Conservation Malaysia

ISBN 1823-7975

A Bulletin Supporting Plant and Animal Conservation in Malaysia

Issue No. 8 (2008)

Malaysian Cycads – ancient plants with little hope for the future?

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Cycads (Cycadaceae) first appeared on earth 270–280 million years ago, and made up the dominant flora during the Jurassic and Cretaceous periods (100–200 million years ago). They remain a part of our modern flora with about 300 species in three families, distributed primarily in dry tropical and sub-tropical regions. The oldest of the families, Cycadaceae, is today represented by a single genus, *Cycas*, of about 90 species scattered throughout Australia and Indo-China, the Malesian region, Japan, South Asia and East Africa.

Malaysia is home to three striking arborescent species of *Cycas*, namely *C. litoralis* (sandy and rocky seashore), *C. clivicola* (limestone cliffs) and *C. macrocarpa* (primary forest understorey).

C. clivicola in its natural limestone habitat in Lenggong, Perak. Previously harvested, this specimen is regenerating from two axillary shoots.

Reaching heights of up to 10 m or more, the massive, often gnarled and twisted trunks bear testimony to centuries of exposure to the harsh conditions of their habitats and are in stark contrast to their graceful crowns of pinnate fronds.

Unfortunately their attractiveness is also their greatest weakness. Cycads are prized ornamentals in the international market. More than 50 million seeds and 13 million plants were legally exported by CITES Parties between 1983 and 1999 (Donaldson *et al.*, 2003). The 1997 IUCN Red List of Threatened Plants included all three cycad families as among the most threatened plant families in the world (Walter & Gillet, 1998). Fifty-two percent of all cycads are listed as threatened, mainly due to habitat loss and harvesting from the wild (Donaldson, 2003).

C. litoralis can today only be found in protected inaccessible locations like this cliff at Dungun, Terengganu

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No documentation exists on harvesting or trade of Cycads in Peninsular Malaysia, but it is generally accepted that such activities occur and seriously impact wild populations, and recent investigations into the trade in Peninsular Malaysian Cycads have provided interesting insights.

C. litoralis is sought after in landscaping projects and has the strongest market presence with 927 recorded specimens, mostly in wholesale nurseries in Johor and the Klang Valley. It is encouraging to note that wild collection has largely ceased as *ex situ* propagation by off-shoots, which this species readily forms in cultivation, has become a standard nursery practice to increase stocks. A different scenario exists for *C. clivicola*. Plants are also widely traded, though in far lesser numbers (total 357), but at prices on average 30-40% higher than *C. litoralis*. This species has no presence in Johor, instead stocks are concentrated in large, high-end urban retail nurseries in the Klang Valley and in small nurseries in Perak, Perlis and Langkawi close to the species' natural habitat. Over 95% of the plants were adult plants with 46% of plants of more than 1m stem height, indicating active harvesting activities, a notion supported by interviews with nursery contacts. *Cycas macrocarpa* interestingly had no presence in the market, with only one juvenile specimen recorded.

Cycas are dioecious plants with a complex biology characterised by slow growth and recruitment, pollinator dependency and extended seed maturation times that preclude regular yearly reproductive activity. Populations need sufficient individuals of both genders in order to reproduce and sustain the genetic diversity necessary to remain independently viable.

On-going conservation monitoring is expected to provide data to facilitate an assessment of the conservation status of the three species native to Peninsular Malaysia, and help in a better understanding of the ecology of these amazing living sentinels that bear testimony to the biodiversity of our planet's ancient past.

▲ Rarely collected, C. *macrocarpa* thrives on the thin humus layer accumulated between the roots of plants.

References:

Donaldson J.S. (2003). Cycads. Status survey and conservation action plan. IUCN/SSC Cycad Specialist group. IUCN, Gland, Switzerland and Cambridge, UK.

Donaldson J.S., Dehgan B., Vovides A.P. & Tang W. (2003). Cycads in trade and sustainable use of cycad populations. In: Cycads. Status survey and conservation action plan. IUCN/SSC Cycad Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

Walter K.S. & Gillet, H.J. (eds.) (1998). 1997 IUCN Red List of Threatened Plants. Compiled by the World Conservation Monitoring Centre. IUCN – The World Conservation Union, Gland, Switzerland and Cambridge, UK.

