

## PROVISIONAL ACCOUNT AND CHECKLIST OF FERNS AND FERN-ALLIES IN BARIO, KELABIT HIGHLANDS, SARAWAK

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### Abstract

*A total of 93 species in 51 genera and 24 families of pteridophytes are reported within the Bario area. These represent approximately 15% of the pteridophyte flora of Sarawak. The Marrattia sambucina record is the first for Sarawak and second for Malaysia. In addition, several field collections of Taenitis, Diplazium and Christella are still awaiting identification to the species level. Overall, specimens collected in the Bano expedition show that Polypodiaceae constitutes the largest number of species, totalling 15 species.*

### INTRODUCTION

Bario lies in the centre of the Kelabit Highlands at approximately 1,110m elevation, 30 44N latitude and 115° 2WE longitude in the Mid Division of Sarawak and bordering Kalimantan on the eastward. its cool climate with natural and beautiful landscapes has attracted many recreational and scientific visitors to this area. While research on the anthropology and sociology of the Kelabits, the dominant ethnic race in Bario, has been extensively carried out in the past, the area has been hardly explored botanically. Generally the area around Bario consists of patches of primary forests, especially on the surrounding hills. The natural dry and wet heath kerangas forests with large tracts of secondary vegetation and village orchards are found in the vicinity of the longhouses. The kerangas forests were exploited for poles and firewood by the locals. Bario is well-known for her rich and unique Kelabit culture, the warm hospitality of the native people, their sustainable practice of growing Bario rice and other traditional products of agriculture.

The geology of Kelabit Highlands is made up of Kelabit Formation where the soils around Bario consist of sandy clays and shales alternating with sandstones (Liechti et al., 1960). This substratum supports mixed dipterocarp and lower montane forests which, upon degradation through human activities, could easily transform into heath forest or kerangas (Whitmore, 1984).

### THE FERNS AND FERN-ALLIES

This preliminary survey of pteridophyte flora in Bario area yielded 24 families, 51 genera and 93 species of ferns and fern-allies with Polypodiaceae constituting the largest family with 9 genera and 15 species (Table 1). The genus *Diplazium* has 8 species. Several interesting species including *Taenitis sp.*, *Diplazium sp.* and *Christella sp.* still remained unidentified and need further studies to ascertain their identity and status.

The various vegetation types of the area consisted of mixed hill dipterocarp forest and lower montane forest on higher elevations, kerangas highland forest or kerapah on the alluvial areas (Whitmore, 1984; Noraini, 1992) and cultivated agricultural crops in the vicinities of the longhouses. The unique kerapah forest were dominated by ericaceous plants such as *Vaccinium* and *Rhododendron* species, myrtaceous plants including *Tristania* and *Eugenia* species and the pitcher plants. The lichen communities were observed in many places forming mats on the ground and tree branches.

Among the pteridophytes commonly found along the trails were *Lycopodiella cernua*, *Blechnum orientale*, *Dipteris conjugata*, *Odontosoria chinensis*, *Belvisia mucronata* and *Selliguea heterocarpa*. The fleshy rhizomes of *Aglaomorpha brooksii* were quite abundant on the wet area along Pa' Umor and Pa' Ukat trails. The fern *Ctenopteris barathrophylla* was also observed. In places where the forests had been significantly disturbed by man especially near the new airstrip, *Nephrolepis auriculata* grew in abundance.

Table 1. Summary of the pteridophyte taxa collected at Bario.

