

Five New Records of Terrestrial and Lithophytic Orchids (Orchidaceae) from Penang Hill, Malaysia

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Abstrak: Lima rekod baru spesies anggerik tanah dan litofitik telah diperolehi dari Bukit Bendera, Pulau Pinang, Malaysia iaitu *Bulbophyllum depressum*, *Goodyera pusilla*, *Peristylus monticola*, *Podochilus microphyllus*, dan *Zeuxine gracilis*. Satu senarai semak untuk setiap spesies dan taburannya di Bukit Bendera dibincangkan.

Kata kunci: Orchidaceae, Rekod Baru, Litofitik, Bukit Bendera

Abstract: Five new records of terrestrial and lithophytic orchid species were gathered from Penang Hill, Pulau Pinang, Malaysia namely *Bulbophyllum depressum*, *Goodyera pusilla*, *Peristylus monticola*, *Podochilus microphyllus*, and *Zeuxine gracilis*. Checklist of each species is provided and their distribution in Penang Hill is discussed.

Keywords: Orchidaceae, New Records, Lithophytic, Penang Hill

INTRODUCTION

Botanical surveys in Pulau Pinang have started since colonial time the 1790s, thus assessment on the diversity of orchids in Penang Hill is not a new topic. Two prominent studies on the orchid flora of Penang Hill had been done previously by Curtis in 1894 and later after 115 years, Curtis's account was re-evaluated by Rusea *et al.* (2011) through a series of comprehensive field assessments in 2004–2008. Their work resulted in a total of 136 species of orchids known to Penang Hill, with 44 species being terrestrial or lithophytic. Our study is a continuation of Curtis's and Rusea's works, aimed at investigating and documenting new records of terrestrial and lithophytic orchids in Penang Hill with reference to their current conservation status. Rapid physical development has happened in recent years — converting forest land for recreational purposes worsened by human interventions and the local climate change — and have put the orchids and their habitat under serious threats. For example, the slipper orchids, *Paphiopedilum barbatum* is no longer common in Penang Hill as

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compared to many years ago due to human activities and the destruction it had caused (Khor *et al.* 1991).

MATERIALS AND METHODS

Comprehensive field surveys were carried out in Penang Hill from November–December 2012 and January–March 2013. Nine areas were thoroughly botanised namely the Summit Road, Government Hill, Tiger Hill, Western Hill, Tunnel Road West, Tunnel Road East, Lower Tunnel Road, Viaduct Road, and Jeep Track. Terrestrial and lithophytic orchids were collected along the trails. Dried and spirit herbarium specimens were deposited in the Herbarium of the School of Biological Sciences, Universiti Sains Malaysia (USM) based on techniques described in Bridson and Forman (1989). Living specimens collected without flowers were cultivated in the Flora Garden of the School of Biological Sciences, USM for future identification studies and ex-situ conservation purposes.

RESULTS

Species account of five newly recorded terrestrial and lithophytic orchid species from Penang Hill is discussed below. The colour plates of specimens cited are shown in Figure 1 (a–f).

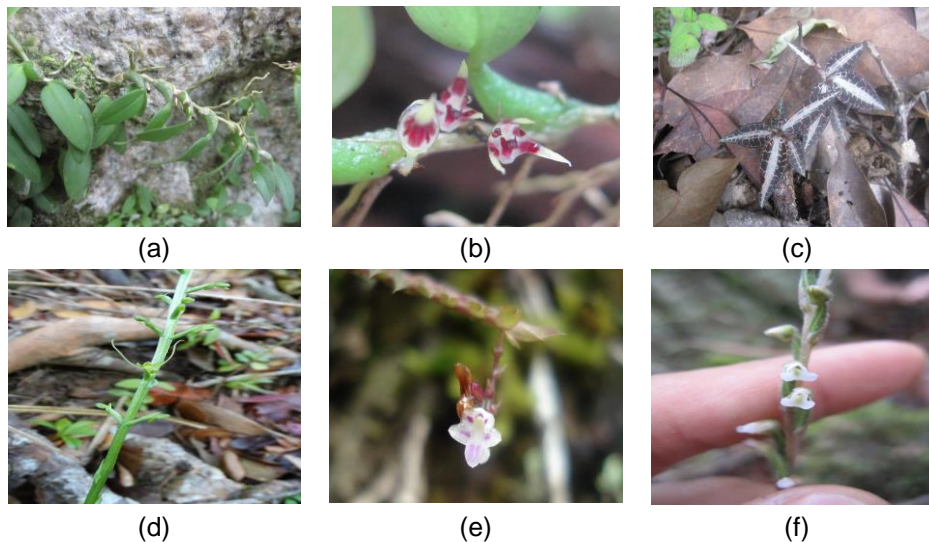


Figure 1: Five new records of terrestrial and lithophytic orchids from Penang Hill: (a) *Bulbophyllum depressum* (habit); (b) *B. depressum* (flower); (c) *Goodyera pusilla* (habit); (d) *Peristylus monticola* (flower); (e) *Podochilus microphyllus* (flower); and (f) *Zeuxine gracilis* (flower).

