

# Gardenwise

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Front Cover:  
Silk-Cotton tree at the Botany  
Centre, Tanglin Core

Photo by: Pang Yoke Yue

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# Message from the Director

Since January 2007, the Botany Centre in the historic Tanglin Core of the Gardens has taken off as an activity and knowledge hub for botany, horticulture and conservation. Some of the important activities are reported in this issue under 'Around the Gardens'. The meeting of Heads of South East Asian Botanic Gardens network (SEABG) was a particularly important event. Attended by 35 participants from 11 countries, this was the second meeting of this grouping (the first meeting was in Jan 2004).

This meeting provided a platform for gardens in the region to share experiences and to work towards capacity building and facilitating the conservation and sustainable use of the indigenous flora of the region. Members were able to agree to a mission statement with the aims and objectives of the network clearly spelled out. While the Gardens played host, we have to thank the Botanic Gardens Conservation International (BGCI) for sponsoring the event.

The Gardens also played host to the International Tourist Guide Day. We proposed guided tours of the Gardens as part of the event and undertook to train the professional licensed guides to provide these tours. It was a win-win situation for all. Both the guides and the Gardens saw this as an opportunity to improve the services that these guides would provide to the Gardens' visitors in future.

Another meaningful yet entertaining event was the inaugural Wildlife Asia Film Festival in March 2007. Seminars hosted included a regional arboricultural seminar in April and another on tropical urban soils in June. Also in June, we hosted the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) seminar on ecotourism.

This issue also reports the rediscovery of an orchid listed as extinct. *Galeola nudifolia*, a bizarre saprophytic orchid that can climb to 15 m, was last collected from Singapore in 1893. In May, a matured plant was spotted in the Central Catchment Nature Reserve. Many fruit pods have formed and we will soon begin the exciting laboratory cultivation of the seeds for possible future reintroduction back to the wild.

The Buzz at the Botany Centre includes the many formal courses, training workshops and hobbyist classes ran at Botany Centre. We will be bidding for regional and international meetings in relevant fields of learning for hosting at the Centre to add to its vibrancy and development as a knowledge hub.

At the Bukit Timah Core of the Gardens on the 11.7 ha extension site, the Children's Garden is being readied for its long awaited opening in October. One of the conserved buildings on the site has been identified for nature and environment based NGOs to set up offices. They will be able to contribute to intellectual discourse and activities complementary to the Garden's mission and help add to our knowledge hub.

We are mindful that any activity, whether directly organized by the Gardens, or in which we are the venue provider, demands staff time and effort. While we often play the part of an event organizer, our role as a botanical and horticultural institution must remain primary. We are taking steps to provide additional resource to meet the additional and changing demands and to remain relevant as a scientific institution.

*Chin See Chung*





# The Giant Silk-Cotton

Visitors are greeted by this view as they emerge from the basement into the Gardens

This tree is destined to be a natural monument. There are two magnificent specimens in the Gardens. Supported by massive buttresses, their impressive trunks with their layered canopies reach 30 m. They are as tall as ten-storey apartments. In their native environment, they may reach over 50 m tall.

*Ceiba pentandra* (Bombacaceae), the Silk-Cotton, is by any account, an outstanding tree. When young, the main trunk and branches, are smooth and green, but often with large conical spines. Native to the forests of tropical America and West Africa, it is one of ten species of the genus *Ceiba*. All other species are confined to tropical America. The Silk-Cotton is one of the most massive of tropical trees with a columnar trunk firmly seated on large spreading buttresses. Its lofty spreading limbs reach protectively over lesser trees. In the African forest, it is one of the tallest trees. During the dry season, it drops its leaves and flowers. When the fruits mature and split, the tree will be covered with fluffy, white cotton bolls – a truly unique spectacle of a tree in sheep clothing.

## An Ecosystem

In its rainforest home, each giant tree is a complete ecosystem. They are often heavily adorned with dozens

of species of epiphytes in complex communities. These aerial habitats, are in turn home to hundreds of species of resident animal life. By day and night, other animal life such as birds and mammals, visit and interact in this arboreal ecosystem. It is difficult to find another tree that is such a key component of the rainforest environment.

## Economic Importance

The Silk-Cotton plays an important role in human communities in its homeland, and in other communities around the tropical world who grow it. The wood is soft and light with many uses and is easily worked. Indigenous people prize its massive boles that allow the construction of huge dugout canoes.

The fruits, like small slim papayas that reach about 20 cm long, split to expose masses of silky fibres that give rise to its common name. These fibres are up to 2 cm long. They are uniquely springy, water resistant and very light and lustrous. Silk-Cotton fibres are only one-sixth the weight of cotton fibres, but are relatively weaker. Unfortunately, its unique qualities also mean it is difficult and impractical to spin and it never became a fibre for fabric. However, until about the 1950s, this was by far the superior stuffing for life preserves, cushions and mattresses. It was cultivated





The tree in full bloom

in large plantations in Indonesia for its fibre. It has since been replaced by synthetics.

The Silk-Cotton is also widely grown because they strike easily from large cuttings forming an instant living fence. Other parts of the tree have many other uses. The young fruits and seeds are eaten as vegetable, while ripe seeds are a source of edible oil. The seed-cake after pressing for oil is a cattle feed. The leaves, roots and bark find their ways into many traditional healing recipes.

Little wonder, this great friendly tree was sacred to the Mayas. It has been declared the national tree of Guatemala.

### **In the Gardens**

In the Gardens, the Silk-Cotton is one of our living monuments. The older of our two largest trees is at the Botany Centre, Tanglin Core. This is about 100 years of age, and has become a celebrated landmark. Here, the new building complex was designed to accommodate and showcase this giant.

The reinforced concrete wall of the basement herbarium has its corner closest to the tree strongly chamfered to avoid a large root that otherwise would have to be cut. The same building block has a cutout at one end to frame

the tree. Visitors emerging from the basement are treated with a picture perfect view of this great tree.

### **Flowering & Fruiting**

In the relatively uniform climate of Singapore, our trees do not have a predictable schedule of leaf-drop and flowering. This seems to be triggered by a period of drought, though we never experience complete defoliation. Possibly, the environmental trigger is never strong enough.

February 2007 was exceptionally dry, with not a drop of rain in the first half. In March, the tree shed its leaves. Its upper half became completely bald, leading to worried visitors wondering if something was wrong with their favourite tree. It was bald for what seemed a worryingly long time. However, in the second half of April, the tree erupted in a massive blooming, the best anyone can remember for this tree. Masses of cream-coloured flowers crowd the ends of twigs exuding a sourish, milky smell. The ground beneath the tree was carpeted with fallen flowers for several weeks, defying efforts to sweep them up.

While the flowers do not seem to produce nectar, a great abundance of the stingless bees (*Trigona* spp.) and a honey bee (*Apis* sp.) were seen working the flowers, collecting pollen. A very busy period was from 6.30 am to 7.00 am when the tree comes alive. The still air vibrates with a





The flowers with a sourish, milky smell are in dense clusters

low hum that is quite audible against the growing traffic noise.

Over the weeks, the flowers drop. The return of wet weather probably hastened this and prevented good fruit set. The tree however remained alarmingly bald. Soon some fruits were seen. In June, a new flush of leaves finally appeared, to the relief of all. They made the crown a refreshing, bright, light green. At the same time the fruits matured and split while high up in the canopy. Bits of cotton fluff, some with a little black seed embedded within, were blown about by the wind though most did not travel far.



The ripe fruit pods split to reveal very fine, lustrous fibres. Three small black seeds are visible

For days the ground around the tree was carpeted with a light dusting of fluffy cotton.

Soon, everything went back to 'normal' and the tree became its normal grand self with a lush green canopy and is possibly a few centimetres taller.

***Chin See Chung***  
*Director*

*Photos by Chin See Chung*



The tree with its canopy of fresh green leaves



# Edible Orchids

## Vanilla

For a start there is *Vanilla*. We all know about vanilla pods, which are the long, thin, seedpods of the climbing, vine-like orchid, *Vanilla planifolia*, the source of vanilla of commerce. Their use is first documented by Hernán Cortés<sup>1</sup> in his account (1519) of the conquest of Mexico. Vanilla is described in the Aztec herbal<sup>2</sup> of 1552, where it is called *tlilxóchitl*. The Aztecs used it to drive away fatigue, and as flavouring for a chocolate drink. In 1658 Willem Piso<sup>3</sup>, a Dutch physician and botanist wrote about it in his account of chocolate, noting that it was combined with chillies. Vanilla-flavoured chocolate and chilli sauce on chicken is still a speciality of Mexican food.

*Vanilla planifolia* has been exported all over the world. Plantations on the islands of the Indian Ocean are now the main source of the pods, with Indonesia coming second. After curing, the pods exude vanillin oil, and it is this, which is used

widely around the world today, in everything from Coca-Cola to ice cream, perfumes to massage oils. Other species are also grown such as *V. pompona* and *V. tahitensis*, but these produce less vanillin. Vanillin has now been synthesised artificially, but demand for the natural product continues.

## Salep

This is a drink prepared from the tubers of orchids, mostly the genus *Orchis* and *Anacamptis*, which are harvested by the millions in Turkey and Greece, threatening them with extinction. The plants are dug up from the wild, leaving whole hillsides covered with small holes in the grass. The tubers are dried and then ground up, mixed with milk, sugar and cinnamon and served as a hot drink or used in the manufacture of Turkish ice cream which is thick, chewy, and can be stretched like chewing gum into a long rope! Its export is now illegal, in the vain hope that this may help conserve the orchid population of Turkey.

In India, tubers of orchid plants of *Eulophia campestris* (now re-named *E. dabia*) and *E. herbacea* are similarly used to make *salep*. Some other species of *Eulophia* are widespread in cultivation.

## Medicinal Herbs

China is well known for its widespread use of herbs<sup>4</sup> for medication, and there the tubers of *Bletilla striata* are used, traditionally mixed with powdered amethyst, for a range of afflictions from healing broken bones to treating tuberculosis. It seems unlikely that this should work; the use of precious stones was thought 'incredible' even by Culpeper who makes perhaps the earliest reference to placebo effect in respect of 'stones'.



