose, 10-20 cm long. Flowers 5-merous. Calyx-tube about 2 x 1.5 mm, pubescent; lobes about 1 x 1 mm, green. Corolla tube about 3.5 x 1.5 mm; lobes about 2.5 x 1.5 mm, white. Staminode tube 2 mm long; lobes 1.5-2 mm long. Filaments about 1.5 mm long. Ovary 4-loculate, style 2-2.5 mm long. Fruit a berry, about 5-8 mm in diam., dull greenish.

HABITAT : Shaded area, margins of primary evergreen forest near the river, alt. 200-300 m; specimens : Ramsri 60 and Maxwell 85-107

FLOWERING AND FRUITING : January-May

ABUNDANCE : Common

DISTRIBUTION : Ceylon, India, Nepal, Bangladesh, Burma, Cambodia, Laos, N. & S. Vietnam, China, Malaysia, Singapore, Sumatra, Java, Philippines, Borneo (Ridsdale, 1976)

Leguminosae-Caesalpinioideae

Woody climbers, treelets, or trees. Leaves alternate, pinnately compound, simple or bilobed, stipulate. Inflorescence racemose or paniculate. Flowers irregular. Sepals 5, petals 5, imbricate in bud. Stamens 10. Ovary superior, carpel 1, ovules many. Placentation parietal. Fruit a legume, dehiscent. Seeds many.

Key to genera

1. Leaves simple, emarginate or bilobed; legume tomentose
 *Bauhinia*
1. Leaves pinnately compound, leaflets 3-7 pairs, opposite; legume
 glabrous *Saraca*

Bauhinia integrifolia Roxb. ssp. *integrifolia*

Woody climber with tendrils, young branches pubescent, later glabrous. Blades broadly ovate, 10-12 x 10-14 cm, apex emarginate, lobes acute, base cordate, glabrous, dark green above, green underneath; secondary nerves 9-10 pairs from base. Petioles 5-7.5 cm long. Inflorescence terminal, paniculate or racemose, pubescent. Pedicels 1.5-2 cm long, slender. Bracts lanceolate, about 2.5 mm long. Receptacle tubular, 2-3 mm long. Calyx-lobes 5, 2-4 mm long, yellowish. Petals 5, obovate, base acute, 8-10 mm long, outside tomentose, yellow-orangish. Fertile stamens 3; filaments 10-15 mm long, red; anthers ellipsoid, 1 x 1.5 mm, brown. Ovary subsessile, elliptic to oblong, 4-5 mm long, tomentose; style 5-7 mm, red; stigma brown. Fruits dehiscent, oblong, 14-19 x 4-5 cm, tomentose, dull green. Seeds flat, orbicular, 1.5-2 cm diam.

HABITAT : Open area along the river, margins of the river, primary evergreen forest, alt. 150-300 m; specimens : Ramsri 30 and Maxwell 84-524

FLOWERING AND FRUITING : Throughout the year

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Larsen, 1984)

Saraca declinata (Jack) Miq.

Tree or treelet 4-10 m tall, 8-15 cm in diam. Leaflets 3-7 pairs, opposite, rachis 15-30 cm long, glabrous. Blades of leaflets oblong or lanceolate, 6-20 x 2-8 cm, apex acuminate or obtuse, base acute or cuneate, dark green above, green underneath ; secondary nerves 9-11 pairs. Petioles 3-4 mm long. Inflorescence corymbose 10-20 cm in diam., axillary, terminal, on leafless branches or cauliflorous, branches slender. Bracts persistent, ovate, apex acute, 4-7 x 2-4 mm, light pinkish; bracteoles obovate, 5 x 3 mm, yellowish-red. Sepals 4, ovate, 5 x 3 mm, yellow-reddish. Stamens 3-4, filaments and anthers red. Ovary glabrous, oblong, 2-2.5 mm long, green. Fruits (Larsen, 1984) oblong to lanceolate, 10-30 x 3-6 cm, apex curved, oblique at base

HABITAT : Shaded area, open place in the primary evergreen forest near the river, alt. 100-150 m; specimens : Ramsri 62, Maxwell 84-189, and Newman 33

FLOWERING : Throughout the year, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Burma, Laos, S. Vietnam, Malay Peninsula, Sumatra, Borneo (Larsen, 1984)

Melastomataceae

Shrubs, treelets, or trees. Leaves simple, usually 3-9 nerves, opposite, exstipulate. Flowers showy, bisexual, sepals and petals 4-5, free. Stamens 8-10, inflexed in bud, anthers opening by terminal pores or by slits, often appendaged. Ovary mostly inferior, 4- to 5-loculate; ovules many in each locule; axile and basal placentation. Fruit a berry or capsule, calyx persistent. Seeds numerous.

Key to genera

1. Inflorescence axillary or terminal
 2. Stamens 10, ovary 5-to 6-loculate, anthers opening by pores
..... *Melastoma*
 2. Stamens 8, ovary 4-to 5-loculate, anthers opening by slits
..... *Pterandra*
1. Inflorescence ramiflorous.....
..... *Memecylon*

Pterandra coerulescens Jack

Tree 4-6 m tall, 6-8 cm in diam. Blades coriaceous, elliptic, 12-12.5 x 6-7 cm, apex acuminate, base rounded, glabrous, margin entire, dark green above, green underneath; 3-nerved from base, raised underneath, sunken above. Petioles 5-6 mm long, glabrous. Inflorescence axillary and terminal, cymose; rachis light green. Calyx cup-shaped, 4-5 mm long, pubescent, light green. Petals oblong or ovate, 3-4 mm long, dark blue. Stamens 8, filaments, dark blue; anthers opening by

slits, dark blue. Ovary 4-to 5-loculate, style dark blue. Fruit a berry, subglobose, 5 x 5 mm, green when immature, seeds many.

HABITAT : Mostly shaded, rocky area along the river, primary evergreen forest, alt. 200 m; specimens : Maxwell 85-875 and 85-62

FLOWERING : September-December, FRUITING : December-January

ABUNDANCE : Common

DISTRIBUTION : W. Malaysia, Indo-China (Craib, 1931), Peninsular Thailand

Melastoma malabathricum L.

Shrub about 3 m tall, about 1.5 cm in diam., branches scabrous. Blades lanceolate, 5-9.5 x 1.6-3.2 cm, apex acute, base acute, dark green above, green underneath; 3-nerved from the base, scabrous on both surfaces. Petioles 3-7 mm long, scabrous. Flowers terminal, in corymb, 1-3 flowers, pedicels scabrous. Bracts large, ovate, apex acuminate, 2-2.5 cm long, scabrous. Calyx-tube cylindrical, 1 cm long; lobes ovate, acute, brownish-green, tomentose. Petals 5, 2-2.5 cm long, violet. Stamens 10, filaments yellow; anthers opening by 1-2 pores, yellow. Ovary 5-loculate, stigma brown. Fruit a berry, subglobose, pinkish. Seed many.

HABITAT : Open place, rocky area along the river, primary evergreen forest, alt. 150 m; specimen : Ramsri 9

FLOWERING AND FRUITING : All year

ABUNDANCE : Not common

DISTRIBUTION : SE. Asia (Craib, 1931)

Memecylon corticosum Ridl.

Treelet 1.5-2 m tall, 1-2 cm in diam. Blades coriaceous, oblong or lanceolate, 11.5-22 x 2.2-5 cm, apex acuminate, base rounded, dark green above, green underneath; pinnate-nerved, midrib raised underneath, sunken above. Petioles 2-4 mm long. Inflorescence on main stems below the leaves and branches, pedicels 5-7 mm long, slender whitish with a pale lilac-pinkish hue. Calyx campanulate, 4-lobed, 1.5-2 mm long, whitish with a pale lilac hue. Petals 4, ovate, apex acuminate, 2-2.5 mm long, whitish-lilac. Stamens 8; filaments 3 mm long, blue; anthers with dark red gland. Ovary 1-loculate, style blue. Fruit a drupe, subglobose; 7 x 8 mm, 1-seeded, yellow-greenish, turning dark red and purple-blackish when ripe.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m;
specimen : Maxwell 85-862

FLOWERING AND FRUITING : August-September

ABUNDANCE : Rare

DISTRIBUTION : Peninsular Thailand.

Meliaceae

Trees. Leaves mostly pinnate, alternate or spiral, leaflets opposite or alternate. Inflorescence in clusters, cauliflorous. Flowers regular, bisexual, 3-5 merous. Calyx 3-to 6-lobed. Petals

4-5, sometimes connate at the base. Stamens 8-10. Ovary 2-to 5-loculate, style 1, stigma orbicular or capitate. Fruit a berry or a capsule, seeds few, arillate.

Key to genera

1. Inflorescence paniculate; petals linear, style thick, 1.5 mm long, fruit a capsule*Chisocheton*
1. Inflorescence a cluster of spikes; petals orbicular, style not thick, 5 mm long, fruit berry-like*Lansium*

Chisocheton laxiflorus King

Tree about 8 m tall, about 10 cm in diam. Leaves pinnately compound, leaflets opposite. Blades of leaflets subcoriaceous, elliptic to oblong, 17-30 x 7.5-8.5 cm, apex acuminate, base slightly oblique, dark green above, green underneath; secondary nerves 9-14 pairs, midrib and secondary nerves tomentose. Petioles 5-10 mm long, pubescent. Inflorescence paniculate, pendulous; rachis slender, green. Calyx cup-shaped, lobes 1.5 mm long, pubescent, yellowish-green. Petals 4, linear, 4-5 mm long, outside pubescent, inside glabrous, white. Stamens tubular, 3 mm long, white, outside glabrous, inside tomentose; anthers linear, pale brown. Ovary 2-to 3-loculate, style 5 mm long, tomentose, whitish; stigma 1, orbicular. Fruit capsular, globose, 3.5-4 cm in diam., red.

HABITAT : Mostly shaded area near the river, primary evergreen forest, alt. 250 m; specimens : Maxwell 85-673 and 85-887

FLOWERING : June-August, FRUITING : July-September

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula (Ridley, 1922)

Lansium domesticum Corr.

Tree 7-12 m tall, 15-20 cm in diam. Leaves pinnately compound, leaflets alternate. Blades of leaflets coriaceous, elliptic to oblong or lanceolate; 9-32 x 3-15 cm, apex obtuse, acute or acuminate, base rounded or acute, glabrous, dark green above, green underneath; secondary nerves 10-12 pairs, prominent underneath. Petioles 4-12 mm long. Inflorescence a cluster of spikes, cauliflorous. Calyx-lobes, 5, orbicular, 1 mm long, pubescent, greenish. Corolla buds greenish and turning light yellowish when open; lobes orbicular, 2 mm long, glabrous. Stamens tubular, subglobose, whitish; anthers whitish. Ovary 3-to 5-loculate, whitish; style pubescent, very short and thick, about 1.5 mm long; stigma 3-to 5-lobed, flat. Fruit a berry, brown, juicy, sap white, ovoid or subglobose, 3 x 2-2.5 cm, indehiscent. Seed yellowish, aril whitish.

HABITAT : Shaded, rocky place along a stream or margins of the primary evergreen forest, alt. 200-275 m; specimens : Maxwell 85-310, 84-496 and 85-513

FLOWERING : February-March, FRUITING : May and November

ABUNDANCE : Not common

DISTRIBUTION : Malay islands (Ridley, 1922)

Menispermaceae

Woody climbers, often with pale yellow sap. Leaves alternate, entire, exstipulate. Flowers minute, axillary or on leafless stems, in cymes, solitary or fascicled, unisexual. Sepals 6, imbricate. Petals 3, free or connate. Stamens 3-6, carpels 3, 1-ovulate. Fruit a drupe.

Fibraurea tinctoria Lour.

Woody climber. Blades coriaceous, ovate to oblong, 8-16 x 4-7.5 cm, apex acuminate, base rounded, glabrous, dark green above, green underneath; nerves 3 from the base, prominent underneath. Petioles 4-7 cm long. Inflorescence axillary or on leafless stems, cymose of paniculate. Sepals 6, ovate, 2.5 x 1.5 mm. Petals 3, elliptic, 2 x 1 mm, white. Stamens 6, filaments 1 mm long. Fruit ellipsoid, smooth, 2 x 1 cm, outside dark green, inside whitish.

HABITAT : Open place, primary evergreen forest, alt. 100-350 m; specimens : Maxwell 85-484, 85-522, and Sirirugsa 775

FLOWERING : March-April, FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula (Ridley, 1922)

Moraceae

Climbers, shrubs, or trees, laticiferous. Leaves simple, alternate, stipulate, often forming a cap over the bud. Inflorescence axillary,

from branches or cauliflorous. Flowers unisexual, in head or embedded in an urn-shaped receptacle. Perianth (Kochummen, 1978) usually 4-lobed. Stamens 4, opposite to perianth lobes. Ovary superior, 1-loculate, 1-ovulate, style 1. Fruits united in to large fleshy compound structures.

Key to genera

1. Flowers enclosed by a receptacle; blades trinerved, bark smooth
..... *Ficus*
1. Flowers not as above; blades many-nerved, bark rough
..... *Artocarpus*

Artocarpus dadah Miq.

Tree about 12 m tall, about 15 cm in diam., twigs brown, tomentose. Blades oblong, 17-24.5 x 8-14 cm, apex acuminate, base obtuse, unequal sided, dark green above, green underneath; secondary nerves 10-12 pairs, pubescent, raised underneath. Petioles 1.5-2.5 cm long, pubescent. Flowers in head (Kochummen, 1978) on leafy twigs. Male head rounded, 0.8-2 cm in diam., yellowish, peduncles 0.8-2 cm long. Female head depressed globose, 1.25-2 cm in diam., peduncles 2.5-3.5 cm long. Perianth 3-to 4-lobed, stigma and style 1, ovary embedded in receptacle. Fruit rounded, rough, soft, outside yellow, inside pale pinkish, 1.4-1.8 cm in diam.

HABITAT : Primary evergreen forest, alt. 100 m; specimen :
Maxwell 85-291

FLOWERS : Not seen, FRUITING : March

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Sumatra, Borneo (Kochummen, 1978)

Ficus

Key to species

1. Trees or shrubs

2. Shrubs*Ficus ischnopoda* Miq.

2. Trees

3. Branchlets, blades, petioles & figs pubescent

4. Figs axillary; blades ovate to oblong, apex cuspidate
.....*Ficus albipila* (Miq.) King

4. Figs cauliflorous, mostly below the leaves; blades
obovate, apex acuminate.....
.....*Ficus schwarzi* Koord.

3. Branchlets, blades, petioles & figs glabrous

5. Figs axillary

6. Figs sessile; bracts persistent
.....*Ficus pisocarpa* Bl.

6. Figs pedunculate; bracts caducous

7. Blades ovate to oblong, base obtuse to rounded
.....*Ficus annulata* Bl.

7. Blades obovate, base acute
.....*Ficus lepicarpa* Bl.

- 5. Figs on trunk and branches or on leafy twigs
 - 8. Figs on leafless twig; leaf apex acuminate, young twigs hollow *Ficus fistulosa*
Reinw ex Bl.
 - 8. Figs on leafy twigs; leaf apex acute, young twigs solid *Ficus vasculosa*
Wall. ex Miq.
- 1. Climbers or epiphytes
 - 9. Figs sessile, in clusters on twigs with large persistent bracts *Ficus bracteata*
Wall. ex Miq.
 - 9. Figs pedunculate, without persistent bracts
 - 10. Figs on the main stem or upper leafless stems
..... *Ficus aurantiacea*
Griff. var *aurantiacea*
 - 10. Figs axillary or on leafy branches
 - 11. Blade apex caudate
 - 12. Petioles pubescent; figs tomentose, 1 cm in diam
..... *Ficus parietalis* Bl.
 - 12. Petioles glabrous; figs glabrous, 0.5 cm in diam
..... *Ficus heteropleura*
Bl. var. *heteropleura*
 - 11. Blade apex acuminate
 - 13. Blades 8-22.5 x 4-7 cm, margins entire, stipules caducous *Ficus subulata* bl.

13. Blades 23-26 x 7.5-8 cm, margins serrate at the upper half, stipules persistent
*Ficus obscura* Bl. var.
borneensis (Miq.) Corn.

Ficus albipila (Miq.) King

Tree about 10 m tall, about 15 cm in diam., branches weak. Blades ovate or obovate, 17-21 x 7-8 cm, apex cuspidate, base obtuse or rounded, dark green above, green underneath; secondary nerves 10-13 pairs, pubescent on both surfaces. Petioles pubescent, 3.5-4.5 cm long. Figs axillary, globose, outside densely pubescent, 0.8-1 cm in diam.; peduncles pubescent, 0.5-0.8 cm long.

HABITAT : Shaded area, primary evergreen forest, alt. 100 m;
 specimen : Maxwell 85-392

FRUITING : April

ABUNDANCE : Rare

DISTRIBUTION : Malaysia (Kochummen, 1978)

Ficus annulata Bl.

Tree about 15 m tall, about 35 cm in diam., latex white with several large adventitious roots at the base, bark smooth, greyish, leaf scars prominent. Blades ovate to oblong, 8-21 x 2.5-10 cm, apex acuminate, base obtuse to rounded, glabrous, dark green above, light green underneath; secondary nerves 12-14 pairs, nerves and reticulations

prominently raised underneath. Petioles glabrous, 2-5 cm long. Figs axillary, subglobose, glabrous, yellowish, outside pale yellow dots, inside whitish, about 2 x 1.5 cm; peduncles yellow-greenish, about 1 cm long.

HABITAT : Shaded, granitic bedrock place in the primary evergreen forest, alt. 300 m; specimen : Maxwell 85-1025

FRUITING : November

ABUNDANCE : Not common

DISTRIBUTION : N. Burma, Indo-China, Malaysia (Kochummen, 1978)

Ficus aurantiacea Griff. var *aurantiacea*

Woody climber on tree trunks. Bark greyish-brown, with abundant white latex. Blades obovate, 3-6 x 1.6-3.5 cm, apex obtuse or rounded, base cuneate, dark green above, green underneath; secondary nerves 4-5 pairs, reticulations prominent underneath. Petioles 0.3-1 cm long. Figs solitary on the main stems or upper leafless stems, globose, outside orange, inside pale yellow, 5-5.5 cm in diam.

HABITAT : Open area, primary evergreen forest, alt. 200 m; specimens : Ramsri 91 and Maxwell 85-1043

Ficus bracteata Wall. ex Miq.

Climber about 10 m tall, about 20 cm in diam. Bark smooth and grey. Young branches, stipules, undersurface of leaves and figs covered with red brown wooly hairs. Blades thick, oblong, 14.5-18.5 x 5-6.5 cm,

apex bluntly acuminate, base obtuse, very dark green above, light green underneath; secondary nerves 5-6 pairs, trinerved at the base, midrib and secondary nerves raised, pubescent underneath. Petioles tomentose, 2-3 cm long. Figs axillary, sessile in clusters with large persistent bracts, depressed globose, orange, tomentose, about 1-1.5 cm in diam.

HABITAT : Shaded, rocky place along the river; primary evergreen forest, alt. 300 m; specimens : Maxwell 85-429 and 85-692

FRUITING : May-July

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Singapore, Sumatra, Borneo
(Kochummen, 1978)

Ficus fistulosa Reinw. ex Bl.

Tree about 8 m tall, about 15 cm in diam., latex white. Bark pale brown, smooth, inner bark pale yellow with pale yellow latex. Young twigs hollow, easily broken. Blades obovate or oblong, 8-20 x 3-6 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 5-8 pairs, prominent underneath. Petioles slender, glabrous, 2-5.5 cm long. Figs on the branches and trunk, mostly below the leaves, globose, glabrous, light green, 6-7 mm in diam., peduncles 1-1.5 cm long.

HABITAT : Rocky area near a stream, primary evergreen forest, alt. 150 m; specimen : Ramsri 17

FRUITING : March

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, India, S. China (Kochummen, 1978)

Ficus heteropleura Bl. var. *heteropleura*

Woody climbers or epiphytes, about 4 cm in diam. near base, latex white. Blades elliptic, 8-15 x 3-5.5 cm, apex caudate, base acute, glabrous on both surfaces, dark green above, light green underneath; secondary nerves 3-5 pairs, trinerved from the base, raised underneath. Petioles glabrous, 0.7-1.5 cm long. Figs axillary and from branches, globose, orange with red spots, glabrous, 0.5 cm in diam.; peduncles pubescent, 0.3-1 cm long.

HABITAT : Open place margins of primary evergreen forest, alt. 150 m; specimen : Ramsri 59

FRUITING : May

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Burma, Indo-China (Kochummen, 1978)

Ficus ischnopoda Miq.

Shrub up to 60 cm tall, about 2 cm in diam., latex white. Leaves spirally arranged. Blades coriaceous, lanceolate, 5-12 x 0.5-1.7 cm, apex acuminate, base cuneate, glabrous, dark green above, light green underneath; midrib raised underneath. Petioles glabrous, 0.3-0.5 cm long. Figs axillary, solitary, globose, light green, later turning reddish, 0.8-1 cm in diam.; peduncles light green, 0.8-1.5 cm long.

HABITAT : Open area, rocky place along the river, primary evergreen forest, alt. 150 m; specimen : Ramsri 8

FRUITING : All year round

ABUNDANCE : Common

DISTRIBUTION : Northern W. Malaysia, India, China (Kochummen, 1978)

Ficus lepicarpa Bl.

Tree about 10 m tall, about 15 cm in diam. Twigs greyish-brown, with prominent leaf scars. Blades abovate, 18-20 x 5.5-7.5 cm, apex acuminate, base acute, glabrous, dark green above, green underneath; secondary nerves 8-9 pairs, raised underneath, tertiary nerves and reticulations visible underneath. Petioles glabrous, 2-3 cm long. Figs axillary, globose, glabrous, outside dark green, inside white, about 1.5 cm in diam.

HABITAT : Shaded, rocky area near a stream, primary evergreen forest, alt. 150 m; specimen : Ramsri 18

FRUITING : March-April

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia (Kochummen, 1978)

Ficus obscura Bl. var. *borneensis* (Miq.) Corn.

Epiphytic shrub on a tree trunk. Twigs reddish, pubescent. Stipule persistent, ovate, apex acuminate, 8 mm long. Blades elliptic to lanceolate, 23-26 x 7.5-8 cm, apex acuminate, base cuneate and oblique, margins serrate at the upper half, glabrous, dark green above, light green underneath; secondary nerves 6-10 pairs, prominent underneath. Petioles 2-3 mm long. Figs clustered, axillary and on twigs behind leaves, globose, about 4 mm in diam.; peduncles light yellowish, 2-3 mm long.

HABITAT : Mostly shaded, rocky area, margins of the primary evergreen forest along the river, alt. 375 m; specimen : Maxwell 85-881

FRUITING : September

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia (Kochummen, 1978)

Ficus parietalis Bl.

Climber or epiphytic shrub on a tree trunk, branches up to 6 m long, about 5 cm in diam. Blades elliptic to oblong, 14-22 x 6.5-9 cm, apex caudate, base rounded or cuneate, glabrous and dark green above, pubescent and light green underneath; secondary nerves 3-4 pairs, trinerved from the base, nerves and reticulation prominently raised underneath, sunken above. Petioles stout, pubescent, 0.8-1 cm long. Figs solitary or in pairs, axillary or from twigs below leaves, outside

orange, inside whitish, globose, tomentose; sap watery-white, about 1 cm in diam.

HABITAT : Shaded area, primary evergreen forest, alt. 100 m;
specimens : Maxwell 85-292 and 85-163

FRUITING : February-March

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Indo-China, Sumatra, Java, Borneo, Philippines (Kochummen, 1978)

Ficus pisocarpa Bl.

Tree about 15 m tall, about 20 cm in diam., latex white. Twigs pale greyish. Blades thick, elliptic to oblong, 6.5-16.5 x 3-5.5 cm, apex acuminate, base obtuse, glabrous on both surfaces, dark green above, light green underneath; secondary nerves 4-7 pairs, trinerved from the base, raised underneath. Petioles glabrous, 2-3 cm long. Figs axillary, in pairs, globose, glabrous, yellowish-greenish, sessile with 3 persistent bracts, about 0.7-1 cm in diam.

HABITAT : Partly open area along the river, rocky place, primary evergreen forest, alt. 300 m; specimen : Maxwell 85-691

FRUITING : July

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Singapore, Sumatra, Java, Borneo (Kochummen, 1978)

Ficus schwarzi Koord.

Tree about 15 m tall, about 20 m in diam. Blades thin, obovate, 12.5-20.5 x 4-7 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 8-9 pairs, tertiary nerves visible and reticulation inconspicuous underneath, prominent above. Petioles glabrous, 0.5-2 cm long. Figs cauliflorous, globose, pale brown, glabrous, 1.5-2 cm in diam.; peduncles 2-2.2 cm long.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m;
specimen : Ramsri 57

FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : Throughout W. Malaysia (Kochummen, 1978)

Ficus subulata Bl.

Epiphytic on tree trunks or scandent, stem about 6 cm in diam. Blades elliptic to lanceolate, 8-22.5 x 4-7 cm, apex acuminate, base cuneate, dark green above, green underneath; secondary nerves 10-13 pairs, prominent underneath. Petioles 0.8-1 cm long. Figs axillary or below the leaves, globose, orange and turning pale reddish, 0.5 cm in diam.; peduncles 2-3 mm long.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m;
specimen : Maxwell 85-315

FRUITING : March

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, S. China (Kochummen, 1978)

Ficus vasculosa Wall. ex Miq.

Tree 12-15 m tall, about 20 cm in diam. Bark grey, smooth, lenticellate. Blades elliptic to oblong, 6-13.5 x 2.5-5 cm, apex acute, base cuneate, dark green above, green underneath; secondary nerves 9-15 pairs, nerves and reticulations raised underneath. Petioles 1-2.5 cm long, slender. Figs on leafy twigs, globose, light yellowish and turning pale reddish outside, pale yellow inside, 8 mm in diam.

HABITAT : Shaded area and mostly open, rocky area near the river, primary evergreen forest, alt. 150-350 m; specimens : Maxwell 85-683 and 85-859

FRUITING : July-September

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Burma, SE. China (Kochummen, 1978)

Myristicaceae

Trees. Leaves large, simple, alternate. Flowers unisexual, axillary, in racemes. Perianth 3-lobed, valvate. Stamens extrorse, filaments jointed into a column. Anthers connate, 8-10. Ovary superior, 1-loculate, 1-ovulate. Fruit a drupe. Seed oblong or globose

Knema furfuracea (Hk. f. & Th.) Warb.

Tree 10-12 m tall, 12-20 cm in diam., sap reddish watery, young branches covered with reddish-tawny tomentose. Blades coriaceous, oblong or lanceolate, 12-30 x 2.5-6.5 cm, apex acuminate, base cordate, dark green above, green underneath; midrib red-tomentose underneath, secondary nerves 20-30 pairs, prominent; immature blades with pale brown, furaceous indumentum. Petioles thick, rusty pubescent, 0.5-1 cm long. Inflorescence racemose, axillary, rusty pubescent. Pedicels 5-10 mm long, pinkish. Perianth triangular or subglobose, about 4 x 5 mm, outside pinkish, inside dark red. Stamens : filaments obconic, anthers dark red. Ovary (Ridley, 1924) red-tomentose. Fruit ovoid or ellipsoid, tomentose. Seed ellipsoid or oblong.

HABITAT : Shaded, rocky place near the river primary ever-green forest, alt. 200 m; specimens : Maxwell 85-296 and 85-254

FLOWERING : February-March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Sumatra (Ridley, 1924)

Myrsinaceae

Herbs, treelets or trees. Leaves simple, alternate or spiral, exstipulate. Flowers small, regular, bisexual. Sepals 5, petals 5, stamens 5, epipetalous. Ovary superior, 1-loculate, free central placentation, style 1. Fruit a drupe, globose, 1-seeded.

Key to genera

1. Trees or treelets; petioles not winged; blades oblong to lanceolate, apex acute, margin serrate
 *Ardisia*
1. Herbs; petioles winged; blades elliptic or lanceolate, apex acuminate, margin undulate *Labisia*

Ardisia colorata Roxb.

Tree or treelet 6-7 m tall, 8-10 cm in diam., glabrous. Blades subcoriaceous, oblong or lanceolate, 11-26 x 3.5-6.5 cm, apex acute, base cuneate or acute, margin entire, dark green above, light green underneath; secondary nerves 12-16 pairs, midrib raised underneath, sunken above. Petioles 1-2 cm long. Inflorescence terminal, paniculate with numerous racemes. Flowers purple or pink, rachis reddish. Pedicels slender, 3-8 mm long. Sepals ovate, apex obtuse, 1-1.5 mm long, whitish. Petals ovate, apex acute, 3-3.5 mm long, pink or purple. Stamens : filaments about 1.5 mm long, anthers sagittate or lanceolate. Ovary globose, style 6-7 mm long. Fruit a drupe, globose, 4 mm in diam., dark red.

HABITAT : Margins of the primary evergreen forest, rocky place along the river, alt. 350 m; specimens : Sirirugsa 54 and Maxwell 85-302

FLOWERING : January-February, FRUITING : March

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Ridley, 1923)

Labisia pumila (Bl.) Benth. & Hk. var. *alata* Scheff.

Herb 15-30 cm tall, stem rooting at the base. Leaves 4-8, spirally arranged. Blades coriaceous, elliptic or lanceolate, 13-35 x 4-8 cm, apex acuminate, base attenuate, margin undulate, green above, pale light greenish underneath; secondary nerves numerous, inconspicuous, midrib raised underneath. Petioles 0.5-2 cm long, broadly winged. Inflorescence axillary and terminal, paniculate. Calyx-lobes 1 mm long, persistent. Fruit a drupe, globose, red 4-5 mm in diam., 1-seeded.

HABITAT : Shaded primary evergreen forest, alt 200-300 m;
specimens : Maxwell 85-503 and 84-143

FLOWERS : Not seen, FRUITING : May and August

ABUNDANCE : Not common

DISTRIBUTION : Java, Sumatra, Borneo, Malay Peninsula (Ridley, 1923)

Myrtaceae

Trees. Leaves simple, exstipulate, opposite, glandular-punctate. Inflorescence terminal or terminal and axillary, paniculate. Flowers regular, bisexual, sepals and petals 4-5. Stamens numerous, filaments slender, free, sometimes in bundles. Ovary inferior, 1-to 5-loculate, ovules 1-many in each locule, style 1. Fruit a capsule, drupe or berry.

Calyx persistent. Seeds 1-many.

Key to genera

1. Blades 3-nerved from the base, flowers in clusters, axillary or on the branches, fruit a berry, many-seeded.....

.....*Rhodammia*

1. Blades 6-to many-nerved, flowers in panicles, terminal or terminal and axillary, fruit a drupe, 1-to 2-seeded

.....*Eugenia*

Rhodammia cinerea Jack

Tree 7-12 m tall, about 10 cm in diam. Bark greyish-brown. Leaves opposite. Blades ovate to oblong, 6-9.5 x 2.5-3.7 cm, apex acuminate, base acute, pubescent and green above, glabrous and light green underneath; nerves 3 from the base, raised underneath, sunken above. Petioles pubescent, 0.5-0.8 cm long. Flowers in clusters, axillary or ramiflorous; pedicels pubescent, 1.5-2 mm long. Calyx-tube campanulate, pubescent; lobes 4, pubescent, about 0.5 mm long. Petals ovate, pubescent on both sides, 2-2.5 mm long. Stamens: filaments glabrous, 2-2.5 mm long; anthers oblong. Ovary ovoid, 1-loculate, pubescent; style puberulous, about 2.5 mm long; stigma curved. Fruit a berry, globose, puberulous, 0.6-0.8 in diam., calyx persistent.

HABITAT : Open rocky place near the river, margins of primary evergreen forest, alt. 200 m; specimens : Ramsri 67 and Santisuk 1255

FLOWERING : March-April, FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Australia (Kochummen, 1978)

Eugenia

Key to species

1. Fruits cylindrical; 1-seeded
 2. Calyx-tube funnel-shaped; fruit about 5-7 x 2-3 mm
 *Eugenia grata* Wight
 2. Calyx-tube cup-shaped; fruit about 20 x 6-8 mm
 *Eugenia rhamphiphylla* Craib
1. Fruits obovoid, ovoid or globose; 1-seeded or 2-seeded
 3. Fruits obovoid or ovoid, 1-seeded
 4. Fruits obovoid; inflorescence on twigs below the leaves,
 calyx-tube campanulate
 *Eugenia operculata* Roxb.
 4. Fruits ovoid; inflorescence axillary and terminal, calyx-
 tube funnel-shaped.. *Eugenia longiflora* (Presl) F. N. Vill
 3. Fruits globose, 2-seeded
 5. Inflorescence terminal, calyx-tube cup-shaped
 *Eugenia densiflora* (Bl.) Miq. var.
 densiflora
 5. Inflorescence axillary and terminal, calyx-tube funnel-
 shaped

6. Blades oblong or lanceolate; fruits 15-18 mm in diam.
 *Eugenia cerasiformis* (Bl.) DC.
6. Blades elliptic; fruits 4.5-5 mm in diam.
 *Eugenia tumida* Duth.

Eugenia cerasiformis (Bl.) DC.

Tree 3-8 m tall, 7-8 cm in diam. Blades oblong or lanceolate, 14-17 x 4.5-5 cm, apex acuminate or blunt acuminate, base cuneate, entire, glabrous, dark green above, green underneath; midrib raised underneath; secondary nerves many. Petioles glabrous, stout, 3-4 mm long. Inflorescence (Kochummen, 1978) axillary and terminal, paniculate, often clustered, bracts and bracteoles minute. Calyx-tube funnel-shaped, 2-3 mm long. Fruits globose, glabrous, 1.5-1.8 cm in diam., green-yellowish, 2-loculate, 2-seeded.

HABITAT : Shaded area along the river, primary evergreen forest, alt. 200 m; specimens : Ramsri 78 and Maxwell 85-447

FLOWERS : Not seen, FRUITING : May-July

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Sumatra Borneo, Java (Kochummen, 1978)

Eugenia densiflora (Bl.) Miq. var. *densiflora*

Tree 7-8 m tall, 8-10 cm in diam. Blades ovate or oblong, 11-14.5 x 4-5.5 cm, apex acuminate, base obtuse to rounded, glabrous, dark green above, light green underneath; secondary nerves 6-7 pairs, prominent underneath. Petioles glabrous, 3-4 long. Inflorescence terminal, paniculate; pedicels green and turning purple, about 1 cm long. Calyx-tube cup-shaped, 5 mm long, maroon, lobes 4, 3-5 mm long, yellowish-greenish. Petals large, orbicular, 1.5 cm long, green. Stamens : filaments about 3-4 cm long; anthers pale yellow. Style whitish-pinkish, 3 cm long. Receptacles red-pinkish. Immature fruits globose, 3-4 cm in diam., green with purplish hue, 2-seeded.

HABITAT : Open margins of the primary evergreen forest, alt. 350 m; specimens : Ramsri 53 and Maxwell 85-356

FLOWERING AND FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Singapore, Sumatra, Borneo, Java (Kochummen, 1978)

Eugenia grata Wight

Tree about 8 m tall, about 10 cm in diam. Bark orange-brown. Blades elliptic or oblong, 7-9.5 x 3-4 cm, apex acuminate, base cuneate, dark green above, light green underneath; secondary nerves many, midrib raised and black dotted underneath. Petioles glabrous, 5-7 mm long. Inflorescence axillary and terminal, paniculate, flowers many. Calyx-

tube funnel-shaped, 3-4 mm long, light yellowish-green; lobes 5, ovate, 1.5 mm long, persistent. Petals obovate, 2.5-3 mm long, white.

Stamens : filaments 5-10 mm long; anthers flattened, whitish. Style about 8 mm long. Fruit (Kochummen, 1978) cylindrical, 5-7 x 2-2.5 mm, white, 1-seeded.

HABITAT : Open margins of the primary evergreen forest, alluvial area along the river, alt. 350 m; specimen : Maxwell 85-386

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : India, Ceylon, Burma, China, Indo-China, China, Sumatra, W. Malaysia (Kochummen, 1978)

Eugenia longiflora (Presl) F. N. Vill.

Tree 12-15 m tall, 15-20 cm in diam. Bark reddish-brown, smooth. Blades elliptic or oblong, 6.5-9.5 x 2-3.5 cm, apex cuspidate, base cuneate, glabrous, dark green above, light green underneath; secondary nerves numerous, midrib raised underneath. Petioles glabrous, 0.5-1 cm long. Inflorescence axillary and terminal, paniculate, dense-flowered. Calyx-tube funnel-shaped, 3-5 mm long, light green; lobes 4, ovate, 1.5 mm long, persistent. Petals ovate, 4 x 3 mm, white. Stamens : filaments about 10 mm long, white; anthers flattened, pale yellowish. Style about 10 mm long. Fruits ovoid, glabrous, 0.8-1 x 0.5-0.8 cm, light green. Seed 1, globose.

HABITAT : Open margins of the evergreen forest, rocky place along the river, primary evergreen forest, alt. 300-350 m; specimens : Maxwell 85-485 and 84-243

FLOWERING : May-June, FRUITING : July-September

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Indo-China, Burma (Kochummen, 1978)

Eugenia operculata Roxb.

Tree 20-25 m tall, about 50 cm in diam. Bark greyish-brown. Blades subcoriaceous, ovate or oblong, 12.5-17.5 x 4.5-5 cm, apex acuminate, base cuneate, brown dotted underneath, dark green above, green underneath; secondary nerves 9-12 pairs, prominent. Petioles glabrous, 1-1.5 cm long. Inflorescence paniculate, on twigs below leaves, branches trichotomous, 4-angled, flowers slightly fragrant. Calyx-tube campanulate, 2 mm long, whitish with pinkish hue. Petals ovate, 2-2.5 mm long, white, free. Stamens : filaments and anthers white. Fruit abovoid, 4-5 x 3-3.5 mm, whitish and often with a pinkish hue, 1-seeded.

HABITAT : Partly open areas, primary evergreen forest, alt. 100 m; specimens : Maxwell 85-382 and 85-763

FLOWERING : April-June, FRUITING : July-August

ABUNDANCE : Not common

DISTRIBUTION : Malay Peninsula, India, Burma, China, Indo-

China, Sumatra, Java, Philippines, Australia (Kochummen, 1978)

Eugenia rhamphiphylla Craib

Tree 25-30 m tall, about 30 cm in diam. Bark reddish-brown. Blades oblong or lanceolate, 9.5-13 x 3-4.7 cm, apex acuminate, base cuneate, glabrous, dark green above, light green underneath; midrib flat above, raised underneath; secondary nerves many. Petioles glabrous, 0.6-0.8 cm long. Inflorescence axillary and terminal, paniculate. Calyx-tube cup-shaped, about 3 mm long, outside green inside light yellow; lobes 5, 1-1.5 mm long. Stamens : filaments 4-5 mm long, white; anthers pale brown. Style about 8 mm long, white. Fruit (Kochummen, 1978) cylindrical, slightly tapered to the base, about 20 x 6-8 mm, 1-seeded.

HABITAT : Primary evergreen forest, alt. 100 m; specimen : Maxwell 85-293

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION : W. Malaysia, Burma (Kochummen, 1978)

Eugenia tumida Duth.

Tree up to 8 m tall, about 8 cm in diam. Bark greyish-brwon. Blades elliptic, 12.5-14.5 x 5-6 cm, apex acuminate, base obtuse, glabrous, green above, light green underneath; secondary nerves many. midrib raised underneath. Petioles glabrous, 5-7 mm long. Inflorescence

(Kochummen, 1978) axillary and terminal, paniculate, flowers fragrant. Bracts and bracteoles minute. Calyx-tube funnel-shaped, 3 mm long. Fruits globose, 4.5x5 mm, crowned by the calyx-tubes, light greenish., 2-seeded.