***Bulbophyllum depressum* King & Pantl.**

Figure 1(a) (habit) and Figure 1(b) (flower).

PENINSULAR MALAYSIA, PULAU PINANG: Penang Hill, Government Hill, lithophytes, growing on mossy rock boulders in a natural trail at about 700 m, S.Y. Nga (NGA06), 11/12/2012 (USM).

Note: Flowering in May (in cultivation).

***Goodyera pusilla* Blume**

Figure 1(c) (habit).

PENINSULAR MALAYSIA, PULAU PINANG: Penang Hill, Lower Tunnel Road, Government Hill, and Western Hill, terrestrial, creeping on the shady and damp forest floor among leaf litter at 686 m, S.Y. Nga (NGA02), 11/12/2012 (USM).

***Peristylus monticola* (Ridl.) Seidenf.**

Figure 1(d) (flower).

PENINSULAR MALAYSIA, PULAU PINANG: Penang Hill, Western Hill, terrestrial/lithophytes, growing on the hilly slope by the roadside at about 830 m, S.Y. Nga (NGA34), 08/03/2013 (USM).

***Podochilus microphyllus* Lindl.**

Figure 1(e) (flower).

PENINSULAR MALAYSIA, PULAU PINANG: Penang Hill, Tiger Hill, lithophytes, creeping on damp mossy rocks by a stream, S.Y. Nga (NGA24), 08/03/2013 (USM).

***Zeuxine gracilis* (Breda) Blume**

Figure 1(f) (flower).

PENINSULAR MALAYSIA, PULAU PINANG: Penang Hill, Tunnel Road West, terrestrial, growing on open ground among *Zeuxine affinis*, S.Y. Nga, (NGA18), 06/01/2013 (USM); Penang Hill, Government Hill, Convalescent Bungalow, terrestrial, large populations were observed among *Z. affinis* and *Zeuxine rupestris* on a grassy ground shaded by historical conifer stands (*Dacrydium* sp.), F.A. Nordin (FAN.PH.660), 11/12/2013 (USM); Penang Hill, Government Hill, Mohd Haniff, 1910 (SING).

Note: Flowering from December–January.

DISCUSSION

The discovery of *B. depressum* (Fig. 1[a] and [b]) in Penang Hill has contributed towards the current knowledge of its occurrence in Peninsular Malaysia. Originally collected from West Sumatra and Bengkulu, *B. depressum* can be found from East Himalaya to China, Borneo, and Java (Comber 2001; World Checklist of Selected Plant Families [WCSP] 2015). Vermeulen (1991:161) in Seidenfaden and Wood (1992) mentioned the occurrence of *B. acutum* J.J.Sm. (synonym of *B. depressum*) in West Malaysia, however there was no information on the locality of the collected specimens. A Borneo entity deposited in the

Singapore Herbarium (SING) under collection number SFN27244 was collected by C. E. Carr from Bundu Tuhan, Sabah in 1933. Later Seidenfaden and Wood (1992) reported that they received a collection (collection no.: Thaitong966) of *B. depressum* from Chumporn, Peninsular Thailand deposited in SING which evidently supported the occurrence of this species in Peninsular Malaysia (SING 2014).

Based on our observation in Penang Hill, *B. depressum* is only known from one locality in Government Hill and the population size is small. The plants were creeping on a wet rock boulder of the granite slope along a forest track which will soon be opened to public as a recreational trail. Further investigation and documentation of *B. depressum* is urgently needed, as the relationship of this species and other members of the section Micromonanthae in Peninsular Malaysia has long been of scientific interest.

G. pusilla (Fig. 1[c]) is a rare northern Peninsular Malaysia entity previously known only from Perak and Kedah (Turner 1995). Confined to hills and lower montane forests of about 1000 m, the leaves of *G. pusilla* are very attractive in dark-purple shades with intense silvery midrib, and are ornamented with reddish netted veins on the surface of the foliage. Due to this uniqueness, *G. pusilla* is awarded as one of the “jewel orchids”. Unfortunately, it is also threatened by over-collection and habitat loss. During our visit to Penang Hill in December 2012, we observed that the habitat and populations of *G. pusilla* in the Lower Tunnel Road were exposed to human activities and threatened with destruction. Most of the plants were left only with the stem on the ground as the leaves were spoilt from grass cutting activities.

