

ACCOUNT AND CHECKLIST OF THE FLOWERING PLANTS AT KELABIT HIGHLANDS, BARIO, SARAWAK

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ABSTRACT

*The Kelabit Highlands at Bario is about 1,100m above sea level and the vegetation consists of submontane forests on the hills and mainly kerangas forests on the plateau. A total of 166 specimens of flowering plants were collected and many more were observed during the expedition. They were identified and classified into 197 species, 143 genera and 68 families. Three new records for Sarawak; viz. *Garcinia bancana*, *Aporosa nervosa* and *Actinodaphne pruinosa* were herein reported. Four rare species, namely *Deplanchea bancana*, *Illicium stapfii*, *Persea sterculiodes* and *Ficus laevis* were also collected together with some Bornean endemic species such as *Rhododendron lanceolatum*, *R. polyanthemum*, *R. suaveolens*, *Vaccinium clementis*, *Litsea oppositifolia*, *Cyclea robusta*, *Artocarpus melinoxylus*, *Ardisia livida* and *Scyphostegia borneensis*. Many more specimens were not identified to the species level.*

INTRODUCTION

A scientific expedition to the Kelabit Highlands at Bario was organized by the Universiti Malaysia Sarawak and the Department of Forestry, Sarawak with the objectives, among others, to document the rich and diverse flora of the Kelabit Highlands at Bario. The expedition began on 8 April and ended on 20 April 1995. Several collection trips were undertaken along the following trails: Pa' Umor with some diversions to Sg. Dapur; Pa' Umor to Pa' Ukat; the quarry at Pa' Puak; behind the old and new airstrips; Alur Jalan to the water reservoir and in the vicinity of the base camp.

The Bario area which form the uppermost catchment of the Sg. Baram is quite close to the Kalimantan border. It sits on a plateau at about 1,100m above sea level surrounded by hills.

VEGETATION

The Kelabit Highlands constitute a flat plateau surrounded by hills, of which the highest peak is Gunung Murud. The local Kelabits are known for their successful and sustainable cultivation of special wet rice "Beras Bario" and pineapple "Nenas Bario". As subsistence farmers they also grow vegetables and fruit trees.

The vegetation on the hills surrounding the Bario settlement was observed to be primarily composed of mixed dipterocarp forests. Human interference and economic activities could readily cause irreversible change and degradation of the natural forests transforming them into

both wet and dry kerangas forests (Whitmore, 1975). Along the undisturbed rivers and streams of the Kelabit Highlands, reasonably long stretches of pristine riparian vegetation still occur. On higher elevations, especially on the trail leading to the peak of G. Murud, montane vegetation dominates. The soils were derived from both the accreting and non-accreting alluvium which are mainly constituted of poor sandy clays and shales alternating with sandstones (Liechti et al., 1960); typical of the Kelabit Eormation. This type of soil is known to be able to support luxuriant growth of mixed dipterocarp forests. Limestone outcrops occur at several locations including the dominant landmark structure known as Gunung Batu Putih at Lawi-lawi.

CHECKLIST OF FLOWERING PLANTS

The specimens collected during the expedition were deposited at the Universiti Malaysia Sarawak, Universiti Kebangsaan Malaysia (UKMB), the Forest Department of Sarawak (SAR), and the Forest Research Institute at Kepong (KEP). Some collections, however, remained unidentified to the species level and one to the genus level at the time when this account was written. Those that were identified were summarized by families in Table 1.

The following checklist is arranged alphabetically, the families are followed by species and notes on them.

Table 1. Summary of the taxa collected and observed.

No.	Family	No. genus	No. species
1.	Actinidiaceae	1	2
2.	Anacardiaceae	2	2
3.	Annonaceae	4	5
4.	Apocynaceae	1	1
5.	Aquifoliaceae	1	1
6.	Araceae	3	3
7.	Araliaceae	2	2
8.	Arecaceae	6	6
9.	Asclepiadaceae	1	1
10.	Asteraceae	3	3
11.	Begoniaceae	1	1
12.	Bignoniaceae	1	1
13.	Bombacaceae	2	3
14.	Burmanniaceae	1	2
15.	Caprifoliaceae	1	1
16.	Casuarinaceae	1	1
17.	Celastraceae	1	1
18.	Chloranthaceae	1	1
19.	Clethraceae	1	1
20.	Clusiaceae	3	4
21.	Cyperaceae	2	2

