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Orchids of Cloud Forest in Genting Highlands, Pahang, Malaysia (Anggerik Hutan Awan Genting Highlands, Pahang, Malaysia)

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ABSTRACT

An inventory of orchid species diversity was carried out in cloud forest of Genting Highlands, which is one of the most developed highland areas in Peninsular Malaysia. Since 1967, construction of roads and hotel complexes has had a serious impact on its physical environment and vegetation. Habitat destructions together with climate change might have caused some orchid species to be extirpated locally or extinct. The cloud forest of Genting Highlands consists of four major peaks, Gunung Ulu Kali, Gunung Chin Chin, Gunung Lari Tembakau and Gunung Mengkuang. However, not much study on orchid diversity was conducted in these areas, therefore, this study is timely and essential to evaluate the current orchid diversity after a gap of three decades. Combined findings from the current study, previous published works and specimens deposited in local herbaria, including those at the Universiti Malaya, Universiti Kebangsaan Malaysia, Forest Research Institute of Malaysia and Biology Department, Faculty of Science, Universiti Putra Malaysia and Singapore Botanic Gardens, an updated list of orchid species found in the cloud forests of Genting Highlands is presented. A total of 134 orchid taxa were recorded, comprised of 51 genera, 132 species, 1 subspecies and 2 varieties, of which 46 are new records to Genting Highlands. Hymenorchis javanica, a species previously reported as endemic to West Jawa was recently discovered in Gunung Ulu Kali. Thirty-three species discovered during this study are currently classified as endemic to Peninsular Malaysia, of which 20 are endemic to Pahang, Perak and Selangor and a very narrowly endemic species; Corybas villosus to Gunung Ulu Kali. Through our observations, most of the orchid species in Gunung Ulu Kali are very susceptible to disappearance due to loss of habitat and local climate change. An assessment of conservation status according to IUCN criterion revealed that 47 orchid taxa from Gunung Ulu Kali were threatened with extinction. Conservation actions were suggested to conserve the orchid diversity in the cloud forest areas of Genting Highlands.

Keywords: Cloud forest; Genting Highlands; Orchids; Pahang

ABSTRAK

Inventori kepelbagaian spesies anggerik telah dijalankan di hutan awan Genting Highlands, yang merupakan salah satu kawasan tanah tinggi yang paling membangun di Semenanjung Malaysia. Sejak 1967, pembinaan jalan raya dan kompleks hotel mempunyai kesan yang serius ke atas alam sekitar fizikal dan tumbuh-tumbuhan. Kemusnahan habitat bersama-sama dengan perubahan iklim mungkin menyebabkan beberapa spesies anggerik mengalami kepupusan tempatan. Hutan awan Genting Highlands terdiri daripada empat puncak utama, Gunung Ulu Kali, Gunung Chin Chin, Gunung Lari tembakau dan Gunung Mengkuang. Walau bagaimanapun, tidak banyak kajian kepelbagaian anggerik telah dijalankan di kawasan ini. Oleh itu kajian ini adalah tepat pada masanya dan penting untuk menilai kepelbagaian anggerik semasa selepas jurang tiga dekad. Gabungan penemuan daripada kajian semasa, kerja sebelumnya yang telah diterbitkan dan spesimen yang disimpan di herbaria, termasuk Universiti Malaya, Universiti Kebangsaan Malaysia, Institut Penyelidikan Perhutanan Malaysia dan Jabatan Biologi, Fakulti Sains, Universiti Putra Malaysia dan Singapore Botanic Gardens, maka senarai terkini spesies anggerik yang ditemui di hutan awan Genting Highlands diperuntukkan. Sejumlah 134 takson anggerik telah dicatatkan, terdiri daripada 51 genus, 132 spesies, 1 subspesies dan 2 varieti, yang mana 46 daripadanya adalah rekod baru untuk Genting Highlands. Hymenorchis javanica, spesies yang dilaporkan sebelum ini sebagai endemik kepada Jawa Barat baru-baru ini ditemui di Gunung Ulu Kali, merupakan rekod baru untuk Malaysia. Tiga puluh tiga spesies yang dijumpai semasa kajian ini kini dikelaskan sebagai endemik kepada Semenanjung Malaysia, 20 daripadanya adalah endemik kepada Pahang, Perak dan Selangor, dan 1 spesies yang sangat sempit endemiknya; Corybas villosus adalah endemik kepada Gunung Ulu Kali. Melalui pemerhatian kami, kebanyakan spesies anggerik di Gunung Ulu Kali yang sangat terdedah kepada kepupusan disebabkan oleh kehilangan habitat dan perubahan iklim setempat. Suatu penilaian status pemuliharaan mengikut kriteria IUCN mendapati bahawa 47 takson anggerik dari Gunung Ulu Kali diancam kepupusan. Usulan pemuliharaan adalah disyorkan untuk memulihara kepelbagaian anggerik di kawasan hutan awan Genting Highlands.

Kata kunci: Anggerik; Genting Highlands; hutan awan; Pahang

INTRODUCTION

Genting Highlands is located at 3°25'45"N and 101°30'24"E in Bentong District which is only 50 km from Kuala Lumpur, the capital city of Malaysia. It lies within the Titiwangsa Range (Main Range) and is on the Pahang and Selangor border. The summit region of Genting Highlands together comprises of Gunung Ulu Kali, Gunung Chin Chin, Gunung Mengkuang and Gunung Lari Tembakau also Gunung Purun, which is totally replaced by hotels and amusement park complexes, is one of the most disturbed cloud forests in Malaysia. Gunung Ulu Kali which is approximately 1770 m above sea level is the highest peak of the summit region.

Prior to this study, there were three different published floristic studies that directly included this part of Genting Highlands as locality of their studies (Ridley 1924; Piggott 1977; Stone 1981; Salifah et al. 2009). Stone's study on the summit flora of Gunung Ulu Kali was carried out in 1978 and was published in 1981. In the study, it was indicated that the temperature of the summit region of Gunung Ulu Kali ranged from 21-23°C during the day and dropped to 10°C at night. The relative humidity may drop below 60% and evaporation rate was high in windy days (Burgess 1969). However meteorological data provided by The Resorts World Sdn. Bhd. showed that mean monthly air temperature during 1994-1995 was 19.7°C with a mean annual rainfall of 3534 mm and mean relative humidity of 53.7% (Chua & Saw 2001). Recent data by Kamarulzaman et al. (2009) using Automated HOBO Weather Station installed at Gunung Ulu Kali recorded mean temperature was 16.5°C, mean annual rainfall was 2339 mm, mean relative humidity was 91.3%. Temperature and humidity readings by the authors recorded that day time temperature ranged from 12-18°C under canopy cover and 14-24°C in the open area, with relative humidity reached 85%.

Stadtmuller (1986) defined cloud forest as forests in the humid tropics that are frequently covered by clouds or mist; thus receiving additional humidity, other than rainfall, through the capture and/or condensation of water droplets (horizontal precipitation), which influences the hydrological regime, radiation balance, and several other climatic, edaphic and ecological parameter. The cloud forests of Genting Highlands are those of the upper montane forest type. Its forest floors mainly covered by mosses even up to the trees. However, Whitmore and Burnham (1969), described the critical range of transitional altitude from lower montane forest to upper montane forest in Genting Highlands is between 4000 ft. (1220 m) to 5400 ft. (1646 m). In the sheltered area of Genting Highlands, the lower montane forest may ascend to 1646 m, while in exposed area the upper montane forest may descend to 1220 m. Certain forest areas of the summit of Genting Highlands considered as elfin forest, which is the sub-type of upper montane forest. Its stunted and twisted trees characterize the elfin forest. The elfin forest in Genting Highlands with its canopy of 5-7 m or less has dense and flattened crown, and with coriaceous leaves and is indicated by its

species such as *Dacrydium comosum* and *Leptospermum flavescescens*, while the indicator species for upper montane forest are *Lithocarpus cyclophorus*, *Garcinia cantleyana* var. *grandifolia*, *Exbucklandia populnea* and *Pandanus klossii* (Stone 1981).

