

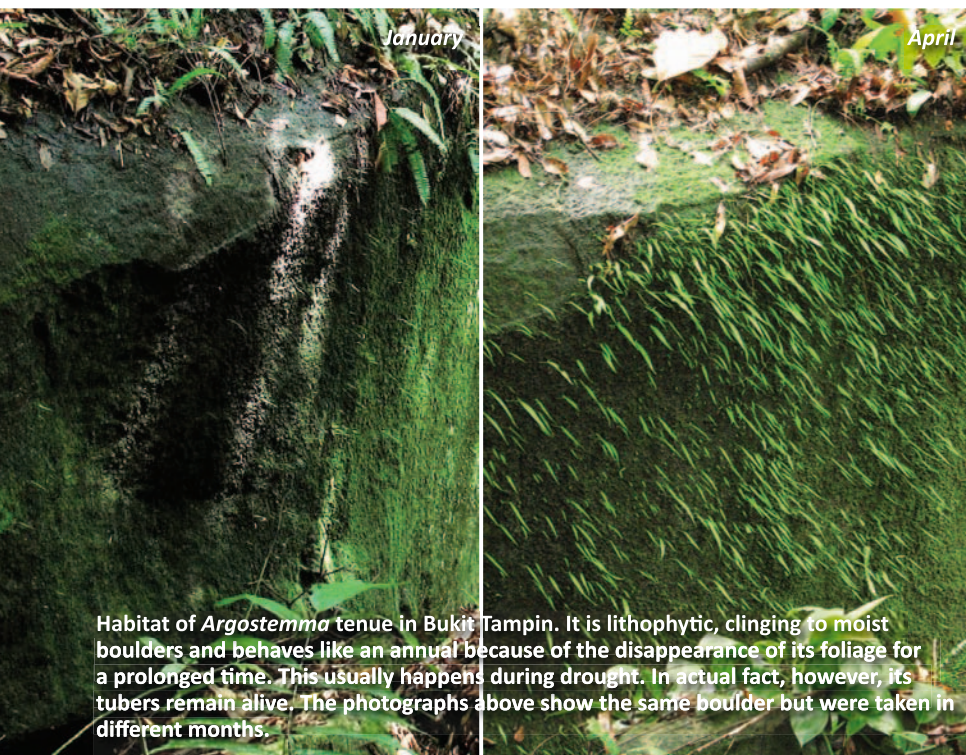
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Now you see it, now you don't –

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Argostemma tenue Ridl.



Habitat of *Argostemma tenue* in Bukit Tampin. It is lithophytic, clinging to moist boulders and behaves like an annual because of the disappearance of its foliage for a prolonged time. This usually happens during drought. In actual fact, however, its tubers remain alive. The photographs above show the same boulder but were taken in different months.

Everybody knows that coffee is a popular beverage. Few people know that the coffee plant comes from a large family called the Rubiaceae. This family is highly diverse in the Malaysian lowland forests and it is often one of the top five ranked families in terms of diversity.

A tiny fleshy herbaceous plant called *Argostemma tenue* shares the same family. Previously recorded from a single locality in Bukit Tampin, Negeri Sembilan (Ridley, 1923), it stole the Malaccan botanical limelight briefly when it was collected by the author in August 2008 from Bukit Senggeh Forest Reserve (FR), becoming a new record for the state.

The most curious thing about this species is that it appears in some months but disappears in other months. To understand its life-cycle, the phenology of the species in Bukit Tampin was regularly monitored for two years from 2009 to 2010 (Fig. 1). The species produces foliage from March to June and then flowers from May to August (previously reported as August to November by Ridley (1923)), followed by fruiting from September to October. The foliage withers in the following drier months and then dies off, leaving the succulent tubers embedded and well-camouflaged on the bare boulders. The



A robust population at Bukit Tampin.

entire population apparently disappears by the end of the year and when the wet season sets in again, a new cycle begins.