No.	Family	No. genus	No. species
22.	Dilleniaceae	1	1
23.	Elaeocarpaceae	1	1
24.	Ericaceae	3	9
25.	Euphorbiaceae	7	11
26.	Fabaceae	5	5
27.	Fagaceae	3	3
28.	Flacourtiaceae	1	1
29.	Gesneriaceae	1	1
30.	Hanguanaceae	1	1
31.	Hypoxidaceae	1	2
32.	Illiciaceae	1	1
33.	Junglandaceae	1	1
34.	Lauraceae	7	9
35.	Liliaceae	1	1
36.	Linaceae	2	2
37.	Loganiaceae	2	2
38.	Loranthaceae	3	3
39.	Marantaceae	3	3
40.	Melastomataceae	7	10
41.	Menispermaceae	2	2
42.	Moraceae	3	12
43.	Myrsinaceae	2	4
44.	Myrtaceae	3	7
45.	Nepenthaceae	1	2
46.	Ochnaceae	1	2
47.	Oleaceae	1	1
48.	Pandanaceae	1	3
49.	Piperaceae	1	1
50.	Polygalaceae	1	1
51.	Rhamnaceae	2	2
52.	Rosaceae	2	3
53.	Rubiaceae	10	15
54.	Rutaceae	1	1
55.	Santalaceae	1	1
56.	Sabiaceae	1	1
57.	Sapindaceae	1	2
58.	Scyphostegiaceae	1	1
59.	Simaroubaceae	1	1
60.	Smilacaceae	1	1
61.	Solanaceae	1	1
62.	Staphyleaceae	1	1
63.	Symplocaceae	1	1
64.	Theaceae	4	5
65.	Urticaceae	1	1

No.	Family	No. genus	No. species
66.	Vitaceae	3	8
67.	Winteraceae	1	1
68.	Zingiberaceae	4	5
	Total	143	197

1. ACTINIDIACEAE

Two species of *Saurauia* were collected and remained unidentified.

- 1.1 *Saurauia* sp. 1 (ALM 4290). Along the trail to Alur Jalan. Shrub of 3m, fruits capsule, hairy, 3-valved.
- 1.2 *Saurauia* sp. 2 (ALM 4182). Track to Pa' Umur. Tree of 5m., fruits on branches about 3cm. diameter, peduncle long, glabrous, white.

2. ANACARDIACEAE

On Kelabit highlands members of Anacardiaceae apparently were scarce, only the fruits of *M. odorata* were observed in the local store on sale, presumably originated from the village orchards in Bario.

- 2.1 *Mangifera odorata*. Fruits large, grey, globose, about 15cm. diameter, flesh yellow, fibrous and sweet.
- 2.2 *Campnosperma auriculata*. Observed.

3. ANNONACEAE

- 3.1 *Annona muricata*. Cultivated in the villages.
- 3.2 *Alphonsea* sp. (KMS 4587) Track to Pa' Umor.
- 3.3 *Friesodielsia* sp. (KMS 4576) Track to Pa' limor. Climber, common.
- 3.4 *Goniothalamus fasciculatus* Boerl. Observed along Alur Jalan.
- 3.5 *Goniothalamus longistipites* Mat-Salleh ined. (KMS 4617, 4624) In the hills near Kg. Baru. Endemic to Sarawak.

4. APOCYNACEAE

- 4.1 *Alstonia angustifolia* Wall. ex A.DC. (ALM 4265). Near the new airstrip. Common.

5. AQUIFOLIACEAE

- 5.1 *Ilex sclerophylloides* Loesener (ALM 4208). Track to Pa' Umor. Common at high altitude.

6. ARACEAE

- 6.1 *Amorphophallus* sp. Observed along the trail to Alur Jalan.
- 6.2 *Homalomena propinqua* Schott. (ALM 4258). Trail to Pa' Puak quarry. Common.
- 6.3 *Scindapsus* sp. (ALM 4242). Trail to Pa' Ukat. Herb of 30cm with spadix, ca. 8 by 1cm.

7. ARALIACEAE

- 7.1 *Arthrophyllum* sp. (ALM 4180). Track to Pa' Iimor. Shrub of 1m, with fruits; leaves almost orbicular, apex rostrate.

- 7.2 *Schefflera* sp. (ALM 4305). Trail beyond the new airstrip. Treelet of 3m, leaves trifoliolate, alternate and infructescence terminal.

8. ARECACEAE

Only two palms were collected and the others were observed.

- 8.1 *Pinanga* sp. (ALM 4312). Beyond the airstrip. Palm of 1m, fruits ellipsoidal at the trunk base, reddish. Very elegant and promised a great potential for potting plants.
- 8.2 *Plectocomia muelleri* Bl. (ALM 4225). Track to Pa' Umor. An elegant palm with long pleated inflorescence.
- 8.3 *Eugeissona tristis*. Observed. This is an element normally present when the forest is cleared.
- 8.4 *Licuala* sp. Observed near the paddy fields. Seems quite allied to the inure Common L *spinosa*.
- 8.5 *Calamus* sp. Observed.
- 8.6 *Korthalsia* sp. Observed.

