Gardenwise

THE NEWSLETTER OF THE SINGAPORE BOTANIC GARDENS VOLUME 26, JANUARY 2006 ISSN 12-1688

NATIONAL PARKS NParks Publication

Specimen Making Workshop

The Education Outreach and the Singapore Herbarium organized a Specimen Making Workshop held on the 6 October 2005.

This workshop was conducted for members of the Singapore Chinese Druggists Association as well as staff and students from Nanyang Polytechnic. The Association was examining suitable ways of displaying traditional Chinese medicinal specimens as a permanent exhibition at their premise, and has roped in students from the polytechnic. In total, 26 members attended this workshop to learn about the method of preserving plant specimens.

During the 3-hour workshop, participants not only get to tour around the Singapore Herbarium, they also had the opportunity to examine some of the oldest specimens in the Herbarium. Apart from observing how living specimens were pressed and mounted onto herbarium sheets, all participants also took turns to make their own plant presses with the medicinal specimens (dried leaves, flowers, stems and roots) that they have brought in.

We wish the Singapore Chinese Druggists Association all the best in developing their exhibition of traditional Chinese medicinal specimens. We would also like to thank them for a meaningful exchange session about the correct usage of traditional Chinese medicine.

Winnie Wong
Education Outreach

All photos by Winnie Wong

Saridah Bte Sabudin (with scarf), staff of the Herbarium, assisting a participant in mounting a specimen onto a herbarium sheet

Saridah Bte Sabudin and Suganthara Davi (2nd and 3rd from left respectively) demonstrating how to sew a specimen onto a herbarium sheet

Participants studying a herbarium specimen

TAXONOMY CORNER

Unclassical Names

For historical reasons, taxonomy is heavily flavoured with Latin. Two hundred and fifty years ago, when taxonomy is deemed to have started in its current form, Latin was the language of European scholarship. Therefore the names of plant species are generally derived from Latin or Ancient Greek (Europe's other classical language).

However, while publication of all new plant species must include a brief description in Latin, it is not compulsory for the names used to be classical. Asian languages have provided the roots for the names of many plant species. Malay, Singapore's national language, is represented, amongst others, in the generic names *Durio*, *Pandanus*, *Koompassia* and *Pinanga* derived from Durian, Pandan, Kempas and Pinang respectively.

Hassan Ibrahim

A lush patch of *Pandanus amaryllifolius* growing in Eco-Lake

Hassan Ibrahim

Fruits of *Areca catechu*, with some showing their fibrous husk

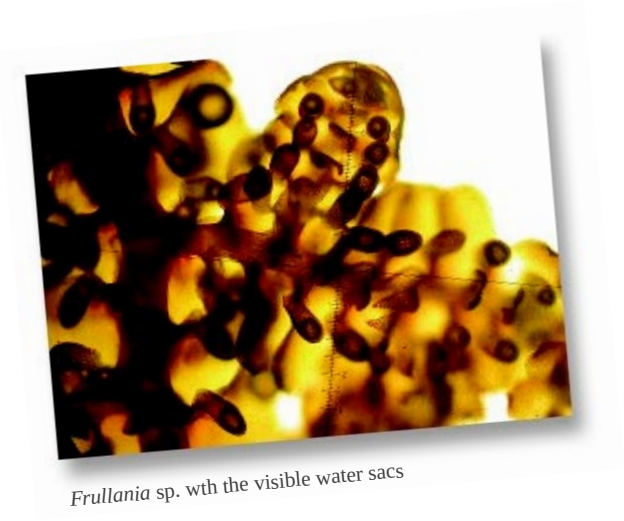
Durian, the 'king of the fruits,' is *Durio zibethinus*. The second part of the species name, the specific epithet, is derived from the Italian for civet, a mammal with a reputation for a strong scent! Daun Pandan is the leaf of *Pandanus amaryllifolius*, widely used in Southeast Asian cooking to impart a distinctive flavour and fragrance. The genus contains more than 700 species. Kempas is a large forest tree. Pinang is Malay for the Betel-nut Palm, but Pinang is not a *Pinanga*. The genus includes many species of small forest palms in Southeast Asia. Pinang is actually *Areca catechu***.** The generic name is derived from Malayalam while the species name is from an ancient Dravidian name meaning cutch or a viscous astringent substance. Chinese (荔枝, *li chi*) provides the name for Litchi in both English and botany with the genus *Litchi*.

Ian Turner
Research Associate
Winchelsea
East Sussex TN36 4WA
United Kingdom

A Course on the 'Little Green Things' in life

How many of you have a Bonsai at home? Well I've just been to a course, not about bonsais but about the little green stuff that grow all around the soil in your bonsai pot! Collectively, these little green plants are known as bryophytes, which comprise the mosses, liverworts, and hornworts.

The third Regional Training Course on Biodiversity and Conservation of Bryophytes and Lichens was an 11-day course held in Bogor, Indonesia. One of its major aims was to develop an awareness and active interest in bryophytes and lichens. The course involved lectures, fieldtrips, and a final project assignment.



Frullania sp. wth the visible water sacs

Bryophytes

Bryophytes are truly fascinating. There are mostly very small plants a few millimeters to centimeters tall and are usually found in moist or wet habitats. They lack water transporting tissues and adapt by being rather small, enabling them to absorb water directly into their cells. You may have the impression that they are delicate plants, but believe me, many bryophytic plants are adapted to harsh conditions like in deserts, alpine zones above the tree line, and even the tundras.

Practical sessions where microscopes become indispensable for this course

They have a hidden sex life or sexual stage, where water is always required for the transfer of the motile sperm to egg. After fertilization, a long stalk, bearing a capsule grows out from the asexual portion of the plant. In mosses, liverworts, and hornworts, this sexual portion (sporophyte) differs quite a fair bit in terms of its appearance and its mechanism of spore dispersal. Mosses often have a whorled leaf arrangement whereas in liverworts, leaf arrangement is bilaterally symmetrical. The non-sexual part of a hornwort looks very similar to that of the liverwort. However, under the microscope, a hornwort has typically one or two large chloroplasts while the liverwort has numerous small ones.

Lichens

Lichens however are more complex and far more difficult to identify in comparison to bryophytes. In certain cases, chemical tests are frequently required though these are sometimes also not too reliable. (For more information on Lichens, please refer to *Gardenwise* **16**(2001):9, written by Dr Harrie Sipman, who was a lecturer during the course).