Genting Highlands was an undisturbed virgin forest until year 1967, when Lim Goh Tong founded it, and started to develop it into a tourism site well-known as casino, entertainment and hotel complex. Before the establishment of casino and hotel complex, this area could only be reached by trekking through the jungle. The earliest development was a road branching off from Kuala Lumpur – Kuantan trunk road through the Genting Sempah to the summit area which was constructed in 1967 (Piggott 1977; Stone 1981). To date, Genting Highlands has been developed into the most famous tourism site in Malaysia that attracted 19.2 million visitors in 2008. It consisted of six hotels with 10,000 rooms, 170 dining and shopping outlets, golf course, farms and other facilities as well (Genting Malaysia Berhad 2010).

Consequently, the development in Genting Highlands has significantly affected the cloud forest in its summit regions. The changes in species composition observed by Chua and Saw (2001), revealed that there have been severe environmental changes at Genting Highlands. They also suggested that the fragmentation of forests may have some negative impacts on certain plant species, while others may not be affected. Salifah et al. (2009) reported that much of Genting Highlands area has lost its original biodiversity due to human activities as 80.5% of pteridophytes recorded by Piggott (1977) were not found in their study.

As for orchid flora, Stone (1981) recorded 45 orchid species comprises of 23 genera. However, there was no other comprehensive study on the orchid diversity of Genting Highlands for nearly 30 years after Stone's inventory. Undoubtedly, there were some factors that may affect the orchid diversity: (1) forest clearance for development, (2) local climate change and (3) illegal collection of valuable orchids. The continuous destruction of natural environment in this area coupled with the knowledge of high orchid diversity has enticed us to pursue this diversity study. The changes brought about by human activities and nature have been the key factors that create the urgency to inventory the orchid species in Genting Highlands and to evaluate their conservation status. This paper aimed to address two aspects; information on diversity and distribution of orchids and issues of natural habitat conservation and climate change.

MATERIALS AND METHODS

Orchid specimens were collected randomly from cloud forest habitat of Genting Highlands throughout the year of 2009. The sampling sites include summit regions of Gunung Ulu Kali, Gunung Chin Chin, Gunung Lari Tembakau, Gunung Purun and Gunung Mengkuang. Orchid specimens collected were preserved using standard herbarium method of Bridson and Forman (1992), then

deposited in Herbarium of Biology Department, Faculty of Science, Universiti Putra Malaysia (UPM). The flowers were kept in Copenhagen solution as spirit collection. For species identification, references used include Ridley (1924), Holtum (1964), Teo (1985), Seidenfaden (1992), Comber (1990 & 2001), Turner (1995), Rusea and Khali-Aziz (2008), Rusea et al. (2009) and Rusea et al. (2010). The names used here are according to the World Checklists of Selected Plant Families access online (Govaerts et al. 2008). Specimens in the local herbaria, Herbarium Universiti Kebangsaan Malaysia, Bangi (UKMB), Herbarium of Universiti Malaya (KLU), Herbarium Forest Research Institute of Malaysia (KEP), Herbarium of Biology Department, Universiti Putra Malaysia (UPM) and herbarium abroad, Herbarium of Singapore Botanic Gardens (SING) were also studied for identity verifications.

RESULTS AND DISCUSSION

A total of 134 orchid taxa were recorded, from 51 genera of which 46 are new records to Genting Highlands (Table 1). One species, *Thelasis* sp. is suspected to be new to

science, similar to the plant found in North Sumatra at 915 m a.s.l. suspected new by Comber (2001). However, Comber (2001) did not further describe nor publish the new species. Two species were found not only new to Genting Highlands but also to Peninsular Malaysia, *Dendrobium sociale* and *Hymenorchis javanica*. *Dendrobium sociale* was previously only recorded in Sumatera, Thailand and Vietnam (Govaerts et al. 2006). *Hymenorchis javanica* was claimed to be endemic to West Java (Comber 1990; Govaerts et al. 2008) and now it is also found in Genting Highlands. Most of the new records of orchids in Genting Highlands are found only in a few small populations. *Hymenorchis javanica* for example is confined to a single population on a few trees and *Paphiopedilum lowii* was recorded only with 2 small clumps, which are now totally missing from the location we spotted them then, as the spot is now part of the road expansion. No other plants were recorded, indicating rarity and vulnerability to local extinction with the current rate of forest conversion and environmental changes.

Endemism is known to be very high in highland habitats especially in the cloud forest region with altitude 1000 – 3000 m a.s.l. (Raxworthy et al. 2008),

TABLE 1. Orchid species found in the cloud forest habitat, Genting Highlands, Pahang

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Acriopsis ridleyi</i> Hook.f.		√	√	MFK057; NYJ240; BCS15331
	<i>Agrostophyllum cyathiforme</i> J.J.Sm	√	√		MCT002; NYJ136; NYJ160; NYJ223
	<i>Agrostophyllum glumaceum</i> Hook.f.	√	√		NYJ195
	<i>Agrostophyllum longifolium</i> (Blume) Rchb.f.		√	√	NYJ230
	<i>Agrostophyllum majus</i> Hook.f.	√	√		NYJ159; NYJ196; NYJ222
	<i>Agrostophyllum stipulatum</i> subsp. <i>bicuspidatum</i> (J.J.Sm.) Schuit.		√	√	NYJ080; OYS009
	<i>Agrostophyllum stipulatum</i> subsp. <i>stipulatum</i> (Griff.) Schltr.		√	√	NYJ194
	<i>Agrostophyllum</i> sp. A		√		NYJ233; NYJ235
	<i>Appendicula uncatata</i> Ridl.		√	√	FRI 60500; NYJ193; OYS017
	<i>Arundina graminifolia</i> (D. Don) Hochr.	√	√		FA011; FRI41051; FRI51458; FRI60494; KHE09034; MFK060; OYS006
	<i>Bromheadia brevifolia</i> Ridl.*	√			-
	<i>Bulbophyllum angustifolium</i> Lindl.	√	√		BCS15073; HUM9020; NYJ206
	<i>Bulbophyllum brevipes</i> Ridl.		√	√	BKSK0913; SHA002
	<i>Bulbophyllum diplantherum</i> Carr *	√			-
	<i>Bulbophyllum gibbosum</i> Lindl.	√			Gunung Mengkuang, 1912, H.C. Robinson, collection number n.a.

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Bulbophyllum grudense</i> J.J.Sm	✓			-
	<i>Bulbophyllum membranifolium</i> Hook.f.	✓			-
	<i>Bulbophyllum minutulum</i> Ridl. ex Burkill & Holttum	✓			-
	<i>Bulbophyllum mutabile</i> Lindl.	✓			-
	<i>Bulbophyllum obtusum</i> (Blume) Lindl.	✓	✓		FRI60481; FRI60493
	<i>Bulbophyllum stormii</i> J.J.Sm	✓			BCS14049
	<i>Bulbophyllum tenuifolium</i> Lindl.	✓			-
	<i>Bulbophyllum wrayi</i> Hook.f. *	✓			-
	<i>Bulbophyllum</i> sp. A		✓		NYJ042; NYJ114; NYJ156; NYJ165; SHA020; SHA060; SHA061
	<i>Bulbophyllum</i> sp. B		✓		NYJ232; SHA067
	<i>Calanthe aurantiaca</i> Ridl. *	✓			-
	<i>Calanthe lyroglossa</i> Rehb.f.	✓	✓		NYJ036; NYJ212; OYS007
	<i>Calanthe rigida</i> Carr *	✓			-
	<i>Ceratostylis ampullacea</i> Kraenzl.		✓	✓	BCS15072; Chan1209; FRI52580; MFK054; NYJ207; NYJ226
	<i>Ceratostylis eria</i> Govaerts *	✓	✓		BCS13539; BCS14141; FA023; FRI67344; NYJ034; OYS005; OYS022; SHA008
	<i>Ceratostylis gracilis</i> Blume	✓			-
	<i>Ceratostylis lancifolia</i> Hook.f. *	✓	✓		BCS14182; NYJ140; NYJ146
	<i>Ceratostylis pulchella</i> Holttum *	✓	✓		FRI41659; FRI64085; NYJ088; OYS033
	<i>Ceratostylis subulata</i> Blume		✓		FRI60551
	<i>Chelonistele sulphurea</i> (Blume) Pfitzer	✓	✓		FRI40674; NYJ153; NYJ161; SA329
	<i>Coelogyne kaliana</i> P.J. Cribb *	✓	✓		BCS14123-A; FA003; MS2963; NYJ154; NYJ162
	<i>Coelogyne cumingii</i> Lindl.	✓			J.K. Wong, 78822
	<i>Coelogyne prasina</i> Ridl.		✓	✓	FRI54165; FRI60555; MCT011; MFK058; NYJ041; OYS011
	<i>Coelogyne radicata</i> Ridl.	✓	✓		BCS13971; BCS15074; FA001; FA020; FRI50569; FRI58894; FRI60480; FRI60485; FRI60492; FRI60498; FRI60499; NYJ033; NYJ119; NYJ128; NYJ199; OYS037; RJ0398; SHA001; SHA011
	<i>Coelogyne tomentosa</i> Lindl.		✓	✓	FRI64090; MCT001; NYJ211