9. ASCLEPIADACEAE

- 9.1 *Dischidia* sp. (ALM 4191). Track to Pa' Umor, at elevation 1,115m, in kerangas forest; scrambler with white latex, flowers pinkish purple leaves very tiny ca. 1.0 by 0.8cm, ovate.

10. ASTERACEAL

- 10.1 *Blumea balsamifera* (L.) DC. (ALM 4260). Trail to Pa' Puak quarry A common weed.
- 10.2 *Erechthites valerianifolia* (Wolf) DC. (ALM 4236). Trail to Pa' Ukat. A common weed in open highland habitats.
- 10.3 *Vernonia arborea* Buch.-Ham. (ALM 4173, KMS 4582). Track to Pa' Umor. The only tree species in the family and very common throughout western Malesia.

11. BEGONIACEAE

- 11.1 *Begonia* sp. (ALM 4282). Along the track to Alur Jalan.

12. BIGNONIACEAE

- 12.1 *Deplanchea bancana* (Scheff.) Steen. (ALM 4233). Just a little away from the base-camp along the trail to Pa' Umor. An elegant tree with large showy yellow flowers. Apparently rare.

13. BOMBACACEAE

- 13.1 *Durio oxyleyanus* Griff. Observed along the track to Pa' Umor.
- 13.2 *Durio zibethinus* Murray Observed planted in orchard.
- 13.3 *Ceiba pentandra*. Observed.

14. BURMANNIACEAE

- 14.1 *Burmanna disticha* L. (ALM 4199). Track to Pa' Umor. Rare, herb confined to highlands.
- 14.2 *Burmanna gracilis* Ridley (KMS 4592). Track from Pa' Umor to Pa' Ukat.

15. CAPRIFOLIACEAE

15.1 *Viburnum sambucinum* Bl. (ALM 4241). Trail to Pa' Ukat. Common in hill and montane forests.

16. CASUARINACEAE

16.1 *Gymnostoma sumatrana* (Jungh. ex de Vriese) L.A.S. Johnson (ALM 4246). In the dry kerangas along the trail to quarry at Pa' Puak. Common and very elegant.

17. CELASTRACEAE

17.1 *Salacia* sp. (ALM 4307). Trail beyond the airstrip. Large liana, flowers white, tubular; fruits ellipsoidal and yellow

18. CHLORANTHACEAE

18.1 *Chloranthus officinalis* Blume (ALM 4289). Common along the trail to Alur Jalan.

19. CLETHRACEAE

Three species have been recorded from Borneo (Berhaman, 1995) and only one was collected in the area.

19.1 *Clethra longispicata* J.J. Smith (ALM 4240). Trail to Pa' Ukat. Quite common on the highlands.

20. CLUSIACEAE

20.1 *Cratoxylum arborescens* (Vahl.) Bl. (ALM 4212). Trail to Pa' Umor. Common.

20.2 *Garcinia bancana* (Miq.) Miq. (ALM 4193). Track to Pa' Umor. A new record to Borneo, records showed that it has been only recorded from Peninsular Malaysia, Sumatra and Banka.

20.3 *Garcinia* sp. (ALM 4218). Track to Pa' Umor. Treelet of 3.5m, with fruits globose, 1-2cm in diameter; leaves coriaceous, ca. 11 by 6.5cm, base obtuse, apex caudate, margin entire, underneath nitid.

20.4 *Hypericum japonicum* Thunb. (ALM 4188). Track to Pa' Umor. Weed of open places, and not common.

21. CYPERACEAE

21.1 *Rhynchospora* sp. Observed in wet places along the roads in Bario.

21.2 *Cyperus naspans*. Observed.

22. DILLENACEAE

22.1 *Dillenia reticulata* King. Observed along the track to Pa' Umor. A juvenile plant with large leaves.

23. ELAEOCARPACEAE

23.1 *Elaeocarpus petiolatus* (Jack) Wall. (ALM 4252). Quite common along the track to Pa' Puak.

24. ERICACEAE

The Bornean highlands are rich in rhododendrons and vacciniums and the Kelabit Highlands are no exception. A total of five and three species of rhododendrons and

vacciniums respectively were collected and one species of the former remained unidentified.