	No. Family	No. genus	No. species
	<b>Fern-allies</b>		
1	Lycopodiaceae	2	3
2	Selaginellaceae	1	4
	<b>Ferns</b>		
3.	Adiantaceae	3	3
4.	Aspleniaceae	1	6
5.	Blechnaceae	1	2
6.	Cyatheaceae	1	4
7.	Dennstaedtiaceae	4	5
8.	Dipteridaceae	1	1
9.	Dryopteridaceae	4	8
10.	Gleicheniaceae	2	2
11.	Davalliaceae	3	5
12.	Dicksoniaceae	1	1
13.	Grammitidaceae	1	1
14.	Hymenophyllaceae	3	4
15.	Lomariopsidaceae	1	1
16.	Marattiaceae	2	3
17.	Nephrolepidaceae	1	3
18.	Oleandraceae	1	1
19.	Ophioglossaceae	1	1
20.	Polypodiaceae	9	15
21.	Schizaeaceae	1	1
22.	Thelypteridaceae	5*	8
23.	Woodsiaceae	1	8

24	Vittariaceae	1	1
	Total	51	93

\* Two taxa remained unidentified

In the mixed hill dipterocarp forest between Pa' Umor and Pa' Ukat, the giant ferns *Cyathea borneensis* and *C. trichodesma* grew well under the canopy of the taller trees. In the lower montane forest near Arul Dalan the ferns were more diverse than those in the kerapah and mixed hill forests. The ferns *Diplazium* spp. (Woodsiaceae), *Tectaria* spp. (Dryopteridaceae), *Angiopteris* spp. and *Marattia sambucina* (Marattiaceae) were seen to dominate. The *Diplazium falcinellum* fern which was recorded in the Mulu area (Pan-is et al. 1984) was also encountered during the collecting trip.

All the specimens collected during the expedition were deposited in the herbaria of Universiti Malaysia Sarawak at Kota Samarahan, Universiti Kebangsaan Malaysia (UKMB) and the Forestry Research Institute, Kepong (KEP).

## CHECKLIST OF PTERIDOPHYTE FLORA

### **I. FERN-ALLIES**

#### **1. LYCOPODIACEAE**

- 1.1. *Lycopodiella cernua* (L.) Pic. Serm. Kerangas Highland Forest. Terrestrial in open places, common. LOCALITY: Main Trail. ELEVATION: ca. 1,115m. 10 May 1995. R. Jaman, RJ 4223; Pa' Umor Trail: ELEVATION: ca. 1,120m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RJ 4233.
- 1.2. *Huperzia phlegmaria* (L.) Rothm. Kerapah Highland Forest. Epiphytic, by trail side. LOCALITY: Pa' Umor-Pa' Ukat Trail. Forest nearby ELEVATION: ca. 1,115m. A. Latiff, L.B. Din & G. Ismail ALM 4229; Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,020m. 12 May 1995. R. Jaman & K. Mat-Salleh, RJ 4255 4256
- 1.3. *Huperzia squarrosa* (G. Forst.) Trevis. Kerangas Highland Forest. LOCALITY: Barb Asal: Epiphyte. By road-side. ELEVATION: ca. 1,110m. R. Jaman, RJ 4257

#### **2. SELAGINELLACEAE**

- 2.1. *Selaginella* sp. 1. Erect stem with soboliferous branches. Median leaves asymmetrical, toothed with long acuminate apex; lateral leaves asymmetrical, toothed on adaxial side; strobili tetragonous; sporophylls dimorphous. Kerangas forest. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,140m. 12 May 1995. R. Jaman & K. Mat-Salleh, RJ 4269.
- 2.2. *Selaginella* sp. 2. Lower Montane Forest. Pa' Umor-Pa' Ukat trail. ELEVATION: ca. 1,150m. 12 May 1995. R. Jaman & K. Mat-Salleh, RJ 4274 (UNIMAS).
- 2.3. *Selaginella intermedia* (Blume) Spring. Lower Montane Forest. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,150m. 12 May 1995. R. Jaman & K. Mat-Salleh, RJ 4275.
- 2.4. *Selaginella brevipes* A. Br. Lower Montane Forest. LOCALITY: Arul dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1140m. 14 May 1995. R. Jaman & Jueng Katu, RJ 4296.