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Corybas carinatus</i> (J.J.Sm.) Schltr.	√			FMS20264
	<i>Corybas comptus</i> J.Dransf. & G.Smith *	√			-
	<i>Corybas holttumii</i> J.Dransf. & G.Smith *	√	√		NYJ244; RK1666
	<i>Corybas selangorensis</i> J.Dransf. & G.Smith *		√	√	NYJ245
	<i>Corybas villosus</i> J.Dransf. & G.Smith *#	√	√		NYJ246; SA713
	<i>Cryptostylis arachnites</i> (Blume) Hassk.	√	√		BCS10785; BCS13972; FRI44866; NYJ030; OYS002; NYJ121; SHA005
	<i>Cymbidium roseum</i> J.J.Sm.	√	√		NYJ228
	<i>Cyrtosia javanica</i> Blume	√			-
	<i>Dendrobium angustifolium</i> (Blume) Lindl.		√	√	MFK059
	<i>Dendrobium bifarium</i> Lindl.		√	√	NYJ213
	<i>Dendrobium convexum</i> (Blume) Lindl.	√			-
	<i>Dendrobium crumenatum</i> Sw.		√	√	NYJ132
	<i>Dendrobium erosum</i> (Blume) Lindl.	√			-
	<i>Dendrobium foxii</i> Ridl. *		√	√	NYJ143
	<i>Dendrobium geminatum</i> (Blume) Lindl.		√	√	NYJ166; NYJ177; NYJ205
	<i>Dendrobium hasseltii</i> (Blume) Lindl.	√	√		BCS13948; BCS14145; BCS15075; Chin1203; FA006; FRI41662; FRI53752; FRI60446; KHE09039; NYJ041; OYS042; RK457; RJ588; SHA010
	<i>Dendrobium heterocarpum</i> Lindl.		√	√	NYJ234
	<i>Dendrobium hughii</i> Rchb.f. *	√			-
	<i>Dendrobium kentrophyllum</i> Hook.f.	√			-
	<i>Dendrobium linguella</i> Rchb.f.		√	√	NYJ134; NYJ175
	<i>Dendrobium longipes</i> Hook.f.	√	√		BCS12372; BCS13523; FA013; FA022; FRI40752; FRI60479; KHE09037; NYJ028; NYJ078; NYJ120; NYJ173; OYS045; RK1118; SHA052; SHA061; Y.K.Wong,78834
	<i>Dendrobium macropodum</i> Hook.f.		√		FA002; SHA012; NYJ131; NYJ171; NYJ202
	<i>Dendrobium pahangense</i> Carr *		√	√	NYJ214; OYS046
	<i>Dendrobium peculiare</i> J.J.Sm.	√	√		BCS14052; NYJ209
	<i>Dendrobium plicatile</i> Lindl.		√	√	NYJ227
	<i>Dendrobium roseatum</i> Ridl. *	√	√		NYJ229
	<i>Dendrobium rupicolum</i> Ridl. *		√	√	FRI60561; OYS044
	<i>Dendrobium sociale</i> J.J.Sm. ++		√	√	FRI60563; FRI60590; NYJ164; NYJ174
	<i>Dendrochilum angustifolium</i> Ridl.	√			-

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Dendrochilum carnosum</i> (Ridl.) Holttum *	✓	✓		BCS10749; FRI50921; FRI60483; MS2996; SHA015
	<i>Dendrochilum gracile</i> (Hook.f.) J.J.Sm.	✓	✓		BCS14047; FA004; FRI38834; FRI60478; FRI60488; FRI60495; FRI60553; FRI60558; NYJ106; NYJ110; OYS035; SHA016
	<i>Dendrochilum gramineum</i> (Ridl.) Holttum *	✓	✓		BCS12376; FRI60482; NYJ115; NYJ118; SHA014
	<i>Dendrochilum linearifolium</i> Hook.f.	✓	✓		BCS8412; BCS12377; BCS15125; FRI58895; FRI60487; HUM9018; MCT007; NYJ109; NYJ116; NYJ117; NYJ191; WY078
	<i>Dendrochilum odoratum</i> (Ridl.) J.J.Sm. *	✓	✓		BCS8411; MFK002; NYJ037; NYJ190; OYS020
	<i>Dendrochilum pallideflavens</i> Blume		✓	✓	NYJ086; NYJ087; NYJ112; OYS021; OYS028; OYS040
	<i>Dendrochilum simile</i> Blume		✓	✓	NYJ129
	<i>Diglyphosa latifolia</i> Blume	✓			-
	<i>Dilochia cantleyi</i> (Hook.f.) Ridl.	✓	✓		BCS13763; FRI40679; FRI44865; NYJ173; SHA017; SHA022
	<i>Dilochiopsis scortechinii</i> (Hook.f.) Brieger *	✓	✓		NYJ157; SHA006
	<i>Eria atrovinosa</i> Carr	✓			-
	<i>Eria crassipes</i> Ridl.	✓	✓		A.Hamid 2330; BCS12375; FRI40680; NYJ180; SHA019
	<i>Eria lamonganensis</i> Rehb.f.		✓	✓	NYJ208; NYJ216
	<i>Eria punctata</i> J.J.Sm.	✓			-
	<i>Eria valida</i> Lindl.	✓			-
	<i>Galeola nudifolia</i> Lour.		✓		FRI16195
	<i>Gastrochilus calceolaris</i> (Buch.-Ham. Ex Sm.) D. Don		✓	✓	MFK009; MFK050; NYJ188
	<i>Hetaeria</i> sp. A		✓		BCS14065
	<i>Hymenorchis javanica</i> (Teijsm. & Binn.) Schltr.		✓	✓	MFK071; NYJ148
	++				
	<i>Liparis cespitosa</i> (Lam.) Lindl.	✓	✓		BCS13909; MFK029
	<i>Liparis gibbosa</i> Finet	✓			-
	<i>Liparis viridicallus</i> Holttum	✓			-
	<i>Microsaccus truncatus</i> Carr *	✓			-
	<i>Mycaranthes oblitterata</i> Blume		✓	✓	FRI64092; MFK021; MYJ083; NYJ167; NYJ179; NYJ198; NYJ217; OYS014