- 24.1 *Gaultheria* sp. (ALM 4187). Track to Pa' Umor. Tree of 6m., fruits pyriform, 0.8 by 0.7cm, yellow; leaves Ca. 7 by 3.7cm, obovate, base acute, apex obtuse, margin entire.
- 24.2 *Rhododendron durionifolium* Becc. (ALM 4201, KMS 4979). Track to Pa' Umor. Common on Sarawak highlands especially in areas bordering Kalimantan.
- 24.3 *Rhododendron lanceolatum* Ridley (ALM 4181). Track to Pa' Umor. Rare, endemic to high altitude of Sarawak and Sabah.
- 24.4 *Rhododendron polyanthemum* Sleumer (ALM 4266). Near the new airstrip. Rare, endemic to Borneo highland.
- 24.5 *Rhododendron suaveolens* Sleumer (ALM 4197). Track to Pa' Umor. Rare, endemic to Borneo.
- 24.6 *Rhododendron* sp. (ALM 4269). Near the new airstrip. Shrub of 2m, petal red, stamen in crown, red.
- 24.7 *Vaccinium bancanum* Miq. (ALM 4179, KMS 4616) Track to Pa' Umor. Common at high altitude.
- 24.8 *Vaccinium clementis* Merr. (ALM 4195). Track to Pa' Umor, occurs at elevation of about 1,115m. Endemic to Borneo.
- 24.9 *Vaccinium* sp. (ALM 4228, KMS 4586). Track to Pa' Umor, at elevation about 1,115m, in kerangas forest. Liana; twigs glaucous; leaves 13-14.5 by 4.1-5.4cm, lanceolate, base obtuse, apex acuminate, margin entire; fruits pisiform and yellow

25. EUPHORBIACEAE

- 25.1 *Aporosa nervosa* Hook. f. (ALM 4276). Quite common along Alur Jalan. Whitmore (1973) claimed that this species is endemic to Peninsular Malaysia. Hence this collection represents a new record for Sarawak.
- 25.2 *Aporosa* sp. (ALM 4310). Track beyond the airstrip. Tree of ca. 4m; fruits globose, orange; leaves elliptical.
- 25.3 *Austrobuxus nitidus* Miq. (ALM 4213). Trail to Pa' Umor. Common.
- 25.4 *Glochidion* sp. 1 (ALM 4304). Along the track to the old airstrip. Treelet of ca. 4m tall, flowers red; fruits capsule, Ca. 0.8cm diameter, manifestly velvety; leaves elliptical Ca. 8.5 by 3.5cm
- 25.5 *Glochidion* sp. 2 (ALM 4245). Along the track to quarry at Pa' Puak. Leaves Ca. 14 by 5cm, drying grey
- 25.6 *Macaranga indistincta* Whitmore (ALM 4283). Occurs along the trail to Alur Jalan. According to Whitmore (1973) this species is only found in Sabah, Sarawak and Sumatra.
- 25.7 *Macaranga pruinosa* (Miq.) M.A. (ALM 4183). Track to Pa' Umor. Common.
- 25.8 *Macaranga hypoleuca*. Observed.
- 25.9 *Baccaurea racemosa*. Observed.
- 25.10 *Homalanthus populneus*. Observed.
- 25.11 *Sapium baccatum*. Observed.

26. FABACEAE

- 26.1 *Bauhinia kockiana* Korth. (ALM 4177, KMS 4584). A common scrambler with a very striking deep reddish flower.
- 26.2 *Callerya nieuwenhuisii* (J.J. Smith) Schot. (ALM 4301). Beyond the airstrip. Not common.

26.3 *Millettia* sp. (ALM 4287). Occurs along the trail to AlurJalan. Liana with large ellipsoid hairy fruits, 10 by 6cm.

26.4 *Parkia speciosa* Hassk. Observed on sale at the local store.

26.5 *Spatholobus ferrugineus* Benth. (ALM 4175). Trail to Pa' Umor. Common.

27. FAGACEAE

27.1 *Castanopsis costata* (Bl.) A.DC. (ALM 4273). Occurs along the trail to Alur Jalan. Not common and usually found at high altitude.

27.2 *Lithocarpus* sp. (ALM 4306). Beyond the airstrip. Treelet of Sm., bark flaky and cupule, scabrid, hairy, nut shiny; leaves 8.2-12.4 by 2.2-3.4cm, elliptical, glabrous, petiole pubescent.

27.3 *Trigonobalanus verticillata* Forman. A large tree with coppices observed on the track to Pa' Umor, near Sg. Dappur.

28. FLACOURTIACEAE

28.1 *Placourtia rukam* Zoll. & Mon. Observed along the trail to Alur Jalan.

29. GESNERIACEAE

29.1 *Aeschynanthus* sp. (ALM 4277). Along the trail to Alur Jalan. Liana with red hairy flowers.

30. HANGUANACEAE

30.1 *Hanguana malayana* (Jack) Merr. (ALM 4297). Occurs along Alur Jalan. Quite common, this is the terrestrial form.

31. HYPOXIDACEAE

31.1 *Curculigo latifolia* Dryand var. *glabrescens* Ridl. (ALM 4254). Trail to the quarry at Pa' Puak. Common at high altitude.

31.2 *Curculigo villosa* Wall. Observed along the track to Pa' Umor.

