

PRELIMINARY ENUMERATION OF THE SUMMIT FLORA, MOUNT MURUD, KELABIT HIGHLANDS, SARAWAK

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ABSTRACT

Mt. Murud, a sandstone mountain in the Kelabit Highlands of northeastern Sarawak, elev. 2,424m, is the highest mountain in Sarawak. Subsequent to the first scientific expedition there in 1922 it has been visited by seven other botanical collectors or collecting teams. Our expedition, from 10-17 April 1995, involved three botanists and four porter-guides. The enumeration provided here, based on previous literature reports, earlier COLLECTIONs observed in two herbaria and specimens collected during this expedition, includes 252 specimen records. The enumeration recognizes 165 taxa of vascular plants collected at 1,500m or higher; 130 taxa are completely determined, 22 are determined only to genus and 13 are conditionally determined. The nomenclature for taxa reported in the literature has been revised to the extent possible. The Orchidaceae, with 42 species and varieties, is the largest family in the flora. The flora has strong phytogeographical relationships with Mount Kinabalu, and probably with other montane areas in Borneo.

INTRODUCTION

Mt. Murud, elev. 2,424m, is the highest mountain in Sarawak. It is located on the boundary of the Limbang and Miri Divisions, in the Kelabit Highlands of northeastern Sarawak. The geology of Murud (as well as most of the Kelabit Highlands) is white or yellowish sandstone of the Miocene Meligan Formation (Yin Ee Heng, 1992). The long, narrow ridge constituting Mt. Murud proper, above about 2,000m is about 4km long, running in an ENE-WSW direction. The two highest points are fairly close together and nearly equal in elevation, the highest being only about 15m higher than the other. A panoramic view of the ridge is provided by Mjöberg (1925, Fig. 10), and a colour photograph of Murud from Batu Lawi is included in Plate 25 of Briggs (1988).

The first expedition to Murud was made by the Swedish zoologist Eric Mjöberg, who approached the mountain in October, 1922, and spent six days on its summit in early November. He made a considerable collection of plants, and obtained many animal specimens as well. Subsequently seven other botanical collectors or collecting teams have been to the summit.

Mjöberg (1925) published a detailed account of his 1922 expedition and a summary of previous exploration in the Kelabit Highlands. In discussing the earlier explorers he noted that the initiative for the exploration of Mt. Murud emanated from the Sarawak Museum in 1914. The then Curator, Mr. J.C. Moulton, began an expedition in October but returned unsuccessfully on 19 November noting that "failure was due in the first place to the lack of food in the district, which prevented us obtaining sufficient natives for transport, and secondly to the alarming

reports of a Dayak invasion which soon after our start robbed us of the few natives we had managed to get together.” (Moulton, 1915). Moulton made a second attempt to reach the mountain in 1920, but again failed.

The Mjöberg Expedition

Mjöberg submitted his plan of exploration to Rajah Charles Vynar Ibrook on 13 July 1922 and received immediate approval. He spent five weeks travelling up the Baram River and into the Kelabit Highlands, at some points with more than 70 porters and guides (his description of the personnel situation is somewhat ambiguous). He left for Baram Station (Marudi) on 6 September, and, after various difficulties, arrived in the Kelabit region on 5 October. His first sight of Mt. Murud was on 10 October, about a two-hour bike before his party arrived at Pa Trap.

He managed to persuade seven local Kelabits to show him the route up Mount Murud. As he tells it, they hacked a path for him climbing steadily upwards, often walking on undergrowth only hanging together by roots. On 19 October he reached the foot of hanging together by roots. On 19 October he reached the foot of Mt. Murud, and on 2 November, “perhaps my most strenuous day during the whole journey” he climbed to the top ridge. His characterization of the summit is as follows:

*“We found ourselves in a strange landscape where low bushes with thick leathery leaves constituted the predominating vegetation. Here and there smaller trees were seen, among them a conifer with trunk and larger branches practically covered with the yellow blossoms of a small, richly flowering, epiphytic orchid. Bright scarlet or snow-white flowers of rhododendron and similar plants were met with everywhere; and most noticeable were the enormous and characteristically shaped pitchers of *Nepenthes lowii*, hitherto recorded only from Kinabalu and Batu Lawi.”*

Mjöberg spent six days on the summit, of which the final day was 13 November. By 27 November he had returned to Pa Trap, and departed the Kelabit Highlands on 4 December, returning to Baram Station on 16 or 17 December.

In his book *Forest Life and Adventures in the Malay Archipelago*, Mjöberg (1988) gave an even more picturesque account of the summit than that quoted above, as follows.

*“I shall not soon forget the sight that met my eye when I succeeded, after tremendous exertions, in reaching the dim cloud-wreathed heights of the unexplored Mt. Murud. The whole of the vast forest was, as it were, illuminated by the newly opened orchids, which produced such a glory of colour that we could not turn our eyes away from all their beauty. Some of the trees were actually turned into pale yellow or mauve under their covering veil of orchids. From the boughs there hung in literal garlands the yard-long clusters of the flowering *Coelogyne*, and even the ground, which at other times is usually dull and bare, was now gay with the delicate plant-like orchids of the *Liparis* variety up to the *Spathoglottis*- and *Vanda*-like types that grow in bushes almost up to a man’s head.”*

Mjöberg was a zoologist-ethnographer, particularly interested in insects. His expedition to Murud

resulted in extensive collections of a wide range of plants and animals, many of which were published on by various authors in Volume 3 of the *Sarawak Museum Journal* (1928). Most of his fern collections were reported on by Bonaparte (1923a). A few pteridophytes and the gymnosperms and angiosperms were listed by Merrill (1928), who described 19 new species from the Murud collection (many no longer recognized; see the enumeration below). Merrill noted that he sent a first lot of orchids to Oakes Ames and a second collection was sent directly by Mjöberg to Ames. Insofar as we have been able to determine, the Mjöberg orchids were not reported upon.

The 1995 Expedition

Between 10 and 20 April a large component of the UNIMAS staff as well as scientists from other universities were in Bario for the first major Bornean expedition sponsored by UNIMAS. The principal purpose of the expedition was to gather baseline information on various environmental aspects, including cultural, anthropological and socio-economic values of the local communities, water quality, climate, geology, flora and fauna, and the river system in the area.

Our expedition to Murud was considerably more modest than Mjöberg's, starting with four botanists (one of whom left the group after the second day because of the rigours of the trail) and four porter-guides. We also had the "luxury" of flying into Bario on a Malaysia Airlines Twin Otter rather than spending a month getting up the Baram River. We would agree with Mjöberg that attaining the summit of Mount Murud requires "tremendous exertions", but the fact that the path was hacked by his guides over 70 years ago and is now well worn, at least along the summit ridge, was an advantage to us.

We attended the Expedition Opening Ceremony in Bario on the morning of 10 April, and, after feasting on a cow sacrificed for the occasion, found the local representative from Pa Lungan, the kampung furthest from Bario toward Murud, who took us through a soaking rain on a four-hour hike to his house for the evening. The next morning he arranged our porter guides and by 9 a.m. we were off on the expedition, seeing no further signs of current civilization until we returned to Pa Lungan six days later. What a privilege it was, one I had never before experienced, to walk through unbroken primary forest (or in some cases old secondary forest) for six straight days, notwithstanding that we were rained on much of the time and constantly under attack by voracious leeches.