## II. FERNS

### 3. ADIANTACEAE

- 3.1. *Pityrogramma calomelanos* (L.) Link. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail: forest nearby ELEVATION: ca. 1,010m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RJ 4231.
- 3.2. *Taenitis intempta*. Rhizome long creeping ca. 3mm diameter. Frond well-spaced ca. 4cm apart. Stipe light castaneous, darker near bases, glossy Frond pinnate, ca. 6-8 pairs, pinnae linear; fertile frond much narrower and longer than sterile ones, fertile frond 0.8-1.2cm wide, up to 25cm long; sterile frond 1.2-1.6cm wide, up to 20.5cm long. Sporangia in single approximately continuous band parallel to costa, sori nearer to the margin than midrib, more or less interrupted. Paraphyses as in 717 *blechnoides*; base swollen with cells close together. Kerangas Highland Forest. Terrestrial in shade. LOCALITY: Main Trail: By trail. ELEVATION: ca. 1,115m. 10 May 1995. R. Jaman, RI 4227.
- 3.3. *Syngamma azizismifolia* (Pr.) I. Sm. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,140m. 14 May 1995. R. Jaman & Jueng Katu RI 4302.

### 4. ASPLENIACEAE

- 4.1. *Asplenium caudatum* G. Forster. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,160m. 14 May 1995. R. Jaman & Jueng Katu, RJ 4316.
- 4.2. *Asplenium nidus* L. Kerangas Highland Forest. LOCALITY: Trail to Sg. Dappur. ELEVATION: ca. 1,020m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4241.
- 4.3. *Asplenium pellucidum* Lam. subsp. *pellucidum*. Kerangas Highland Forest. Epiphyte. LOCALITY: Arul Dalan. Kg. Baharu Bario, behind air strip, trail to the hill. ELEVATION: ca. 1,110m. 14 May 1995. K. Mat-Salleh KMS 4626.
- 4.4. *Asplenium salignum* Blume. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,160m. 14 May 1995. R. Jaman & Jueng Katu, RI 4315.
- 4.5. *Asplenium* sp. 1. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RJ 4288.
- 4.6. *Asplenium* sp. 2. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RJ 4293.

### 5. BLECHNACEAE

- 5.1. *Blechnum orbiculare* L. Kerangas Highland Forest. Terrestrial in exposed area. Stipe having small decurrent frond; young frond reddish. LOCALITY: Main Trail: by trail. ELEVATION: Ca. 1,115m. 10 May 1995. R. Jaman, RI 4219. Pa' Umor Trail: 5g. Puok. ELEVATION: ca. 1,135m. 11 May 1995. R. Jaman, A. Lati W K. Mat-Salleh & A. Zainudin, RJ 4238.
- 5.2. *Blechnum* sp. 1. Lower Montane Forest. Rhizomes were introduced and planted at the Fern Garden, Universiti Kebangsaan Malaysia. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RI 4266.

**6. CYATHEACEAE**

- 6.1. *Cyathea recommutata* Copel. Basal stipes having small fronds. Kerangas Highland Forest. Trunk *ca.* 0.7m. LOCALITY: Main Trail. By trail. ELEVATION: *ca.* 1,115m. 10 May 1995. R.Jaman, RI 4228.
- 6.2. *Cyathea contaminans* (Wall. ex Hook.) Copel. Kerangas Highland Forest, terrestrial on river-bank. Trunk *ca.* 1.5m; stipe purplish. LOCALITY: Sg. Dappur. ELEVATION: *ca.* 1,140m. 11 May 1995. R. Jaman, A. Latiff, K. MatSalleh & A. Zainudin, RI 4244.
- 6.3. *Cyathea borneensis* Copel. Lower Montane Forest. Trunk *ca.* 3m tall. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: *ca.* 1,170m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4277.
- 6.4. *Cyathea trichodesma* (Scort.) Copel. Mixed Dipterocarp Forest. Trunk *ca.* 1m tall. LOCALITY: Pa' Umor-Pa' Ukat. ELEVATION: *ca.* 1,170m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4279.

