ISBN 1823-7975
Conservation Malaysia
A Bulletin Supporting Plant and Animal Conservation in Malaysia Issue No 22 (2015)

A New Record of Hawk Moth Larvae Defoliating Endemic Bornean *Alocasia cuprea* K.Koch

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Introduction

Alocasia commonly known as Elephant's Ears, is one of the most morphologically diverse genera of about 113 species in the aroid or Araceae family. It is distributed from Sri Lanka through Indochina to China, southern Japan, the Malesian region, Oceania and Australia (Nauheimer *et al.,* 2012). This rhizomatous or bulbous perennial is a genus of major horticultural importance and agricultural significance in tropical and subtropical Asia due to its beautiful foliage, patterns of leaf variegation and texture, and food value (Bhatt *et al.,* 2013; Medecilo & Madulid, 2013).There are about 50 species recorded in Borneo and many of them are endemic, including *A. cuprea* K. Koch, which is only confined to Sabah.

Alocasia cuprea is one of the stunning aroids; it is a small and compact plant, up to 80 cm tall. The leaves are ovate in shape, stiff and thick (cardboard-like) and may grow up to 60 cm long and 40 cm wide. The most striking feature is its foliage, which has contrasting leaf colour and texture. The upper leaf surface is glossy bronze-green, darker near the primary veins while the lower leaf surface is deep purple in colour. The leaves also have a very strange glossy texture, almost lacquered, and are so reflective that they often appear to be metallic.

The species can be found growing naturally on slopes in rain forest, over a wide variety of substrates including ultramafics, sandstone and limestone (Hay, 1998). Some of the areas where this species have been recorded are Marai-Parai and Kg. Nalumad (Ranau), Gunung Rara Forest Reserve and Bukit Gemuk (Tawau), Maliau Basin and Sg. Imbak Forest Reserve (Tongod). Horticulturally, this plant is a slow grower that prefers light shade; it grows well as a potted plant.

Attack by hawk moth larvae

Alocasia cuprea has been cultivated at the Forest Research Centre (FRC) nursery in Sepilok, Sabah as part of an on-going project on 'Research on the Potential of Native Plant Species in Urban Forestry' under the 10th Malaysia Plan. Three young orangey hawk moth larvae, measuring 25 mm in length, were observed defoliating *A. cuprea* in March 2015. A mature larva can reach a length of 40 mm. Like other hawk moth larvae, they have a tail or 'horn' at the back of the body. They also have a pair of rounded structures at the front of the body which are fake eyes producing a menacing appearance, presumably to ward off intruders. One larva was attacked by a parasitoid, with a pupa stuck onto its body.

The pupal stage was about 14 days and the emerged adult was identified as *Pergesa acteus* Cramer, based on Leong and D'Rozario (2009).This hawk moth is found throughout South and South-East Asia. It is referred to as *Rhyncholaba acteus* by Holloway (1998). The adult moth has a wing span of 44 mm and a body length of 33 mm. The larva of this hawk moth species has been recorded feeding on a wide range of plants from the families Araceae, Begoniaceae, Commelinaceae, Fagaceae, Leeaceae, Onagraceae and Vitaceae (Robinson *et al.,* 2001). Within the genus *Alocasia*, it was recorded feeding on *A. crassifolia* and *A. macrorrhizos*. However, *A. cuprea* is a new host plant record. In Leong and D'Rozario (2009), the larva of the same species was green in colour but colour variation among hawk moth larvae is known to be widespread, depending on the host plant.

Native ornamental *Alocasia cuprea* at the FRC nursery in Sepilok.

The larva that was attacked by the parasitoid did not continue to grow or eat in captivity. An adult parasitic wasp from the family Braconidae emerged, measuring 7 mm in body length and a few days later, the larva died.

Acknowledgement
We thank Prof. Seiki Yamane for some comments on the parasitic wasp.

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Top view of a healthy mature *Pergesa acteus* larva (40 mm in length) on the underside of the dark brownish *red Alocasia cuprea* leaf.

Side view of a live *Pergesa acteus* larva (25 mm in length), with a parasitoid cocoon fastened onto its surface. Take note of the exit wound (black spot beside the cocoon) made by the emerged parasitoid larva.