HABITAT : Shaded, rock place, primary evergreen forest, near the river, alt. 250 m; specimen : Maxwell 85-520

FLOWERS : Not seen, FRUITING : May

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia, Borneo (Kochummen, 1978)

Oleaceae

Treelets or climbing shrubs. Leaves simple, opposite, exstipulate. Inflorescence axillary or terminal, paniculate or cymose. Flowers regular, bisexual or unisexual. Calyx-tube campanulate or funnel-shaped. Corolla-tube short or long. Stamens 2, inserted on corolla, anthers ovate or oblong, filaments short. Ovary superior, 2-loculate, style 1. Fruit a berry.

Key to genera :

1. Treelets, inflorescence paniculate; calyx campanulate, anthers ovoid *Linociera*
1. Scandent, inflorescence cymose; calyx funnel-shaped, anthers oblong *Jasminum*

Jasminum scandens L.

Climbing shrubs, branches pubescent. Blades subcoriaceous ovate to lanceolate, 1-8 x 1.5-3 cm, apex acuminate, base rounded, margin entire, pubescent and green underneath, dark green above; secondary nerves 3-4 pairs. Petioles 3-8 mm long. Inflorescence axillary and terminal, cymose. Flowers fragrant. Calyx funnel-shaped; tube 2 mm

long; lobes 6-7, linear, 3 mm long, pubescent, green, persistent.
 Corolla salver-shaped, narrow, 1.5-2 cm long; lobes 6-7, imbricate,
 linear, white. Stamen 2, filaments 0.5 mm long, anthers oblong. Ovary
 ovoid, glabrous, about 1 x 0.8 mm; style glabrous, 2.5-3 mm long.
 Fruit a berry, ovoid, 7 x 6 mm, smooth, dark green.

HABITAT : Open area, rocky place near the river primary
 evergreen forest, alt. 200 m; specimens. Ramsri 10 and Maxwell 84-13

FLOWERING : March and August, FRUITING : August

ABUNDANCE : Common

DISTRIBUTION : India, Burma, Laos, Indo-China (Kerr, 1939)

Linociera termiflora Wall. ex G. Don

Treelet up to 4 m tall, about 4 cm in diam., glabrous. Blades
 coriaceous, elliptic to oblong, 7-11 x 2.5-3.5 cm, apex caudate, base
 acute, dark green above, pale light green underneath; secondary nerves
 4-5 pairs. Petioles 4-5 mm long. Inflorescence axillary, paniculate,
 rachis whitish or pale yellowish, slender. Calyx-tube campanulate,
 lobes 4, ciliate, pubescent, 0.8-1 mm long, light yellowish. Corolla-
 lobes 5, ovate, 1.5 x 1 mm, light yellowish. Stamens 2, filaments
 about 0.3 mm long; anthers ovoid. Ovary subglobose, glabrous, about
 0.8 x 0.6 mm, style about 0.5 mm long.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m;
 specimen : Maxwell 85-884

FLOWERING : September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Burma (Kerr, 1939)

Piperaceae

Creeping or erect herbs, often aromatic. Leaves simple, alternate, stipulate. Male and female flowers minute in spikes, perianth none. Stamens 2-6. Ovary superior, 1-loculate, 1-ovulate, stigma 2-3. Fruit a drupe.

Piper

Key to species

1. Creeping herbs; blades coriaceous, elliptic to lanceolate, nerves 4, pinnate *Piper kurzii* C.DC.
1. Erect herbs; blades membranous, oblong or elliptic, nerves 5, palmate *Piper paucistigmum* Ridl.

Piper kurzii Ridl.

Erect ground herb, about 50 cm tall, branched, nodes swollen, easily broken. Blades coriaceous, elliptic to lanceolate, 15-18 x 5-6.5 cm, apex acuminate; base cuneate, dark green above, light green underneath, glabrous; secondary nerves 2 from the base and 2 from the midrib, raised underneath. Petioles glabrous, 2-12 mm long. Male spikes (Ridley, 1924) slender, about 4.5 cm long, peduncles about 1.8 cm long.

Bracts oblong, apex rounded. Female spikes about 4.5 cm long, peduncles about 1.5 cm long, stigmas 3, thick, rounded. Fruit a drupe, sessile, ellipsoid, shortly pointed, about 3.5 x 3 mm, immature green, mature orange.

HABITAT : Shaded area in the primary evergreen forest, alt. 400 m; specimen : Ramsri 36

FLOWERS : Not seen, FRUITING : April

ABUNDANCE : Not common

DISTRUBUTION : Burma (Ridley, 1924)

Piper paucistigmum C. DC.

Stems creeping on tree trunks, glabrous, branches spreading. Blades membranous, oblong or elliptic, 7.5-10 x 3.5-4.5 cm, apex acuminate, base acute or obtuse, dark green above, light greenish underneath; secondary nerves 5 from the base, prominent underneath. Petioles slender, 0.8-3 cm long. Inflorescence opposite to the leaf, peduncle slender. Female spike (Ridley, 1924) about 4 cm long, bracts ovate. Ovary not seen. Fruits a drupe, globose, 3 mm in diam., immature green, mature red.

HABITAT : Shaded area on rocks, primary evergreen forest, alt. 150 m; specimen : Ramsri 63

FLOWERS : Not seen, FRUITING : May

ABUNDANCE : Rare

DISTRIBUTION : W. Malaysia (Ridley, 1924)

Rosaceae

Trees or shrubs. Leaves simple, alternate. Flowers solitary or in racemes, bisexual, regular. Calyx 5-lobed, persistent. Petals 5-0, borne on the calyx-tube. Stamens 5-many. Carpels 1-many, adnate to the calyx-tube. Style 1. Fruit a drupe, 1-seeded.

Prunus

Key to species

1. Petioles pubescent, secondary nerves 8-9 pairs, racemes fascicle.
..... *Prunus arborea* (Bl.) Kalkm. var.
montana (Hk. f.) Kalkm.
1. Petioles glabrous, secondary nerves 4-5 pairs, racemes solitary.
..... *Prunus grisea* (C. Muell.) Kalkm. var.
tomentosa (K. & V.) Kalkm.

Prunus arborea (Bl.) Kalkm. var. *montana* (Hk. f.) Kalkm.

Tree up to 25 m tall, about 25 cm in diam. Blades elliptic to ovate, 16-17 x 7-8 cm, apex acuminate, base rounded or cuneate, oblique, dull dark green above, dull green underneath; secondary nerves 8-9 pairs. Petioles 1-1.5 cm long, pubescent. Inflorescence (Vidal, 1970) axillary, racemose, 2-5 cm long, pubescent. Calyx-tube outside pubescent, inside glabrous, calyx 7-to 12-lobed, subequal. Petals none. Stamens many. Ovary usually hairy, sometimes glabrous. Fruit a drupe, globose, pubescent, 6-7 mm in diam., greenish.

HABITAT : Shaded areas, primary evergreen forest, alt. 200 m;
specimen : Maxwell 85-309

FLOWERS : Not seen, FRUITING : March

ABUNDANCE : Not common

DISTRIBUTION : NE. India, E. Pakistan, S. China, Burma, Laos,
Cambodia, N. & S. Vietnam (Vidal, 1970)

Prunus grisea (C. Muell.) Kalk. var. *tomentosa* (K. & V.) Kalk.

Tree 8-10 m tall, about 15 cm in diam. Blades ovate to lanceolate, 8-10.5 x 3.5-4.2 cm, apex acuminate, base acute, glabrous, dark green above, green underneath; midrib pubescent underneath; secondary nerves 4-5 pairs. Petioles 0.5-1 cm long, glabrous. Inflorescence (Vidal, 1970) axillary, racemose, solitary, 1-3 cm long. Calyx-tube outside pubescent, inside glabrous, lobes 7-10, minute. Petals none. Stamens many. Ovary usually glabrous. Fruit a drupe, globose or ellipsoid, glabrous, 6-9 mm in diam., light green.

HABITAT : Shaded area, primary evergreen forest, alt. 150-375
m; specimens : Maxwell 85-480 and 84-316

FLOWERS : Not seen, FRUITING : May and October

ABUNDANCE : Not common

DISTRIBUTION : Burma, Malay Peninsula, S. Vietnam, Sumatra,
Java, Borneo (Vidal, 1970)

Rubiaceae

Herbs, shrubs, treelets, or trees, sometimes climbers, or creepers. Leaves mostly opposite, entire, interpetiolar stipulate, free or connate. Flowers mostly bisexual, regular, 4- to 5-merous. Calyx-tube adnate to the ovary. Corolla-tube short or long, 4- to 5-lobed. Stamens as many as corolla-lobes. Ovary inferior, 2- to many-loculate, 1-many ovules in each locule, placentation axile. Fruit capsular, baccate, or drupaceous.

Key to genera

1. Ovules more than 1 in each locule
 2. Fruit capsular
 3. Flowers sessile in dense heads *Adina*
 3. Flowers in cymes or panicles
 4. Treelets or shrubs; inflorescence paniculate, stipules triangular *Greenea*
 4. Herbs; inflorescence cymose, stipules ovate or bristle
 5. Erect herbs; inflorescence terminal
 6. Stipules ovate, acuminate, 6 mm long; calyx-lobes white, lanceolate; corolla rotate *Argostemma*
 6. Stipules bristle, 3 mm long; calyx-lobes green, linear; corolla salver-shaped *Ophiorrhiza*
 5. Climbing or decumbent herbs; inflorescence terminal and axillary *Hedyotis*
 2. Fruit baccate
 7. Corolla-lobes valvate; stipules oblong to lanceolate
 8. Calyx-lobes lanceolate; one enlarged *Mussaenda*

- 8. Calyx-lobes orbicular or triangular; not enlarged
 - 9. Inflorescence terminal, calyx-lobes orbicular; stipules 5 mm long; fruits white.....*Mycetia*
 - 9. Inflorescence axillary, calyx-lobes triangular; stipules 10 mm long; fruits orange*Urophyllum*
- 7. Corolla-lobes imbricate, stipules triangular.*Diplospora*
- 1. Ovule 1 in each locule
 - 10. Corolla-lobes imbricate
 - 11. Flowers 4-merous; stipules triangular
 - 12. Inflorescence cymose, calyx campanulate..*Ixora*
 - 12. Inflorescence racemose, calyx cup-shaped
.....*Pavetta*
 - 11. Flowers 5-merous; stipules ovate*Tarenna*
 - 10. Corolla-lobes valvate
 - 13. Flowers in cymes or panicles
 - 14. Inflorescence axillary, in cymes; stipules lanceolate, about 5 mm long.*Canthium*
 - 14. Inflorescence terminal, in panicles or cymes; stipules triangular 3-3.5 mm long*Psychotria*
 - 13. Flowers in fascicles
 - 15. Prostrate herbs; blades ovate, apex acute, base cordate; stipules semi-lunar, flowers terminal, solitary or pedunculate umbels, fruit a berry
.....*Geophila*
 - 15. Treelets; blades elliptic-oblong, apex acuminate, base cuneate; stipules triangular, flowers

axillary, fascicled, sessile, fruit a drupe

..... *Lasianthus*

Adina dissimilis Craib

Tree about 1.5 m tall, about 15 cm in diam. Blades subcoriaceous, elliptic, 14-22.5 x 6.5-8.5 cm, apex acuminate, base cuneate, glabrous, dark green above, greenish underneath; secondary nerves 5-10 pairs, raised underneath. Petioles glabrous, 1-3 cm long. Stipules minute. Inflorescence terminal and axillary, sessile in heads. Peduncles 3-5 cm long, pubescent. Calyx-lobes 5, about 1 cm long. Corolla-tube funnel-shaped, lobes 5, 1.5-2 mm long, outside pubescent, inside glabrous. Stamens 5, filaments 1.5-2 mm long; anthers oblong. Ovary globose, glabrous, style 2.5-3 mm long, stigma globose.

HABITAT : Primary evergreen forest, alt. 150 m; specimen :
Ramsri 4

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION : Peninsular Thailand

Argostemma diversifolium Ridl.

Herb 10-17 cm tall, fleshy. Blades membranous, ovate, 9.5-12 x 7.5-9.5 cm, apex acute, base obtuse or rounded, dark green above, pale light greenish underneath, secondary nerves about 6 pairs inconspicuous. Petioles about 2 mm long. Inflorescence terminal, cymose; peduncles

fleshy, greenish-whitish, pedicels white. Calyx campanulate; lobes lanceolate, acute, white. Corolla rotate, lobes ovate, acute, white; base of corolla inside green. Stamens : filaments whitish, anther blue, opening by pores. Ovary obovoid, glabrous, style white, 5-6 mm long.

HABITAT : Mostly shaded, wet place on rocks in a stream; primary evergreen forest, alt. 300 m; specimens : Maxwell 85-665 and 85-686

FLOWERING : July, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION : W. Malaysia (Craib, 1932)

Canthium dicoccum (Gaertn.) T. & B. var. *dicoccum*

Tree 6-10 m tall, 10-15 cm in diam. Blades subcoriaceous, elliptic to ovate, 1.5-8.5 x 3.2-3.8 cm, apex acuminate, base cuneate, glabrous, dark green above, light green underneath; secondary nerves 3-4 pairs, prominent. Petioles glabrous, 0.5-0.8 cm long. Stipules lanceolate, acuminate, 5 mm long, glabrous. Inflorescence axillary, cymose; peduncle short, about 3-5 mm long; branches many, slender, flowers numerous; pedicels slender, in flowers 5-8 mm long, in fruits 7-10 mm long, greenish, pubescent. Calyx-tube campanulate, 2 mm long, greenish, puberulous. Corolla-tube funnel-shaped, 2.5 mm long, lobes lanceolate acute, 2 mm long, throat villous, yellow-greenish. Stamens 5, filaments 0.5-1 mm long; anthers oblong. Ovary ovoid, 2-loculate, glabrous; stigma bilobed, greenish; style stout, glabrous, 6-7 mm long,

greenish. Fruits subglobose, 6-8 x 6-7 mm, grey-greenish.

HABITAT : Open place along the river; primary evergreen forest, alt. 250 m; specimens : Maxwell 85-456 and 85-676

FLOWERING : May, FRUITING : July

ABUNDANCE : Not common

DISTRIBUTION : India, Assam, China, Indo-China, W. Malaysia, Philippines (Craib, 1932)

Diplospora stylosa Ridl.

Tree up to 6 m tall, about 10 cm in diam. Blades elliptic to oblong, 12-16 x 3.2-4.5 cm, apex acuminate, base cuneate, dark green above, green underneath; secondary nerves 4-6 pairs, pubescent underneath. Petioles pubescent, 4-7 mm long. Stipules triangular, caudate, pubescent, 8 mm long. Flowers axillary, clusters. Calyx-tube campanulate, about 1 mm long, greenish, pubescent. Corolla-tube 1.5 mm long, outside glabrous, inside villous, whitish, lobes oblong, about 2 mm long, light yellowish. Stamens : filaments white; anthers pale brown. Ovary obovoid, glabrous; style glabrous, 3.5 mm long, white; stigma bifid, white.

HABITAT : Margins of the primary evergreen forest near the river, alt. 350 m; specimen : Maxwell 85-301

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Peninsular Thailand.

Geophila repens (L.) I. M. Johns.

Prostrate herb. Blades ovate, 1.5-4.5 x 2-5.7 cm, apex acute, base cordate, glabrous, dark green above, pale light green underneath; secondary nerves 3-4 pairs. Petioles glabrous, slender, 2-6.5 cm long. Stipules semi-lunar. Flowers terminal, solitary, or peduncled umbellate. Calyx-tube green-brownish, lobes linear, acuminate, 3 mm long, persistent. Corolla-tube funnel-shaped, white, throat hairy, lobes 5, lanceolate, about 5 mm long. Stamens 5, filaments filiform; anthers linear. Ovary 2-loculate, 2-ovuled; style slender, bifid. Fruit a berry, globose, about 1 cm in diam., orange-reddish, juicy.

HABITAT : Shaded, primary evergreen forest, alt. 300 m;
specimen : Ramsri 65

FLOWERING AND FRUITING : April-May

ABUNDANCE : Common

DISTRIBUTION : Tropics (Craib, 1932)

Greenea corymbosa (Jack) K. Sch.

Treelet or shrub 3-4 m tall. Blades oblanceolate, 28.5-30 x 8.5-9 cm, apex acuminate, base cuneate, pubescent on both surfaces, dark green above, light green underneath; secondary nerves 25-30 pairs, nerves and midrib tomentose, prominent underneath. Petioles pubescent, 2.5-3.5 cm long. Stipules triangular, acuminate, pubescent, 1-1.5 cm

long. Inflorescence terminal, paniculate, branched tomentose. Peduncles about 3-6 cm long, greenish, branches 0.5-2 cm long, flowers numerous. Calyx-tube green, tomentose, lobes 4, ovate, pubescent, 1 mm long, persistent. Corolla funnel-shaped, tube 8-10 mm long, pale yellow, pubescent, lobes 4, ovate, 2-2.5 mm long, pubescent. Stamens 4, filaments 0.5 mm long or nearly sessile; anthers linear, brown. Ovary 2-loculate, style glabrous, pale yellow, 8-9.5 mm long, stigma yellow. Immature capsules globose, 1-2.5 mm in diam., tomentose.

HABITAT : Open rocky place near the river, primary evergreen forest, alt. 250 m; specimen : Ramsri 98

FLOWERING AND FRUITING : August-September

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Singapore (Craib, 1932)

Hedyotis

Key to species

1. Climbing herbs; nerves conspicuous, stipules about 3 mm long, corolla-tube about 2 mm long..... *Hedyotis capitellata* Wall. ex G. Don var. *pubescens* Kurz
1. Decumbent herbs; nerves inconspicuous, stipules 5-8 mm long, corolla-tube about 10 mm long..... *Hedyotis coronaria* (Kurz) Craib

Hedyotis capitellata Wall. ex G. Don var. *pubescens* Kurz

Climbing herb, glabrous. Blades subcoriaceous, ovate or elliptic to lanceolate, 3-7 x 1.5-3 cm, apex acuminate, base cuneate, pubescent underneath, dark green above, green underneath; secondary nerves 4-5 pairs, conspicuous. Petioles pubescent, 2-4 mm long. Stipules connate, bristles, about 3 mm long. Inflorescence terminal and axillary, cymose. Peduncles 1-2 cm long, flowers numerous. Calyx-tube campanulate, 2 mm long, green, lobes ovate, acute, pubescent. Corolla-tube 2 mm long, pale yellow, lobes oblong, 4 mm long, inside villous. Stamens 4, filaments villous, 5 mm long; anthers linear. Ovary 2-loculate, style glabrous, 3.5-4 mm long. Capsule obovoid, glabrous.

HABITAT : Open area along the river, primary evergreen forest, alt. 200 m; specimen : Ramsri 11

FLOWERING AND FRUITING : March

ABUNDANCE : Common

DISTRIBUTION: N. Burma, N. Vietnam, and Laos (Fukuoka, 1970)

Hedyotis coronaria (Kurz) Craib

Decumbent herb, branches 4-angled, pubescent. Blades subcoriaceous, oblong or linear, 1.5-6 x 0.6-2 cm, apex acuminate, base acute, glabrous except the midrib, dark green above, green underneath; secondary nerves 4-5 pairs, inconspicuous. Petioles pubescent, 2-2.5 mm long. Stipules connate, bristles, 5-8 mm long. Inflorescence terminal, cymose, condensed. Calyx-lobes lanceolate, acuminate, 3 mm long, pubescent, greenish.

Corolla-tube 10 mm long, white, lobes oblong, 3-3.5 mm long. Stamens 4, filaments 1.5-2 mm long, puberulous. Ovary 2-loculate, style puberulous, about 1 mm long. Fruits (Ridley, 1923) ellipsoid, many-seeded. Seeds (Hooker, 1880) angular, dotted.

HABITAT : Open place, primary evergreen forest, alt. 150 m;
specimens : Ramsri 55 and Maxwell 84-148

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Assam, Burma, Yunnan, Vietnam, W. Malaysia,
and the Philippines (Fukuoka, 1970)

Ixora

Key to species

1. Branchlets, leaves and stipules tomentose; blades oblanceolate, 21-28 x 7-9 cm, stipules acicular, 15-20 mm long; corolla white
..... *Ixora brunonis* Wall. ex G. Don
1. Branchlets, leaves and stipules glabrous; blades lanceolate, 8-17 x 2.3-4.5 cm, stipules triangular, 3-4 mm long; corolla red-orange..... *Ixora javanica* (Bl.) DC.

Ixora brunonis Wall. ex G. Don

Shrub or treelet 2-3 m tall. Branchlets tomentose. Blades subcoriaceous, oblanceolate, 21-28 x 7-9 cm, apex acuminate, base

cuneate or cordate, tomentose, dark green above, green underneath; secondary nerves 11-17 pairs. Petioles tomentose, 2-2.5 mm long. Stipules triangular, acicular, tomentose, 15-20 mm long. Inflorescence terminal and axillary, cymose; peduncles pinkish, tomentose; pedicels reddish. Calyx campanulate; lobes 4, lanceolate, acuminate, pubescent, pinkish. Corolla-tube cylindric, narrow, about 3 cm long, white, lobes 4, oblong to lanceolate, acuminate, outside pubescent, inside tomentose. Stamens 4; filaments glabrous, 2 mm long; anthers sagittate. Ovary 2-loculate, style glabrous, 4-4.5 mm long. Fruits ovoid, 6.5-7 x 6 mm, glabrous, green.

HABITAT : Shaded area, primary evergreen forest, alt. 150 m;
specimens : Ramsri 97 and Maxwell 84-122

FLOWERING AND FRUITING : August-September

ABUNDANCE : Rare

DISTRIBUTION : Burma, W. Malaysia, Singapore (Craib, 1934)

Ixora javanica (Bl.) DC.

Treelet 1-5 m tall, 2-5 cm in diam. Blades coriaceous, lanceolate, 8-17 x 2.3-4.5 cm, apex acuminate, base obtuse, glabrous, dark green above, green underneath; secondary nerves 8-12 pairs, inconspicuous. Petioles glabrous, 2-2.5 mm long. Stipules triangular, acuminate, glabrous, 3-4 mm long. Inflorescence terminal, cymose, peduncles crimson. Calyx-tube campanulate; lobes 4, broadened, red or crimson. Corolla-tube narrow, cylindric, 3.5-4 cm long, reddish-orange, lobes 4, ovate, 0.7-

0.8 cm long, red. Stamens 4; filaments glabrous, 2 mm long; anthers sagittate. Ovary 2-loculate, style 1, about 4.5 cm long. Fruit subglobose, 2-to 3-lobed, glabrous, about 6 x 8 mm; green with a reddish hue.

HABITAT : Open and shaded area in the primary evergreen forest, rocky place, alt. 250 m; specimen : Ramsri 32

FLOWERING AND FRUITING : April

ABUNDANCE : Common

DISTRIBUTION : Java (Craib, 1934)

Lasianthus maingayi Hk . f.

Treelet about 1.5 m tall, about 1 cm in diam. Blades subcoriaceous, elliptic or oblong, 7.5-17 x 3-5.5 cm, apex acuminate, base cuneate, pubescent and pale green underneath, dark green above; secondary nerves 5-8 pairs, tertiary nerves transverse, raised underneath. Petioles pubescent, 4-5 mm long. Stipules triangular, acute, pubescent, 3 mm long. Flowers small, axillary, sessile, fascicled. Calyx-tube campanulate; lobes 4, acute, silvery-greenish. Corolla-lobes salver-shaped, 5-6 mm long, outside glabrous, inside villous; lobes triangular, white. Stamens 5, filaments 0.5-1 mm long, white; anthers white. Ovary 3-to 6-loculate, style 1, glabrous, white. Drupe subglobose, 4 x 3.5 mm, greenish-brown, 1-seeded.

HABITAT : Shaded area, primary evergreen forest, alt. 150 m; specimens : Ramsri 70 and Maxwell 84-533

FLOWERING : December, FRUITING : May

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Craib, 1934)

Mussaenda

Key to species

1. Treelets : blades ovate to oblong, 16.5-25 x 6.5-9.5 cm, pubescent underneath; stipules triangular, acuminate, glabrous, 3.5-5 mm long. *Mussaenda variolosa* Wall. ex G. Don
1. Woody climber; blades ovate-elliptic, 9-14 x 4-8 cm, pilose on both surfaces; stipules lanceolate, caudate, pilose, 8 mm long *Mussaenda villosa* Wall. ex G. Don

Mussaenda variolosa Wall. ex G. Don

Treelet up to 1 m tall, about 1 cm in diam. Blades subcoriaceous, ovate to oblong, 16.5-25 x 6.5-9.5 cm, apex acuminate, base cuneate, glabrous and dark green above, pubescent and light green underneath; secondary nerves 9 pairs. Petioles glabrous, 1.5-5.5 cm long. Stipules triangular, acuminate, glabrous, 3.5-5 mm long. Inflorescence terminal, cymose, 2-to 3-chotomous. Pedicels glabrous, 1-1.5 mm long. Calyx-lobes lanceolate, glabrous; enlarged lobes ovate, acuminate, 5-6 x 2.5-4.8 cm, glabrous on both sides, white. Corolla-tube, glabrous, slender,

1.5-2 cm long. Stamens 5, filaments glabrous, 5-5.5 mm long; anthers linear, about 1.5 mm long. Ovary 2-loculate; style filiform, 6 mm long; stigma linear. Fruit obovoid, 1 cm long, greenish.

HABITAT : Open margins of primary evergreen forest, alt. 150 m; specimen : Ramsri 52

FLOWERING AND FRUITING : May

DISTRIBUTION : Burma (Craib, 1932)

Mussaenda villosa Wall. ex G. Don

Woody climber, branches red-tomentose. Blades coriaceous, ovate or elliptic, 9-14 x 4-8 cm, apex acuminate, base cuneate, pilose on both surfaces, dark green above, green underneath; secondary nerves 9-12 pairs, raised underneath. Petioles pilose, 0.5-1.5 cm long. Stipules lanceolate, caudate, pilose, 0.8 cm long. Inflorescence terminal and axillary, cymose, densely pilose, many-flowered. Pedicels pilose, about 1 cm long. Calyx-lobes narrow, linear to lanceolate, pilose, greenish; enlarged lobes ovate, acute, 10.5 x 8.5 - 9 cm; glabrous above, pubescent on nerves underneath, white. Corolla-tube 1-2.5 cm long, pilose, yellowish; lobes inside orange, outside yellow. Stamens 5; filaments pubescent, 5-6 mm long; anthers linear, about 1.5 mm long. Ovary 2-loculate, style filiform, 5 mm long, stigma linear. Fruit oblong, 1-1.5 long, sparsely hairy, greenish.

HABITAT : Open place margins of the primary evergreen forest near the river, alt. 200 m; specimens : Ramsri 76 and Maxwell 84-150

FLOWERING : May, FRUITING : August

ABUNDANCE : Not common

DISTRIBUTION: Malay Penisnula (Craib, 1932)

Mycetia malayana (G. Don) Craib

Treelet up to 1 m tall, about 1 cm in diam., bark white. Blades elliptic to lanceolate, 13-21.5 x 5-6.3 cm, apex acuminate, base cuneate, pubescent on both surfaces, dark green above, pale light green underneath; secondary nerves 10-16 pairs, pilose, raised underneath. Petioles pubescent, 0.5-1.5 mm long, slightly winged. Stipules oblong to lanceolate, pubescent, 5 mm long. Inflorescence (Ridley, 1932; Hooker, 1880) terminal, cymose, branches slender. Flowers numerous, solitary or fascicled. Calyx orbicular, pubescent. Corolla-tube very short, outside pubescent; lobes 4-5, oblong, acute. Stamens 4-5. Ovary 2-loculate, style slender. Fruits subglobose, 5-8 mm in diam., white.

HABITAT : Shaded primary evergreen forest, rocky area, alt. 200 m; specimen : Ramsri 19

FLOWERS : Not seen, FRUITING : March

ABUNDANCE : Common

DISTRIBUTION: Malay Peninsula (Craib, 1932)

Ophiorrhiza remotiflora Ridl.

Herb about 20-25 cm tall. Blades thin, lanceolate, 8.5-18 x 2-5.5 cm, apex acuminate, base cuneate, dark green above, pale light

green underneath; secondary nerves 10-12 pairs, glabrous. Petioles slender, glabrous, 3-5 cm long. Stipules bristle, 3 mm long. Inflorescence terminal, cymose, branched; peduncles 4 cm long, pink-greenish. Pedicels 1-2 mm long, greenish. Calyx-lobes linear, acute, 1 mm long, green. Corolla salver-shaped, 5 mm long, white; lobes 5, valvate. Stamens 5; filaments 1.5 mm long, pale yellow; anthers linear, orange. Ovary 2-loculate; style filiform, 2 mm long, white, stigma white. Capsules reniform, apical dehiscent, greenish.

HABITAT : Shaded area on rocks along a stream, primary evergreen forest, alt. 200 m; specimen : Ramsri 73

FLOWERING AND FRUITING : May

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia (Craib, 1932)

Pavetta graciliflora Wall. ex Ridl.

Treelet 2-3 m tall, about 3 cm in diam. Blades subcoriaceous, elliptic to lanceolate, 6-21.5 x 2-6.5 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 7-11 pairs. Petioles glabrous, 1-2.5 cm long. Stipules triangular, acute, glabrous, 3-3.5 cm long. Inflorescence on lateral branches and axillary, racemose, peduncles greenish. Pedicels very slender, rarely up to 1 cm long. Calyx-tube cup-shaped, greenish. Corolla-tube about 1.3 cm long; lobes oblong, acute, 3-4 mm long, whitish. Stamens 1 cm long. Ovary 2-loculate, style very slender, 1.5 cm long, stigma entire. Fruits

subglobose, about 5 mm in diam., light green with brown spots.

HABITAT : Shaded area, primary evergreen forest, alt. 150-200 m; specimens : Ramsri 74 and Maxwell 84-499

FLOWERING : November, FRUITING : May

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Craib, 1934)

Psychotria

Key to species

1. Creepers; inflorescence cymose, puberulous, fruit white
..... *Psychotria saxamentosoides* Val.
1. Treelets; inflorescence paniculate, tomentose, fruits greenish
and turning orangish or reddish
....., *Psychotria rhinocerotis* Reinw. ex Bl.

Psychotria rhinocerotis Reinw. ex Bl.

Treelet 1-1.5 m tall, red tomentose, unbranched. Blades coriaceous, obovate, 17-21 x 7.5-9 cm, apex acuminate, base cuneate or obtuse, glabrous and dark green above, pubescent and very pale green underneath; secondary nerves 12-14 pairs, tomentose, raised underneath. Petioles tomentose, 1-5 cm long. Stipules triangular, pubescent, 3.5 mm long. Inflorescence terminal, paniculate, red-tomentose; branches slender; peduncles green. Calyx-lobes lanceolate, acuminate, tomentose, 2 mm long, whitish-greenish. Corolla whitish and often with slightly

pinkish hue, outside pubescent, throat hairy. Stamens 5; filaments pubescent, 0.5-0.5 mm long; anthers ovoid. Ovary 2-loculate, style 2-2.5 mm long, stigma white. Fruit ellipsoid, 4-to 8-ridged, 0.8 x 0.6 cm, greenish and turning orangish or reddish, juicy. Seeds 4-to 5-ridged.

HABITAT : Open place and shaded, primary evergreen forest, alt. 200-250 m; specimens : Ramsri 21, 71 and Maxwell 85-374

FLOWERING : April, FRUITING : May

ABUNDANCE : Common

DISTRIBUTION: Burma, W. Malaysia (Craib, 1934)

Psychotria sarmentosoides Val.

Creepers on a tree trunk, branches spreading, patent. Blades coriaceous, ovate or elliptic, 4-6.5 x 1.8-3 cm, apex acuminate, base acute, dark green above, light green and glabrous or puberulous underneath. Petioles glabrous, 2-5 mm long. Stipules triangular, puberulous, 3 mm long. Inflorescence terminal, cymose, puberulous. Pedicels 2-2.5 mm long, greenish. Calyx campanulate, 5-lobed, 0.5 mm long, greenish. Corolla-tube 2 mm long, whitish; lobes 5, valvate, 1 mm long. Stamens 5, filaments 0.5 mm long, anthers orbicular. Ovary 2-loculate, style 2 mm long, white. Fruits ellipsoid, 6.5 x 5 mm, whitish, soft and pulpy. Seeds black, 4-ridged.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m; specimens : Maxwell 85-394 and 84-542

FLOWERING : April, FRUITING : December

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia, Burma (Craib, 1934)

Tarenna

Key to species

1. Blades glabrous; secondary nerves glabrous; ovary 2-loculate, fruit 2-seeded..... *Tarenna stellulata* (Hk. f.) Ridl.
1. Blades puberulous; secondary nerves pilose; ovary 3-loculate, fruit 1-seeded..... *Tarenna puberula* Craib

Tarenna puberula Craib

Treelet about 2 m tall, about 2 cm in diam. Blades subcoriaceous, elliptic, 8-12 x 2.5-4 cm, apex acuminate, base cuneate, dark green above, green and puberulous underneath; secondary nerves 7-8 pairs, pilose, raised underneath. Petioles pubescent, 1-2 cm long. Stipules ovate, acuminate, pubescent, 6 mm long. Inflorescence terminal, cymose, puberulous. Calyx-lobes (Craib, 1932) 3 mm long. Corolla-tube 5 mm long, lobes 7 mm long, puberulous. Stamens 5, filaments 1 mm long, anthers linear. Ovary 3-loculate, style pubescent. Fruits globose, 0.5-0.6 cm in diam., greenish, 1-seeded.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m;
specimen : Ramsri 101

FLOWERS : Not seen, FRUITING : September

ABUNDANCE : Not common

DISTRIBUTION : Peninsular Thailand

Tarennia stellulata (Hk. f.) Ridl.

Treelet 1-1.5 m tall. Blades subcoriaceous, elliptic, 6.5-18.5 x 2.5-6.5 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 5-7 pairs, prominent underneath. Petioles glabrous, 0.5-1.5 cm long. Stipules ovate, acuminate, glabrous, 5-7 mm long. Inflorescence terminal, cymose, peduncles greenish. Calyx campanulate, lobes ovate, acuminate, 1.5 mm long, pubescent, greenish. Corolla-tube 5 mm long, lobes oblong, acuminate, margin ciliate, 7 mm long, yellow-greenish. Stamens 5, filaments 1 mm long, anthers linear. Ovary 2-loculate, style 5 mm long, stigma yellowish-green. Fruits globose, 0.7-0.8 cm in diam., dark green, 2-seeded.

HABITAT : Open area along the river, primary evergreen forest, alt. 200 m; specimens : Maxwell 85-491, 84-232 and 85-174

FLOWERING : May, FRUITING : September

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia (Craib, 1932)

Urophyllum blumeanum (Wight) Hk. f.

Shrub or treelet 1.5-2.5 m tall, 2-4 cm in diam. Blades subcoriaceous, elliptic to oblong, 12.5-22 x 4-8.8 cm, apex acuminate or cuspidate, base acute, glabrous, dark green above, pale light green underneath; secondary nerves 10-16 pairs; midrib puberulous, raised underneath. Petioles pubescent, 0.8-1.7 cm long. Stipules lanceolate to oblong, pubescent, about 1 cm long. Inflorescence axillary, cymose, peduncles light greenish. Pedicels pubescent, 4-5 mm long. Calyx cup-shaped; lobes triangular, acute, greenish. Corolla-tube, 2-3 mm long, lobes 5-6, triangular, 3 x 2 mm, acuminate, white, throat white hairy. Stamens 5-6; filaments glabrous, 1 mm long; anthers linear, white. Ovary 5-to 6-loculate, ovules numerous, style 1. Immature fruits green; mature fruits subglobose, 3-5 mm in diam., orange.

HABITAT : Shaded, rocky area, primary evergreen forest, alt. 200-300 m; specimens : Maxwell 85-399 and 85-551

FLOWERING AND FRUITING : April-May

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Craib, 1932)

Rutaceae

Treelets or shrubs. Leaves pinnate, opposite or spiral, exstipulate. Inflorescence terminal or axillary, in cymes or panicles, bisexual, regular. Sepals and petals 5, imbricate. Stamens 8-10, anthers 2-celled. Ovary superior with disc surrounding base, 2-to 6-

loculate. Fruit a berry or drupe. Placentation axile.

Key to genera

1. Branchlets and leaf rachis pubescent, leaflets 3-9.5 x 2-3 cm, pubescent; inflorescence terminal, fruits ovoid to oblong

.....*Micromelum*

1. Branchlets and leaf rachis glabrous, leaflets 16-30 x 5.7-8.7 cm, glabrous; inflorescence axillary, fruits subglobose

.....*Glycosmis*

Glycosmis chlorosperma Spr.

Treelet 2-4 m tall, 2-3 cm in diam, branchlets and leaf-rachis glabrous. Blades of leaflets ovate to lanceolate, 16-30 x 5.7-8.7 cm, apex acute, base slightly oblique or obtuse, margin undulate, glabrous, dark green above, very pale light green underneath; secondary nerves 6-10 pairs, prominent underneath. Petioles 3-4 mm long, glabrous. Inflorescence axillary, paniculate. Sepals triangular, ciliate, 1 mm long, greenish. Petals imbricate, oblong, 5.5-6 mm long, white, pubescent. Stamens 8, filaments 4 mm long, white, anthers light yellow. Ovary villous, 2-to 5-loculate, ovule 1 in each locule. Fruit a berry, subglobose 7 x 8 mm, grey-greenish.

HABITAT : Partly open place, along a stream, primary ever-green forest, alt. 350 m; specimen : Maxwell 85-681

FLOWERING AND FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION : W. Malaysia, Singapore, Sumatra, Java (Stone, 1972)

Micromelum minutum (Forst. f.) Wight & Arn.

Treelet about 1.5 m tall, 1.5-2 cm in diam., branchlets and leaf-rachis pubescent. Leaflets 5-7. Blades of leaflets ovate to oblong, 3-9.5 x 2-3 cm, apex acuminate, base slightly oblique, margin undulate, dark green above, green underneath; secondary nerves 5-8 pairs, pubescent on both surfaces. Petioles pubescent, 3-4 mm long. Inflorescence terminal, branched, cymose. Calyx campanulate, 5-lobed, 1 mm long, pubescent. Petals valvate, oblong to lanceolate, acute, 3-5 mm long, pubescent. Stamens 10, filaments puberulous, 3-3.5 mm long, anthers linear. Ovary pubescent, 2-to 6-loculate, ovule 2 in each locule; style 1, villous, about 4 mm long. Fruit a berry, ovoid to oblong, 1-1.3 x 0.5-0.8 cm, greenish turning reddish, glabrescent.

HABITAT : Open place in the primary evergreen forest near the river, alt. 320 m; specimens : Ramsri 27

FLOWERING : March-April, FRUITING : April

ABUNDANCE : Common

DISTRIBUTION: W. Malaysia (Stone, 1972)

Sapindaceae

Trees. Leaves alternate, pinnately compound, leaflets entire. Flowers small, unisexual, irregular. Sepals 4, imbricate. Petals 4,

unequal. Stamens 5-10, free, anthers 2-celled, filaments pubescent. Ovary 3-loculate, style 1. Fruit a drupe, tuberculate, seed arillate.

Xerospermum noronhiacum (Bl.) Bl. (*X. intermedium* Radlk.)

Tree up to 20 m tall, about 30 cm in diam. Blades of leaflets elliptic to lanceolate, 11.5-15 x 3.5-4 cm, apex acuminate, base cuneate, glabrous, dark green above, green underneath; secondary nerves 7-9 pairs, prominent underneath. Petioles 2-3 mm long. Racemes axillary (Ridley, 1922), sometimes branched. Sepals 4, rounded, ciliate. Petals 4, villous. Stamens 8, filaments pubescent. Fruits obovoid, tuberculate, 2.3-2.5 x 1.5-1.7 cm, greenish and turning yellowish, aril yellowish.