Lecturers and participants at the course

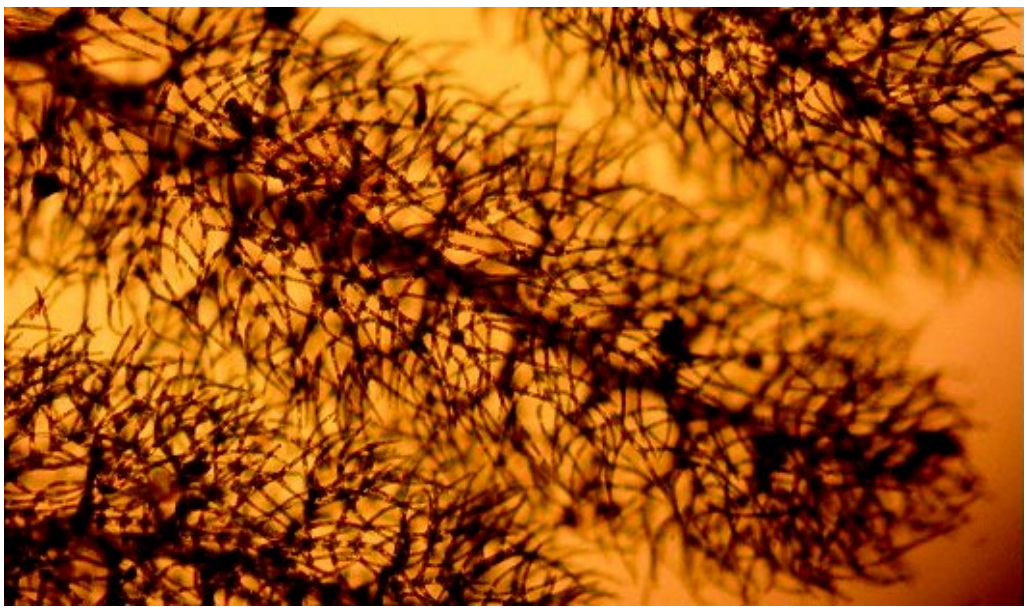
Gunung Halimun

Our final project was entitled 'Biodiversity of Leafy Liverwort Species in Gunung Halimun National Park (GHNP)'. There are numerous peaks in GHNP varying between 500-2,000 m above sea-level. The liverwort team trekked up Mt. Kendang on a trail and collected bryophytes from different habitats and niches – for example soil, trunks of trees, fallen or rotting wood, near water and anywhere else that they could be found. Specimens were especially collected at different altitudes from a tea plantation, in lowland forest through the sub-montane forest to Mt. Kendang peak (height 1,620 m). The leafy liverworts were later identified to the best of our abilities, and their distribution plotted against altitude.

Species such as the liverworts *Trichocolea tomentella*, *Frullania* spp. and certain *Plagiochila* spp. have unique features that enable them to store more moisture from the early morning mist, are thus able to survive conditions on the open peaks. A total of over 55 species from 23 genera and 11 families were identified from our three-day stint up Gunung Halimun.

Conclusion

All in all, lessons were learned, and new friendships fostered. This was truly a practical course. My utmost gratitude to SEAMEO BIOTROP (Southeast Asian Ministers of Education Organization for Tropical Biology) who sponsored the course fees and local expenses.



Trichocolea tomentella, with reduced leaves that act like hair, allowing the plant to collect and store water

The next time you do go down for a stroll in any of our gardens, parks or natural reserves, do keep your eyes wide open for these little delicate and beautiful green things in life.

Serena Lee
Herbarium

All photos from Serena Lee

Vibrant Marketplace will offer the widest array under one roof of plants, gardening products, equipment and tools, garden enhancing furnishings, arts and craft, and garden-related lifestyle products.

Garden Fiesta will offer a programme of fun-filled activities, exciting events and entertaining performances to enhance the fiesta ambience of the Singapore Garden Festival.

Wong Wei Har
Singapore Garden Festival

Come December this year Singapore's first international garden and flower show welcomes the world to the premier garden city on the equator. More than four decades of consistent and concerted effort in planning and establishing the city's lush plantings, network of tree-lined streets, well-situated parks and tropical gardens has established Singapore's reputation as a premier garden city. It is a global city ideal for hosting the first International garden and flower show on the equator.

The Singapore Garden Festival will be a biennial event. Unique to the Festival is the showcasing of creations by top international award-winning landscape and garden designers, florists and horticulturists specially invited to the Festival. These professional and garden enthusiasts will work alongside Singapore's own talents to create a show designed to capture the imagination and interest of the man-in-the-street, the serious gardener and visitors of all ages.

Five focus areas are planned for the Festival:

"Best of Show" Designer Gardens will gather international and local award-winning garden and landscape designers to create displays that will please the eye and delight the senses.

Floral Windows to the World will showcase the skill and artistry of floral designers from home and abroad.

Orchid Extravaganza will see an important plant group in the international floriculture trade, orchids, being emphasized through the Singapore Orchid Show. This annual orchid event will take place at the Singapore Garden Festival this year.

The 4th International Ginger Symposium

4th International Symposium on the Family Zingiberaceae
3 - 6 July 2006

The Singapore Botanic Gardens is hosting the 4th International Symposium on the Family Zingiberaceae (Ginger group) from July 3-6, 2006. The forthcoming symposium with its main theme on the advances in the study of Asiatic ginger biodiversity and utilization is open to all who are interested in the gingers and their relatives.

Since the diversity of gingers is centred in Asia, it is appropriate that the series of symposia have all been held in Asia - the first in Hat Yai, Thailand, the second in Guangzhou, China, the third in Kon Khaen, Thailand, and now, the fourth in Singapore.

The Singapore symposium reviews updates and discoveries on the biodiversities, classification, evolution, phylogeny, and distribution of members of this family. The symposium has invited a number of renowned authorities in the family of gingers to be special speakers, including Prof. Kai Larsen from the University of Aarhus, Dr. John Kresas from the US Smithsonian Herbarium, Dr. Axel Poulsen from the Royal Botanical Garden in Edinburgh, Prof. Puangpen Sirirugsa from Prince of Singkla University, and, Dr. Alan Carle who will speak on the construction of the Ginger Garden in Singapore. We welcome oral and poster presentations from participants.

The registration fees include the programme, souvenir bag, teas, lunches, the welcome reception, a Ginger dinner, and the proceeding publication. Do register before 1st April 2006 for an "early bird" discount.