The first day's journey out of Pa Lungan took us to Long Rapung (elev. ca. 1,140m), now a grove of giant bamboo (called *bulu batong* in Kelabit) on the Dapur River floodplain, but formerly a kampung that was evacuated during the Confrontation. Our night in the open shelter constructed entirely of bamboo with rattan lashings, was comfortable except that we had to position ourselves to avoid the drips and leaks that continued with the all-night rain. By 9 am, the next morning we were underway again and were able to cross the Dapur River on a huge log that had been undercut by the river and fallen across it. We were hardly 15 minutes out of camp before one of the first exciting discoveries of the expedition was made, a huge vine of a vanilla orchid (*Vanilla kinabaluensis* Carr), the first time it had been seen in Sarawak. We marked the spot and left the plant to be collected on the return. In spite of the great size of the plant, we could

find only one beautiful large yellow flower.

One of the slightly ridiculous nightly routines of the trip was to attempt to dry one's shoes and socks over the campfire. This was a particularly futile effort on the first day out of Long Rapung, because the Dapur River had to be crossed three more times (and the near-equal sized Belaban River once), these crossings without the aid of a fallen tree, and it wasn't only shoes that were wet, but trousers up to the crotch or higher (if we were lucky). These rivers were so swift and swollen by the recent heavy rains that our guides had to help us across by taking our hands. On the one ill-advised occasion I refused this service I ended up with an unanticipated bath of my entire front side because of the unsure footing and rapid current.

The next day's journey brought us to the Belaban Camp (elev. ca. 1,160m), at the confluence of the Dapur and Belaban rivers. Here there was no bamboo hut, but we were lucky to have a tent hat developed only minor leaks during another night of constant rain. Our porter-guides made do (and stayed about as dry) with a lean-to made of a large piece of nylon fabric suspended between two poles, and a ground covering of bark pulled off the common *tristania* nccs in 8-metre strips. (I had long thought that *tristania* had evolved an effective way of keeping the epiphytes off by means of its scaling bark, but its evolution has not kept up with this utilization by tile local people). Surely this campsite must be one of the most beautiful anyone has ever enjoyed, and, along with the soothing river sounds, came complete with a bath site on the mossy rocks of tile Belaban.

The following day's hike was probably the easiest of the entire expedition, requiring only three to four hours to the final base camp (elev. ca. 1,775m) before tile ascent of Murud. This day was less strenuous in part because there were no large rivers to ford, the climb was relatively gentle, going up a total of about 500 meters, and there weren't so many deep, slushy root-enclosed puddles as we had to slog through on the previous days. Fortunately we arrived at this base camp early enough to get tile tent and lean-to set up before tile rain started again (and continued all night). Again *tristania* bark provided tile floor mat for the porter-guides. This camp served us two nights, the one before the final ascent and upon descent. I continued to marvel at how excellent a fire our porter-guides could build and maintain in spite of all the firewood being sopping wet. They achieved wonderful fires with the bamboo at Long Rapung, and with fresh green *tristania* wood at the other ca hills.

The following morning we left base camp early (7:30), with tile objective of getting to the summit as quickly as possible, which turned out to be nearly five hours later. The trail ascended steeply, first up through an oak-laurel lower montane forest, which then turned into a lower stature mossy forest just below the summit ridge at about 2,000m. We made it to this point in less than an hour, and initially thought that once on the ridge, the going would be easy. The actual situation was just the opposite. Along the ridge, the trail was deeply worn into tree roots and branches, and went up and down interminably with climbs and drops of 3-6 metres, so that in 2.5 hours we had gained hardly more than 300m in elevation through this spectacular dwarfed mossy elfin forest with the trees sometimes only 3-4m high, and rarely attaining more than 8m. At about 11 am. we thought we were approaching the highest point along the ridge, but this was not actually reached until 12.

The final ascent of Murud was achieved without the soaking to which we had become accustomed, but we had been on the summit less than half an hour when the rains started again. On reaching the top we started immediately collecting every plant in sight that had flowers or Fruits. After filling our rice sacks with specimens of all fertile plants encountered, we started making our way slowly back to the base camp (along that terrain one can only go slowly, but also to collect as much as possible along the summit ridge). The rain was incessant and did not make collecting easier, and the clouds obscured many of the beautiful views we should have been able to enjoy. Not many photographs were taken on the summit ridge, but we did capture a few scenes on the few occasions when the clouds lifted.

We continued making collections all the way back to the base camp, where we arrived just as it was getting dark. Had we not made it there before dark we would have had to spend the night in the open in the rain, because the trail was too difficult and dangerous to negotiate in darkness. Again it rained all night, but there was some escape from the water in our tent and lean-to. One of the nicest discoveries of the expedition was the vanilla plant noted above, but we were also able to document with a specimen the occurrence of *Rafflesia pricei* Meijer in Sarawak, a species previously collected only from the Mount Kinabalu area in Sabah (and apparently more recently in Brunei). This plant was growing as a parasite on a huge *Tetrastigma* vine about 45 minutes walking distance from Long Rapung. Another worthwhile discovery was the slipper orchid, *Paphiopedilum javanicum* var. *virens* (Rchb. F.) Stein, near the top of Sekelun Hill between Long Rapung and Pa Lungan. In total our COLLECTIONs amounted to a little over 70. We arrived back in Bario a little after midday on 17 April, almost exactly one week after setting out on the expedition.

METHODS

The enumeration provided below is incomplete but represents all the collections reported by Bonaparte (1923a), Merrill (1928), my own collections and those encountered in the Sarawak Forest Department Herbarium and the Royal Botanic Gardens, Kew. I have not had time to search systematically through all the Sarawak Herbarium and Kew collections, so a considerable number of species must have been missed. The fern collections Mjöberg submitted to Bonaparte are now in the herbarium of the Museum National d'Histoire Naturelle, Paris. Merrill (1928) stated that types of the species he described based on the Mjöberg collections are in the Herbarium of the University of California. (Berkeley). Presumably the first set of non-types is also deposited there, but he notes additionally that a set was deposited in the Natural History Museum, London. The latter specimens have not been examined in the present study, but some Mjöberg collections were located in Kew. The nomenclature and taxonomic concepts applied by Bonaparte and Merrill have been updated to the extent possible without a detailed study of all the relevant material.

Only species that occur above 1,500m are included in the enumeration. For some collections recorded from below that elevation it cannot be ascertained if the specimens actually came from Mt. Murud or from nearby localities. The most interesting physiognomic and biogeographic aspects of the Murud flora are encountered above 1,500m (mostly above 2,000m), so this seems an appropriate lower limit. The elevation data provided by Bonaparte (1923a) and Merrill (1928)

for Mjöberg collections are not in all cases readily convertible into a computer database, particularly when such statements as “at high altitudes” (e.g., *Carex cruciata*) and “from above an altitude of 1,900m” (e.g., *Rhododendron crassifolium*, reported as *R. murudense*), or elevations were given pertaining to two different mountains in Sarawak.

The overall concept of a floristic botanical database was outlined by Beaman and Regalado (1989). An integrated system of computer programs used for data editing and printing enumerations, such as for the pteridophytes (Parris et al., 1992), orchids (Wood et al., 1993) and gymnosperms (Beaman & Beaman 1993) was written in the dBASE IV programming language by Reed Beaman. The specimen-management programs employed for the Murud enumeration are versions of the programs we have used for enumerating the Kinabalu Flora, with minor modifications. These programs allow access to any aspect of the database through a menu system. Six principal relational data files were employed. Two of these files contain data on specimens, including types. Taxonomic, nomenclatural and bibliographic information is linked from other files. Menus facilitate inputting and editing specimen and taxon data, globally replacing various expressions such as changing an author’s name or abbreviation, indexing and querying the database, computing a summary of elevation ranges for taxa, numbering taxa, making an index to numbered collections, and printing, enumerations of all taxa in the database or selected families or genera.