HABITAT : Partly open margin of the primary evergreen forest close to the river, alt. 250 m; specimen : Maxwell 85-674

FLOWERS : Not seen, FRUITING : June-July

ABUNDANCE : Not common

DISTRIBUTION: Burma (Ridley, 1932)

Saurauiceae

Trees or shrubs. Branches hollow. Leaves simple, spirally arranged, blades serrate. Flowers axillary or on trunks, bisexual. Sepals and petals 3, imbricate. Stamens many. Ovary 3-to 5-loculate, styles 3-5. Fruit a berry.

Saurauia tristyla DC.

Tree up to 6 m tall, about 10 cm in diam., branches hollow. Blades obovate or oblong, 15-20 x 4.5-6.5 cm, apex acuminate, base narrowly cuneate, margins serrate, dark green above, light green underneath; secondary nerves 9-10 pairs. Petioles 5-2 cm long. Inflorescence axillary or on trunks, in small fascicles. Pedicels pilose, 1.5-2.5 cm long, pale greenish. Sepals 3, obovate, acute, 4-5 mm long, whitish. Petals ovate, 5-6 mm long, whitish. Stamens about 15, filaments pink, anthers whitish. Ovary glabrous, styles 3.

HABITAT : Shaded, rocky area along a stream, primary evergreen forest, alt. 200 m; specimen: Maxwell 85-405

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Burma, Sumatra, Malay Peninsula, Indo-China, S. China (Keng, 1972)

Sterculiaceae

Trees or treelets. Leaves simple, alternate or spiral. Inflorescence axillary or terminal, cymose or paniculate. Flowers bisexual or unisexual, regular. Calyx 5-lobed. Corolla 5-lobed or absent. Stamens 10 in two whorls, connate, staminodes present or absent. Ovary superior, 5-loculate, with 2-to many ovules in each locule. Placentation axile. Fruit a capsule or follicle, seed arillate.

Key to genera

1. Flowers unisexual; petals absent, fruit a follicle
*Sterculia*
1. Flowers bisexual; petals 5, fruit a capsule.....
*Leptomychia*

Leptomychia heteroclita (Roxb.) Kurz

Treelet 2-2.5 m tall, about 3-4 in diam. Bark brownish, lenticellate. Blades ovate to oblong, 10-16 x 3-5 cm, apex acuminate, base acute or obtuse, glabrous, dark greenish above, greenish underneath; secondary nerves 4-6 pairs. Petioles 0.8-1 cm long. Inflorescence axillary, cymose. Sepals ovate to lanceolate, 6 mm long, pubescent on both sides, greenish. Petals orbicular, concave, villous, 2-2.5 mm long, white. Stamens 6-6.5 mm long. Staminodes 10, about as long as the stamens. Ovary obovate, tomentose. Style 1, 5-5.5 mm long, pilose. Fruit capsulate, 4-valved, pale greenish.

HABITAT : Shaded area, primary evergreen forest, alt. 300-350 m; specimens : Sirirugsa 960 and Maxwell 85-865

FLOWERING : February, FRUITING : September

ABUNDANCE : Not common

DISTRIBUTION: Burma, Andaman, Sumatra, Borneo, Philippines
 (Kochummen, 1973)

Sterculia

Key to species

1. Trees 10-15 m tall; blades cordate or rounded at the base, carpels 2-3 or 4
 2. Blades cordate at the base, carpels 2-3
.....*Sterculia cordata* Bl. var. *cordata*
 2. Blades rounded at the base, carpels 4
.....*Sterculia parviflora* Roxb.
1. Treelets 1-1.5 m tall; blades acute at the base, carpels 5...
..... *Sterculia coccinea* Jack

Sterculia coccinea Jack

Treelet 1-1.5 m tall, 2-3 cm in diam. Blades obovate or obovate to oblong, 14-22 x 5-7.5 cm, apex acuminate, base acute, glabrous, dark green above, green underneath; secondary nerves 8-9 pairs. Petioles 1.5-2.5 cm long. Panicles short (Ridley, 1922), few-flowered, axillary, pendulous, pubescent. Calyx-lobes linear to oblong, acute, pubescent, greenish or whitish-yellow. Male flowers : staminal column short, glabrous, brownish; anthers 10, sessile. Hermaphrodite flowers : gynophore short, ovaries 5, boat-shaped, pubescent; stigmas 5, cylindrical recurved. Follicles 5, oblong, 5-6 cm long, outside bright reddish, inside pinkish. Seeds 1 x 0.7 cm, testa black.

HABITAT : Shaded bamboo area in the primary evergreen forest, alt. 350 m; specimen : Ramsri 56

FLOWERS : Not seen, FRUITING : May

ABUNDANCE : Common

DISTRIBUTION: W. Malaysia in the lowlands (Kochummen, 1973)

Sterculia cordata Bl. var. *cordata*

Tree, up to 15 m tall, about 20 cm in diam. Blades coriaceous, elliptic or ovate, 14-24 x 8-14 cm, apex acuminate, base cordate, glabrous above, tomentose underneath, dark green above, pale grey-greenish underneath; secondary nerves 8-9 pairs, prominent underneath, midrib sunken above. Petioles 3.5-4 cm long, pubescent. Inflorescence axillary, paniculate, rachis pinkish. Calyx-tube campanulate, lobes 5, acute, 2 mm long, tomentose on both sides, outside pinkish, inside whitish. Petals none. Stamens : filaments 1.5-2 mm long; anthers yellow. Female flowers (Ridley, 1922) : calyx campanulate, outside hairy, inside glabrous; lobes lanceolate, acute. Follicles (Kochummen, 1973) 2-3, 5-12 cm long. Seeds 4-10

HABITAT : Open area, margins of the primary evergreen forest, alt. 300 m; specimen : Maxwell 85-304

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia, Sumatra, Java (Kochummen, 1973)

Sterculia parviflora Roxb.

Tree up to 10 m tall, about 15 cm in diam. Blades ovate or ovate to oblong, 12-17 x 6-7 cm, apex acuminate, base rounded, glabrous, dark green above, green underneath; secondary nerves 7-8 pairs and midrib prominent. Petioles 3-5 cm long. Panicles (Ridley, 1022) red-tomentose, slender. Calyx-lobes linear to lanceolate, outside tomentose, inside glabrous, pinkish. Petals none. Follicles 4, ovate, 8 cm long, outside red, inside dark red. Seeds 2 x 1.5 cm, testa black.

HABITAT : Mostly shaded area near the river, primary evergreen forest, alt. 350 m; specimen : Maxwell 85-682

FLOWERS : Not seen, FRUITING : June-July

ABUNDANCE : Common

DISTRIBUTION: W. Malaysia, Singapore, NE. India (Kochummen, 1973)

Styracaceae

Trees. Leaves simple, alternate, exstipulate. Flowers bisexual, regular, 5-merous, in panicles. Calyx campanulate, 5-lobed; corolla 5. Stamens 10, epipetalous. Ovary superior, 3-to 4-loculate, style 1. Fruit a drupe, calyx persistent.

Styrax serrulatum Roxb. var. *rugosum* Steen

Tree 8-25 m tall, 8-25 cm in diam. Blades ovate, 3-11.5 x 1.5-5.5 cm, apex acuminate, base obtuse, glabrous, drying thinly papery,

margin undulate, dark green above, green underneath, both surfaces light green when young; secondary nerves 4-6 pairs. Petioles 3-6 mm long, puberulous. Inflorescence axillary and terminal, paniculate, or flowers solitary. Calyx-tube campanulate, 4 mm long, outside tomentose, inside pubescent, light greenish, persistent. Corolla-lobes oblong, 8-9 mm long, tomentose on both sides, white. Stamens : filaments tomentose, 4 mm long, white; anthers linear, flat, 4-4.5 mm long, yellow. Ovary tomentose, 3-loculate, stigma capitate, style 10 mm long. Fruit a drupe, globose to ovoid, 1-1.5 cm in diam., greenish.

HABITAT : Partly open margins of the primary evergreen forest, alt. 250-350 m; specimens : Maxwell 85-346 and 85-669

FLOWERING : March-April, FRUITING : May-July

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia (Putz, 1978)

Theaceae

Trees. Leaves simple, alternate or spiral, exstipulate. Flowers bisexual or unisexual, solitary, regular, bracteolate. Sepals and petals 5 imbricate. Stamens many to numerous. Ovary 3-to 5-loculate, with one to many ovules in each locule, styles 1-3. Placentation axile. Fruit a berry or capsule.

Key to genera

1. Style 1, ovary globose, silky; fruit a capsule, shallowly 5-lobed, 2-2.5 cm in diam..... *Pyrenaria*

1. Style 3-fid, ovary ovoid, glabrous; fruit a berry, globose, 3-4 mm in diam.....*Eurya*

Eurya acuminata DC. var. *acuminata*

Tree 5-12 m tall, about 15 cm in diam. Terminal bud pilose, branches glabrescent. Blades membranous, lanceolate, 3-9 x 1-2 cm, apex acute to acuminate, base cuneate, margin serrate, glabrescent underneath, midrib raised. Petioles puberulous, 1-2 mm long. Flowers axillary, solitary or in small clusters. Sepals elliptic, 1-2 mm long, pubescent, greenish. Petals obovate, 3-4 mm long, whitish. Stamens 10-12, filaments 2 mm long; anthers linear, about 1.5 mm long. Ovary (Keng, 1972) ovoid, glabrous, style 3-fid. Fruit a berry, globose, 3-4 mm in diam., whitish.

HABITAT : Partly shaded area, primary evergreen forest, alt. 250 m; specimen : Maxwell 85-688

FLOWERING : July, FRUITING : August

ABUNDANCE : Not common

DISTRIBUTION: India, Ceylon, W. Malaysia, SW. China (Keng, 1972)

Pyrenaria camelliflora Kurz

Tree up to 8 m tall, about 15 cm in diam. Blades oblong or elliptic, 14-19 x 5.5-6 cm, apex acuminate or acute, base acute or cuneate, margin serrate, glabrous and dark green above, green underneath; secondary nerves 6-7 pairs. Petioles 1-1.5 cm long. Bracts 2, ovate 3-4

mm long, greenish. Sepals (Keng, 1972) ovate to orbicular, 4-6 mm long. Petals oblong to orbicular, 10-13 mm long, yellowish-white. Ovary globose, silky, 2-3 mm long. Style 1, glabrous, 4-6 mm long. Fruit a capsule, shallowly 5-lobed, 2-2.5 cm in diam., greenish and turning light yellowish, indehiscent. Seeds angular, flat.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m; specimen : Maxwell 85-482

FLOWERS : Not seen, FRUITING : May

ABUNDANCE : Not common

DISTRIBUTION: Burma (Keng, 1972), Peninsular Thailand.

Tiliaceae

Woody climbers, shrubs or trees. Leaves simple, alternate, stipulate. Inflorescence axillary, paniculate. Flowers regular, bisexual. Sepals and petal 5, petals shorter than sepals. Stamens numerous. Ovary 2-to 4-loculate, with 2-many ovules in each locule, style 1. Fruit a drupe.

Grewia acuminata Juss.

Woody climber, stellate-pubescent. Blades oblong or ovate, 8-16x 4-6.5 cm, apex acute or acuminate, base rounded, margin undulate, dark green above, green underneath; secondary nerves 4-5 pairs. Petioles 6-7 mm long. Inflorescence axillary, paniculate. Pedicels 1-1.5 cm long, green. Sepals linear to oblong, 2-2.5 cm long, outside, stellate-

tomentose, greenish inside whitish. Petals oblong, 5-7 mm long, glabrous, whitish. Stamens adnate at the base, filaments white, anthers subglobose, yellow. Ovary 2-to 4-celled, tomentose. Style 1, white, about 1 cm long. Fruits globose, 1-1.5 cm in diam., greenish, stellate-pubescent.

HABITAT : Open place, along a stream, primary evergreen forest, alt. 400 m; specimens : Maxwell 85-689 and 85-905

FLOWERING : September, FRUITING : June-July

ABUNDANCE : Common

DISTRIBUTION: Borneo (Ridley, 1922)

Urticaceae

Herbs or treelets. Leaves simple, alternate, often oblique. Inflorescence cymose or clustered. Flowers small, mostly unisexual. Perianth 4-to 5-lobed. Stamens 4-5, opposite to the perianth lobes. Ovary superior, 1-celled, 1-ovuled, style 1. Fruit an achene or a drupe.

Key to genera

1. Treelets; leaves with irritant hairs *Dendrocnide*
1. Herbs; leaves without irritant hairs
 2. Leaves with stipules; flowers dioecious..... *Elatostema*
 2. Leaves without stipules; flowers monoecious... *Procris*

Dendrocnide stimulans (L.f.) Chew

Treelet 2-4 m tall, 2-3 cm in diam. Blades coriaceous, elliptic to obovate, 22.5-27 x 7.5-10 cm, apex acuminate, base cuneate, margin entire, dark green above, light green underneath, pubescent on veins and with irritant hairs underneath. Petioles with irritant hairs, 4-7 cm long. Stipules ovate, 0.7-1 cm long, pubescent. Inflorescence (Chew, 1969) branched, racemose. Female inflorescence axillary, flowers 2-10. Male flowers sessile, finely irritant hairy. Stamens 4, filaments reflexed. Infructescence pendulous, rachis purplish with irritant hairs. Fruits oblong, 2-3 mm long.

HABITAT : Shaded, rocky place along a stream, primary ever-green forest, alt. 250 m; specimen : Maxwell 85-311

FLOWERS : Not seen, FRUITING : March

ABUNDANCE : Not common

DISTRIBUTION: Hainan, Laos, Vietnam, W. Malaysia, Sumatra, Java, Philippines, Borneo (Chew, 1969)

Elatostema

Key to species

1. Blades ovate, apex rounded, margin undulate, 3-4.5 x 1.5 cm; stipules 5-8 mm long *Elatostema repens* (Lour.) Hall.f.
1. Blades lanceolate, apex acuminate, margin serrate, 7.5-13 x 3.5-5 cm; stipules 8-18 mm long..... *Elatostema molle* Wedd.

Elatostema molle Wedd.

Succulent herb, about 40 cm tall. Blades oblanceolate, 7.5-13 x 3.5-5 cm, apex acuminate, base oblique, margin serrate, dark green above, pale light greenish underneath; secondary nerves 3-4 pairs. Petioles 2-7 mm long. Stipules membranous, 8-18 mm long. Bracts whitish, puberulous. Male head sessile, tepals 4, whitish. Stamens 4, white, inflexed in bud. Female head not seen.

HABITAT : Shaded, stream area in the primary evergreen forest, growing on granitic rocks, alt. 200 m; specimen : Maxwell 85-1042

FLOWERING : November, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Yahara, 1984), Peninsular Thailand

Elatostema repens(Lour.) Hall. f.

Creeping herbs. Blades ovate, 3-4.5 x 1.5-2.5 cm, apex rounded, base oblique, margin undulate, glabrous and dark green above, pubescent and light greenish underneath; 3-nerved. Petioles 2-5 mm long. Stipules membranous, ovate, acuminate, 5-8 mm long, persistent. Inflorescence rachis dull dark-pinkish, tepals pinkish-whitish. Male cymes (Backer, 1965) : peduncle 5-10 cm long. Female clusters sessile, perianth lobes 1 mm long.

HABITAT : Shaded area, primary evergreen forest, rocky places, alt. 250 m; specimen : Maxwell 85-505

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : S. China, Indo-China, Malay Peninsula, Sumatra, and Java (Yahara, 1984)

Procris

Key to species

1. Creeping or decumbent herbs; blades oblanceolate, 8.5-11 x 2-3.5 cm, glabrous *Procris laevigata* Bl.
1. Erect herbs; blades elliptic to oblong, 14-19.5 x 7-9 cm, tomentose..... *Procris frutescens* Bl.

Procris frutescens Bl.

Erect herb. Blades elliptic to oblong, 14-19.5 x 7-9 cm, apex acuminate, base oblique, margin undulate or subentire, tomentose on both surfaces, dark green above, green underneath; secondary nerves on lower surface raised, nerves 3 from the base. Petioles glabrous, 9-14 cm long. Male inflorescence in axillary, cymose; peduncle and rachis yellowish; tepals 4-lobed, whitish-pinkish; stamens 4, filaments and anthers white. Female inflorescence sessile, in head on receptacle; tepals cup-shaped, whitish.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m;
specimen : Maxwell 85-316

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Java (Backer, 1965)

Procris laevigata Bl.

Creeping or decumbent herb, stems and leaves fleshy, upper part of stem light green. Blades oblanceolate, 8.5-11 x 2-3.5 cm, apex cuspidate, base oblique, glabrous, dark green above, light green underneath; midrib prominent underneath, nerves invisible. Petioles glabrous, 0.4-0.9 cm long, light green. Male inflorescence : pedicels and tepals white. Female inflorescence white, sessile on receptacle.

HABITAT : Shaded area, primary evergreen forest, growing on a rotting, fallen tree trunk, alt. 325 m; specimen : Maxwell 85-882

FLOWERING : September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Java, Borneo, Philippines (Ridley, 1924)

Verbenaceae

Trees or woody climbers. Leaves simple, opposite, or alternate, exstipulate. Inflorescence cymose or corymbose, axillary or terminal. Flowers bisexual, irregular, 5-merous. Corolla funnel-shaped, with short or long tube. Stamens 4-5. Ovary superior 2-to 4-loculate, style 1, stigma entire or bifid. Fruit a drupe.

Key to genera

1. Trees; calyx-tube campanulate; corolla-tube 12 mm long; ovary 4-celled; stigma entire..... *Clerodendrum*
1. Woody climbers; calyx-tube cup-shaped; corolla-tube 2 mm long; ovary 2-celled; stigma bifid..... *Premna*

Clerodendrum disparifolium Bl.

Tree, up to 8 m tall, about 12 cm in diam. Blades thin, elliptic to lanceolate, 6-10.5 x 2.2 cm, apex long acuminate, base obtuse, glabrous, dark green above, green underneath; secondary nerves 5-6 pairs. Petioles 0.5-3 cm long. Inflorescence axillary and terminal, cymose, rachis 2-3 cm long, greenish, pedicels 0.5-1 cm long. Calyx-tube campanulate, 5-lobed, yellowish-green; lobes lanceolate, acute 3 mm long. Corolla-tube 1.2 cm long; lobes 5 mm long, pale yellow. Stamens 4, didynamous; filaments filiform, whitish; anthers pale yellow. Ovary 4-celled, 1-ovulate, stigma entire, style whitish. Fruit a drupe, 0.8-1 cm in diam., calyx persistent.

HABITAT : Primary evergreen forest, shaded place, alt. 200 m; specimens : Maxwell 85-407 and PSU. Herbarium No.13

FLOWERING : April, FRUITING : August

ABUNDANCE : Not common

DISTRIBUTION: Throughout W. Malaysia, Java, Borneo (Kochummen, 1978)

Premna trichostoma Miq.

Woody climber, about 10 cm in diam. at the base, glabrous, lenticelate. Blades coriaceous, ovate or obovate, 13.5-14.5 x 9-11 cm, apex obtuse, base rounded, green above, light green underneath; secondary nerves 4-5 pairs. Petioles puberulous, 5 cm long. Inflorescence terminal, corymbose, rachis light greenish, flowers sessile. Calyx-tube cup-shaped, 1.5 mm long, pubescent, light greenish. Corolla-tube funnel-shaped, 2 mm long, inside white villous; lobes 4. Stamens 4; filaments 2.5-3 mm long, white; anthers brown. Ovary 2-celled, 2-ovulate; style slender, 2.5 mm long; stigma bifid. Fruit (Ridley, 1923) a drupe globose, black.

HABITAT : Open margins of the primary evergreen forest, along the river, alt. 350 m; specimen : Maxwell 85-384

FLOWERING : April, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Java, Borneo (Ridley, 1932)

Vitaceae

Vines or climbers with tendrils. Stems terete or flattened. Leaves alternate, simple or compound. Inflorescence axillary, umbellate or cymose. Flowers regular, bisexual, 4-5 merous. Ovary 2-loculate, style short. Fruit a berry, globose

Key to genera

1. Leaves simple, stems smooth; disc pinkish, stigma capitate....

..... *Cissus*

1. Leaves compound, stems tuberculate; disc yellowish, stigma 4-lobed

..... *Tetrastigma*

Cissus repens Lmk.

Vine, stem terete, succulent, smooth, easily broken at the nodes. Leaves simple. Blades subcoriaceous, ovate, 4.5-7.5 x 4.5-7 cm, apex acuminate, base subcordate to cordate, margin serrate, glabrous, dark green above, light green underneath; nerves 4-5 from the base. Petioles slender, 3-6 cm long. Inflorescence axillary, umbellate. Rachis 2-3 cm long, greenish. Flowers 4-merous. Calyx pubescent, green. Petals yellowish-green. Disc pink, 4-lobed. Stamens : filaments subulate, anthers oblong. Style pinkish; stigma capitate, yellow. Fruit a berry, globose, 5 mm in diam., green.

HABITAT : Open area along the the river, rocky place in the primary evergreen forest, alt. 200-250 m; specimen : Ramsri 24

FLOWERING : March-April, FRUITING : May-August

ABUNDANCE : Common

DISTRIBUTION: India, Burma, Vietnam, Kampuchea, Malaysia (Latiff, 1982)

Tetrastigma hookeri (Laws.) Pl.

Climber, 2-3 cm in diam., tuberculate. Leaves 5-foliolate coriaceous, glabrous. Blades of leaflets elliptic to oblong, 12-20.5 x 5-6.5 cm, apex acuminate or caudate, base acute or slightly oblique, margin serrate, dark green above, light green underneath; secondary nerves 6-10 pairs, midrib raised on underneath. Petioles 9-16.5 cm long, petiolule 1.5-3 cm long. Inflorescence axillary, cymose. Pedicels 5 mm long, light green. Flowers 5-merous. Calyx light green. Petals light yellowish. Disc yellowish, 4-lobed. Stigma 4-lobed, style light yellowish, 1 mm long. Fruit (Latiff, 1983) a berry, globose, 3.2-3.5 cm in diam.

HABITAT : Shaded area, primary evergreen forest, alt. 250 m;
specimen : Maxwell 85-396

FLOWERING : April, FRUITS : Not seen

DISTRIBUTION: India, Burma, Java, Sumatra, Borneo and Malay Peninsula (Latiff, 1983)

Monocotyledonae

Agavaceae

Perennials, xerophytic, often with woody rhizomes producing stems. Leaves often spirally arranged crowded, thick and fibrous. Flowers bisexual, regular, in panicles or racemes. Perianth segments 6. Stamens 6. Ovary superior, axile placentation, style slender. Fruit a berry.

Dracaena curtisii Ridl.

Erect plant with woody rhizomes producing stems. Blades coriaceous and fibrous, linear to lanceolate, 50-65 x 3-3.5 cm, apex acuminate, base cuneate, sessile, dark green above, green underneath. Flowers in terminal panicles. Panicles about 30-50 cm long, peduncles green. Tepal buds whitish with pale greenish hue. Tepals linear, 1-1.5 cm long, white, connate at the base. Stamens 6 from the base of the perianth tube; filaments about 1.3 cm long, white; anthers whitish. Fruits globose, 1-to 3-seeded.

HABITAT : Shaded area, primary evergreen forest, rocky place, alt. 150-300 m; specimens : Ramsri 69 and Maxwell 85-486

FLOWERING : March-May, FRUITING : May

ABUNDANCE : Common

DISTRIBUTION: Malay Peninsula (Ridley, 1924)

Araceae

Perennial herbs, erect, creeping or climbing, often rhizomatous or tuberous. Leaves alternate, petioles sheathing at the base. Flowers unisexual or bisexual, sessile, spadix enclosed by a spathe. Perianth usually absent. Stamens free, anthers 2-to 4-celled, dehiscent by pores or slit. Ovary 1-to 3-loculate, style very short. Fruit usually baccate, 1-to many-seeded.

Key to genera

1. Terrestrial, erect herbs
 2. Leaves compound; spadix with or without appendage
 3. Leaflets 3-5; spadix with filiform appendage
..... *Arisaema*
 3. Leaflets more than 5; spadix with conical appendage.....
..... *Amorphophallus*
 2. Leaves simple; spadix without appendage
..... *Homalomena*
1. Vine, creeping, climbing or epiphytic herbs
 4. Leaves 4-to 6-lobed, each lobe about 6-12 cm long.
..... *Epipremnopsis*
 4. Leaves entire
 5. Flowers bisexual; spathe ovate or ovate to lanceolate,
spadix cylindrical or ovoid to globose.....
..... *Phorhos*
 5. Flowers unisexual; spathe both-shaped, spadix cylindrical
 6. Blades falcate or lanceolate

7. Ovary 1-celled..... *Scindapsus*
 7. Ovary 2-celled..... *Rhaphidophora*
 6. Blades ovate to oblong or lanceolate
*Anadendrum*

Amorphophallus carnosus Ridl.

Tuber subglobose, outside brownish, inside yellowish. Leaflets lanceolate, 12.5 x 3-3.5 cm, green above, light green underneath. Peduncle 8 cm long, pinkish-greenish with brownish blotches. Spathe boat-shaped, 7-12 cm long. Spadix a little longer than spathe. Appendage conical, apex obtuse, pale yellow, 5-7 cm long. Ovary flask-shaped, 1-to 3-loculate, style short and thick.

HABITAT : Shaded area, primary evergreen forest, alt. 250-300 m, specimens : Ramsri 84 and 92

FLOWERING : July-September, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Malay Peninsula (Ridley, 1925)

Anadendrum montanum (Bl.) Schott

Creeping on tree trunks and sometimes on the ground. Blades coriaceous, ovate to oblong or lanceolate, 16-19.5 x 5.5-7 cm, apex acuminate, base slightly oblique, dark green above, green underneath. Petioles slender, 6-9 cm long. Inflorescence axillary; scape green, 8-10 cm long. Spathe (Ridley, 1925) boat-shaped, apex cuspidate,

glaucous, green. Spadix as long as spathe. Stamens 3; filaments broadened; anthers linear, yellow. Ovary ovoid, 1-loculate. Fruits yellow and turning red.

HABITAT : Shaded area in the primary evergreen forest, alt. 250-300 m; specimens : Ramsri 39 and 75

FLOWERS : Not seen, FRUITING : April-May

ABUNDANCE : Common

DISTRIBUTION: Singapore, W. Malaysia (Ridley, 1925)

Arisaema

Key to species

1. Blades ovate; spadix 2-2.5 cm long, appendage 1.5-2 cm long
.....*Arisaema cuspidatum* (Roxb.) Engl.
1. Blades elliptic or oblong; spadix 3.5 cm long, appendage 4 cm long.....*Arisaema scortechinii* Hk.f.

Arisaema cuspidatum (Roxb.) Engl.

Tuber subglobose and flattened, outside pale brown, inside pale yellowish to whitish. Stem and petiole mottled olive-green and dark purple. Leaves trifoliate. Blades of leaflets ovate, 8-31 x 3-12.5 cm, apex acuminate, base oblique, dark green above, light green underneath. Petioles 0.5-4 cm long. Scape 19-37 cm long. Spathe whitish with pale greyish streaks, upper part of spathe light greenish. Spadix about 2-2.5 cm long, green; appendage light greenish, filiform, 1.5-2

cm long. Stamens light yellow, anthers oblong. Ovary 1-loculate.
Fruits yellow-greenish and turning greenish.

HABITAT : Shaded, rocky areas in the primary evergreen forest, alt. 300 m; specimens : Maxwell 85-488 and 85-973

FLOWERING : May, FRUITING : October

ABUNDANCE : India, W. Malaysia, Cambodia, Philippines (Ridley, 1925)

Arisaema scortechinii Hk. f.

Tuber oblong, about 3-4 cm long. Leaves compound, 3-5 leaflets. Blades elliptic or oblong, 17-20.5 x 4.5-7.5 x 4.5-7.5 cm, apex caudate, base oblique, dark green above, pale light green underneath. Petioles 1-1.5 cm long, dark green with greyish blots. Scape about 88 cm long, pale light greenish with greenish spots. Spathe light greenish-whitish on both surfaces, hood bent over the spadix. Spadix 3.5 cm long; appendage filiform, 4 cm long, green. Anthers whitish to pale yellow. Sterile part light greenish.

HABITAT : Shaded area near the river, primary evergreen forest, alt. 100-175 m; specimens : Maxwell 84-535 and 85-1039

FLOWERING : November-December, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Ridley, 1925)

Epipremnopsis media (Schott) Engl.

Creeping on tree trunks with slender adventitious roots and rooting in the ground. Blades 4-6 lobes, each lobe oblong, about 6-12 cm long, apex acute, base rounded, dark green above, green underneath. Petioles terete, glabrous, 18-30 cm long. Inflorescence axillary, scapes 8-10 cm long, green-brownish. Spathe ovate, pale brown. Spadix cylindrical, 5-7.5 cm long, yellowish-green. Flowers without perianth. Stamens 6, free, filaments 3 mm long. Ovary flattened, 1-loculate. Fruit (Ridley, 1925) white.

HABITAT : Shaded area, primary evergreen forest, alt. 150-200 m; specimens : Ramsri 66, 93 and Maxwell 84-385

FLOWERING : May-October, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Java, Philippines, borneo (Ridley, 1925)

Homalomena pendula (Bl.) Bakh. f.

Erect herbs, stems stout, fleshy. Leaves simple. Blades coriaceous, ovate or triangular, 7-26 x 2-20 cm, apex acuminate, base cordate, truncate, sagittate, or oblique; immature blades pinkish, older dark green above, green underneath; very variable in sizes and shapes. Petioles stout, lower half widened towards the sheath, 10-46 cm long, whitish-pale yellow, glabrous. Inflorescence axillary or basal. Scapes 5-20 cm long, terete, greenish. Spathe oblong to cylindrical, apex cuspidate, 5-7 cm long, outside green to yellowish, inside whitish. Spadix

cylindric, 4-5 cm long. Stamens 1 mm long, white. Ovary ovoid or globose, whitish. Fruits whitish to pale yellowish.

HABITAT : Shaded and open place near the river, primary ever-green forest, alt. 200 m; specimens : Ramsri 72 and Maxwell 85-1

FLOWERING AND FRUITING : Throughout the year

ABUNDANCE : Common

DISTRIBUTION: Java, Singapore, W. Malaysia (Ridley, 1925)

Pothos

Key to species

1. Blades oblong; 12-21 x 5-8 cm, petioles not winged, spadix cylindrical, spathe 6-10 cm long.....*Pothos kingii* Hk. f.
1. Blades lanceolate to linear, 4-8 x 1-1.5 cm, petioles broadly winged towards the base, spadix ovoid to globose, spathe 0.5 cm long*Pothos raxburghii* de Vriese

Pothos kingii Hk. f.

Climber on a tree trunk. Blades oblong, 12-21 x 5-8 cm, apex cuspidate, base obtuse or rounded, green above, light green underneath. Petioles 4.5-11 cm long. Inflorescence axillary, scape 3.5-8 cm long, dark purple. Spathe ovate to lanceolate, 6-10 cm long, dark purplish. Spadix cylindrical, 4-5.5 cm long, dark purple. Ovary oblong, 3-celled.

HABITAT : Shaded area in the primary evergreen forest, alt. 250 m; specimens : Ramsri 35 and Maxwell 84-338

FLOWERING : April-October, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: W. Malaysia, Malay Peninsula (Ridley, 1925)

Pothos roxburghii de Vriese

Vine, main stems creeping, leafy branches patent. Blades lanceolate to linear, 4-8 x 1-1.5 cm, apex acuminate, base obtuse, dark green above, green underneath. Petioles broadly winged towards the base, 1.5-5 cm long. Inflorescence axillary, scape 0.8-1.3 cm long, spathe ovate, cuspidate, 0.5 cm long, dark maroonish-purple. Spadix ovoid to globose, 0.3-0.4 cm in diam., yellow-greenish and turning greenish. Tepals 6; filaments flat; anthers ellipsoid. Ovary oblong, 3-celled.

HABITAT : Mostly shaded place near the river, primary evergreen forest, on a fallen tree, alt. 200 m; specimen : Maxwell 85-886

FLOWERING AND FRUITING : September

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia, Malay Peninsula (Ridley, 1925)

Rhaphidophora lobbi Schott

Climbers or creeper on the tree trunks. Blades subcoriaceous, falcate to lanceolate, 8.5-17.5 x 3-6.5 cm, apex acuminate, base

oblique, dark green above, green underneath; secondary nerves 5-8 pairs. Petioles 4-5 cm long. Inflorescence axillary. Scape pendulous, 3 cm long. Spathe boat-shaped, 2.5-3 cm long, brown. Spadix cylindrical, 3 cm long, pale yellow, filaments flat, linear. Ovary 1-to 2-loculate. Seeds (Ridley, 1925) 6, elliptic, flattened.

HABITAT : Shaded area, primary evergreen forest, alt. 200 m;
specimen : Ramsri 79

FLOWERING : July, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Borneo, Singapore, W. Malaysia (Ridley, 1925)

Scindapsus hederaceus (Z. & M.) Miq.

Creeper on tree trunks, hanging with long adventitious roots and rooting in the soil. Leaves simple. Blades falcate to lanceolate, 7.5-20 x 3.5-7 cm, apex acute, base oblique, dark green above, green underneath. Petioles 3.5-8 cm long, sheathing. Inflorescence axillary. Scape erect, 7 cm long, greenish. Spathe boat-shaped, 8 cm long, light greenish and turning light yellowish. Spadix cylindrical, 3 cm long. Stamens 3, filaments flat, anthers ovoid, opening by pore. Ovary conical, 1-celled, stigma linear. Fruits light orangish.

HABITAT : Shaded area in the primary evergreen forest, near the river, alt. 250-350 m; specimens : Maxwell 85-696 and 85-962

FLOWERING : July-August, FRUITING : September-October

ABUNDANCE : Not common

DISTRIBUTION: Java, Singapore, W. Malaysia (Ridley, 1925)

Commelinaceae

Erect or decumbent herbs. Leaves simple alternate or spirally arranged, sheathing at the base. Inflorescence paniced cymose. Flowers regular, bisexual, blue or violet. Perianth in two series. Stamens 6, sometimes reduced to staminodes, anthers oblong or globose, filaments often hairy. Ovary 2-to 3-loculate, style 1, stigma small. Fruit capsular.

Key to genera

1. Erect herbs; inflorescence terminal and axillary
..... *Aneilema*
1. Decumbent herbs; inflorescence axillary
 2. Petioles and sheaths glabrous; flowers in cymose, stamens 3,
filaments glabrous..... *Commelina*
 2. Petioles and sheaths tomentose; flowers in panicles, stamens
6, filaments villous..... *Forrestia*

Aneilema

Key to species

1. Inflorescence 14-24 cm long; sepals dark brown, petals whitish;
staminodes 3, hairy..... *Aneilema herbacium* (Roxb.) Wall. ex
Kunth

1. Inflorescence 5-7 cm long; sepals violet to lilac, petals lilac;
staminodes 2, glabrous *Aneilema conspicuum* (Bl.) Kth.

Aneilema conspicuum (Bl.) Kth.

Erect herb, clustered, about 1 m tall. Blades lanceolate, 15-20.5 x 2.8 -3 cm, apex acuminate, base acute, glabrous, dark green above, very light pale green underneath. Petioles glabrous, 0.5 cm long, sheaths 2 cm long, glabrous. Inflorescence axillary and terminal, rachis purplish; panicle wide spreading, 5-7 cm long. Sepals 3, violet to lilac. Petals 3, elliptic, lilac. Stamens 3; filaments lilac; anthers oblong, yellow. Staminodes 2. Ovary 3-celled. Fruit a capsule, globose, white.

HABITAT : Shaded, rocky area in the primary evergreen forest,
alt. 200 m; specimen : Ramsri 29

FLOWERING AND FRUITING : March-April

ABUNDANCE : Common

DISTRIBUTION: Burma, Java, Sumatra (Ridley, 1924)

Aneilema herbaceum (Roxb.) Wall. ex Kunth

Erect herbs, roots slender, not tuberous. Blades elliptic to lanceolate, 9.5-16 x 1.9-3.8 cm, apex acuminate, base acute, pubescent, dark green above, green underneath. Petioles 0.5 cm long, pubescent; sheaths 2.5 cm long, pubescent. Inflorescence terminal and axillary,

paniculate, 14-24 cm long. Sepals oblong, 5-7 mm long, dark brown. Petals whitish. Fertile stamens 3; filaments blue, hairy; anthers yellow. Stamines 3, hairy. Flowering in the late afternoon. Ovary 3-celled. Fruits ellipsoid, 5-7 mm long.

HABITAT : Shaded rocky place, primary evergreen forest, alt. 150 m; specimen : Ramsri 37

FLOWERING AND FRUITING : March-April

ABUNDANCE : Not common

DISTRIBUTION: Java (Backer and Bakhuizen, 1968)

Commelina diffusa Burm. f.

Decumbent herb, stem up to 50 cm tall. Blades elliptic to lanceolate, 3-9.5 x 1-2.5 cm, apex acuminate, base obtuse, dark green above, green underneath. Petioles 0.5 cm long, glabrous; sheath 2 cm long, glabrous. Flowers in cyme, peduncle 0.7-2.5 cm; bracts green; pedicels whitish : Sepals 3, membranous, light blue. Petals longer than sepals. Stamens 3; filaments glabrous, light blue; anthers grey. Staminate 1, yellow. Ovary 3-celled.

HABITAT : Partly open, rocky areas near the river, disturbed place in the primary evergreen forest, alt. 300 m; specimen : Maxwell 85-506

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Java (Backer, 1968)

Forrestia mollissima (Bl.) Kds. forma *mollissima*

Decumbent herb. Blades lanceolate, 25-30 x 5-6 cm, apex acuminate, base cuneate, pubescent, dark green above, green underneath. Petioles 2-3 cm long, tomentose, sheaths 4-5 cm long, velutinous. Inflorescence axillary in panicles. Peduncles 1-1.5 cm long, violet. Sepals 5-7 mm long, violet. Petals 6 mm long, blue. Stamens 6, filaments villous, anthers ovoid. Ovary 3-celled. Fruit a capsule, bright purple. Seeds orangish.

HABITAT : Shaded area, primary evergreen forest, alt. 200-250 m; specimens : Maxwell 84-100 and 85-400

FLOWERING : April, FRUITING : August

ABUNDANCE : Not common

DISTRIBUTION: Java (Backer and Bakhuizen, 1968)

Cyperaceae

Annual or perennial herbs. Culms usually solid, terete or trigonal. Leaves 3-ranked, the sheath closed. Blades linear or oblong. Flowers bisexual, in spikes or panicles, each floret subtended by a single glume; glumes imbricate. Perianth represented by scales or bristles. Stamens 1-3. Ovary 1-loculate, 1-ovulate, style 2-to 3-branched. Fruit a nutlet.

Scleria lithosperma (L.) Sw. var. *lithosperma*

Erect herbs with leafy stems; rhizome woody. Culms solid, triangular, glabrous, 50-60 cm long, slender, tufted. Blades linear, apex acuminate, base acute, glabrous, dark green above, green underneath, sheath hairy. Panicles 3-10 cm long, with spikelets or clusters of spikelets, terminal and axillary. Rachis dark green. Glumes spirally arranged, ovate to lanceolate, apex acuminate, glabrous, brownish. Stamen 1, stigmas 3, style 1, 3-fid. Nutlets ovoid, smooth, glabrous, whitish-grey.

HABITAT : Shaded, often disturbed place in the primary evergreen forest, alt. 200 m; specimen : Maxwell 85-1048

FLOWERING AND FRUITING : November

ABUNDANCE : Not common

DISTRIBUTION: All tropical regions except Africa (Ridley, 1925)

Gramineae

Annual, biennial or perennial herbs; erect or decumbent and woody bamboos. Culms mostly hollow, jointed. Leaves entire, linear or lanceolate, consisting of an elongate sheath which is split on one side, ligulate. Inflorescence terminal or axillary, in panicles; each floret subtended by glumes (lemma and palea). Perianth usually reduced to scales (lodicules). Stamens 3-6, filaments slender, anthers versatile. Ovary 1-loculate, 1-ovulate, style 2-to 3-branched. Grain with rich starchy endosperm.