The Zingiberaceae family includes many important species that are of economic use (for food, spices, ornamentals and medicines). We anticipate that this symposium will attract a large audience. Interested attendees should register early. For more information about the symposium and to download the registration form, please visit *http://www.sbg.org.sg/igs/igs2006.asp*.

Benito C. Tan
Chairman
4th International Symposium on the Family Zingiberaceae

Two gingers found in the Ginger Garden *(Photos by Hassan Ibrahim)*

Hubert Kurzweil

(From left to right) Li Huiling, Loo Wei Lun, Kavitha Mahalingam and Karine Teo

Karine Teo joined in July 2005 as Marketing Co-ordinator (Marketing & Commercial Activities). She was with Novena Square Shopping Mall prior to joining the Gardens dealing with advertising and promotions. She enjoys her work here and hopes to contribute positively. She said she's single …. "but not available".

Li Huiling graduated from Ngee Ann Polytechnic in July 2005 with a Diploma in Horticulture & Landscape Management. She joined the Gardens as a Horticulture Officer and is with the Plant Resource Centre since August 2005. She likes challenges that allow her to grow and learn. She quotes Daisaku Ikeda's saying: "Overcoming obstacles and challenges will let oneself to realise his/her true potential and do our own Human Revolution".

Totally new to the field of horticulture, Loo Wei Lun joined the Gardens in August 2005 as an Assistant Horticulture Officer out of interest for this field. He graduated from a polytechnic here majoring in Biotechnology. But he is energetic and keen to learn new things. He enjoys swimming and looks upon Ian Thorpe, the 2000 Olympic Gold swimmer from Australia, as one of his idols.

Kavitha Mahalingam joined the Gardens as a Visitor Service Coordinator in September 2005. She worked previously in another statutory board (Singapore Corporation Of Rehabilitative Enterprises - SCORE), which helps to prepare offenders to transit from incarceration back to society, with the hope that their successful reintegration can prevent them from being repeat offenders. To unwind, Kavitha either goes for a swim or a jog with her husband of 4 months.

A scuba-diving fan, Dr Hubert Kurzweil joined the Gardens in December 2005 as an orchid taxonomist. He was born in Vienna, Austria, where he grew up and received his formal education. For the last 20 years he had been living in Cape Town, South Africa, studying the morphology and taxonomy of the South African orchids. Throughout his early life he followed his strong interest in Asian orchids by undertaking regular botanical trips to India, Nepal, Sri Lanka, Myanmar, Thailand and Malaysia. Hubert also enjoys hiking, running and travelling.

What it Should Have Been…

In the last issue of Gardenwise (Issue **25**(2005):28), it was mentioned that Nura Abdul Karim - who returned to the Gardens after her study leave - studied at Curtin University, Perth, Australia. In actual fact, her *Alma Mater* is University of Western Australia, Perth. Apologies for the unintended error.

Editors

Photos by Hassan Ibrahim

KEY VISITORS TO THE GARDENS (JULY 2005 – DECEMBER 2005)

NParks

Mrs Dobrev Klara, wife of the Prime Minister of Hungary, appreciating a new *Dendrobium* hybrid named after her on the 19th July 2005. On her right is Dr Wong Wei Har and Dr Yam Tim Wing (left) from the Gardens

KEY VISITORS TO THE GARDENS (JULY 2005 – DECEMBER 2005)

NAME	FROM
Mr Ahmed Ebrahim	Chairman (M E Council), Bahrain
Dr Alan Fife	Landcare Research, New Zealand
Datuk Annas	Chairman, Energy Commission, Malaysia
Mrs Anne Rogge	Wife of the President of the International Olympic Committee
Ms Avryl Lattin	Third Secretary, Australian High Commission to Singapore
Mr & Mrs Bornito de Sousa	Chairman of MPLA (Peoples' Movement for the Liberation of Angola), the Republic of Angola
Dr Bruce Maslin	Conservation and Land Management, Australia
Mr Bunyamin Karaca	Acting Deputy Undersecretary, Ministry of Environment and Forestry, Turkey
Mr Charles Curwen	Secretary of Governor of Victoria, Australia
Mr Chen Rong Gen	Deputy Division Chief, Shanghai Municipal Commission of Construction and Communications, People's Republic of China
Dr Cheng Ping Chin	Academia Sinica, Taiwan
Mr Chung Dong-chea	Minister for Culture and Tourism, Republic of Korea
HE Clare Martin	Chief Minister, the Northern Territory, Australia
HE Dr Daniel Woker	Ambassador of Switzerland to Singapore
Mr David Malone	Executive Director, Trade And Major Projects, Chief Minister's Department, Australia
Mr Deden Girmansyah	Bogor Herbarium, Indonesia
Mrs Dobrev Klara	Wife of the Prime Minister of the Republic Of Hungary
Dr Ed de Vogel	National Herbarium of the Netherlands, the Netherlands
Mr Flavio Saraiva de Carvalho Fonseca	Minister-Counsellor in Embassy of the Republic of Angola to Singapore
Mr Fred McCue	Senior Media Adviser to the Chief Minister, Australia
Mrs Genevieve Lamy	Wife of Director-General of World Trade Organisation
Dr George Weiblen	University of Minnesota Herbarium, USA
Mr Gu Yukun Suzhou Industrial Park Administrative	Director, Organisation and Personnel Bureau Committee, People's Republic of China
Mr Hua Shi Jun	Section Chief, Huangpu District Construction Bureau, Guangdong, People's Republic of China
Mr Huang Jiyue	Vice Chairman, Suzhou Industrial Park Administrative Committee, People's Republic of China
Mr Huang Yifeng	Vice Mayor of Shantou, Guangdong, People's Republic of China
Mr Jackie Chan	International Superstar
HE John and Mrs Lynne Landy	Governor of Victoria, Australia
Mr Kim Jung-hoon	Game Industry Division, Republic of Korea
Mr Kim Sang-ug	Head of Game Industry Division, Republic of Korea
Mr Kwon Chang-gun	Director, Korea National Tourism Organisation in Singapore
Mrs Lalao Ravalomanana	First Lady of Madagascar

