

ZINGIBERACEOUS SPECIES OF TAWAU HILLS PARK, SABAH

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ABSTRACT

A survey of zingiberaceous species was carried out in Tawau Hills Park ranging from 100 to 300m. A total of 36 species from 14 genera are reported. This represents nearly 23% of the estimated 160 species described for Sabah and Sarawak. Among the present collection, 4 specimens are suspected to be new species and 2 specimens are possibly new varieties. Members of the tribe Alpineae are predominant in the ginger flora of the areas surveyed. A checklist of zingiberaceous species is provided together with notes on their habitat and distribution.

INTRODUCTION

The Tawau Hills Park, Sabah, which covers an area of almost 28,000 ha. was gazetted as a State park in 1979 to protect its natural flora and fauna. It is also an important water catchment area for the district of Tawau with several rivers such as Sg. Balung, Sg. Junob, Sg. Kinabutan, Sg. Tawau, Sg. Menti and Sg. Merotai flowing through the Park. The Park consists of mainly lowland dipterocarp forest with its fringes fairly distributed. A portion of its forest (ca. 40%), particularly the lower elevations of the eastern and western part, was logged before the area was gazetted into a park, hence leaving approximately 60% of the area still under primary jungle. Three main peaks, namely Gunung Magdalena (1310m), Gunung Lucia (1189m) and Gunung Maria (1067m) remain scientifically unexplored and scientific documentation of their flora and fauna is non-existent.

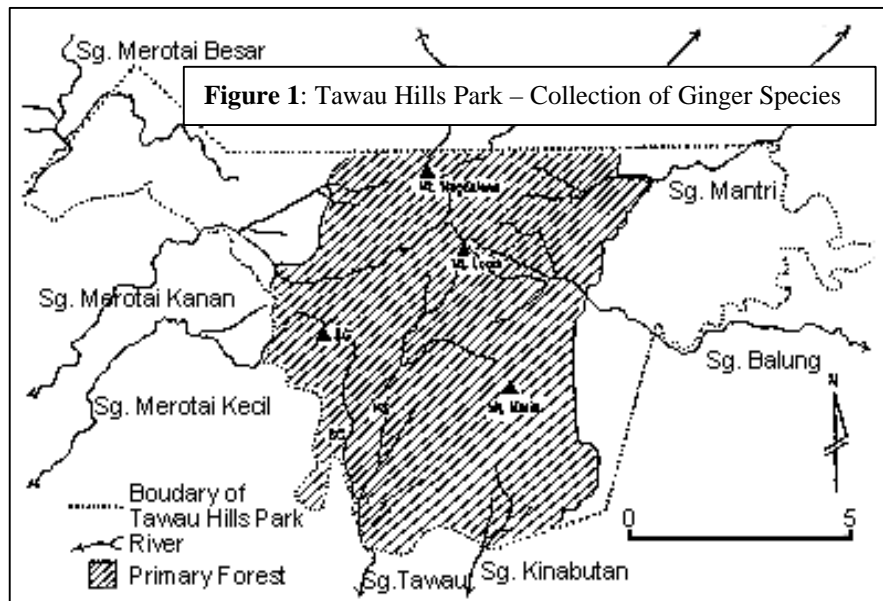
The Park's vegetation varies with elevation, and in the lowlands where most of the survey of gingers was carried out, the forest is a mixture of dipterocarps and other tree species such as shrubs, ferns and forest herbs. Herbs such as gingers, begonias, *Argostemma*, and *Sonerila* flourish in cool, moist habitats while epiphytes inhabit tree trunks along the river banks. Some of these forest floor herbs and epiphytes, in particular, species from Orchidaceae, Zingiberaceae, Palmae and Gesneriaceae, provide potential materials for ornamentals. Likewise, zingiberaceous species provide potential resources for a variety of uses ranging from medicine to food. These are basically rhizomatous, aromatic herbs ranging in size from as small as 15cm in *Camptandra parvula* to as tall as 4-5m as observed in a number of genera from the tribe Alpineae. A comprehensive introduction to Zingiberaceae can be found in earlier reports and papers (Ibrahim, 1989; 1990).