*Bletilla striata*

Another popular orchid is *Dendrobium nobile*, with its beautiful pink and purple flowers carried on fleshy canes (really modified pseudobulbs). Widespread collection for its supposed medicinal properties has brought it to the edge of extinction in the wild, but it is common in cultivation in the West as a decorative plant. *Gastrodia elata* is another orchid which, despite



*Vanilla pompona*



*Anacamptis pyramidalis*

having a distribution from Japan through China to Korea and Tibet, is also on the brink of extinction because of collection for 'medicinal' use and as a food. Unfortunately, it is also rare in cultivation. The fresh tubers are eaten raw or steamed, and the dried tubers are made into a decoction as a "sedative; anticonvulsive; (and) stimulant to cerebral functions". Interestingly, it contains vanillin.



*Dendrobium nobile*

*Cymbidium*, the once popular orchid of commerce, is widespread through Asia and Australia, and, in places, parts are eaten. *Cymbidium hookerianum*, from the Himalayas at altitudes around 2,000-2,500 metres, called 'oleochoto' by the Bhutanese, is fried into a local delicacy and are also added to curries. Sturtevant<sup>5</sup> reported that the 'tubers' of *Cymbidium canaliculatum* are



*Cymbidium hookerianum* 'Mokuseikou'



*Dendrobium speciosum*

eaten by the aborigines of a place called Wide Bay in Australia, but as this orchid does not have tubers, it is possible he meant the fleshy base to the leaves (called a pseudobulb). He also reported that the pseudobulbs of the spectacular *Dendrobium speciosum* are eaten there.

Chewing orchid pseudobulbs for their water content was noted by Hipólito Ruiz and Joseph Pavón<sup>6</sup>, the Spanish pharmacists turned botanists who travelled in Peru and Chile in the years 1777-1788, collecting and documenting the plants of these countries, then still under the dominion of Spain. They published the brief first description of *Maxillaria bicolor* but never published the full description as they ran out of money and time (they died) for the orchid volume. They wrote<sup>7</sup>: 'These bulbs are so juicy and tender that they can be chewed very easily, and they give so much tasteless juice that six of them are sufficient to quench the thirst; the Indians do this very frequently when they pass through these places in order not to go out of their way to drink in the depths of the quebradas (= ravines).' It still grows Huasahuassi in Peru,

where Ruiz had found it. They have beautiful, lush, smooth green – almost translucent – pseudobulbs, which do indeed yield a delicious fresh fluid, with much the same taste as elderflower cordial.

In Africa, orchid tubers as foodstuff reach its greatest level outside Turkey, but with a much wider range being collected. Orchid tubers contain carbohydrates and polysaccharides. None are known to be poisonous, and they are collected by the hundreds of tons each year for food. In Tanzania<sup>8</sup>, *Disa*, *Habenaria* and *Satyrion* are the most endangered. So rare have orchids become in some areas that collectors travel for several days to the Mozambique border to collect there as well. Conservation efforts are being looked for there and in Malawi, but they are not easy, and strategies still have to be worked out.



*Disa watsonii*



*Habenaria rhodocheila*



There is probably no country in the world (apart from Antarctica) where orchids are not eaten by someone. In North America<sup>9</sup> the roots of *Aplectrum hyemale* are (or were) made into a poultice and used to treat headaches and boils, to make a tea to treat bronchitis, and to make children eloquent and fat. *Cypripedium* such as *C. pubescens* and *C. luteum* are another group of North American orchids that, according to the botanist Constantine Rafinesque (1783-1840)<sup>10</sup>, have medicinal properties: ‘... all the species are equally medicinal ... They are sedative, nervine (make you sneeze!), antispasmodic ... They produce beneficial effects in all nervous disorders and hysterical affections, by allaying pain, quieting the nerves and promoting sleep. They are also used in hemicrania (= migraine), epilepsy, tremors, nervous fever (!) etc.’ None of this is believed today. It is of note that the glandular hairs on the stems and leaves of *Cypripedium* cause a contact dermatitis, similar to that from poison ivy, in some people.

Orchids have been used to make glue (*Schomburgkia tibicinis*, now *Myrmecophila tibicinis*), to promote speech in babies (*Masdevallia uniflora*, in Quechua called *rima-rima*), and to prevent South African native houses being struck by lightning (*Ansellia africana*). Often the claims for such a diversity of properties – e.g. to treat tonsillitis, hypertension and cancer (*Cremastra appendiculata*) make one immediately reject the idea, and while none are poisonous, significant contaminants, such as colchicine are found in some preparations as to



*Ansellia africana*



*Cremastra appendiculata*

produce a risk element to trying them. There are alkaloids in several orchids at concentrations over 0.1%, that may turn out to have medicinal value, but all ‘natural’ herbal medicines should be subjected to robust testing before their value and their safety can be assured.

**Henry Oakeley**

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*Photos by Henry Oakeley*

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## Footnote:

*Adapted from an article in Herbs 32(4)(2007): 14-17, the journal of the Herb Society, which aims to increase the understanding, use and appreciation of herbs and their benefits to health by bringing together all those with an interest in herbs by providing a world-wide forum for interchange of ideas and information on herbs. It has its headquarters at Sulgrave Manor near Oxford, UK. Visit [www.herbsociety.co.uk](http://www.herbsociety.co.uk) or write to [email@herbsociety.org.uk](mailto:email@herbsociety.org.uk) for more information.*



# *Galeola nudifolia*

## An Extinct Orchid Re-discovered

An orchid thought to be extinct in Singapore has been re-discovered.

In May 2007, some unusual flowers clinging to the trunk of a dead tree about 10 m high were spotted in the central catchment area by staff of the Nature Reserve. A subsequent check with the Herbarium revealed it as *Galeola nudifolia* – an orchid thought to be extinct in Singapore.

The genus *Galeola* is closely related to *Vanilla*. Recent taxonomic work suggests that there are only seven species in the genus *Galeola* spreading throughout Asia, including Myanmar, Thailand, the Philippines, Malaysia and Indonesia.

Like *Vanilla*, the species *Galeola nudifolia* is a climber. However, *G. nudifolia* does not possess green leaves or green stems. Instead, the stem is about 1 cm thick, dull bronze brown with fleshy, reddish brown scale leaves. In habit, it is very similar to another saprophytic climbing orchid, *Erythrorchis altissima*, but differs in the floral structure as well as the stem thickness. The plant derives its food from parasitizing a fungus, which breaks down organic matter (myco-heterotrophic). This explains why the *G. nudifolia* was found climbing up a dead tree. This orchid climbs with short climbing roots, one at each node, opposite the scale leaves. These roots firmly attach themselves to the tree bark. The stem can reach more than 15 m in height, with internodes that are up to about 20 cm long.



Branching inflorescence of *Galeola nudifolia*



Inflorescence of *Galeola nudifolia*. Flowers, buds and capsules are clearly visible

Flowering shoots can be apical or lateral, arising from the nodes of the uppermost scale leaves of the climbing stem. The inflorescence is a branching panicle and the flowers open from the bottom of the inflorescence upward. Flowers are dirty, creamy yellow in colour and do not open wide. The labellum is concave, yellow with orange-red stripes. The flowers smell faintly of overripe bananas.



A flower in full bloom

Paul Leong

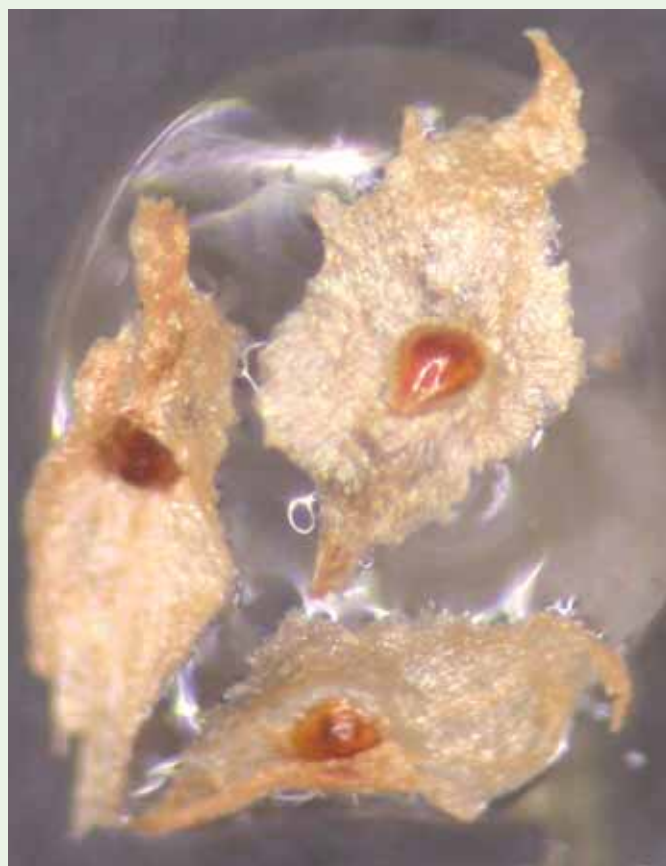
From past herbarium record of specimens collected in Singapore, the orchid thrived near swampy areas. The last collection, dated September 1893, is by H.N. Ridley, a former Director of the Gardens, in an area called Bukit Mandai Road. Notes on that herbarium specimen indicate that the plant was climbing up a tree. This recently re-discovered orchid was found on the drier part of a swamp, at the edge of a disturbed forest. Moist and warm leaf litter in various degrees of decomposition covered the ground. It was found creeping about 1 m away from the tree, and climbed to about 8 m high.

Interestingly, notes about specimens collected from Peninsular Malaysia indicate that the plant was found in localities as varied as hill stations, at altitudes as high as 6,000 ft. Other habitats include grasslands, where it became a sprawling mass of stems on tall grasses, flowering at almost ground level. Notes on other herbarium specimens indicate that the plants were creeping on a dead log, sprawling on a grassy stream bank or creeping near a golf course.



