

CORYBAS A HIGHLY ENDEMIC AND ENDANGERED ORCHID GENUS IN PENINSULAR MALAYSIA

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Corybas is an orchid genus that consists of about 131 known species in the world (The Plant List, 2010) but only eleven species were recorded in Peninsular Malaysia (Ridley, 1925; Holttum, 1964; Royen, 1983; Dransfield et. al., 1986; Seidenfaden & Wood, 1992; Turner, 1995; Schuiteman et. al., 2008), of which 8 species are endemic. There are 910 known species in 146 genera of orchid species in Peninsular Malaysia of which 198 (21.8%) are endemic (Rusea et al., 2010). The genus with one or more tiny tuberous one-leaved, single-flowered herb. In Peninsular Malaysia, they are terrestrial orchids that can only be found in the mossy forest with elevation of above 1000 meter above sea level (a. s. l.) in montane forest or ever-humid and wet limestone outcrops.

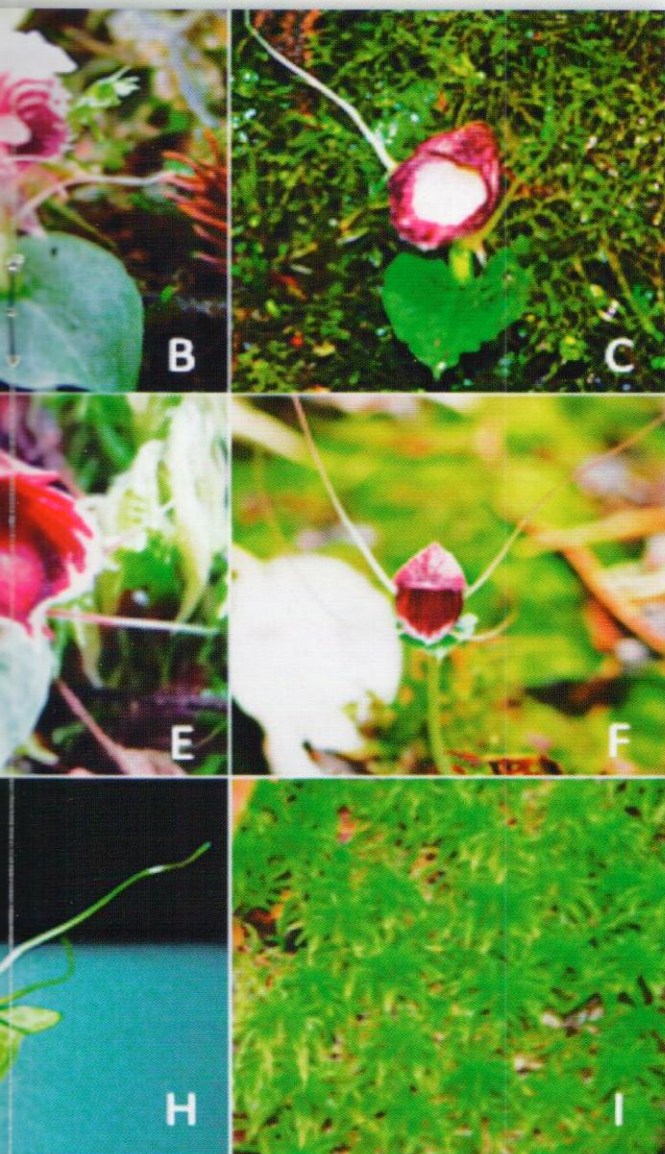
Corybas fascinating colour and special morphology has contributed to its common name known as "spider orchid" or "helmet orchid" based on its floral structures. It has a slender stem, bears a single flower just above of its single small heart-shaped (cordate) leaf with pale green, white or red veins. It is a very small plant of a few centimeters in height. Among the three sepals, dorsal sepal is large and erect from the base with broad hooded apex. Comparatively, lateral sepals and petals are narrow and thread-like, which sometimes longer than the size of the whole flower and spread like whiskers. Lip is erect from a tubular base with two short spurs. As noted by Holttum (1964), the pedicel of Corybas is very short during flowering, but elongates very much in fruit, which give the seeds a better chance of dispersal.