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Oberonia padangensis</i> Schltr.		√	√	NYJ210; NYJ215; NYJ220
	<i>Ornithochilus difformis</i> (Wall. ex Lindl.) Schltr.	√			BCS13916
	<i>Oxystophyllum atrorubens</i> (Ridl.) M.A.Clem.	√	√		MFK024
	<i>Paphiopedilum lowii</i> (Lindl.) Stein		√	√	MFK086
	<i>Pholidota carnea</i> (Blume) Lindl. var. <i>carnea</i>	√	√		NYJ137
	<i>Pholidota carnea</i> (Blume) Lindl. var. <i>parviflora</i> (Hook.f.) de Vogel *	√	√		NYJ181
	<i>Pholidota carnea</i> (Blume) Lindl. var. <i>pumila</i> (Ridl.) de Vogel *		√	√	FRI42511; MCT015; SHA023
	<i>Pholidota gibbosa</i> (Blume) de Vriese	√	√		NYJ130; NYJ178; NYJ225; OYS019; SHA018
	<i>Pholidota longibulba</i> Holttum *		√	√	NYJ085; NYJ224; OYS018
	<i>Pholidota ventricosa</i> (Blume) Rechb.f.	√			-
	<i>Phreatia crassifolia</i> Ridl. *	√			-
	<i>Phreatia densiflora</i> (Blume) Lindl.	√			-
	<i>Phreatia listrophora</i> Ridl.		√	√	FRI60552; NYJ238
	<i>Phreatia plantaginifolia</i> (Koen.) Ormerod		√	√	NYJ197
	<i>Phreatia sulcata</i> (Blume) J.J.Sm.		√		BCS14180
	<i>Pilophyllum villosum</i> (Blume) Schltr.	√			-
	<i>Pinalia appendiculata</i> (Blume) Kuntze	√	√		BCS14061; FRI60554
	<i>Pinalia densa</i> (Ridl.) W.Suarez & Cootes	√	√		BCS15076; FRI64060; FRI67347; NYJ218; OYS015
	<i>Pinalia elata</i> (Hook.f.) Kuntze *	√	√		BCS13553; BCS15362; FA007; FA019; FRI41043; FRI41658; FRI60489; NYJ039; NYJ169; NYJ200; SHA007; SHA058; SHA064
	<i>Pinalia pachystachya</i> (Lindl.) Kuntze	√	√		MFK040; NYJ133
	<i>Platanthera angustata</i> (Blume) Lindl.	√	√		BCS11692; Chin1204; FA005; FA018; FRI60475; KHE09036; MFK005; MK1152; NYJ031; NYJ080; SHA004; SS19
	<i>Plocoglottis lowii</i> Rechb.f.		√		BCS12031-A
	<i>Polystachya concreta</i> (Jacq.) Garay & Sweet		√	√	NYJ221
	<i>Pteroceras compressum</i> (Blume) Holttum		√	√	NYJ182
	<i>Schoenorchis micrantha</i> Blume	√			-
	<i>Schoenorchis minutiflora</i> (Ridl.) J.J.Sm.		√	√	MFK033; MFK051; NYJ183
	<i>Spathoglottis aurea</i> Lindl.	√	√		FA012; FRI60456; FRI60565; KHE09035; MS2965; NYJ122; OYS001; OYS032; SHA003; SHA070

No.	Taxa	Previous Study	Current study	New to Genting	Specimens Cited
	<i>Spathoglottis plicata</i> Blume		√	√	FRI51456; FRI51512; FRI51514; MFK061; NYJ103; OYS031
	<i>Spiranthes sinensis</i> (Pers.) Ames	√	√		FRI51563; NYJ042; NYJ092; NYJ203; SA759; SHA050
	<i>Taeniophyllum glandulosum</i> Blume		√	√	MFK052; NYJ187
	<i>Thelasis macrobulbon</i> Ridl.	√			-
	<i>Thelasis micrantha</i> (Brongn.) J.J.Sm.		√	√	NYJ192
	<i>Thelasis</i> sp. ++		√	√	NYJ095; NYJ144
	<i>Thrixspermum brevicapsularis</i> Holtum *	√			FRI64210
	<i>Thrixspermum centipeda</i> Lour.		√	√	NYJ136
	<i>Thrixspermum pauciflorum</i> (Hook.f.) Ridl.		√	√	NYJ168
	<i>Thrixspermum scortechinii</i> (Hook.f.) Ridl.	√			Gunung Ulu Kali, 1967, G. Hadley, collection number n.a. (KLU)
	<i>Thrixspermum trichoglottis</i> (Hook.f.) Kuntze		√	√	A.G.Piggott 2708; NYJ158
	<i>Trichotosia ferox</i> Blume		√		FRI40591
	<i>Trichotosia teysmannii</i> (J.J.Sm.) Kraenzl.	√			-
	<i>Vanilla kinabaluensis</i> Carr	√			-
	Total	82	93	43	

Legends:

* endemic to Peninsular Malaysia according to Turner (1995) and Govaerts et al. (2008)

endemic to Genting Highlands according to Turner (1995) and Govaerts et al. (2008)

++ new to Peninsular Malaysia

Notes for unidentified species:

Agrostophyllum sp. A This plant has stem about 5 mm wide, much flattened towards apex, with its leaves to 13 × 0.8 cm, shining pale green, linear.

Bulbophyllum sp. A Pseudobulbs oval, yellow to orange, at right angle of woody rhizome. Leaves 3-5 cm × 6-8 mm, coriaceous.

the phenomenon is also observed in Genting Highlands. A total of 29 species known to be endemic to Peninsular Malaysia were found with 19 rediscovered in the current study. The other 10 species not found during the current study were either known from poor specimen collection or collected once, displaced identity or misidentified. This study was not able to clarify these issues due to lack of information on the specimens cited. The current study also observed one narrowly endemic species *Corybas villosus* in small population growing among the thinning *Sphagnum* mosses carpet at the peak of Gunung Ulu Kali. The population size and physical environmental condition indicate the conservation status of this species is critically endangered or even vulnerable to extinction. Authorities responsible for maintaining biodiversity in the highland, Forestry Departments of Peninsular Malaysia through their enactment that declared forest found 1000 m and above are

Inflorescence much longer, bearing many sweet-scented, greenish-yellow small flowers.

Bulbophyllum sp. B This plant has distinctive characteristic where its leaf narrowed abruptly at the base and form a stalk 5-9 cm long. Inflorescence usually longer, 15-27 cm. Flowers small, translucent pale yellow, the lip darker.

Hetaeria sp. A The herbarium specimen examined without opened flower makes the species identification not possible. Stem less than 10 cm long, with a few leaves attached 1-3 cm apart along its length. Leaves to 14 × 4 cm, elliptic, with stalk about 5 cm long.

totally protected forest, should collaborate with scientists to safeguard these endemic species for assurance of their existence in the future.

The high number of new records found during this study was expected considering the 30 years gap between current and previous study (Stone 1981). In the past 30 years, the robust development together with global climate change could change the species composition. Some species will be lost due to unfavourable growth environment and some others were newly established and flourished with changes of climatic elements. Another possibility was that some of the species were overlooked or miss identified during the earlier study.

Seven species (*Appendicula uncata*, *Dendrobium crumenatum*, *Dendrobium heterocarpum*, *Dendrobium pahangense*, *Dendrobium rupicolum*, *Dendrobium sociale*, *Pholidota longibulba*) are among the new records found

growing on the cliff at the abandoned construction project where the vegetation cover has been removed. This area is exposed to direct sunlight and wind, thus having lower humidity and temperature 2-3°C higher than under forest canopy. The changes of physical environment in Genting Highlands created some new niche favorable for certain species to thrive.

A very interesting finding was that some lowland species are now migrating to the cloud forest areas. *Appendicula uncata*, *Dendrobium crumenatum*, *Phreatia plantaginifolia*, *Thelasis micrantha* and *Thrixspermum trichoglottis* are species of lowland area of Peninsular Malaysia, which are now found flourishing in the summit

area of Genting Highlands. This evidence supported our hypothesis that temperature rise due to global climate change also impacted the local environment that creates a favorable condition for lowland species to flourish. Species are able to migrate to higher elevation with higher temperature, where they are usually found in open areas of Genting Highlands. These open areas have temperatures 2-3°C higher than under forest canopy thus favorable for the lowland species growth. Some of the newly recorded species are shown in Plate 1. Most of the species recorded in previous study were without specimen cited as they are from published literatures and books. A complete specimen cited information are list in the Appendix.