◀ A male cone of C. *clivicola* in late anthesis. The cone has begun to tilt due to commencement of senescence at its base.

◀ Seeds of C. *litoralis* are believed to take about two years to mature. The seeds shown here are almost ripe and ready to abscise.

A rare encounter with life on the edge, in all its ephemeral beauty

By Jutta, M. (mariamjutta@frim.gov.my), Yao, T.L.& Kueh, H.L.

On a recent botanical expedition to Terengganu, three myco-heterotrophs (myco: fungus, heterotrophic: living on organic substrate for its growth and development), namely the orchid *Didymoplexiella ornata* and two species of *Thismia* (Burmanniaceae), were among the more unusual and exciting finds.

Devoid of green tissues and thus lacking chlorophyll, these plants are unable to photosynthesise. They need to obtain nutrients from alternative sources, in most cases from fungi with which they form unique associations. Delicate, short-lived and coloured to blend into their surroundings, they are difficult to spot among the mesh of dry twigs and dead leaves that make up the litter layer from which they so briefly emerge.

The association between flowering plants and fungi spans the continuum from the mutualistic (where both partners benefit) to the parasitic (where only one party gains while the other loses) and involves thousands of different species of fungi, and an estimated 90% of plant species.

Plants without green chlorophyll-containing leaves are parasitic in nature because they are totally dependent on the fungus. Many of these plants have no root hairs and it is the fungus that absorbs water and nutrients from the soil and decomposing organic matter.

Myco-heterotrophs such as *Didymoplexiella ornata*, *Thismia arachnites* and *T. javanica* spend much of their existence dormant in the soil as hardly recognizable sausage-like roots or tubers. The tuber slowly absorbs nutrients from the fungal hyphae that penetrate its cells. Once the myco-heterotroph has stored enough energy, it makes a sporadic, almost momentous above-ground appearance during which it blooms and fruits. This brief interlude, which can be as short as a few days, presents the only chance to spot and observe them.

Very little is known about the ecology of such plants, in part due to the difficulties in obtaining living material (which makes them such exciting finds), but also because myco-heterotrophs have proven notoriously recalcitrant to cultivation which largely eliminates research and experiments.

For their continued existence myco-heterotrophs depend on the intact ecological balance of their natural habitats. Restricted to deeply shaded, humid places, the already precariously balanced life cycles of these plants may easily be stretched beyond capacity once biotic (e.g. pollinator presence, dispersers, fungal host(s)) or abiotic conditions (light, humidity) are altered or compromised. Chancing upon such rare gems leaves a sense of wonder for Nature's creativity and complexity, but also a painful reminder of the urgency for conservation of what remains of it.

The flowers of *Didymoplexiella ornata* raised above a slender dark-coloured stem.

Despite its small size (1 cm broad) and dull colouration, closer inspection of the flower of *D. ornata* reveals a rare beauty.

The bright lemon colouration makes *T. arachnites* easy to spot among the forest litter . The specific epithet '*arachnites*' is derived from the long tentacles that give it a spider-like appearance.

This recent find of *T. javanica* confirms the existence of this species in Peninsular Malaysia.

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LIMESTONE H

By Phoon, S.N. (phoon@frim.gov.my),

Gua Cenderawasih Recreational Forest and Bukit Papan Forest Reserve (including Bukit Kubu Recreational Forest), Perlis, were explored botanically in early 2007. Compared to the north, flora of the Southern limestone hills is little known.

The forest floor is covered with humus and very little soil. Emergent trees are scattered and herbaceous plants are rather few, as a result of direct sunlight exposure. Rattans, climbers and *Streblus ilicifolius* are relatively common. We climbed Gua Cenderawasih and Bukit Kubu Recreational Forest via a cement walkway. In Bukit Papan Forest Reserve, however, we were unable to reach the summit as the presence of thorny leaves of *S. ilicifolius* and tangled climbers cut off all possible paths ascending to its peak.