32. ILLICIACEAE

32.1 *Illicium stapfii* Merr. (ALM 4267). Near the new airstrip. Saunders (1995) recorded two species of *Illicium* in Borneo *I. kinabaluensis* A.C. Smith which is restricted to Mt. Kinabalu and *I. stapfii* which is uncommon in Borneo. In Sarawak the latter is only recorded from Linau-Balui plateau and therefore, this collection represents the second collection of the species from the state.

33. JUNGLANDACEAE

33.1 *Engelhardtia roxburghiana* Wall. Observed along the track Pa' Umor.

34. LAURACEAE

34.1 *Actinodaphne pruinosa* Nees (ALM 4178, KMS 4585). Trail to Pa' Umor. Common from lowland to hill forests. Kochummen (1989) stated that this species is endemic to Peninsular Malaysia; hence this represents a new record for Sarawak.

34.2 *Beilschmiedia* sp. (ALM 4295). Along the trail to Alur Jalan. Tree of 20m, fruits oblong 3cm long, black with red stalk.

34.3 *Cassytha filiformis* L. Observed along the track beyond the airstrip.

- 34.4 *Lindera pipericarpa* (Meissn.) Boerl. (ALM 4185). Track to Pa' Umor. Common at high altitude.
- 34.5 *Litsea oppositifolia* L.S.Gibbs (ALM 4311). Beyond the airstrip. Endemic to Borneo.
- 34.6 *Litsea* sp. (ALM 4221). Track to Pa' Umor. Tree ca. 8m tall, leaves small Ca. 7 by 3cm, elliptical, base cuneate, and apex acuminate.
- 34.7 *Nothophoebe sarawacensis* Gamble (ALM 4314). Beyond the airstrip. Rare and endemic to Kelabit Highlands.
- 34.8 *Persea declinata* (Bl.) Kosterm. (ALM 4222). Not common but widely distributed from Peninsular Malaysia to Borneo.
- 34.9 *Persea sterculioides* Elmer (ALM 4316). Beyond the airstrip. Rare.

35. LILIACEAE

- 35.1 *Dianella ensifolia* Red. (ALM 4248). Trail to quarry Common from lowland to highland.

36. LINACEAE

- 36.1 *Indorouchera griffithiana* (Planch.) Hall (ALM 4211). Common liana.
- 36.2 *Ixonanthes reticulata*. Observed.

37. LOGANIACEAE

- 37.1 *Fagraea cuspidata* Bl. (ALM 4210). Track to Pa' Umor. Common.
- 37.2 *Gelsemium elegans* (Gardn. & Champ.) Benth. (ALM 4227, 4772). Track to Pa' Umor and along the trail to Alor Jalan. This rare species is known to be poisonous especially when leaves and roots are eaten raw Apparently the leaves contain many alkaloids.

38. LORANTHACEAE

- 38.1 *Dendrophthoe pentandra* (L.) Miq. (ALM 4238). Trail to Pa' Ukat. Common parasite in lowland and highland.
- 38.2 *Macrosolen* sp. (ALM 4274). Alor Jalan. Parasite on *Canarium* sp.; leaves coriaceous, lanceolate to elliptical, base obtuse; stamen numerous and red.
- 38.3 *Scurrula ferruginea* (Jack) Danser (ALM 4204). Trail to Pa' Umor. Common parasite on treelet in open places at lowland to lower montane forest.

39. MARANTACEAE

- 39.1 *Donax grandis* (Miq.) Ridl. Observed along the track to Pa' Umor. The large leaves are believed to be used for wrapping food.
- 39.2 *Phacelophrynium maximum* (Bl.) K. Schum. (ALM 4293). Alor Jalan. Common, wild and planted as the local people use the leaves for wrapping rice when they go out for hunting or farming.
- 39.3 *Phrynium* sp. (ALM 4257). Trail to Pa' Puak quarry Herb of 1.5m, with hairy fruits and glabrous bract.

40. MELASTOMATACEAE

- 40.1 *Dissochaeta* sp. (ALM 4303). Trail beyond the airstrip. Scrambler; twigs and leaves hairy; fruits subglobose, operculum wide.
- 40.2 *Macrolenes* sp. (ALM 4237). Trail to Pa' Ukat. Scrambler with twig, inflorescence and

leaves below very hairy

- 40.3 *Melastoma beccarianum* Cogn. (ALM 4184). Trail to Pa' Umor. Common at high altitude.
 40.4 *Melastoma malabathricum* Jack. A common weed observed along the track to Pa' Umor.
 40.5 *Pachycentria pulverulenta* (Bl.) Clausing (ALM 4200, KMS 4583). Track to Pa' Umor.
 40.6 *Plethiandra* sp. (ALM 4196). Track to Pa' Umor. Shrub of Ca. 1m tall, flowers white, stamen pink; capsule with wide mouth.
 40.7 *Sonerila* sp. 1 (ALM 4261). Track to Pa' Puak.
 40.8 *Kibersia tessellata*. Observed.
 40.9 *Medinella speciosa*. (KMS 4575) Track to Pa' Umor.
 40.10 *Sonerila* sp. 2 (ALM 4231). Track to Pa' Umor, elev. 1,115m in kerangas forest. Herb of Ca. 15cm, leaves base cordate, apex acute, underneath net-like; inflorescence 5-10cm long terminal and axillary, flowers in umbels, yellow with pink pedicels.