Dioscoreaceae

Vines, tuberous. Leaves simple opposite. Flowers small, unisexual, in panicles. Perianth parts 6. Stamens 3-6. Ovary inferior, 3-loculate, ovules two in each locule. Fruit capsular, 3-winged.

Dioscorea oryzetorum Pr & Burk. var. *oryzetorum*

Vine, tuber globose. Blades mostly elliptic, 7-10 x 4-8 cm, apex acuminate, base cordate or auriculate, dark green above, light green underneath; nerves 5 from the base, prominent underneath. Petioles glabrous, 2.5-7 cm long. Male inflorescence axillary or on leafless branches, peduncles green, 30-35 cm long; buds light green, ellipsoid. Outer petals 1 mm long, inner petals a little shorter, oblanceolate. Stamens with very short filaments. Capsule pale yellowish, 3-winged.

HABITAT : Partly open disturbed place with secondary growth in the primary evergreen forest, alt. 250-300 m; specimens : Maxwell 85-106 and 85-1031

FLOWERING : November, FRUITING : January

ABUNDANCE : Not common

DISTRIBUTION : Malaysia (Burkill, 1951)

Key to genera

1. Culms woody, 10-20 in a tuft..... *Gigantochloa*
1. Culms herbaceous, fewer than 10 in a tuft
2. Decumbent herbs; blades pubescent, 9.5-10.5 x 1-1.3 cm:.....
 *Cryptococcum*
2. Erect herbs; blades glabrous, 12.5-26 x 4-5.7 cm
 *Leptaspis*

Cryptococcum accrescens (Trin.) Stapf

Decumbent herb. Blades lanceolate, 9.5-10.5 x 1-1.3 cm, apex acuminate, base cuneate, both surfaces pubescent, dark green above, light green underneath, sheaths puberulous. Panicles 4-5 cm long, spikelets minute, numerous, green. First glume ovate, apex acute, secondary glume elliptic, apex rounded. Grains (Ridley, 1925) ovoid, yellow.

HABITAT : Partly open in the primary evergreen forest, alt. 200 m; specimen : Maxwell 85-1046

FLOWERING : All year

ABUNDANCE : Common

DISTRIBUTION: India, W. Malaysia, China (Ridley, 1925)

Gigantochloa wrayi Gamb.

Erect bamboos; culms 10-20 in a cluster, about 8 m tall, 6 cm in diam., culms of young clusters dark green with yellowish-green vertical

streaks, older uniformly dark green; culm sheath appendage erect and later patent 90° , lanceolate, acuminate, 8.5-13.5 cm long. Blades oblong to lanceolate, 13.5-22.5 x 1.5-2.2 cm, apex acuminate, base rounded, pubescent, green above, light green underneath. Petioles 2-3 cm long, leaf sheaths glabrous. Panicles (Redley, 1925) compound, branches with few fertile and several sterile flowers and numerous bracts; spikelets conic, some what flattened; palea oblanceolate, bifid, ciliate.

HABITAT : In the primary evergreen forest, alt. 350 m; specimens : Ramsri 83

FLOWERS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Malay Peninsula (Ridley, 1925)

Leptaspis urceolata (Roxb.) R.Br.

Stems erect, rhizome creeping, often raised above the ground on stilt roots, 30-50 cm tall, base covered with sheathing leaves. Blades coriaceous, elliptic to lanceolate, 12.5-26 x 4-5.7 cm, apex acute, base acute, glabrous, dark green above, light green underneath. Petioles 8-11.5 cm long, sheathing at the base. Panicles terminal, pubescent, 20-25 cm long. Glume ovate, apex acute, puberulous, green. Stamens 6, anthers light yellow. Styles 3.

HABITAT : Shaded areas, primary evergreen forest, alt. 150 m; specimens : Ramsri 31 and Sirirugsa 107

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Ceylon and Malay island (Ridley, 1925)

Liliaceae

Herbs, rhizomatous, roots from a rhizome, stem erect. Leaves simple, linear to lanceolate, fibrous. Flowers bisexual, often regular. Perianth segments 6, two series. Stamens 6, filaments free or connate. Ovary usually superior, sometimes inferior, 3-carpelate, placentation axile. Fruit a capsule or berry.

Key to genera

1. Flowers pedicelate, anthers borne on a distinct staminal corona;
fruit subglobose, 8 x 7 mm*Peliosanthes*
1. Flowers sessile, anthers adnate to the perianth; fruits globose
15-20 mm in diam*Tupistra*

Peliosanthes teta Andr. ssp. *teta*

Erect herbs, perennial. Rhizome very short. Roots thick. Blades elliptic to oblong, 25-31 x 4.8-9 cm, apex acuminate, base acute, glabrous, entire, dark green above, green underneath; many-nerved. Petioles terete, glabrous, 25-35 cm long. Racemes 7-20 cm long, Peduncles flattened, erect, usually 25-30 cm long, dark green; pedicels 3-6 mm long. Perianth segments orbicular, glabrous, 2.5-3 mm long. Anthers sessile. Ovary superior, 3-loculate, green; style 1-2 mm long. Fruits subglobose, 8x7 mm.

HABITAT : Shaded area in the primary evergreen forest, alt. 20 m; specimen : Ramsri 38

FLOWERING AND FRUITING : April

ABUNDANCE : Common

DISTRIBUTION: India, S. China, Malay Peninsula, Malaysia (Jessop, 1979)

Tupistra violacea Ridl.

Tufted herb, stem short, rhizomes creeping, upper stem with erect leaves. Blades coriaceous, oblong to lanceolate, 60-70 x 8-11 cm, apex acuminate, base cuneate, fibrous, dark green above, green underneath. Inflorescence ascending up to 17 cm long. Peduncle 9 cm long, purplish. Perianth segments dark purple, tube 5-6 x 4.5-6 cmm. Stamens light yellow, anthers sessile. Ovary white; stigma whitish with purple hue, style white with spotted violet. Fruits globose, 15-20 mm in diam., dark purple-blackish.

HABITAT : Shaded and partly open areas on a large granitic in the primary evergreen forest, alt. 200-250 m; specimens : Maxwell 85-91 and 85-404

FLOWERING : January, FRUITING : March-April

ABUNDANCE : Not common

DISTRIBUTION: Malaysia, Malay Peninsula) (Jessop, 1979)

Marantaceae

Perennial herbs, rhizomatous. Leaves alternate, two-ranked, the petioles sheathing the stem. Flowers irregular. Sepals 3, corolla 3-lobed. Stamen 1 and staminode 4. Ovary inferior, 1-to 3-loculate, stigma and style 1. Fruit a capsule, indehiscent, 1-to 3-seeded, not arillate.

Donax carnaeformis (G. Forst.) K. Sch.

Branching herb, stem erect, 3-3.5 m tall, 2.5-3 cm in diam. Blades ovate or oblong to lanceolate, 14-34 x 10-22 cm, apex acuminate, base rounded or obtuse, glabrous, dark green above, green underneath; midrib prominent on lower surface. Petioles glabrous, 1.5-3 cm long, sheaths pubescent 7-20 cm long. Inflorescence axillary, often with many branches, about 20-30 cm long. Primary bracts (Holttum, 1951) 1.2-1.5 cm apart, 2.3-3.2 cm long, each with 1-2 pairs of flowers. common pedicel of pair of flowers 2.5-3 cm long; pedicels of individual flowers about 2.5-5 mm long. Sepals narrow, about 3 mm long, white. Corolla-tube 8-10 mm long, white; lobes, lanceolate, apex obtuse, 10-14 x 4-5 mm, white. Staminodes broadened, margin yellowish. Stamen white, about 2 mm long. Infructescence pendulous; fruits globose, 10 mm in diam., green-yellowish, turning pale yellow, indehiscent. Seeds usually 2, sometimes 1 or 3 without aril.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m;
specimen : Ramsri 116

FLOWERING : October, FRUITING : November

ABUNDANCE : Common

DISTRIBUTION : Burma, Indo-China, through Malaysia to the islands of the Pacific (Holttum, 1951)

Musaceae

Tall robust herbs with pseudostems which are formed by the leaf sheaths. Flowers bisexual, zygomorphic, pedicellate in the axils of bracts and aggregated in cymose inflorescence, subtended by spathes. Perianth segments 3, petaloid, split on one side. Stamens 5. Fruit a berry.

Musa acuminata Colla

Gigantic herbs, rhizomatous, laticiferous, irritating with watery sap and fibrous with pseudostems, 4-6 m tall, 12-18 cm in diam. Blades oblong to lanceolate, 3 x 0.25 m, apex rounded, base obtuse or rounded, waxy, dark green above, grey-green underneath. Inflorescence terminal, pendulous, 1-1.5 m long, rachis dull dark green : bracts both sides dull dark red, bracteoles white. Tepals white, lobes yellow. Style : lower half white, upper half light orangish; stigma light orangish. Fruit a berry, oblong, 9-12 cm long, outside green, inside whitish. Seeds numerous; sap irritate.

HABITAT : Open rocky thickets along the river, disturbed place in the primary evergreen forest, alt. 200 m; specimen: Maxwell 85-516

FLOWERING AND FRUITING : Throughout of the year

ABUNDANCE : Common

DISTRIBUTION : Malay Peninsula (Simmonds, 1955)

Orchidaceae

Perennial herbs, terrestrial, epiphytic, erect or creeping, usually pseudobulbs. Leaves mostly alternate, sheathing. Inflorescence in panicles, racemes or spikes. Flowers bisexual, zygomorphic. Tepals 3. Stamens 1-2, united with style forming a column; pollen mostly in pollinia. Ovary inferior, mostly 1-loculate, ovules numerous parietal placentation. Fruit (Keng, 1969) a capsule. Seeds numerous, minute, spindle-shaped.

Key to genera

1. Epiphytes

2. Inflorescence terminal or terminal and axillary; blades triangular or oblanceolate

3. Inflorescence terminal and axillary, lip ovate; fruits cylindrical about 6 cm long.....*Galeola*

3. Inflorescence terminal, lip oblong; fruits ellipsoid, about 4 cm long.....*Liparis*

2. Inflorescence axillary; blades obovate to oblong....*Thelasis*

1. Terrestrials

4. Inflorescence terminal, in spike.....*Haemaria*

4. Inflorescence axillary, in raceme

5. Blades oblong to lanceolate, 70-75 x 7.5-8 cm, apex caudate;

- inflorescence about 110 cm long, lip pink ... *Spathoglottis*
 5. Blades ovate, 20-24 x 4.5-7 cm, apex acuminate; inflorescence
 about 46 cm long, lip yellowish-whitish..... *Coelogyne*

Haemaria discolor (Ker.) Ldl.

Erect herb, leafy part short, with 4-6 leaves. Blades thin, ovate, 2.8-4.2 x 1-1.6 cm, apex acute, base oblique, usually with midrib, blackish-greenish with maroon veins above, uniformly pale maroon underneath. Petioles and sheaths 1-1.5 cm long. Inflorescence terminal, in spike, about 8-13 cm long. Peduncle about 6.5-11.5 cm long, dull pale reddish-whitish in lower half, pale greenish in upper half, pubescent. Bracts broadened, thin, 1 cm long, pinkish-whitish. Pedicels 0.8 cm long, white, pubescent. Tepals 8 x 3 mm, whitish, column white, anther cap pale yellow.

HABITAT : Shaded area in the primary evergreen forest, on a large granitic, alt. 300 m; specimen : Maxwell 85-684

FLOWERING : July, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: Indo-China, W. Malaysia, Sumatra (Seidenfaden and Smitinand, 1959)

Coelogyne styrekes Ridl.

Terrestrial herbs, pseudobulbs oblong, 4-8 cm long. Blades ovate, 20-24 x 4.5-7 cm, apex acuminate, base acute, dark green above, green

underneath; nerves raised underneath. Petioles 29-33 cm long. Inflorescence axillary, racemose, about 46 cm long, rachis whitish-light yellowish. Bracts 3-4 cm long, pinkish-whitish. Tepals pinkish-whitish. Lip yellowish-whitish, base purple, ridges brownish. Column yellowish-whitish, base purple.

HABITAT : Rocky area near a stream, primary evergreen forest, shaded place, alt. 200 m; specimen : Maxwell 85-388

FLOWERING : April, FRUITS : not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia, Peninsular Thailand (Seidenfaden and Smitinand, 1959)

Galeola altissima (Bl.) Rchb. f.

Stem very slender, creeping on the ground or on tree trunk, about 2.5 m long, dull reddish-pinkish. Scale leaves triangular, base broadened, 0.5-0.8 cm long. Inflorescence terminal and axillary. Peduncle branched, slender, about 15-20 cm long. Pedicels pale brown-pinkish. Tepals 1-2 x 0.5 cm, whitish-light yellowish. Lip ovate, outside whitish-light yellowish, inside margins of midlobe white, lateral lobes inside with purple vertical lines, about 1 cm long. Column 6 mm long, yellowish. Anther cap greenish. Fruit (Holttum, 1953) oblong and slender, about 1.6 x 0.7 cm, opening by two unequal valves. Seeds winged, about 1 mm in diam.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m;
specimen : Maxwell 85-303

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia, Java, Borneo (Seidenfaden and Smitinand, 1959)

Liparis elegans Ldl.

Epiphytes; pseudobulbs conic, about 2-3 cm long, epiphyte on small boulders, close to the ground, with two leaves. Blades oblanceolate, 22-22.5 x 1.8-3 cm, apex acute, base cuneate, widest in upper half, dark green above, green underneath. Inflorescence terminal, racemes, erect, about 18 cm long, flowers many. Peduncle 8 cm long, green. Bracts lanceolate, 3.5-4 mm long. Pedicels 3-4 mm long, green. Sepals and petals light yellowish. Lip oblong, whitish. Capsule (Ridley, 1924) elliptic, about 4 cm long.

HABITAT : Shaded to partly open areas in the primary evergreen forest, alt. 200 m; specimen : Maxwell 84-479

FLOWERING : November, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia, Sumatra to Philippines (Seidenfaden and Smitinand, 1959)

Spathoglottis plicata Bl.

Pseudobulbs conic. Blades oblong to lanceolate, 70-75 x 7.5-8 cm, apex caudate, base cuneate, dark green on both surfaces. Petioles 32 cm long. Inflorescence axillary in raceme, about 110 cm long, many flowered. Bracts ovate to lanceolate, pinkish-greenish. Pedicels 2-2.5 cm long, violet. Tepals ovate to oblong, 1-1.5 cm long, pink. Lip pink, lateral lobes dark pink, midlobe, dark yellow, basal ridges dark yellow. Fruits oblong, about 2-2.5 cm long, green.

HABITAT : Open moist area on bedrock along the river; primary evergreen forest, alt. 400 m; specimen : Maxwell 85-496

FLOWERING AND FRUITING : May

ABUNDANCE : Rare

DISTRIBUTION: India, W. Malaysia, Sumatra to the Philippines (Seidenfaden and Smitinand, 1961)

Thelasis triterra Rchb. f.

Epiphyte, old pseudobulbs greyish-green, young yellowish-green. Blades coriaceous, obovate to llong, 2-4 x 0.5-1 cm, apex obtuse, base cuneate, dark green above, green underneath. Petioles very short. Inflorescence axillary, 7.5-16 cm long. Peduncle 6-8 cm long, yellowish-green. Bracts 2 mm long. Tepals : outer yellow-green, inner pale yellowish, 2.3-2.5 mm long. Lip ovate, 1-1.5 mm long.

HABITAT : Open area along the river; on the branches of a fallen dry tree, primary evergreen forest, alt. 300 m; specimen :

Maxwell 85-871

FLOWERING : September, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia, Sumatra to the Philippines (Seidenfaden and Smitinand, 1961)

Palmae

Climbers, shrubs or trees. Leaves pinnate or palmate. Petioles sheathed. Inflorescence paniculate. Flowers regular. Perianth segments 3. Stamens 3-6. Ovary usually 3-loculate, with one ovule in each locule. Fruit a drupe or nut.

Key to genera

1. Climber, thorny or spiny; stem solitary; inflorescence elongated, 6 m long, flagella present; leaflets 85-90, linear to lanceolate
..... *Calamus*

1. Stem erect, not thorny or spiny; clustered; inflorescence short, 30-50 cm long, flagella absent; leaflets 4-12, trapezoid
..... *Inquamira*

Calamus balingensis Furt.

Stem solitary, climbing, rarely erect, thorny or spiny. Leaves pinnate, 1.75 m long; leaflets 85-90, regularly spaced, linear to lanceolate, 40-50 x 1.5-2 cm, apex acuminate, base obtuse, spiny; dark green above, green underneath. Inflorescence axillary, branched,

pendulous; inflorescence including flagella 6 m long, with 3-4 hanging racemes, each with 10-12 spikes. Sepals dark green. Corolla-tube whitish, lobes brownish-greenish. Stamens : filaments whitish, anthers light yellowish. Fruits (Ridley, 1925) globose or ellipsoid, scales of fruit large, in spirals. Seed 1, globose.

HABITAT : Shaded area, primary evergreen forest, alt. 300 m;
specimen : Maxwell 85-517

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: Peninsular Thailand

Inquamura polymorpha Becc.

Stems up to 2 m tall, slender, 4-7 in a cluster. Leaves near the top, 40-70 cm long, with 4-12 trapezoid acuminate leaflets, 7.5 x 30 cm; dark greenish above, greenish underneath. The petioles sheathed. Inflorescence rachis greenish, about 30-50 cm long. Sepals brownish. Petals light yellowish, pink in buds. Stamens : filaments whitish, anthers light yellowish. Ovary light yellowish. Fruits ovoid or ellipsoid, green and turning white.

HABITAT : Shaded area, primary evergreen forest, alt. 250 m;
specimens : Ramsri 94 and Maxwell 85-542

FLOWERING AND FRUITING : May-September

ABUNDANCE : Rare

DISTRIBUTION : Malay Peninsula (Ridley, 1925)

Pandanaceae

Woody plants, usually with prop-roots, sometimes climbing, usually branched. Leaves stiff, simple, linear, spiny, spirally 3-ranked. Flowers unisexual, in elongate or compact spikes, subtended by spathes. Perianth absent. Stamens numerous, the filaments free or connate. Ovaries syncarpous, with 1 ovule or numerous ovules. Multiple fruit (Keng, 1978) oblong to globose, berries or drupes.

Freycinetia sumatrana Hemsl. var. *sumatrana*

Stems climbing on tree trunks up to 4 cm thick; branches spreading. Leaves spirally arranged, in 3 ranks. Blades coriaceous, linear, spiny, apex caudate, or acuminate, sheathing at the base, dark green above, green underneath; midrib with numerous parallel nerves on each side. Inflorescence terminal, 3-branched, elongated, 1.5-2.5 cm long, pale yellowish; bracts 12-16 cm long, yellowish-whitish with greenish tips. Peduncles thick, 4 cm long, cylindrical. Flowers numerous, perianth absent, sessile. Stamens borne directly on the rachis. Ovaries numerous, 1-loculate, with numerous ovules.

HABITAT : Primary evergreen forest, alt. 250 m; specimen :
Maxwell 85-305

FLOWERING : March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION : Cambodia, Vietnam (Stone, 1971)

Zingiberaceae

Perennial herbs, terrestrial, rhizomatous, aromatic. Blades lanceolate, oblong to lanceolate, elliptic, ligulate, sheathed. Flowers zygomorphic, bisexual, bracteate, terminal or from rhizomes, 3-merous. Perianth segments 3. Fertile stamen 1. Staminode 1. Ovary inferior, 1-to 3-loculate, axile placentation. Fruit a capsule. Seeds numerous, often arillate.

Key to genera

1. Inflorescence terminal on a leafy stem
 2. Blades lanceolate, base acute, ligule ciliate; corolla and staminodes orange..... *Globba*
 2. Blades elliptic, base rounded or oblique, ligule not ciliate; corolla white, staminodes lilac..... *Kaempferia*
1. Inflorescence basal on a leafless stem
 3. Inflorescence always above the ground.... *Zingiber*
 3. Inflorescence usually partly buried in the ground
 4. Leaves 1-3 in a tuft; flowers solitary or clustered.....
..... *Elettariopsis*
 4. Leaves 1-28 in a tuft; flowers in a cone-like inflorescence
 5. Lip 2-3 cm long, yellow; staminode present, ligule not lobed..... *Amomum*
 5. Lip 5-7 cm long, red; staminode absent, ligule bilobed
..... *Etilingera*

Amomum

Key to species

1. Blade apex caudate, petioles 5-6 mm long, ligule puberulous;
bracteoles 1.5-1.8 cm long, pink *Amomum aculeatum*
Roxb.
1. Blade apex acuminate, petioles 10 mm long, ligule glabrous;
bracteoles 0.7-0.8 cm long, very pale brown... *Amomum hastilabium*
Ridl.

Amomum aculeatum Roxb.

Rhizomes underground, white. Leafy stems up to 1.8 m tall, leaves 7-28. Blades oblong to lanceolate, 21-25 x 4.5-5 cm, apex caudate, base cuneate, green above, light green underneath. Petioles 5-6 mm long, ligule puberulous, 7 mm long. Inflorescence from the rhizome. Peduncle pale green, 16 cm long. Bracts 3.5 x 1.5 cm, light brown. Bracteoles 1.5-1.8 cm long, pink. Calyx 2.5-3 cm long, dotted with pink, apex brownish. Corolla-tube 2.5-3 cm long, white; lobes transparent, pale yellow. Labellum 2.5-2.8 cm wide, yellow, midline dark yellow and with 4 red lines running along. Lateral staminodes clear white. Anthers white, crest pale yellow. Fruits spherical, 10-15 mm diam., dull red.

HABITAT : Very wet bank of a stream in the primary evergreen forest, alt. 100-150 m; specimens : Newman 17 and 57

FLOWERING : March, FRUITING : August

ABUNDANCE : Not common

DISTRIBUTION: Penang, Java and India (Holttum, 1950)

Amomum hastilabium Ridl.

Rhizomes underground. Leafy stems 1.5-2 m tall, leaves 15-20. Blades oblong to lanceolate, 20-34 x 3-4.5 cm, apex acuminate base acute, dark green above, green underneath. Petioles 10 mm long; ligule glabrous, 5-6 mm long. Inflorescence from the rhizome, elongate, 5-8 cm long, 2-3 cm in diam. Bracts elliptic to ovate, 1-1.5 cm long, brown. Bracteoles 0.7-0.8 cm long, very pale brown. Corolla-tube white, lobes pale yellow. Labellum 2-3 cm long, yellow; lateral lobes white, midlobe yellow, midline yellow towards the throat, edges with red lines. Anther and crest white. Stigma pink. Fruiting bracts dry, brown. Fruits globose, greenish-brownish, sessile, smooth.

HABITAT : Shaded areas, primary evergreen forest, alt. 300-325 m; specimens : Maxwell 85-509 and Newman 54

FLOWERING : March-April, FRUITING : May

ABUNDANCE : Common

DISTRIBUTION: Singapore, W. Malaysia (Holttum, 1950)

Etilingera venusta (Ridl.) R. M. Smith

Rhizomes often above the ground level. Leafy shoots rather close together, 3-4 tall, leaves 18-22. Blades oblong to lanceolate, 68 x 11.2

cm, apex acuminate, base cuneate, dark green above, maroon underneath. Petioles 2 cm long. Ligule ciliate, bilobed. Inflorescence from rhizome, bracts 4 cm long, lower part green, upper half red, inner bracts white with red in the upper half. Calyx-tube 4-5 cm long, whitish-reddish, lobes dark red. Corolla-tube 2.5-3 cm long, white with red in the upper half. Labellum 5-7 cm long, red with whitish-greenish margins. Staminode none. Stamens; filaments 2.7-3 mm long, white; anthers red. Fruiting head (Holttum, 1950) about 12 cm in diam., fruits red.

HABITAT : Shaded, rocky place in the primary evergreen forest, alt. 250 m; specimen : Maxwell 85-512

FLOWERING : April-May, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia (Holttum, 1950)

Elettariopsis curtissi Bak.

Rhizomes creeping underground, leaves 1-3. Blades lanceolate, 55-62 x 10-15.5 cm, apex acuminate, base cuneate, dark green above, green underneath. Petioles 13-17 cm long. Ligule 2 cm long. Inflorescence from the rhizome, horizontal. Bracts ovate, 1-1.5 cm long, pale reddish. Calyx-tube 3 cm long, white, lobes brownish. Corolla-tube and lobes white. Stamens white, filaments 3.5-4 mm long. Labellum 2.5-3 x 2.5-2.7 cm, lateral white, median band deep yellow to red with a crimson line on either side towards the base

HABITAT : Shaded areas, primary evergreen forest, alt. 325
m; specimen : Maxwell 85-510

FLOWERING : May, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Penang (Holttum, 1950)

Globba fasciata Ridl.

Stems 80-90 cm tall, green, with a short rhizome. Blades lanceolate, 13-25 x 3.5-5.5 cm, apex acuminate, base acute, dark green above, green underneath. Ligule ciliate, sheath glabrous. Inflorescence terminal on a leafy stem, 30 cm long. Peduncle 8-10 cm long, green, branches crowded. Calyx-tube funnel-shaped, green, lobes lanceolate, acuminate. Corolla-tube 4-7 mm long, orange. Stamines ovate, 7 x 2 mm, orange. Stamen 1, orange. Immature fruits light green.

HABITAT : Shaded, rocky areas in the primary evergreen forest, alt. 300 m; specimen : Maxwell 85-489

FLOWERING AND FRUITING : May

ABUNDANCE : Not common

DISTRIBUTION: Singapore, W. Malaysia (Holttum, 1950; Ridley, 1924)

Kaempferia pulchra Ridl.

Rhizomes and roots fleshy, leaves 2 or 3. Blades elliptic, 14-18 x 9.3-13.5 cm, apex acute, base rounded or oblique, horizontal, close to the ground, dark green above, light green underneath. Petioles and sheath broadened 4-5 cm long. Ligule lobes rounded, sheaths imbricate and enclosing the inflorescence. Inflorescence terminal, each flower protected by a bract and bracteole. Bracts 2.5-3.2 cm long, pale green, imbricate. Bracteoles 1-1.3 cm long, white. Calyx white. Corolla-tube 3.5-4 cm long, white, lobes 10 x 3 mm, white or whitish-reddish. Staminodes lilac. Labellum lilac, white at throat. Stamen 1. Anther crest lilac, Fruits (Holttum, 1950) oblong or ovoid, 1.2 cm long, smooth. Seeds globose.

HABITAT : Shaded area, on rock or on the ground in the primary evergreen forest, alt. 150 m; specimen : Ramsri 34

FLOWERING : March-April, FRUITS : Not seen

ABUNDANCE : Common

DISTRIBUTION: Singapore, W. Malaysia (Holttum, 1950)

Zingiber

Key to species

1. Inflorescence cylindric, 55 cm long, bracts orangish-brown; calyx transparent, corolla-tube about 3 cm long.....
.....*Zingiber spectabile* Griff.

1. Inflorescence ovoid, 15-18 cm long, bracts bright red with white tip, imbricate; calyx subcoriaceous, corolla-tube about 5 cm long
 *Zingiber multibracteatum* Holtt.

Zingiber multibracteatum Holtt.

Rhizomes under ground. Leafy stems up to 1.5 m tall. Blades elliptic or lanceolate, 15-28 x 3.5-6.5 cm, apex acuminate, base acute, glabrous, green above, whitish green underneath, sessile. Ligule 3.5-4 mm long. Inflorescence aovoid, compact, 15 x 8 cm. Bracts bright red with white tips, imbricate. Bracteoles 3 x 1.5 cm, glabrous, white. Calyx subcoriaceous, 3 cm long, white. Corolla-tube 5 cm long, white, lobes 2.8 cm long, pale yellow with clear veins. Labellum blackish purple and mottled with greenish yellow, throat greenish yellow. Stamen 1. Anther pale yellow, crest purple.

HABITAT : Primary evergreen forest, shaded area near stream, alt. 150 m; specimen : Newman 52

FLOWERING : February-March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia, Java (Holttum, 1950)

Zingiber spectabile Griff.

Rhizomes under ground, bearing leafy stems close together. Leafy stems up to 2 m tall, leaves 20-50. Blades oblong to lanceolate, 30-35 x 5 cm, apex acuminate; base cuneate, glabrous, dark green above, green

underneath, sessile. Ligule very thin, glabrous. Inflorescence 30-55 cm tall, cylindric. Bracts obovate, orangish-brown. Bracteoles 4 cm long, pink. Calyx transparent, 2.5-3 cm long. Corolla-tube 3 cm long, white; lobes 2.5-2.7 cm long, greenish-white with clear veins. Labellum 2.5 x 2.5 cm, blackish-purple, mottled with pale yellow. Anther pale yellow, crest blackish purple, darker than the labellum. Fruits (Holttum, 1950) ellipsoid, about 2.5 cm long.

HABITAT : Shaded area in the primary evergreen forest, alt. 300 m; specimen : Newman 55

FLOWERING : February-March, FRUITS : Not seen

ABUNDANCE : Not common

DISTRIBUTION: Throughout W. Malaysia (Holttum, 1950)

GYMNOSPERMAE

Gnetaceae

Treelets or woody climbers, branches with swollen joints. Leaves simple, opposite, entire, secondary nerves curved, anastomosing. Strobilus axillary or on stem, branched or unbranched, flowers unisexual, spirally arranged on strobilus. Fruits mostly ellipsoid, ripening pink or red.

Gnetum

Key to Species

1. Treelets; strobilus axillary, branched
..... *Gnetum gnemon* L. var. *tenerum* Mgf.
1. Woody climber; strobilus axillary or on stem, branched or unbranched
 2. Blade base cuneate; strobilus branched
..... *Gnetum latifolium* Bl. var. *funiculare* (Bl.) Mgf.
 2. Blade base acute or slightly oblique; strobilus unbranched
..... *Gnetum tenuifolium* Ridl.

Gnetum gnemon L. var. *tenerum* Mgf.

Treelet 1.5 m tall. Blades thin, elliptic or oblong, 8-17 x 4-8 cm, apex acuminate, base acute to obtuse, glabrous, dark green above, green underneath; nerves prominent underneath; secondary nerves curved, anastomosed, 6-8 pairs. Petioles 0.5-1.4 cm long. Strobilus axillary, branched: Peduncle 3-4 cm long, light green; pedicel of strobilus, 1.5-

2 cm long. Collars of strobilus yellowish, sterile ovaries light green. Fruits (Phengklai, 1975) sessile, ellipsoid to ovoid, 1.5 x 1.0 cm.

HABITAT : Shaded area in the primary evergreen forest, alt. 150 m; specimen : Newman 56

STROBILI : March-April, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia (Phengklai, 1975)

Gnetum latifolium Bl. var. *funiculare* (Bl.) Mgf.

Woody climber, stems about 5 cm in diam. at the base. Blades oblong or lanceolate, 8-14 x 3-6 cm, apex acuminate, base cuneate, green above, dark green underneath; secondary nerves 6-8 pairs, curved, distinctly anastomosed. Petioles 1-1.2 cm long. Strobilus from lower leafless parts of stems and axillary, branched. Peduncle 1.5-2 cm long. Strobilus collars light green. Fruits (Phengklai, 1975) ellipsoid or obovoid, 1.5-2.5 x 1-1.2 cm, pink or dark orange when ripe, stalk slender, 0.5-2 cm long.

HABITAT : Open margins of the primary evergreen forest along the river, alt. 350 m; specimen : Maxwell 85-387

STROBILI : March-April, FRUITS : Not seen

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia (Phengklai, 1975)

Gnetum tenuifolium Ridl.

Woody climber, stem slender. Blades oblong or lanceolate, 14-17.5 x 5-7 cm, apex acuminate, base acute, sometimes slightly oblique, glabrous, dark green above, green underneath; secondary nerves raised underneath, curved, anastomosed, 6-9 pairs. Petioles 0.5-1.5 cm long. Strobilus axillary, unbranched. Peduncle 2-3.5 cm long, yellow-greenish. Strobilus stalk 0.8-1.0 cm long, green. Stigma pale yellow, style white. Fruit ellipsoid, acute, 1.5 x 0.8 cm, green and turning reddish and juicy, stalk 1-1.5 cm long.

HABITAT : Shaded area near the river, primary evergreen forest, alt. 200-350 m; specimens : Ramsri 113, Sirirugsa 960, and Maxwell 85-961

STROBILI : September-January, FRUITING : November-February

ABUNDANCE : Rare

DISTRIBUTION: W. Malaysia (Phengkai, 1975)

PTERIDOPHYTA

Lycopodiaceae

Epiphytic or erect herbs. Stems dichotomous. Leaves microphyllous, each with a single vein, arranged in spirals or whorls. Fertile leaves (sporophyll) forming strobilus. Sporangia solitary at the axil of sporophyll.

Lycopodium

Key to species

1. Epiphytic plants; leaves oblong or lanceolate, 10-10.5 x 3-5 mm; strobilus dichotomous branching, 5-7 cm long.....
..... *Lycopodium phlegmaria* L.
1. Terrestrial plants; leaves linear, 3-4 x 0.5 mm; strobilus solitary or in pairs, 4-7 mm long... *Lycopodium cernuum* L.

Lycopodium cernuum L.

Stems erect, main stems 50-60 cm tall, bearing many branches, densely covered with leaves. Leaves linear, 3-4 x 0.5 mm, apex acuminate, base rounded, margin entire. Strobilus solitary or in pairs, 4-7 mm long. Sporophylls ovoid, acuminate, 2-2.5 mm long, green and turning light yellowish.

HABITAT : Open place on the ground, primary evergreen forest, alt. 250 m; specimen : Ramsri 113

ABUNDANCE : Not common

DISTRIBUTION: Tropics and subtropics throughout the world (Tagawa and Iwatsuki, 1979)

Lycopodium phlegmaria L.

Stems creeping, dichotomous branching, 15-20 cm long. Leaves oblong or lanceolate, 10-10.5 x 3-5 mm, apex acuminate, base rounded or obtuse, midrib visible, margin entire, green to yellowish green. Strobilus distinct, pendulous, dichotomous branching, 5-7 cm long. Sporophylls ovate or subdeltoid, 1 mm long, apex slightly acuminate.

HABITAT : Epiphytic on tree trunks, primary evergreen forest, alt. 300 m; specimen : Ramsri 13

ABUNDANCE : Rare

DISTRIBUTION: Old World tropics, North to S. Japan (Tagawa and Iwatsuki, 1979)

Selaginellaceae

Herbs. Stem erect or scandent, bearing leaves and rhizophores; branches dichotomous. Leaves microphyllous, dimorphic and spirally arranged in four rows, ventral leaves larger than dorsal leaves. Sporophylls arranged spirally forming cylindrical spikes. Sporangia at the axil of sporophyll.

Selaginella

Key to species

1. Stem scandent, stoloniferous; sporophylls ovate, apex acute....
..... *Selaginella willdenowii* (Desv.) Bak.
1. stem erect, not stoloniferous; sporophylls subtriangular or ovate, apex with minute teeth or long tail.
 2. Dorsal leaves elliptic, ciliate; sporophylls subtriangular, apex with minute teeth, 1 mm long.....
..... *Selaginella argentea* (Wall. ex Hk. & Grev.) Spr.
 2. Dorsal leaves ovate to suborbicular, not ciliate; sporophylls ovate, apex with long tail *Selaginella roxburghii* (Hk. & Grev.) Spr.

Selaginella argentea (Wall. ex Hk. & Grev.) Spr.

Stem erect about 30 cm tall. Ventral leaves elliptic, about 1 x 0.5 mm, apex acute, base rounded to cordate, ciliate; dorsal leaves elliptic, ciliate, with distinct white margin, green above, pale whitish-greenish underneath. Sporophylls subtriangular, apex toothed.

HABITAT : On wet granitic along the river, mostly shaded places in the primary evergreen forest, alt. 325 m; specimen : Maxwell 85-1027.

ABUNDANCE : Not common

DISTRIBUTION: Burma, Malaya and Indochina (Tagawa and Iwatsuki, 1979)

Selaginella roxburghii (Hk. & Grev.) Spr.

Erect herb, 15-20 cm tall, about 3 mm in diam., lower portion with rhizophores and the upper portion with spiral arranged leaves. Ventral leaves patent, elliptic, 3-4.5 x 1.5-2 mm, apex acute, base unequal subcordate, usually with distinct midrib. Dorsal leaves smaller, ovate to suborbicular about 1 mm long, apex with tail, dark green above, pale light green underneath. Sporophylls ovate, apex with long tails, about 1.5 cm long, dark green.

HABITAT : Shaded area, rocky place under the tree, primary evergreen forest, alt. 250 m; specimen : Ramsri 115

ABUNDANCE : Not common

DISTRIBUTION: Malaya and Sumatra (Tagawa and Iwatsuki, 1979)

Selaginella willdenowii (Desv.) Bak.

Scandent herb, 1-3 m in diam., stoloniferous, sometimes forming bushes, up to 3 m high, rarely bearing leaves. Branches 50-80 cm long. Leaves on the main branch, densely on the lateral branches. Ventral leaves patent, oblong, 2.5-3 x 1 mm, apex acuminate, base rounded, glabrous. Dorsal leaves smaller, 0.5-2 mm long, dark green-purple above, green underneath. Sporophylls ovate, apex acute, about 1 mm long, greenish.

HABITAT : Open place, secondary evergreen forest, alt. 100 m; specimen : Ramsri 114

ABUNDANCE : Common

DISTRIBUTION: Burma, Indochina, Malaya, Sumatra, Java and the Philippines (Tagawa and Iwatsuki, 1979)

Aspleniaceae

Rhizome erect or creeping, terrestrial, epiphyte or on rock. Scales very small, dark. Stipes blackish. Fronds simple to pinnately compound. Veins free or united, without costules. Sori brown, elongate along veins or on veins, indusiate, attached to one side of the vein.

Asplenium macrophyllum Sw.

Rhizome creeping on granitic rocks or epiphyte, bearing a tuft of fronds. Scales dark. Stipes blackish, slender. Young plants : fronds simple, hastate, 5-6 x 1.5-2 cm. Old plants : fronds pinnately compound, pinnae ovate to lanceolate, 5.8 x 1.5-2.5 cm, apex acuminate, base slightly oblique, margin serrate, dark green above, very light green underneath. Veins branching without veinlets. Sori brown, elongate along individual veins. Indusia whitish.

HABITAT : Partly open place on granitic rocks, tree trunks and on the dry branches of fallen trees; primary evergreen forest, alt. 200-300 m; specimens : Maxwell 85-872 and 85-1040

ABUNDANCE : Not common

DISTRIBUTION: Mascarene Island to Polynesia, North to Tonkin (Holttum, 1968)

Athyriaceae

Rhizome terrestrial, erect, bearing a tuft of fronds; scales dark. Stipes stout. Fronds pinnately compound. Veins free. Sori elongate along the veins, indusiate.

Diplazium crenatoserratum (Bl.) Moore

Rhizome erect, short, scales on bases of stipes, bearing a tuft of fronds. Stipes 30-40 cm long. Fronds pinnate; pinnae about 20-25 pairs, oblong to lanceolate, apex caudate, base oblique, margin serrate, dark green above, green underneath. Costae pinnate, about 4 pairs. Sori brown, elongate, on the veins.

HABITAT : Shaded, primary evergreen forest near the river, alt. 150 m; specimen : Maxwell 84-481

ABUNDANCE : Not common

DISTRIBUTION: W. Malaysia (Holttum, 1968)

Blechnaceae

Rhizome erect, terrestrial, stout, bearing a rosette of pinnate fronds, base of stipes covered with scales. Veins free or sometimes united near the costule. Sori elongate near the costule of pinnae, brown. Indusiate.

Blechnum orientale L.