**7. DENNSTAEDTIACEAE**

- 7.1. *Histioptens incisa* (Thunb.) I. Sm. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail. Sg. Puok. ELEVATION: *ca.* 1,135m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4237.
- 7.2. *Lindsaea gomphophylla* Baker. Kerangas Highland Forest. Terrestrial in shade. LOCALITY: New Air Strip. Forest nearby ELEVATION: *ca.* 1,115m. 12 May 1995. LB. Din & G. Ismail, RI 4251. K. Mat-Salleh KMS 4619.
- 7.3. *Lindsaea ensifolia* Sw. Kerangas Highland Forest to Lower Montane Forest. LOCALITY: Pa' Umor Trail. Sg. Puok. ELEVATION: *ca.* 1,135m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4239. LOCALITY: Pa' UmorPa' Ukat Trail. ELEVATION: *ca.* 1,160m. 12 May 1995. R. Jaman & K. MatSalleh, RI 4276.
- 7.4. *Microlepia spelunca* (L.) T. Moore var. *villosissima* C. Chr. Kerangas Highland Forest. Terrestrial in semi-shaded places. LOCALITY: Trail to Sg. Dappur. ELEVATION: *ca.* 1,020-1030m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4242.
- 7.5. *Odontosoria chinensis* (L.) I. Smith. Kerangas Highland Forest. LOCALITY: Main Trail. by trail. ELEVATION: *ca.* 1,115m. 10 May 1995. R. Jaman, RI 4223.

**8. DIPTERIDACEAE**

- 8.1. *Dipteris conjugata* Reinw Kerapah Highland Forest. Terrestrial and common by trail. LOCALITY: Main Trail. ELEVATION: *ca.* 1,115m. 10 May 1995. R. Jaman, RI 4218. Note. Fan-shaped frond.

**9. DRYOPTERIDACEAE**

- 9.1. *Dryopteris* sp. Rhizome erect. Stipe and young frond covered by large light brown scales. Frond tri-quadripinnate; veins 1-2 forked, free; sorb on veins, indusiae absent. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R. Jaman, RI 4286.
- 9.2. *Tectaria grandidentata* (Cesati) Holttum. Lower Montane Forest. LOCALITY: Arul Dalan. Track. to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 14 May 1995. R.Jaman & Iueng Katu, RI 4311.
- 9.3. *Tectaria inopinata* Holttum. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R. jaman, RI 4289. Note.

Fronde simple, thin, cordate at base.

- 9.4. *Tectaria* sp. 1. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R.Jaman, RI 4280.
- 9.5. *Tectaria* sp. 2. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R.Jaman, RI 4287.
- 9.6. *Tectana* sp. 3. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RI 4292.
- 9.7. *Pleocnemia hem iteliiformis* (Racib.) Holttum. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RI 4294. Note. Basal stipe and crozier covered with brown large scales.
- 9.8. *Ctenitis aciculata* (Baker) Ching. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,150m. Lower Montane Forest. 14 May 1995. R. Jaman & Iueng Katu, RI 4307. NOTE: Rhizome erect; stipe copiously scaly Fertile.

## 10. GLEIC ENIACEAE

- 10.1. *Dicranopteris lineans* (Burm. f.) Underw var. *subspeciosa* Holttum. Kerangas Highland Forest. Terrestrial and forming thicket by trail in exposed area. LOCALITY: Main Trail. ELEVATION: ca. 1,115m. 10 May 1995. R. Jaman, RI 4220.
- 10.2. *Sticherus truncatus* (Willd.) Nakai var. *truncatus*. Kerangas Highland Forest. Terrestrial and forming thicket by trail in exposed area. LOCALITY: Main Trail. by trail. ELEVATION: ca. 1,115m. 10 May 1995. R.Jaman, RI 4221.