NAME	FROM
Mr Lee Hae-don	Secretary to Minister for Culture and Tourism, Republic of Korea
Mr Li Guixian	Vice-Chairman, 10th National Committee of the Chinese People's Political Consultative Conference, People's Republic of China
Dr Lim Byung-ho	Urban Planning, Senior Researcher, Daejeon Development Institute, Republic of Korea
Dr Lim Cheong Keat	Malaysia
Mr Liu Yiqong	Deputy Bureau Chief, TieLing, Liao Ling Province, People's Republic of China
Mr M.S Lee	Director Of Town Development Division, Gangwondo Development Corporation, Republic of Korea
Dr Mari Alkatiri	Prime Minister, Timor-Leste
Dr Moon Kyung-Won	Senior Research Fellow, Daejeon Development Institute, Republic of Korea
Datin Norlina Dato' Paduka Haji Abu Bakar	Wife of Pehin Yahya, Minister of Energy, Brunei Darussalam
Mr Quentin Kilian	Assistant Director, International Trade, Chief Minister's Department, Australia
Robert Johns	Botanical Research Institute of Texas, USA
Dr Ruth Kiew	Forest Research Institute, Malaysia
Mr See Hoon Park	President Of Gangwondo Development Corporation, Republic of Korea
Mr Shi Xiao Hua	Director, Development Management Board of Tai Zhou City, People's Republic of China
Mr Tang Cher Hing	University Putra Malaysia, Malaysia
Mr Tang Da Jun	Deputy Chief Executive Officer, Tian Jin Chemical District, People's Republic of China
Dr Tang Mo-Shih	Sun Yat-sen University, People's Republic of China
Ms Tao Siliang	Vice President, China Association of Mayors, People's Republic of China
Datuk Tiong Thai King	Chairman, Sibu Municipal Council, Sarawak, Malaysia
Ms Titien Ng. Praptosuwiryo	Bogor Herbarium, Indonesia
Dr Tony Start	Conservation and Land Management, Australia
Mr Tuan Haji Onn Haji Abdullah	Director, Kuching North City Hall, Malaysia
Datin Norasiah Bte Jaafar	Wife of Malaysian Government Official
Dr Wang Ruijiang	South China Botanic Garden, People's Republic of China
Ms Wendy Clement	University of Minnesota Herbarium, USA
Mr Woo Jong-sik	President, Korea Game Development and Promotion Institute, Republic of Korea
Lord & Lady Woolf	Lord Chief Justice Of England and Wales, UK
Mr Yang Cheul-mo	Assistant Director (Tourism Development), Daejeon Metropolitan City, Republic of Korea
Mr Yang Eui-seok	Officer (Tourism Division), Daejeon Metropolitan City, Republic of Korea
Datin Zainun Dato Paduka Haji Hashim	Wife of Pengiran Dato Ismail, Permanent Secretary, Prime Minister's Office, Brunei Darussalam
Ms Zuraidah Sainan	Director, Landscape Department, Petaling Jaya Municipal Council, Selangor, Malaysia

A New Life for an Old Dame

The scientific journal, *Gardens' Bulletin Singapore*, published biannually by the Gardens, has had a long and glorious history, under one name or another. It matured together with the Gardens having its humble beginning as far back as 1891.

In its infancy, it was called *Agricultural Bulletin of the Malay Peninsula* when H.N. Ridley founded it in 1891. As a toddler, it was superceded by *Agricultural Bulletin of the Straits and Federated Malay States* (1901 to 1911), when Ridley continued to serve as author and editor.

Its early names reflected the importance of the Gardens as an agricultural experimental station. At 75.7 ha, the Gardens was then at its largest and more than half was the Economic Garden. The Bulletin reported a continuous stream of research on a wide range of plants with economic or potential economic value. It was during this period that the many studies on Para Rubber (*Hevea brasiliensis*) and its development were published, setting the stage for an industry that changed the economic fortunes of the region.

The journal grew and as a teenager and young adult came to be known as *Gardens' Bulletin Straits Settlements* from 1912, evolving to the present *Gardens' Bulletin Singapore*, in 1947.

A page from
Agricultural Bulletin of the Straits and Federated Malay States

Over the years, the earlier volumes, though sturdily bound, have suffered the wear and tear of time. To prevent its further deterioration on the Library's shelves, we have initiated a rescue by scanning each page for permanent storage. Thanks to new technology using a 'scanjet vertical scanner', this old dame has been given a new life. The scanned pages are stored in compact discs as reference materials. It is a painstaking task scanning each wrinkled page that has seen the ups and downs of life, but it is a well-worth effort to save a family member of the Gardens.

Hassan Ibrahim
Herbarium and Library

Designed & Produced by P D ADDISON

Contents

Front Cover:
Samples of plants found in the Evolution Garden

Photos by: Chin See Chung

EDITOR
Chin See Chung

ASST. EDITOR & PRODUCTION MANAGER
Hassan Ibrahim

Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569
NATIONAL PARKS BOARD

nparks_sbg_visitor_services@nparks.gov.sg
www.sbg.org.sg
www.nparks.gov.sg

Message from the *Director*

This issue of Gardenwise presents another rich sampling from the activities in the Gardens with something for all interested in plants and horticulture. Around the Gardens, wielders of our horticultural paintbrush, continually add diversity and beauty. The re-development at the Tanglin complex is nearing completion. The hoardings are a stark reminder that we still seek our visitors' patience and indulgence. But they know that better things are around the corner.

From this issue, three new items are added as regular features. They reflect our expanding interests and activities. *Notes from the Economic Garden* will showcase examples from our growing collection of plants that humans use directly. In *Beyond the Gardens*, interesting activities staff participate in beyond our shores, are shared with readers while in *Upcoming Events*, we announce horticultural or botanical events of general interest.

Two upcoming events are being planned and organized. In July this year, we will host the 4th International Symposium on the family Zingiberaceae. The Gardens, with its focus on members of this group of plants underlined by our very popular Ginger Garden, is a choice location for the symposium. We look forward to welcoming the many participants to our new facilities at the southern end of the Gardens and to special tours of the Ginger Garden.

The Gardens is also leading in organizing Singapore's first international garden and flower show with its Deputy Director, Dr Wong Wei Har, appointed as the show director. This inaugural show will be staged in December in an indoor, air-conditioned space over 2.3 hectares. It aims to secure the niche as the top flower and garden show in the tropics and is also planned to be a powerful and inspiring stimulant to Singapore's evolving gardening culture.