41. MENISPERMACEAE

- 41.1 *Cyclea robusta* Becc. (ALM 4288). Alur Jalan. Endemic to Borneo.
 41.2 *Pericampylus glaucus* (Lamk.) Merr. (ALM 4270). Alur Jalan. Common at lowland, occasionally found on high altitude.

42. MORACEAE

The family is well represented by the figs. A total of eight species of wild figs were collected.

- 42.1 *Artocarpus melinoxylus* Gagnep. ssp. *brevipedunculatus* Jarrett (ALM 4235). Track to Pa' Umor. Rare and endemic to Borneo.
 42.2 *Artocarpus odoratissimus*. Observed. The sweet arils are very popular with the locals.
 42.3 *Artocarpus incisus*. Observed.
 42.4 *Ficus aurata* Miq. (ALM 4192). Track to Pa' Umor. Common.
 42.5 *Ficus laevis* Bl. (ALM 4299). Beyond the airstrip. Rare in Borneo. So far only one collection was made from Mt. Subis, Niah.
 42.6 *Ficus lepicarpa* Bl. (ALM 4320). Beyond the airstrip, along the river bank. Common.
 42.7 *Ficus macilenta* King var. *macilenta* (ALM 4172). Track to Pa' Umor. Shrub, endemic to Sarawak at high altitude. The other variety is endemic to Gunung Kinabalu, Sabah.
 42.8 *Ficus oleaefolia* King var. *myrsinoides* Corner (ALM 4194). Track to Pa' Umor. This variety is endemic to Bornean highlands.
 42.9 *Ficus uncinata* (King) Becc. (ALM 4256). Trail from Pa' Puak quarry to Ulong Palang. Common from lowland to highland.
 42.10 *Ficus deltoidea* Jack (ALM 4226). Track to Pa' Umor.
 42.11 *Ficus elasticus*. Cultivated.
 42.12 *Streblus glaber* (Merr.) Corner (ALM 4234). Track to Pa' Umor. Common from lowland to highland.

43. MYRSINACEAE

- 43.1 *Ardisia livida* Mez. (ALM 4186). Track to Pa' Umor. Rare. Endemic to Borneo.
 43.2 *Ardisia pyramidalis* Pers. (ALM 4217). Track to Pa' Umor. Common.
 43.3 *Ardisia* sp. (ALM 4224). Track to Pa' Umor. Treelet of 4m., leaves ca. 35 by 9cm., drying brown, hairy below, especially on veins, glabrous above; fruits pisiform.
 43.4 *Labisia pumila* (Bl.) F Vill. & Naves (ALM 4264). Common understory herb.

44. MYRTACEAE

A total of four species of eugenias were collected and they remained unidentified.

- 44.1 *Decaspermum fruticosum* Forst. (ALM 4302). Beyond the airstrip. Common.
- 44.2 *Eugenia* sp. 1 (ALM 4214, 4239). Trail to Pa' Umor and Pa' Ukat. Treelets of Ca. Sm tall; leaves 7-8.5 by 2.5-Scm, widely elliptical, base obtuse, apex cuspidate, margin entire, coriaceous, veins numerous Ca. 3cm apart; flowers small, stamen red. The specimens are very close to *Eugenia goniocalyx* which is endemic to Peninsular Malaysia.
- 44.3 *Eugenia* sp. 2 (ALM 4298). Trail beyond the airstrip. Tree ca. 8m tall, leaves Ca. 14 by 6.5cm, obovate, base acute, apex obtuse, margin entire, coriaceous, veins ca. 3mm apart; fruits cream turning red, ellipsoidal, Ca. 1.5 by 0.8cm
- 44.4 *Eugenia* sp. 3 (ALM 4206). Trail to Pa' Umor, in wet kerangas. Treelet ca. 3m tall, leaves ca. 6 by 4cm, oblong, base semi-cordate, apex emarginate; stamen yellow
- 44.5 *Eugenia* sp. 4 (ALM 4291). Alur Jalan. Tree of 4m, twigs and leaves underneath hairy; veins very prominent; fruits red, globose, edible.
- 44.6 *Tristania whiteana* Gruff. (ALM 4202). Track to Pa' Umor. In wet kerangas; the woods are cut into firewoods.
- 44.7 *Tristania merguensis* Gruff. (Obs). This species is extensively collected by the locals and chopped to make firewood.