Pupa of *Pergesa acteus.*

An adult moth of *Pergesa acteus.*

An adult parasitoid (7 mm in length) of a braconid wasp that emerged from the cocoon on the *Pergesa acteus* larva.

New Record of *Dipterocarpus alatus* in Peninsular Malaysia from Pulau Payar, Kedah

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Pulau Payar Marine Park

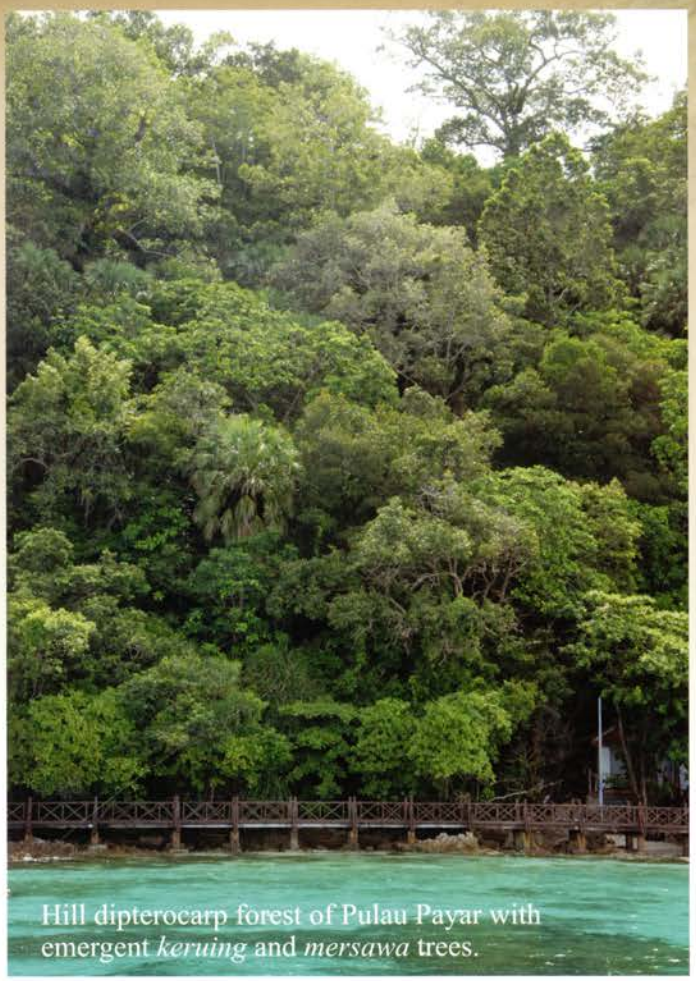
The Pulau (P.) Payar Marine Park (6° 3' 50" N, 100° 2' 28" E) was gazetted in 1994 and consists of a group of small islands including P. Payar, P. Lembu, P. Kaca and P. Segantang. Pulau Payar, located 35 km south of P. Langkawi, Kedah, is the largest of the islands with an area of 31.2 ha and an approximate length of 1.75 km and 500 m width[1]. This is less than 6% of the size of FRIM. There are no freshwater streams on the island. Nonetheless, the entire island is covered by dense vegetation.

Vegetation

Due to its small size, the forest of P. Payar is a generally impoverished version of coastal hill dipterocarp forest with a narrow strip of coastal rocky shore vegetation. The hill dipterocarp forest is a 4-layered forest with sparse ground cover, a sub-canopy layer dominated by *Livistona speciosa* fan palms and a fairly tall canopy level topped with scattered emergents, mostly of *Dipterocarpus* species. Only three species of dipterocarps were recorded during the botanical survey carried out between the 3rd and 7th of August 2015, including two species of *keruing* (*Dipterocarpus grandiflorus* and *D. alatus*) and one *mersawa* (*Anisoptera costata*). These are dominant, towering emergent trees – the largest tree observed was a *keruing belimbing* (*D. grandiflorus*) with a diameter at breast height of 1.2 m.

New *keruing* record

Fruiting specimens of the two *keruing* species collected were matched against verified specimens in the FRIM herbarium and confirmed to species. The first, *D. grandiflorus*, a very large buttressed tree, is widespread in the lowlands of Peninsular Malaysia. Worldwide it ranges from India to Indo-China, the Philippines and Indonesia. The second, *D. alatus*, is a new record for Peninsular Malaysia. Previously it had only been recorded from Myanmar to the Philippines, with the southernmost occurrence in Peninsular Thailand above the Kangar-Pattani line.