BIOGEOGRAPHIC RELATIONSHIPS

Mjöberg. (1925) noted a strong biogeographic relationship between Mt. Murud and Mount Kinabalu. He indicated that he

“had not been working many days in the new field of exploration before I realized the great affinity between the famous fauna of Kinabalu and that of Mt. Murud situated more than a hundred miles farther south. Among the more conspicuous forms of life, the birds afforded clear evidence. Altogether I found nine birds more than one hundred miles farther south of their previously known home. To this we may add quite a number previously recorded only from Kinabalu and Mt. Dulit, and I feel confident that many more of what hitherto were considered exclusively Kinabalu birds would have been found not only on Mt. Murud but also in the intervening regions between Kinabalu and Mt. Murud and Mt. Dulit and even much farther south, proving that we have a continuous avifauna right through the central mountains of Borneo from Kinabalu in the north to Mt. Poi in the west and possibly with many forms south to the Muller and Schwaner Mountains.”

In the enumeration below 140 taxa are determined completely enough to allow a comparison with the Kinabalu flora. Of this number 96 taxa (69 per cent) are common to Mount Kinabalu and Mt. Murud, although in this analysis three varieties are represented that differ in the two localities. Many of the species are found in other localities as well, so it cannot be said that the Kinabalu-Murud relationship is a unique circumstance. Nevertheless, Mjöberg’s observations are supported, that there is great similarity in the species composition of the biota of Murud and Kinabalu.

BOTANICAL COLLECTORS ON MT. MURUD

In addition to the Mjöberg expedition and our own, other botanical collectors who have visited the summit of Mt. Murud are as follows: J.A.R. Anderson and Ilias Paie of the Sarawak Forest Department collected together on 10 October 1967. B.L. Burt and A.M. Martin from the Royal Botanic Gardens, Edinburgh, collected on the summit ridge from 23 September to 15 October 1967. Ilias Paie collected there from 30 September to 13 October, 1967. H.P. Nooteboom of the Rijksherbarium, Leiden, with Paul Chai of the Sarawak Forest Department, collected from 4-7 April 1970. Yii Puan Ching of the Sarawak Forest Department collected on the summit ridge on 10-13 September, 1982. One record of a collection by a Sarawak Museum Native Collector (*Diplazium porphyrorachis*, based on a report by Price, 1983) is recorded in the enumeration. We do not know when this collection was made.

Bonaparte (1923b) cited specimens of several species of ferns collected by J.C. Moulton from the summit and the foot of Mt. Murud in December 1914. On the basis of Mjöberg's (1925) account indicating that the Moulton expeditions did not reach Murud these records appear to be in error. Furthermore, the numbers attributed by Bonaparte to Moulton do not agree with the numbering system otherwise used by the latter. More likely the numbers correspond to Mjöberg collections. These specimens have not been included in the enumeration.

ENUMERATION

This enumeration includes 18 pteridophytes (two fern allies and 16 ferns), seven gymnosperms, 54 monocotyledons, and 86 dicotyledons. The total number of taxa is 165, representing 48 families and 88 genera, based on 252 specimen records; 35 taxa (21%) are incompletely determined or determined with uncertainty. The largest family is the Orchidaceae, with 42 species and varieties, and the largest genus is *Dendrochilum*, with eight species and varieties.

Fern Allies

1. LYCOPODIACEAE

1.1. HUPERZIA

1.1.1. *Huperzia phlegmana* (L.) Rothm. ELEVATION: 1,700-2,000m. Listed by Merrill (1928) as *Urostachys phlegmaria* (L.) Hert. COLLECTIONS: Mt. Murud. Mjöberg 73; SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11489.

1.1.2. *Huperzia verticillata* (L.f.) Trevis. ELEVATION: 1,900m. Listed by Merrill (1928) as *Urostachys verticillata* (L.f.) Hert. COLLECTION: Mt. Murud. 1,900m, Mjöberg 73.

Ferns

2. ASPLENIACEAE

2.1. ASPLENIUM

2.1.1. *Asplenium nidus* L. ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg 204.

3. BLECHNACEAE

3.1. BLECHNUM

- 3.1.1. *Blechnum procerum* auctt., non (Forst.) Sw ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a) as *Blechnum capense* var. *procerum* f. *integrum* Bonap. (type). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg 214.

4. CYATHEACEAE

4.1. CYATHEA

- 4.1.1. *Gyathca capitata* Copel. ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg 95.

5. DENNSTAEDTIACEAE

5.1. HISTIOPTERIS

- 5.1.1. *Ilistiopteris incisa* (Thunb.) J. Sm. ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg 108

6. DIPTERIDACEAE

6.1. DIPTERIS

- 6.1.1. *Dipteris conjugata* Reinw ELEVATION: 2,400m. Listed by Bonaparte (1923a). COLLECTION: Mt. Murud summit 2,400m, Mjöberg sn.
- 6.1.2. *Dipteris lobbiana* Moore ELEVATION: 1,500-1,800m. Doubtfully occurring as high as indicated, 1) Ut so listed by Bonaparte (1923a). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg sn.
- 6.1.3. *Dipteris quinquefurcatci* Christ. ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a), but probably a form of the polymorphic *D. cofluglta*. COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg sn.

7. GRAMMITIDACEAE

7.1. CTENOPTERIS

- 7.1.1. *Ctenopteris taxodioides* (Baker) Copel. ELEVATION: 1,500-2,400m Listed by Bonaparte (1923a) and Merrill (1928) as *Polypodium taxodioides* Baker. COLLECTIONS: Mt. Murud. 2,400m, Mjöberg 70, 1,500-1,800m, 256

7.2. PROSAPTIA

- 7.2.1. *Prosaptia contigua* (6. Forst.) C. Presl. ELEVATION: 1,500-2,400m. Listed by Bonaparte (1923a) as *Davallia contigua* (6. Forst.) J. Sm. COLLECTIONS: Mt. Murud. 1,500-1,800m, Mjöberg sn.; Mt. Murud summit, 2,400m, Mjöberg sn.

8. HYMENOPHYLLACEAE

8.1. MACROGLENA

- 8.1.1. *Macroglena meifolia* (Bory ex Willd.) Copel. ELEVATION: 1,200m. Listed by Merrill (1928) as *Trichomanes pluma* Hook. COLLECTION: Mt. Murud. 1,200m, Mjöberg 19.

9. OLEANDRACEAE

9.1. OLEANDRA

- 9.1.1. *Oleandra neriiformis* Cay. ELEVATION: 1,500-1,800m. Listed by Merrill (1928).

COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg sn.

10. PLAGIOGYRIACEAE

10.1. PLAGIOGYRIA

10.1.1. *Plagiogyria pycnophylla* (IKunze) Mett. ELEVATION: 1,500-1,800m. Listed by Bonaparte (1923a) as *P pycnophylla* var. *integra* subvar. *stenophylla* Bonap. (type). COLLECTION: Mt. Murud. 1,500-1,800m, Mjöberg 22.

10.1.2. *Plagiogyria tuberculata* Copel. ELEVATION: 2,400m. Listed by Bonaparte (1923a) as *P rotundipinnata* Bonap. (type). COLLECTION: Mt. Murud. 2,400m, Mjöberg s.n.