PLATE 1. Some orchid species found in Genting Highlands. A. *Corybas holtumii*; B. *Corybas carinatus*; C. *Corybas villosus* (endemic); D. *Bulbophyllum brevipes*; E. *Pholidota carnea*; F. *Cryptostylis arachnites*; G. *Ceratostylis eria*; H. *Coelogyne radicata*; I. *Paphiopedilum lowii*; J. *Dendrochilum gracile*; K. *Arundina graminifolia*; L. *Spathoglottis aurea*; M. *Dendrobium hasseltii*; N. *Bulbophyllum angustifolium* and O. *Dendrobium longipes*

CONCLUSION

The cloud forest areas in Genting Highlands have been seriously fragmented by road and facilities construction. The small population of many orchid species reflected the consequences of those activities. Most of the species found were in a small population or only represented by few individuals. In general, the orchid flora diversity in the summit region of Genting Highlands has undergone drastic changes with many montane restricted species being missing and many lowlands species thriving. In a nutshell, Genting Highlands's summit region is still favourable for orchid growth. However, threats from the changing environment could further enhance pressure to slow adapting species that might cause local extinction. It would be a great loss if some of these species extinct before they are even known and appreciated. Therefore, the inventory of species in this type of vegetation is very important for other parts of Malaysia. The destruction of forested areas is a continuous process in Peninsular Malaysia and that definitely will cause species loss. To prevent this disaster, awareness among the public on biodiversity conservation is very important. As for Genting Highlands, the Genting Malaysia Berhad should be actively involved with effort towards conserving biodiversity in this region not only for the country but also for their livelihood. A cleared forest usually signifies increased of temperature. Low temperature is the main reason visitors came to Genting Highlands.

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Appendix: Specimens Examined.

Acriopsis ridleyi Hook.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 057, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 240, 12/2/2011 (UPM); Bentong, Genting Highlands, G. Ulu Kali, opposite Sri Genting Villa, in montane forest, B.C. Stone & D. Jones, BCS 15331, 18/10/1982 (KLU).

Agrostophyllum cyathiforme J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Raub, Upper Tras Valley, under Frasers Hill, I.H. Burkill, 7877, 27/9/1922 (SING); Bentong, Genting Highlands, G. Ulu Kali, M.C. Tan, MCT 002, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 136, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 160, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 223, 15/11/2010 (UPM). SELANGOR: Gombak, Rawang, Rewang Stream, H.N. Ridley, collection number n.a., May 1891 (SING).

Agrostophyllum glumaceum Hook.f.

PENINSULAR MALAYSIA, PAHANG: Gombak, Rawang, H.N. Ridley, collection number n.a., 1847 (SING); Sungai Teku, R.E. Holttum, 20558, 25/8/1928 (SING); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 195, 3/9/2010 (UPM).

Agrostophyllum longifolium (Blume) Rchb.f.

PENINSULAR MALAYSIA, PAHANG: Tanah Rata, Cameron Highlands, Gunung Berembun, H.N. Ridley, 13039, collection date n.a. (SING); Tanah Rata, Cameron Highlands, A.H. Batten Pool, collection number n.a., November 1939 (SING); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 230, 15/11/2010 (UPM).

Agrostophyllum majus Hook.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 159, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 196, 3/9/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 222, 15/11/2010 (UPM). PENANG: George Town, North East district, Government Hill, top of Government Hill, C. Curtis, collection number n.a., November 1890 (SING).

Agrostophyllum stipulatum subsp. *bicuspidatum* (J.J.Sm.) Schuit.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 080, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 009, 15/12/2009 (UPM).

Agrostophyllum stipulatum subsp. *stipulatum* (Griff.) Schltr.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 194, 3/9/2010 (UPM).

Agrostophyllum sp. A

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 235, 28/3/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 233, 16/11/2010 (UPM).

Appendicula uncata Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, roadside near telekom tower, S.N. Phoon, FRI 60500, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 017, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 193, 3/9/2010 (UPM).

Arundina graminifolia (D.Don) Hochr.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, summit of G. Chin Chin, near the army base-camp, A. Noorsiha, S. Kamarudin & B. Baya, FRI 41051, 16/1/1994 (KEP); Bentong, Genting Highlands, G. Ulu Kali, hilly slope, Syahida Emiza, FRI 51458, 22/3/2006 (KEP); Bentong, Genting Highlands, G. Ulu Kali, roadside near telekom tower, S.N. Phoon, FRI 60494, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 011, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, H.E. Khor, KHE 09034, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 060, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 006, 2009 (UPM).

Bulbophyllum angustifolium (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Soepadmo, HUM 9020, 4/4/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 15/8/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, J.B. Lowry, 452, 24/8/1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 15073, 14/3/1982 (KLU); Bentong, Genting Highlands, G. Ulu Kali, M.M.J. van Balgooy nr, 7136, 2/3/1996 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 206, 3/9/2010 (UPM).

Bulbophyllum brevipes Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., 1913 (SING); Bentong, Genting Highlands, G. Ulu Kali, BKSK 0913, 2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 002, 12/6/2009 (UPM).

Bulbophyllum gibbosum (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., 1912 (SING).

Bulbophyllum obtusum (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60481, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60493, 25/3/2008 (KEP).

Bulbophyllum stormii J.J.Sm

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone & M.G. Manuel, BCS 14049, 18/3/1979 (KLU).

Bulbophyllum uniflorum (Blume) Hassk.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., 1913 (SING).

Bulbophyllum sp. A

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 042, 2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 020, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 060, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 061, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 114, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 156, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 165, 29/6/2010 (UPM).

Bulbophyllum sp. B

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Razali, 23705, 12/10/1974 (UKMB); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 067, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 232, 16/11/2010 (UPM).

Calanthe lyroglossa Rchb.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 036, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 007, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 212, 3/9/2010 (UPM).

Ceratostylis ampullacea Kraenzl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 15072, 14/3/1982 (KLU); Bentong, Genting Highlands, G. Ulu Kali, S.C. Chin, Chan 1209, 12/7/1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, J. Dransfield, 903, 12/7/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, A.T. Nor Ezzawanis, FRI 52580, 16/2/2007 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 043, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. fidraus, MFK 054, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 207, 3/9/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 226, 15/11/2010 (UPM).

Ceratostylis eria Govaerts

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, C.L. Chan & B.C. Stone, BCS 13539, 22/12/1977 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14141, 16/9/1979 (KLU);

Bentong, Genting Highlands, G. Ulu Kali, P.T. Ong, FRI 67344, 16/2/2009 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 023, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 034, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 005, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 022, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 008, 12/6/2009 (UPM).

Ceratostylis lancifolia Hook.f.

PENINSULAR MALAYSIA, PAHANG: Jerantut, Gunung Tahan, R.E. Holttum, 20686, 31/8/1928 (SING); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14182, 4/11/1979 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 140, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, Y.J. Ng, NYJ 146, 29/6/2010 (UPM).

Ceratostylis pulchella Holttum

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, trails to Bt. Tunggul, 1566 m, B. Perumal, C.L. Gan, Angan & Bedul, FRI 41659, 18/1/1994 (KEP); Tanah Rata, Cameron Highlands, Taman Sedia, originally collected from G. Ulu Kali, P.T. Ong, FRI 64085, 15/10/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 088, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 033, 15/12/2009 (UPM).

Ceratostylis subulata Blume

PENINSULAR MALAYSIA, JOHOR: Pontian Kecil, E.J.H. Corner, 1116, July 1939 (SING). PAHANG: Raub, Fraser's Hill, C.E. Carr, 408, November 1930 (SING); Bentong, Genting Highlands, G. Ulu Kali, roadside next to telekom tower, S.N. Phoon, FRI 60551, 25/3/2008 (KEP).