Terrestrial ferns. Rhizome erect, stout, often raised above ground level, the apex densely covered with brown scales. Stipes stout, about 50-70 cm long, base covered with scales. Fronds pinnately compound, 110 x 50 cm; pinnae numerous, lanceolate, 25-30 x 1-1.5 cm, apex acuminate, base cuneate, dark green above green underneath. Veins simple or branched from the costules. Sori brown, in an elongate row on each side of the costule. Indusia elongate, covering the sori, distinct.

HABITAT : Open place margins of the primary evergreen forest, alt. 250 m; specimen : Ramsri 58

ABUNDANCE : Common

DISTRIBUTION: Throughout the tropics of Asia, Australia and the Pacific (Holttum, 1968)

Cyatheaceae

Terrestrial tree ferns; stem erect, bearing rosette of fronds at terminal. Trunk and base of stipes covered densely with scales and hairs. Fronds usually large, pinnately compound, mostly bipinnate. Veins pinnately nerved. Sori rounded on veinlets.

Cyathea contaminans (Wall. ex Hk.) Copel.

Stem erect, about 8 m tall, about 15 cm in diam., unbranched. Fronds about 4 m long, stipe about 1 m long, stout. Pinnae 50-60, costae stout, thorny, dark green-purplish or maroonish. Pinnules lanceolate,

0.2 x 1.3 cm, apex acuminate, base subtruncate, dark green above, greyish-green underneath. Veins usually free. Sori brownish, rounded on veinlets. Trunk and base of stipes covered densely with scales and hairs.

HABITAT : Mostly shaded, rocky places along a stream near the river, primary evergreen forest, alt. 400 m; specimen : Maxwell 85-498

ABUNDANCE : Not common

DISTRIBUTION: N. India and Malaysia (Tagawa and Iwatsuki, 1979)

Dennstaedtiaceae

Rhizome erect, bearing roots. Fronds pinnate with deeply lobed pinnae. Veins all free, lateral veins in the lobes forked. Sori on the branch of each vein, terminal. Indusia reniform.

Pteridrys symatica (Willd.) C. Chr. & Ching

Rhizome erect, bearing a tuft of stipes. Stipes 30-40 cm long, brown when dry, smooth, scales at the base. Fronds with deeply lobed pinnae. Pinnae about 7-10 pairs, stalked about 1 cm long, lobes almost oblong and oblique, 0.5-2.5 cm long, margin serrate, dark green above, green underneath. Lateral costules in the lobes forked once or twice. Sori brown, rounded. Indusia thin, reniform

HABITAT : Shaded, primary evergreen forest near the river, alt. 150 m; specimen : Maxwell 84-483

ABUNDANCE : Common

DISTRIBUTION : Indochina, Malaysia to Philippines (Holttum, 1968)

Lindsaeaceae

Rhizome creeping or erect, terrestrial or epiphyte. Fronds pinnately compound, stipes not jointed to the rhizome, venation distinctly branching. Costae deeply grooved, the base of the groove not raised. Sporangia on vein, marginal or terminal. Indusia present, attached to the base of the sori.

Sphenomeris chusana (L.) Copel. var. *tenuifolia* (Sw.) C. Chr.

Rhizome erect, short. Stipes 5-10 cm long, pinkish-brown. Fronds 4-5 pinnate, 15-30 cm long, costae light green; pinnae deltoid oblique; pinnules deltoid oblique, dark green above, green underneath, vein 2-3 each lobe. Sori brown, solitary or united at terminal veins. Indusia attached to the base of the sori, greenish.

HABITAT : Mostly shaded, moist cracks in the granite bedrock along the river, primary evergreen forest, alt. 375 m; specimen : Maxwell 85-880

ABUNDANCE : Rare

DISTRIBUTION: Madagascar, Polynesia, Japan (Holttum, 1968)

Marattiaceae

Rhizome terrestrial, short, erect or creeping; fleshy, bearing brown scales. Stipes fleshy, swollen at base, and also with pair of stipules. Fronds compound, 1-to 2-pinnate, veins free. Sori linear, sporangia dehiscing along the slit.

Angiopteris evecta (Forst.) Hoffm.

Rhizome short, broad, solid, erect, above the ground, light brownish, with brown scales. Stipes 68-125 cm long, dark green, with scattered whitish streaks. Fronds bipinnate, about 150-240 x 90-110 cm; pinnae 4-7 pairs, costae swollen; pinnules thin, ovate, 12-14 x 1.5-2 cm, apex caudate, base cuneate or oblique, glabrous, margin serrate. Veins free. Sori linear, brownish, sporangia dehiscing along the slit.

HABITAT : Shaded, rocky area primary evergreen forest, alt. 300 m; Ramsri 86

ABUNDANCE : Common

DISTRIBUTION: Malaysia (Tagawa and Iwatsuki, 1979; Holttum, 1968) Throughout Thailand.

Oleandraceae

Rhizome creeping, stem creeping or erect covered with imbricating scales. Stipes articulate from the rhizome, short or long. Fronds simple, entire, glabrous. Veins simple or forked. Sori on each side of the midrib, indusiate.

Oleandra pistillaris (Sw.) C. Chr.

Scrambling, stem dense, 1-1.5 m tall, erect, branched, bearing fronds, covered with dense scales. Scales imbricate, dark-brownish to blackish. Stipes 0.5-10 mm long. Fronds coriaceous, oblong or lanceolate, 40-45 x 3-4 cm, apex caudate, base cuneate, glabrous, margin entire, green above, light green underneath. Veins simple or forked. Sori brown, bearing a simple row of sori on each side of the midrib, indusium reniform.

HABITAT : Shaded place on a large boulder along the river, primary evergreen forest, alt. 450 m; specimen : Maxwell 85-495

ABUNDANCE : Rare

DISTRIBUTION : Malaysia, Java and Malay Peninsula (Holttum, 1968)

Ophioglossaceae

Rhizome creeping, fleshy, terrestrial. Fronds tripartite, each branch with a terminal lobe and a few pairs of lateral lobes, venation free. Fertile spike erect. Sporangia sessile, opening by a longitudinal slit.

Helminthostachys zeylanica (L.) Hk.

Rhizome creeping, fleshy, about 5 mm in diam., bearing fleshy roots. Stipes 13-26 cm long, greenish or purplish, fleshy. Fronds tripartite. Pinnae oblong or lanceolate, 10-14 x 1.5-2 cm, apex acuminate, base cuneate, midrib raised underneath, margin entire or irregularly serrate, dull dark green above, dull green underneath. Fertile spike erect, stipe about 8 cm long, brownish. Sori brownish, sporangia sessile, rounded, opening by a longitudinal slit.

HABITAT : Shaded area, margins of the primary evergreen forest, alt. 150 m; specimen : Maxwell 85-507

ABUNDANCE : Not common

DISTRIBUTION: Ceylon and Assam to New Caledonia and Queensland (Tagawa and Iwatsuki, 1979)

Osmundaceae

Rhizome short, suberect, no scales. Stipes bearing; circinate vernation covered with mucilage, producing hairs. Fronds pinnate, pinnae narrow, entire, veins free. Sporangia on thick stalks, almost spherical, sori pale brown.

Osmunda vachelli Hk.

Rhizome short, suberect. Fronds about 15-20, about 30-40 cm long. Stipes and fronds 100-120 cm long. Pinnae coriaceous, lanceolate, 8-17x 0.8-1.0 cm, apex acuminate, base acute, margin entire, veins two or three times dichotomous branching, dark green above, green underneath. Fertile pinnae shorter than sterile ones. Sporangia spherical, short stalked. Sori pale brown.

HABITAT : Mostly shaded place along the river, primary evergreen forest, alt. 450 m; specimen : Maxwell 85-493

ABUNDANCE : Rare

DISTRIBUTION: S. and SW. China, Hongkong and Indochina (Vietnam and Cambodia) (Tagawa and Iwatsuki, 1979)

Polypodiaceae

Rhizome creeping, usually epiphytic on tree trunk or on the dry branches of a fallen tree. Fronds simple, entire. Veins reticulated, with free veinlets. Sori exindusiate, rounded or elongated parallel to the midrib or to the margin.

Key to genera

1. Fronds lanceolate; sori dense on either side of the midrib
 *Pyrrosia*
1. Fronds oblong; sori sunk in distinct cavities ... *Phymatodes*

Phymatodes griffithiana (Hk.) Ching

Rhizome epiphytic, long creeping, about 4 mm in diam., with brownish scales. Stipes about 2.5-5.5 cm long, greenish and brownish. Fronds simple, oblong, 9.5-16.5 x 2.5-3.5 cm, apex obtuse, base acute, glabrous on both surfaces, dark green above, green underneath. Veins reticulated, with free veinlets. Sori light brownish, sunken in distinct cavities.

HABITAT : Open area along the river; on the dry branches and trunk of a fallen tree, primary evergreen forest, alt. 300 m; specimen : Maxwell 85-873

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Holttum, 1968)

Pyrrosia adnascens (Sw.) Ching

Epiphytic, rhizome creeping, about 1.5 mm in diam., cover with brown scales. Stipes about 5 mm to 5 cm long, brownish, stipes of fertile fronds longer than those of the sterile fronds. Fronds simple, fertile fronds lanceolate, 5-9 x 0.5 cm, sterile fronds about 0.6-0.7 x 2.5-5 cm, greenish on both sides, upper surface bearing small scattered stellate hairs or glabrous when old, veins not visible. Sori brownish, dense, between midrib and margin

HABITAT : On a tree trunk in the primary evergreen forest, alt. 250 m; specimen : Ramsri 87

ABUNDANCE : Common

DISTRIBUTION: India, S. China, W. Malaysia to Polynesia (Holttum, 1968)

Thelypteridaceae

Rhizome terrestrial, creeping or erect, covered with scales. Stipes very long. Fronds pinnate or bipinnate compound. Pinnae oblong or lanceolate, midrib raised on upper surface. Veins usually free, sometimes united. Sori on the veins, indusium reniform.

Key to genera

1. Rhizome creeping; veins visible
 2. Pinnae 4 pairs, apex caudate; veins 16 pairs
..... *Pronephrum*
 2. Pinnae 18-19 pairs, apex acuminate; veins 8 pairs.....
..... *Amphineuron*
1. Rhizome erect; veins hardly visible... *Sphaerostephanos*

Amphineuron terminans (Hk.) Holtt.

Rhizome creeping, about 6 cm long, 6 cm in diam. Stipes 50-80 cm long, purple-greenish, brown when dry, base covered with scales. Fronds bipinnate; pinnae 18-19 pairs, oblong or lanceolate, 14-23 x 1.2-1.7 cm, apex acuminate, base unequal, margin serrate, green on both surfaces. Veins about 6-8 pairs. Sori brownish, on terminal veins. Indusium brown

HABITAT : Shaded, rocky place near the river, primary ever-green forest, alt. 150 m; specimen : Ramsri 16

ABUNDANCE : Common

DISTRIBUTION: Malay Peninsula (Holttum, 1968)

Pronephrum asperum (Presl) Holtt.

Rhizome creeping, about 8 cm long, 5 cm in diam. Stipes 40-70 cm long, blackish to dark green, base covered with scales. Fronds odd-pinnately compound, about 9 pinnae; pinnae oblong, 18-25 x 3-5 cm, apex

caudate, base slightly oblique, margin serrate, dark green above, green underneath. Veins about 16 pairs. Sori brown-blackish on veins.

Indusium reniform.

HABITAT : Shaded area in the primary evergreen forest, alt. 200 m; specimen : Maxwell 85-1045

ABUNDANCE : Rare

DISTRIBUTION: Malaysia (Holttum, 1968)

Sphaerostephanos penninger (Hk.) Høltt.

Rhizome erect, 10-15 cm above the ground. Stipes 50-100 cm long, brownish-purplish, base covered with scales. Fronds bipinnate; pinnae about 20 pairs, oblong or lanceolate, 8-17 x 1.3-1.8 cm, apex acuminae, base oblique, margin serrate, dark green above, green underneath. Veins hardly visible. Sori brown, on veins two rows between midrib of each pinnae.

HABITAT : Shaded area along the river, primary evergreen forest, alt. 400 m; specimen : Maxwell 85-677

ABUNDANCE : Not common

DISTRIBUTION: Malay Peninsula (Holttum, 1968)

Vittariaceae

Rhizome epiphytic, creeping, short or long, sometimes slender.
Fronds simple or tripinnate, entire, glabrous. Veins simple or branched

in narrow fronds. Sori exindusiate immersed in groove along the submarginal or ends of veins.

Key to Genera

1. Sori sunken in marginal groove along the fronds, no flaps.....

.....*Vittaria*

1. Sori at the ends of veins, when young covered by reflexed marginal flaps.....*Cheilanthes*

Cheilanthes tenuifolia (Burm.) Sw.

Epiphyte, rhizome bearing roots and a tuft of fronds. Stipes brown-reddish or purplish, scattered, short brown hairy, glabrescent, 6-19 cm long. Fronds tripinnate, dimorphic; sterile fronds on short stipes and fertile fronds on long stipes. Pinnae deltoid, dark green above, pale light green underneath. Veins invisible above, distinct underneath, branched. Sori brown, separated at vein-ending, when young protected by reflexed marginal flaps.

HABITAT : Open place on the ground near granitic rocks, primary evergreen forest, alt. 150 m; specimen : Ramsri 95

ABUNDANCE : Not common

DISTRIBUTION: India, China, Malaysia, Australia and Polynesia (Holttum, 1968)

Vittaria elongata Sw. var. *elongata*

Rhizome creeping, about 3.5-8 cm long, scales dark brown with long hairs, bearing roots. Stipes 0.3-0.5 cm long, green. Fronds simple, thin, linear, 30-40 x 0.5-0.8 cm, apex and base long attenuate, midrib distinct on the upper surface, glabrous, margin entire, dark green above, green underneath. Veins invisible. Sori brownish, sunken in the marginal groove, elongate along the whole length of fronds.

HABITAT : On a large granitic boulder near the river, shaded area in the primary evergreen forest, alt. 300 m; specimen; Maxwell 85-1024

ABUNDANCE : Rare

DISTRIBUTION: S. China, Indo-China, India, Malay Peninsula, Tropical Africa (Boonskerd, 1975)

CONCLUSSION AND DISCUSION

The study some of the vascular plants at Gahrome Falls was conducted by surveying and collecting specimens. The specimens were identified with the aid of available taxonomic literature and compared with identified herbarium specimens.

A total of 81 families, 174 genera and 220 species of vascular plants were collected and consist of:

1. Monocotyledons : 41 species were found. The majority are herbs in terrestrial or epiphytic habits, growing on fallen trees, tree trunks, or granitic rock in shaded areas, for example : Agavaceae

(*Dracaena curtisii* Ridl.), Araceae (*Anadendrum montanum* (Bl.) Schott, *Homalomena pendula* (Bl.) Bakh. f.), Commelinaceae (*Aneilema conspicuum* (Bl.) Kth.), Gramineae (*Gigantochloa wrayi* Gamb.), Marantaceae (*Donax cannaeformis* (G. Forst.) K. sch.), Orchidaceae (*Coelogyne wyrekes* Ridl., *Liparis elegans* Ldl.) Zingiberaceae (*Kaempferia pulchra* Ridl., *Zingiber multibracteatum* Holtt.) etc.

2. Dicotyledons : 154 species of trees, treelets, shrubs, woody climbers, vines, and herbs were found. Their habitats are terrestrial in soil, on granitic rocks, on fallen trees or tree trunks in open and shaded places, for example : Dilleniaceae (*Dillenia ovata* Wall ex Hook.f. & Thoms.), Rubiaceae (*Mussaenda villosa* Wall. ex G. Don, *Ixora javanica* (Bl.) DC., *Geophila repens* (L.) I.M. Johns.), Leguminosae-Caesalpinioideae (*Euhinia integrifolia* Roxb. ssp. *integrifolia*), Vitaceae (*Cissus repens* Lmk.) etc.

3. Gymnospermae : 3 species were found, 1 treelet and 2 woody climbers in the genus *Gnetum* (*Gnetum gnemon* L. var. *tenerum* Mgf., *Gnetum latifolium* Bl. var. *funiculare* (Bl.) Mgf., *Gnetum tenuifolium* Ridl.)

4. Pteridophytes : 22 species were found in terrestrial or epiphyte habitats, under trees, on fallen trees, tree trunks, or granitic rocks. They were found both in open places and shaded areas, for example: Lycopodiaceae (*Lycopodium phlegmaria* L., *Lycopodium cernuum* L.), Selaginellaceae (*Selaginella willdenowii* (Desv.) Bak., *Selaginella roxburghii* (Hk. & Grev.) Spr.), Ferns : Aspleniaceae (*Asplenium macrophyllum* Sw.), Blechnaceae (*Blechnum orientale* L.), Polypodiaceae (*Pyrrosia adnascens*

(Sw.) Ching), Cyatheaceae (*Cyathea contaminans* (Wall. ex Hk.) Copel.)
Vittariaceae (*Cheilanthes tenuifolia* (Burm.) Sw.) etc.

The vegetation of Gahrome Falls, of which some species have been studied, is very similar to the vegetation of other waterfalls on Khao Luang, Nakorn Si Thammarat Province (Kiriwong, Promlok, Krungching), which Dr. Tem Smitinand examined in 1961. This is to be expected because these waterfalls are all so close together.

Most of the pteridophytes collected at Gahrome falls are also reported by Holttum (1965) to occur in Malaysia. Peninsular Thailand belongs to the same floristic region as W. Malaysia so this is not surprising.

It is suggested that modern techniques in anatomy, physiology, and chemical analysis should be applied in further studies. Some species may turn out to be very useful as medicinal plants or as natural insecticides against insects which destroy crops and carry disease organisms.

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Fig. 1 *Justicia ptychostoma* Nees (Acanthaceae)

A : Flowering branch, B : Capsule

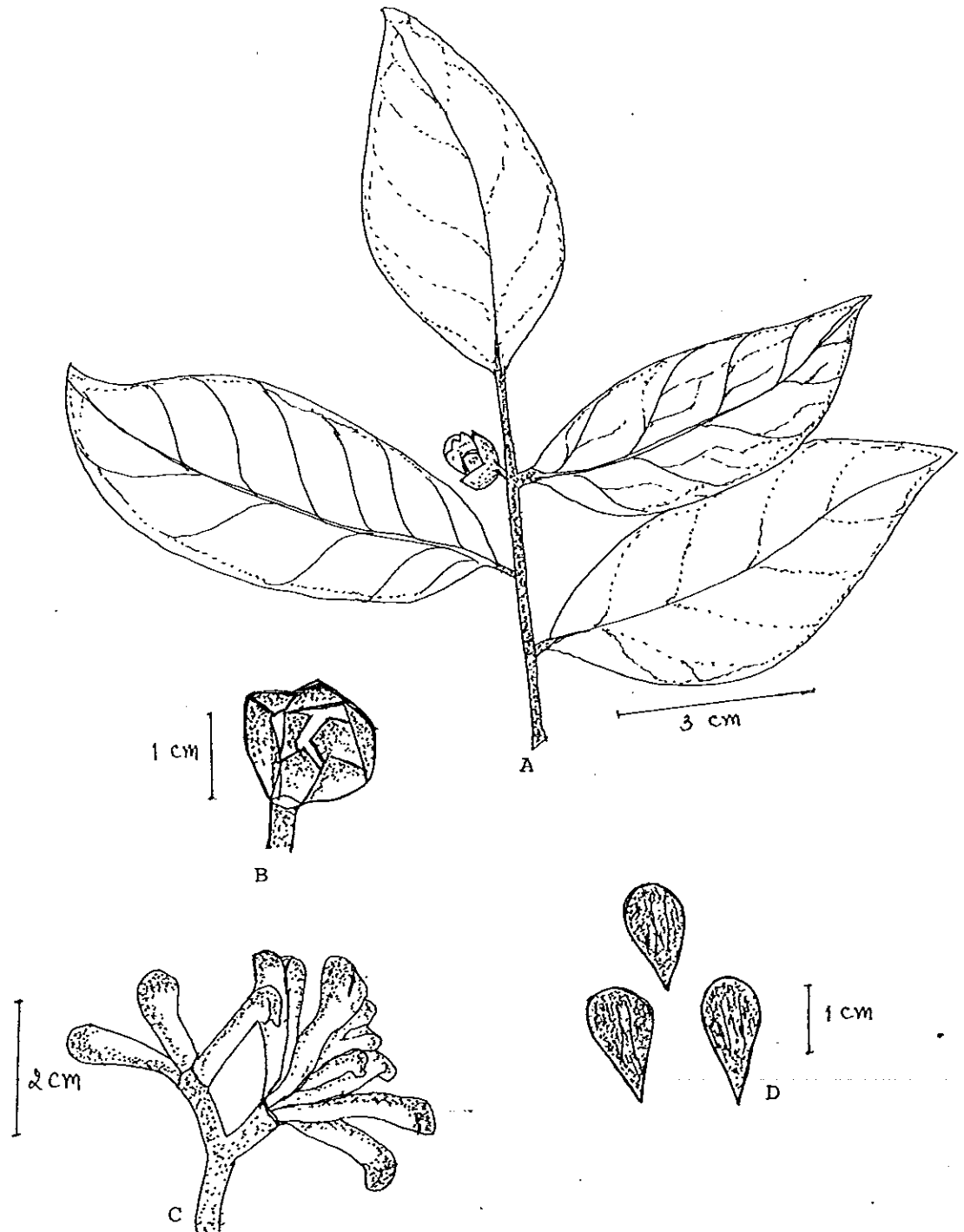


Fig. 2 *Anaxagorea javanica* Bl. var. *javanica* (Annonaceae)

A : Branch, B : Flower, C : Ripe fruit , D : Seeds

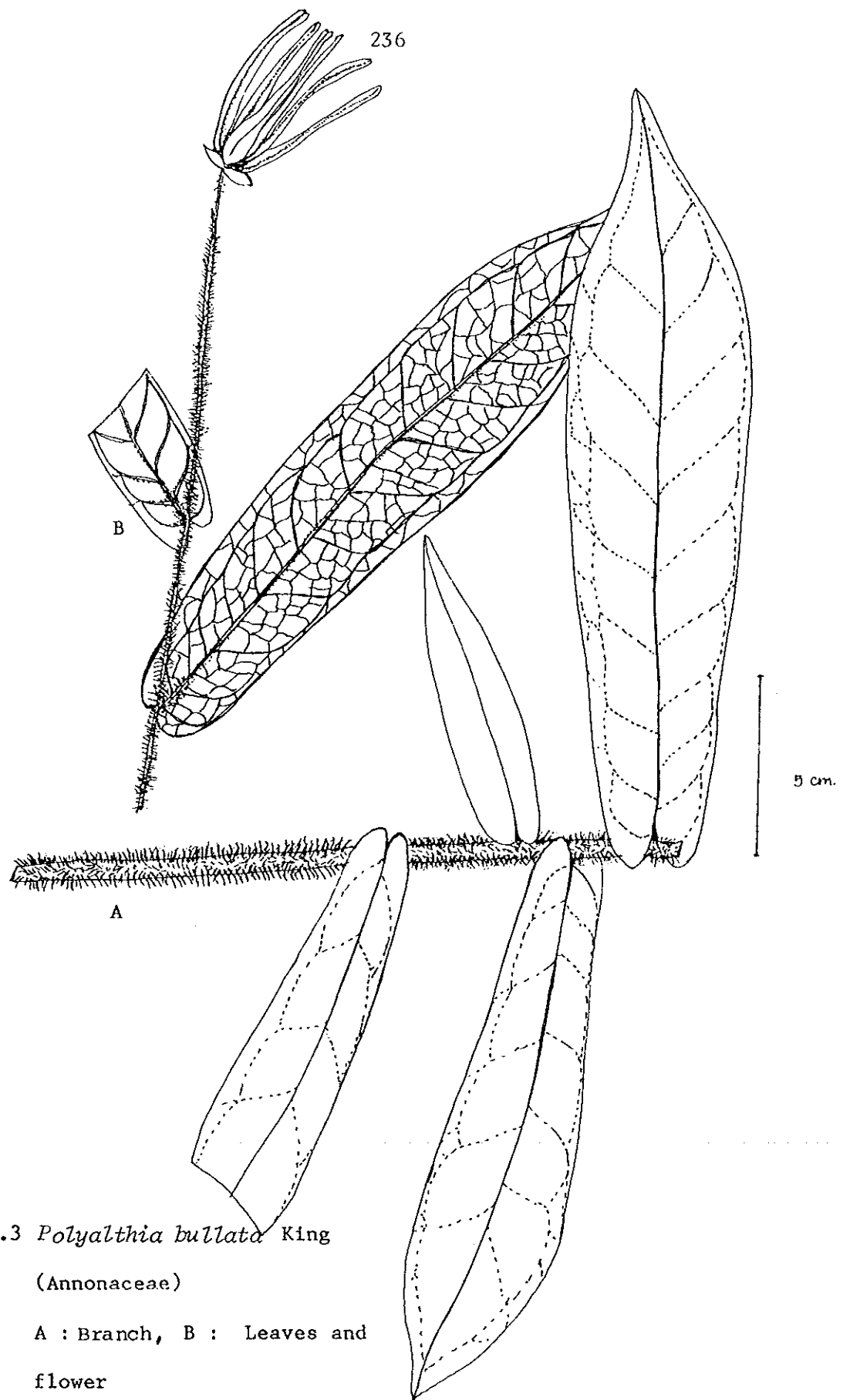


Fig.3 *Polyalthia bullata* King
(Annonaceae)

A : Branch, B : Leaves and
flower

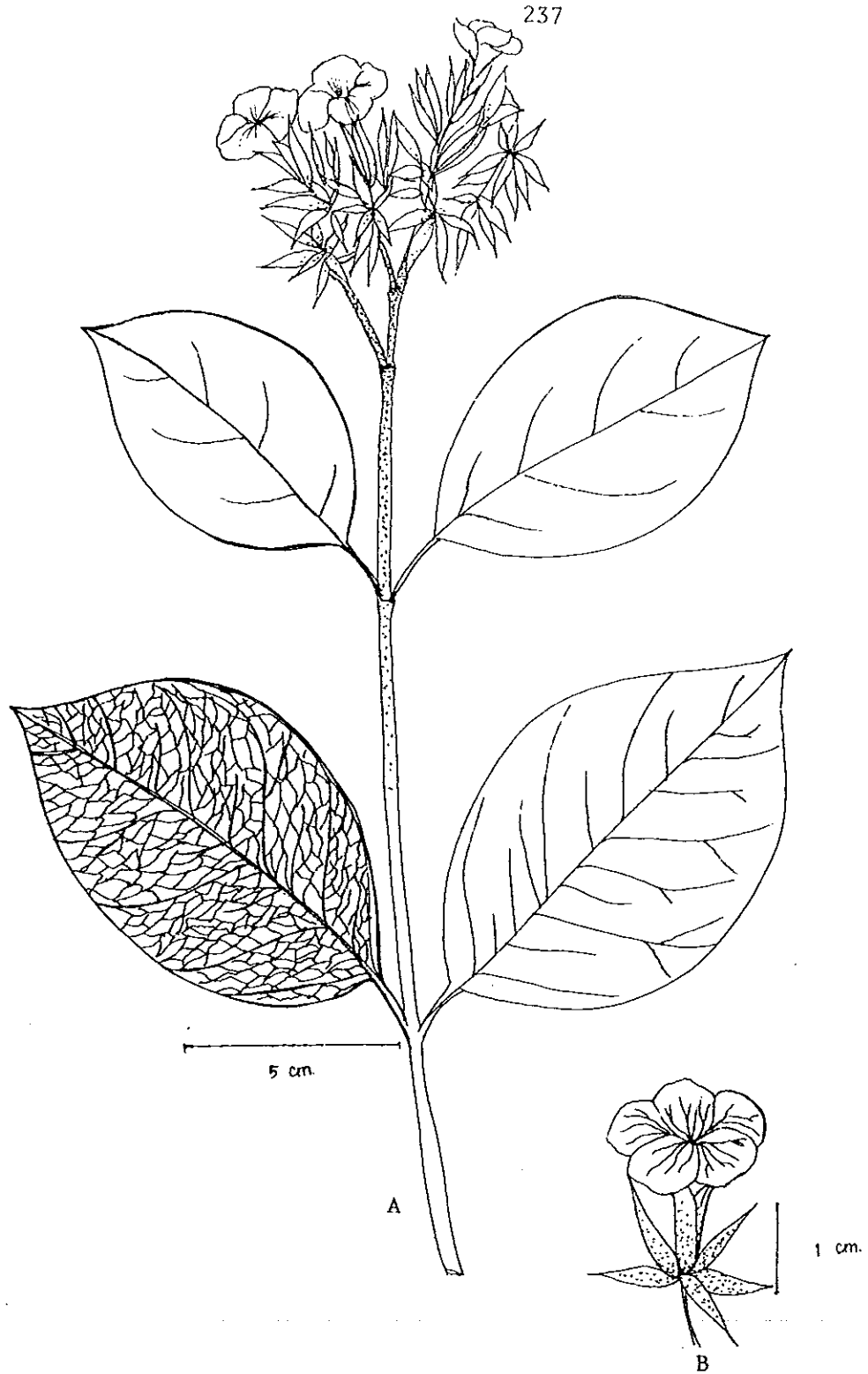


Fig. 4 *Aganosma wallichii* G. Don (Apocynaceae)

A : Flowering branch, B : Flower

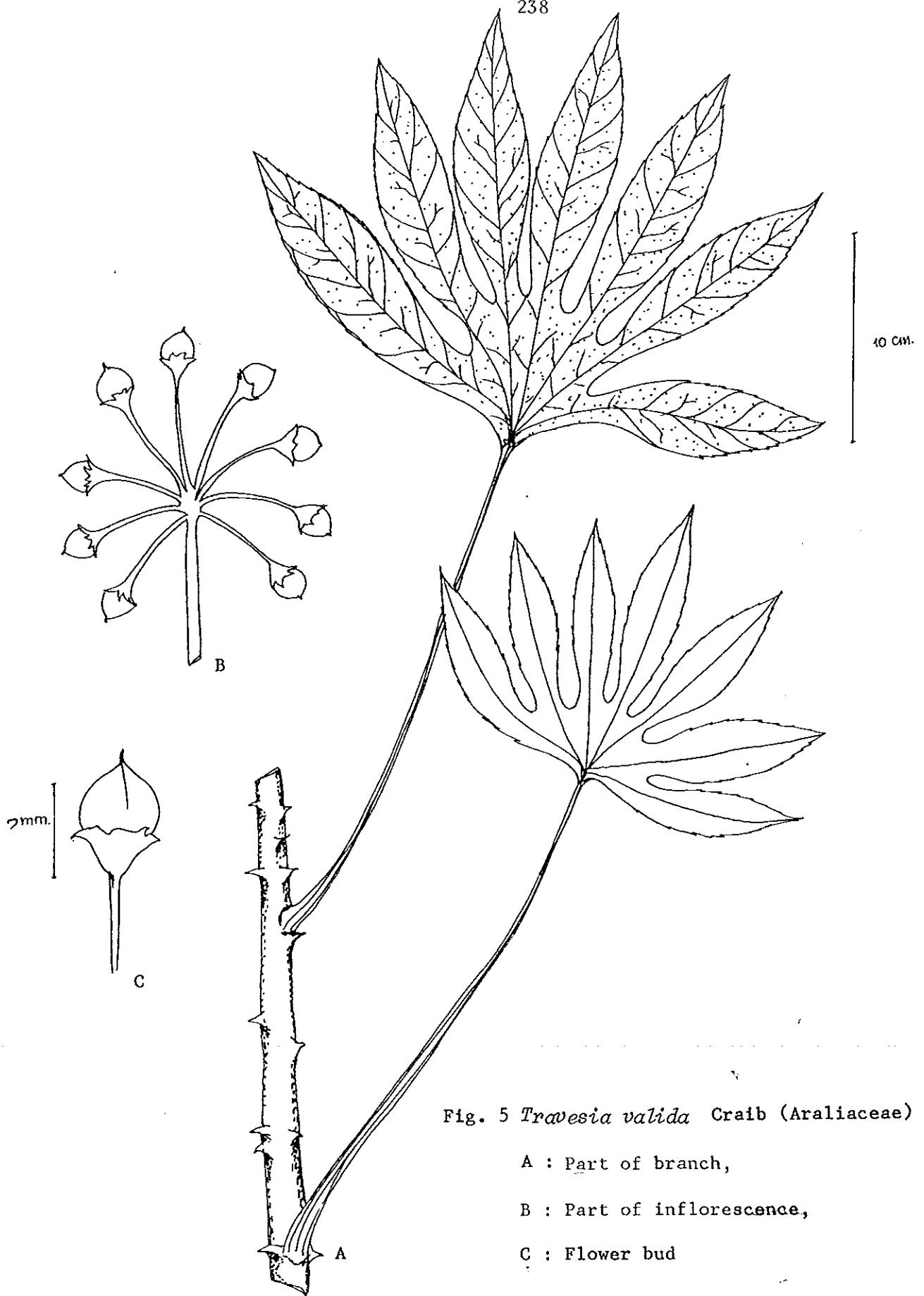


Fig. 5 *Travesia valida* Craib (Araliaceae)

- A : Part of branch,
- B : Part of inflorescence,
- C : Flower bud

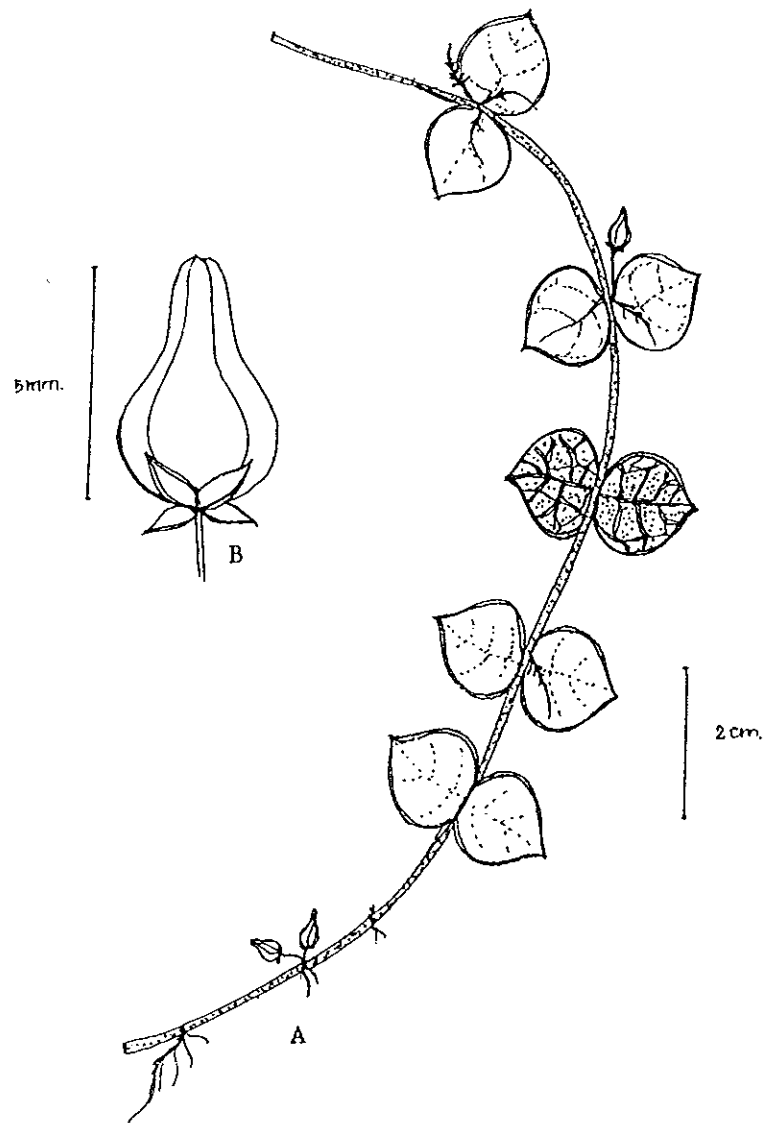


Fig. 6 *Dischidia nummularia* R. Br. (Asclepiadaceae)

A : Habit, B : Flower bud

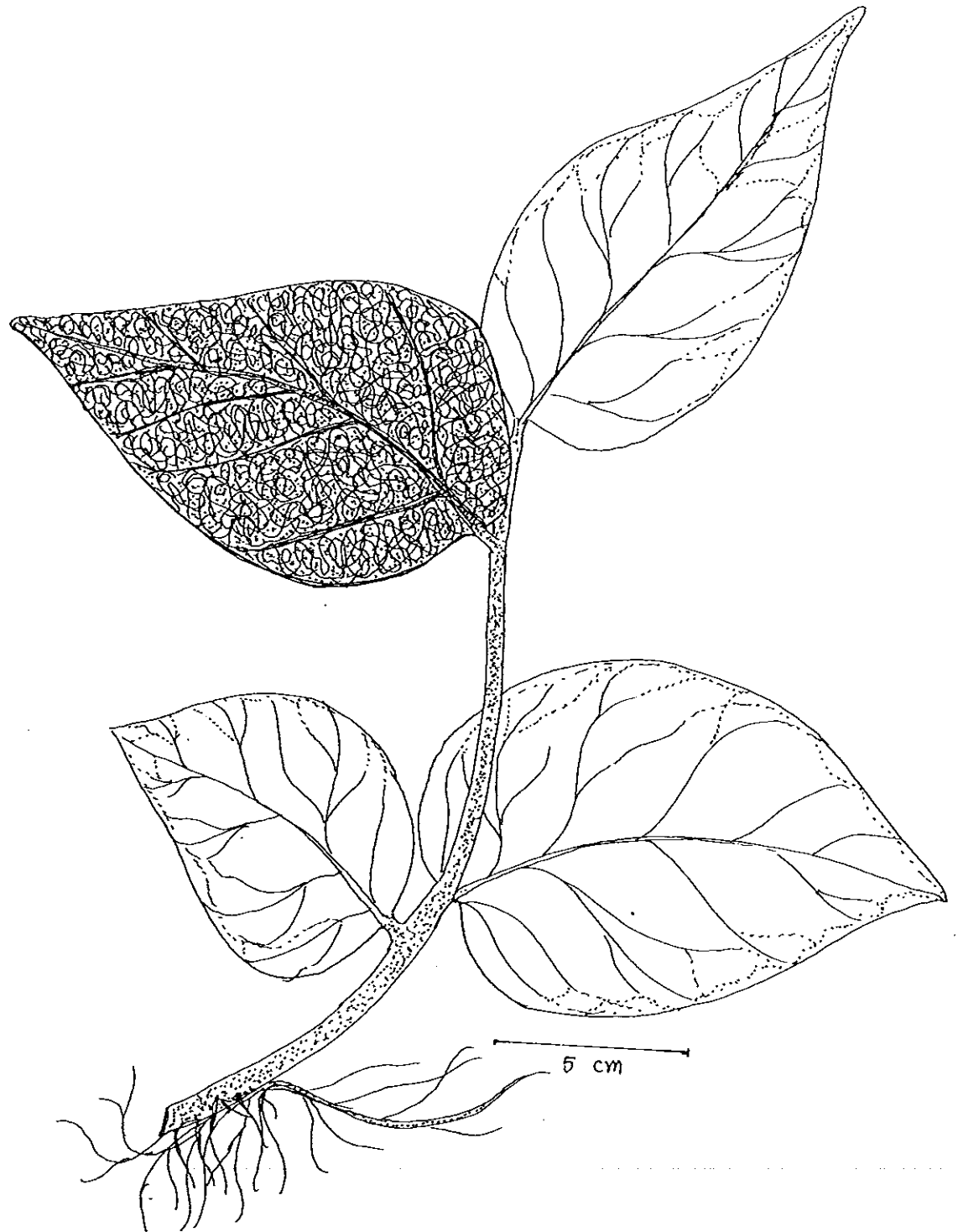


Fig. 7 *Thottea tomentosa* (Bl.) Hou (Aristolochiaceae)