*Galeola* is a unique and interesting genus as the plants are myco-heterotrophic throughout their lives. All orchids are myco-heterotrophic, that is they rely on fungi for their nutrient and growth, but only at some point in their life. This relationship between the orchids and fungi is known as orchid mycorrhiza.

Orchid seeds are dust-like, each consisting of a tiny spherical embryo with no endosperm and a thin seed coat. In nature, the mycorrhizal fungi are very important during orchid germination as the orchid seeds rely on them to grow into a small lump of tissue known as a protocorm. These structures derive all of their nutrients and energy from their fungal symbionts. Once the protocorm has grown to a sufficient size, it starts to produce shoots. Orchids with green leaves can then begin to photosynthesize. However, *Galeola* does not produce any green leaves and therefore must rely on the fungi to supply its food throughout its life. Seeds of *Galeola* are among the biggest in the orchid family measuring some 1.5 mm long. Individual seeds can even be seen by the naked eye. Unlike seeds of other orchid species, those of *Galeola* are winged. This is also extraordinary for an orchid.



Seeds of *Galeola nudifolia*, taken from a 70-year old herbarium specimen. They are each about 1.5 mm long

Yam Tim Wing

Careful observation of the flowers showed a very interesting phenomenon: the pollen masses seem to bend down towards the stigma. This phenomenon has also been observed in other orchids that self pollinate such as *Spathoglottis plicata*, *Ophrys* and *Cattleya aurantiaca*.

We believe that *Galeola nudifolia* also self-pollinates. This explains why quite a number of seed capsules were formed naturally. In order to verify our hypothesis, we dissected several flower buds and found that even before the flowers open, the pollen masses start to grow towards the stigma. This observation supports our hypothesis. It has been more than a month since the seed capsules were observed and we are very happy to report that they are growing nicely on the plant.



Yam Tim Wing

Dissected flower bud of *Galeola nudifolia* with the floral lobes removed. The pollen masses are bending towards the stigma

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Orchid Breeding and Micropropagation

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Central Catchment Nature Reserve



# Flora of Thailand Project

The Kingdom of Thailand is endowed with a rich plant-life, with an estimated 10,000 species of vascular plants known. The flora is typical of tropical and subtropical continental Asia, and influenced by Indochinese, Malayan and Himalayan elements. Many different habitat types are found here including evergreen rainforests, various deciduous forest types, pine forests, savanna (a forest-grassland mixture) and grassland. The wide range in geographical latitude has its effect on the plant diversity too. Frost frequently occurs in winter on the higher mountains of Northern Thailand, while the southernmost parts of the Thai Peninsula next to the Malaysian border obviously have a humid tropical climate. The altitude varies from sea level to over 2,500 m on Doi Inthanon (Northern Thailand). The geology and soil diversity of the country also play a major role.

Thailand is rather densely populated and land is heavily utilised. Consequently, human impact is heavy, but a comparatively large number of undisturbed habitats can still be found as many nature conservation areas have been set aside.

## The Flora Project

The entire vascular plant flora of Thailand is currently being written up in a series of books. This project was initiated in 1965 by Prof Kai Larsen from the University of Aarhus (Denmark) and is currently undertaken by many Thai and foreign botanists. To date, nine volumes have been published, covering 30 families out of the well over a hundred known in Thailand.

Full botanical descriptions, with notes on natural habitats, flowering times and overall distribution (both within and outside of Thailand) will be provided. In addition, identification keys to all

species, subspecies and varieties will be provided. Thai common names will be given. Black-and-white line drawings and colour photos of selected representatives will give the readers a better idea of what the plant looks like. The research is based on fieldwork, literature study and examinations of herbarium collections. Photographs will also be an important resource for the publication. The aim of the flora treatment is to enable users like university students, plant lovers and professional botanists to identify their plants and have access to various kind of information about them. It will be a basis for strategic conservation plans for the natural areas of Thailand.

## Orchids

The orchid family is well represented in Thailand with about 1,110 species belonging to 173 different genera. Numerous epiphytic orchids are found in the evergreen as well as deciduous forests, with a large number of ground (terrestrial) species in forests and grassy habitats. There are also a number of orchids growing on rocks (epilithic or lithophytic). Nearly all of the major Asian orchids like *Dendrobium* (with 153 species), *Bulbophyllum* (150), *Liparis* (30) and *Coelogyne* (27) are represented here.

The orchid flora has benefited enormously from the work of the famous Danish ambassador to Thailand, Dr Gunnar Seidenfaden from the University of Copenhagen, Denmark. From 1959 to 2001, Seidenfaden published a large amount of scientific articles as well as books on the Thai orchids. His 13-part series of articles *Contributions to the Orchid Flora of Thailand* contain various notes on the Thai orchids, reports of new distribution records, as well as descriptions of newly discovered species. In addition,

taxonomic revisions of all orchid genera occurring in Thailand are found in his series *Orchid Genera of Thailand* (14 volumes). Seidenfaden also made important contributions to the knowledge of the orchids of our region. The book *The Orchids of Peninsular Malaysia and Singapore* (co-authored with Jeffrey Wood from Kew Gardens, UK) is the first comprehensive treatment of the orchids since the monumental work *Orchids of Malaya* written by R.E. Holttum in 1953.

## Updates

Seidenfaden's studies are an invaluable basis for the current compilation of the orchid volume, but his main achievement was to establish a concept of recognisable species of Thai orchids. However, botanical descriptions, which are an integral part of a modern flora treatment were not provided. Several names have been changed since Seidenfaden first wrote his treatments, new distribution records have been made, and entirely new species have been discovered. A new improved treatment would be a complete update in every respect.

The orchid volume will be published in six instalments over the next few years. Co-ordinated by Dr Henrik Ærenlund Pedersen from the University of Copenhagen, Denmark, the majority of the genera will be written by Thai botanists. Most will be written by Dr Somran Suddee from the Royal Forest Herbarium in Bangkok. My own involvement is to write the taxonomic accounts of twelve orchid genera in the *Habenaria* and *Calanthe* groups (a total of over 100 species).

**Hubert Kurzweil**

*Herbarium*

*Photos by Hubert Kurzweil*



## A selection of Thailand's Flora



The parasite *Sapria himalayana*, related to the famous *Rafflesia*



*Habenaria humistrata*, a terrestrial orchid



The epiphytic orchid *Neogyna gardneriana*



*Thunbergia hossei* (Acanthaceae)



*Tainia angustifolia*, a terrestrial orchid



*Paphiopedilum villosum*, one of the very few slipper orchids that grow on trees



*Hoya multiflora* (Asclepiadaceae)



*Cephalantheropsis obcordata*, a terrestrial orchid



The terrestrial orchid *Calanthe cardioglossa*



# Flora of Peninsular Malaysia Project

A floristic account to cover the over 8,000 vascular plant species of Peninsular Malaysia is underway. The Gardens is one of the many collaborators needed to accomplish this huge undertaking.

## Earlier Floristic Accounts

The only attempt at a complete flora of the Malay Peninsula is H.N. Ridley's five-volume *Flora of the Malay Peninsula* (published between 1922 and 1925). R.E. Holttum made an attempt in his *Flora of Malaya* (1953-1971). However, his attempts resulted in the publication of only orchids and ferns, with H.B. Gilliland contributing on grasses.

The more recent *The Tree Flora of Malaya*, published by the Forest Research Institute Malaysia between 1972 and 1989, covers only trees. There remains no comprehensive publication that includes all the families, genera and species of vascular plants in Peninsular Malaysia.

## The Project

The aim of the Flora of Peninsular

Malaysia Project is to produce an up-to-date account for all naturalised, vascular plants of Peninsular Malaysia based on original research. The conservation status of each species will also be indicated. It is expected to be published 4 parts to a volume, with each part containing about 100 species. The entire flora is expected to be covered in 20 volumes.

The project is coordinated by Dr Ruth Kiew from the Forest Research Institute Malaysia. She heads a team of young botanists and will also receive contributions from external collaborators.

For the first volume, expected to be published by the end of 2007, two family accounts will be written by the Gardens' staff. Hassan Ibrahim revises the family Bonnetiaceae with one species, *Ploiarium alternifolium* (Cicada Tree or *Reriang*). This is a very common plant that is also used as an ornamental. It is unique as it can begin flowering at a height of just over a metre, but can grow to nearly 30 m in its natural habitat. Two other related species (*P. pulcherrimum*

and *P. sessile*) are found within Southeast Asia and two remaining genera (*Archytaea* and *Bonnetia*) from this small family are found in South America.

Serena Lee revises the family Nelumbonaceae, of which the genus *Nelumbo*, the Sacred Lotus, is represented. Two living species are recognised in the world, *N. nucifera* and *N. lutea*. However, as there are similarities in characters between the two, the latter is suggested to be a subspecies of *N. nucifera*.

## Conclusion

This project documents the flora of areas with very high species diversity and will form the basis for conservation planning and management. It is an example of collaborative research and cooperation between individuals and institutions.

**Hassan Ibrahim**  
Library

**Serena Lee**  
Herbarium



Flowers and fruits of *Ploiarium alternifolium*

Hassan Ibrahim



Type of *Nelumbo nucifera* (Sacred Lotus), located in the British Museum, UK

From <http://www.nhm.ac.uk/>



# *Schismatoglottis*

## – Terrestrial Forest Aroids in Sarawak

This is the second in a series of occasional articles aiming to introduce the main groups of aroids in Sarawak (for the first article see *Gardenwise* **23**(2004): 11-13).

The aroids (family Araceae) are pre-eminent among the herbaceous flora of Sarawak. Among them, species of the genus *Schismatoglottis*, the vegetatively similar genus *Homalomena*, and the horticulturally popular genus *Alocasia* are among the most abundant and diverse of the forest floor aroids.

*Schismatoglottis* is a predominantly old world tropics genus of more than 100 species of terrestrial herbaceous plants adapted to constant levels of soil and atmospheric moisture (so-called mesophytes). Some adapt to the flood zones of tropical forest streams (such plants are termed rheophytes). Others very rarely grow as swamp plants in full sun (helophytes). The primary distribution of this genus is in Borneo.