The same worrying condition was also observed for *P. monticola* (Fig. 1[d]) in Western Hill, which is the only known locality for *P. monticola* in Penang Hill. The population was very small with less than 10 individuals within an area of about 10 m². *P. monticola* grows on open places in hills and montane forests as in Western Hill (highest peak) where they grew on the exposed hilly slope by the roadside and few individuals managed to escape and thrived at the edge of the tarred-road. Our observations indicate that the populations of *P. monticola* in Gunung Jerai (Kedah) and Gunung Ledang (Johor) were found at higher elevations (1200–1300 m) compared to Penang Hill (830 m) and were more widely distributed.

However, we believe that there are more individuals of *P. monticola* around as this species has underground tubers that sometimes remain dormant until suitable condition for them to produce new green shoots existed. There is a concern though whereby the slope where the population of *P. monticola* was found on Western Hill was bare without any ground-covering herbs, which may be wiped off by mudslides during rainy days.

Another interesting discovery is *P. microphyllus* (Fig. 1[e]) in Tiger Hill. This lithophytic species was found growing densely on rocks covered in mosses by a small creek and its epiphytic form was spotted established nearby on mossy tree trunks. Surprisingly a new record to Penang Hill, this species is common and widespread in other parts of Peninsular Malaysia, distributed from lowlands to hills up to lower montane forests. Based on Curtis (1894), Turner (1995), and Rusea et al. (2011), another species of *Podochilus* was recorded from Penang

Hill, which is *P. tenuis*. In a glance, both *P. microphyllus* and *P. tenuis* look almost similar in vegetative size, habits, flower colour, and shape but the former differs in having elliptic leaves of about 2 mm wide while the latter is narrower (1 mm wide) and the leaves are more closely-arranged. In Gunung Jerai as an example, both species were found growing together in a population of the same habitat, thus the occurrence of *P. microphyllus* in Penang Hill might have been overlooked before.

As compared to the other four new records mentioned, *Z. gracilis* is the most widespread species in Penang Hill. They are known from more than three localities, concentrated mainly in Tunnel Road West and Government Hill. A historical collection of *Z. gracilis* by Mohd Haniff in 1910 (SING) was recorded from Government Hill. Along the tarred-road in Top Station, populations of *Z. gracilis* can be seen growing on open and semi-shaded areas among grasses and *Tainia penangania*. *Z. gracilis* is always being confused with *Z. affinis* but differs in having a smaller flower size and the presence of a yellow-notch on the lip. Much more information is needed about this particular genus in Peninsular Malaysia as most of the species were still under studied. Only 2 out of 10 Peninsular Malaysia species have been reported from more than one locality (Seidenfaden & Wood 1992). *Z. gracilis* has only been known from Ulu Tembeling in Pahang, however our field observation records showed that this species was also found in Gunung Ledang and Gunung Jerai at about 900–1200 m asl. The Convalescent Bungalow area in Government Hill was found to be a “nursery” for *Z. gracilis*, *Z. affinis*, and *Z. rupestris*. A small grassy patch of about 25 m² was covered with populations of this three *Zeuxine* species. We propose that this particular area be conserved and protected from any human or physical disturbances as *Z. rupestris* is a rare species, collected only once in 1892 and is endemic to Penang Hill (Ridley 1907; Ridley & Hutchinson 1924; Holttum 1964; Seidenfaden & Wood 1992; Turner 1995; SING 2014; KEW 2014).

Up to date, none of the species have been assessed and assigned with current conservation status from The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN 2015). Terrestrial and lithophytic species are very fragile as compared to their epiphytic sisters. Once their habitats are disturbed, the chances for the population to survive are very minimal. Relying on specific soil mycorrhiza for food at their early stage of development, any changes to their surrounding microhabitat might lead to local extinction. In situ conservation is highly recommended in order to protect their habitat and population in Penang Hill as they were obviously threatened with physical developments, human interventions, and climate change.

CONCLUSION

This finding has contributed towards the current knowledge on terrestrial and lithophytic orchids in Penang Hill. To date, a total of 49 species of terrestrial and lithophytic orchids are known to Penang Hill. The discovery of *B. depressum* has provided new information on its occurrence in Peninsular Malaysia, thus making it a new record for both Peninsular Malaysia and Penang Hill. Except for *Z. gracilis*, the other four species, *B. depressum*, *G. pusilla*, *P. monticola*, and *P. microphyllus*, were only known from less than three localities in Penang Hill with a small population size.

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