METHOD

A survey was conducted over 5 trails in the Park area (Figure 1) during a period of one week. Plants were collected, documented and processed as voucher specimens. Viable rhizomes of species collected from plants of low elevations were obtained to provide planting materials for Rimba Ilmu Botanic Garden, University of Malaya. In the case of several very common species, descriptions were recorded based only on observations.

RESULTS AND DISCUSSION

Most of the gingers collected are from areas within walking distance of the Park HQ, namely, trails 1, 2 and 4 (Figure 1). All trails surveyed are those at elevations ranging from 100 to 330m, where most zingiberaceous species would normally thrive. No attempt was made to survey the 3 peaks mentioned earlier, due to time constraints.



In common with other lowland forests that have been surveyed prior to this expedition, the majority of the smaller-sized gingers, except for several *Scaphochlamys sp.*, are found in shaded, cool and moist habitats, and along river banks. The zingiberaceous species are comparatively underestimated because some plants are sterile and hence not collected. With the exception of a few

species with characteristic vegetative features, it is almost impossible to confirm the identification of wild gingers in their sterile form. The area around the base camp is basically primary forest. The common gingers of the ground flora include *Boesenbergia pulchella* and *Globba*. Other forest floor herbs such as *Argostemma*, *Clerodendron* and *Begonia* are also common.

The survey revealed that the tribe Alpineae is well represented, with 23 species (out of a total of 93 species), including 4 suspected new species and varieties. Tribes Globbeae and Hedycheae are poorly represented, with only 3 species collected for each tribe. Although the same epiphytic species, namely *Burbidgea schizocheila* and *Hedychium muluense*, are accounted for in Gunung Danum and Tawau Hills Park, they are noticeably fewer in number in the latter and found only along trail and near base camp.

The *Zingiber* species found here are quite interesting with 2 species suspected to be undescribed. Earlier reports have shown that the diversity of zingibers in Sabah is rather high, some bearing unique and distinct inflorescence structure unknown in Peninsular Malaysia. Intraspecific variations such as those exhibited by species within the so-called *Zingiber gracile* complex of Peninsular Malaysia, however, are not so obvious in the Park.

The forest near the Merota estate (trail 3) is reported to be a logged secondary forest and most areas are rather dry for gingers. However, species such as *Etilingera brevilabris* and *Eflingera fimbriobracteata* are common, indicative of disturbed habitats. The area in the vicinity of the water-fall at Merotai is basically of volcanic formation and *Alpinia ligulata* appears to be quite dominant with many individuals bearing fruits. Seedlings are also abundant. This species has been reported to be widespread in its distribution. The forest near Sg. Mentri is similar to Merotai in being relatively logged and disturbed. Common species found at Merotai are also encountered here growing in huge stands further inland. Other species such as *Etilingera littoralis* fringe the exposed river bank.

Three flower colour variants of *Costus globosus* are found locally. They are: (a) the large yellow flowered variant (near the waterfall on trail 2), (b) the large orange flowered variant (trail 3) and (c) the small orange flowered variant (uncommon, trail 3). In almost all specimens, ants were observed inhabiting the spiny inflorescence, suggesting the presence of nectar. *Costus speciosus*, another widespread species both in East and West Malaysia, was found growing abundantly along the track bordering the cocoa estates toward Sg. Mentri. The moist trail very close to the base camp was covered by seedlings of *Costus* sp. resembling *C. paradoxus*, a 'dwarf' *Costus* of logged forest.

The annotated checklist provided here is the result of the fieldwork by the author who was surveying mainly the lowland habitats. Details of the trails mentioned are shown in Figure 1. Identification of species follows Smith (1972, 1985, 1986, 1987, 1988, 1989).

TRIBE: ALPINEAE

Genus: *Alpinia*

A. ligulata K Schum.

Ht. 1- 1.5m. Fruits ca. 2.5cm in diam., paniculate infl. branches. Prominent long ligules. Alt. 100-315m. Trail 1, trail 2 and trail 3. (HI 473, HI 485, HI 489).