Hill dipterocarp forest of Pulau Payar with emergent *keruing* and *mersawa* trees.

Leaves of the two species appear to be quite similar, with that of *D. alatus* being slightly more hairy and the hairiness is persistent along the midrib and basal parts of the main veins. It is therefore fairly difficult to tell them apart in the field, although dried leaves can be identified with a certain degree of confidence when examined with a ×10 hand lens or under the stereomicroscope. The fruits are however, adequately distinctive. The fruits of *D. alatus* are only half as large as the fruits of *D. grandiflorus* and the winged calyx tubes of *D. grandiflorus* often have recurved margins, while those of *D. alatus* are straight.

Botanical expedition team members posing in front of the largest *mersawa* (*Anisoptera costata*) encountered with a DBH exceeding 80 cm, on a ridge dominated by *Livistona speciosa* fan palms.

A juvenile leaf of *Dipterocarpus alatus* (left), with a slightly more caudate base and acute tip is also fairly similar to that of *D. grandiflorus* (right two) with broadly obtuse to slightly caudate bases and acuminate tips.

Mature leaves of *Dipterocarpus alatus* (left two), with slightly more hairy midrib and veins, are fairly similar to that of *D. grandiflorus* (right three).

Fruits of *Dipterocarpus alatus* (right) are only half the size of that of *D. grandiflorus* (left).

Implications of finding

It came as a surprise that such a small island with an expected naturally low plant species diversity would harbour a new dipterocarp record for the country. Initially, leaves that differ only slightly in hairiness were thought to be a natural variation within a population perhaps due to differences in the age of leaves between mature- and juvenile-phase trees. We were indeed fortunate to have encountered the trees in fruit. Without the presence of fruits, it would have been impossible to determine *D. alatus* from sterile leaf vouchers alone. Could *D. alatus* have been overlooked on the main island of Langkawi and other forests in the northwestern-most corner of Peninsular Malaysia?

The *keruing* trees in this part of the peninsula are worth a closer re-examination to see if more *D. alatus* populations have been "hiding in plain sight" amongst its more common *keruing belimbing* cousins.

Acknowledgement

The authors would like to thank Jabatan Taman Laut Malaysia for logistical support.

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What do we know of *Dipterocarpus coriaceus* in Peninsular Malaysia?

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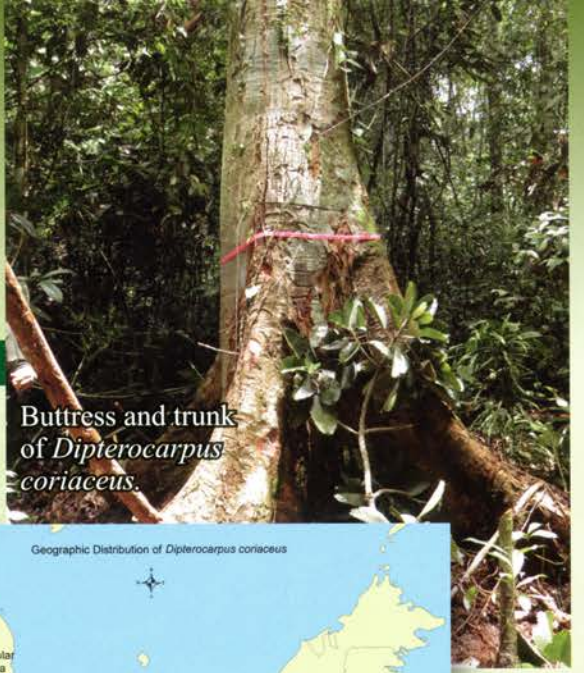

Buttress and trunk of *Dipterocarpus coriaceus*.

Dipterocarpus coriaceus (Dipterocarpaceae; *keruing paya*) is one of the few dipterocarps that favours a peat swamp habitat. Although not strictly confined to peat swamps and can be found in mixed peat swamp forests, the trees are locally aggregated (Ashton 1982). The species is distributed from Sumatra through Peninsular Malaysia to Borneo.