Chelonistele sulphurea (Blume) Pfitzer

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 6/8/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, S. Anthonysamy, SA 329, 1980 (KEP); Bentong, Genting Highlands, G. Ulu Kali, L.S.L. Chua, FRI 40674, 24/6/1997 (KEP); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 153, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 161, 29/6/2010 (UPM).

Coelogyne cumingii Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Mengkuang, J.K. Wong, 78822, 16/6/1959 (KEP).

Coelogyne kaliana P.J. Cribb

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, J. Dransfield, 901, 12/7/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, M. Shah & M. Ali, MS 2963, 11/6/1973 (KEP, SING); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14123-A, 5/8/1979 (KLU); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 003, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 154, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 162, 29/6/2010 (UPM).

Coelogyne prasina Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, M. Jutta, FRI 54165, 19/11/2006 (KEP); Bentong, Genting Highlands, G. Ulu Kali, abandoned land opposite telekom tower, S.N. Phoon, FRI 60555, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, M.C. Tan, MCT 011, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 058, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 041, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 011, 15/12/2009 (UPM).

Coelogyne radicata Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 6/9/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Razali Jaman, 0398, 12/10/1974 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 13971, 12/10/1977 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Hassan & D. Jones, collection number n.a., 10/4/1981 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 15074, 14/3/1982 (KLU); Bentong, Genting Highlands, trail to Bt. Tunggul, 1500 m, B. Perumal, C.L. Gan, Angan & Bedul, FRI 41660, 18/1/1994 (KEP); G. Ulu Kali, K. Imin, FRI 50569, 22/3/2006 (KEP); Tanah Rata, Cameron Highlands, Taman Sedia, originally collected from G. Ulu Kali, P.T. Ong, FRI 58894, 22/4/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60480, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, tree branches at the

roadside, near telekom tower, S.N. Phoon, FRI 60485, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60492, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, roadside near telekom tower, S.N. Phoon, FRI 60498, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60499, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 001, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 020, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 037, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembaku, Shahrudin, SHA 001, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembaku, Shahrudin, SHA 011, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 033, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembaku, Y.J. Ng, NYJ 119, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 128, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 199, 3/9/2010 (UPM).

Coelogyne tomentosa Lindl.

PENINSULAR MALAYSIA, PAHANG: Tanah Rata, Cameron Highlands, Taman Sedia, originally collected from G. Ulu Kali, P.T. Ong, FRI 64090, 15/10/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, M.C. Tan, MCT 001, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 211, 3/9/2010 (UPM).

Corybas carinatus (J.J.Sm.) Schltr.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Kalong, FMS 20264, 25/9/1929 (KEP).

Corybas holttumii J.Dransf. & G.Smith

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, R. Kiew, RK 1666, 30/3/1985 (KEP); Bentong, Genting Highlands, Gunung Ulu Kali, Y.J. Ng, NYJ 244, 15/12/2009 (UPM).

Corybas selangorensis J.Dransf. & G.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Lari Tembaku, Y.J. Ng, NYJ 245, 29/6/2010 (UPM).

Corybas villosus J.Dransf. & G.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Razali, collection number n.a., 12/10/1974 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, S. Anthony, SA 713, 1/10/1986 (KEP); Bentong, Genting Highlands, Gunung Ulu Kali, Y.J. Ng, NYJ 246, 16/11/2010 (UPM).

Cryptostylis arachnites (Blume) Hassk.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 10785, 26/6/1977 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 13972, 12/10/1978 (KLU); Bentong, Genting Highlands, G. Ulu Kali, L.G. Saw, FRI 44866, 25/6/1997 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 030, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 002, 2009 (UPM); Bentong, Genting Highlands, G. Lari Tembaku, Shahrudin, SHA 005, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembaku, Y.J. Ng, NYJ 121, 26/3/2010 (UPM).

Cymbidium roseum J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 228, 15/11/2010 (UPM).

Dendrobium angustifolium (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 059, 16/12/2009 (UPM).

Dendrobium bifarium Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 213, 3/9/2010 (UPM).

Dendrobium cf. connatum (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60556, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60564, 25/3/2008 (KEP).

Dendrobium crumenatum Sw.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 132, 27/5/2010 (UPM).

Dendrobium foxii Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 143, 27/5/2010 (UPM).

Dendrobium geminatum (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 166, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 177, 19/7/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 205, 3/9/2010 (UPM).

Dendrobium hasseltii (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 15/8/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, below *Dacrydium* forest, J.B. Lowry, 135884, 17/10/1968 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.C. Chin, 1203, 12/7/1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, J.B. Lowry, 451, 1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Razali, RJ 588, 12/10/1974 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, the road to telekom tower, 1482MK, 8/9/1977 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, Razali, RJ 457, 23/11/1979 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 13948, 17/9/1978 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14145, 16/9/1979 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 15075, 14/3/1982 (KLU); Bentong, Genting Highlands, trail to Bt. Tunggul, B. Perumal, C.L. Gan, Angan & Bedul, FRI 41662, 18/1/1994 (KEP); Bentong, Genting Highlands, G. Ulu Kali, M.Y. Chew, FRI 53752, 12/9/2007 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60446, 26/11/2007 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 006, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, H.E. Khor, KHE 09039, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 041, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 042, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 010, 12/6/2009 (UPM).

Dendrobium heterocarpum Wall. ex Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 234, 15/11/2010 (UPM).

Dendrobium linguella Rehb.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 134, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 175, 19/7/2010 (UPM);

Dendrobium longipes Hook.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.K. Wong, 78834, 28/3/1959 (KEP); Bentong, Genting Highlands, G. Ulu Kali, J. Dransfield, 904, 12/7/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, summit, M. Shah, 2957, 11/6/1973 (SING); Bentong, Genting Highlands, G. Ulu Kali, Razali Jaman, 37R, 12/10/1974 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, C.L. Chan & B.C. Stone, BCS 13523, 22/12/1977 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 12372, 14/4/1978 (KLU); Bentong, Genting Highlands, G. Ulu Kali, R. Kiew, RK 1118, 8/2/1982 (KEP); Bentong, Genting Highlands, G. Ulu Kali, L.S.L. Chua, FRI 40752, 25/1/1999 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60479, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 013, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 022, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, H.E. Khor, KHE 09037, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 045, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 052, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 061, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 028, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 078, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 120, 26/3/2010 (UPM).

Dendrobium macropodum Hook.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 002, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 012, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 131, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 171, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 202, 3/9/2010 (UPM).

Dendrobium pahangense Carr

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 046, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 214, 3/9/2010 (UPM).

Dendrobium peculiare J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Cameron Highlands, growing on introduced conifers at entrance of Parit Falls, Sungai Bertam, 4700 ft., G.P. Lewis, 199, 1977 (KEP); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone & K. Pearce, BCS 14052, 18/3/1979 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 209, 3/9/2010 (UPM).

Dendrobium plicatile Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 227, 15/11/2010 (UPM).

Dendrobium roseatum Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., January 1913 (SING); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 229, 15/11/2010 (UPM).

Dendrobium rupicolum Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60561, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 044, 18/12/2009 (UPM).

Dendrobium sociale J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60563, 25/3/2008 (KEP); Tanah Rata, Cameron Highlands, Mr. Tay's nursery, originally collected from Simpang Pulau - Cameron Highlands, S.N. Phoon, FRI 60590, 27/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 164, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 174, 19/7/2010 (UPM).

Dendrochilum carnosum (Ridl.) Holttum

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang Lebah, H.C. Robinson, 22/1/1913 (SING); Jerantut, Gunung Benom, F.M.S. Mus. Coll., collection number n.a., 27/7/1925 (SING); Jerantut, Gunung Tahan, Anonymous, 20647, 29/8/1928 (SING); Bentong, Genting Highlands, G. Lari Tembakau, Y.K. Wong, 78830, 28/3/1959 (KEP); Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., July 1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, M. Shah & M. Ali, MS 2996, 12/6/1973 (KEP); Bentong, Genting Highlands, G. Ulu Kali, trail to army base-camp, K. Imin, FRI 50921, 16/2/2007 (KEP); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 10749, 11/5/1972 (KLU); Bentong, Genting Highlands, G. Ulu Kali, near telekom tower, S.N. Phoon, FRI 60483, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 015, 12/6/2009 (UPM).