The generic name *Schismatoglottis* is from the Greek *schisma*, *schismatos* (separating) and *glōtta* (tongue) and refers to the variously deciduous upper part of the spathe (or spathe limb) that is a feature of most species.

In its typical form, the spathe in *Schismatoglottis* is differentiated into a lower persistent portion enclosing the female zone of the spadix and an upper ephemeral spathe limb subtending the male flower zone and terminal appendix. The point of differentiation is usually marked by a constriction. During flowering the spathe undergoes a series of movements, including inflating and



*Schismatoglottis* species typically have the spathe limb shedding during anthesis (flowering time)

spreading of the upper and lower spathe, linked to managing pollinators during the various fertile phases of the flowers.

Spadix structure in *Schismatoglottis* is complex. Broadly it is divided into a lower female flower zone, a middle male flower zone, which may or may not be separated from the female zone by a sterile portion, and usually a terminal sterile appendix.

The female flower zone is often fused for up to two thirds of its length to the lower spathe, though in many species it is free. The female flowers



Spadix of *Schismatoglottis* showing the female flower zone partly fused to the spathe

are often intermixed by irregularly arranged sterile male flowers. In many species these sterile structures are confined to a basal ring or to a single row along the join between the spathe and spadix.

The male flower zone of *Schismatoglottis* consists of massed stamens not arranged or orientated into discrete male flowers – in marked contrast to *Homalomena*. Stamens are generally truncate and raised on short filaments or occasionally stalkless with the filaments often but not always partially joined into small groups of two or three.





Spadix of *Schismatoglottis maelii* (left) and *Homalomena lancea* (right). Note that the stamens of *Schismatoglottis* form a compact mass whereas those of *Homalomena* are arranged into discrete flowers

There are six informal taxonomic groups of *Schismatoglottis* based on shoot architecture, spathe structure, the structure of the petiolar sheath and the means by which the spathe limb is shed. Four of these groups are present in Sarawak and discussed here.

### Calyptrata Group

Species closely allied to *Schismatoglottis calyptrata* have the shoots not renewing growth after flowering. Instead new lateral buds will grow from the base, while the rest of the mature shoot will die (like banana plants). Species in this group have the spathe limb falling just prior to the male flowers shedding their pollen, abscising cleanly at the top of the lower spathe. The spathe limb falls in a single piece, or after breaking into regular or irregular pieces, while the tissue is still fresh, leaving the male flower zone

and appendix (if present) exposed. However, other spathe senescence types do occur in this group, but all show lateral growth of new shoots from the base.



A post-floral shoot of *Schismatoglottis muluensis* (a close ally of *S. calyptrata*) renewing from lateral buds low on the shoot

*Schismatoglottis wallichii* sheds the spathe limb by splitting into regular pieces that adhere to one another and then contract upwards so that the spathe limb is drawn up the spadix, rather in the manner of an Austrian blind, before falling in a loosely coherent unit. *S. wallichii* is unusual in the Calyptrata Group by virtue of the spadix fertile to the tip.



*Schismatoglottis wallichii* (above and below)

*Schismatoglottis motleyana* is notable for the spathe shedding in a single piece but not before the interior epidermis has begun to slough away in a series of rectangles and squares. *Schismatoglottis clarae* is so far unique in the Calyptrata group by the spathe limb melting into a sticky paste that then dries onto the spadix before being shed.



*Schismatoglottis motleyana*

The widespread but never abundant *Schismatoglottis longifolia* (one of only three *Schismatoglottis* species co-present in Peninsular Malaysia and Borneo) has the spathe limb barely opening and then persistent after flowering before gradually degrading and falling while still clasping the spent parts of the spadix. The clustered, nodding inflorescences and infructescences are diagnostic for this species.



*Schismatoglottis longifolia*

### Asperata Group

It is this group that shows the most variation in spathe structure and movement, although all species so far studied are notable for the open-topped (not closely constricted) persistent lower spathe during the maturation of the fruit.

Species most closely allied to *Schismatoglottis asperata* have the spathe inflating and the limb gaping when the female flowers are active, then opening more or less wide as the male flowers shed their pollen. All species in the group renew growth after flowering from a bud near the tip of the active shoot.



*Schismatoglottis asperata*. Inflorescence (left) at end of male flower activity (note: Spathe limb beginning to melt)



*Schismatoglottis clarae*



*Schismatoglottis longifolia* post flowering with the spathe limb and spent parts of the spadix fallen. Note the nodding inflorescences and developing fruiting heads



*Schismatoglottis asperata* at early fruiting stage showing the open persistent lower spathe





*Schismatoglottis jelandii*. Inflorescence at the early stage of male activity with wide-open spathe limb

Species of the complex around *Schismatoglottis multinervia* have a thick-textured spathe limb that is green outside, but glossy and dark coloured inside. The spathe limb inflates and gapes slightly when the female flowers are active. This then splits longitudinally into two or more strips when the male flowers begin to shed their pollen. So far as is known, species in the *multinervia* complex are restricted to limestone and are all locally endemic.



*Schismatoglottis multinervia*

Species of the *Schismatoglottis patentinervia* complex are striking not only for their distinctive erect shoots with strap-shaped leaf blades and broad-winged petioles, but also by the inflorescences carried deep within the shoot tips such that the lower spathe is obscured by the leaf bases. The female flowers become receptive when the spathe inflates and the spathe limb gapes slightly.



*Schismatoglottis* sp. aff. *patentinervia* at early male flower activity. Note the inflorescence buried deep in the shoot apex

The *Schismatoglottis nervosa* complex is particularly interesting in that all species are strongly aromatic when crushed, a feature more often associated with *Homalomena*. The *nervosa* complex is notable for the spathe limb mostly liquefying into a mucilaginous mess without first breaking into pieces.



*Schismatoglottis nervosa* after male flowers have shed their pollen; note that the spathe limb has melted completely

Species allied to *Schismatoglottis conoidea*, aside from distinctive elongated shoots giving rise to plants with a straggling habit, have the spathe limb hardly opening and long persistent into the male flower phase, before shedding in pieces. The spathe is also notably thick and glossy as opposed to the rather spongy texture of species closely allied to *S. asperata*.



*Schismatoglottis conoidea* at late female anthesis. Note the thick spathe limb



*Schismatoglottis maelii*

### Multiflora Group

The Multiflora Group has vegetative shoots with apical portion renewing growth at flowering. A greater proportion of the petiolar sheath is free and usually (but not exclusively) the spathe limb is shedding in a single piece when still fresh. Typical of the group is *Schismatoglottis maelii* from the Bau area.

The Multiflora Group is of particular interest in studies on adaptation to rheophytic habitats (i.e. tropical forest streams habitats) and the evolutionary study of the Schismatoglottideae.

### Tecturata Group

The Tecturata Group comprises of allied species (e.g. *Schismatoglottis tecturata* and *S. petri*) where the foliage leaves alternate with reduced



*Schismatoglottis tecturata*

leaves. The spathe has only the marginal and distal parts of the spathe limb withering after flowering while the remainder persists well into development of the fruits. Besides the above two species, a further species, *S. jipomii* has been described for the group, which has the spathe limb falling fresh from the constriction and falling in a single or only a few pieces.



*Schismatoglottis jipomii*

**Peter Boyce**

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Photos by Peter Boyce and  
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# SEABG Meeting

The Singapore Botanic Gardens once again played host to a meeting of directors of the SEABG network (South East Asia Botanic Gardens network), from February 7 – 9, 2007. A total of 35 attendees from 20 institutions representing 11 countries attended the meeting, which was to decide the future direction of the network.

Discussions focussed on:

1. Review and evaluation of past SEABG activities.
2. Refinement of SEABG's aims and objectives and crafting of mission statement.
3. Formulation of concept project proposals that can be used to seek funding from donors.

Networking, followed by capacity building, was overwhelmingly seen as the most valuable outcome of the SEABG network. Also appreciated were the technical advice and resources given during BGCI site visits.

SEABG's mission statement, aims and objectives are also refined as follows:

## SEABG Network Mission Statement

Facilitate and enhance the conservation and sustainable use of indigenous flora of the South East Asian region, through the activities of Botanic Gardens and related institutions.

## Aims & Objectives

SEABG aims to:

1. Improve members' overall standards through capacity building in the areas of plant conservation, horticulture, environmental education, and curation of collections, in support of the Global Strategy for Plant Conservation (GSPC) targets and International Agenda for Botanic Gardens In Conservation (IABG).
2. Facilitate communication between members and with other BG communities worldwide.
3. Prepare & develop Codes of Conduct for collection and exchange of plant materials.
4. Facilitate the coordination and assist in the development of collaborative plant conservation programmes among members.
5. Facilitate the use of resources from beyond the region for the benefit of SEABG network.
6. Provide a fund raising platform for SEABG activities.



SEABG delegates touring the National Orchid Garden



Bian Tan

Bian Tan



Dr Saw Leng Guan (right), Director, Tropical Forest Biodiversity Centre, Malaysia, assisted in crafting the SEABG mission statement

Anle Tieu

### Conclusion

On the whole, it was a fruitful and productive meeting. SEABG members took the opportunity to know each other better during the three days, especially during tours to areas within the Gardens like the National Orchid Garden, Library, and Herbarium. Meetings such as these are essential for strengthening the network links, growing a sense of network ownership by members, increasing commitment to its mission and aims, and for SEABG to evolve into a community of individuals as well as institutions.

**Bian Tan**

*Programme Coordinator, Southeast Asia  
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International (BGCI)  
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In addition, there was useful discussion on CBD (Convention on Biological Diversity) issues such as access and benefit sharing, prior informed consent, and material transfer agreements.

### Next Meeting

SEABG is very fortunate to have Dr Li Chia-Wei (National Tsing Hua University, Taiwan) host the next SEABG director's meeting in two years time.