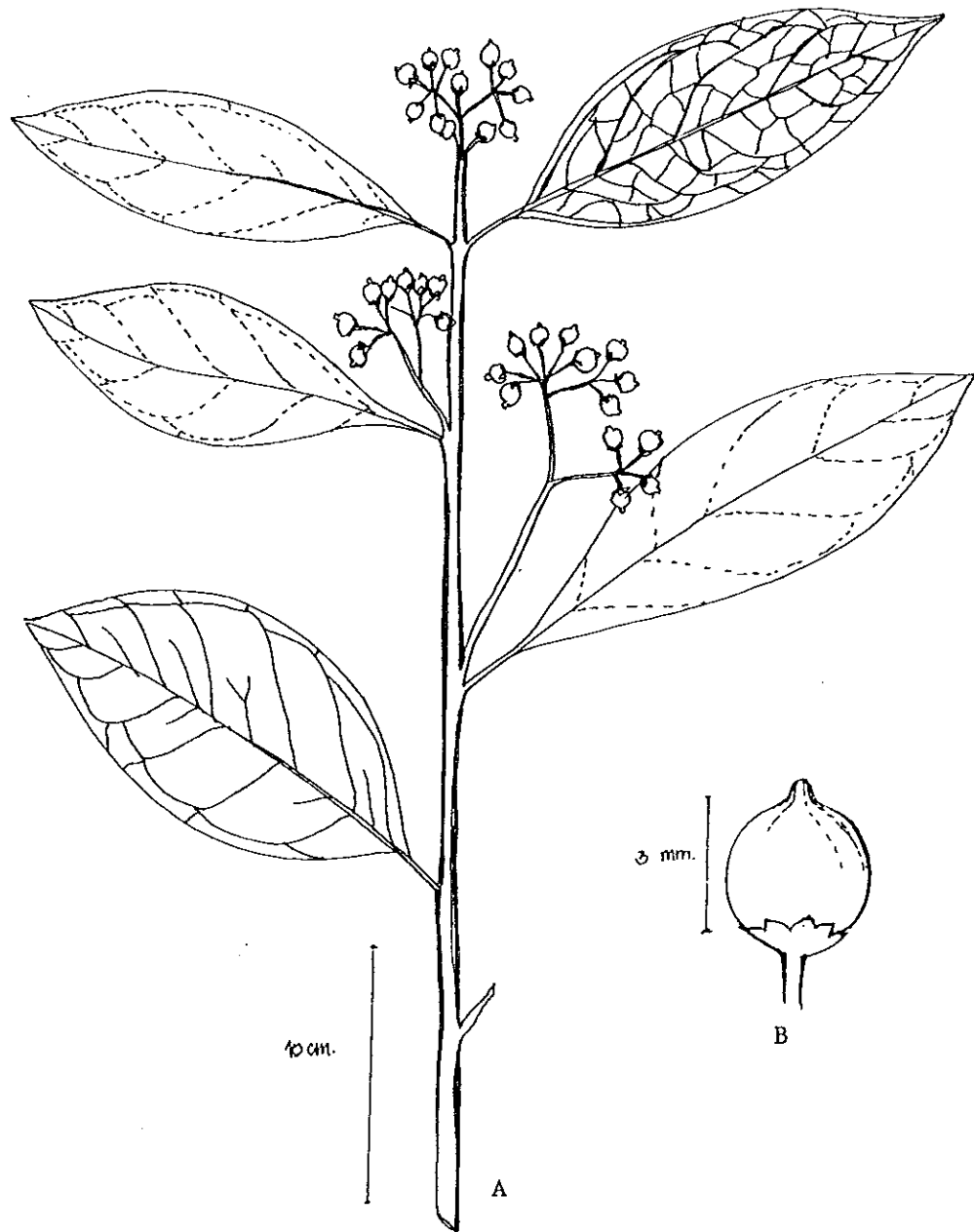


Fig. 8 *Ilex cymosa* Bl. (Aquifoliaceae)

A : Fruiting branch, B : Fruit

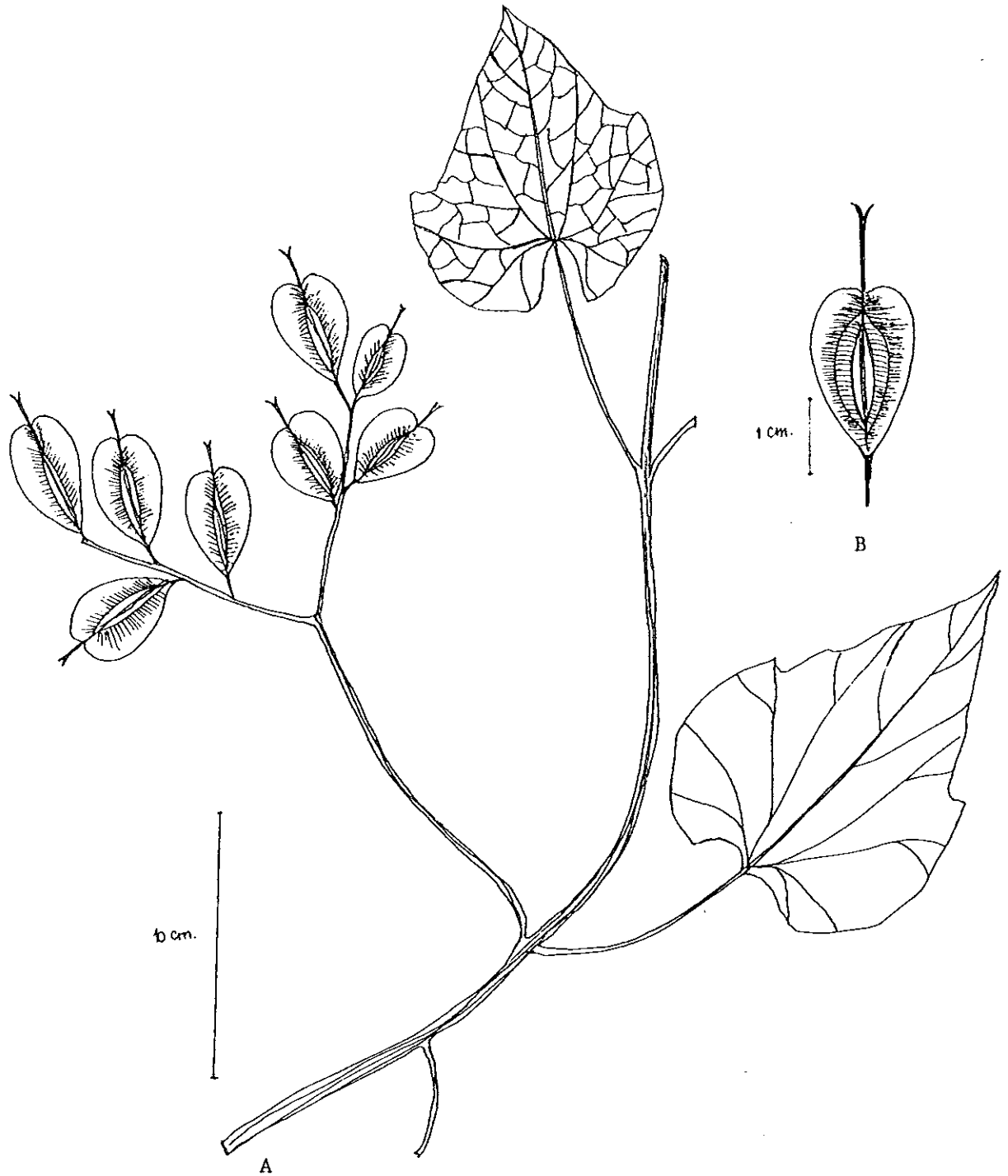


Fig. 9 *Cardiopteris quinqueloba* (Hassk.) Hassk. (Cardioteridaceae)

A : Fruiting branch, B : Fruit

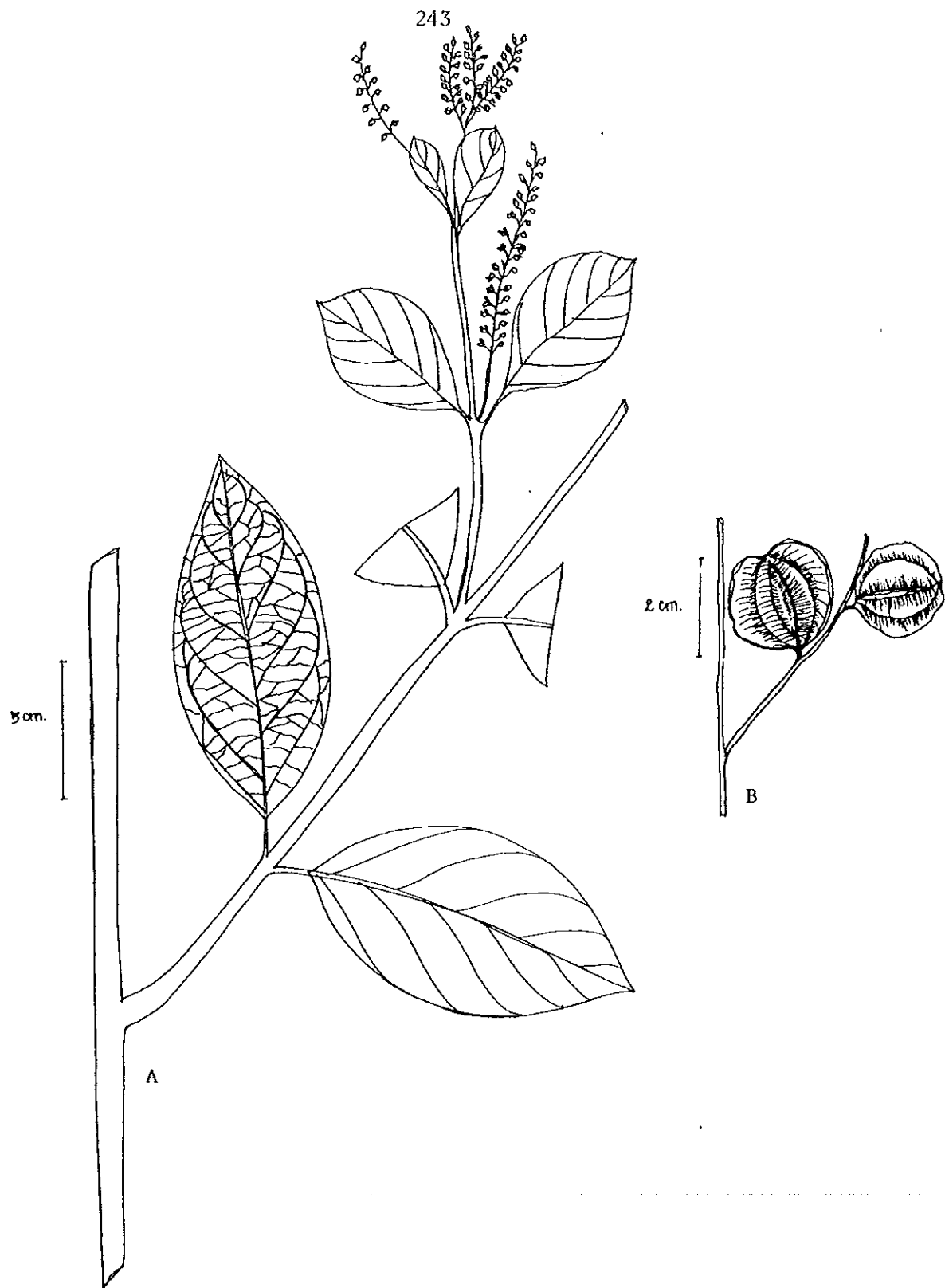


Fig. 10 *Combretum foliatum* Craib (Combretaceae)

A : Flowering branch, B : Fruits

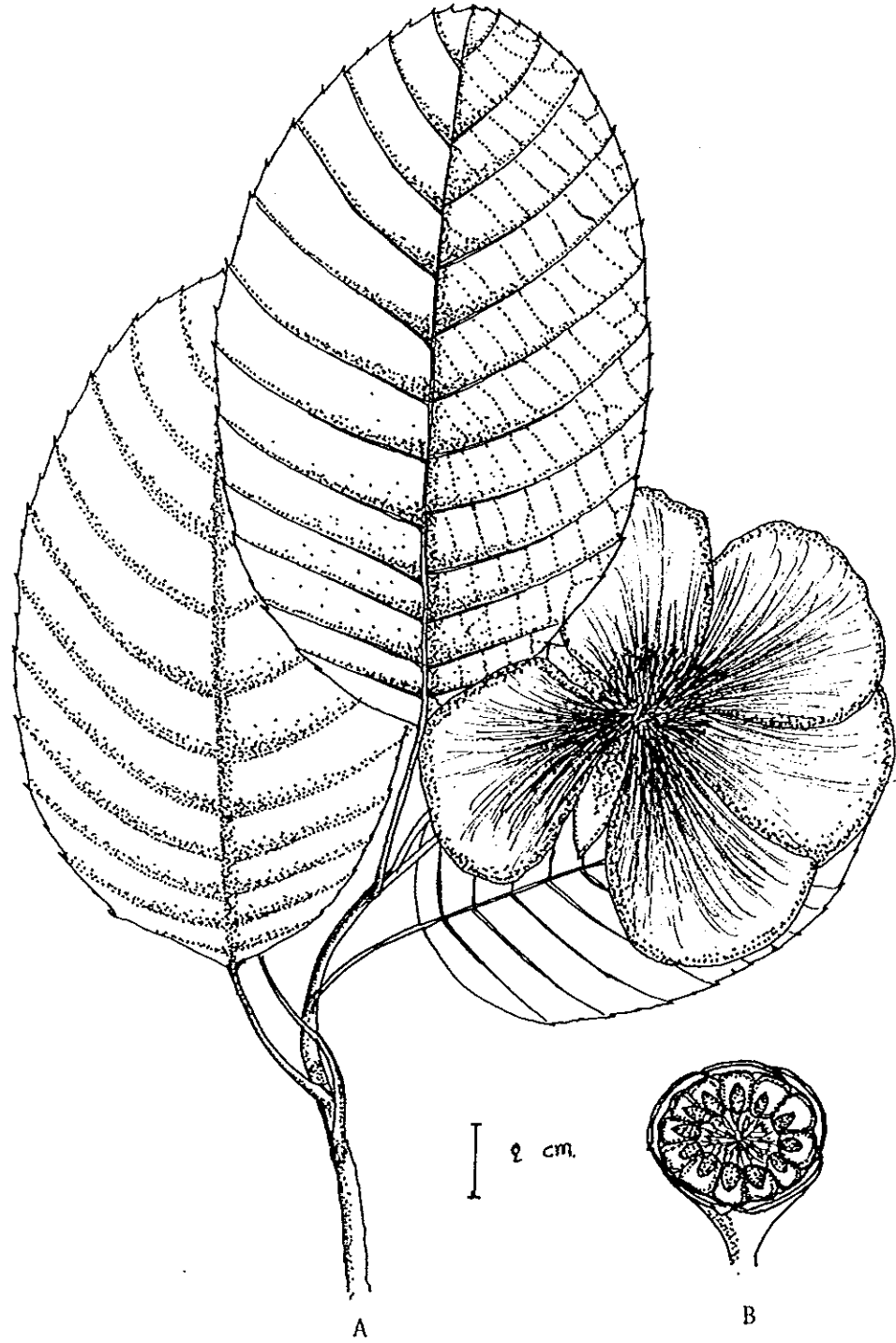


Fig. 11 *Dillenia ovata* Wall ex Hook. f. & Thoms

A : Flowering branch, B : X.S. fruit

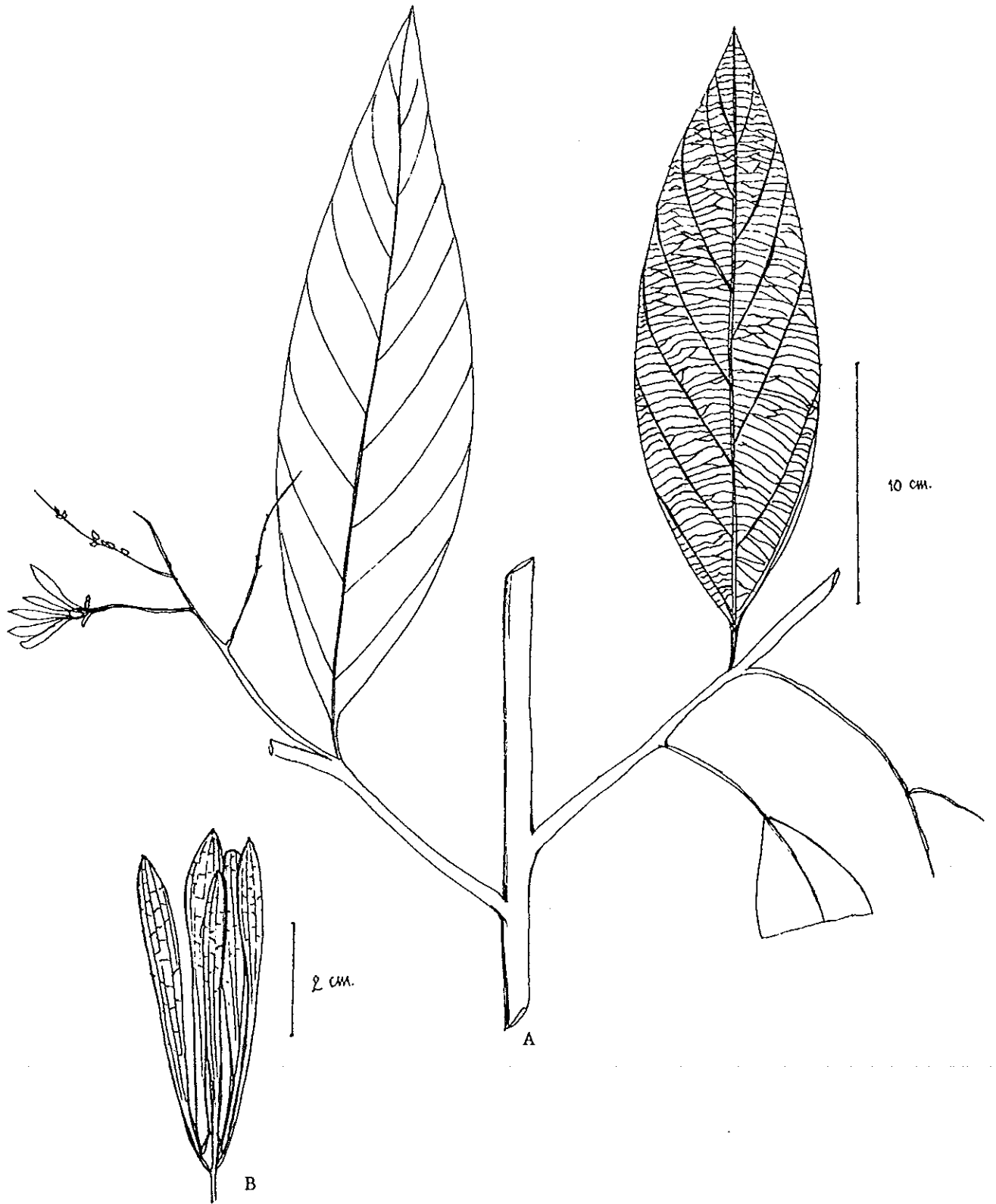


Fig.12 *Parashorea stellata* Kurz (Dipterocarpaceae)

A : Flowering branch, B : Fruit

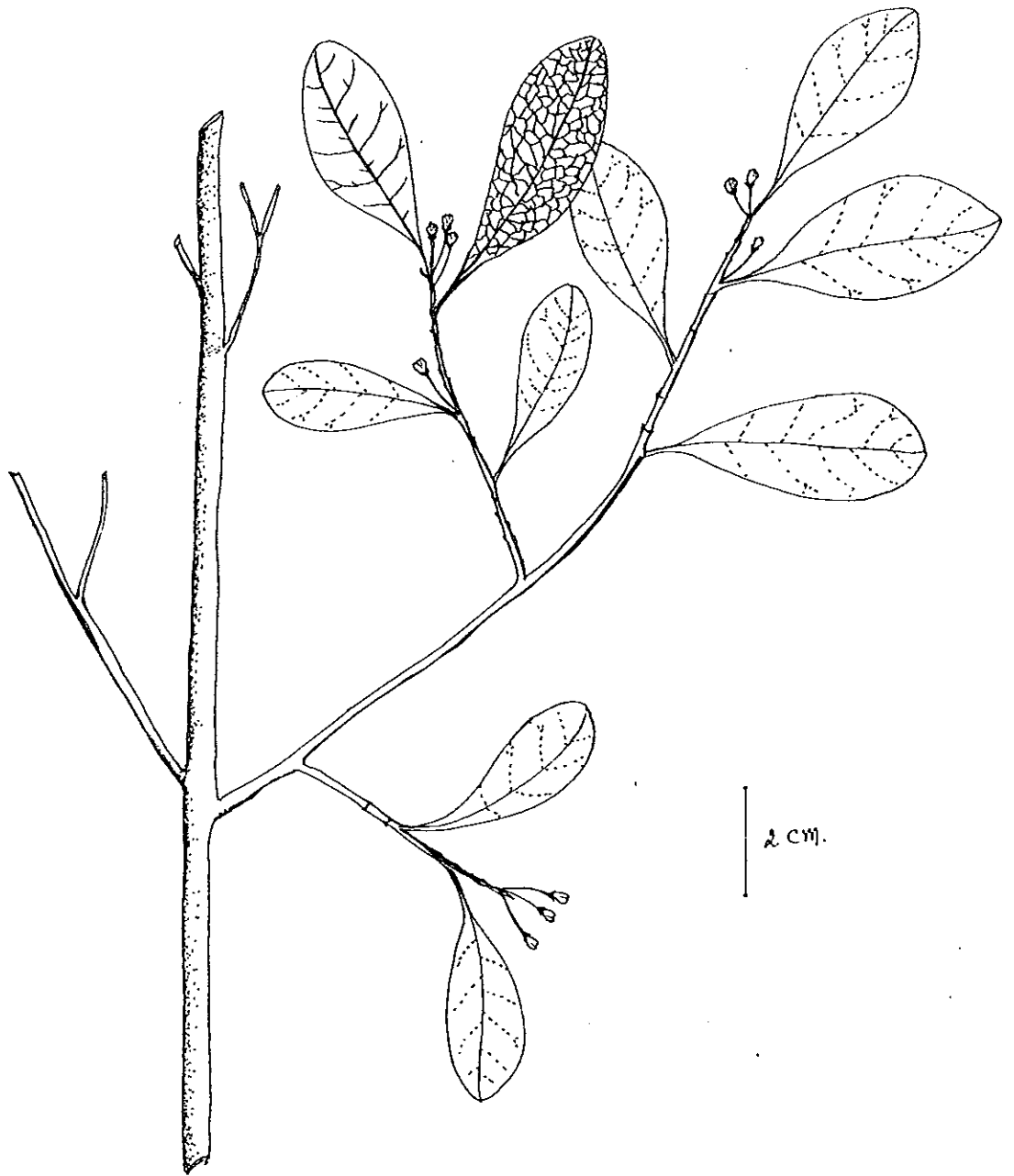


Fig. 13 *Erythroxylum cuneatum* (Miq.) Kurz (Erythroxylaceae)

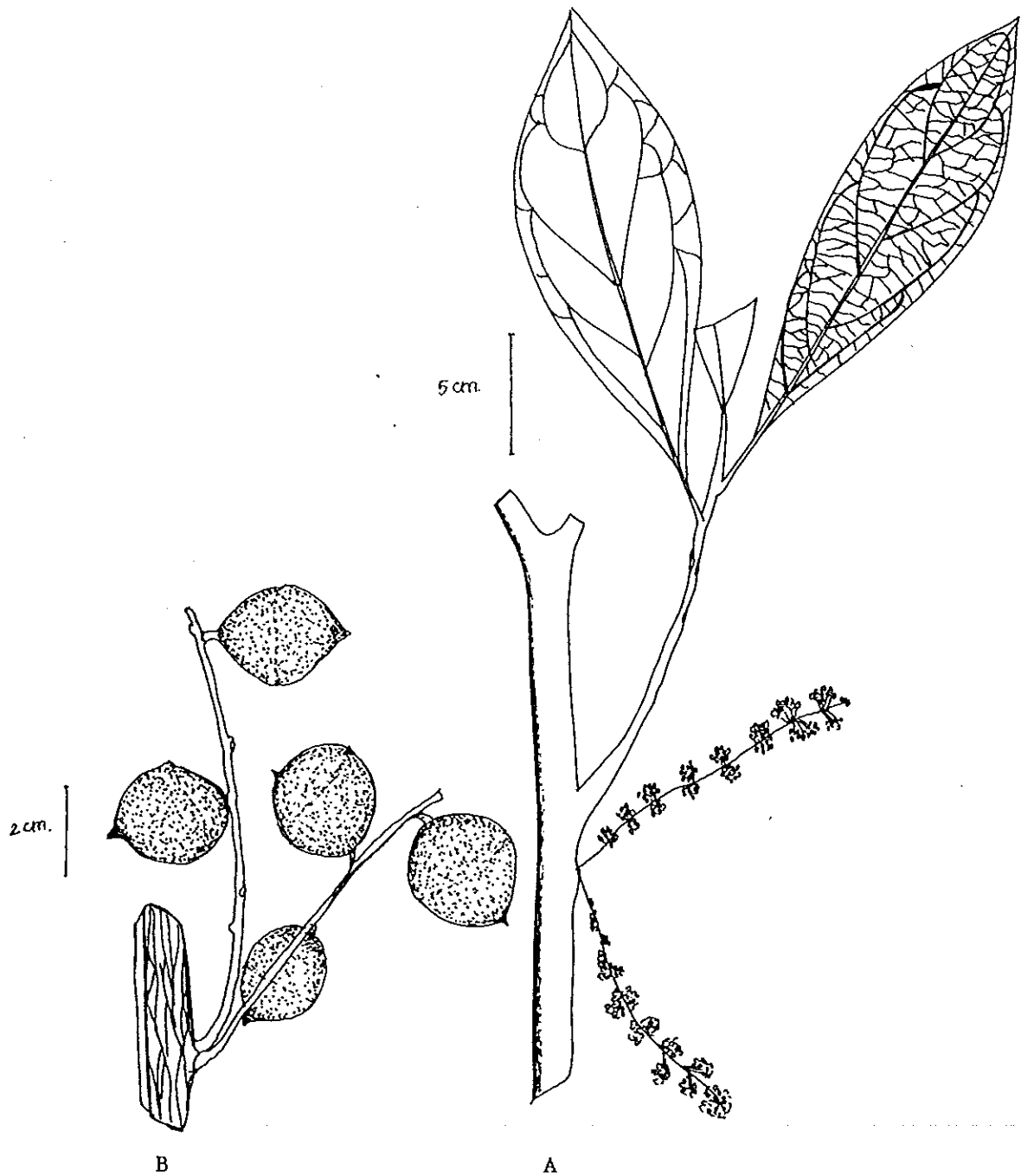


Fig. 14 *Baccarea ramiflora* Lour. (Euphorbiaceae)

A : Flowering branch, B : Fruits

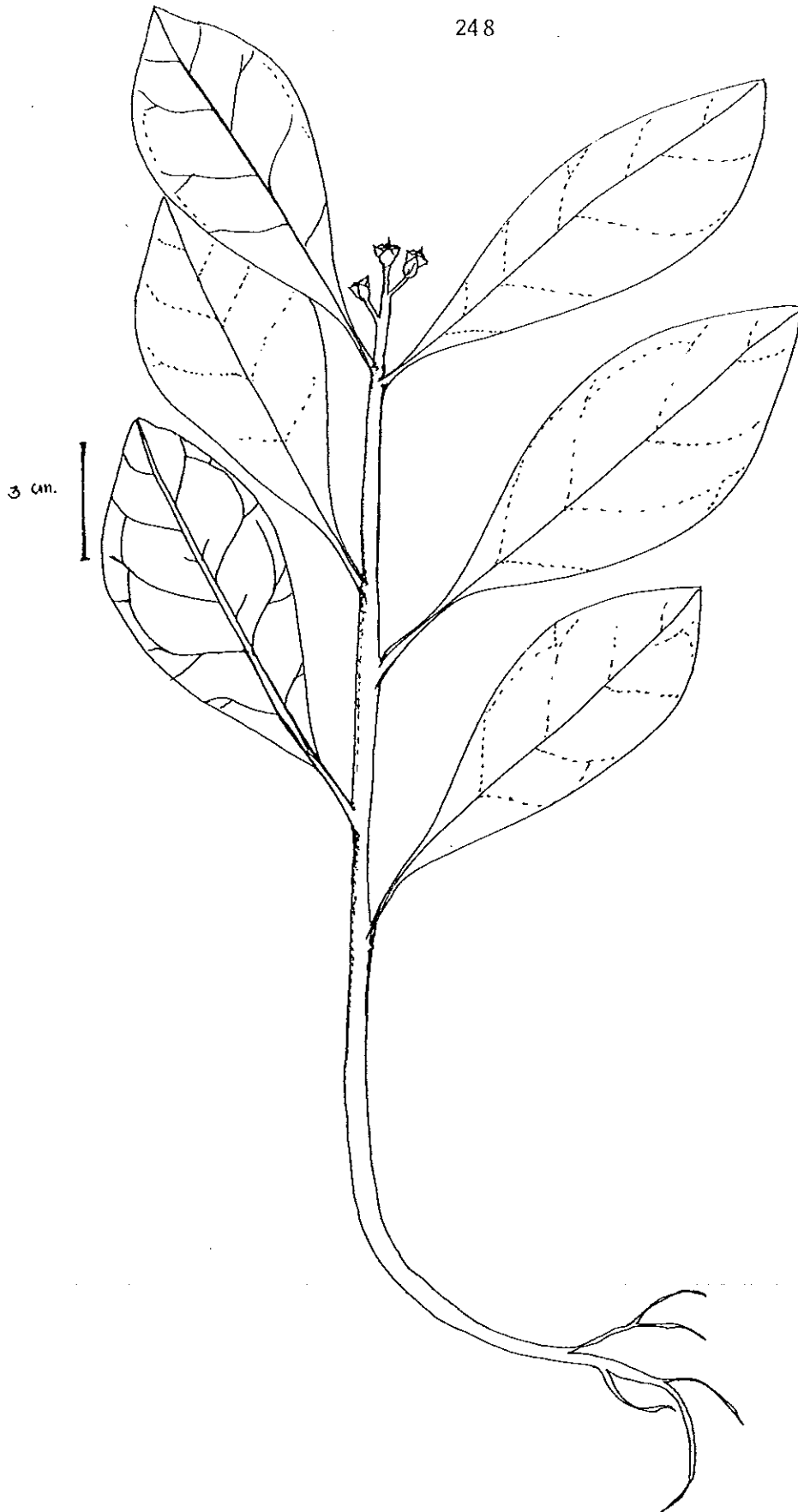


Fig. 15 *Euphorbia synadenium* Ridl. (Euphorbiaceae)



Fig. 16 *Lithocarpus elegans* (Bl.) Hatus. ex Soep. (Fagaceae)

A : Flowering branch, B : Fruiting branch

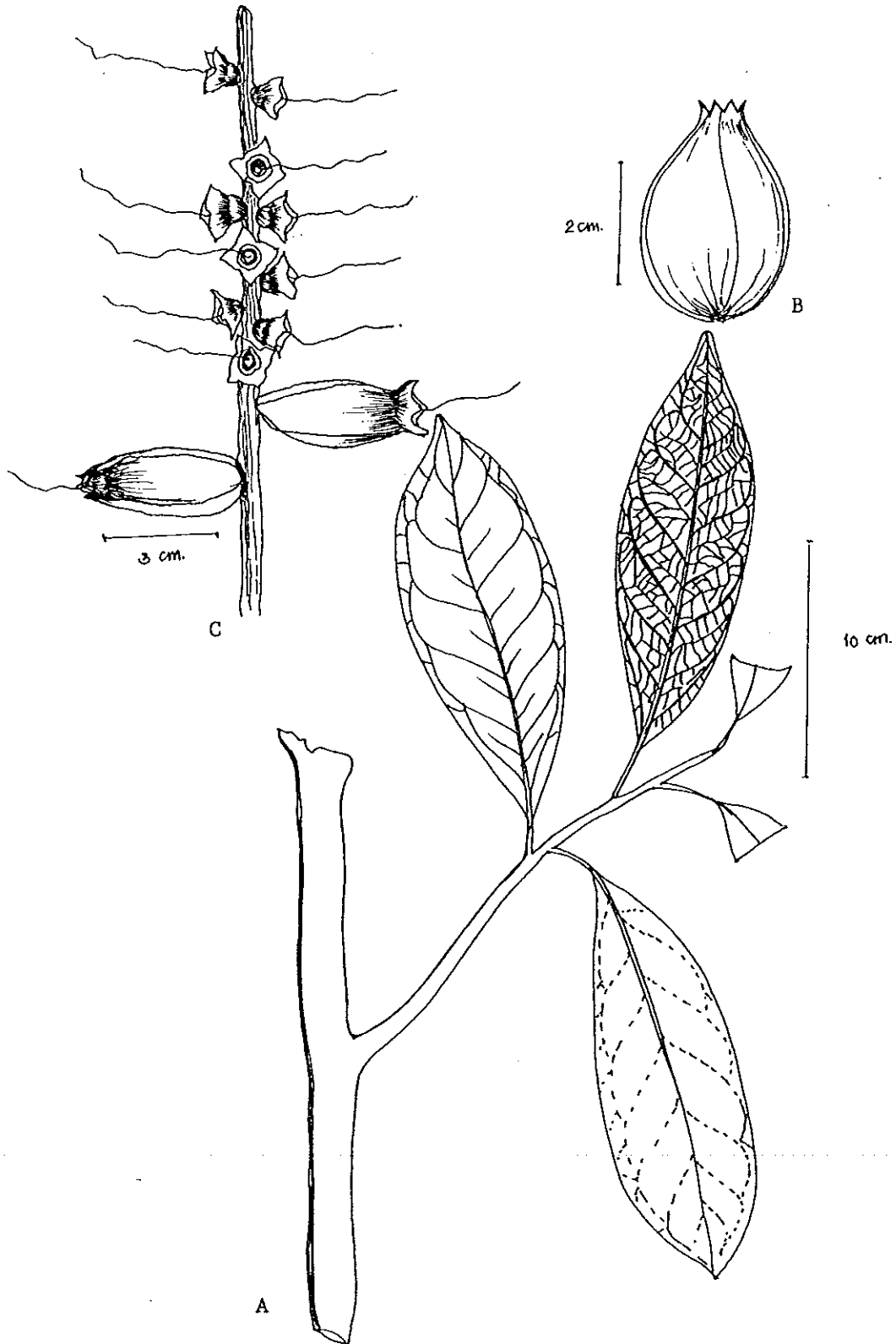


Fig. 17 *Barringtonia pendula* (Griff) Kurz (Lecythidaceae)

A : Branch, B : Flower bud, C : Part of infructescence showing fruit, calyx and style

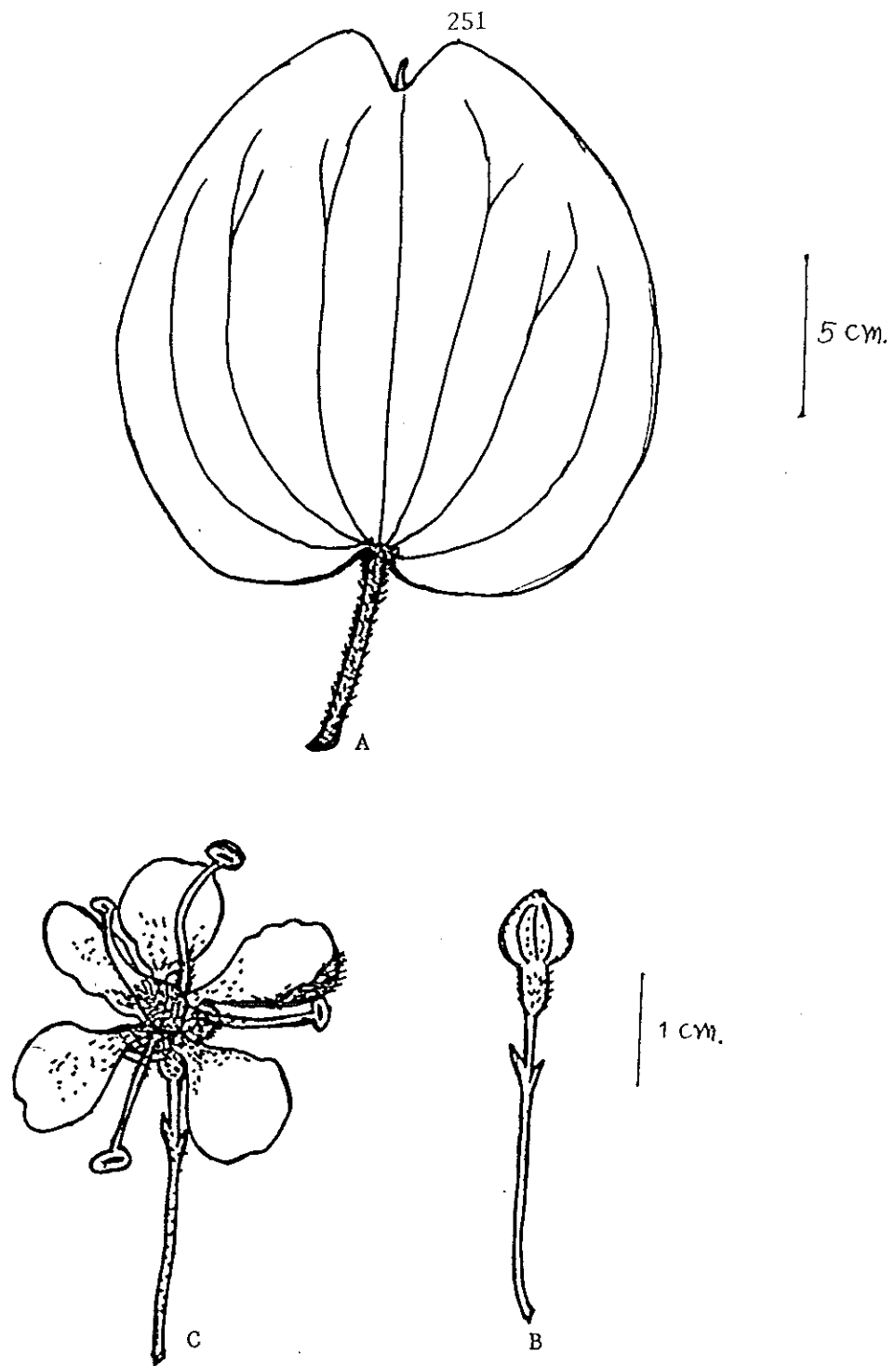


Fig. 18 *Balhinia integrifolia* Roxb. ssp *integrifolia* (Caesalpinoideae)