11. POLYPODIACEAE

11.1. SELLIGUEA

11.1.1. *Selliguea albidosquamata* (Blume) Parris ELEVATION: 1,900m. Listed by Bonaparte (1923a) as *Polypodium czlhidosquacunatum* Blume. COLLECTION: Mt. Murud. 1,900m, Mjöberg 71.

11.1.2. *Selliguea enervis* (Cay.) Chine. Listed by Merrill (1928) as *Polypodium triquetrum* Blume. COLLECTION: Mt. Murud. Mjöberg 68.

12. WOODSIACEAE

12.1. DIPLAZIUM

12.1.1. *Diplazium porphyrorachis* (Baker) Diels. Cf. Price (1983). COLLECTION: Mt. Murud. Sarawak Museum Native Collector 2937.

Gymnosperms

13. ARAUCARIACEAE

13.1. AGATHIS

13.1.1. *Agathis kinabaluensis* de Laub. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11464.

14. PHYLLOCLADACEAE

14.1. PHYLLOCLADUS

14.1.1. *Phyllocladus hypophyllus* Hook. f. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11466.

15. PODOCARPACEAE

15.1. DACRYARPUS

15.1.1. *Dacryarpus imbuicatus* (Blume) de Laub. ELEVATION: 1,500m. Listed by Merrill (1928) as *Podocarpus jav(Iiicus* (Burm. I.) Merr. COLLECTION: Mt. Murud. 1,500m Mjöberg 99.

15.2. DACRYDIUM

15.2.1. *Dacrydium beccarii* Parl. in DC. ELEVATION: 1,200m. Listed by Merrill (1928). COLLECTION: Mt. Mumud. 1,200m, Mjöberg 100.

15.2.2. *Dacrydium gibbsiae* Stapf in Gibbs. ELEVATION: 2,100-2,400m. COLLECTION: Mt. Murud near summit, 2,100m, Ilias S. 26505; Mt. Murud summit, 2,400m Anderson &

Ilias S. 261471; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11440.

15.2.3. *Dacrydium xanthandrum* Pilger. ELEVATION 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2400m, Beaman 11487.

15.3 PODOCARPUS

15.3.1 *Podocarpus neriifolius* D. Don in Lamb. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11480.

Angiosperms: Monocotyledons

16. ARECACEAE

16.1. CALAMUS

16.1.1. *Calamus gibbsianus* Becc. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11471.

16.1.2. *Calamus Mattanensis* Becc. ELEVATION: 1,900m. Listed by Merrill (1928) as *C. ferrugineus* Becc., a synonym fide Dransfield (1992), and not recorded as occurring in the Kelabit Highlands. The determination is doubtful. COLLECTION: Mt. Murud. 1900m, Mjöberg 126.

16.1.3. *Calamus pilosellus* Becc. ELEVATION: 1,900m. Listed by Merrill (1928). Not recorded by Dransfield (1992) as occurring in the Kelabit Highlands. The determination is doubtful. COLLECTION: Mt. Murud. 1,900m, Mjöberg 128.

17. CYPERACEAE

17.1. CAREX

17.1.1. *Carex cruciata* Wahl. Listed by Merrill (1928). COLLECTION: Mt. Murud. Mjöberg 113.

17.2. GAHNIA

17.2.1. *Gahnia javanica* Zoll. & Moritzi ex Moritzi. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11465.

18. ORCHIDACEAE

18.1. APPENDICULA

18.1.1. *Appendicula congesta* Ridl. ELEVATION: 1,700m. COLLECTION: Mt. Murud Camp III: 1,700m, Burt & Martin B 5233.

18.1.2. *Appendicula foliosa* Ames & C. Schweinf. ELEVATION: 1,600m. COLLECTION: Mt. Murud. 1,600m, Yii S. 44421.

18.1.3. *Appendicula* sp. ELEVATION: 1,600m. COLLECTIONS: Ba Kelalan/Mt. Murud. Burt & Martin B 5434; Mt. Murud. 1,600m, Yii S. 44401.

18.2. BROMHEADIA

18.2.1. *Bromheadia finlaysoniana* (Lindl.) Miq. ELEVATION: 2,100-2,300m. COLLECTIONS: Mt. Murud N side, 2,100m, Burt & Martin B 5463/A; Mt. Murud summit, 2,300m, Yii S. 44482.

18.3. BULBOPHYLLUM

18.3.1. *Bulbophyllum apodum* Hook. f. ELEVATION: 1,900m. COLLECTION: Mt. Murud near

Camp IV, 1,900m, Burt & Martin B 5404.

18.4. CALANTHE

18.4.1. *Calanthe aff. pulchra* (Blume) Lindl. ELEVATION: 1,800m. COLLECTIONS: Ba Kelalan/Mt. Murud. 1,800m, Burt & Martin B 5271; Mt. Murud. Nootboom 1969.

18.4.2. *Calanthe speciosa* (Blume) Lindl. ELEVATION: 1,800m. COLLECTION: Ba Kelalan/Mt. Murud. 1,800m, Burt & Martin B 5368.

18.5. CHELONISTELE

18.5.1. *Chelonistele* sp. ELEVATION: 1,800m. COLLECTION: Mt. Murud near Camp III, 1,800m, Burt & Martin B 5272.

18.6. COELOGYNE

18.6.1. *Coelogyne craticulaelabris* Carr. ELEVATION: 2,300m. COLLECTION: Mt. Murud N side: 2,300m, Burt & Martin B 5454.

18.6.2. *Coelogyne hirtella* J.J. Sm. ELEVATION: 2,200m. COLLECTION: Mt. Murud. 2,200m, Nootboom 2019.

18.6.3. *Coelogyne moultonii* J.J. Sm. COLLECTION: Ba Kelalan/Mt. Murud. Burt & Martin B 5258.

18.6.4. *Coelogyne radioferens* Ames & C. Schweinf. ELEVATION: 1,800-2,000m. COLLECTIONS: Mt. Murud near Camps III and IV 1,800-2,000m, Burt & Martin B 5274; Mt. Murud/Dapur River. 1,900m, Ilias S. 26519.

18.6.5. *Coelogyne tenompokensis* Can. ELEVATION: 1,700m. COLLECTION: Mt. Murud Camp III, 1,700m, Burt & Martin 5245.

18.6.6. *Coelogyne* sp. ELEVATION: 1,700m. COLLECTION: Ba Kelalan/Mt. Murud. 1,700m, Burt & Martin B 5247.

18.7. CYMBIDIUM

18.7.1. *Cymbidium elongatum* J.J. Wood, Du Puy & Shim. ELEVATION: 2,000-2,100m. COLLECTIONS: Mt. Murud N side, 2,100m, Burt & Martin B 5460; Mt. Murud above Camp LV, 2,000m, Burt & Martin B 5428.

18.8. DENDROBIUM

18.8.1. *Dendrobium piranha* C.L. Chan & P Cribb. ELEVATION: 2,200m. COLLECTION: Mt. Murud. 2,200m, Nootboom 2032.

18.8.2. *Dendrobium* sp. sect. *Rhopalanth* ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11482.

18.9. DENDROCHILUM

18.9.1. *Dendrochilum crassifolium* Ames

a. var. *crassifolium*. ELEVATION: 1,700m. COLLECTION: Ba Kelalan/Mt. Murud. 1,700m, Burt & Martin 5241.

b. var. *murudense* J.J. Wood ELEVATION: 2,300-2,400m COLLECTIONS: Mt. Murud. 2,400m, Nootboom 1995; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11459.