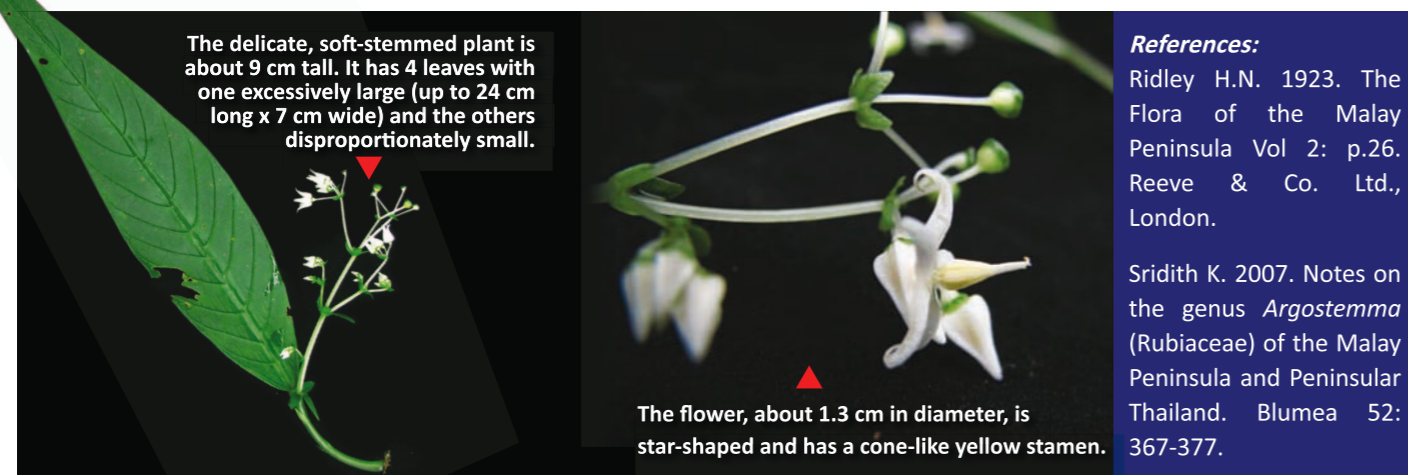


Fig 1. Phenology of *Argostemma tenue*.

Argostemma tenue is narrowly endemic to Negeri Sembilan and Malacca. The population in Bukit Tampin is locally abundant on vertical faces of boulders, and the plants are much bigger in size than of those in Bukit Senggeh. In Bukit Senggeh, only a very small population of plants (c. 20 plants) was found on a single rock face

in the valley. The population shares the same niche with *Begonia herveyana*, a critically endangered begonia.

Like *Argostemma tenue*, many *Argostemma* species are restricted to undisturbed forest habitats (Sridith, 2007). The population in Bukit Tampin is considerably healthier and apparently more viable compared to that in Bukit Senggeh FR and this may be closely linked to the fact that the former habitat has been long protected as a recreational, educational and water catchment forest. In contrast, Bukit Senggeh is highly fragmented and its forest comprises a myriad patchwork of vegetation at various degradation levels. The population here may be at the brink of extinction - its minute population size makes it extremely susceptible to both demographic and environmental events, and edge-effects inflicted by the degradation of the surrounding land.



The delicate, soft-stemmed plant is about 9 cm tall. It has 4 leaves with one excessively large (up to 24 cm long x 7 cm wide) and the others disproportionately small.

The flower, about 1.3 cm in diameter, is star-shaped and has a cone-like yellow stamen.

References:

Ridley H.N. 1923. The Flora of the Malay Peninsula Vol 2: p.26. Reeve & Co. Ltd., London.

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Cameron Highland's Palas *Licuala cameronensis* Saw, A Critically Endangered Palm

By Saw, L.G. (sawlg@frim.gov.my)

The genus *Licuala* commonly known as palas, is a group of dominant palms that inhabit the Malaysian forest understory. In some sites, the genus may completely dominate the understory at the expense of other plants.