Figure 1. The eight species of Corybas. A. *Corybas calopeplos*; B. *Corybas carinatus*; C. *Corybas holttumii*; D. *Corybas ridleyanus*; E. *Corybas holttumii*; F. *Corybas ridleyanus*; G. *Corybas holttumii*; H. *Corybas ridleyanus* in mosses carpeted forest floor.



Figure 2. *Corybas* habitat, Genting Highlands (above) and Cameron Highlands (below).



Corybas recovered during this study.
 B. *Corybascomptus*; D. *Corybas geminigibbus*; E.
Corybas selangorensis; H. *Corybas villosus* and I.
 or favourable for their growth.

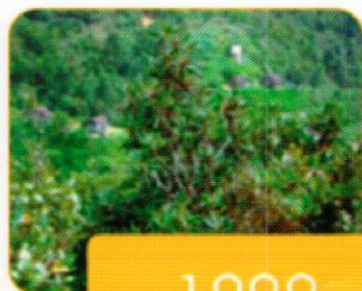
Genus *Corybas* prefer a cooler climate like in highlands and mountains to provide a suitable habitat and environment for their growth. In Peninsular Malaysia, montane forests are the forest vegetation, which endows the flourish of *Corybas* spp. with cool and humid breeze from the atmosphere, and high accumulation of moisture by epiphytic bryophytes, moss-covered tree limbs and the thick forest floor litter. Most of the species are growing on mossy banks, mountain rocks or ridges-tops in montane forests. Some of the species like *C. ridleyanus*, *C. holttumii* and *C. villosus*, often grows among *Sphagnum* carpets which is believed to assist in their propagation and growth.

Highlands regions in Peninsular Malaysia are mostly concentrated on the main range, the Titiwangsa Range. It gives to the formation of the montane forest at the spinal cord of Peninsular Malaysia. Undoubtedly, today climate change and human activities have affected the habitat of many organisms, especially to the highland species. Genting Highlands and Cameron Highlands are two major highland habitat in Peninsular Malaysia that has been greatly fragmented and developed into popular eco-tourism hotspot in South East Asia. The natural environment and its general ecology has been seriously altered, including the orchid species population where species that are sensitive to drastic environmental changes would be threatened to extinction due to their inability to adapt accordingly.

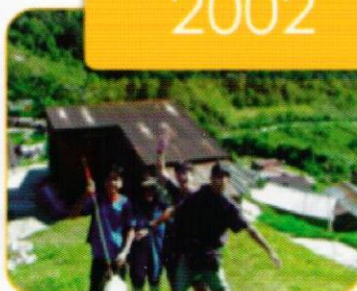
According to Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), all *Corybas* species in Peninsular Malaysia are under CITES Appendix II since 2003 (CITES, 2009). Undeniably, *Corybas* species deserve due attention and conservation effort as their loss could domino effect on other precious organisms within the ecosystem. They are potentially considered as the "panda" in the orchid's world. WWF-Malaysia (2010) reported that "our Main Range is not as cool as it once was" and the massive forest clearing is believed to be the main culprit. Genting Highlands and Cameron Highlands are the two major area



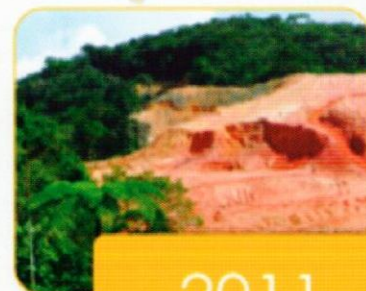
2009



1999



2002



2011

Highlands (below) showing the degraded montane forest in Peninsular Malaysia over a period of time.