45. NEPENTHACEAE

We observed three species of the pitcher plants but collected only two.

- 45.1 *Nepenthes rafflesiana* Jack (ALM 4198). Track to Pa' Umor. Not common.
- 45.2 *Nepenthes gracilis* Ridley (KMS 4592). Track from Pa' Umor to Pa' Ukat.

46. OCHNACEAE

- 46.1 *Euthemis leucocarpa* Jack (ALM 4244, 4262). Trail to quarry and near the new airstrip. Common from peat swamp to 1,000m altitude.
- 46.2 *Euthernis minor* Jack (ALM 4207). Trail from base camp to Pa' Umor. Common at highland.

47. OLEACEAE

- 47.1 *Chionanthus cuspidatus* Bl. (ALM 4220). Track To Pa' Umor. Rare, seems to be confined to Borneo.

48. PANDANACEAE

- 48.1 *Pandanus matthewsii* Merr. (ALM 4223). Trail to Pa' Umor. Not common. Record showed the species occur only in Sabah and Sarawak at high altitude.
- 48.2 *Pandanus rusticus* Stone (ALM 4189). Not common.
- 48.3 *Pandanus* sp. (ALM 4296). Alur Jalan. Erect herb of 3m, fruits terminal in 5 rows or toros.

49. PIPERACEAE

- 49.1 *Piper* sp. (ALM 4315). Trail beyond the airstrip. Climber, fruits red and pisiform.

50. POLYGALACEAE

- 50.1 *Xanthophyllum* sp. (ALM 4279). Alur Jalan. Tree of about

4m, leaves chartaceous, elliptical, base acute, apex caudate, margin rather wavy; fruits globose.

51. RHAMNACEAE

- 51.1 *Alphitonia excelsa* (Fenzl) Reiss ex Endl. (ALM 4319). Common all over Borneo from lowlands to highlands.
 51.2 *Rhamnus borneensis* Steen. var. *borneensis* (ALM 4216). Track to Pa' Umor. Common on high altitude.

52. ROSACEAE

- 52.1 *Prunus arborea* (Blume) Kalkman (ALM 4278). Alur Jalan. Tree of about 4m., fruits globose, cream.
 52.2 *Rubus moluccanus* L. (ALM 4219, KMS 4607). Track to Pa' Umor. Common from lowlands to highlands.
 52.3 *Rubus rosifolius* Stokes (ALM 4205). Track to Pa' Umor.

53. RUBIACEAE

- 53.1 *Argostemma* sp. (ALM 4285). Along the trail to Alur Jalan. herb of ca. 0.4m tall, capsules tubular, stalk Ca. 1.5cm.
 53.2 *Canthium confertum* Korth. (ALM 4209). Track to Pa' Umor. Common in lower montane forests.
 53.3 *Lasianthus griffithii* Wight (ALM 4309). Common.
 53.4 *Lasiant has* sp. 1 (ALM 4308). Trail beyond the airstrip. Treelet of 1 Sm., fruits ellipsoid, black; leaves elliptical Ca. 17.1 by 4.2cm, tertiary nerves bullate, raised below, depressed above.
 53.5 *Lasianthus* sp. 2 (ALM 4247). Trail to quarry Treelet of ca. 4m tall, leaves elliptical Ca. 8 by 2cm, fruits subglobose, hairy
 53.6 *Morinda* sp. (ALM 4286). Alur Jalan. Liana, leaves elliptical, base acute, apex acuminate, margin entire, coniceous, with small fruits, stalks Ca. 1cm long.
 53.7 *Mussaenda glabra*. Observed.
 53.8 *Paederia verticillata* Bl. (ALM 4251). Trail to quarry Common.
 53.9 *Porterandia anisophylla* (Jack ex Roxb.) Ridley (KMS 4591). Track from Pa' Umor to Pa' Ukat.
 53.10 *Psychotria* sp. 1 (ALM 4284). AlurJalan. Shrub of 3m., fruits red shiny in umbels, ellipsoidal ca. 1.2 by 8cm, manifestly alate.
 53.11 *Psychotria* sp. 2 (ALM 4263). Near the new airstrip. Liana, leaves chartaceous, elliptical; fruits ellipsoidal 0.8 by 0.4cm, ribbed, white.
 53.12 *Urophyllum* sp. (ALM 4255). Trail to Pa' Puak quarry Treelet of 4m., leaves lanceolate to elliptical 13-19 by 3.5-5.2cm, base obtuse, apex caudate, margin entire, underneath hairy; fruits shiny green.
 53.13 *Wendlandia burkillii* Cowan (Observ.) Track to Pa' Umor.
 53.14 *Rubiaceae Indet.* (ALM 4292). Alur Jalan. An elegant tree of 15m., large and fruits large and stony The author collected the same species at Sayap-Kinablau (Latiff, 1995) and the sample was sent to Dr. Tirvengadam (P) for identification.