A. cf. niewenhuizii Val.

Ht. 3m. Fruits yellowish brown. Grows by the river, Sg. Tawau (trail 4) and partially exposed. Alt. 260m. (HI 502). This specimen appears to be comparable to that of *A. niewenhuizii* in its paniculate inflorescence branches and short ligule, ca 5-6mm. However, the inflorescence is not as strongly paniculate as in most *A. ligulata* and *A. niewenhuizii*, although the former is more widespread than the latter. Intermediates or hybrids between

the two species have been reported (Smith, 1985) and this specimen could well be one of the suspected hybrids.

Genus: *Amomum*

A. cf hansenii R.M. Smith

Ht. 1.2-2m. Flowers orange. Woody rhizome with stilt roots. Forest shade. Alt. 260-310m. Trail 1, trail 4. (HI 468, HI 480, HI 503). Specimens were collected from 3 sites. This species may be closely affiliated with *A. hansenii*.

Amomum sp. 1.

Ht. 2.5-3m. Infl. bracts brown, corolla lobes white, midlobe of labellum orange. Lvs. sweetly aromatic, glabrous. Rhizome cream in colour.

Grows along the river bank, Sg. Junub, at the edge of the secondary forest at Merotai (trail 3). Alt. 140m. (HI 492).

Amomum sp. 2

Ht. ca. 1.5m. Fruits dark green. Woody rhizome with stilt roots. Similar to *Amomum* sp. 1. reported from Gunung Danum. Alt. 295m. Trail 1. (HI 475).

Amomum sp. 3

Ht. 2m. Infl. still in bud. Rhizome cream in colour, distinctly aromatic resembling the odour of the galangals. Forest shade. Alt. 190m. Trail 5. (HI 507).

Genus: *Burbridgea*

B. schizocheila Ridl.

Ht. 50-60 cm. Epiphytic, orange flowers. Semi exposed. Lvs. glabrous. Trail 1. (HI 463). The only *Burbridgea* sp. encountered in this area. Occasional on tree trunks. More frequently encountered at G. Danum but only a few individuals were observed at Tawau Hills Park. *Burbridgea* species are often cultivated for their ornamental value.

Genus: *Elettaria*

E. cf. longituba (Ridl.) Holtt.

Ht. 1.3m. Flowers Single, white. Rhizome runner-like. Grows along river bank of Sg. Tawau of trail 4. Alt. 260m. (HI 504). This specimen is comparable to *E. longituba* but at this point its identification could not be confirmed.

Genus: *Etlingera*

Etlingera(*Achasma*) *cf.punicea*(Roxb.)R.M. Smith.

Ht. 2m. Flowers red. Grows at the bases of trees in forest shade. Alt. 290m. Trail 1. (HI 472). Possibly a variant of *E. punicea* or belonging to *E. punicea* complex.

E. cf. punicea (Roxb.) R.M. Smith

Ht. 1.2m. Flowers red, throat of labellum, yellow. Alt. 305m. Trail 2. (HI 483). This specimen is also closely affiliated to *E. punicea*. It is also similar to *Etlingera cf. punicea* (HI 359) collected from G. Danum.

Genus: *Etlingera* (Geanthus)

E. fimbriobracteata (K. Schum.) R.M. Smith.

Ht. 1.5-2m. Distinct infl. with brilliant yellow flowers and red stigma. Clumps of this species are found towering over the river banks of Sg. Junub, Merotai, of trail 3. Alt. 100m. (HI 491). A common species of disturbed secondary forest.

E. brevilabris (Val.) R.M. Smith.

Ht. 1.5-1.8m. Brilliant blood red flowers. Abundant along the path at Merotai (trail 3). Clayey soil. Alt 100m. (HI 494). Another common species of open and disturbed areas.

Etlingera sp. 1.

Ht. 1 in. Lvs. glabrous. Stems conspicuously red in colour right down to the bases. Rhizome strongly aromatic, similar odour to the stems and rhizomes of *Etlingera elatior* otherwise known as 'kantan'. Flowers, white with brown stigma. Grows on damp peaty soil in full shade near the river bank, Sg. Mantri (trail 5). Alt. 190m. (HI 506). Possibly an undescribed species.

E. littoralis (Konig.) Giseke.

Ht. over 3m. Grows along river bank of Sg. Mantri. Common in open disturbed habitat.

Genus: *Geocharis*

Geocharis sp.