The peat swamp forests of South-East Asia have been shrinking at an alarming rate. A striking example is in the state of Sarawak. In 1996, peat swamp forests covered approximately 1.13 million ha (9.2%) of the state but by 2005, 98.5% of this cover had been lost and only 1.47% (19,260 ha) of the original area was naturally forested (Wong, 2005). Of this, only a fraction is protected, i.e., in the Maludam National Park. In Peninsular Malaysia, the known distribution of *D. coriaceus* covering approximately 1,600 ha of swamp forest has now been reduced to a mere 470 ha. Historical localities such as Bukit Kecil in the district of Manjung and Hutan Melintang and Changkat Jong in the district of Hilir Perak are now oil palm plantations. The Bikam Forest Reserve (FR) is badly degraded and no trees of the species have been located in its 400 ha forest. Like the case of *D. semivestitus* (Chan & Chua, 2007), all apparently seems lost for the Peninsular Malaysian populations of *D. coriaceus*. As a result, the species is categorized as critically endangered in the Malaysia Plant Red list as well as in the IUCN Red List of Threatened Species (http://www.iucnredlist.org/search/).

The discovery of *D. coriaceus* at Chikus FR, some 20 km away from Bikam FR, therefore, came as a complete surprise when we were called to inspect a population of unidentified trees there. Rangers from the Perak Forest Department had stumbled upon these trees close to the margin of the forest. In the peninsula, *D. coriaceus* closely resembles *D. costulatus* (*keruing kipas*). In the vegetative state, only the scars on the leafy twig and the habitat are distinctive. Twigs of *keruing paya* have closely crowded annular scars while those in *keruing kipas* are more distant. *Keruing kipas* is widespread in a variety of habitats whereas *keruing paya* is highly restricted to only peat and mixed peat swamps. In the fruit, *keruing paya* is winged while *keruing kipas* has protuberant shoulders.

Chikus FR is a small reserve of about 470 ha. Because of its isolation and fragmentation, the forest is affected by edge-effect factors and is poorly structured. It has no emergent layer and a lower than normal main canopy but is lush with undergrowth. There are also many gaps of different sizes. Surprisingly, although Chikus had lost a large portion of its swamp land, the abiotic characters typical of a swamp forest, such as the presence of peat and swampy niches, are still evident.

To date, three trees of *D. coriaceus* have been located at Chikus FR. Two are mature trees with diameter at breast height of about 70 cm and one is a juvenile. More efforts are required to determine its population size in the reserve. Perak Forest Department is believed to have set up a High Value Conservation Forest (HCVF) to conserve the population there. As an afterthought, the presence of *D. coriaceus* at Chikus is not unexpected as the forest is less than 20 km away from Bikam FR.


Collaborative effort between Perak Forest Department and FRIM.

It is feared that the continuous drainage required for the maintenance of the surrounding oil palm estates will have severe hydrologic impacts on the ecological functions of the remaining swamp forest at Chikus. This may lead to degradation of forest quality and eventually threaten the survival of the *D. coriaceus* population. Conservation actions at the habitat level are clearly required to protect the population. To do this, FRIM had forwarded a recommendation to Perak Forest Department to keep the Chikus forested area intact and as a Forest Reserve. The areas immediately beyond the forested area have been planted with timber species for plantation purposes. It is hoped that in the distant future, these planted areas will be integrated into the forest complex. In parallel, *ex-situ* conservation efforts by botanic gardens, such as at FRIM, are necessary to secure the germplasm of the species. Additionally, more research needs to be conducted to gain a better understanding of the plant communities and its association in this threatened habitat.

In summary, *D. coriaceus* is as critically threatened as its peat swamp habitat in the peninsula.