Dendrochilum gracile (Hook.f.) J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Tanah Rata, Cameron Highlands, F.M.S. Mus. Coll., collection number n.a., 15/10/1923 (SING); Tanah Rata, Cameron Highlands, M.R. Henderson, collection number n.a., 15/4/1930 (SING); Bukit Kamunting Road, H.M. Burkill, HMB2860, 10/10/1961 (SING); Raub, Fraser's Hill, Jeriau Waterfall Jungle, M. Shah, MS2786, 1/9/1972 (SING); Bentong, Genting Highlands, G. Ulu Kali, M. Shah, MS2996, 12/6/1973 (SING); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14047, 18/3/1979 (KLU); Bentong, Genting Highlands, G. Ulu Kali, near telekom tower, L.S.L. Chua, FRI 38834, 23/4/1997 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60478, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, tree branches at the roadside, near telekom tower, S.N. Phoon, FRI 60488, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, roadside near telekom tower, S.N. Phoon, FRI 60495, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, roadside next to telekom tower, S.N. Phoon, FRI 60553, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, earthy embankment in front of an abandoned project, opposite telekom tower, S.N. Phoon, FRI 60558, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 004, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 035, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 050, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 016, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 106, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 110, 26/3/2010 (UPM).

Dendrochilum gramineum (Ridl.) Holttum

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 12376, 14/4/1976 (KLU); Bentong, Genting Highlands, G. Ulu Kali, tree branches at the roadside, near telekom tower, S.N. Phoon, FRI 60482, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 014, 12/6/2009 (UPM);

Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 115, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 118, 26/3/2010 (UPM).

Dendrochilum linearifolium Hook.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, summit, Soepadmo, HUM 9018, 4/4/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 8412, 7/3/1969 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 12377, 14/4/1976 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Hassan & D. Jones, collection number n.a., 10/4/1981 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, montane elfin forest, B.C. Stone, BCS 15125, 4/4/1982 (KLU); Bentong, Genting Highlands, G. Ulu Kali, W.K. Tan, 9, 9/5/1991 (SING); Bentong, Genting Highlands, G. Chin Chin, Joanes & Wendy Yong, WY 078, 13/4/2003 (KEP); Tanah Rata, Cameron Highlands, Taman Sedia originally collected from G. Ulu Kali, P.T. Ong, FRI 58895, 22/4/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, tree branches at the roadside, near telekom tower, S.N. Phoon, FRI 60487, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, M.C. Tan, MCT 007, 26/2/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 021, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 109, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 116, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 117, 26/3/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 191, 3/9/2010 (UPM).

Dendrochilum odoratum (Ridl.) J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Raub, Fraser's Hill, near Methodist Mission, 4000 ft., M. Shah and M. Noor, MS677, 26/8/1959 (SING); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 8411, 7/3/1969 (KLU); Raub, Fraser's Hill, path to Pine Tree Hill, R. Kiew, RK3327B, 27/9/1991 (SING); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 002, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 037, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 020, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 051, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 190, 3/9/2010 (UPM).

Dendrochilum pallideflavens Blume

PENINSULAR MALAYSIA, JOHOR: Kota Tinggi, Sungai Sedili, E.J.H. Corner, 25899, 29/7/1932 (SING). PAHANG: Raub, Fraser's Hill, Pine Tree Hill, 4800 ft., R.E. Holttum, 21552, 21/3/1929 (SING); Cameron Highlands, Robinson Fall, R.E. Holttum and M.R. Henderson, 23257, 31/3/1930 (SING); Tanah Rata, Cameron Highlands, earthy embankment outside Equatorial Hotel, S.N. Phoon, FRI60603, 27/3/2008 (KEP, SING); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 086, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 087, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 112, 26/3/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 021, 15/12/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 028, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 040, 18/12/2009 (UPM). PERAK: Kuala Kangsar, Gunung Bubu, 5000 ft., L. Wray, 3901, March 1890 (SING).

Dendrochilum simile Blume

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 129, 27/5/2010 (UPM).

Dilochia cantleyi (Hook.f.) Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 9/7/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, J. Dransfield, 905, 12/7/1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 13763, 11/6/1978 (KLU); Bentong, Genting Highlands, G. Purun, L.S.L. Chua, FRI 40679, 25/7/1997 (KEP); Bentong, Genting Highlands, G. Ulu Kali, L.G. Saw, FRI 44865, 25/6/1997 (KEP); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 017, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 022, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 173, 19/7/2010 (UPM).

Dilochiopsis scortechinii (Hook.f.) Brieger

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., 1913 (SING); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 006, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 157, 29/6/2010 (UPM).

Eria crassipes Ridl.

PENINSULAR MALAYSIA, PAHANG: Cameron Highlands, Gunung Berembun, 6000 ft., R.E. Holttum and M.R.

Henderson, 23401, 4/4/1930 (SING); Bentong, Genting Highlands, 5000 ft., A. Hamid, 2330, 21/7/1974 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 12375, 14/4/1976 (KLU); Bentong, Genting Highlands, G. Purun, L.S.L. Chua, FRI 40680, 25/7/1997 (KEP); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 019, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 180, 19/7/2010 (UPM).

Eria lamonganensis Rchb.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 208, 3/9/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 216, 15/11/2010 (UPM).

Galeola nudifolia Lour.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near road cutting, K.K. Kochumen, FRI 16195, 27/9/1970 (KEP).

Gastrochilus calceolaris (Buch.-Ham. ex Sm.) D.Don

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 009, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 050, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, Y.J. Ng, NYJ 188, 3/9/2010 (UPM).

Hetaeria sp. A

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, summit zone, mossy montane forest, B.C. Stone, BCS 14065, 31/3/1979 (KLU).

Hymenorchis javanica (Teijsm. & Binn.) Schltr.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 071, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, Y.J. Ng, NYJ 148, 29/6/2010 (UPM).

Liparis cespitosa (Lam.) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 13909, 30/7/1978 (KLU); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 029, 2009 (UPM).

Mycaranthes oblitterata Blume

PENINSULAR MALAYSIA, PAHANG: Tanah Rata, Cameron Highlands, Taman Sedia, originally collected from G. Ulu Kali, P.T. Ong, FRI 64092, 15/10/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 021, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 014, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 083, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 167, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 179, 19/7/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 198, 3/9/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 217, 15/11/2010 (UPM).

Oberonia padangensis Schltr.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 210, 15/11/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, Y.J. Ng, NYJ 215, 3/9/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 220, 15/11/2010 (UPM).

Ornithochilus difformis (Wall. ex Lindl.) Schltr

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, mossy montane forest, M.G. Manuel & B.C. Stone, BCS 13916, 30/7/1978 (KLU)

Oxystophyllum atrorubens (Ridl.) M.A.Clem.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 024, 2009 (UPM).

Paphiopedilum lowii (Lindl.) Stein

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 086, 11/6/2009 (UPM).

Pholidota carnea (Blume) Lindl. var. *carnea*

PENINSULAR MALAYSIA, PAHANG: Raub, Fraser's Hill, C.E. Carr, FMS96, September 1929 (SING); Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 1968 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 137, 27/5/2009 (UPM);

Pholidota carnea var. *parviflora* (Hook.f.) de Vogel

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 6/8/1967 (KLU); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 181, 19/7/2010 (UPM).

Pholidota carnea var. *pumila* (Ridl.) de Vogel

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, 1758 m, S. Kamarudin, FRI 42511, 23/4/1997 (KEP); Bentong, Genting Highlands, G. Ulu Kali, M.C. Tan, MCT 015, 26/2/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 023, 12/6/2009 (UPM).

Pholidota gibbosa (Blume) Lindl. ex de Vriese

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 019, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 018, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 130, 27/5/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 178, 19/7/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 225, 15/11/2010 (UPM).