18.9.2. *Dendrochilum dewindtianum* WW Sm. a. var. *dewindtianum*. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11448.

- 18.9.3. *Dendrochilum galbanum* J.J. Wood. ELEVATION: 1,800-2,300m. COLLECTIONS: Mt. Murud. 2,300m, Yii 5. 44430; Mt. Murud 2nd summit, 2,300m, Yii S. 44430; Mt. Murud SW of Camp III, 1,800m, Burt & Martin B 5328.
- 18.9.4. *Dendrochilum gibbsiae* Rolfe. ELEVATION: 1,600m. COLLECTIONS: Mt. Murud. 1,600m, Yii 5. 44402; Mt. Murud below Camp III, 1,600m, Burt & Martin B 5299.
- 18.9.5. *Dendrochilum lancilabium* Ames. ELEVATION: 2,100m. COLLECTIONS: Ba KeLalan/Mt. Murud. Burt & Martin B 5319; Mt. Murud. 2,100m, Ilias S. 26455.
- 18.9.6. *Dendrochilum longipes* J.J. Sm. ELEVATION: 1,800-2,300m. COLLECTIONS: Mt. Murud. 1,800m, Nootboom 1945; Mt. Murud 2nd summit, 2,300m, Yii S. 44432.
- 18.9.7. *Dendrochilum muluense* J.J. Wood. ELEVATION: 1,700-2,200m. COLLECTIONS: Mt. Murud Camp III, 1,700m, Burt & Martin B 5244; Mt. Murud between 1st and 2nd summits, 2,200m, Yii S. 44616.

18.10. DILOCHIA

- 18.10.1. *Dilochia cantleyi* (Hook. f.) Ridl. ELEVATION: 1,700m. COLLECTION: Mt. Murud. 1,700m, Yii S. 44627.
- 18.10.2. *Dilochia rigida* (Ridl.) J.J. Wood. ELEVATION: 2,200-2,400m. COLLECTIONS: Mt. Murud 2nd summit, 2,200m, Ilias S. 26408; Mt. Murud between 1st and 2nd summits, 2,300m, Yii 5. 44486; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11455; Mt. Murud, Dapur River headwaters. 2,400m, Ilias S. 26538.
- 18.10.3. *Dilochia* aff *rigida* (Ridl.) J.J. Wood. COLLECTION: Mt. Murud. Yii 5. 44486.
- 18.10.4. *Dilochia* aff *wallichii* Lindl. ELEVATION: 2,100m. COLLECTION: Mt. Murud Camp V, 2,100m, Burt & Martin B 5443.
- 18.10.5. *Dilochia* sp. ELEVATION: 2,400m. COLLECTION: Mt. Murud, Dapur River headwaters. 2,400m, Ilias S. 26539.

18.11. ERIA

- 18.11.1. *Eria crassipes* Ridl. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud. 2,400m, Nootboom 2065, 2,300m, Yii S. 44431.
- 18.11.2. *Eria robusta* (Blume) Lindl. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44491; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11485.
- 18.11.3. *Eria* sp. ELEVATION: 1,700-1,800m. COLLECTIONS: Mt. Murud Camp III, 1,700m, Burt & Martin B 5231; Mt. Murud SE of Camp III, 1,800m, Burt & Martin B 5327.

18.12. LIPARIS

- 18.12.1. *Liparis compressa* (Blume) Lindl. ELEVATION: 1,700m. COLLECTION: Mt. Murud Camp III, 1,700m, Burt & Martin B 5237.

18.13. NABALUIA

- 18.13.1. *Nabaluaia exaltata* de Vogel. ELEVATION: 1,800-2,100m. COLLECTIONS: Mt. Murud. 2,100m, Ilias S. 26466; Mt. Murud above Camp III, 1,800m, Burt & Martin B 5259.

18.14. PHOLIDOTA

- 18.14.1. *Pholidota gibbosa* (Blume) de Vriese ELEVATION: 1,900m. COLLECTION: Mt.

Murud Camp IV 1,900m, Burt & Martin B 5390.

18.15. PLOCOGLOTTIS

18.15.1. *Plocoglottis* sp. ELEVATION: 1,800m. COLLECTION: Mt. Murud Camp III, 1,800m, Burt & Martin B 5329.

18.16. PODOCHILUS

18.16.1. *Podochilus microphyllus* Lindl. ELEVATION: 1,800m. COLLECTIONS: Ba Kelalan/Mt. Murud, Bor River. Burt & Martin B 5519; Mt. Murud Camp III, 1,800m, Burt & Martin B 5287.

18.17. TRICHOTOSIA

18.17.1. *Trichotosia cf annulata* Blume. ELEVATION: 1,700m. COLLECTIONS: Mt. Murud, Belaban River headwaters. 1,700m, Ilias S. 26353.

18.17.2. *Trichotosia pilosissima* (Rolfe) Carr. ELEVATION: 1,700m. COLLECTIONS: Mt. Murud Camp III, 1,700m, Burt & Martin 5229, 1,700m, B 5230.

18.17.3. *Trichotosia poculata* (Ridl.) Kraenzl. ELEVATION: 1,800m COLLECTION: Mt Murud path to summit, 1,800m, Nooteboom 1946.

19. PHORMIACEAE

19.1. DIANELLA

19.1.1. *Dianella ensifolia* (L) DC in Redouté. ELEVATION: 1,500m. Listed by Merrill (1928). COLLECTION: Mt. Murud. 1,500m, Mjöberg 123.

20. ZINGIBERACEAE

20.1. ALPINIA

20.1.1. *Alpinia argentea* (B.L. Burt & R.m. Sm.) R.m. Sm. COLLECTION: Ba Kelalan/Mt. Murud. Burt & Martin B 5166.

20.2. BURBIDGEA

20.2.1. *Burbidgea nitida* Hook. f. Listed by Merrill (1928). COLLECTION: Mt. Murud. Mjöberg 122.

20.2.2. *Burbidgea pubescens* Ridl. ELEVATION: 1,700m. COLLECTION: Ba Kelalan/Mt. Murud. 1,700m, Burt & Martin B 5314.

20.3. GEANTHUS

20.3.1. *Geanthus fimbriobracteatus* (K. Schum.) B.L. Burt & R m Sm COLLECTION Ba Kelalan/Mt. Murud. Burt & Martin B 5342.

20.3.2. *Geanthus longipetiolatus* B.L. Burt & R.m. Sm ELEVATION 2,000m COLLECTION: Ba Kelalan/Mt. Murud. 2,000m, Burt & Martin B 5343.

20.3.3. *Geanthus pubescens* B.L. Burt & R.m. Sm. ELEVATION: 2,000m. COLLECTION: BA Kelalan/Mt. Murud. 2,000m, Burt & Martin B 5343.

20.4. HEDYCHIUM

20.4.1. *Hedychium cylindricum* Ridl. ELEVATION: 1,900-2,400m. Listed by Merrill (1928) as the type of *H. Mjöbergii* Merr. COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 121.

Angiosperms: Dicotyledons**21. ANACARDIACEAE**

21.1. RHUS

21.1.1. *Rhus* sp. ELEVATION: 2,200-2,400m. COLLECTIONS: Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44488, 2,200m, S. 44612; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11454.

22. APOCYNACEAE

22.1. LEUCONOTIS

22.1.1. *Leuconotis erugenifolia* (Wall. ex G. Don) A. DC. ELEVATION: 1,900m. Listed by Merrill (1928) as *Leuconotis* sp. COLLECTION: Mt. Murud. 1,900m, Mjöberg 124.