Ht. 3-4m. Radial infl. In fruit. Stilt roots. Forest shade. Alt. 265m. Trail 1. (HI 478).

Genus: *Hornstedtia*

Hornstedtia is identified by the rigid involucre of sterile bracts which almost encloses the inflorescence. In most cases, the inflorescence held on rhizomes with stilt roots.

H. cf. tomentosa (131.) Bakh.

Ht. 2m. Sterile bracts reticulate. Flowers red. Stilt roots. Forest shade. Occasional along trail 1. Alt. 285m. (HI 460). Although the sterile bracts resemble *H. scyphifera*, this species is comparable to *H. tomentosa* in having flowers resembling the beak of a duckbilled platypus.

Genus: *Plagiostachys*

As mentioned in an earlier report (Ibrahim, 1991), the genus *Plagiostachys* is relatively difficult to identify without the presence of fresh flowers. Although 13 collections were made, all specimens were without fresh flowers except for one collection (HI 509). Of these, 3 specimens were in bud, 3 specimens were over flowered and 6 specimens bore fruits. The above specimens are therefore not annotated here.

One small *Plagiostachys* species with leathery and rugose leaves collected from Tabin Forest Reserve and Gunung Danum (HI 35 1), was collected again here (HI 479) along trail I not far from the hot spring. Unfortunately it only bore some ripe fruits, red in colour ca 7-10cm. above the ground. It remains, as mentioned earlier (Ibrahim, 199 1), a suspected new species or subspecies.

TRIBE: GLOBBEAE**Genus: *Globba***

Only 3 species of *Globba* were observed at Tawau Hills Park, all of which are relatively common and have been previously collected at Gunung Danum.

G. propinqua Ridl.

Ht. 0.7-1 in. Lvs. dark green above with purplish tinge underneath. Sterile bracts green. Flowers pale orangish yellow, with 4 anther appendages. Occasionally found in forest shade, along river banks, along trail 1. Alt. 285m. (HI 464). Several individuals were also observed near the waterfall of trail 2.

G. pendula Roxb.

Ht. 60 cm. Flowers orange with 2 anther appendages. Lvs. hairy underneath. Common in moist areas in forest shade. Alt. 215-285m. Trail I and trail 5. (HI 465, HI 511). This is one of the most common species of strewn or river banks or wet habitats in Peninsular Malaysia.

G. franciscii Ridl.

Ht. 50-75 cm. Yellowish orange or sometimes orange flowers with 2 anther appendages. Lvs. glabrous with purplish tinge underneath. Fruits ribbed. Common along river bank, under forest shade. Sometimes growing in semi-exposed habitats. Alt. 285-290m. Trail 1, trail 5. (HI 469, HI 470, HI 471, HI 511).

This species was one of the most common globbas encountered during the expedition, especially along trail 1. It is easily identified in the field by the wide-spreading cincinni of the inflorescence, with distinctly pedicellate flowers and 2 little appendages (a few millimetres long) on the filament above the labellum. This plant has been successfully propagated in Rimba Ilmu Botanic Garden of University of Malaya and could be

popularized as a potted ornamental plants as flowering is non-seasonal and propagation is easy.

TRIBE: HEDYCHEAE

Genus: *Boesenbergia*

B. pulchella (Ridl.) Merr.

Ht. 30-40cm. Flowers white, midlobe of labellum red. Forest shade. Alt. 285m. Trail 1. (HI 466). This is the most common *Boesenbergia* sp. encountered in Tawau Hills Park as well as in Tabin Forest Reserve and on Gunung Danum, It forms part of the ground flora, especially in areas around the base camp.

Genus: *Hedychium*

Hedychium cf. muluense R.M. Smith.

Ht. 50 cm. Epiphyte on trees. In vegetative state, with its inflorescence just appearing. Lvs. leathery and glabrous. Trail I and near base camp. (HI 474). Although this epiphytic ginger is more commonly encountered than *Burbridgea schizocheila* (epiphytic), in particular in the vicinity of the base camp, all specimens sighted were not flowering. Hence it can only be recorded as comparable to *Hedychium muluense*, based on the similar vegetative characters. It appears to be more common here than Gunung Danum. This species seems to favour lower elevations.