## 11. DAVALLIACEAE

- 11.1. *Davallia trichomanoides* Blume. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail. ELEVATION: ca. 1030m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4246.
- 11.2. *Davallodes burbidgei* C. Chr. Lower Montane Forest. Epiphyte. LOCALITY: Arul Dalan. Track to Lelang, by the river. ELEVATION: Ca. 1,115m. 13 May 1995. R.Jaman, RI 4263.
- 11.3. *Humata subvestita* (C. Chr.) Parris. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail. ELEVATION: ca. 1,130m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin RI 4254.
- 11.4. *Humata repens* (L. f.) Diels. Kerangas Highland Forest. Epiphyte in semi shaded places. LOCALITY: Main Trail. ELEVATION: ca. 1,115m. 10 May 1995. R.Jaman, RI 4225.
- 11.5. *Humata pusilloides* Copel. Rhizome tiny, long creeping, chalky beneath when scales removed. Frond dimorphous. Sterile frond shorter than fertile ones, fertile frond thin. Closely related to *H. repens* but differs in having small rounded sterile fronds, ca. 1cm long and chalky characteristic. Kerangas Highland Forest. Epiphyte in semi-shaded places. LOCALITY: Pa' Umor Trail. ELEVATION: ca. 1,130m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin RI 4253.

## 12. DICKSONIACEAE

- 12.1. *Cibotium arachnoideum* (C. Chr.) Holttum. Kerangas Highland Forest and Mixed Dipterocarp Forest. Trunk short, sub-erect. Frond ca. 2.5m tall; base of stipe covered with golden hairs. stipe purplish. LOCALITY: Main Trail. ELEVATION: ca. 1,115m. 10 May 1995. R.Jaman, RI 4226. Pa' Umor-Pa' Ukat. Trail. ELEVATION: ca. 1,140-1,170m. 12

May 1995. R. Jaman & K. MatSalleh, RI 4273.

### 13. GRAMMITIDACEAE

- 13.1. *Grammitis impressa* Copel. Kerangas Highland Forest. LOCALITY: Pa' UmorPa' Ukut Trail. ELEVATION: ca. 1,020-1,030m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4270.

### 14. YMENOP YLLACEAE

- 14.1. *Mecodium productum* Kunze. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail. forest nearby ELEVATION: ca. 1,120m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4234.
- 14.2. *Hymenophy Hum* sp. 1. Kerangas Highland Forest. LOCALITY: Kg. Bharu. behind airstrip, trail to the hill. ELEVATION: ca. 1,110m. 14 May 1995. K. Mat-Salleh, KMS 4623.
- 14.3. *HymenophyZZum* sp. 2. Kerangas Highland Forest. Epiphyte on base of tree in sheltered area. LOCALITY: Pa' Uinor-Pa' Ukut Trail. ELEVATION: ca. 1,020-1,030m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4255.
- 14.4. *Trichomanes* sp. Kerangas Highland Forest. LOCALITY: Pa' Uinor-Pa' Ukut Trail. ELEVATION: ca. 1,020-1,030m. 12 May 1995. R. Jaman & K. MatSalleh, RI 4271.

### 15. LOMARIOPSIDACEAE

- 15.1. *Lomagramma brooksii* Copel. Lower Montane Forest. Locality: Arul Dalan. Track to Lelang. ELEVATION: ca. 1,160m. 14 May 1995. R. Jaman & Iueng Katu, RI 4313.

### 16. MARATTIACEAE

- 16.1. *Angioptensferox* Copd. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang, by the river. ELEVATION: ca. 1,120m. 13 May 1995. R. Jaman, RI 4265. ELEVATION: ca. 1,140m. R. Jaman & Iueng Katu., RI 4306. Note. Differs from *A. evecta* in stipe having long dark brown hairs throughout.
- 16.2. *Angiopteris aff. holttumii* (C. Chr.) differs from *A. holttumii* in having stipe reddish and no scale present throughout the juvenile plant. Sterile. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang, by the river. ELEVATION: ca. 1,150m. 13 May 1995. R. Jaman & Iueng Katu, RI 4305.  
Note. Stipe redish, scale absent throughout.
- 16.3. *Marattia sambucina* Bl. Lower Montane Forest. Terrestrial in semi-shaded area. LOCALITY: Arul Dalan. Track to Lelang. ELEVATION: ca. 1,150m. 13 May 1995. R. Jaman & Iueng Katu, RI 4301. Note. This species which has tuberculate stipe and rachises was identified to the above species and representing the second record for Malaysia and the first for Sarawak. It was first recorded in Sabah, Malaysia bylainan & Latiff (1995). Apparently, it is quite common in Kalimantan (Kato, pers. comm.).