## United Nations ESCAP Ecotourism Meeting & Seminar

The 14<sup>th</sup> meeting of the executive committee and seminar of the network of APETIT (Asia Pacific Education and Training Institutes in Tourism) was held at the Gardens' Botany Centre from 26 - 28 June 2007. The seminar, "Ecotourism Interpretative Programmes, Education and Research" was organised by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and the Singapore International Hotel and Tourism College (SHATEC). More than 30 APETIT delegates from 12 countries, including Australia, China, Indonesia, Iran, Thailand and

Vietnam attended the seminar. They were joined by another 40 observers from international organisations, National Parks Board (NParks) and public/private sector that are involved in ecotourism. The seminar highlighted ecotourism as an emergent trend, as tourists are increasingly keen on interacting with flora and fauna in their natural habitat. The rising potential of nature-based tourism reflects the value and need to preserve our natural environment.

The Guest-of-Honour was Mr Ng Lang (CEO, NParks). Mr Wong

Tuan Wah, (Director/Conservation, NParks) gave a presentation on the conservation and management of Singapore's biodiversity. NParks also played host and invited the delegates for nature-guided walks to the Sungei Buloh Wetland Reserve, the Tree Top Walk@MacRitchie and the Gardens.

**Yap Siow Hong  
Mak Sin Chang**  
*Visitor Services*



## International Tourist Guide Day 2007

The Gardens played host to 2007's International Tourist Guide Day (ITGD) on 31 March. Into its 3<sup>rd</sup> year, the ITGD is aimed at raising the profile of tour guides as Singapore's tour ambassadors, as well as to acknowledge and celebrate their contribution to the tourism industry. The Singapore Tourism Board and the Society of Tourist Guides have been organizing ITGD since 2005. This year, in collaboration with the Gardens, free-guided tours of our newly re-developed Tanglin Core were offered to the public. The tour guides were trained by the Gardens' staff in preparation for this.

Kicking off at 9 am, the full-day event included balloon sculpting, magic tricks, Chinese calligraphy and most importantly, free-guided tours conducted by these professional licensed guides. Two tours were offered, the Heritage Tour and the Botany Centre Tour. Conducted in English and Mandarin, they lasted an hour each.

The Botany Centre Tour brought participants to the first 'pitched green roof' in Singapore, affectionately known as the Green Pavilion. Also included are the heritage tree, *Calophyllum inophyllum*, the Orchid Breeding & Micropropagation Laboratory, Library of Botany & Horticulture, the Singapore Herbarium, the conserved

buildings (Holttum and Ridley Halls) and our new Saraca Stream Walk. They learned about the history of our various departments, their old homes turned new, and our onward journey into the next decade.

The nostalgic Heritage Tour brought the participants out to our lawns, where they enjoyed the collection of all things old and iconic. These included favourites like the Tanglin (Main) Gate, Swan Lake, Swiss Granite Fountain, Sealing Wax Palm (featured in the Gardens' logo), Bandstand, sculptures and heritage trees like the Tembusu (*Fagraea fragrans*), Kapok (*Ceiba pentandra*) and the Malayan Terminalia (*Terminalia subspatulata*).

Our guides are vital ambassadors in projecting the importance of conservation of not only our Earth, but also our heritage. Ms Lily Tan, who came to the event with her two children, exclaimed "The tour (Heritage) was educational and the activities brought a smile to my two children. You should have more of such activities!"

**Benjamin Aw**  
Visitor Services



Benjamin Aw

## A R O U N D   T H E   G A R D E N S

# Launch of 2007 Coin Set – *Heritage Orchids of Singapore*

On the 31<sup>st</sup> of May, more than 50 enthusiastic and budding artists turned up at the National Orchid Garden for the Orchid Painting Competition held in conjunction with the launch of the 2007 Heritage Orchids of Singapore Coin Set. Coincidentally, the winners from the Open and Junior categories of the competition painted Singapore's national flower, *Vanda* Miss Joaquim.

Orchids have been closely associated with the Gardens. Its breeding programme, started in 1928, contributed to the flourishing orchid industry in Singapore. This year, joining the ranks of *Vanda* Tan Chay Yan and *Aranda* Majula that were featured in the 2006 Heritage Orchids of Singapore Coin Set, are *Vanda* Mimi Palmer and *Dendrobium* Singa Mas.

*Dendrobium* Singa Mas is one of the most beautiful hybrids created by the Gardens. *Singa* is Malay for 'Lion' and *Mas* for 'Gold'; so the name of this hybrid with its clear



2007 Heritage Orchids of Singapore Coin Set featuring *Vanda* Mimi Palmer (left) and *Dendrobium* Singa Mas (right)

yellow inflorescences translates as 'Golden Lion'. *Vanda* Mimi Palmer, a handsome hybrid with distinctively strong bluish grey tessellations, is blessed with an incredibly strong and sweet fragrance. Many have likened it to the scent of a delicious chocolate or cotton candy aroma. Like the previous year's series, Singapore Mint has placed extra care and effort to ensure the precision and accuracy in depicting the color and bloom of the orchids on the coins. The successful launch

will encourage the Singapore Mint and the Gardens to commemorate more heritage orchids. Visitors can view these national treasures at the permanent Heritage Orchid Display in the National Orchid Garden.

**Mak Sin Chang**  
Visitor Services

Photos by Benjamin Aw



One of the participants drawing an orchid



Mr Dan Tan, Senior Vice President/Commercial from Singapore Mint, introducing the Heritage Coin Set



## A Meeting on Biodiversity Conservation

It is uncommon to have an international gathering of scientists, government officials and industrial representatives to discuss biodiversity conservation issues. We are heartened that such a meeting was held on January 15 to 17, 2007 in Bintulu, Sarawak, Malaysia.

The conference “Biodiversity Conservation in Tropical Planted Forests in Southeast Asia” was attended by over 200 people from more than 12 countries from Europe, North America, Asia and Oceania. The participants were from museums, universities, government and non-government agencies as well as the industrial sector. Co-organized by the State Government of Sarawak, Sarawak Forestry and the Grand Perfect company, the conference was officially opened by the Chief Minister of Sarawak State Government, and the Director of Forests of Sarawak State.

Two staff from the Gardens were invited to give talks at the conference. Their talks focused on the results of their field research in the Bintulu limestone area (in 2004 and 2006). Sarawak herbarium (SAR) collaborated in the project with field assistance provided by the Grand Perfect company.

Serena Lee talked on the diversity of the vascular flora of Bukit Sarang in Bintulu, Sarawak. This unique



Participants at the conference (from left); Julia (from SAR), Serena Lee, Benito C. Tan, Roland Yap (ASEAN-ABC) and Jaap Vermeulen (National Herbarium of the Netherlands, Leiden Branch)

Rosie

limestone habitat is home to several endemics worthy of protection and conservation.

Benito C. Tan gave a review on the role of cryptogams (pteridophytes and bryophytes) as indicator plant species for the different types of lowland forests found in Borneo, Peninsular Malaysia and Singapore.

At the end of the three-day meeting, the conference came to the conclusion that the preservation of biodiversity should include the preservation of the primary forest parcels within

large logging concession areas.

This fruitful regional meeting also highlights the importance and need of collaboration and mutual support among the research institutions, industrial sectors and government agencies in order to achieve the goal of conserving biodiversity for posterity.

**Benito C. Tan**  
**Serena Lee**  
*Herbarium*

## WHAT'S BLOOMING

# Floral Fireworks

*Gloriosa superba*, commonly known as Glory Lily, Flame Lily, Gloriosa Lily or Tiger Claw, is a native of Africa and Asia. One can find this vine happily growing along the fence of the Evolution Garden with many other wonderful climbers.

It belongs to the family Colchicaceae. The genus name, *Gloriosa*, is latin, meaning glorious or superb and its species epithet, *superba*, means splendid. Undoubtedly, the father of modern taxonomy, Carl Linnaeus, must have been very impressed by the striking flowers when he first described and named the plant in 1753.

The unusually shaped flower of the *Gloriosa superba* has bright crimson and yellow floral lobes. In bud, they face downwards. As the blooms mature, the floral lobes elongate, become wavy at the edges and gradually arch backwards. Throughout the process, the flower goes through a spectrum of colour changes from its originally green to crimson-yellow to bright scarlet. The stamens (male part of flower) are extremely visible and curve gently outward. Each flower is about 7 to 12 cm in length.

Another interesting characteristic of this plant is the tendril-like spiral tips at the end of each bright green and

lance-shaped leaf. It is fascinating to watch the slender leaf tendrils coil around nearby supports to get a grip for its upward climb. The Glory Lily grows well in warm sunny conditions and likes well-drained, rich soil. The vine dies down after flowering but emerges again later from the tuberous roots. As this climber is rather sparse, it is best combined with other vines or lush shrubs to set a dramatic scene when it blooms.

The *Gloriosa superba* is grown commercially for a chemical compound known as colchicine. Although research has shown that all parts of the plant are extremely poisonous when ingested, the tuber of the plant is used in Ayurveda and Yunani systems of medicine to treat bruises, intestinal worms, skin problems and even impotence.

Its strange flower shape along with its vibrant colours makes *Gloriosa superba* an interesting addition to any gardens.

**Nura Abdul Karim**  
Living Collections

Photos by Nura Abdul Karim



*Gloriosa superba*





## Unusual Heliconia from Tropical America



*Heliconia longiflora*

Strolling along the Gardens by the Symphony Lake, we will chance upon the Heliconia Walk dedicated to the splendid ornamental heliconias.

Some of the more popular species and horticulture varieties can be found along this Walk. The less common species of heliconias are scattered in the heart of the Ginger Garden.

One rarity, *Heliconia longiflora*, is in full bloom now and will keep flowering for the next few months. These plants in the Ginger Garden are almost two metres high. Under favourable conditions in nature they can shoot up to five metres. The beautiful dark green leaves are numerous and arranged distichously on the pseudostem (false stem), which is topped with an attractive erect inflorescence.

The inflorescence consists of four to eight bright orange boat-shaped bracts, which are in fact modified leaves. From each of these bracts, several yellow-orange flowers with near-white tips emerge. The flowers are longer than the bracts, hence the name '*longiflora*'. This is rather unusual in the genus where the most prominent part of the inflorescence is usually the huge, colourful and often waxy bracts with the flowers partly hidden in them.