A : Leaf, B : Bud, C : Flower

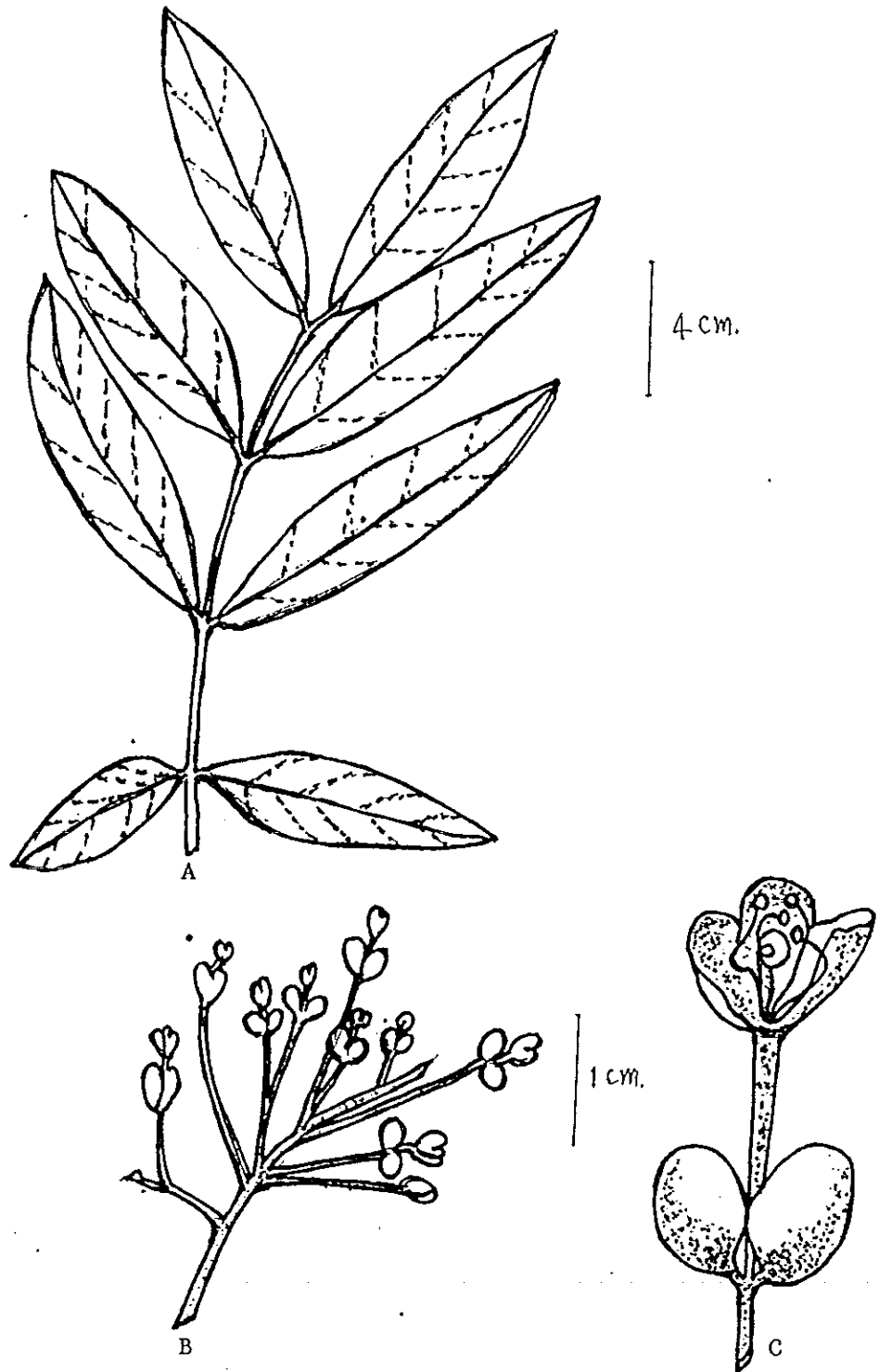


Fig. 19 *Saraca declinata* (Jack) Miq. (Caesalpinioideae)

A : Leaf, B : Part of inflorescencè, C : Flower

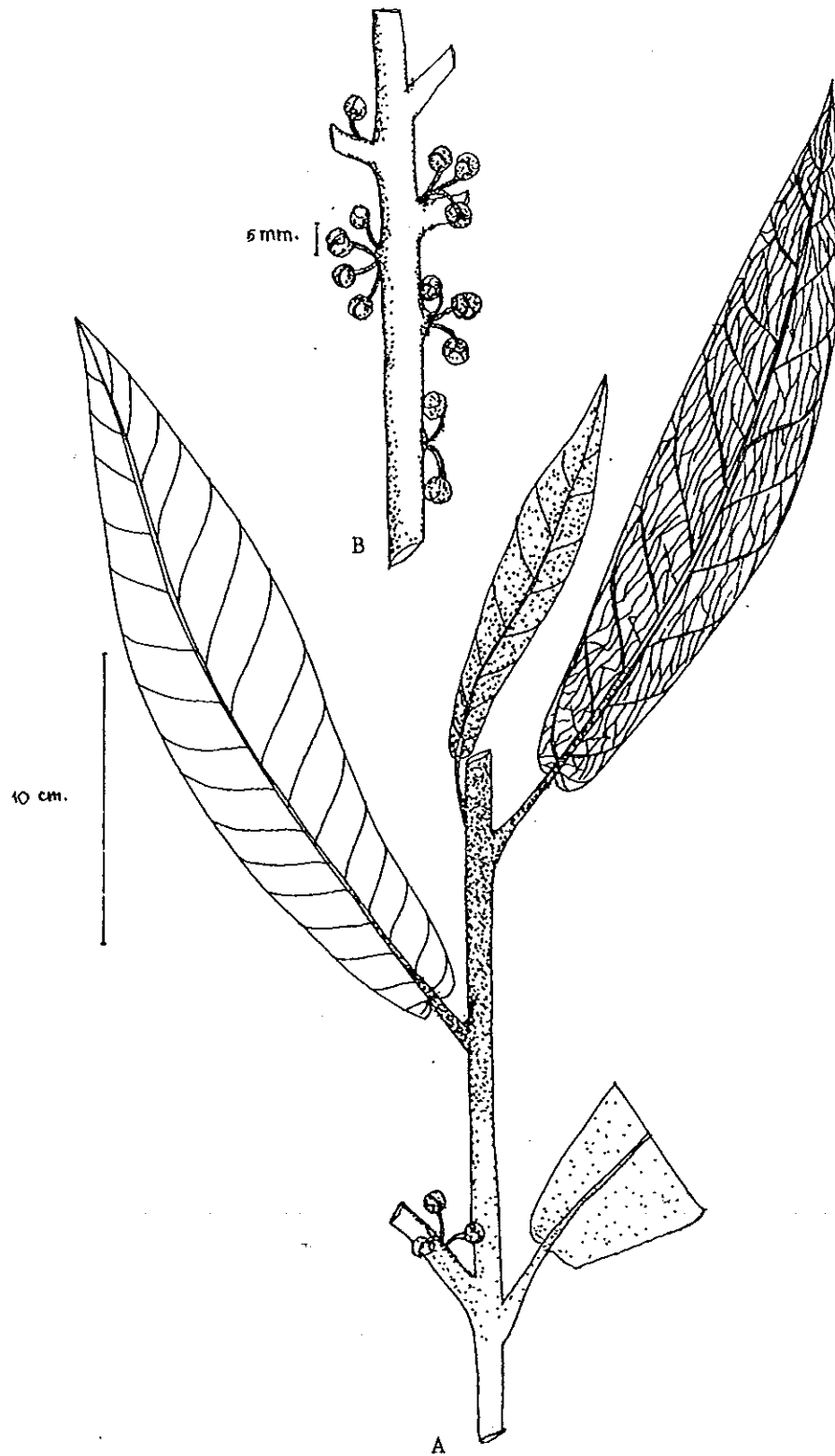


Fig. 20 *Knema furfuracea* (Hk. f. & Th.) Warb. (Myristicaceae)

A : Fruiting branch, B : Part of stem and figs

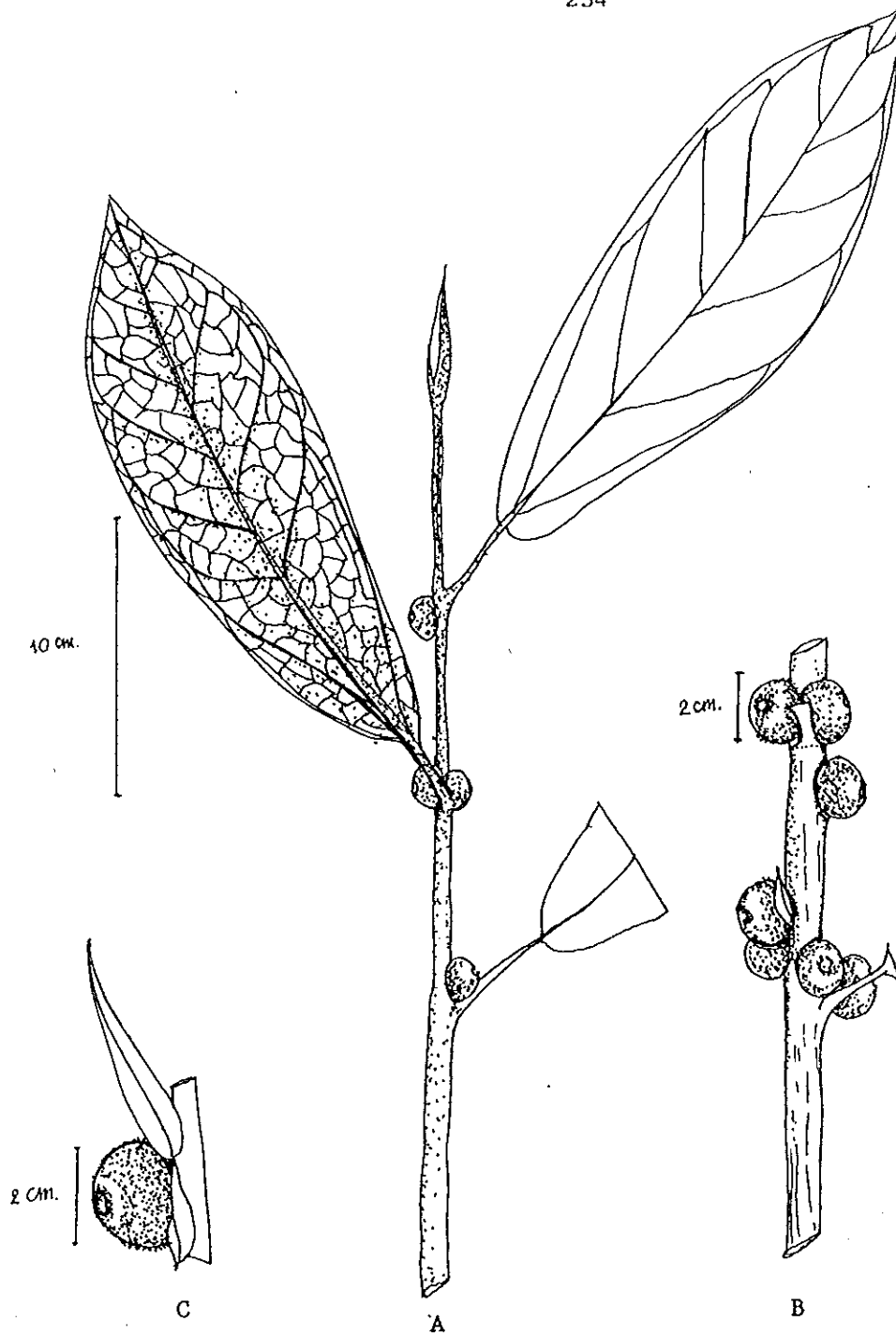


Fig. 21 *Ficus bracteata* Wall. ex Miq. (Moraceae)

A : Fruiting branch, B : Part of stem and figs,

C : Fig and persistent bracts

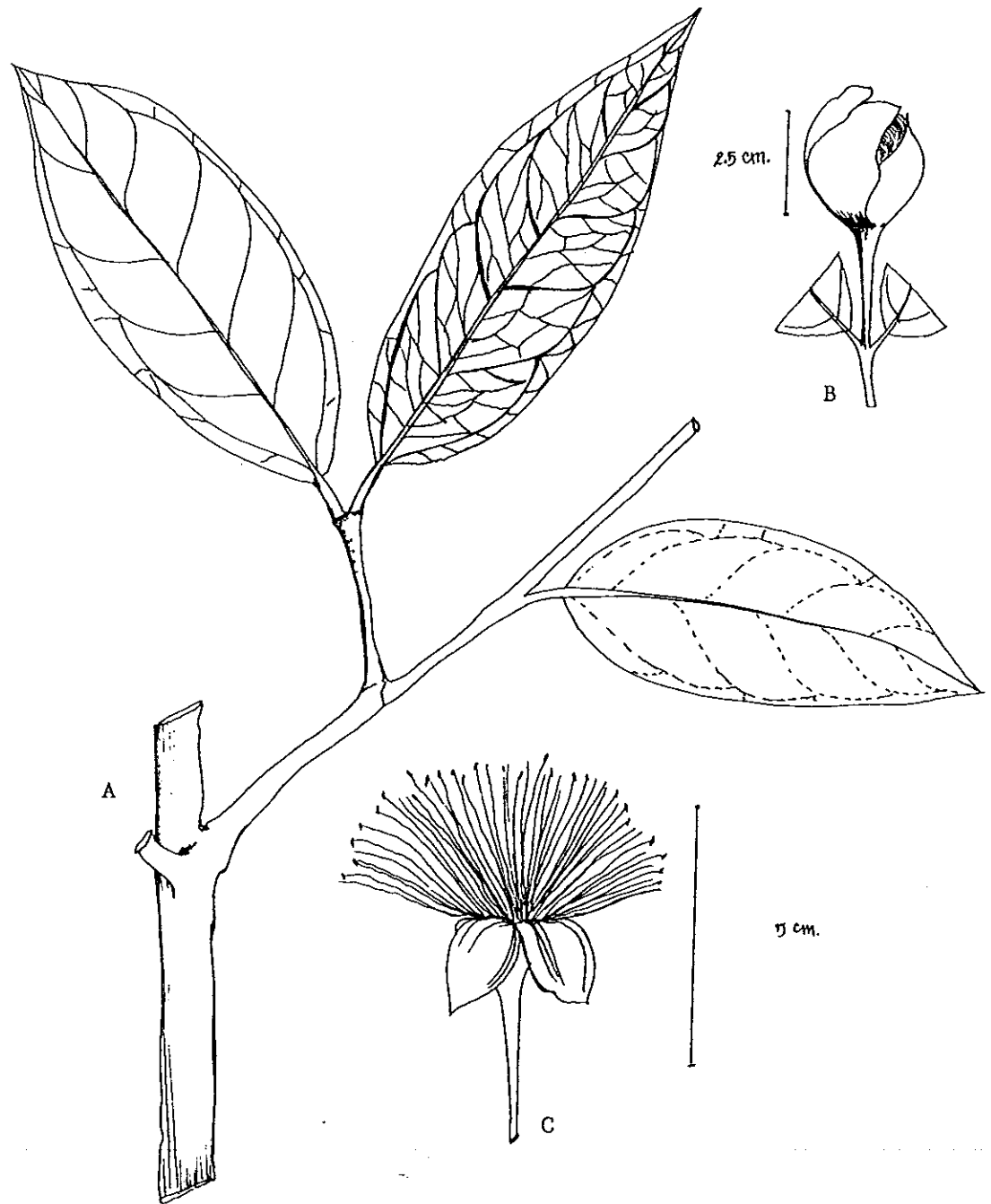


Fig. 22 *Eugenia densiflora* (Bl.) Miq. var. *densiflora* (Myrtaceae)

A : Branch, B : Flower bud , C : Flower, showing stamens

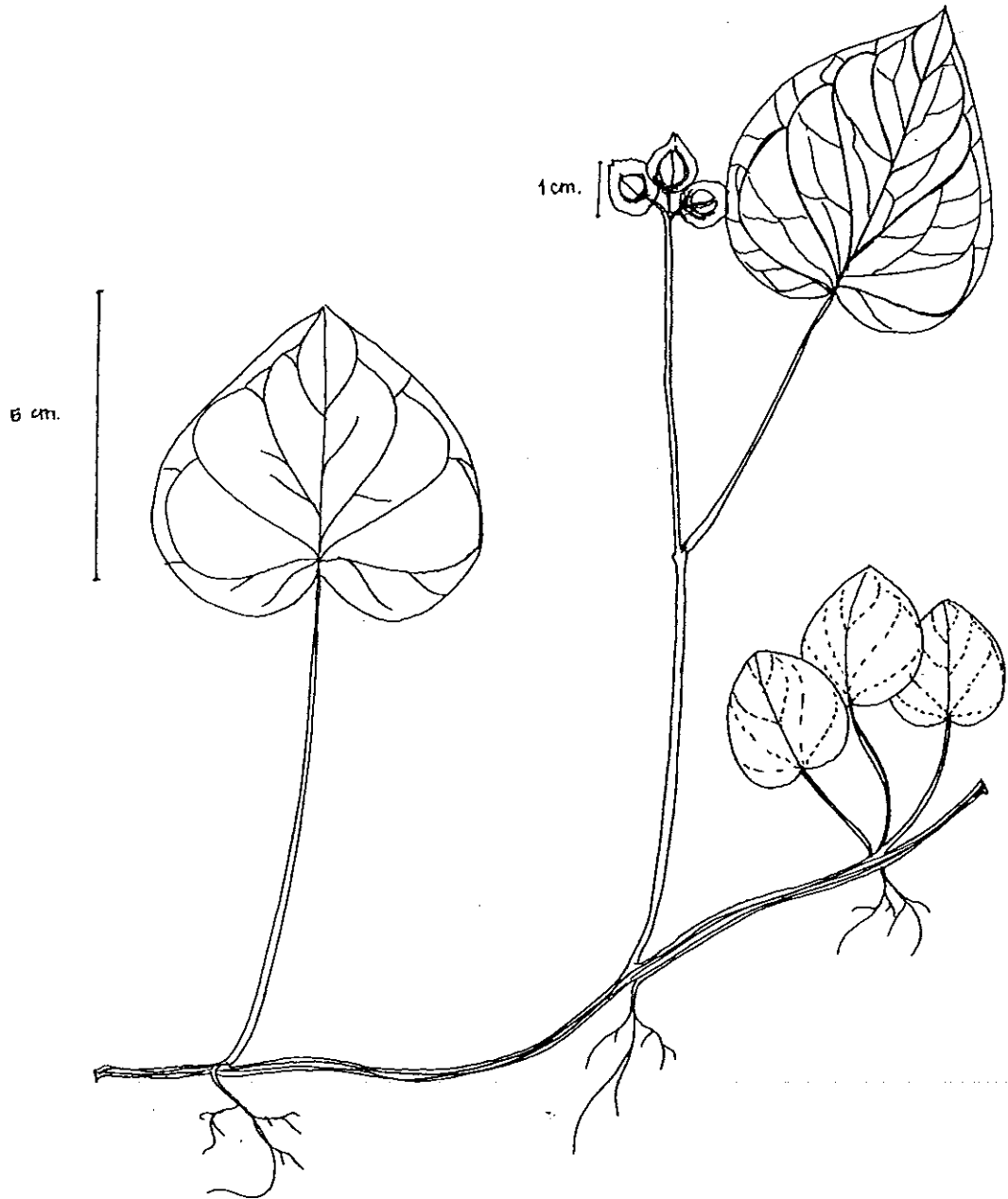


Fig. 23 *Geophila repens* (L.) I.M. Johns. (Rubiaceae)

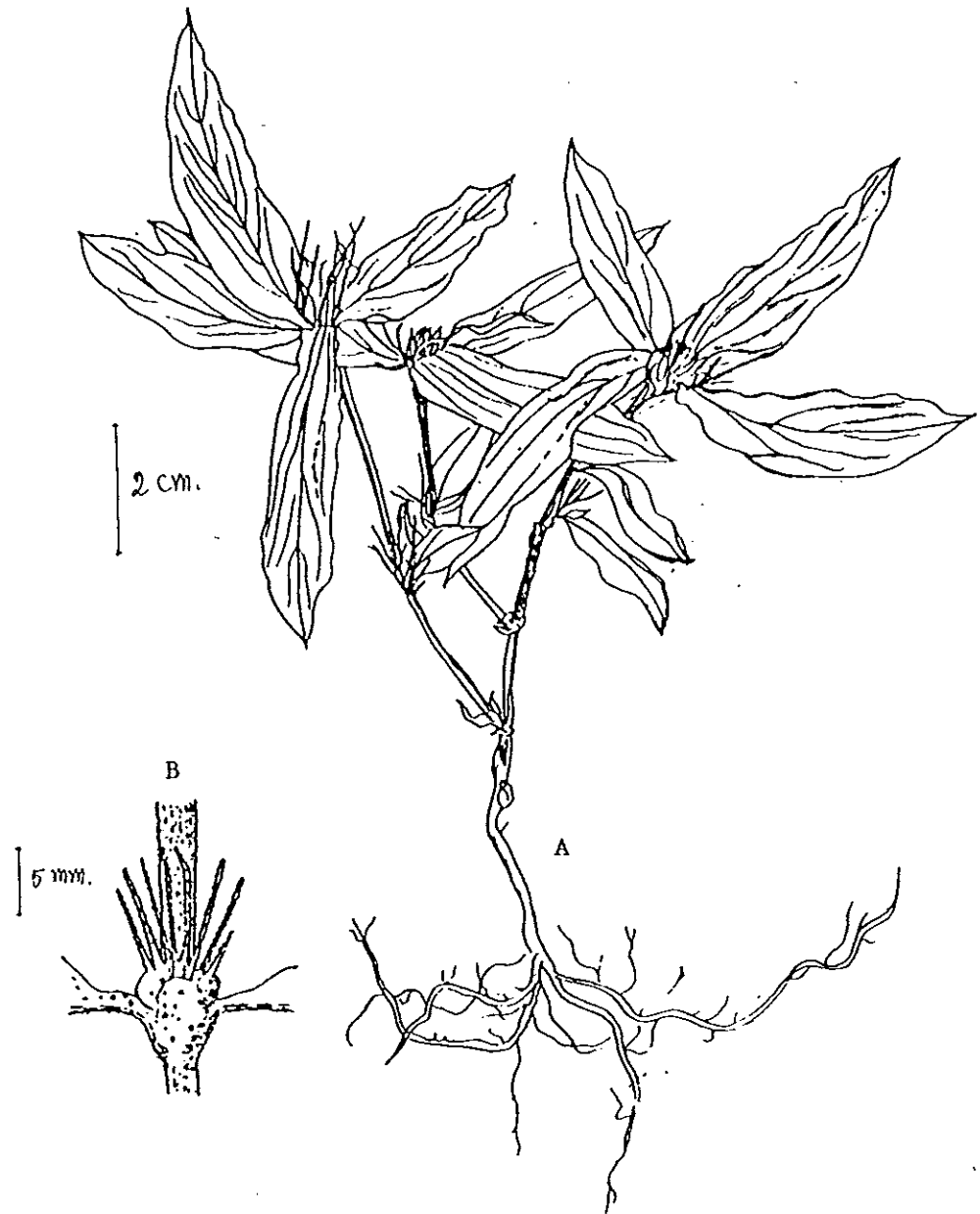


Fig. 24 *Hedyotis coronaria* (Kurz) Craib (Rubiaceae)

A : Habit, B : Stipule

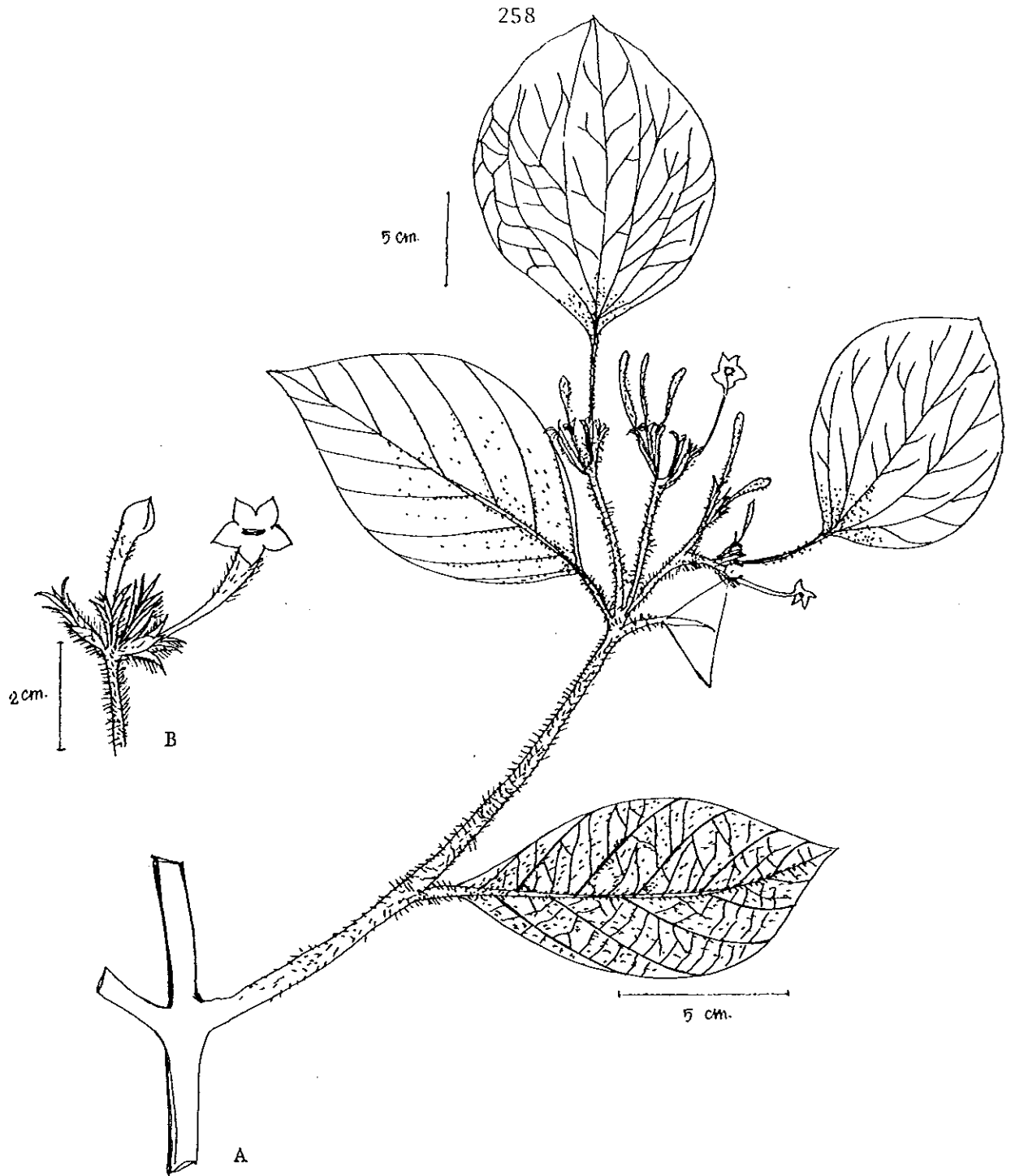


Fig. 25 *Mussaenda villosa* Wall. ex G. Don (Rubiaceae)

A : Flowering branch, B : Inflorescence



Fig. 26 *Sterculia coccinea* Jack (Sterculiaceae)

A : Follicles, B : Seeds

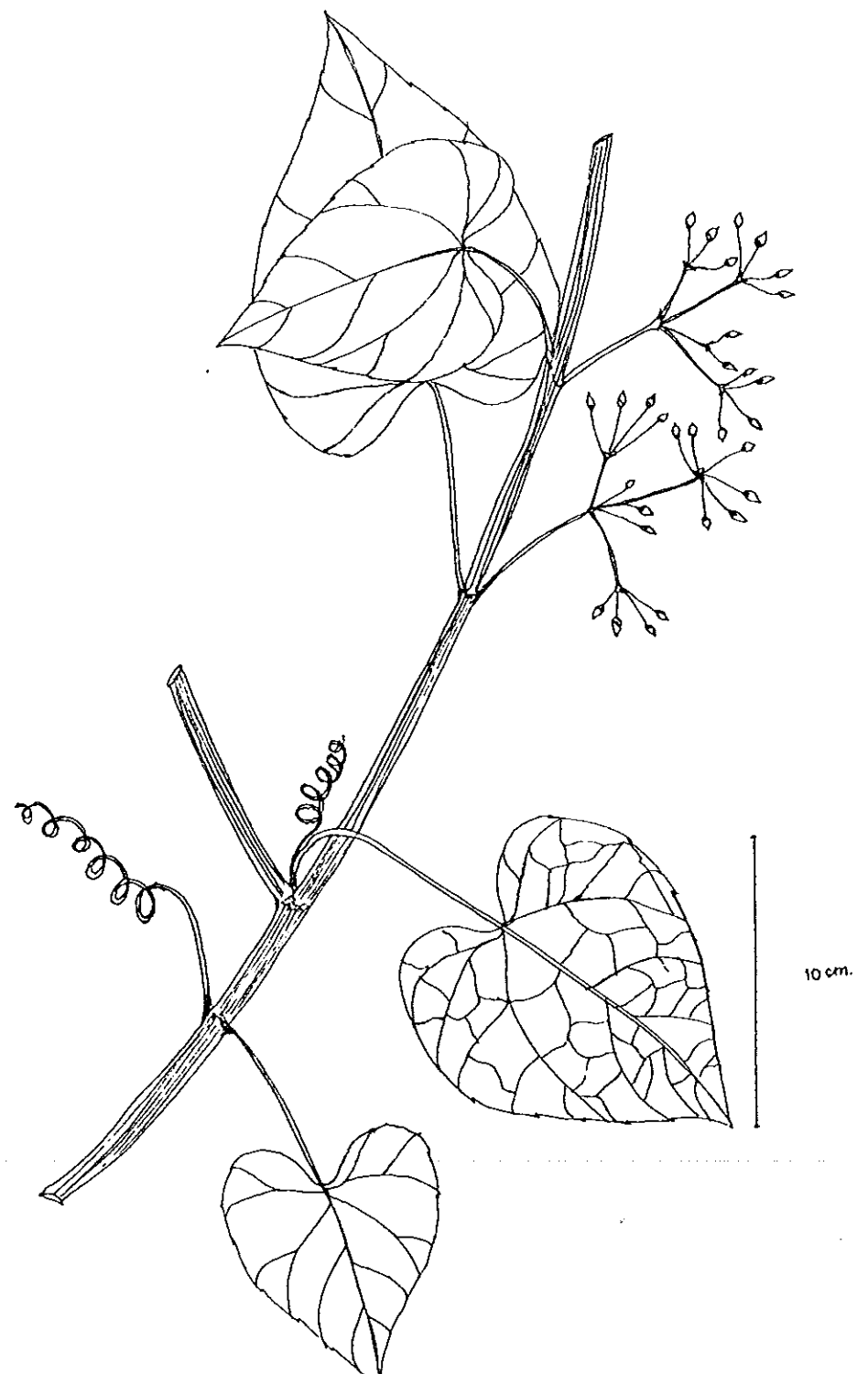


Fig.27 *Cissus repens* Lmk. (Vitaceae)

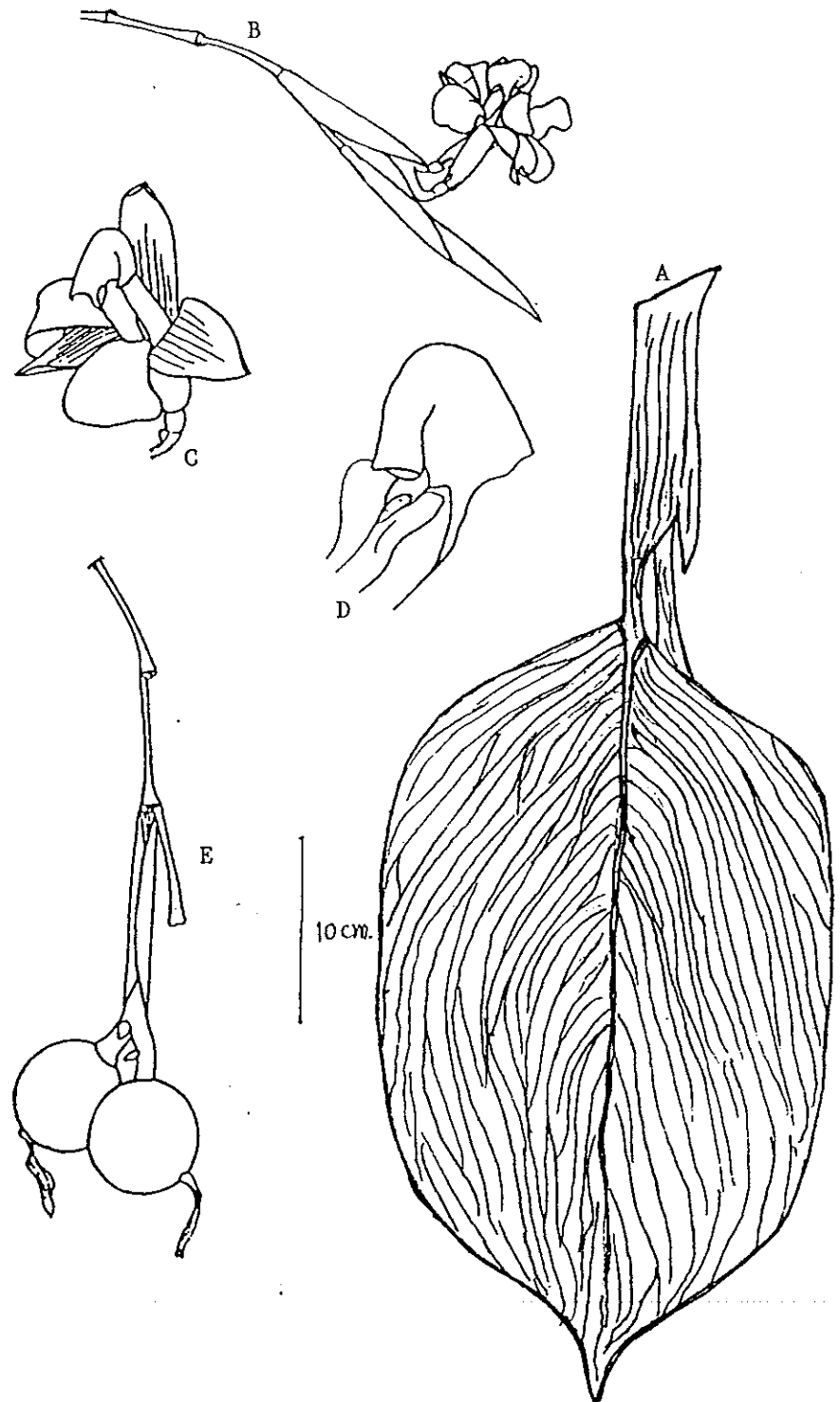


Fig. 28 *Donax cannaeformis* (G. Forst.) K. Sch. (Marantaceae)

A : Leaf, B : Part of inflorescence, showing flowers

C : A flower, showing petals and staminode, D : Staminode

E : Part of infructescence, showing fruits

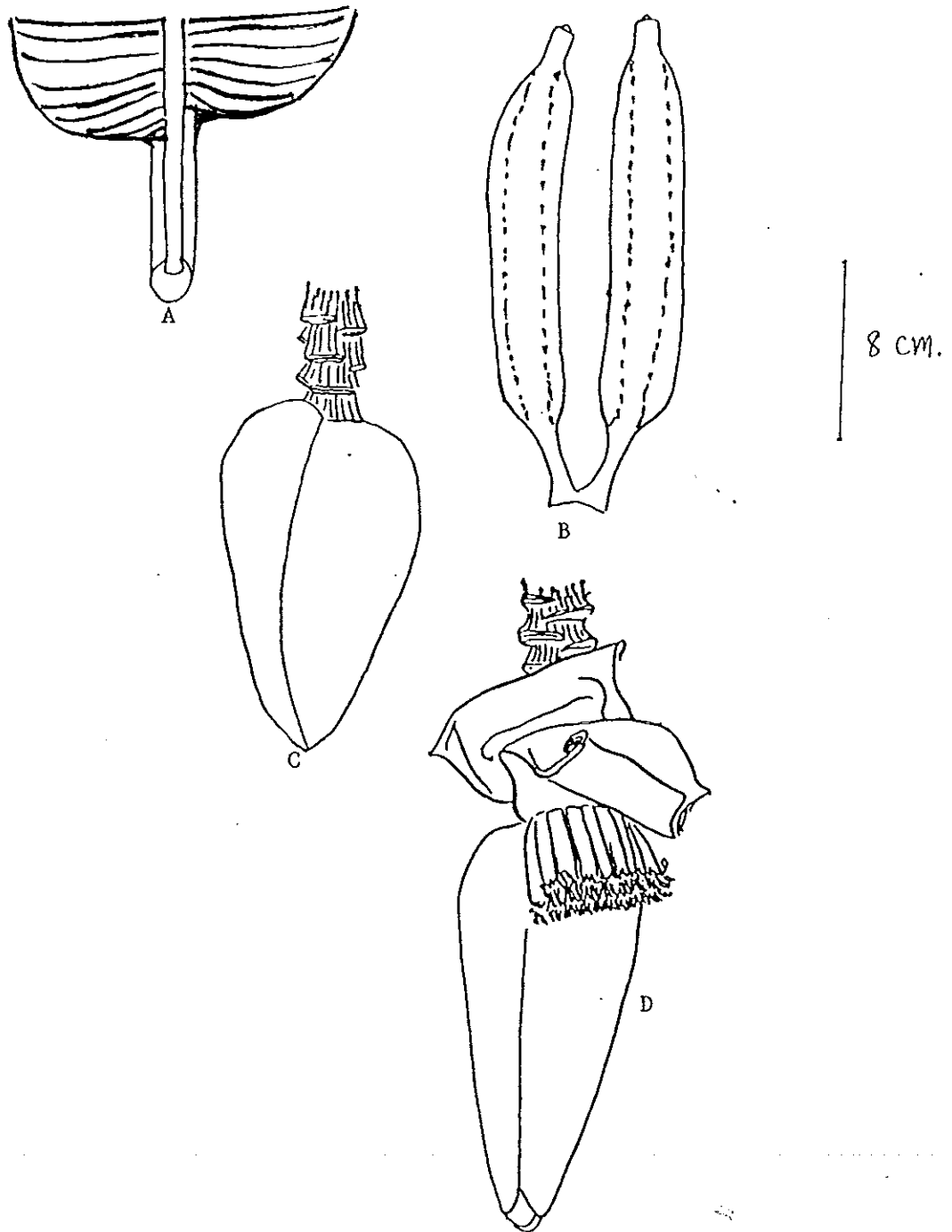


Fig. 29 *Musa acuminata* Colla (Musaceae)

A : Part of petiole and blade base, B : Fruits,

C-D : Inflorescence

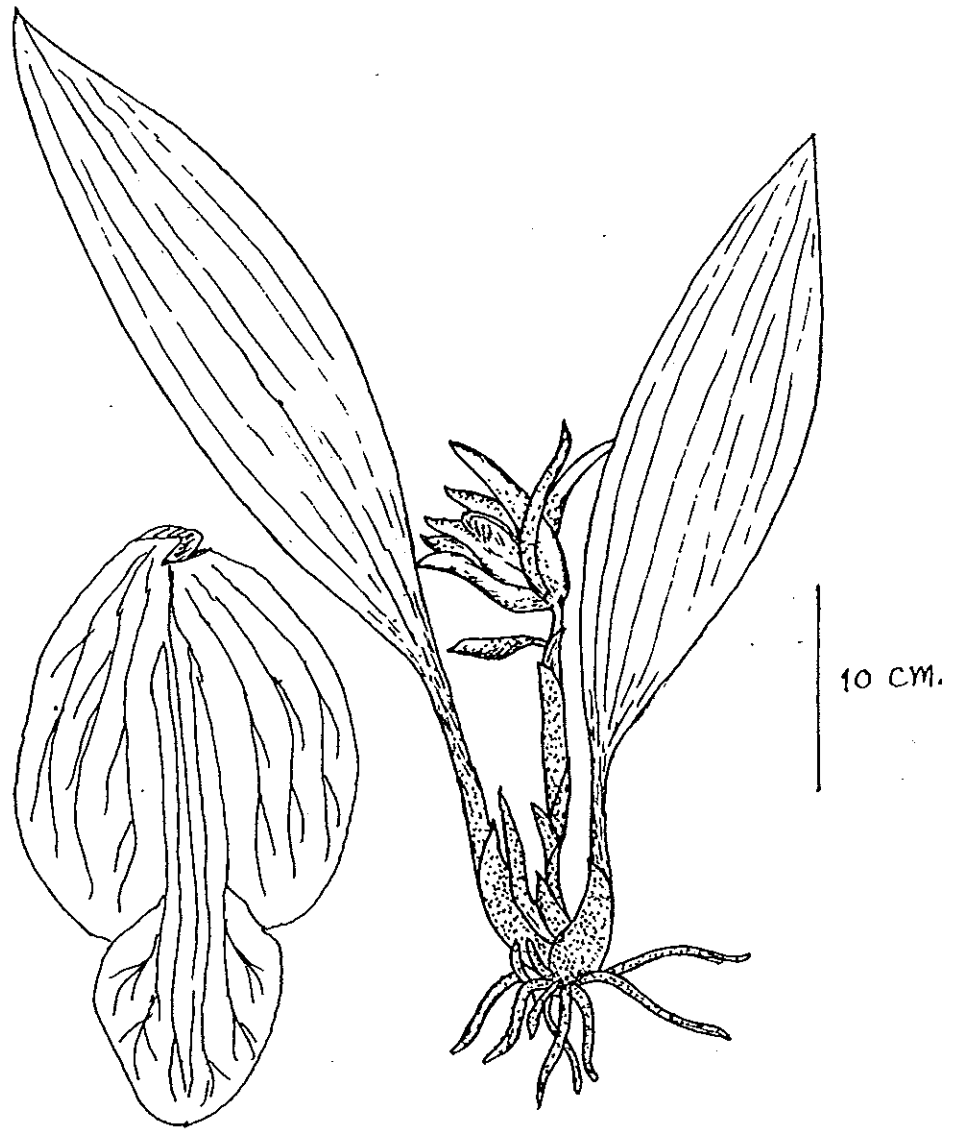


Fig. 30 *Coelogyne xyrekes* Ridl. (Orchidaceae)