Most *Licuala* are lowland species and almost all are closed-canopy species, the only exception being *L. spinosa*, which is able to thrive in open environments and is often found in coastal areas, behind mangroves and inland swamp forests. There are about 134 species of *Licuala* and they are distributed from south China, east India

Licuala cameronensis planted in Kepong Botanic Gardens. The plant was collected in 1991 as a wildling.

through South-East Asia into north-east Australia and the Pacific Islands (Dransfield *et al*, 2008). Their centres of diversity are in Peninsular Malaysia, Borneo and New Guinea. Peninsular Malaysia has about 41 species (Saw, 1997). Although the genus is a common component of the forest undergrowth, it is peculiar that at the species level, they do not occur widely. The genus has a high level of endemism. Out of the 41 species, 33 (80%) are endemic to Peninsular Malaysia (Saw, 2005). Among these, 19 species (46%) are hyper-endemics, i.e., these species are only known from a very restricted range. The reasons for such a high number of hyper-endemic species are not very clear. One possibility is that the exacting habitat requirements and the gregarious nature of individual species result in population isolation, and this promotes speciation.

One of the rarest hyper-endemics is *Licuala cameronensis*. I described the species in 1997 in the revision of the genus for Peninsular Malaysia. *Licuala cameronensis* has so far been recorded only from the lower montane forests of Cameron Highlands. Back in 1991, while conducting regular monitoring work on *Citrus halimii*, a wild citrus found at Farlie Boh Tea Estate in Cameron Highlands, Mr. Damanhuri Sabari, a research assistant, returned one day with a *Licuala* specimen. It turned out to be a new species. In May that year I personally went to the site to see the population. On that trip we collected herbarium specimens and several wildlings for planting in FRIM. Two of these plants are surviving well in the Kepong Botanic Gardens. These plants have begun to flower and fruit in cultivation.

Licuala cameronensis is distinctive—small, solitary and no more than one metre tall. It is an elegant palm, the inflorescence has silky hairy rachillae (stalk holding the flowers); the only other species with similar hair covering is *Licuala lanuginosa*. *Licuala lanuginosa*, however, is stemless and clustering and is much larger with a very



Fruiting *Licuala cameronensis*.



Mr. Damanhuri Sabari standing beside *Licuala cameronensis* in Bertam Forest Reserve, Cameron Highlands.

different inflorescence structure. It is restricted to Johor and is another lowland species with narrow endemism.

Licuala cameronensis is common on ridges but is absent in the valleys. No other populations have been discovered elsewhere in Cameron Highlands. In 2000, while visiting the Royal Botanic Gardens Kew, U.K., I found another collection of the species made by W. Ave, who collected from Kampung Sekam, Perak. This is a village along the Tapah–Cameron Highlands Road, also in lower montane forest. This would be the second locality where the species has been found.

Last year in February 2010, I re-visited the site, keen to see if the species was surviving well and to gather some population data. The population is still as healthy as observed almost 20 years ago. We counted 48 individuals with discernable stems and another 45 acaulescent (stemless) presumably juvenile individuals giving a total of 93 individuals. The population is reproductive and we found some adult plants flowering and fruiting. We searched the entire area but it appeared that the species is indeed confined to one population, growing gregariously in two adjacent ridges separated by a shallow valley beside the tea estate.

Based on its population size and range, the species is assessed as Critically Endangered (CR B2). The population is safe only as long as the forest reserve remains and there is no conversion of the land to other uses.

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Dransfield J., Uhl W.H., Asmussen C.B., Baker W.J., Harley M.M & Lewis C.E. 2008. Genera Palmarum. Kew Publishing, Royal Botanic Gardens, Kew. 732 pp.

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Bactrocera dorsalis probing the lip of a *Bulbophyllum ecornutum* flower.

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The importance of *Bactrocera* fruit flies as pollinators of *Bulbophyllum* orchids

Bactrocera dorsalis carrying the pollinia of a *Bulbophyllum elevatopunctatum* flower.