threatened by the forest clearance activities with the evidence of temperature increased recorded in that area. Consequently, natural habitat of orchids is undoubtedly destructed. Forests and species are physically and genetically fragmented by logging activities (Dixon et al, 2003), which caused population decreased and gene pool weakening. Malaysian total known species, distribution, habitat preferences and conservation status are listed in Table 2 and (Figure 1) shows some species photographed in-situ. Two major threats faced by all the montane plant species in the tropical countries are local climatic changes and conversion of forested area to other land use. Through our observations over the years, all *Corybas* species are found going among mosses especially *Sphagnum* and some leafy liverworts. Mosses carpeted forest floor in the montane region are seen depleting drastically in all the above 1000m mountain peaks in Peninsular Malaysia. The best examples are Gunung Ulu Kali, Genting Highlands and Pine Tree Hill, Fraser's Hills, both on the Titiwangsa Range which is the back bone for Peninsular Malaysia. (Figure 2) shows the depleting mosses carpeted forest floor in both mountain peaks over a ten years period from 1999. Temperature raise and humidity fall are two key parameters that significantly impacting the survival of many mountain peak endemic species in Peninsular Malaysia (Ng et al, 2011.).

Corybas major weakness is their sensitiveness and slow adaptation to environmental changes even in their natural habitat. *Corybas* species are definitely unable to adapt quickly as other plants to the rapidly changing surroundings, proven by their small population in scattered patches in the forest. Being unable to adapt quickly makes conservation of their natural population is the only chance for them to survive, which could be accomplished through rehabilitation of their surrounding habitat. It is proposed that all *Corybas* species endemic to Peninsular Malaysia be categorized as Critically Endangered with criteria A1(c) (IUCN Red List 2001, Version 3.1) being met by all the 8 endemic species namely *Corybas calcicola*, *Corybas calopeplos*, *Corybas caudatus*, *Corybas holttumii*, *Corybas ridleyanus*, *Corybas selangorensis* and *Corybas villosus*. Further research on the ex situ conservation techniques for this elusive and sensitive ground orchid should be an immediate priority to safe guard their survival. However, in situ conservation remains the best conservation approach for biodiversity. Current global climate change also impacted major mountain regions in Peninsular Malaysia with evidence of thinning and declining area of mosses carpeted forest floor seen in Genting Highlands, Pahang where 5 *Corybas* species are recorded as well as Cameron Highlands where the hill has been cleared for residential (Figure 2).

Table 1. The total known species of *Corybas* found in Peninsular Malaysia with their distribution, habitat preferences and conservation status.

Species	Distribution		Habitat	Conservation Status in Peninsular Malaysia
	World	Peninsular Malaysia		
<i>Corybas calcicola</i> J.Dransf. & G.Sm. #	Malaysia	Kelantan / Selangor / Pahang	Limestone Forest	Rare And Endemic To Three Localities
<i>Corybas calopeplos</i> J.Dransf. & G.Sm.*#	Malaysia	Kedah / Pahang	Mossy Montane Forest	Rare And Endemic To Two Localities
<i>Corybas carinatus</i> (J.J.Sm.) Schltr.*	Malaysia Indonesia	Perak / Pahang / Johore	Mossy Montane Forest	Widespread But In Small Populations
<i>Corybas caudatus</i> Holttum #	Malaysia	Pahang	Mossy Montane Forest	Very Rare And Endemic To One Locality
<i>Corybas comptus</i> J.Dransf. & G.Sm.*#	Malaysia	Pahang	Mossy Montane Forest	Rare And Endemic To Two Localities
<i>Corybas fornicatus</i> (Blume) Rchb.f.	Malaysia Indonesia	Pahang	Montane Forest	Rare And Only From One Locality
<i>Corybas geminibbus</i> J.J.Sm.*	Malaysia Indonesia	Kedah	Mossy Thick Humus In Montane Forest	Abundant But Only Known From One Locality
<i>Corybas holttumii</i> J.Dransf. & G.Sm.*#	Malaysia	Pahang	Mossy Montane Forest	Rare And Endemic To Two Localities
<i>Corybas ridleyanus</i> Schltr.*#	Malaysia	Pahang	Mossy Upper Montane Forest	Rare And Endemic To Two Localities
<i>Corybas selangorensis</i> J.Dransf. & G.Sm.*#	Malaysia	Selangor / Pahang	Mossy Montane Forest	Rare And Endemic To Three Localities
<i>Corybas villosus</i> J.Dransf. & G.Sm.*#	Malaysia	Selangor	Mossy Upper Montane Forest	Rare And Endemic To One Locality

Legend: * species recovered during this study
species endemic to Peninsular Malaysia

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