Suggested reading

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Unraveling the confusion in Peninsular Malaysian *Orchidantha*

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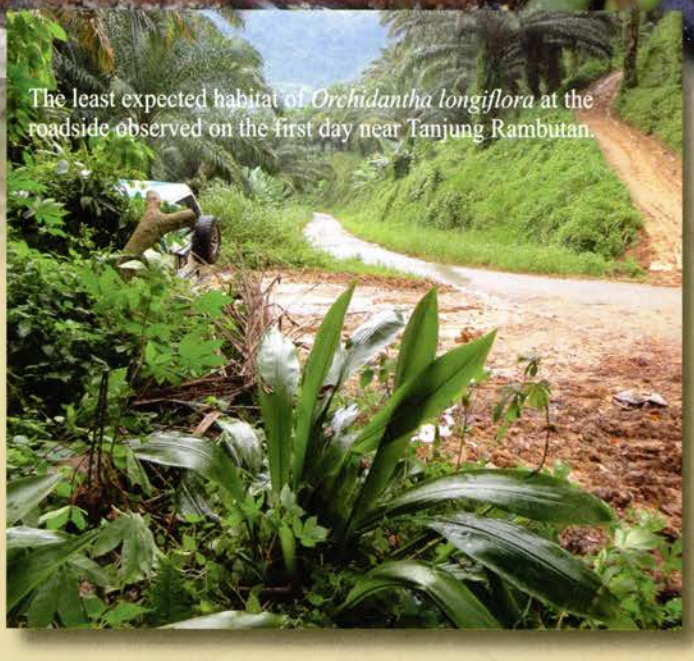

The least expected habitat of *Orchidantha longiflora* at the roadside observed on the first day near Tanjung Rambutan.

The publication of Lowiaceae for Flora Malesiana in 1996 (Larsen, 1996) triggered the discovery of many new species of *Orchidantha*. The revision with its key to the species enabled botanists to determine the identity of species much more easily thus stimulating the discovery of new taxa. In Larsen's account, he reported ten species worldwide with six from the Malesian region. All species are found west of the Wallace Line with a few species extending into Indo-China and tropical China. Following this publication, nine new species have since been added; five from Borneo, two from Vietnam, and one each from Peninsular Malaysia and Thailand. In Larsen's account, four species were recorded for Peninsular Malaysia, i.e. *O. longiflora, O. maxillarioides, O. fimbriata* and *O. siamensis*, and in 2014, a new species, *O. lengguanii* was described from Peninsular Malaysia (Leong-Škorničková, 2014). In spite of these accounts, there is still some confusion with the application of some names, in particular for *O. longiflora, O. fimbriata* and *O. calcarea*; species found in Peninsular Malaysia. This is because some researchers still refer to Holttum (1970) who appeared to have misinterpreted the type specimens (specimens on which new taxa are based) of the three species. In December 2014, we embarked on a four-day trip to the state of Perak with the hope of unraveling the confusion. Joining the team was Dr. Jana Škorničková-Leong, a Zingiberales expert from the Singapore Botanic Gardens. Dr. Škorničková-Leong has recently started to revise the family Lowiaceae. The research team was completed by an experienced plant collector.

Our first stop brought us to Hutan Lipur Ulu Kinta, a recreational forest near the town of Tanjung Rambutan on the outskirts of Ipoh. The condition of the forest however, did not seem to match the habitat of *O. longiflora* that was described from there. We therefore decided to follow a road through an oil palm plantation in our vehicle. It was most unexpected when suddenly our eyes were drawn to several clumps of *Orchidantha* -like looking plants on both sides of the road. Without wasting a second, all four of us jumped out of the vehicle and started looking for evidence if indeed the clumps were of *Orchidantha*. To our delight they were our target plants! Unfortunately, none of the plants were flowering. The only way to identify a species of *Orchidantha* is from its flower, in which case we had none. Nonetheless, we were lucky to discover an unopened inflorescence in one of the clumps and decided to come back on our return trip with the hope that the buds would have bloomed.

On the second day, we travelled further north to Hutan Lipur Ulu Kenas, a recreational forest near Kuala Kangsar. As *Orchidantha* prefers moist habitats such as stream banks, we decided to follow a trail along a river that runs through the recreational forest. To make full use of our day, we collected other flowering plants as well, especially the less studied monocotyledons such as palms and gingers.Unfortunately, by midday we had not found any *Orchidantha*, and so decided to venture onto a nearby hilly trail which also proved futile. At the end of the day, although no *Orchidantha* was sighted, we were paid off with a good 24 collections comprising both herbarium and living specimens. We headed off to Gerik in the late evening after processing the specimens.