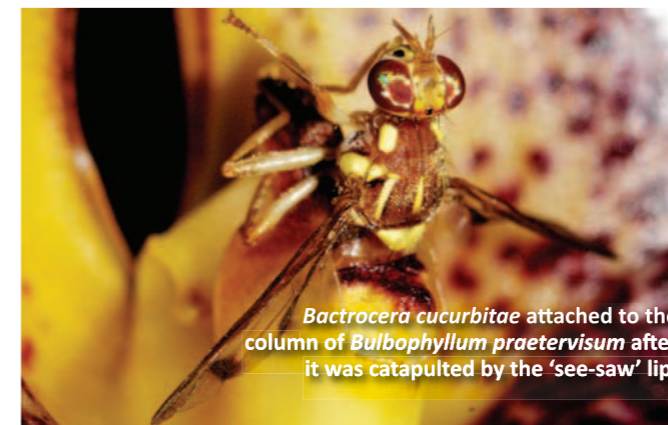
Bactrocera fruit flies (formerly in the genus *Dacus*) are generally regarded as agricultural pests. The female fruit fly lays its eggs in fruits and vegetables such as guava, papaya, wax apple, brinjal, tomato and cucumber. The larvae feed inside the fruits causing damage and premature fruit fall. Some species have tremendous impact on crops; if not controlled, the damage they cause can be substantial.

In the wild, however, these flies that are pests of agriculture play a crucially important role as pollinators of some orchid species, particularly orchids of the genus *Bulbophyllum*. Some *Bulbophyllum* species produce chemical compounds (e.g. methyl eugenol, raspberry ketone and zingerone) that attract the *Bactrocera* fruit fly to visit the flowers. These chemical compounds, when ingested during visits, boost their sex pheromones that are used in courtship, in addition to building the fly's chemical defenses against predators. To aid this, the *Bulbophyllum* flower has a specialised mechanism, in which the hinged lip, when over-balanced, tips over and traps the visiting fly in between the column and the lip, thus enabling pollination. During the floral visit, the fly probes on the sepals, petals and finally the lip, feeding on the chemicals the flower produces. When the balance of the lip is disturbed, the lip catapults forward and the fly is thrown against the column (a structure containing both male and female reproductive parts), detaching the pollinia, which then adheres to the body of the fly. When the fly visits another flower, this process is repeated

Bulbophyllum elevatopunctatum flower heavily visited by *Bactrocera dorsalis*.

but this time, the pollinia from the previous flower are deposited onto the stigma. Recent observations and studies have shown that numerous *Bulbophyllum* species are dependent strictly on *Bactrocera* fruit flies as their sole pollinator.

In view of the role of *Bactrocera* fruit flies as orchid pollinators, it is of concern that the agriculture sector sometimes implements area-wide control programmes to eradicate *Bactrocera* fruit flies, through the use of pesticides, biological control, male annihilation (MAT) or sterile insect techniques (SIT), and poisoned protein baits, or a combination of these methods. It would be most unfortunate if *Bactrocera* fruit flies that may be the sole pollinators of some *Bulbophyllum* orchids are eliminated. For orchid species that rely on single pollinators, the extermination of their pollinators would have serious consequences on their survival and diversity. It is therefore important to understand the interactions between fruit flies, the orchids they pollinate and the damage they cause to farmers' crops. Such an understanding must be factored into pest management of fruit flies in agricultural areas. Only then will we be able to manage the fragile balance between orchid conservation and agricultural production of fruits and vegetables.



Bactrocera cucurbitae attached to the column of *Bulbophyllum praetervisum* after it was catapulted by the 'see-saw' lip.



An unidentified *Bulbophyllum* species visited by a *Bactrocera* fly.

Suggested reading:

Tan, K.H. (2009). Fruit-fly pests as pollinators of wild orchids. *Orchid Digest* 73: 180–187.

Ong, P.T., Hee, A.K.W., Wee, S.L. & Tan, K.H. (2011). The attraction of flowers of *Bulbophyllum* (section *Sestochilus*) to *Bactrocera* fruit flies (Diptera: Tephritidae). *Malesian Orchid Journal* 8: 93–102.

Bulbophyllum patens (usual purple form) visited by several *Bactrocera* flies.



Bulbophyllum patens (an unusual yellow form) visited by a *Bactrocera* fly.

Bactrocera dorsalis clinging to the lip after slipping down from the slippery sepals of a non-resupinate flower of *Bulbophyllum praetervisum*.

Alpinia petiolata has large yellow flowers dangling on a long inflorescence. It is endemic to the mountains of Peninsular Malaysia.