23. AQUIFOLIACEAE

23.1. ILEX

23.1.1. *Ilex havilandii* Loes. ELEVATION: 2,300-2,400m. Mjöberg 93 was listed by Merrill (1928) as *I. confertifolia* Merr. (type). COLLECTIONS: Mt. Murud near summit, 2,400m, Mjöberg 93; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11444, 2,300-2,400m, 11483.

23.1.2. *Ilex spicata* Blume ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11468.

24. ARALIACEAE

24.1. ARTHROPHYLLUM

24.1.1. *Arthrophyllum collinum* Philipson. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11470.

24.2. SCHEFFLERA

24.2.1. *Schefflera Mjöbergii* Men. ELEVATION: 1,800-2,300m. COLLECTIONS: Mt. Murud. 1,900m, Mjöberg 117 (type); Mt. Murud 2nd summit, 2,000m, Ilias S. 26386; Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44487; Mt. Murud path to summit, 1,800m, Nooteboom 1961; Mt. Murud/Dapur River. 2,100m, Ilias S. 26467.

24.2.2. *Schefflera trineura* Frodin med. ELEVATION: 1,800-2,200m. COLLECTIONS: Mt. Murud. 1,800m, Nooteboom 1958; Mt. Murud between 1st and 2nd summit, 2,200m, Yii S. 44619.

24.2.3. *Schefflera* aff. *remotiserrata* Men. ELEVATION: 2,200m. COLLECTION: Mt. Murud. 2,200m, Nooteboom 2052.

25. BEGONIACEAE

25.1. BEGONIA

25.1.1. *Begonia murudensis* Merr. ELEVATION: 1,900-2,400m. Listed by Merrill (1928). COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 119 (type).

26. ELAEOCARPACEAE

26.1. ELAEOCARPUS

- 26.1.1. *Elaeocarpus glaberrimus* Knuth. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11484.
- 26.1.2. *Elaeocarpus murudensis* Men. ELEVATION: 1,900-2,400m. COLLECTIONS: Mt. Murud. 1,900-2,400m, Mjöberg 83 (type); Mt. Murud summit ridge, 2,300-2,400m, Beaman 11449.

27. ERICACEAE

27.1. DIPLYCOSIA

- 27.1.1. *Diplycosia barbiger*a Sleumer. ELEVATION: 1,900m. COLLECTION: Mt. Murud/Belaban River. 1,900m, Ilias S. 26373.
- 27.1.2. *Diplycosia heterophylla* Blume ELEVATION: 2,000m. COLLECTION: Mt. Murud above Camp IV, 2,000m, Burt & Martin B 5430.
- 27.1.3. *Diplycosia pittosporifolia* J.J. Sm. a. var. *fimbriata* (Sleumer) Argent. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud. 2,400m, Nooteboom 2002; Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44478; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11457.
- 27.1.4. *Diplycosia punctulata* Stapf. ELEVATION: 2,300m. COLLECTIONS: Mt. Murud 2nd summit, 2,300m, Yii 5. 44447; Mt. Murud N side, 2,300m, Burt & Martin B 5452.
- 27.1.5. *Diplycosia saurauoides* Jj. Sm. ELEVATION: 2,000-2,400m. COLLECTIONS: Mt. Murud above Camp III: 2,000m, Burt & Martin B 5268; Mt. Murud between 1st and 2nd summits, 2,300m, Yii 5. 44490; Mt. Murud summit, 2,400m, Nooteboom 1992.
- 27.1.6. *Diplycosia aff saurauoides* J.J. Sm. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11469.
- 27.1.7. *Diplycosia cf. urceolata* Stapf. ELEVATION: 2,000-2,200m. COLLECTIONS: Mt. Murud 2nd summit, 2,000m, Ilias 5. 26381, 2,200m, S. 26416; Mt. Murud above Camp 111, 2,000m, Burt & Martin B 5266.

27.2. RHODODENDRON

- 27.2.1. *Rhododendron crassifolium* Stapf. ELEVATION: 1,900-2,400m. Mjöberg 106 was listed by Merrill (1928) as the type of *R. murudense* Men. COLLECTIONS: Mt. Murud. 1,900m, Mjöberg 106; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11474, 2,300-2,400m, 11478.
- 27.2.2. *Rhododendron durionifolium* Becc. ELEVATION: 1,900-2,400m. Mjöberg 105 was listed by Merrill (1928) as the type of *R. Mjöbergii* Men. COLLECTIONS: Mt. Murud. 1,900-2,400m, Mjöberg 105; Mt. Murud summit ridge, 2300-2,400m, Beaman 11447.
- 27.2.3. *Rhododendron orbiculatum* Ridl. ELEVATION: 2,200-2,400m. COLLECTIONS: Mt. Murud between 1st and 2nd summits, 2,200m, Yii S. 44602; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11486.
- 27.2.4. *Rhododendron pneumonanthe* Sleumer. ELEVATION: 1,900-2,400m. Listed by Merrill (1928) as *R. jasminiflorum* Hook. COLLECTIONS: Mt. Murud. 1,900-2,400m, Mjöberg 103, 1,900-2,400m, 104.
- 27.2.5. *Rhododendron villosum* (Jj. Sm.) A.L. & P ELEVATION: 1,900m. Listed by Merrill (1928) as *R. cuneifolium* Stapf var. *subspathulatum* Ridl. COLLECTION: Mt. Murud. 1,900m, Mjöberg 98.
- 27.2.6. *Rhododendron* sp. nov.? Et.EVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11441.

27.2.7. *Rhododendron* sp. subsect. *Pseudovireya*. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11450, 2,300-2,400m, 11467.

27.3. VACCINIUM

27.3.1. *Vaccinium clementis* Men. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11445.

27.3.2. *Vaccinium pachydernum* Stapf. ELEVATION: 1,900-2,400m. Listed by Merrill (1928). COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 108.

27.3.3. *Vaccinium* sp. 1. Listed by Merrill (1928). COLLECTION: Mt. Murud. Mjöberg 110.

27.3.4. *Vaccinium* sp. 2. Listed by Merrill (1928). COLLECTION: Mt. Murud. Mjöberg 109.

28. ESCALLONIACEAE

28.1. POLYOSMA

28.1.1. *PoZyosma Mjöbergii* Men. ELEVATION: 1,900-2,400m. COLLECTIONS: Ba Kelalan/Mt. Murud. 2,300m, Ilias S. 26489; Mt. Murud. 1,900-2,400m, Mjöberg 107 (type); Mt. Murud 2nd summit, 2,300m, Yii S. 44426.

28.1.2. *PoZyosma* sp. 1 ELEVATION: 1,900-2,200m. COLLECTIONS: Mt. Murud between 1st and 2nd summits, 2,200m, Yii 44615; Mt. Murud/Belaban River, 1,900m, Ilias S. 26375.

29. EUPHORBIACEAE

29.1. AUSTROBUXUS

29.1.1. *Austrobuxus nitidus* Miq. ELEVATION: 1,700m. COLLECTION: Ba Kelalan/Mt. Murud. 1,700m, Ilias S. 26521.

30. FABACEAE

30.1. WHITFORDIODENDRON

30.1.1. *Whitfordiodendron* sp. ELEVATION: 1,700-2,000m. COLLECTION: SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11491.

31. GESNERIACEAE

31.1. AESCHYNANTHUS

31.1.1. *Aeschynanthus* sp. ELEVATION: 1,900m. Listed by Merrill (1928) as *Trichosporum Mjöbergii* Men. Mjöberg 89 is the type. COLLECTIONS: Mt. Murud. 1,900m, Mjöberg 81, 1,900m, 89.