A : Habit, B : Lip

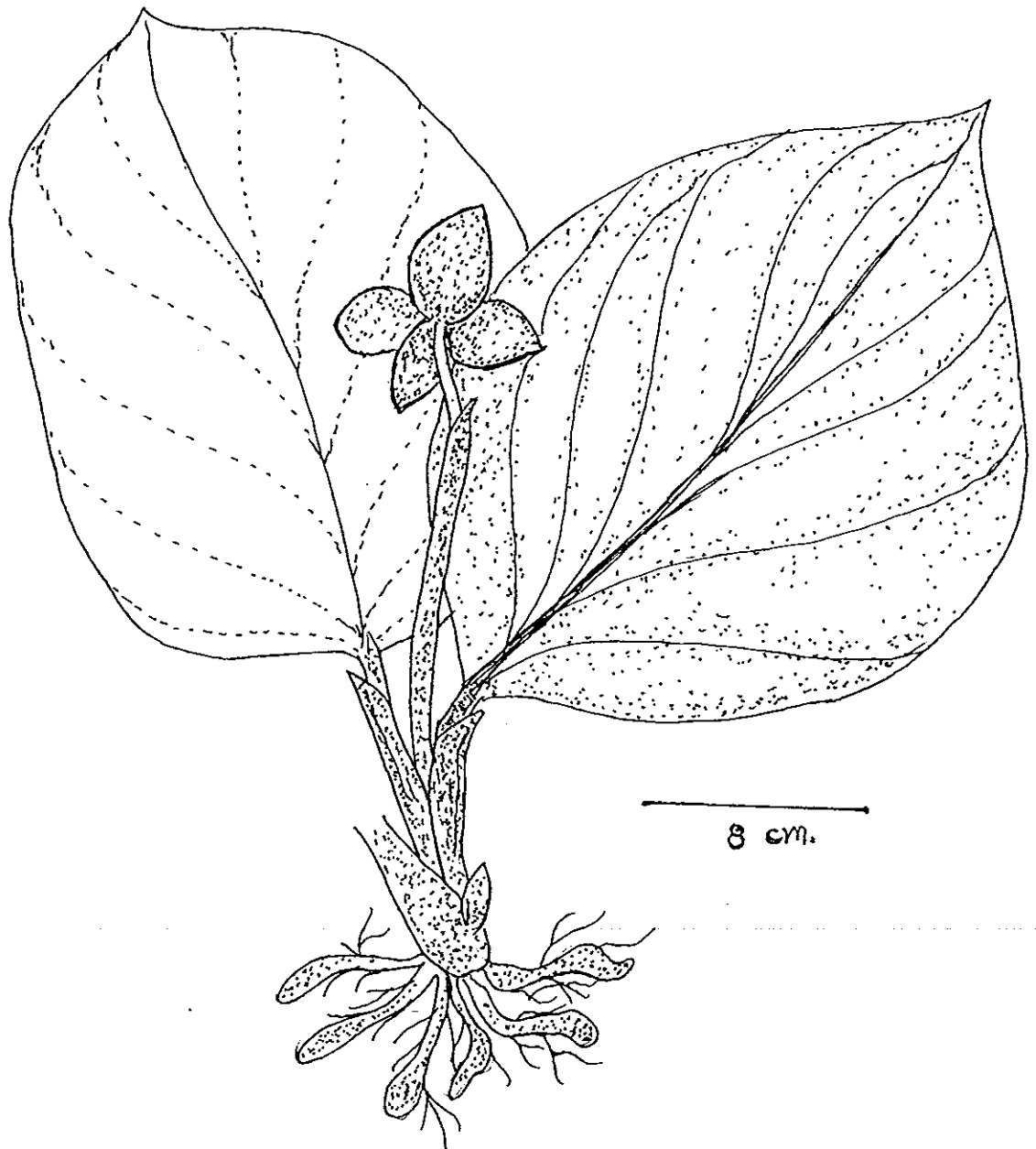


Fig. 31 *Kaempferia pulchra* Ridl. (Zingiberaceae)

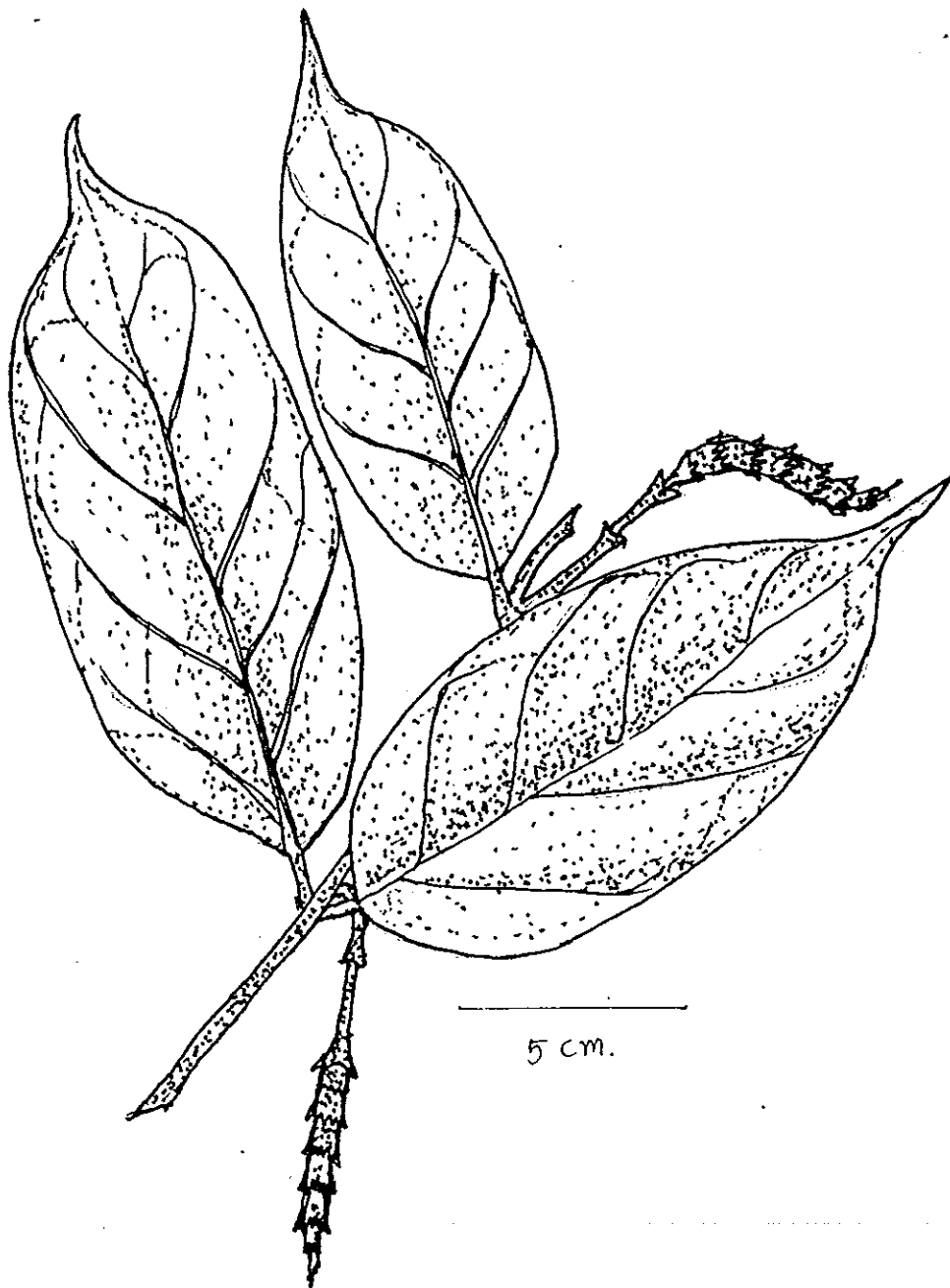


Fig. 32 *Gnetum tenuifolium* Ridl. (Gnetaceae)

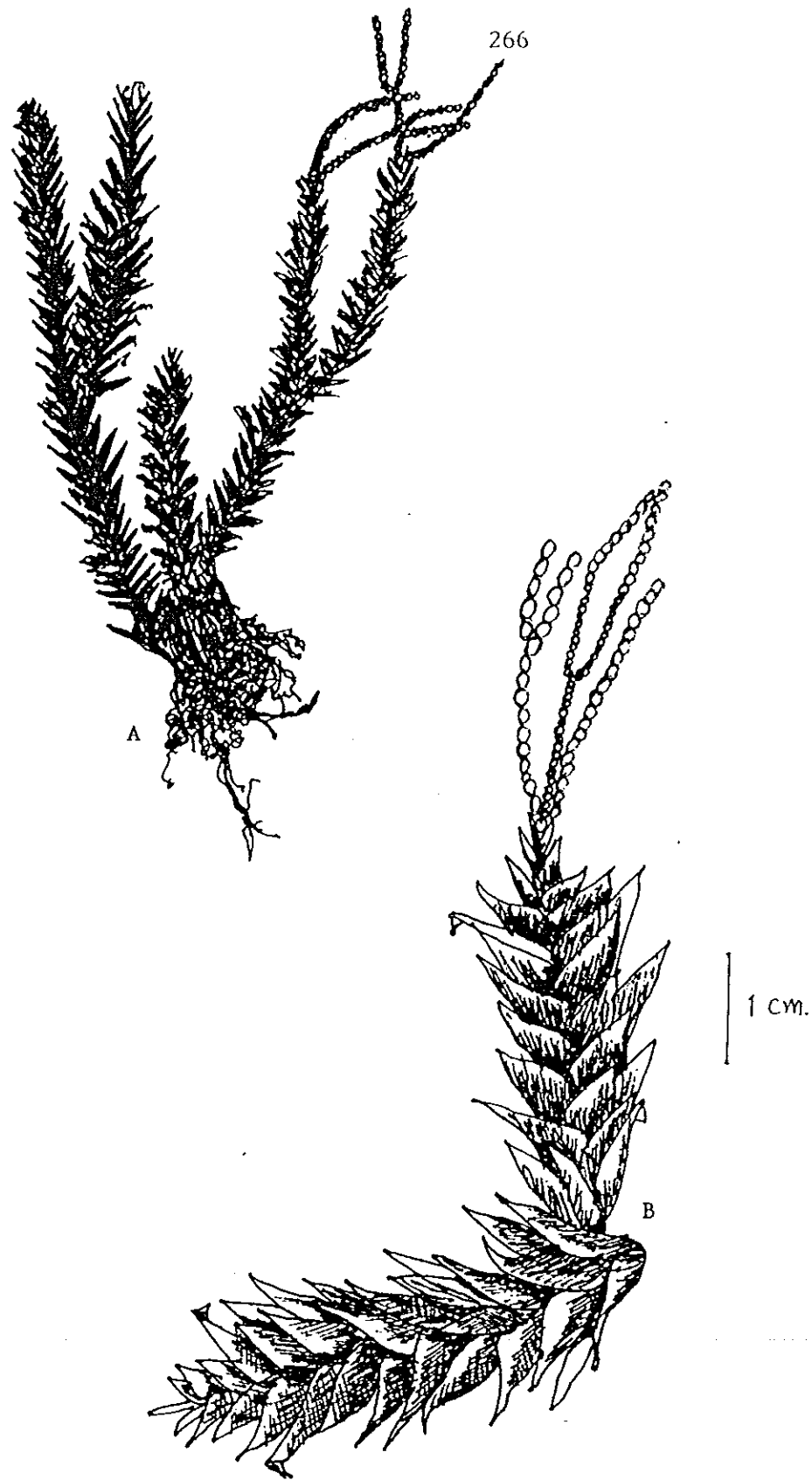


Fig. 33 *Lycopodium phlegmaria* L. (Lycopodiaceae)

A : Habit, B : Leaves arrangement, strobilus

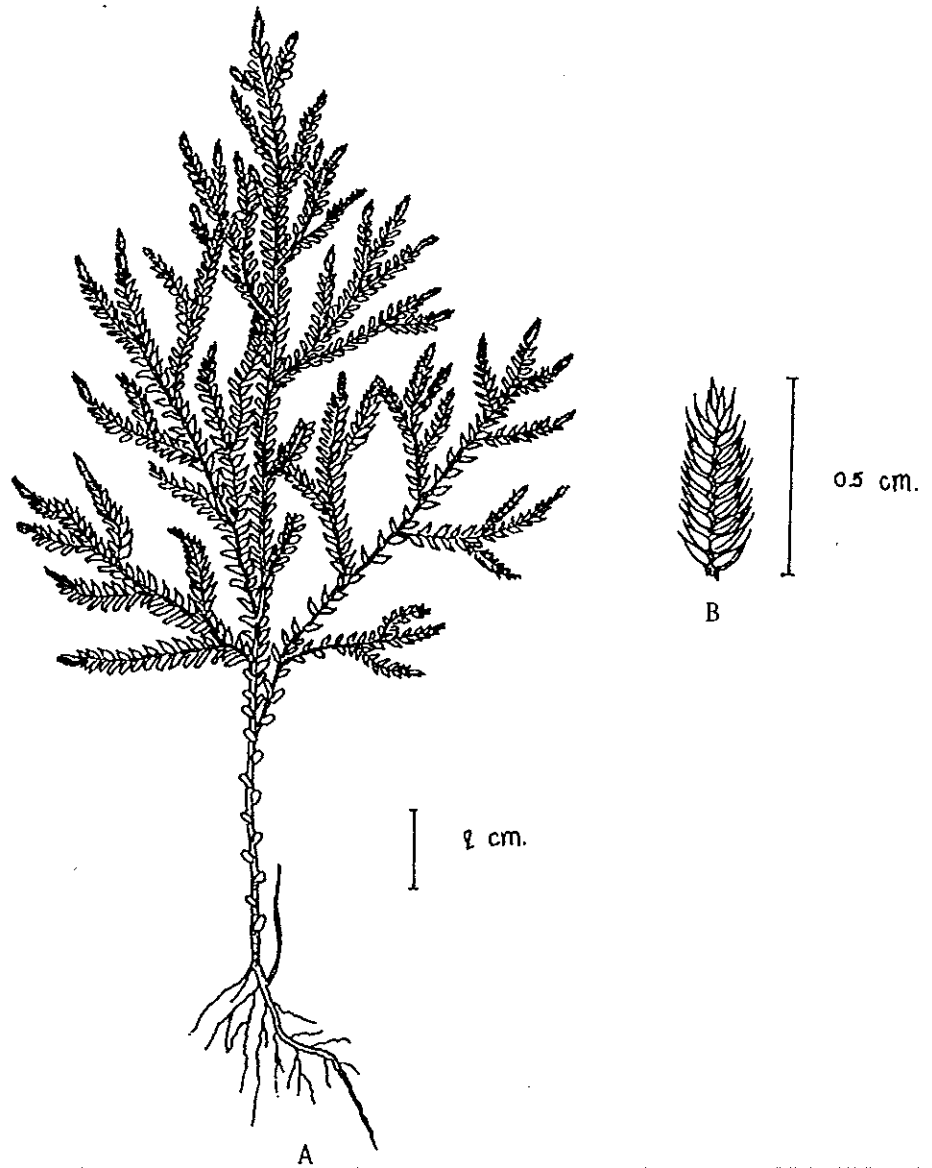


Fig. 34 *Selaginella roxburghii* (Hk. & Grev.) Spr.

A : Habit, B : Strobilus

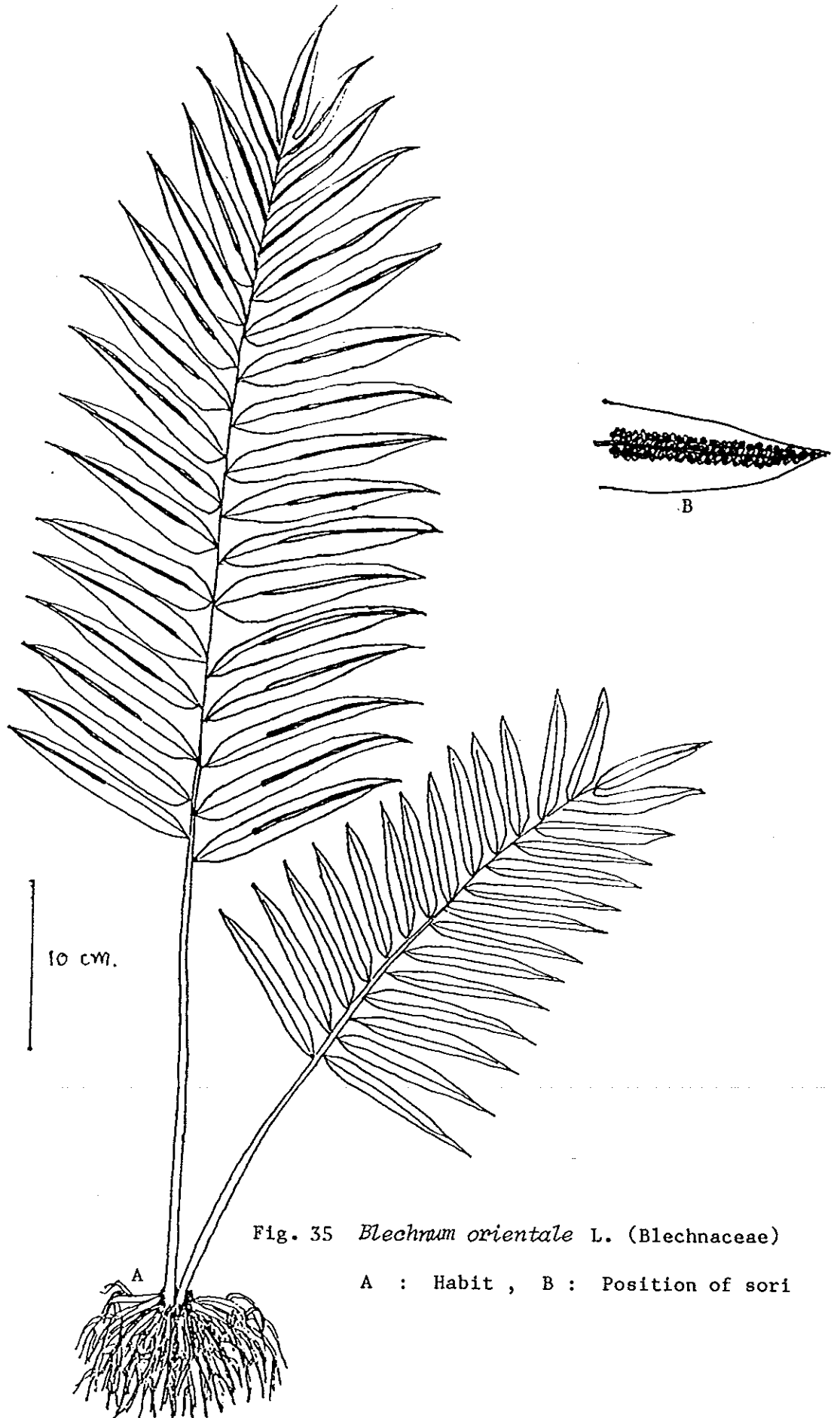


Fig. 35 *Blechnum orientale* L. (Blechnaceae)

A : Habit , B : Position of sori

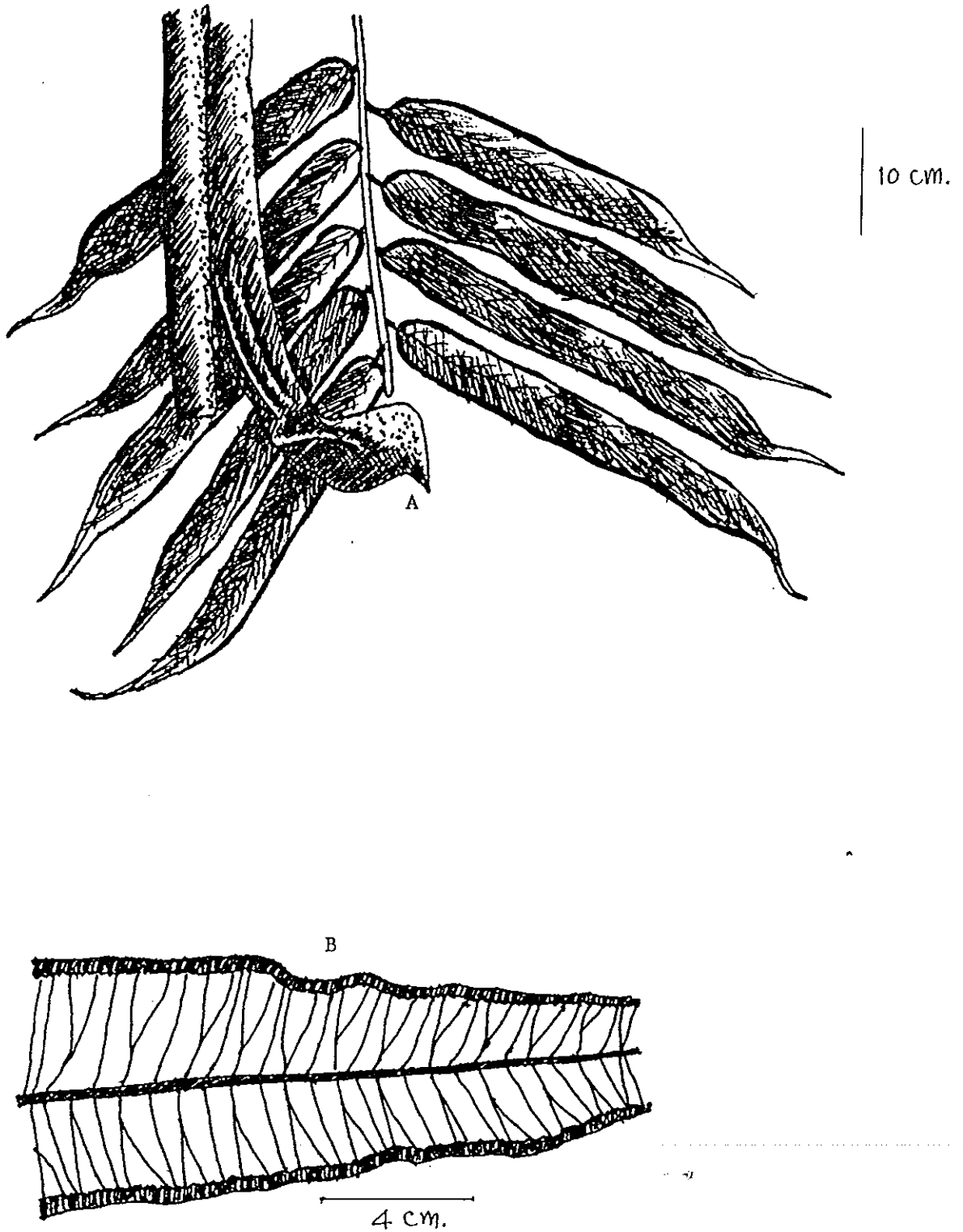


Fig. 36 *Angiopteris evecta* (Forst.) Hoffm. (Marattiaceae)

A : Part of frond, B : Position a sori

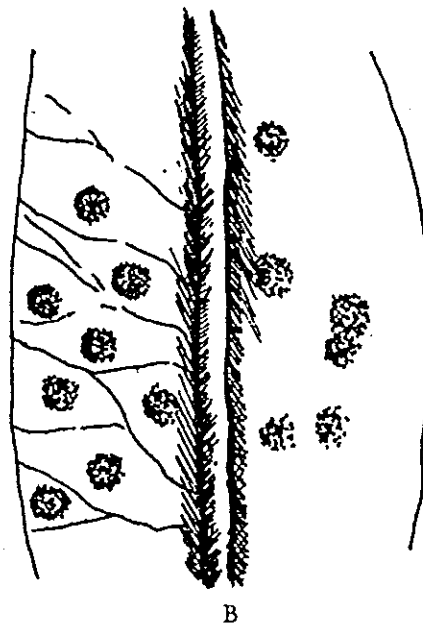
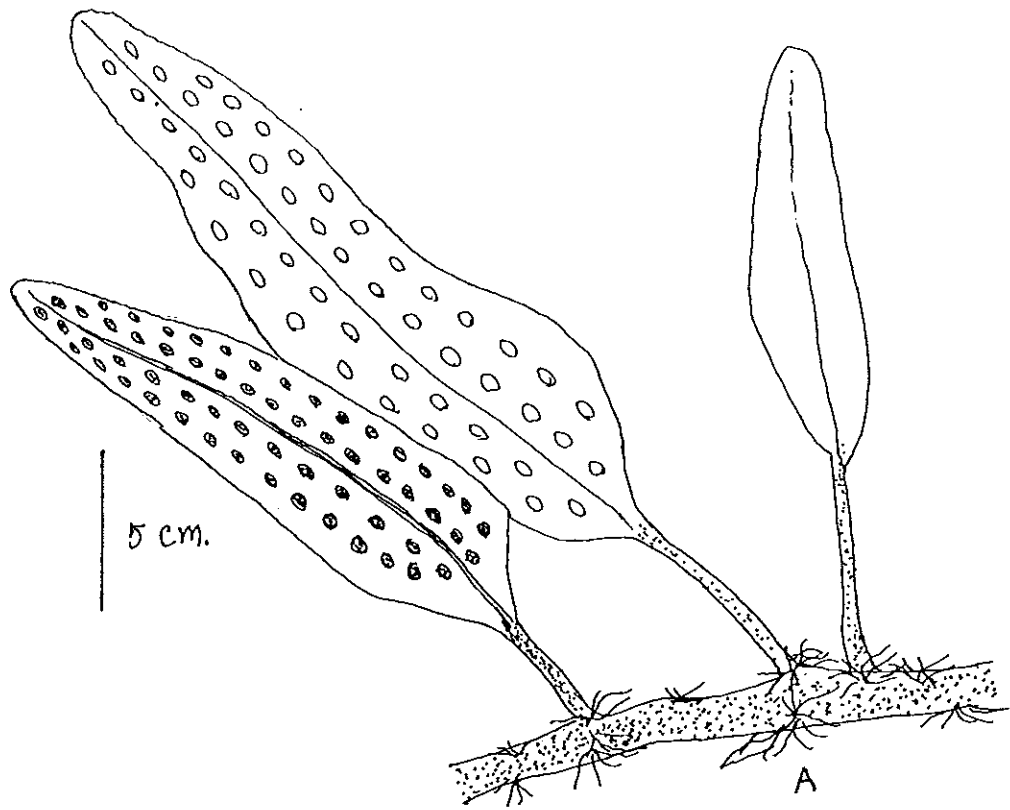


Fig. 37 *Phymatodes griffithiana* (Hk.) Ching (Polypodiaceae)
 A : Habit, B : Position of sori

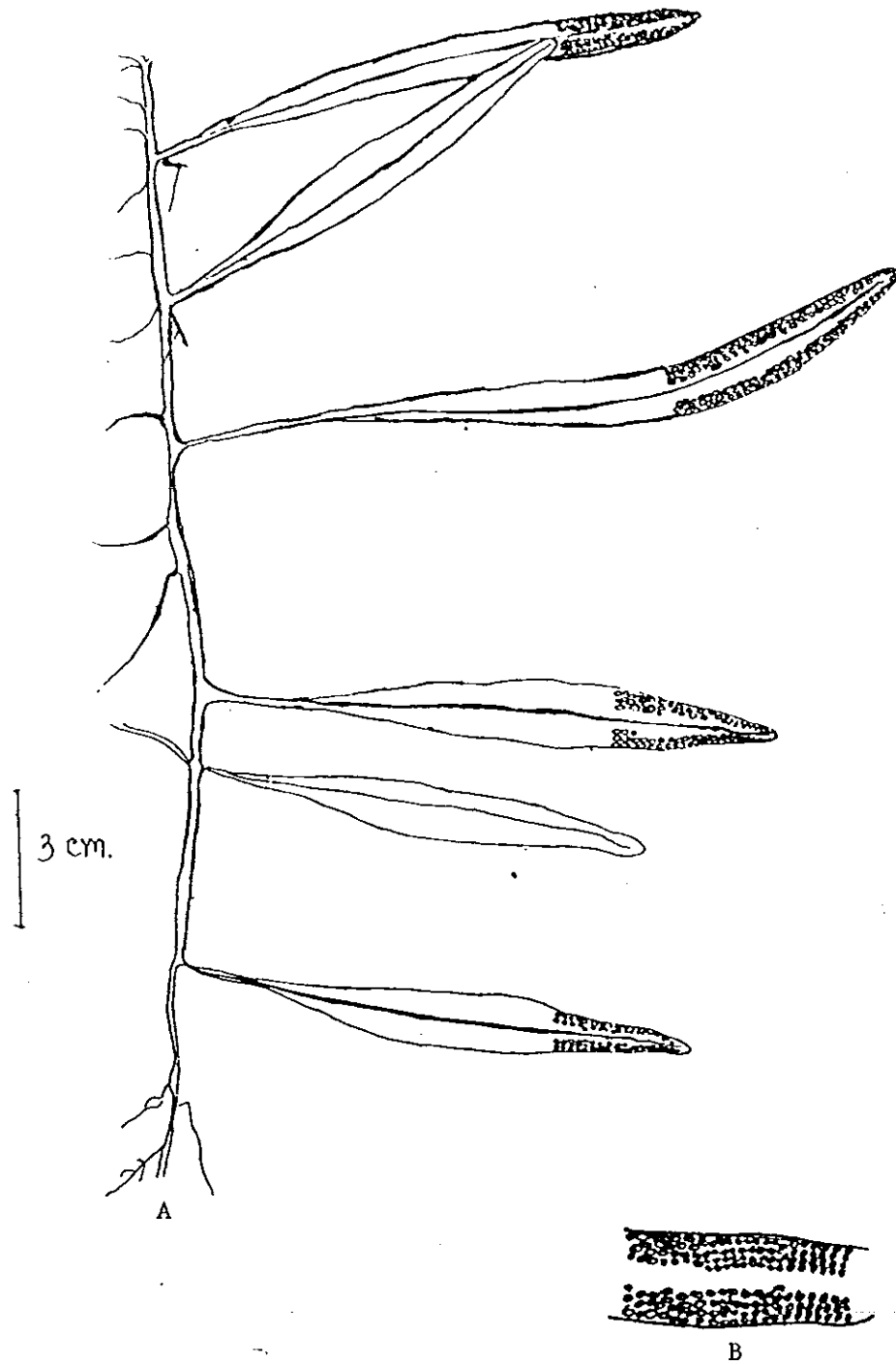


Fig. 38 *Pyrrosia adnascens* (Sw.) Ching (Polypodiaceae)

A : Habit, B : Position of sori

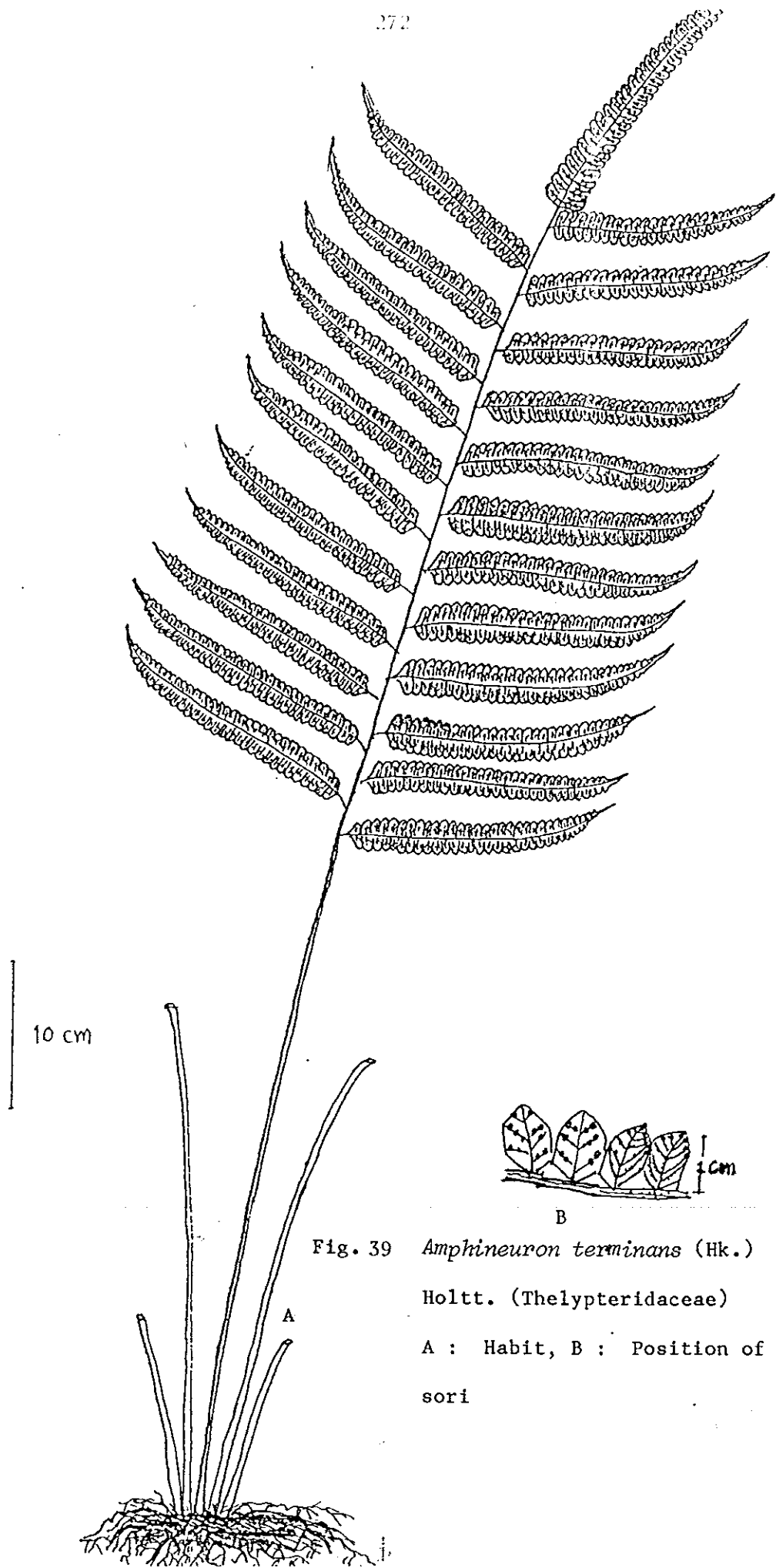


Fig. 39 *Amphineuron terminans* (Hk.)

Holtt. (Thelypteridaceae)

A : Habit, B : Position of sori

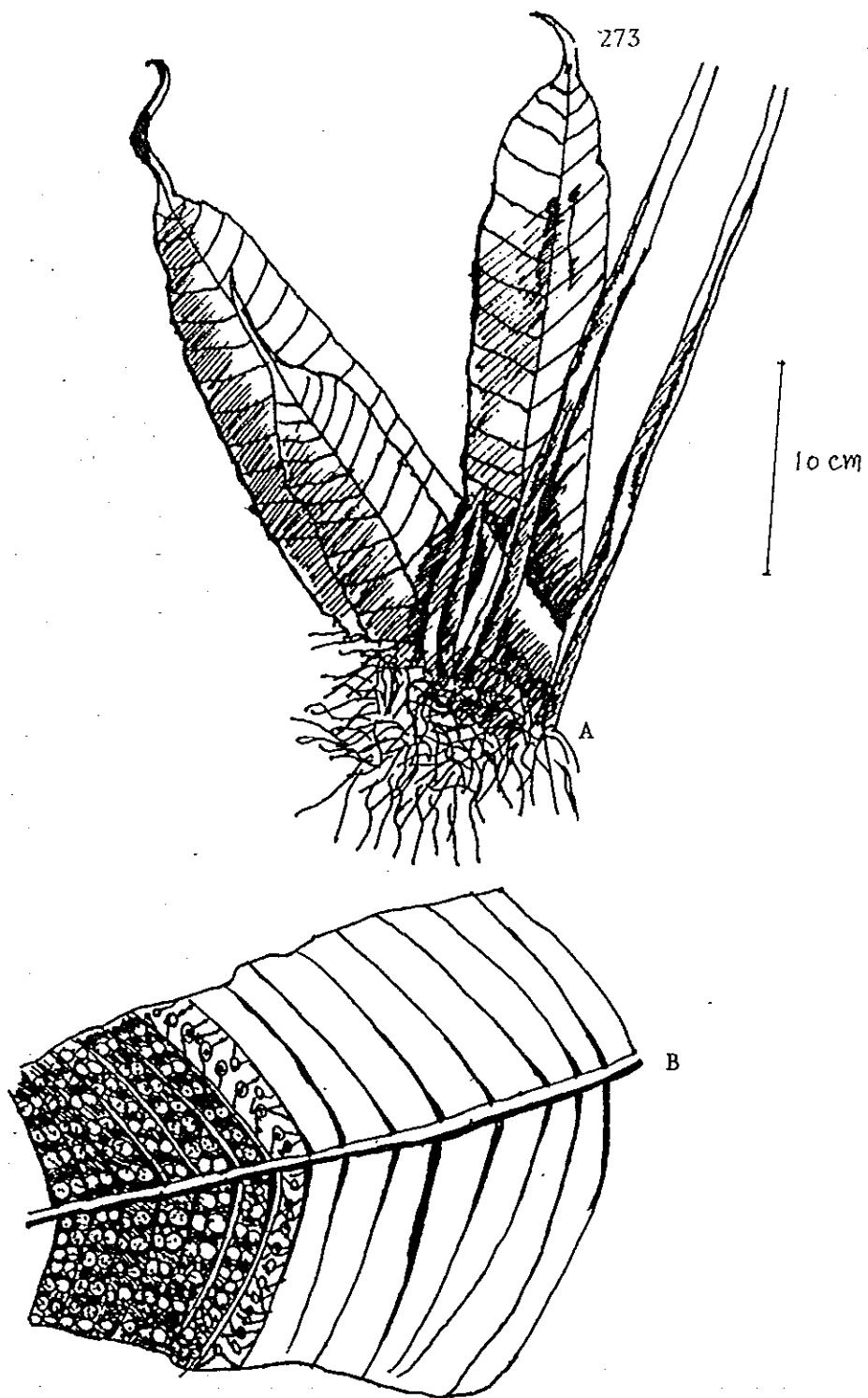


Fig. 40 *Pronephrium asperum* (Presl.) Holtt. (Thelypteridaceae)

A : Habit, B : Position of sori