Pholidota longibulba Holttum

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 018, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 085, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 224, 15/11/2010 (UPM).

Phreatia listrophora Ridl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, roadside next to telekom tower, S.N. Phoon, FRI 60552, 25/3/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 238, 12/2/2011 (UPM).

Phreatia plantaginifolia (Koen.) Ormerod

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 197, 3/9/2010 (UPM).

Phreatia sulcata (Blume) J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, B.C. Stone, BCS 14180, 4/11/1979 (KLU).

Pinalia appendiculata (Blume) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, on trail to Gunung Lari Tembakau, B.C. Stone, BCS 14061, 18/3/1979 (KLU); Bentong, Genting Highlands, G. Ulu Kali, roadside next to telekom tower, S.N. Phoon, FRI 60554, 25/3/2008 (KEP).

Pinalia densa (Ridl.) W.Suarez & Cootes

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, 1750 m, B.C. Stone, BCS 15076, 14/3/1982 (KLU); Tanah Rata, Cameron Highlands, Taman Sedia, originally collected from G. Ulu Kali, P.T. Ong, FRI 64060, 29/8/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, P.T. Ong, FRI 67347, 18/2/2009 (KEP); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 015, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 218, 15/11/2010 (UPM).

Pinalia elata (Hook.f.) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, J.B. Lowry, 450, 24/8/1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, mossy forest, B.C. Stone, BCS 13553, 29/1/1978 (KLU); Bentong, Genting Highlands, G. Ulu Kali, montane elfinwood thickets, B.C. Stone, BCS 15362, 21/12/1982 (KLU); Bentong, Genting Highlands, G. Lari Tembakau, trail to the summit, 1720 m, A. Noorsiha, S. Kamarudin & B. Baya, FRI 41043, 15/1/1994 (KEP); Bentong, Genting Highlands, trail to Bt. Tunggul, B. Perumal, C.L. Gan, Angan & Bedul, FRI 41658, 17/1/1994 (KEP); Bentong, Genting Highlands, G. Ulu Kali, roadside near telekom tower, S.N. Phoon, FRI 60489, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 007, 14/11/2009 (UPM); Bentong, Genting Highlands, G.

Chin Chin, A. Faiz, FA 019, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 007, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 058, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 064, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 039, 21/10/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 169, 29/6/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 200, 3/9/2010 (UPM).

Pinalia pachystachya (Lindl.) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 040, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 133, 27/5/2010 (UPM).

Platanthera angustata (Blume) Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, near the Selangor border, S.C. Chin, 1204, 12/7/1971 (KLU); Bentong, Genting Highlands, G. Ulu Kali, summit, B.C. Stone, BCS 11692, 27/1/1974 (KLU); Bentong, Genting Highlands, G. Ulu Kali, road to telekom tower, M. Kasim, MK 1152, 7/7/1974 (UKMB); Bentong, Genting Highlands, 1770 m, Sahdan bin Salim, SS 19, 30/11/1980 (UKMB); Bentong, Genting Highlands, G. Ulu Kali, near the entrance road, S.N. Phoon, FRI 60475, 24/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 005, 14/11/2009 (UPM); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 018, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, H.E. Khor, KHE 09036, 2/2/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 004, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 055, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 031, 10/9/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 080, 15/12/2009 (UPM).

Plocoglottis lowii Rehb.f.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, peat under ericaceous scrub, B.C. Stone, BCS 12031-A, 21/8/1974 (KLU).

Polystachya concreta (Jacq.) Garay & Sweet

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 221, 15/11/2010 (UPM).

Pteroceras compressum (Blume) Holttum

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, Y.J. Ng, NYJ 182, 30/7/2010 (UPM).

Schoenorchis minutiflora (Ridl.) J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 033, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 051, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, Y.J. Ng, NYJ 183, 30/7/2010 (UPM).

Spathoglottis aurea Lindl.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, summit, M. Shah & M. Ali, MS 2965, 12/6/1973 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 60456, 4/2/2008 (KEP); Bentong, Genting Highlands, G. Ulu Kali, earthy embarkment in front of an abandoned project, opposite telekom tower, S.N. Phoon, FRI 60565 25/3/2008 (KEP); Bentong, Genting Highlands, G. Chin Chin, A. Faiz, FA 012, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, H.E. Khor, KHE 09035, 2/2/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 001, 2009 (UPM); G. Ulu Kali, Y.S. Ooi, OYS 032, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 003, 12/6/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Shahrudin, SHA 070, 18/12/2009 (UPM); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 122, 26/3/2010 (UPM).

Spathoglottis plicata Blume

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, roadside, exposed rocky slope, S. Syahida Emiza, FRI 51456, 22/3/2006 (KEP); Bentong, Genting Highlands, G. Ulu Kali, near telekom tower, A.R. Ummuh Nazrah, FRI 51512, 22/3/2006 (KEP); Bentong, Genting Highlands, G. Ulu Kali, near telekom tower, A.R. Ummuh Nazrah, FRI 51514, 22/3/2006 (KEP); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee templer, M. Fidraus, MFK 061, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.S. Ooi, OYS 031, 15/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 103, 26/3/2010 (UPM).

Spiranthes sinensis (Pers.) Ames

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, S. Anthony, SA 759, 20/2/1987 (KEP); Bentong, Genting Highlands, G. Ulu Kali, S.N. Phoon, FRI 51563, 22/3/2006 (KEP); Bentong, Genting Highlands, G.Lari Tembakau, Y.J. Ng, NYJ 042, 21/10/2009 (UPM); Bentong, Genting Highlands, G.Lari Tembakau, Shahrudin, SHA 050, 2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, Y.J. Ng, NYJ 092, 5/3/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 203, 3/9/2010 (UPM).

Taeniophyllum glandulosum Blume

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, M. Fidraus, MFK 052, 16/12/2009 (UPM); Bentong, Genting Highlands, G. Ulu Kali, near Chin Swee temple, Y.J. Ng, NYJ 187, 3/9/2010 (UPM).

Thelasis micrantha (Brongn.) J.J.Sm.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 192, 3/9/2010 (UPM).

Thelasis sp.

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, inside the compound of Chin Swee temple, Y.J. Ng, NYJ 095, 5/3/2010 (UPM); Bentong, Genting Highlands, G. Ulu Kali, inside the compound of Chin Swee temple, Y.J. Ng, NYJ 144, 29/6/2010 (UPM).

Thrixspermum brevicapsularis Holttum

PENINSULAR MALAYSIA, PAHANG: Tanah Rata, Cameron Highlands, Tanah Rata, originally collected from G. Ulu Kali, P.T. Ong, FRI 64210, 14/5/2008 (KEP).

Thrixspermum cf. *calceolus* (Lindl.) Rchb.f.*Thrixspermum* cf. *centipeda* Lour

PENINSULAR MALAYSIA, KELANTAN: Gua Musang, Kuala Relai, M. Haniff and M. Nur, 10218, 31/1/1923 (SING). PAHANG: Bentong, Genting Highlands, G.Ulu Kali, Y.J. Ng, NYJ 136, 27/5/2010 (UPM).

Thrixspermum cf. *pauciflorum* (Hook.f.) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, Y.J. Ng, NYJ 168, 29/6/2010 (UPM).

Thrixspermum scortechinii (Hook.f.) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, G. Hadley, collection number n.a., 15/8/1967 (KLU).

Thrixspermum trichoglottis (Hook.f.) Kuntze

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, G. Ulu Kali, A.G. Piggott, 2708, 2/3/1981 (KLU); Bentong, Genting Highlands, G. Lari Tembakau, Y.J. Ng, NYJ 158, 29/6/2010 (UPM).

Trichotosia ferox Blume

PENINSULAR MALAYSIA, PAHANG: Bentong, Genting Highlands, Gunung Mengkuang, H.C. Robinson, collection number n.a., 20/1/1913 (SING); Bentong, Genting Highlands, G. Ulu Kali, summit, L.S.L. Chua, FRI 40591, 25/9/1998 (KEP).