### 17. NEP ROLEPIDACEAE

- 17.1. *Nephrolepis aunculata* (L.) Trimen. Kerangas Highland Forest. Terrestrial in open places. LOCALITY: New Air-Strip. ELEVATION: ca. 1,110m. 14 May 1995. R. Jaman & Iueng Katu RI 4319.
- 17.2. *Nephrolepis davalloides* (Sw) Kunze. Kerangas Highland Forest. LOCALITY: Sg. Dappur. Off Pa' Umor Trail. ELEVATION: ca. 1030m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4250.

- 17.3. *Nephrolepis* sp. Rhizome long creeping, covered with blackish scales; son indusiated; lowest pinnae smaller than those in the middle. Lower Montane Forest. LOCALITY: Bario Asal. Sg. Arul Dalan, on the slope of the trail. ELEVATION: ca. 1,115m. 13 May 1995. R.Jaman, RI 4262.

## 18. OLEANDRACEAE

- 18.1. *Oleandra pistillans* (Sw) Cay. Kerangas Highland Forest. LOCALITY: Main Trail. ELEVATION: ca. 1,115m. 10 May 1995. R.Jaman, RJ 4224.

## 19. OP IOGLOSSACEAE

- 19.1. *Helmintostachys zeylanica* (L.) Hook. In the ex-paddy field. Terrestrial in open ground. LOCALITY: Bano Asal. Arul Dalan. 1,000m. 13 May 1995. R. Jaman, RI 4261

## 20. POLYPODIACEAE

Two species of *Aglaomorpha* occur in Bano, with *A. heraclea* new to Sarawak (Parris & Latiff, 1997).

- 20.1 *Aglaomorpha brooksii* Copel. Kerangas Highland Forest. Terrestrial or epiphyte in exposed places. LOCALITY: Pa' Umor Trail. Forest nearby ELEVATION: ca. 1,130m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4236 & RJ 4247; Bano Asal. Arul Dalan Trail. ELEVATION: ca. 1,120m. 3 May 1995. R. Jaman, RI 4260. Note. Rhizome creeping, huge; frond hairy beneath, fertile one on apical part of the frond, much contracted, flatten, acrostichoid.
- 20.2. *Aglaomorpha heraclea* (Kunze) Copel. Lower Montane Forest. Epiphyte in moderately shaded places. LOCALITY: Arul Dalan. Track to Lelang, by the river. ELEVATION: ca. 1,130m. 14 May 1995. R. Jaman & Iueng Katu, RJ 4318. Only one species of *Belvisia* occurs in Bano.
- 20.3 *Belvisia mucronata* (Fee) Copel. Kerangas Highland Forest. LOCALITY: Sg. Dappur. Trail to Pa' Umor. ELEVATION: ca. 1,030m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RJ 4248. Three species of *Drynaria* occur in Sarawak, but only one species found in Bario.
- 20.4 *Drynaria quercifolia* (L.) I. Smith. Kerangas Highland Forest. LOCALITY: Pa' Umor Trail. Sg. Puok. ELEVATION: ca. 1,025m-1,030m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4240.
- 20.5 *Goniophlebium rajaense* (C. Chr.) Pains. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,120m. 13 May 1995. R.Jaman, RI 4285.
- 20.6 *Microrium punctatum* (L.) Copel. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1,130m. 14 May 1995. R. Jaman & Iueng Katu, RI 4309.
- 20.7 *Paragramma longifolia* (Blume) T. Moore. Kerangas Highland Forest. Epiphyte on the stem of *Plectocomiopsis* sp. (palm). LOCALITY: Pa' Umor Trail. Forest nearby ELEVATION: ca. 1,120m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4232; Kg. Baharu Bario. Behind airstrip, trail to the hill. ELEVATION: ca. 1,115m. 14 May 1995. K. Mat-Salleh KMS 4620.
- 20.8 *Phymatosorus nigrescens* (Blume) Pic.-Serm. Lower Montane Forest. On river-bed in