Even as the tempo of activities at the Tanglin complex is being stepped up to ensure that all landscape plantings are completed in the coming months, we have embarked on consolidating the 11.7 hectare extension to the Gardens at its northeastern borders. Water and electrical supply lines have been delinked from neighbouring buildings outside the Gardens and delapidated structures are being demolished. Structures designated as conservation buildings are in the process of being repaired and restored for future use. Very soon, visitors to this side of the Gardens will be able to enjoy new and exciting plants, landscapes and amenities, carefully blended with the historical buildings. The theme will be economic plants, reflecting the history of the entire northern half of the Gardens that was an economic garden from 1879 to 1924.

The Evolution Garden, our newest major attraction, opened in February 2005, is highlighted in this issue. The success of this garden continually delights us. It seems to be the most popular attraction for those who value the Botanic Gardens for its solid scientific foundation and strong environmental message. It is a perennial reminder to the administrators that the overwhelming success of the Botanic Gardens as a destination for visitors who treat it as a park, should not detract the Gardens from its scientific and educational roles.

Chin See Chung

The Evolution of a Garden – the Evolution Garden

Introduction

The opening of the Evolution Garden was a significant event even in our fast evolving Botanic Gardens where the spawning of new horticultural attractions continually delight.

The Evolution Garden is a unique educational plant display with the theme that plants support life. It is an outdoor classroom with selected key groups of plants telling the amazing story of how they, with the ability to produce oxygen, made planet earth habitable for other life forms. It demonstrates that the plant kingdom is dynamic and ever changing. It shows how, long before humans arrived, plants evolved into the myriad complex and wonderfully varied forms that we see today. The Evolution Garden takes visitors on a journey through time, from the fiery beginnings of the planet, through the planet of strange ancient plants, the age of dinosaurs, and on to the modern world of over 250,000 different flowering plants that we enjoy today.

Strategic Planning

It began with an idea. Fact finding and research finally resulted in a concept proposal in September 2000. This was discussed, dissected, elaborated and finally laid out on the ground. From the first groundbreaking the garden was lovingly nurtured and it evolved to a form ready for the opening on 14 February 2005.

Strategic planning in the development helped achieve clarity in determining the goals for the new attraction and helped formulate action plans to achieve these goals.

Central to the planning of the garden was the challenge of balancing and interweaving the use of selected artificial models to represent extinct plants and selecting the large number of living specimens of the various plant groups to be presented in an evolutionary sequence. Simultaneously, the software, programming and interpretation had to be planned for and developed. We also had to make provisions for the comfort of visitors, using trees out of their evolutionary sequence, to create shade. All of these had to be carried out within budget.

The garden was also planned so that we could consolidate our considerable collection of over 40 species of cycads in one landscaped location. These plants had been gathered over the decades and planted in various parts of the Botanic Gardens. Thus the section of the garden representing the age of the cycads, had to be sufficiently large.

As an educational facility the garden needed special attention. A strategy is to create as exciting a landscape as possible using both massive real boulders and some artificial ones as well as planting exciting and amazing prehistoric plants including many large old cycads. We wanted plants that will create a sense of wonder, interest and excitement. We successfully grew a thriving patches of *Equisetum* (Horsetail), probably for the first time in Singapore and created more excitement by making several models of the extinct *Lepidodendron* (Giant Clubmoss) as examples from the Carboniferous period.

We also wanted to "lighten" the educational component without compromising its content. The action plan for this strategy called for joint efforts of our horticulturists and education officers to present the Evolution Garden as the stomping grounds of the Botanic Gardens' "resident dinosaur". She is a *Botanicosaurus* and her name is Sara. A new storybook, *Adventure with Plants, Sara at the Evolution Garden*, was specially written. In this production that doubles as a workbook, Sara comes to "life" for our young visitors as they follow her adventures through the garden. Along the way they learn about fossils and that plants produce oxygen, making life possible for animals. They find out about bryophytes, ferns, cycads, and other plants and hold their breath as Sara narrowly escapes from her terrifying enemy, Monty. Older children and adults are not forgotten too. A guidebook, *Evolution Garden - Time Travel Through the Plant Kingdom*, complementing the displays was written as well. It also serves as a stand-alone reference on the exciting journey that our planet has taken.

Having set the physical stage, we next sought to get buy-in from the teachers before the attraction was formally opened. Drilling this strategy down to action plan, the Gardens' education team organized

evolution garden familiarization talks and tours for teachers.

The Setting

At the entrance to the Evolution Garden, huge columns of fossilized tree trunks, the "trees of stone," create a special effect and sets the mood for the Garden. Across a bridge, the time journey begins, some 4,600 million years ago.

The entrance plaza is decorated with fossil tree trunks and ammonites embedded in the concrete floor

The Earth at its beginning was stark, with an unbreathable atmosphere of poisonous gases devoid of oxygen, and intolerably hot with harmful ultraviolet radiation from the sun.

To create a realistic picture of the uninhabitable Earth at this time, we created a landscape where artificial rocks and a mud pool are used to represent the young Earth pulsing with volcanoes spewing lava and where the land was strewn with streaming pools of bubbling, scalding mud. For visitors in a tropical garden, the heat and humidity can be extremely uncomfortable if ample shade is not provided. However we deliberately created a barren rocky waste at the start of the journey for effect and to provide a contrast and to set the stage for when plants would make the planet hospitable.

Following on the heel of the blackened volcanic landscape is a shallow pool backed by wave-cut rocks with replicas of Stromatolites, mounds of calcium carbonate slowly produced by colonies of blue-green bacteria inhabiting shallow seafloors some 3,600 million years ago. One of the many signboards explained that these unique bacteria were able to photosynthesize, giving off oxygen that gradually transformed the atmosphere making the land more hospitable. After this, the various groups of plants are displayed in an evolutionary sequence along a path sculptured by boulders and terrain change.

Across the bridge, the time journey begins at a hot, hostile and lifeless period

Land Plants

At the beginning of our display of early land plants are the spore producing, non-vascular bryophytes. A delightful example is the liverwort *Marchantia*, with its bifurcating fleshy thalli forming lovely green mats on boulders. Nearby are models of the extinct *Cooksonia* that lived more than 400 million years ago. Next to this is the fine twig-like *Psilotum nudum* or Whisk Fern, a living fossil with an ancestry that dates back to the era of *Cooksonia* and to which it bears a resemblance.

