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Penang Island is blessed with a good diversity of cockroach species. Most of these cockroaches live on the forest floor and help to break down leaf litter. A total of 44 species of cockroaches was found in a short survey carried out in various locations in the island. The locations where cockroach pitfall traps had been placed and cockroaches had been sampled include the Penang National Park, the Penang Botanic Gardens, Penang Hill, Bukit Jambul, Balik Pulau and Lembah Burung of Universiti Sains Malaysia.

Table 1 shows the composition of cockroaches trapped in different localities in Penang. Three families were found, namely Blattellidae, Blattellidae and Blaberidae. The Penang Botanic Gardens has the largest diversity of cockroach species (n = 22), followed by Penang Hill (n = 20) and the Penang National Park (n = 17). Some of the interesting species of cockroaches found in the survey are shown in Figure 1.

Table 1: Composition of cockroach species found in different locations in Penang Island¹

Location	n	No. species sampled		
		Blattellidae	Blattellidae	Blaberidae
Penang National Park	17	17	17	17
Penang Botanical Gardens	22	22	22	22
Penang Hill	20	20	20	20
Balik Pulau	6	6	6	6
Bukit Jambul	18	18	18	18
Lembah Burung	10	10	10	10

¹Quah & Lee (unpublished).

More surveys will be undertaken in future to further substantiate the data obtained in the current survey. We strongly believe there are many more species of cockroaches out there in Penang Island that remain undiscovered, to fellow researchers or are even new to science!

About the authors

Lee Chow Yang is a Professor of Entomology. He had killed thousands of cockroaches while working for his Ph.D. more than 15 years ago and is grateful to these fascinating creatures; without them, he would neither have received his Ph.D. nor have a position in USM today. Evan Quah is a naturalist at heart and a Ph.D. candidate by profession. He spends most of his time peeping at the "intimate moments" of house geckos and observing other interesting behaviours. With the findings from his studies, he hopes to design effective sustainable management strategies against these crawlies.

ECO Bulletin welcomes contributions in the form of articles or photographs on ecological issues in USM. Kindly submit all articles and images to:
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The editor reserves the right to select and edit articles for publication based on space availability and topical interests. All articles must carry the sender's full name, address and telephone number. A pseudonym may be included.



(E) *Panesthia angustipennis*



(F) *Pseudorhaphaspis nebulosa*



(G) *Epilampra* sp.



(H) *Morphna maculata*



(I) *Rhabdoblatta* sp.



(J) *Perisphaerus* sp.

iECO-USM
in brief



Tamarindus indica
(Leguminosae)
Asam Jawa

The species is a native of East Africa and West Asia. An individual tree can reach 25m in height. The leaflets are in 10-18 pairs, oblong in shape. Flowers are yellow with red dots while fruits are brown in segmented rounded pod.

Usage: The pulp of the fruits are used as a sour flavouring for cooking and making drinks. They are also known for their medicinal value. The fruits are widely used as a remedy to treat fever, intestinal diseases and diarrhoea. Over-ripe fruits are used to clean and brighten silver, copper and brass.

B10...a site to behold...

B10 is instantly identifiable by its stout silhouette, snuggled in a calm cul-de-sac amid the lush wooded site of Lorong Pegawai where silence is broken only by the shrill calls of riang-riang (cicadas), other insects and birds. It is here in the traffic-free surroundings that the restful haven and mother-nature synchronise in perfect harmony.

This cool hideaway in a green refuge is one of the campus' oldest 1938 bungalows. The architecture and surroundings fuse a touch of romantic 'Englishness' and Malay vernacular charm.

Photographs and text courtesy of USM, *The Leader*, vol. 3, no 2

Yellow-vented bulbul,
P. goavier

The bird is considered to be an aggressive pest species frequently found in the campus. They are omnivorous, feeding on fruits, seeds, nectar and insects.

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April 2010
Vol. 2 • No. 1
ISSN 1985 - 9775

The **ECO** Bulletin



working together towards a sustainable future



GLOBAL NETWORKING
FOR USM'S ECOTEAM

By Prof. Mashhor Mansor
School of Biological Sciences

Universiti Sains Malaysia's (USM) Eco Team has always aspired to be involved in high impact research projects as well as to keep abreast of current global environmental and ecological issues.

The team has always kept an open mind to motivate the campus community not only in spreading awareness of the environment but also in practising concepts of sound ecological management.

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Boyce, during his visit to Eco-Hub

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To date, the team has worked hard to attract various visitors including a world renowned Aroid taxonomist, Peter Boyce. Boyce, currently attached to the School of Biological Sciences as a visiting scientist, has written several books and more than 100 reputed articles on Aroids. On 21 February 2010, he gave a talk on the world of Aroids at the Eco Hub. In addition, Universiti Utara Malaysia (UUM) Vice Chancellor Tan Sri Dr Nordin Kardi and his team visited the Eco Hub on 1 February 2010.

It is hoped that the Eco Hub can be an attractive site for top university administrators and other agencies. The chance for top level executives from various agencies, including the police force, to feel the serene forest atmosphere of a healthy campus can bring about the silent but effective message that our unique forest ecosystem can be admired and appreciated. Perhaps this kind of atmosphere is conducive for informal and relaxing discussions particularly on matters pertaining to environmental issues.

During the visit, USM Deputy Vice Chancellor (Research & Innovation) Professor Asma Ismail explained the function of ECO-USM as well as the future plans and undertakings for the university. This is an example of networking that can, and should, be established within the country.