Results of this trip are very encouraging. Out of 70 collections, at least 20 species were recorded as new to the State, including some rare species or limestone endemics.

Some interesting fauna were observed too, such as the Black-bearded Flying Dragon (*Draco melanopogon*), Golden Paradise Tree Snake (*Chrysopelea ornata*) and Dusky Leaf Monkey (*Semnopithecus obscurus*).

Acknowledgement
Special thanks to Ms. Chew Ming Yee (FRIM) and Mr. Daicus M. Belabut (Universiti Malaya) in identifying the animals.

▲ 1. Bukit Papan Forest Reserve located at Kuala Perlis, near the jetty to Pulau Langkawi. It stretches for about 10 km and is surrounded by paddy fields

▶ 2. Getting through the dense tangle of stilt roots and climbers is quite a task!

3. *Chirita viola* (Gesneriaceae) is a new record for Perlis. This small herbaceous plant of about 2 cm tall was previously only recorded in Pulau Langkawi, Kelantan and Pahang.

4. *Thunbergia crispula* (Acanthaceae), although a common climber, is a new record to Perlis. This species may have been sidelined during collection because it occupies a belukar area.

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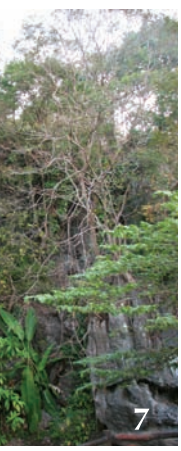
Rafidah, A.R. & Imin, K.



5a&5b . *Doryopteris ludens* (Adiantaceae) growing in rock crevices with very little humus and almost no soil.

6. Cemented steps leading to the peak of Gua Cenderawasih made collection easy.

7. Deciduousness is common in the White Meranti-Gerutu forest during the dry season.

8. *Pentace triptera* (Tiliaceae) although common throughout Peninsular Malaysia, is yet another new record for Perlis.

9a&9b. *Impatiens macrosepala* grows in rock crevices in shady and cool habitats.

10. Attractive lantern-like red flowers of *Sterculia lancaviensis* (Sterculiaceae).

11. *Chrysopelea ornata*, commonly known as Golden Paradise Tree Snake, is an efficient climber and glider.

12. The Dusky Leaf Monkey was probably wondering what we were up to.

Platymna tweediei

a rare gem endemic to the Central Mountains

By Chew, M.Y. (chew@frim.gov.my), Yao, T.L. & Kamarudin, S.

**Stong State Park, Kelantan,
Gunung Tera to Gunung Ayam,
12 February 2007.**

It was Day Six into our nine-day long botanical expedition to Gunung Tera and the surrounding areas (see series No. 7, 2008). For the first time, the weather was not cooperative, thick, obscuring fog hung low over the mountains, signaling that the humidity level was approaching saturation point and that we could expect a fine drizzle. Having to cover almost 12 km of undulating terrain daily, the last thing we wanted was to get rained upon in the chilly lower montane forest at about 1,300 m above sea level with a temperature of about 20ºC.

It was a quarter past ten when we began to scale the first steep slope for the day in a single file. Huffing and puffing, the front-liners, namely Dr. Ruth Kiew and our guide, Mr. Pauzi Husin, narrowly missed stepping on this large, gaudily-coloured snail languishing in the middle of the trail. The poor snail, minding its own business, did not enjoy the lavish attention and immediately retracted its stalked eyes. That did not stop us at all from admiring this incredible piece of artwork by Mother Nature, the large, blackish brown, dorsal-ventrally flattened shell almost 7 cm across, the knobbly, Indian-ink-black upper mantle parts, blood-red sides framed with black lattice patterns and finally finishing in a solid red, undulating skirting for the foot!

Images of this beauty were sent to Dr. Jaap Vermeulen, a terrestrial mollusc taxonomist based

Unlike their colourful marine cousins, the nudibranchs that are dubbed "butterflies of the sea", most land snails usually have an earthy, green-brown appearance and this makes *Platymna tweediei* a real rare gem.