Beyond this, more elaborate life-forms are demonstrated including thriving patches of *Equisetum*

Equisetum hyemale do very well here in damp spots

Life on land began with simple plants. *Marchantia* form green mats on rocks

A model of *Lepidodendron* from the great coal swamps of the Carboniferous era with tree ferns in the background

Wrinkled trunk of the unidentified *Cycas*

(Horsetail), another living fossil dating back to the Carboniferous period 360 to 290 million years ago. Next to this are the models of the extinct Giant Clubmoss, *Lepidodendron*, also from the Carboniferous. A storyboard explains that dead plants from the great swamps of the Carboniferous under heat and pressure were converted to coal, a major energy source today.

From here on, masses of spore-producing ferns dominate including the Elephant Fern, *Angiopteris*, the Tree Fern, *Cyathea* and the "Pimple Fern", *Phymatosorus*, which forms an effective ground cover.

The fern, *Phymatosorus* forms an effective ground cover

Around a curve beyond a netted shelter, the Mesozoic period, 245 to 65 million years ago is displayed. This is the age of the dinosaurs, the palm-like cycads and ancient conifers. Highlights of this display, conveniently located along the pathway, are small groves of large *Cycas rumphii*, tastefully arranged amidst massive granite boulders.

A view of the cycad zone. *Zamia furfuracea*, extreme left, partially cut-off; *Encephalartos hildebrandtii* top left with lighter coloured young leaves; *Cycas revoluta*, bottom left with leaning trunk with young *Dioon spinulosum* to its right by the path; *Macrozamia moorei*, middle, with long leaves curving down. The plant to the right is our largest and yet to be identified *Cycas*

A handsome *Dioon spinulosum*

Adding elegance are eight lovely specimens of *Macrozamia moorei* with their fine drooping leaves. Other notable specimens are the architectural *Cycas revoluta, C. siamensis, Zamia furfuracea* and *Dioon spinulosum*. Exceptional specimens of *Encephalartos hilderbrandtii* grow remarkably lush here. Perhaps the most outstanding specimen is the 'mother' of our collection, a huge, ancient looking plant, wrinkled with age. This unidentified *Cycas* was donated to the Gardens five years ago, and according to the owner originally came from Vietnam 30 or 40 years ago.

Young unfolded leave of *Cycas siamensis*

Beyond the cycads and the gymnosperms, the flowering of the world begins. The display here starts with the more primitive families including Nymphaeaceae (Waterlilies), Magnoliaceae (*Magnolia, Michelia*) and Annonaceae (*Anaxagorea, Desmos, Uvaria*). The scent of some of these wonderful flowering plants is evident here. The crowning glory of the world of flowering plants is probably best exemplified by the tremendous diversity of the tropical rain forest.

Male cones of *Cycas siamensis* are usually solitary, here a plant with twin cones

Having fun amidst the cycads

A typical bi-lingual storyboard. The flowering of the world begins with the more primitive families like Nymphaeaceae, Magnoliaceae and Annonaceae – all of which are represented in the Evolution Garden

Desmos chinensis from the family Annonaceae

Here in this garden, the visitor will encounter an extremely rich grouping of tropical shrubs and trees at the end of the journey through time. Less than two years after planting, the diversity of the flowering world is evident. Leaves of all shapes, sizes and textures line the walkway and blooms of many colours attract the eye. Plants have indeed transformed a stark and barren planet into a soft, lush welcoming world. In this garden over 400 species tell their story.

Programmes

The Evolution Garden is an educational first for Singapore and special programmes were designed to take advantage of this living outdoor classroom to better connect plants and people. Kindergarten and the lower primary students follow Sara's adventures in the Evolution Garden, others take the *Evolution Garden Tour*, or participate in either, *Plant Classification* or *Evolution and Adaptation of Plants*. In addition, the Garden was brought to schools where talks were given. In all, through programmes and talks, over 13,000 students and teachers were reached out to, in 2005.

Conclusion

The Evolution Garden will continue to evolve. As the shade trees mature and the microclimate moderates, a greater diversity of liverworts, mosses and ferns can be grown. The core cycad collection will be added to. As the flowering plants mature, the environment would become more conducive for the planting of understorey plants. However competition for survival would mean that some of the planted species would die out while others thrive.

Ultimately, its success will depend on how much it is used and how much our visitors enjoy this very special journey through time. So far the feedback has been extremely encouraging. Some visitors find this garden with its solid scientific foundation and strong environmental message, the most interesting of all the displays in the Botanic Gardens.

A flower of the annonaceous scrambler, *Uvaria grandiflora*

Wong Wei Har
Deputy Director
Chin See Chung

This article evolved from an earlier article by Wong Wei Har that appeared in the Botanic Gardens Conservation International (BGCI) publication, Roots ***2****(2005):9. All photos taken by Chin See Chung.*

A Bryophyte Garden on a Rubber Slipper

Bryophytes, which include mosses and liverworts, are nearly cosmopolitan in distribution except in marine habitats. In the tropics, they grow on many kinds of substrates, ranging from rocks, soil, logs, tree trunks, branches and leaves. Recent reports have shown that they, in the absence of root structures, can grow also on the hard outer wings of beetle and the epidermal scales of lizard. One simply cannot underestimate the capability of these plants for growing in various kinds of hospitable and seemingly in hospitable environments.

Mother Nature recently showed us her amazing versatility when we found bryophytes growing on one of the most unusual substrates – an abandoned rubber slipper submerged in a fast flowing stream inside the rain forest.

In September 2005, a workshop on the ecology and conservation of bryophytes and lichens in Malesia was organized by the SEAMEO-BIOTROP office in Bogor, Indonesia. The many participants were brought to the Mount Halimum National Park in Java, Indonesia, looking at the diversity and collecting specimens from these two groups of non-flowering plants. While foraging through the dense rain forest, the group, by chance, picked up a rubber slipper submerged in water that was 2/3 covered with different species of bryophytes, forming a nice garden of watery green mosses and liverworts.

We carefully mapped the extent of coverage of each of the plant species on the slipper and identified a total of 14 species of bryophytes in ten genera, which included eight species from five genera of mosses, and six species from five genera of liverworts.

In terms of area coverage, two creeping mosses, *Callicostella papillata* and *Vesicularia reticulata*, together formed more than 50% of the entire bryophyte population that grew on the slipper. This is followed by the thalloid liverwort, *Riccardia* spp., and then by an erect moss, *Fissidens hollianus*. The remaining species of bryophytes contribute only a small percentage of the bryophyte population found attached to the soaked surface of slipper. All the species identified are commonly found in other substrates nearby inside the forest.