54. RUTACEAE

54.1 *Luvanga* sp. Observed along the track to Pa' Umor.

55. SANTALACEAE

55.1 *Henslowia buxifolia* Bl. (ALM 4203). Track to Pa' Umor. Common especially on high altitude.

56. SABIACEAE

56.1 *Meliosma sumatrana* (Jack) Walp. (ALM 4317). Beyond the airstrip. Common from lowlands to highlands.

57. SAPINDACEAE

57.1 *Nephelium lappaceum* L. (ALM 4294) Planted tree in orchard.

57.2 *Nephelium ramboutan-ake* (Labill.) Leenh. (ALM 4271). Alur Jalan. Common cultivated fruit plants.

58. SCYPHOSTEGIACEAE

58.1 *Scyphostegia borneensis* Stapf. (ALM 4281). Alur Jalan. Not common. Monotypic genus endemic to Borneo.

59. SIMAROUBACEAE

59.1 *Eurycoma longifolia* Jack (Obs.). Track to Pa' Umor.

60. SMILACACEAE

60.1 *Smilax* sp. (ALM 4253). Near Pa' Puak quarry area. Liana with thorn and hairs, inflorescence with two umbellate flowers.

61. SOLANACEAE

61.1 *Solanum torvum* Sw Observed along the track to Pa' Umor.

62. STAPHYLEACEAE

62.1 *Turpinia sphaerocarpa* Hassk. var. *sphaerocarpa* (ALM 4275). Alur Jalan. Not common, usually found on river bank.

63. SYMPLOCACEAE

63.1 *Symplocos cochinchinensis* (Lour.) Moore subsp. *cozhinchinensis* (ALM 4321). Track beyond the airstrip. Common from lowlands to montane forests.

64. THEACEAE

64.1 *Adinandra villosa* Choisy (ALM 4174, KMS 4593). Track to Pa' Umor, common at highlands.

64.2 *Adinandra* sp. (ALM 4190). Track to Pa' Umur. Treelet of 3m., branchlet, leaves and fruits glabrous; leaves small 7 by 2cm, elliptical.

64.3 *Gordonia* sp. (ALM 4280). Alur Jalan. Tree of Ca. 8m tall, fruits oblong with long slits; sepals very large.

64.4 *Schima wallichii* (DC.) Korth. (ALM 4176). Track to Pa' Umor. Common.

64.5 *Ternstroemia glabra* Miq. (ALM 4249). Trail to quarry This species is usually found in

freshwater or peat swamp forests at low altitude. This is the first collection from high altitude.

65. URTICACEAE

65.1 *Poikilospermum suaveolens*. A large parasite observed from a distance.

66. VITACEAE

66.1 *Ampelocissus thyrsoiflora* (Blume) Planch. (RJ 4299). Track to AlurJalan reservoir. Sterile.

66.2 *Ampelocissus ochracea* (Teys. & Binn.) Merr. (ALM 4250). Large liana with long spicate inflorescence.

66.3 *Cissus adnata* Roxb. Observed along the track to Pa' Umor, sterile.

66.4 *Tetrastigma leucostaphylum* (Dennst.) Alston (Obs.) Track to Pa' Umor. This is the known host for rafflesias.

66.5 *Tetrastigma megacarpum* Latiff (Obs.). AlurJalan. Sterile.

66.6 *Tetrastigma papillosum* (Bl.) Planch. (ALM 4313). Beyond the airstrip, near the stream, berries red, pisiform.

66.7 *Tetrastigma diepenhorstii* (Miq.) Latiff (ALM 4300). Beyond the airstrip.

66.8 *Tetrastigma brunneum* Merr. (ALM 4205). Track to Pa' Umor.

67. WINTERACEAE

67.1 *Drimys piperita* Hook. f. (ALM 4268). Not common and endemic to the highlands of Borneo.

68. ZINGIBERACEAE

68.1 *Alpinia* sp. 1 (ALM 4318). Trail beyond the airstrip. Herb of ca. 2m tall, fruits globose Ca. 1.4cm diameter on racemose inflorescence.

68.2 *Alpinia* sp. 2 (ALM 4232). Track to Pa' Umor. Herb of 0.5m. fruits cream, globose.

68.3 *Costus globosus* Blume (ALM 4259). Trail from Pa' Puak quarry to Ulong Palang.

68.4 *Globba* sp. (ALM 4230). Trail to Pa' Umor. Herb of ca. 0.4m tall, flowers yellow

68.5 *Zingiber* sp. (ALM 4243). Herb of ca. 0.5m tall.

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