Genus: *Scaphochlamys*

According to present records, *Scaphochlamys* is a small genus in Borneo with only 5 species reported so far. Species diversity is higher in Peninsular Malaysia with a record of 19 species, excluding new undescribed species and subspecies. Some species are known to withstand dry and exposed habitat conditions. Only 1 species was observed in the Park, mainly around the base camp.

S. petiolata (K. Schum.)

Ht. 25cm. Lvs. glabrous. Petals white, midlobe of labellum yellow. Semi exposed. Alt. 265m. Near base camp. (HI 501).

TRIBE: ZINGIBEREAE

Genus: *Zingiber*

This is a rather difficult genus to identify without the flowers. Six collections were made, of which 2 specimens are similar and 2 specimens are suspected to be new and undescribed. Most zingibers are distinguished vegetatively by the pulvinus petioles but in the smaller sized species this character is not so prominent. Nearly all species bear an erect radical inflorescence. In a few

exceptions the inflorescences are prostrate and in Borneo there is only I report of *Zingiber* with a terminal inflorescence (Ibrahim, 1989).

Zingiber sp. 1.

Ht. 3m. Long infl. stalk *ca.* 52cm. Infl. length *ca.* 20cm. Rhizome slightly aromatic. Forest shade. Aft. 285m. Trail 1. (HI 462).

Zingiber sp. 2.

Ht. 3-4m. Long infl, *ca.* 80cm. from the ground. Infl. rachis *ca.* 20cm. Infl. bracts light brown with greenish margin. Flowers lemon yellow. Fully shaded. Alt. 285m. Trail 1. (HI 467). Probably a new undescribed species.

Zingiber pseudopungens R.M. Smith.

Ht, 2-2.5m. Infl. deep red, prostrate. Infl. bracts with lacy edges. Long prostrate peduncle. Rhizome aromatic. Full forest shade. Able to survive in wet habitats or flooded areas. Alt. 190-225m. Campsite, trail 5. (HI 487, HI 508).

Zingiber cf. gracile Jack.

Ht. 1.4m. Infl. *ca.* 25cm. long with short peduncle. Fleshy rhizome, ginger-like smell. Rhizome purplish in cross-section. Infl. bracts pinkish red. Flowers cream. Alt. 300m. Base camp. (HI 497). This species is comparable to *Z. gracile* but differs slightly in having ovate leaves. Possibly it belongs to the *Z. gracile* complex.

Zingiber sp. 3

Ht. 3-4m. Erect infl. 60cm. above the ground. Infl. bracts light green with yellowish and reddish tinge. Forest shade, in some areas partially exposed. Alt. 215m. Trail 5. (HI 5 10). This species appears to be closely related to *Zingiber albiflorum* from the characteristics of its inflorescence bracts. Another suspected new species or variety.

SUBFAMILY: COSTOIDEAE

Genus: Costus

C. globosus Bl.

Ht. 1.5m. Infl. bracts spiny. Flowers large, yellow, throat of labellum white. Edge of the river bank near the waterfall along trail 2. Alt. 295M. (HI 486).

C.globosus Bl.

Ht. 2.5-3m. Lvs. smaller than normal. Flowers orange, smaller than usual. Growing in total shade but on damp soft sandy soil near the river bank, Sg. Junob of trail 3. Alt. 1 00m. (HI 490). Another colour variant of *C globosus* which is not common. Further up Sg. Junob, along the river bank, several clumps of *C globosus* with orange flowers (large size) were found.

C. speciosus (Koenig.) Sm.

Ht. 2-3m. Very common along the cocoa estate track to Sg. Mantri. Widespread distribution.

CONCLUSION

Generally, the pattern of species distributions is similar among most areas that have been surveyed. Where the forest is disturbed, we can expect a pre-dominance of common species indicative of such habitats, namely, several *Etilingera* species, *Costus speciosus* and other smaller gingers such as *Boesenbergia pulchella*. However, the primary forests are rich in uncommon species and hence there is a higher chance of discovering new undescribed species, subspecies or varieties. Members of the tribe Alpineae are predominant in the ginger flora of Tawau Hills Park followed by Zingibereae, Globbeae and Hedycheae.

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