- shade. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: Ca. 1,120m. 13 May 1995. R. Jaman, RI 4290. ELEVATION: Ca. 1,550m. 14 May 1995. R. Jaman & Iueng Katu, RI 4314
- 20.9 *Pyn-osia christii* (Giesenh.) Ching. Lower Montane Forest. Terrestrial. Rhizome creeping on river-bank. LOCALITY: Arul Dalan. Track to Lelang, by the river. Track to Lelang. ELEVATION: ca. 1,115m. 13 May 1995. R. Jaman, RI 4264. Note. Rhizome creeping; frond well-spaced; frond not so dimorphous. Sorb covers almost the apical part of adaxial surface, red.
- 20.10 *Pyrrhosia lanceolata* (L.) Farw In the ex-paddy field. LOCALITY: Bario Asal. Trail to Arul Dalan. ELEVATION: ca. 1,115M. 13 May 1995. R. Jaman, RI 4259.
- 20.11 *Pyrrhosia rasamalae* (Racib.) Ching. Kerangas Highland Forest. Epiphyte. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,030m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4267.
- 20.12 *Selliguea albidosquamata* (Bl.) Parris. Kerangas Highland Forest. Terrestrial in shade. LOCALITY: Pa' Umor Trail. forest nearby ELEVATION: Ca. 1,130m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4235. Note. Rhizome creeping; stipe long, purplish to dark; pinnae having chalky spots on upper surface.
- 20.13 *Selliguea heterocarpa* Blume. Kerangas Highland Forest to Mixed Dipterocarp Forest. Epiphyte in moderately shaded places. LOCALITY: Pa' Umor Trail. ELEVATION: Ca. 1,140m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4245. Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,140-1,170m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4272. kg. Bharu Bario. Behind airstrip, trail to the hill. ELEVATION: ca. 1,115m. 14 May 1995. K. Mat-Salleh, KMS 4622.
- 20.14 *Selliguea triloba* (Houtt.) M. G. Price. Kerangas Highland Forest. Terrestrial. Sterile and fertile frond are observed as simple and lobed. LOCALITY: Main Trail. By trail. ELEVATION: Ca. 1,115in. 10 May 1995. R. Jaman, RI 4218 & 4229. Pa' Umor Trail. Forest nearby ELEVATION: Ca. 1,220in. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4230.

## 21. SCIZAEACEAE

- 21.1 *Lygodium microphyllum* (Cay.) R. Br. Kerangas Highland Forest. Scrambling in forest edges. LOCALITY: New Air-Strip. ELEVATION: CO. 1,110m. 14 May 1995. R. Jaman & Iueng Katu RI 4320.

## 22. 1 ELYPTERIDACEAE

- 22.1 *Amphineuron immersum* (Blume) Holttum. Kerangas Highland Forest. Terrestrial in semi-shaded places. LOCALITY: Sg. Dappur trail. Off Pa' Umor Trail. ELEVATION: Ca. 1,140m. 11 May 1995. R. Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4243. Note. Acicular hairs present on the veins, costae and costules.
- 22.2 *Christefla* sp. Mixed Dipterocarp Forest. Basal frond having much reduced pinnae. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1,140m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4278.
- 22.3 *Mesophlebion falcatilobum* Holttum. Lower Montane Forest. Terrestrial in shaded. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: ca. 1040m. 14 May 1995. R. Jaman & Iueng Katu, RJ 4308. NOTE: Rhizome erect.
- 22.4 *Pneumatoptens caeflosa* (Bl.) Nakai. Lower Montane Forest. LOCALITY: Arul Dalan.