This species is naturally distributed from Nicaragua to Colombia. In the Ginger Garden, it can be found in the area dedicated to America, in the middle patch located opposite the pond.

**Jana Leong-Skornickova**  
Herbarium

*Photo by Jana Leong-Skornickova*



## WHAT'S BLOOMING



## Sweet Snow, White Butterflies

*Hedychium coronarium* (Family Zingiberaceae) is a beautiful ginger with magnificent scented white flowers. Due to the shape of its flowers, it is commonly called “Butterfly Ginger”, “Butterfly Lily” or “White Butterfly”. The flower has a broad labellum (lip) reaching 7 cm in length and width. With two distinct lobes, it resembles the wings of a butterfly. Its Sanskrit name *Gandasuli* means “Queen’s Perfume” and refers to the delicate scent of the flowers that has a hint of gardenia. Originally from the Himalayas, this favourite and commonly cultivated ginger is naturalized in many tropical and subtropical countries. This species is one of the hardiest hedychiums and thrives well in full sun.

In the Ginger Garden, this sweet-smelling beauty is planted in several areas. The most conspicuous patch is just behind the bench opposite the waterfall. Visitors strolling in the late afternoon or early evening will have the opportunity to ‘catch’ the scent as it is strongest at these times.

Johann Gerhard Koenig described the genus *Hedychium* in 1783 and named a species *Hedychium coronarium* - the only member of the genus known in Europe then. *Hedychium* is derived from Greek *hedys* = sweet and *chion* = snow.

The centre of diversity of this genus is in the Himalayas. More than 80 species are known, and many are splendid ornamentals. Through active breeding, many new varieties have also been introduced for cultivation.

**Jana Leong-Skornickova**  
Herbarium

Photos by Jana Leong-Skornickova



*Hedychium coronarium*



# *Pteroceras pallidum*

## - an Endangered Orchid in Singapore

As a result of habitat change, only around 50 orchid species from the originally estimated 200 are still known to occur in the wild. A re-discovery of an extinct orchid is occasionally made (see page 2 on *Galeola nudifolia*!). As in other parts of the tropics it is usually the ground (= terrestrial) orchids which suffer the most as they are often dependent on pristine environments while epiphytic orchids can frequently endure higher levels of disturbance of their habitats.

During a recent collecting trip to Nee Soon Forest, Yam Tim Wing and Paul Leong came across an interesting epiphytic orchid growing on a *Horsfieldia crassifolia* tree. Several plants were collected and later identified as specimens of *Pteroceras pallidum*, a rare orchid in Singapore. It is classified as 'Endangered' in the Red Data Book.

*Pteroceras* is a small genus of about 20 species found in Asia, ranging from Northern India through Indochina to the Philippines in the north, and southwards to the Lesser Sunda Islands, Java and Sumatra. It is placed in the orchid subfamily Epidendroideae, under the tribe Vandaeae. This is one of the largest and most diverse tribes of the orchid family comprising about 2,000 species in 160 genera. Some of its representatives are well-known in horticulture and the cut-flower industry, like *Vanda*, *Phalaenopsis*, *Aerides*, *Arachnis*, *Doritis*, *Papilionanthe*, *Renanthera*, *Angraecum* and *Aerangis*. Singapore's



Yam Tim Wing



Paul Leong



Hubert Kurzweil

National Flower, *Vanda* Miss Joaquim, belongs in this group.

Like all species of the genus *Pteroceras*, the flowers last for only up to two days. This is somewhat unusual as many tropical orchids have waxy flowers that stay fresh for weeks or months. However, short-lived flowers, known as ephemerals, are also found in some other SE Asian orchids, like for example the Pigeon

Orchid (*Dendrobium crumenatum*) or *Thrixspermum* species. *Pteroceras pallidum* is found in Peninsular Thailand, Malaya, Sumatra, Java and Borneo. It grows on lianas, tree trunks or branches in evergreen rain forest from sea-level to over 600 m altitude.

We have pollinated the flowers of some of the collected specimens. We hope to be able to harvest large amounts of seeds, so as to propagate and reintroduce the plants into the wild. This form of *ex situ* conservation (conservation through cultivation) has proven to be successful with other orchids like the Tiger Orchid, *Grammatophyllum speciosum*. We hope it will also have a major role in the conservation of Singapore's population of *Pteroceras pallidum*.

**Hubert Kurzweil**  
**Paul Leong**  
Herbarium

**Yam Tim Wing**  
**Aung Thame**  
Orchid Breeding and  
Micropropagation

**Derek Liew**  
Central Nature Reserve

## GINGER AND ITS ALLIES

*Cornukaempferia aurantiflora*

The genus *Cornukaempferia* of the family Zingiberaceae has been described only in the last decade. It is endemic to Thailand with only two species described so far: *C. aurantiflora* and *C. longipetiolata*. However, the former

species has already been established in the horticultural trade for some years under various names such as *Kaempferia* or *Boesenbergia*.

The generic name is compiled from the Greek, *cornu*, meaning horn-like.

This refers to the prominent curved anther crest, similar to species of the genus *Zingiber*. Vegetatively, species of *Cornukaempferia* look similar to that of another ginger genus *Kaempferia*. However, DNA analysis has shown that *Cornukaempferia* is more closely related to the genus *Zingiber* than to *Kaempferia*.

*Cornukaempferia aurantiflora* is a stemless herb with 2-3 large leaves, forming a ground cover in secondary forests. The dark green leaves with their silver spots and velvety look make the plant outstandingly beautiful even when not in flower. The flowers with red corolla lobes and bright orange large labellum appear from the middle of the leaves. This species is doing well in the Ginger Garden.

Both *Cornukaempferia* species are rare and limited in their distribution. To prevent over-collection of the wild species, they have to be protected especially as they gain popularity in the horticultural trade.

**Jana Leong-Skornickova**  
Herbarium

*Photos by Jana Leong-Skornickova*



*Cornukaempferia aurantiflora*



# A Holiday Programme For Children

Overheard in the classroom at the end of the day....

"Mummy, will you enroll me for the workshop before May next time?" one of the children who attended the 'Young Fern Detective' school holiday workshop asked her mother.

Curious, the mother asked her, "Why?"

"So that I can laminate fern leaves and make pretty souvenirs for your Mother's Day present!" the young daughter replied.

The mother, very happy to hear that, said "Sure! I will do so next year!"

As part of education outreach in the Gardens, we conducted three workshops for children and two thematic nature tours, for children

and parents, during the June 2007 school holidays.

## Workshops

Lower-primary children took part in the full-day '**Young Fern Detective**' workshop conducted on 5 June. Armed with their worksheets, they observed many different types of ferns during their one-hour tour of the Fernery. Back in the classroom, participants studied fern spores and a multitude of different types of spore cases under microscopes. They also thoroughly enjoyed the art & craft sessions, making souvenirs from laminated fern leaves with guidance from their facilitator, Ms Winnie Wong. Towards the end of the day, they tapped on their creative skills to design and create a 'Dish Garden' by planting several types of ferns and decorating their creation with ornaments.

The '**Young Aqua Botanist**' workshop held on 7 June attracted upper-primary children. The bubbly group followed Mr Hassan Ibrahim for an outdoor aquatic plant trail in the morning. The children, very enthusiastic and observant, asked many questions and documented their observations in their worksheets or by taking photographs. These children observed many aquatic and semi-aquatic plants like the Sedge, Victoria Lily and Duckweed at the Saraca Stream Walk, the Marsh Garden and the Green Pavilion of Botany Centre. The tour took longer than the allocated one hour due to an overwhelming number of questions from the keen young learners. After lunch, the group eagerly dissected and observed cross-sections of the aquatic plant parts under the microscope. These children also had fun making



Education Manager, Winnie Wong, making souvenirs using ferns to participants of the "Young Fern Detective" workshop

Koh-Low Neok Chien



Young fern 'detectives' examining *Selaginella* at the Fernery

Lim Swee Cheng



A young fern 'detective' proudly showcasing her finished fern artworks

Lim Swee Cheng

their own water garden in aquariums by using at least five types of water plants.

The shy participants of the half-day 'Trees & Me' workshop on 12 June, were of kindergarten level. They quietly followed the instructions of Ms Yeo Kar Hoon, their facilitator for the day. The ice was broken only after they started on the children's treasure hunt, completing the activities on the "Sara, the Forgetful Dinosaur" workbook. They crushed and smelled the leaves of a Eucalyptus, completed a page of bark rubbing on the Tembusu tree (*Fagraea fragrans*), and did some colouring. They also studied the Cannonball Tree (*Couroupita guianensis*), the Monkey Pot Tree (*Lecythis ollaria*) and the Rain Tree (*Samanea saman*). The children were excited when tasked to search for Sara's misplaced 'siblings', which were still in their eggs. They finally found the eggs hidden under the Monkey Pot Tree.

Can you imagine 4 to 6 year-olds

creating landscapes in a dish garden? Well, these children managed to do just that! Their parents were so amazed by their children's creativity and capability displayed at the workshop.

Feedback from a Ms Fraeda Seow, "My son, Bryan, enjoyed himself very much and is looking forward to more of such workshops." Ms Adeline Koh said, "My daughter really enjoyed the session so much that she wants to know if there are other related programmes on plants. I, too, felt the same because it really makes them understand science instead of just reading the textbook and answering assessment questions in school." From Ms Serena Teo, "My children, Breanna and Carissa, loved the programme and couldn't stop talking about it." Ms Kor emailed, "My daughter, Yong Xin, found your workshop fun-filled and informative. She had a wonderful time. We believe your workshop has been a great success. I look forward to your next workshop."

### Thematic Guided Tours

We had a total of 97 children and their accompanying adults joining us for the thematic guided tours - 'Flower Trail' and 'Singapore Botanic Gardens – Our Heritage'.