31.2. AGALMYLA

3 1.2.1. *Agalmyla tuberculata* Hook. f. ELEVATION: 1,800-2,400m. COLLECTIONS: Mt. Murud. 2,400m, Nooteboom 2007; Mt. Murud N side, 2,100m, Burt & Martin B 5459; Mt. Murud above Camp III, 1,800m, Burt & Martin B 5249.

31.3. CYRTANDRA

31.3.1. *Cyrtandra cuprea* B.L. Burt. ELEVATION: 1,800m. COLLECTION: Mt. Murud near Camp III, 1,800m, Burt & Martin B 5270.

3 1.3.2. *Cyrtandra dolichopoda* B.L. Burt. ELEVATION: 1,600m. COLLECTION: Mt. Murud

below Camp III, 1,600m, Burt & Martin B 5307.

31.3.3. *Cyrtandra horizontalis* B.L. Burt. ELEVATION: 1,300-2,000m. COLLECTIONS: Mt. Murud/Komap River, 1,300m, Burt & Martin B 5169; SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11493.

3 1.3.4. *Cyrtandra trisejala* C.B. Clarke. ELEVATION: 1,600-1,800m. COLLECTIONS: Mt. Murud. 1,700m, Nootuboorn 1914, 1,600m, Yii S. 44416; Mt. Murud below Camp IV 1,800m, Burt & Martin B 5375.

31.4. DIDYMOCARPUS

31.4.1. *Didymocarpus simplex* Kraenzl. ELEVATION: 1,800-2,000m. COLLECTION: Mt. Murud near Camps III and IM 1,800-2,000m, Burt & Martin B 5275.

31.5. LOXOCARPUS

31.5.1. *Loxocarpus* sp. ELEVATION: 1,600m. COLLECTION: Mt. Murud below Camp III, 1,600m, Burt & Martin B 5313.

32. ILLICIAEAE

32.1. ILLICIUM

32.1.1. *Illicium cauliflorum* Merr. ELEVATION: 1,900-2,400m. Listed by Merrill (1928); type. COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 114.

33. LAURACEAE

33.1. LINDERA

33.1.1. *Lindera bibracteata* (Blume) Boerlag. a. var. *rufa* (Stapl) Kosterm. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11473.

34. LOGANIACEAE

34.1. FAGRAEA

34.1.1. *Fagraea ceilanica* Thunb. ELEVATION: 1,900m. Listed by Merrill (1928) as *F obovata* Wall. in Roxb. COLLECTION: Mt. Murud. 1,900m, Mjöberg 94.

35. LORANTHACEAE

35.1. HELIXANTHERA

35.1.1. *Helixanthera* sp. nov.? ELEVATION: 1,900-2,200m. COLLECTIONS: Mt. Murud. 1,900m, Nootboom 1965; Mt. Murud between 1st and 2nd summits, 2,200m, Yii S. 44620.

36. MAGNOLIACEAE

36.1. MAGNOLIA

36.1.1. *Magnolia* sp. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11479.

37. MELASTOMATACEAE

37.1. MEDINILLA

37.1.1. *Medinilla homoeandra* (Stapf) Nayar. ELEVATION: 1,900m. Listed by Merrill (1928) as *Anplectrum homoeandrutn* Stapf. COLLECTION: Mt. Murud. 1,900m, Mjöberg 96.

37.2. PLETHIANDRA

37.2.1. *Plethiandra* sp. nov.? ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 1475.

37.3. SONERILA

37.3.1. *Sonerila macro* n. sp. Merr. ELEVATION: 1,900-2,400m. Listed by Merrill (1928); Mjoberg 75 is the type. The species may not be distinct from the widespread *S. tenuifolia*. COLLECTIONS: Mt. Murud. 1,900-2,400m Mjöberg 75; Mt. Murud 2nd summit, 2,300m, Yii S. 44434.

37.3.2. *Sonerila pulchella* Stapf. ELEVATION: 1,700-2,000m COLLECTIONS: SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11494.

37.3.3. *Sonerila tenuifolia* Blume. ELEVATION 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11460.

37.3.4. *Sonerila* sp. ELEVATION: 1,800m. COLLECTION: Mt. Murud near Camp III, 1,800m, Burt & Marlin B 5284.

38. MYRSINACEAE**38.1. ARDISIA**

38.1.1. *Ardisia mjobergii* Merr. ELEVATION: 1,900-2,400m. Listed by Merrill (1928). COLLECTION Mt. Murud. 1,900-2,400m, Mjöberg 80 (type).

38.1.2. *Ardisia obovatifolia* Merr. ELEVATION: 1,900m. Listed by Merrill (1928); type. COLLECTION: Mt. Murud. 1,900m, Mjöberg 79.

38.2. EMBELIA

38.2.1. *Embelia minutifolia* Stapf. ELEVATION: 2,300-2,400m COLLECTION Mt Murud summit ridge, 2,300-2,400m, Beaman 11456.

38.2.2. *Embelia tortuosa* Stapf. ELEVATION: 2,300-2,400m. COLLECTION Mt Murud summit ridge, 2,300-2,400m, Beaman 11472.

39. MYRTACEAE**39.1. BAECKEA**

39.1.1. *Baekkea taxifolia* Merr. ELEVATION: 2,400m. Listed by Merrill (1928). COLLECTIONS: Mt. Murud. 2,400m, Mjöberg 84 (syntype). 2,400m, 111 (syntype).

39.2. LEPTOSPERMUM

39.2.1. *Leptospermum javanicum* Blume. ELEVATION: 1,500-2,400m. COLLECTIONS: Mt. Murud. 1,500m, Mjöberg 92; Mt. Murud summit ridge, 2,300-2400m, Beaman 11442.

39.3. SYZYGIUM

39.3.1. *Syzygium castaneum* (Merr) Merr. & Perry ELEVATION: 1,900-2,400m. COLLECTIONS: Mt Murud Camp IV, 2,000m, Ilias S. 26389; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11462; Mt. Murud/Belahan River, 1900m, Ilias S. 26380.

39.3.2. *Syzygium aff kinabaluense* (Stapf Merr. & Perry ELEVATION: 2,100-2,300m. COLLECTIONS: Mt. Murud. 2,100m, Ilias S. 26458; Mt. Murud 2nd summit, 2,300m, Yii S. 44428; Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44469.

39.3.3. *Syzygium pallidilimbium* Merr. & Perry. ELEVATION: 2,300-2,400m. COLLECTIONS:

Mt. Murud 2nd summit, 2,000m, Ilias S. 26385, 2,200m, S. 26406; Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44467; Mt. Murud summit, 2,400m, Anderson & Ilias S. 26472; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11446.

- 39.3.4. *Syzygium pallidilimbus* Merr. & Perry? ELEVATION: 2,000-2,400m. COLLECTIONS: Mt. Murud 2nd summit, 2,000m, Ilias S. 26385, 2,200m, S. 26406; Mt. Murud between 1st and 2nd summits, 2,300m, Yii S. 44467; Mt. Murud 2,400m, Anderson & Ilias S. 26472; Mt. Murud summit ridge summit, 2,300-2,400m, Beaman 11446.

40. NEPENTHACEAE

40.1. NEPENTHES

- 40.1.1. *Nepenthes lowii* Hook. f. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud. Mjöberg 115; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11476.
- 40.1.2. *Nepenthes murudensis* Culhamined.? ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11461.