- Track to Lelang (Reservoir). ELEVATION: *ca.* 1,040m. 14 May 1995. R. Jaman & Iueng Katu, RI 4304. NOTE: Rhizome erect or sub-erect.
- 22.5 *Pronephrium cuspidatum* (Blume) Holttuin. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R. Jaman, RI 4284. NOTE: Rhizome creeping. Son one in each areoles.
- 22.6 *Pronephnum nitidum* Holttum. Kerangas Highland Forest and in ex-paddy field. Terrestrial on wet condition, exposed. LOCALITY: 5g. Dappur trail, 011 Pa' Umor Trail. ELEVATION: *ca.* 1,140m. 11 May 1995. R.Jaman, A. Latiff, K. Mat-Salleh & A. Zainudin, RI 4249; Bano Asal. Arul Dalan. 1000 1005 13 May 1995. R. Jaman, RI 4258. Note. Tips of fertile frond of 5g. Dappur specimen (Rj 4249) are long acuminate and forming enlarge segment of buds.
- 22.7 *Sphaerostephanos baramensis* (C. Chr.) Holttum. Lower montane forest. LOCALITY: Arul Dalan, track to Lelang Reservoir. ELEVATION: *ca.* 1,120m. 13 May 1995, R.Jaman RI 4283
- 22.8 Thelyptendaceae 1. Lower Montane Forest. Terrestrial in shaded. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,160m. 14 May 1995. R.Jaman & Iueng Katu, RI 4317.
- 23. WOODSIACEAE**
- 23.1 *Diplazium asperum* Blume. Lower Montane Forest. LOCALITY: Arul dalan. Track to LeLang (Reservoir). Elevation *ca.* 1,020m. 14 May 1995. R. jaman & Iueng Katu, RI 4303.
- 23.2 *Diplazium cord~folium* Blume. Lower Montane Forest. Terrestrial in shade. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,1 20m. 13 May 1995. R. Jaman, RJ 4282 & RJ 4295; 14 May 1995. R. Jaman & Jueng Katu, RJ 4297.
- 23.3 *Diplazium crenatoserratum* (Blume) Moore. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1050m. 14 May 1995. R.Jaman & Jueng Katu, RJ 4300.
- 23.4 *Diplazium falcinellum* C. Chr. Lower Montane Forest. Terrestrial in shade. LOCALITY: AruDalán. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,150m. 14 May 1995. R.Jaman & Iueng Katu, RI 4310.
- 23.5 *Diplazium latisquamatum* Holttum. Lower Montane Forest. Rhizome creeping; stipe dark. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R.Jaman, RI 4291.
- 23.6 *Diplazium* sp. 1. Rhizome erect or suberect, Setiferous scales covering the stipes and rachis throughout, dark brown. Frond simply pinnate; basal pinnae truncate on both sides, margin coarsely serrate; veins anastomosing; sori on the veins branches. Lower Montane Forest. Terrestrial in shade. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,160m. 14 May 1995. R.Jaman & Iueng Katu, RI 4312.
- 23.7 *Diplazium* sp. 2. Lower Montane Forest. Terrestrial in shade. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R. Jaman, RI 4281. NOTE: Veins copiously anastomosing.
- 23.8 *Diplazium* sp. 3. Lower Montane Forest. LOCALITY: Arul Dalan. Track to Lelang (Reservoir). ELEVATION: *ca.* 1,120m. 13 May 1995. R. Jaman, RI 4282a.

**24. VITTARIACEAE**

- 24.1 *Vittaria ensiformis* Sw Kerangas Highland Forest. LOCALITY: Pa' Umor-Pa' Ukat Trail. ELEVATION: ca. 1030m. 12 May 1995. R. Jaman & K. Mat-Salleh, RI 4268. Arul Dalan. Lelang (Reservoir Area). ELEVATION: ca. 1,120m. 12 May 1995. LB. Din & C. Ismail, RI 4252.

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