Considering the fact that most bryophytes grow by the centimetre per year under optimal conditions, we estimated the slipper must have been submerged in the flowing stream for more than five years to develop such a wonderful mini-garden consisting of a great variety of bryophytes on its hard, rubbery surface.

Benito C. Tan
Department of Biological Sciences
National University of Singapore
Singapore 119260

Lia Damayanti
Cibodas Botanic Garden
Cianjur 43253
Jawa Barat
Indonesia

Photos from Benito Tan

Front End | Middle View | Floor End

The slipper

The stream where the slipper was found

A Plant Journey from Kuala Pilah to Tampin

A recent drive between the Malaysian towns of Kuala Pilah and Tampin through roads that are still marked by the old bulky concrete milestone indicators threw up a few interesting discoveries.

The membranous seeds of the Midnight Horror. This is used in local medicine

Midnight Horror

A fine specimen of the famed Midnight Horror, *Oroxylum indicum*, Bignoniaceae, was spotted very soon after leaving the town of Kuala Pilah. It was an unusually bushy specimen with a large crown and a healthy crop of hanging, broad, purplish-red pods about a metre long. A ripened pod will open revealing lots of tissue-thin seeds with transparent membranous wings, of about 7 by 3 cm.

A large specimen of the Midnight Horror with the prominent pendulous pods. The young pods and the flowers are used as vegetables

Professor Corner in his classic book *Wayside Trees of Malaya*, described the tree as "grotesque" and "monstrous," like an uneven gigantic umbrella or often quite leafless and usually with dangling sabre-like pods. And the night-blooming flowers when present are large, fleshy, greenish-white with purple and with an offensive smell. He also called it a "Broken Bones Plant" on account of the ribs of the very large compound leaves that fall off in segments like "limb-bones." I like Paul Theroux's description in the short story *Dengue Fever* in his book *The Consul's File*, which introduces this 'curious' tree to the reading world. "… a tall simple pole like an enormous coat-rack, with big leaves that looked like branches – but there were very few of them. It was covered with knobs, stark black things; and around the base of the trunk there were always fragments of leaves that looked like shattered bones, but not human bones."

Professor Corner added this description about the flowers, "The corolla begins to open about 10 pm, when the tumid, wrinkled lips part and the harsh odour escapes from them. By midnight, the lurid mouth gapes widely and is filled with stink…". The plant probably earned its colourful label, Midnight Horror, because of its nocturnal habit, offensive smell coupled with its unusual appearance, … and the pile of "bones," exaggerated in the dead of the night.

Pitaya

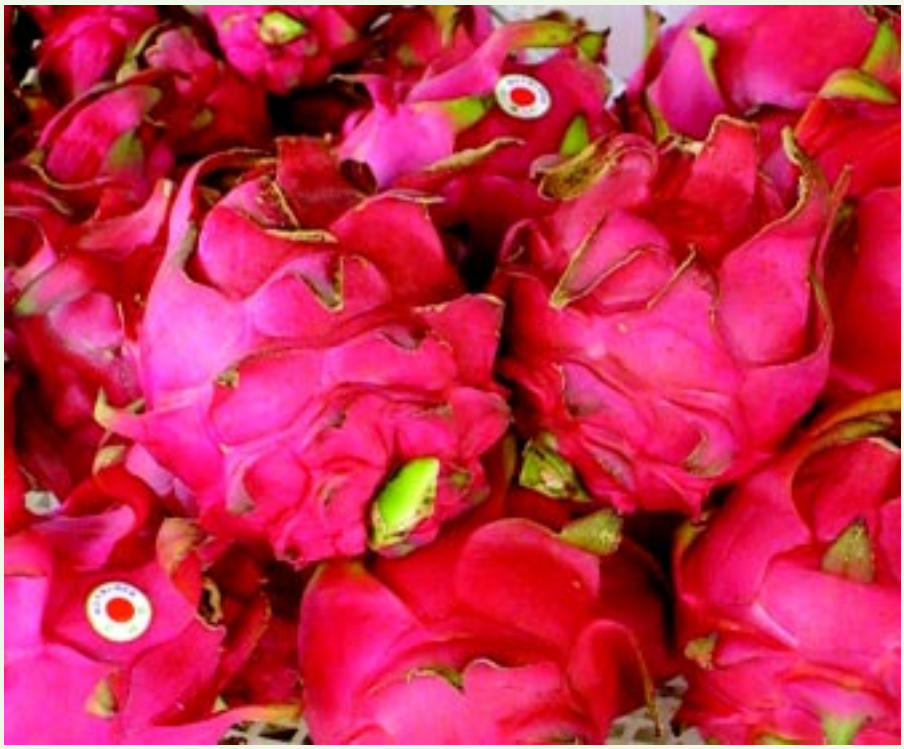
As the drive continued, the scenery showed small farms of Pitaya or as

A farm of Pitaya near Kuala Pilah

The robust three-angled stems growing over a concrete support clinging on by aerial roots. The fruits are bagged

A pile of cuttings. Older segments are used to propagate the plant while the rest is mulched

A drink, Pitaberry, made from this bland, though refreshing fruit juice



The startlingly pink fruits...

marketed in Singapore, "Dragon Fruit," (*Hylocereus undatus*, Cactaceae). These are actually fruits of a cactus that originate from tropical America. A climber by habit with three-angled stems, the plant, rooted in the ground, climbs up a concrete pillar with aerial roots, ending in a frame that encourages and supports branching. The plant produces large, showy flowers that bloom at night. The fragrant flowers are cross pollinated and will produce fuchsia-pink skinned fruits covered with large leaf-like scales. When cut, the fruit will reveal white translucent pulp that is filled with numerous minute black seeds. The plant can be propagated easily from stem cuttings. Stopping at a pitaya farm along the road, one can buy a chilled can of dragon fruit juice; stem cuttings for one's own garden and of course, loads of pink fruits.

Lemang

Roadside stalls doing a brisk business selling *lemang* to travellers are a common sight. Hardworking local sellers do their cooking on the spot. *Lemang* is a traditional dish of glutinous rice cooked with coconut milk in a bamboo container over open fire. A check with one *lemang* seller revealed a recipe that calls for 10 kg of rice to be soaked in milk from five coconuts with some salt added. This would fill about 40 bamboo tubes of 40-cm length each of 5 to 6 cm in diameter.