1. The snail lying along the path.

2. Such bright colours make the snail stands out like a sore thumb against the drab forest floor. This could be a warning to potential predators of its nasty taste.

3. View from above showing the strongly ribbed, dark-brown 7 cm-wide shell.

at the Nationaal Herbarium Nederland. His excited response came almost immediately: "A rare meeting with the local wildlife!" It turned out that we had sighted *Platymna tweediei*, a rare species of land snail from the family Ariophantidae, which is endemic to the Main Range of Peninsular Malaysia. According to Dr Vermeulen, it is known only from the Telom Valley (Cameron Highlands), Pergau River (Kelantan) and Temengor Forest Reserve (Perak). Its brilliantly coloured mantle has never been photographed before.

Our guides concurred about the elusiveness of this snail. It was never spotted along popular tourist trails and in the past five years, only three guides had seen the species on six occasions during different months of the year, twice per year being the maximum frequency. All locations were along the Tera-Ayam ridge. This particular one, seen along a seldom used trail at the base of Gunung Tera (5 20ºN, 101 54ºE) that linked the wet valleys of Begonia Camp to the Old Tera Camp on a ridge higher up, seemed to be the "hot-spot", with three confirmed sightings by Mr. Pauzi. The other localities were the back trail to Gunung Ayam and the ridges leading to Gunung Kob. All individuals were about the same size, with a shell diameter of about 7 cm. It is a terrestrial snail, never observed on trees, and always found in wet areas. All observations were between 9 and 11 a.m., during fair weather.

Platymna tweediei appears to be a dweller of the pristine mossy forest. Any form of encroachment may seriously threaten the population. A carefully guarded state park could be its last secure haven, provided that ecotourism activities do not exceed the carrying capacity, which would lead to degradation of its habitat. Interest expressed by the local stakeholders to monitor, record and safe-guard this species is greatly applauded.

Taxonomic Notes

Platymna tweediei Tomlin, 1938, is the largest and rarest of several conspicuous ariophantid snails that are endemic to the forests of the central mountain range, occurring on non-calcareous soils. The genus *Platymna*, has only one species. It is similar to *Hemiplecta* but has a larger, paper-thin, entirely dark brown, rather strongly ribbed shell. J. Vermuelen.

Acknowledgements

Sincere gratitude to Dr. Ruth Kiew for spearheading the Gunung Tera Expedition, Dr. Jaap Vermeulen for identification and taxonomic references, Pauzi Husin, Mohd Adzhar Mat Razali, Nik Rosli Nik Hassan and Nik Mohd Masri for their contribution and for "keeping an eye out" for *Platymna tweediei* in the State Park, and lastly Forestry Department Peninsular Malaysia for safeguarding the Park.

Suggested readings

Davison, G.W.H. 1995. The Terrestrial Molluscan Fauna of Temengor Forest Reserve, Hulu Perak, Malaysia. Malayan Nature Journal, Volume 48: 233 248. (Note: The same species of snail was named as *Hemiplecta tweediei*.)

Davison, G.W.H. 1995. Belum —A Rainforest in Malaysia. Malaysian Nature Society. P. 115. (Note: Picture of the shell of the same species of snail was named as *Hemiplecta floweri*.)

Artificial Seed Research on Selected Tropical Tree Species in FRIM

By Noraliza, A. (noraliza@frim.gov.my)

The tropical forests of Malaysia have been identified as one of the mega diverse regions of the world. Progress in industrialization and rapid population growth have however placed great pressures on forested land. It is noted that 10,000 species become extinct annually worldwide (Racelis, 1999). The two main threats are harvesting and change in land use patterns. *Ex situ* conservation, recognised as complementary to the *in situ* approach, includes the establishment of germplasm materials in botanic gardens, field genebanks, provenance trials, seed storage and biotechnological advances. Biotechnology does not intend to replace conventional approaches in *ex situ* conservation but offers researchers and genebank curators a set of additional tools to allow them to improve the conservation of germplasm collections (Engelmann, 1998).