### New Programmes

We will be staging new themes for the next school break in September and December 2007, targeted to teach our children and cultivate their interest in botany through interactive experiential learning. New programmes will also be offered at the Jacob Ballas Children's Garden, due to open to the public on 1 Oct 2007. This Children's Garden will be the first of its kind in Asia. Look out for more exciting programmes to come at our website [www.sbg.org.sg](http://www.sbg.org.sg).

**Koh-Low Neok Chein**  
**Janice Yau**  
Education Outreach



A group photograph of 'Young Aqua Botanist' participants with their creative water gardens

Koh-Low Neok Chein



"Young Aqua Botanists" on tour at the Marsh Garden, listening intently to Hassan Ibrahim (furthest right, in dark blue)

Koh-Low Neok Chein



Young "Trees & Me" participants adding decorations to their tree specimens

Winnie Wong



# Order Out of Chaos

by *Charlie Jarvis*

*Published in May 2007 by The Linnean Society of London in association with the Natural History Museum, London. 1,016 pages, colour photographs. Price GBP 80.*

“If you do not know the name of things, the knowledge of them is lost too,” said the Swedish botanist Carolus Linnaeus in the middle of the 18<sup>th</sup> century. During his lifetime (1707-1778), Linnaeus started to consistently apply binomial names for plants (genus and species). Little did he know how big an impact this would have on botany. Three hundred years after his birth, this binomial system is still widely used. His *Species Plantarum*, published in 1753, is universally accepted as the starting point for the naming of plants.

Charlie Jarvis, based in the British Museum, is a well-known specialist on Linnaean names of plants. He dedicated more than 25 years of his research life to gather information on Linnaeus and plant names first coined by Linnaeus. With assistance from many other botanists, he

searched original materials found in various institutions that could serve as types.

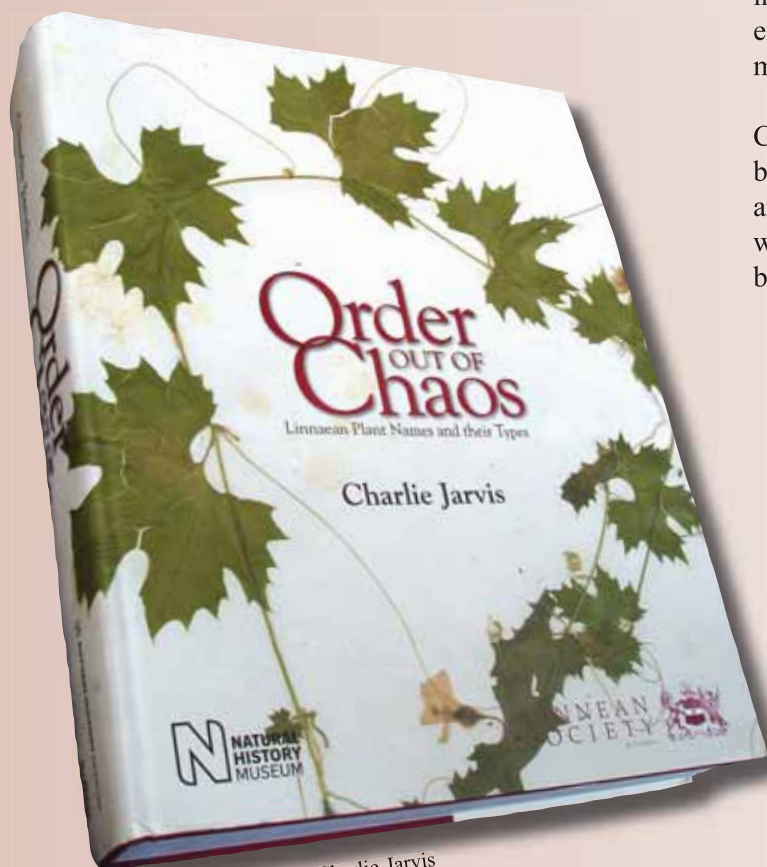
This book goes beyond 1,000 pages. One could prematurely assume that it would be of interest only to professional botanists. No doubt it will, especially the 750-page list of plant names and their status. Yet, for those who are interested in the history of natural sciences, the first 250 pages is reason enough to read this book. It is filled with beautiful colour plates of drawings, paintings, plants specimens and images from Linnaeus’ books and manuscripts.

The first six chapters cover various topics linked to Linnaeus’ life, publications, collections, and even information on his students and collectors. It also includes a chapter “The Art and Science of Typification”, explaining the basic principles of plant taxonomy with many examples.

Charlie Jarvis celebrated the anniversary of Linnaeus’ birth by writing this extraordinary book about Linnaeus and his plants. I am sure Linnaeus, wherever he is now, would be very pleased with this very systematic and beautiful work.

**Jana Leong-Skornickova**  
*Herbarium*

*Photo by Jana Leong-Skornickova*



*Order Out of Chaos by Charlie Jarvis*

**Footnote:**

A special exhibition on Carolus or Carl Linnaeus, dubbed the Father of Modern Taxonomy, will be launched in the Gardens on 2 August 2007, on the occasion of his 300<sup>th</sup> birth anniversary. This will continue till the end of the year and include exhibits of rare books, botanical drawings, herbarium specimens and plant artifacts pertinent to this famous botanist.

## BOOK REVIEW

# Robert Wight and the Botanical Drawings of Rungiah and Govindoo

by Henry J. Noltie

Published in 2007 by the Royal Botanic Garden Edinburgh, UK. Compilation of three books. In colour. Price GBP 75.



This is an account of Henry J. Noltie's magnificent trilogy on Robert Wight - a Scottish surgeon with the East India Company. Wight was also an enthusiastic botanist, spending over 30 years of his life in South India. Noltie analysed in great detail not only Wight's botanical accomplishments, but also many aspects of his life and collections. He also paid special attention to a set of beautiful botanical drawings made for Wight by local Indian artists.

The first of three books in this collection, *The Life and Work of Robert Wight*, describes Wight's family background and education. It also mentions his first journey to India, which lasted 12 years, and

his brief return to Britain before going back to India for another 20 years. Wight's second visit to India is elaborated on almost a hundred pages forming the major part of the book. The remaining pages are dedicated to his final years spent back in Britain.

The second book, *Botanical Drawings made by Rungiah & Govindoo: the Wight Collection*, highlights botanical drawings done by two highly skilled Indian botanical artists. Unlike many botanists in the past, who considered pictures as childish or helpful only to illiterates, Wight was a proponent of 'using the medium of senses as a way of assisting the mind'. He recognized that written language is

inadequate to interpret all forms of ideas occurring in nature.

Noltie introduced botanical art as a scientific tool in the first 50 pages. He also elaborated on the two Indian artists, the Wight's collection and on the lithographic methods, which was much improved and promoted by Wight. The book includes 137 botanical drawings with technical details and various notes on the plants depicted.

The third book, *Journeys in Search of Robert Wight*, is a personal account of the numerous journeys the author made to get all relevant material for these books. Noltie made trips to various herbaria, libraries and archives in both Europe as well as in India. He also visited places where Wight lived and worked. This third book definitely gives yet another dimension and depth when compared to the first two.

The whole work is well written, making it hard to stop reading. From the first glance, it is very clear that this is a 'must have' for anyone interested in botanical art and history of botany.

**Jana Leong-Skornickova**  
Herbarium

Photo by Jana Leong-Skornickova



# *Calycophyllum spruceanum* - the Naked Tree



*Calycophyllum spruceanum* (Rubiaceae) is an attractive and multi-purpose tree of the Amazon basin. This species is indigenous to Brazil, Peru, Ecuador and Bolivia.

The Naked Tree, otherwise called *Mulateiro* or *Pan-Mulato*, is a handsome tree with an upright habit. It reaches a height of 30 metres. This tree is well known as a rainforest hardwood and exported around the world for its high-density timber. It produces clusters of small fragrant, white flowers.

This tree sheds and regenerates its bark on a yearly basis. The papery outer bark turns reddish-brown and flakes off in long strips. The bark has a long history of traditional medicinal uses to the locals in its native home. Interestingly, the bark changes colour and ranges from green to a brownish tone during the course of a year. It is so smooth it looks like it has been polished.

In recent years, the bark has generated a lot of interest among researchers and formulators of body care products in South America for its apparent beneficial effect to human skin. The bark has a high content of phenols and organic acids, which may explain its traditional use in stopping the ageing process of skin. It is definitely more sustainable if grown for its bark than to have it logged for timber.

These tall Amazon trees were transplanted to the edge of the Eco-lake from the lawn that is currently being hoarded due to the construction of the MRT (underground train) station. They were grown from seeds given to the Gardens in 1993 by a nurseryman from New Zealand.