At the global regional level, Research Unit Chief Professor Musri Masman of Universitas Syiah Kuala, Aceh visited the Eco Hub on 5 January 2010. There are a number of common interests between the two universities especially the work on our natural heritage based on Islamic principles and the Malay World.

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A group photo taken during Nordin's visit to Eco-Hub

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Similarly, on 14 February 2010, I was invited by King Saud University, Saudi Arabia to be a visiting professor. Earlier this year, USM Vice Chancellor Professor Tan Sri Dato' Dzulkifli Abdul Razak was also invited to deliver a keynote there. During my visit, I had the opportunity of having an audience with the Malaysian Ambassador to Saudi Arabia, Dato' Syed Omar Al Saggaf. One of the topics of our discussion was the suggestion of a project based on the concept of the Quranic garden, a concept which has attracted the attention of major Islamic universities all over the world. This project had actually been mooted by USM's Centre for Global Sustainable Studies (GSSS) director Professor Zakri Abdul Hamid. It is therefore hoped that USM can also take the lead in implementing the project which will result in the listing of all the plants mentioned in the Quran.

Some examples of the plants are olives (zaitun; *Olea europea*), figs (ateen; *Ficus carica*), pomegranates (rumman; *Punica granatum*), ginger (zanjabil; *Zingiber officinale*), Christ's thorns (sidr; *Zizyphus spinachristi*), grapes (enab; anggur; *Vitis vinifera*), date palms (nakhil; *Phoenix dactylifera*), tooth-brush trees (khamt, arak, kayu sugi; *Salvadora persica*), citrons (otrog; *Citrus medica*), camel's hay (idhkhair; *Cymbopogon schoenanthus*), chenna (henna; *Lawsonia inermis*), s'adan (sa'adan; *Neurada procumbens*), orfots (orfot; *Acasia oerfota*) and true sennas (sana, sanamakky; *Senna alexandrina*).

I fully recommend that these plants be widely cultivated within the campus as they all offer a wide spectrum of research opportunities. As a start, the life cycles and eco-physiology of these plants can be intensively studied by a group of botanists and ecologists who are based at the school of Biological Sciences, USM.



Asma having a word with Nordin during his visit to the Eco-Hub



Key personnel from both USM and UUM having a discussion in the Eco-Hub meeting room

The fascinating world of cockroaches

By Lee Chow Yang and Evan Quah Seng Huat
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Cockroaches are an interesting group of insects. They are one of the most primitive winged insects that have gone through very limited morphological changes since the Carboniferous period. Some 4,500 species of cockroaches have been described, but just a small fraction of them are pests. Most cockroach species can be found on the floor of tropical rain forests, caves, mountains, deserts, etc.

Despite their infamous status as insect pests, some cockroach species are beneficial insects to the ecosystem. Cockroaches decompose plant litter in the rain forests. They have also been observed to be the main pollinator of a plant species in Borneo. Cockroaches are also an important food link in the food chain. In the desert sand dunes of California, 23% of the food biomass of scorpions *Paruroctonus mesaensis* are the desert cockroaches (*Arenivaga investigata*). In the Seychelles, *Pycnoschelus indicus* serves as prey to the endangered magpie robins (*Copsychus sechellarum*).

Adult cockroaches measure between 15 and 100 mm in length. The largest cockroach in the world (*Miroblatta baai*) was found in the caves in Kalimantan, while the smallest cockroach (*Attaphila fungicola*) in the world is about the size of *Drosophila*. On the other hand, the heaviest cockroach is the Australian soil-burrowing cockroach (*Macropanesthia rhinoceros*) weighing up to >30 g.

Cockroaches can be dull in appearance or highly attractive. The Australian bush cockroach (*Ellipsidion australe*) is colourful. Some cockroaches, such as those belonging to the genus *Platyzosteria*, resemble the beetle. Cockroaches from the genus *Perisphaerus* (that can be found in Penang Hill) can roll themselves into a ball when disturbed (see Figure 1, species J). Many species of cockroaches that live inside caves lose their colour or even their eyes as a result. For example, *Nelipophygus* sp. from Mexico is white, has no eyes and cannot survive outside the cave environment.

The eggs of cockroach are laid in groups and are kept inside a capsule-like shell called the ootheca. After the eggs are formed, they will either be deposited (e.g., American cockroach, *Periplaneta americana*), carried externally (e.g., German cockroach, *Blattella germanica*) or carried internally in a brood chamber. In addition, *Pycnoschelus surinamensis* (Surinam cockroach) is even capable of producing progenies via partenogenesis (reproduction without mating).

The nymphs that emerge from the ootheca look like little adults, except that they are wingless and cannot reproduce. They will undergo a series of moults before becoming adults. All nymphs feed by themselves. However, it is interesting to note that some cockroach species exhibit parental care. The mother cockroach from the genus *Perisphaerus* feed its nymphs through two pairs of apertures at the base of its legs from which the nymphs suck nutrient milk through their tube-like mouthparts.

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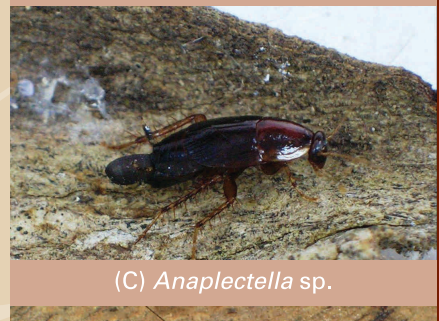
Figure 1: Selected cockroach species found in the survey in Penang Island, Malaysia.



(A) *Archiblatta hoeveni*



(B) *Homalophilpa* sp.



(C) *Anaplectella* sp.



(D) *Miriamrothschildia* sp.