Artificial seed technology is a method adopted in recent years for improving and conserving tree species. The artificial seed development was promoted by Murashige (1977). In Forest Research Institute Malaysia (FRIM), artificial seed technology has been tested as a protocol for conserving tropical tree species such as *Aquilaria malaccensis* and *Acacia* hybrids. The production of artificial seeds is done using somatic embryos or tissue-cultured shoots or axillary buds. Artificial seeds prepared from these materials provide an easy and novel delivery system. The use of somatic embryos in artificial seed however has not been very successful for many tree species and hence, shoot tips and axillary buds are used as alternatives. Artificial seeds consist of derivatives encased in a protective coating containing carbon sources, nutrients, growth regulators and anti-microbial agents. The artificial seed coat must protect the plant material from mechanical damage during handling and allow germination and conversion to occur without inducing undesirable variations (Harikrishna & Ong, 2002). The coating must be mild enough to protect the material, allow germination and maintain its stability at room temperature whether stored in capped or sealed containers. Coating should be biodegradable and solvents that are used must be harmless to the material. Concentrations of alginate, duration of storage and use of different media types will significantly affect the frequency of regeneration from encapsulated embryos (Niranjan & Sudarshana, 2005).

The potential advantages of artificial seed technology are genetic uniformity of plants, rapid propagation of desirable lines, easy handling and transport of cultured materials, reduction in costs of vegetatively-propagated superior lines, reduction in breeding cycle, reduction in storage space and direct delivery to the field omitting the transplanting and acclimatization processes. Research on artificial seed production for forest trees using somatic embryos has been reported for *Eucalyptus citriodora, Santalum album, Pinus lambertiana, Pinus taeda* and *Picea abies* while that of shoot tips has been reported for *Jacaranda mimosaefolia* and *Guazuma crinita*. Results have however been less promising (Gupta & Kreitinger, 1993). Recent development in this approach has paved way for the large-scale production of artificial seeds of selected forest species and now, bioreactors are employed to produce large quantities of artificial seeds.

References

Ahuja, M.R. 1991. Application of biotechnology to the preservation of forest tree germplasm. In: Woody plant biotechnology, MR Ahuja (ed.) Plenum Press, New York. Pp 307-313.

Engelmann, F. 1998. In vitro Conservation of Horticultural Genetic Resources. Review of the State of the Art. Paper presented at World Conference on Horticultural Research. 17-20 June 1998. Rome, Italy.

Gupta, P.K. and Kreitinger, M. 1993. Synthetic seeds in forest trees. In: Micropropagation of woody plants. MR Ahuja (ed.) Kluwer Academic Publishers, Dordrecht. Pp 107-119.

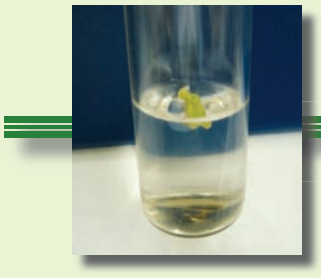
Harikrishna, K and Ong, C.H. 2002. Synthetic seeds. In: Basic principles of biotechnology and their application in forestry. B Krishnapillay (ed.) APAFRI. Pp 87-91.

Murashige, T. 1977. Plant cell and organ cultures as horticultural practices. Acta Hort. 78: 17.

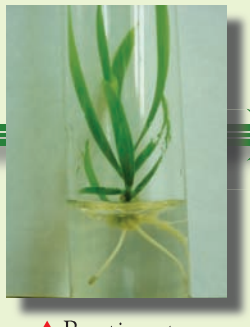
Niranjan, M.H. and Sudarshana, M.S. 2005. In vitro response of encapsulated somatic embryos of Lagerstroemia indica L. Indian J Exp Biol. 43(6): 4-552.

Racelis, D.A. 1999. Fundamentals of environmental impact assessment: training manual on recent developments in forestry and environment. College, Laguna: TREES, UPLBCFNR.

▲ *Acacia* hybrid's artificial seed – coating with nutrients,growth regulators and anti-microbial agents



▲ Shoot induced from the artificial seed



▲ Rooting stage

▲ Plant ready for transfer to the nursery

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