Unusual trunk colour



Flaking off the outer bark

**Andrea Kee**  
Plant Information Unit

Photos by Andrea Kee



## KEY VISITORS TO THE GARDENS (JANUARY TO JUNE 2007)

Name	From
HE Abdulla Abbas	Head of Muscat Municipality, Oman
Mr Apolinario Carino	Siit Arboretum Botanical Garden, Philippines
Dr & Mrs Artis Pabriks	Minister of Foreign Affairs, Latvia
HE Bouasone Bouphavanh	Prime Minister of Laos People Democratic Republic
Dr Charles Clarke	James Cook University, Cairns, Australia
Dr Chen Jin	Xishuanbanna Tropical Botanical Garden, Kunming, Yunnan, China
Dr Domingo A. Madulid	Philippines National Herbarium, Philippines
Prof Edwino S. Fernando	The University of the Philippines, Philippines
Mr Eric Hanquinet	Siit Arboretum Botanical Garden, Philippines
Dr Esperanza Maribel Agoo	De la Salle University, Philippines
HE Flavio Fonseca	Ambassador of Angola
Dr Franz Josef Jung	Minister of Defence, Germany
Ms Hadyah Idris	Forest Reseach Institute Malaysia, Malaysia
Dr Hu Huabin	Head of Research Planning and Foreign Affairs, Xishuanbanna Tropical Botanical Garden, Kunming, Yunnan, China
Mr Ilyas Asaad	Director, Regional Office for Sulawesi, Maluku & Papua, Ministry of Environment, Indonesia
Dr Irawati	Director, Center for Plant Conservation, Bogor Botanic Gardens, Indonesia
HE Islam A Karimov	President of Republic of Uzbekistan
Mrs Jean Ping	Spouse of Foreign Minister, Gabon
Mr Joachim Gratzfeld	Director, Regional Programmes, BGCI, UK
HE Kamal Unakitan	Minister of Finance, Turkey
Mrs Keophayvanh Insixieng May	Deputy Director General, Research Institute of Science, Science, Technology & Environment Agency, Vientiane, Lao PDR
Mr Khampheng Phothichidto	Director, General Resources, Science Technology & Environment Agency, Research Institute of Science, Lao PDR
Mr Khamseng Nanthavong	Deputy of Academic Division, Vientiane, Lao PDR
Mr Khin Muang Hla	Park Warden, Hkhakaborazi National Park, Nature and Wildlife Conservation Division, Myanmar
Mr Khou Eang Hourt	Chief Research on Botany & Plant Ecology, National Park and Wildlife Sanctuary, Cambodia
Mr Kofi Boakye-Yiadom	Executive Director, University of Ghana Botanical Garden, Ghana
Ms Lai Ee May	Penang Botanic Gardens, Malaysia
Prof Le Chia-Wei	Department of Life Science, National Tsing Hua University, Taiwan
Mr Lee Bo Kyung	Deputy Minister for Minister of Culture & Tourism, South Korea
Mr Lim Boon Tiong	Director, Penang Botanic Gardens, Malaysia
Mr Lim Chung Lu	Forest Reseach Institute Malaysia, Malaysia
Dr Lindy Cayzer	Australian National Herbarium, Australia
HE Mansoor Hassan Bin Rajab	Minister of Municipalities & Agriculture, Bahrain
Dr Mark Clements	Australian National Herbarium, Australia
HE Mohamad Yousuf Shalwani	Omani Ambassador to Singapore
Hj Murad Hj Husin	CEO, Hang Tuah Jaya Corporation, Malacca Botanical Gardens, Malaysia
Mrs Natalia Borisova	Spouse of Mr Sergey Borisova, President of the Union of Entrepreneurial Organisation, Russia

Name	From
Ms Nik Norafida bt Nek Ali	Universiti Kebangsaan Malaysia, Malaysia
Ms Nor Essawanis Abdullah Thani	Universiti Kebangsaan Malaysia, Malaysia
Dr Pan Fuh-Jiunn	Chief, HengChun Tropical Botanic Garden, Taiwan
Mr & Mrs Paolo Bonaiuti	Honorary Member of Parliament, Italy
Dr Peter Wilkie	Royal Botanic Garden, Edinburgh, UK
Dr Portia Lapitan	Makiling Center for Mountain Ecosystems, University of the Philippines Los Banos College, Philippines
Mr Qiu He	Vice Governor, Jiangsu Province, People's Republic of China
Dr Razali Jaman	Universiti Kebangsaan Malaysia, Malaysia
Ms Rozilawati Shahari	Universiti Kebangsaan Malaysia, Malaysia
Dr Ruth Kiew	Forest Reseach Institute Malaysia, Malaysia
Hj Saidin Bin Salleh	Forestry Department, Ministry of Industry & Primary Resources, Brunei
Dr Saw Leng Guan	Director, Tropical Forest Biodiversity Centre, Malaysia
HE Sheikh Nasser Al-Mohammad Al-Ahmed Al-Jaber Al-Sabah	Prime Minister of Kuwait
Mr Shein Gay Ngai	Nat Ma Taung National Park, Myanmar
Ms Siti Eryani Suterisno	Forest Reseach Institute Malaysia, Malaysia
Ms Siti Maryam Yaakub	James Cook University, Cairns, Australia
Mr Sok Kheng Novin	Vice Chief, National Park and Wildlife Sanctuary, Cambodia
Dr Somsy Gnophazay	Dean of Forestry, Vientiane, Lao PDR
Ms Sugiarti	Bogor Botanic Gardens, Indonesia
Dr Sugumaran Manickam	Rimba Ilmu, University of Malaya, Malaysia
HM Sultanah Zanariah	HM Sultanah of Johor, Malaysia
Prof Sun Wei-Bang	Executive Director, Kunming Botanic Gardens of KIB, Yunnan, China
Dr Suyanee Vessabutr	Head, Technical and Research Department, Queen Sirikit Botanic Garden, Thailand
Dr T.Y Aleck Yang	Assoc. Curator, National Museum, Taiwan
Ms Tan Ai Lee	Universiti Kebangsaan Malaysia, Malaysia
Mr Tan Cher Hing	Universiti Putra Malaysia, Malaysia
Ms Tan Hui Sin	Forest Reseach Institute Malaysia, Malaysia
Mr Tateyama Shuhei	Miyazaki Prefecture Parks Foundation, Japan
Dr Tran Cong Khanh	Director, Centre for Research and Development of Ethno-medicinal Plants, Vietnam
Dr Tran Van On	Director, Hanoi University of Pharmacy, Hanoi, Vietnam
Mr V.G. Sagun	University of Illinois, USA
Dr Vincent Demoulin	Université de Liège, Belgium
Ms Wang Yuan-Chen	Chief Secretary, Xinyi District Office, Taipei, Taiwan
Dr Wang Zhong-Lang	Associate Professor, Kunming Botanic Gardens of KIB, Kunming, Yunnan, People's Republic of China
Prof Wong Khoo Meng	Director, Rimba Ilmu Botanic Garden, Malaysia
Ms Wu Shu-Hui	Hengchun Tropical Botanic Garden, Taiwan
Mr Yao Tze Leong	Forest Reseach Institute Malaysia, Malaysia

*Ascocenda* 'Iskandar Zanarah' is named after Her majesty Sultanah Zanariah of Johor (in centre of picture) during her visit on 13 April 2007. She was accompanied by Mrs Mah Bow Tan, wife of the Minister for National Development, and Mr Ng Lang (CEO, NParks)



*Denbrobium* 'Nasser Al-Mohammed Al-Sabah' is named after His Highness Sheikh Nasser Al-Mohammed Al-Ahmed Al-Jaber Al-Sabah, the Prime Minister of the State of Kuwait during his visit on 5 June 2007

Photos from Visitor Services



# Systema Naturae

This monumental work by Carolus or Carl Linnaeus was first published in 1735 with just 11 pages then. It reached 3,000 pages by the 13<sup>th</sup> edition published in 1770. We have the 10<sup>th</sup> edition in our collection. We will receive the 6<sup>th</sup> edition (published in 1748) as a generous donation by Mrs Gertrude Marsh Looi, FLS.

Written in Latin, the language of science in those days, the complete title of this invaluable work is:

*Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.*

(Translated: "System of nature through the three kingdoms of nature, according to classes, orders, genera and species, with [generic] characters, [specific] differences, synonyms, places").

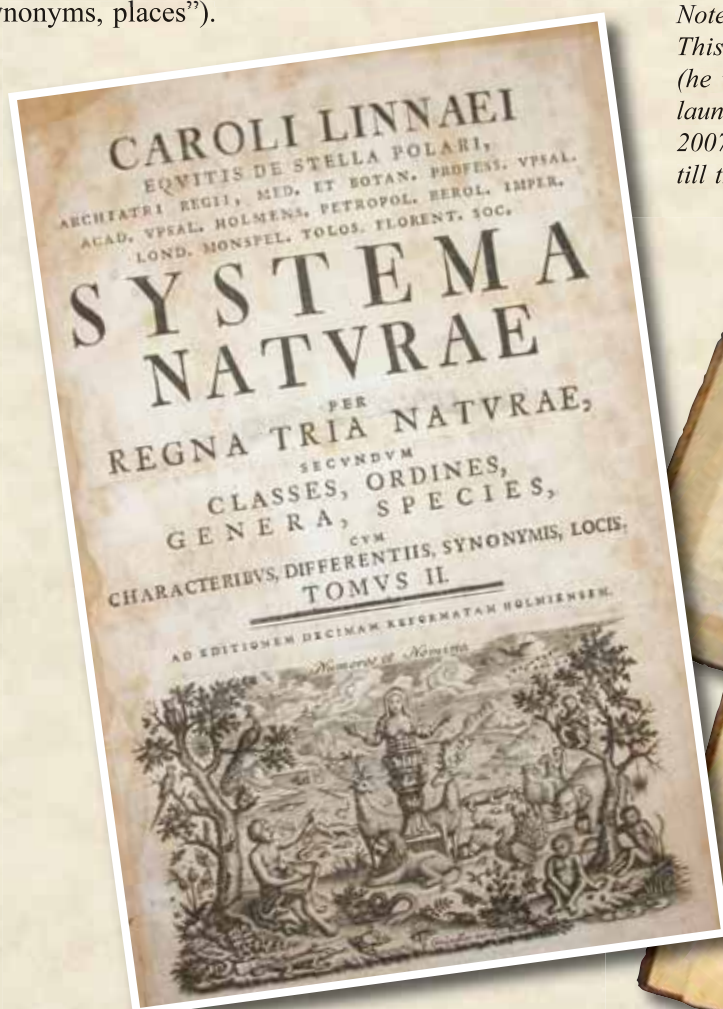
Through this publication, Carl Linnaeus (1707 – 1778), or Carl von Linné as he was later called, offered a system of classification of the natural world, dividing it into the animal, plant and mineral kingdoms. Of prime importance is that this 10<sup>th</sup> edition, published in 1758, is internationally accepted as the starting point of zoological nomenclature. (The starting point for botanical nomenclature is 1753, the year his epoch-making book, *Species Plantarum*, was published).

**Hassan Ibrahim**  
Library

Photos by Serena Lee

Note:

This being the tercentenary of the birth of Carl Linnaeus (he was born on the 23<sup>rd</sup> May 1707), the Gardens will be launching a poster exhibition and displays on the 2<sup>nd</sup> August 2007 to celebrate this occasion. The public exhibition will last till the end of the year.



*Systema Naturae*

Included within the cover of this publication is a depiction of Linnaeus in the Garden of Eden and organizing the creatures that God has created