Our spirits were not dampened on the third day despite a tiring journey the night before. We headed for the small town of Lenggong where Gunung Runtuh is located. Previously, we had collected *Orchidantha* from this site. We passed by Kampung Gelok, a small village edging smallholdings of rubber and some small-scale orchards. First, we went uphill to a more open area and on the slope of a rubber plantation we discovered a healthy population of *Orchidantha*. Notwithstanding the abundance of the plant here, we only found remnants of old inflorescences. We decided to go downhill and that was when our vehicle experienced some glitches. While waiting for the vehicle to be repaired, we explored the area under some old rubber plantations and were delighted to see what we believed to be an *Orchidantha* plant in full bloom! Further digging revealed another freshly opened flower, with all of its vital characters preserved. Comparison with available notes showed that it could possibly be an *O. calcarea**. Not far from that spot, on the fringe of some bamboo thickets, we saw what

we thought was a second species with a flower bud emerging from the base. Judging from the length of its sepal, the closest candidate would be *O. fimbriata*. The occurrence of two species growing sympatrically (in the same geographic location) was a surprise as there are no previous records of sympatric *Orchidantha* species. Our notion of geographical isolation for different *Orchidantha* species that maintain species isolation now needs to be re-examined. Our investigation continued to Gunung Runtuh, historically known as Gunung Geruntu, which was believed to be the type locality of *O. calcarea*. A 30 minutes' walk along the foot of the limestone hill finally brought us to a decent population at the side of the pebble road. Here, we found the *O. calcarea* again, both with buds and flowers.

Saw, L.G. and Škorničková-Leong, J. photographing a palm, *Arenga hookeriana* at Hutan Lipur Ulu Kenas.

The fast flowing Sungai Senoi-oi where scattered clumps of *Orchidantha longiflora* were found to be growing along the bank.

On the final day, we went back to Ulu Kinta with the hope that the buds we had seen earlier had bloomed. We were quite surprised to find that they were still in bud and therefore decided to have the plant dug out and planted in FRIM. Dissatisfied that we had not found any flowering material, we decided to seek local help from a Temiar village close by at Kampung Makmur. After inquiring from the villagers whether they had ever stumbled upon any plants which resembled *Orchidantha*, we were introduced to Mr. Ajid who claimed to have seen such plants. The plant is known as *lebak* among the locals. Without further ado, we went to the location where he claimed to have sighted it, which was along the Sungai Senoi-oi. And he was right! Based on the flowers that we found, the population was of *O. longiflora*. We were told that the Temiar use the plant to treat night urination among children.

Comparison between the flowers of *Orchidantha calcarea* (left) and *O. fimbriata* (right).

A developing fruit of *Orchidantha calcarea* protruding from the soil in Lenggong.

This short productive trip had been very successful in collecting from the type localities for two of the three species in our puzzle. Field excursions to see the plants in the wild and collecting from type localities of a particular plant taxon is sometimes essential to reconfirm its taxonomic status. At the same time, there is always the possibility of discovering something new in the forest. A very good example would be the new *O. lengguanii* which was recently described (Leong-Škorničková, 2014). This species was discovered in Sungai Selai, Endau-Rompin State Park, when the second author managed to collect living specimens in 2002 that subsequently proved to be a new species. Results from this excursion will soon be written up clarifying the confusion of the names applied to the three species.

**O. calcarea* is the heterotypic synonym of *O. longiflora* (Leong-Škorničková, 2014).

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Leong-Škorničková, J. 2014. *Orchidantha lengguanii* (Lowiaceae), a new species from Peninsular Malaysia, and typification of *O. maxillarioides*. *Gardens' Bulletin Singapore* 66: 15–25.

Erratum to Conservation Malaysia 21, pp 6

Lagerstroemia calyculata Kurz (Lythraceae), a new species recorded in Malaysia should read ***Lagerstroemia calyculata* Kurz (Lythraceae), a new record in Malaysia.**

Articles should be sent to The Editor, Conservation Malaysia Bulletin, Forest Research Institute Malaysia, 52109 Kepong, Selangor D.E. (attn: Dr. Lillian Chua, lilian@frim.gov.my). Conservation Malaysia is distributed free of charge upon request. We welcome any contribution or feedback. Send contributions or address comments and queries to the editor. Past issues are available at http://www.chm.frim.gov.my. Funded by the Ministry of Natural Resources and Environment. Editorial team: Dr. Lee Su See, Dr. Saw Leng Guan and Dr. Lillian Chua.