Hidden Beauties of Fraser's Hill, Pahang

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Fraser's Hill is a well known hill resort located on the Main Range of Peninsular Malaysia. It was first established in the 1890s, among others, to meet demands for tin mining activities operated by Chinese miners. Throughout this period, a Scots named Louis James Fraser supplied his mule train to transport the tin down to Raub. The mines were later abandoned when the ore supply dwindled. Towards the late 1910s, the British Resident converted it to a cool retreat to cater for the increasing European population residing in Malaya. After the construction of the road and buildings, the hill station was opened to visitors in 1922. It was justly named after its pioneer.

Apart from being a tourist attraction, Fraser's Hill is a popular and important botanical collecting site. Its high levels of biodiversity were first noted by H.N. Ridley in 1897 when he made collections at the nearby Semangkok Pass, also known as The Gap. Since then, Ridley and many other botanists have discovered numerous new species from the station and its surrounding areas.

One notable plant family present in Fraser's Hill is the ginger family Zingiberaceae. There are no less than 31 ginger species recorded here and 11 of them were named based on collections from Fraser's Hill. These are *Alpinia murdochii* Ridl., *Camptandra ovata* Ridl., *Geostachys primulina* Ridl., *Globba curtisii* Holttum, *Globba holttumii* S.N.Lim, *Globba patens* var. *costulata* S.N.Lim, *Hornstedtia striolata* Ridl., *Scaphochlamys pennipicta* Holttum, *Zingiber aurantiacum* Theilade, *Zingiber fraseri* Theilade and *Zingiber multibracteatum* Holttum.

When in flower, one simply cannot miss the stunning dark purplish brown floral bracts of *Zingiber multibracteatum*. It is only found on the mountains of Kelantan, Pahang and Perak.

Many of these gingers are unique because they are endemic either to Fraser's Hill (such as *Geostachys primulina* and *Zingiber fraseri*) or to Peninsular Malaysia. During recent visits, the author was pleasantly surprised to find many of them thriving well in the forest, with some just several steps away from the winding hill road. They are able to survive provided the intensity of disturbance is low.

In April 2010, the Pahang state government declared a ban on new development of natural forest land at the hill station so as to preserve its rich natural heritage and revitalizing environment. This ruling is indeed another strategic move towards the long-term conservation of Fraser's Hill's rich biodiversity and pristine environment.

Geostachys densiflora grows on steep slopes supported by stout aerial roots anchored firmly into the soil. The name 'densiflora' refers to the very dense flowers borne on the inflorescence.

The long and slender inflorescences of *Zingiber aurantiacum* protrude from the ground. It can only be found at mid elevation south of the Main Range.

Scaphochlamys pennipicta is the only species in the genus with pure white flowers.

Scaphochlamys pennipicta has never been found again at Fraser's Hill after its first and only collection in 1923. Fortunately, another population was discovered in Krau Wildlife Reserve, Pahang.

Camptandra ovata, another endemic to the mountains of Peninsular Malaysia, has white flowers emerging from a large green cup-shaped bract (photo by Syahida E.S.).

Alpinia rafflesiana is widespread from low to high elevations in Peninsular Malaysia. Except for the bright orange flowers, the whole plant is covered in velvety hairs.



Globba cernua has pale yellow flowers that resemble petite dancing ladies.



Geostachys primulina has leaves with a purple undersurface. This species has been recorded only from Semangkok Pass at Fraser's Hill (photo by Lau K.H.).



Alpinia murdochii is a tall ginger endemic to the mountains of Peninsular Malaysia. Its flowers are white on the outer surface and red on the inner surface (photos by Ong P.T.).



Globba patens var. *costulata* favours rocky stream banks. This species was first described from a plant collected at Fraser's Hill.

Acknowledgements

Thank you to Dr. Ruth Kiew for comments and Lau Kah Hoo, Ong Poh Teck and Syahida Emiza Suhaimi for their pictures.

Errata for Issue No. 13 (2011):

Page 7. *Dipterocarpus tempehes* is also found in Singapore.

Suggested reading:

Kiew, R. 1998. The seed plant flora of Fraser's Hill, Peninsular Malaysia: with special reference to its conservation status. FRIM Research Pamphlet No. 121. 121 pp.

Holttum, R.E. 1950. The Zingiberaceae of Malay Peninsula. The Garden's Bulletin Singapore 13:82–105.