41. PENTAPHRAGMATACEAE

41.1. PENTAPHRAGMA

- 41.1.1. *Pentaphragma aurantiaca* Stapf. ELEVATION: 1,900-2,400m. Mjöberg 112 was listed by Merrill (1928) as the type of *P. obtusifolium* Merr. COLLECTIONS: Mt. Murud. 1,900m, Mjöberg 112; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11443.
- 41.1.2. *Pentaphragma* sp. ELEVATION: 1,700-2,000m. COLLECTION: SE side of Mt. Murud ridge, 1700-2,000m, Beaman 11490.

42. PIPERACEAE

42.1. PIPER

- 42.1.1. *Piper cantnum* Blume? ELEVATION: 1,700-2,000m. COLLECTION: SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11492.

43. POLYGALACEAE

43.1. POLYGALA

- 43.1.1. *Polygala venenosa* Juss. Listed by Merrill (1928). COLLECTIONS: Mt. Murud. Mjöberg 95.
- 43.1.2. *Polygala* sp. ELEVATION: 1,500m. Listed by Merrill (1928). COLLECTION: Mt. Murud. 1,500m, Mjöberg 91.

44. ROSACEAE

44.1. PRUNUS

- 44.1.1. *Prunus arborea* (Blume) Kalkman. a. var. *alticola* Kalkman. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud summit ridge, 2,300-2,400m, Beaman 11452.

45. RUBIACEAE

45.1. ACRANTHERA

- 45.1.1. *Acranthera aff atropella* Stapf. ELEVATION: 1,700-2,000m. COLLECTION: SE side of Mt. Murud ridge, 1,700-2,000m, Beaman 11488.

45.2. ARGOSTEMMA

- 45.2.1. *Argostemma murudense* Men. ELEVATION: 1,900-2,400m. Listed by Merrill (1928).
COLLECTIONS: Mt. Murud. 1,900-2,400m, Mjöberg 82 (type), 1,900-2,400m, 88.

45.3. IXORA

- 45.3.1. *Ixora sessililimba* Men. ELEVATION: 1,900-2,400m. Listed by Merrill (1928).
COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 116 (type).

45.4. PSYCHOTRIA

- 45.4.1. *Psychotria densifolia* Stapf. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud
summit ridge, 2,300-2,400m, Beaman 11481.

46. SYMPLOCACEAE**46.1. SYMPLOCOS**

- 46.1.1. *Symplocos adenophylla* Wall. ex G. Don. COLLECTION: Mt. Murud, Belaban River
Headwaters, 1,700m, Ilias S. 26306.
- 46.1.2. *Symplocos anomala* Brand. COLLECTION: Mt. Murud, Belaban River Headwaters,
1,600m, Ilias S. 26357.
- 46.1.3. *Symplocos henschelii* (Moritzi) Benth. ex C.B. Clarke. a. var. *henschelii*. ELEVATION:
1,900-2,400m. Mjöberg 120 was listed by Merrill (1928) as the type of *S. dolichantha* Men.
COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 120.
- 46.1.4. *Symplocos laeteviridis* Stapf. a. var. *Mjöbergi* (Men.) Noot. ELEVATION: 1,900-
2,400m. Mjöberg 97 was listed by Merrill (1928) as the type of *S. Mjöbergii* Merr.
COLLECTION: Mt. Murud. 1,900-2,400m, Mjöberg 97. b. var. *pauciflora* Noot.
ELEVATION: 1,700-2,000m. COLLECTIONS: Mt. Murud. 1,700-2,000m, Ilias S. 26334
Ilias 5. 26392.
- 46.1.5. *Symplocos tricoccata* Noot. ELEVATION: 1,700m. COLLECTION: Mt. Murud.
1,700m, Ilias 5. 26305.

47. THEACEAE**47.1. ADINANDRA**

- 47.1.1. *Adinandra clemensiae* Kobuski. ELEVATION: 1,600-2,200m. COLLECTIONS: Mt.
Murud. 1,600m, Yii S. 44499; Mt. Murud between 1st and 2nd summits, 2,200m, Yii S.
44611.
- 47.1.2. *Adinandra dumosa* Jack? ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud
summit ridge, 2,300-2,400m, Beaman 11477.

47.2. TERNSTROEMIA

- 47.2.1. *Ternstroemia beccarii* Stapf. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud
2nd summit, 2,300m, Yii S. 44439, 2,300m, 5. 44448; Mt. Murud summit ridge, 2,300-
2,400m, Beaman 11463.
- 47.2.2. *Ternstroemia denticulata* (Pierre) RidI. ELEVATION: 2,200-2,300m. COLLECTIONS:
Mt. Murud between 1st and 2nd summits, 2,300m, Yii 5. 44484, 2,300m, 5. 44485, 2,200m,
5. 44605.
- 47.2.3. *Ternstroemia lowii* Stapf. ELEVATION: 2,300-2,400m. COLLECTION: Mt. Murud
summit ridge, 2,300-2,400m, Beaman 11453.

48. WINTERACEAE**48.1. DRIMYS**

48.1.1. *Drimys piperita* Hook. f. ELEVATION: 2,300-2,400m. COLLECTIONS: Mt. Murud. Mjöberg 101; Mt. Murud summit ridge, 2,300-2,400m, Beaman 11458.

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Beaman 11440 (15.2.2); 11441 (27.2.6); 11442 (39.2.1); 11443 (41.1.1); 11444 (23.1.1); 11445 (27.3.1); 11446 (39.3.3); 11447 (27.2.2); 11448 (18.9.2a); 11449 (26.1.2); 11450 (27.2.7); 11451 (..); 11452 (44.1.1a); 11453 (47.2.3); 11454 (21.1.1); 11455 (18.10.2); 11456 (38.2.1); 11457 (27.1.3a); 11458 (48.1.1); 11459 (18.9.1b); 11460 (37.3.3); 11461 (40.1.2); 11462 (39.3.1); 11463 (47.2.1); 11464 (13.1.1); 11465 (17.2.1); 11466 (14.1.1); 11467 (27.2.7); 11468 (23.1.2); 11469 (27.1.6); 11470 (24.1.1); 11471 (16.1.1); 11472 (38.2.2); 11473 (33.1.1a); 11474 (27.2.1); 11475 (37.2.1); 11476 (40.1.1); 11477 (47.1.2); 11478 (27.2.1); 11479 (36.1.1); 11480 (15.3.1); 11481 (45.4.1); 11482 (18.8.2); 11483 (23.1.1); 11484 (26.1.1); 11485 (18.11.2); 11486 (27.2.3); 11487 (15.2.3); 11488 (45.1.1); 11489 (1.1.1); 11490 (41.1.2); 11491 (30.1.1); 11492 (42.1.1); 11493 (31.3.3); 11494 (37.3.2).

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Yii 44401 (18.1.3); 44402 (18.9.4); 44416 (18.1.2); 44426 (28.1.1); 44428 (39.3.2); 44431 (18.11.1); 44432 (18.9.6); 44434 (47.2.1); 44447 (27.1.4); 44448~ (47.2.1); 44469 (39.3.2); 44478 (27.1.3a); 44482 (47.2.2); 44485 (47.2.2); 44486 (18.10.3, (24.2.1); 44488 (21.1.1); 44490 (27.1.5); 44499 (47.1.1); 44602 (27.2.3); 44605 (47.1.1); 44612 (21.1.1); 44615 (28.1.2); 44619 (24.2.2); 44620 (35.1.1); 44627 (18.10.1).

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