Lemang still with its banana leaf wrapper and resting on the split bamboo, cut into bite sizes

A lady cooking *lemang* in bamboo tubes over an open fire

The bamboo traditionally used to cook this dish is commonly called *buluh lemang* (*buluh* meaning bamboo in Malay) after the product. The species is either *Schizostachyum brachycladum* or *S. zollingeri* (Family Gramineae). Their thin walls allow fast cooking of the glutinous rice so it is not surprising that both species are also commonly known as *buluh nipis* or thin bamboo with the latter also known as *buluh telor* or "egg bamboo." What is used as the cooking container is the fresh internodes sawn off at one end. The inside of the bamboo container is lined with banana leaf before being filled with the mixture of glutinous rice and coconut milk. The filled bamboo containers are arranged against a fire. A slow cooking time of nearly three hours may be required, with frequent turning. One lady seller remarked that she prefers to use the *buluh telor* (*S. zollingeri*) as it apparently has thinner walls and so allows faster cooking.

When done, the bamboo tube is easily split to reveal its contents wrapped in banana leaves. The glutinous rice is soft, oily and tasty

There were many other exciting plant encounters during this journey. Most show the close connections between people and plants and deserve to be followed up another time.

Wong Wei Har
Deputy Director

Photos by Wong Wei Har

Lightning Protection for Trees. Do they Protect?

Lightning strikes have killed over 100 trees in the Gardens from 1990 to 2004 at a rate of between two to ten trees a year. Trees that are killed ranged from small (for example Cocoa Tree, *Theobroma cacao*, about 5 m tall, to the very tall and large like the Common Pulai, *Alstonia angustiloba*, at about 45 m). Since 1993, the Gardens has installed Lightning Protection System (LPS) on over 100 large, mature trees to protect them from the damaging effects of lightning strikes. Most were installed over the last three years. The system protects trees by safely providing an alternate path to the ground for the electrical charges when lightning strikes a protected tree.

Malayan Spindle Tree (*Bhesa paniculata*) installed with the strike counter (circled red)

One of the questions frequently asked by our visitors is how do we know that the LPS works and are protecting the trees. How can we find out that the trees installed with LPS and later struck by lightning were actually saved by the system? So far, the evidence is

Close-up of the strike counter

circumstantial, as no trees with LPS have been damaged by lightning. However, we do not know if they have been struck by lightning and protected by the system.

The question may soon have an answer. We have recently installed lightning strike counters on 30 trees with LPS with another 20 to be installed in the next phase. The weatherproof strike counters are attached to the main conductor of the LPS between the air terminal and the grounding system using special connections. When a tree with an LPS is struck by lightning, the resulting electrical current will flow from the air terminal down to the grounding system. The counter will detect the current and record the strike. The number of times the tree is struck will also be recorded.

Both trees and strike counters will be checked monthly and the results collated and tabulated over time. The counters will provide evidence whether the LPS are protecting the trees or not. The information collected and correlated with tree location, species and heights will add to our meagre knowledge of the impact of lightning on trees. This will perhaps help us in our long-term management of trees in the Gardens.

Saiful Anuar
Living Collections

Photos by Saiful Anuar

SBG Fellowship: *Facilitating Taxonomic Research*

In 2004, the Gardens introduced the SBG Botanical Fellowship to encourage and support research at the Singapore Herbarium by botanists on short stints. Grants are given to four or five botanists annually to cover their living expenses during their stay here. Their taxonomic research, focusing on the regional flora, should result in publications in international scientific journals.

The Fellowship has facilitated botanists to come and physically work on our herbarium materials. To date, the Gardens has granted the award to nine recipients – and most come from the Southeast Asian region.

The Recipients

Dr Phang Siew Moi, a seaweed specialist, was the first recipient for the Fellowship. The Singapore Herbarium has a valuable collection of more than 2,000 specimens of seaweed collected by H.M. Burkill in the 1960's. Dr Phang has organised and verified Burkill's extensive collection from Peninsular Malaysia and Singapore. She is preparing a checklist based partly from this collection to be used as part of the studies on the systematics and distribution of marine algae in Malaysia.

Three recipients were from Herbarium Bogoriense, Bogor, Indonesia – namely Dr Elizabeth A. Widjaja, Mr Deden Girmansyah and Ms Titien Ng. Praptosuwiryo.

In her project, Dr Widjaja curated the Singapore Herbarium's collection of *Enicosanthum*, *Polyalthia* (both from Family Annonaceae) and *Frecynetia* (Family Pandanaceae) by sorting, re-organising and providing correct identifications. A revision in the first

Dr Elizabeth A. Widjaja

two genera is needed as part of her project on the family Annonaceae for Flora Malesiana (a massive project documenting the flora of Southeast Asia). During her stay, Dr Widjaja, who is also a bamboo specialist, took time and assisted in identifying the living collection of bamboos in the Gardens.

While Mr Deden Girmansyah was here to carry out morphological studies on Javan Begonias, Ms Titien researched ferns of the genus *Diplazium* from the Malay Peninsula. Both budding taxonomists updated and curated our herbarium materials on these groups of plants. They found the Gardens' library well-stocked with useful literature in their field of work.

Another recipient who worked on the family Annonaceae was Dr Wang Ruijiang. Coming from the South China Botanical Garden, he was here to study the genus *Cyathocalyx* and make comparisons with *Drepananthus* – a very closely related genus. The study based on the variations in the morphological characters of these two genera allows for a higher level of accuracy in species identification. Dr Wang is also revising these genera for Flora Malesiana.

Dr Kongkanda Chayamarit, curator of The Forest Herbarium, Bangkok, Thailand, focused on the family Lauraceae. She concentrated on the distribution of the genus *Cinnamomum* in Thailand and curated our collection of Thai species. The extant literature in our library

Dr Kongkanda Chayamarit

benefited her greatly in this project. Her data forms part of the Flora of Thailand project.

A mycologist from the University of Belgium, Dr Vincent Demoulin was also one of the early recipients of this Fellowship Award. He updated the fungal collection in the Herbarium, and devoted some attention to E.J.H Corner's collection. Corner, a former Assistant Director of the Gardens, pioneered the study of the Southeast

Asian polypore group of fungi. He described many new species based on his collections from areas like the Gardens Rain Forest and Bukit Timah Nature Reserves.

Dr Demoulin also collected fresh specimens from these 'familiar' grounds, where Corner collected decades ago. New specimens will allow a definite clarification to species already identified. Besides, these new materials give good indication on the changing status of the diversity of the tropical fungi over the last hundred years or so.

Serena Lee

Dr Vincent Demoulin

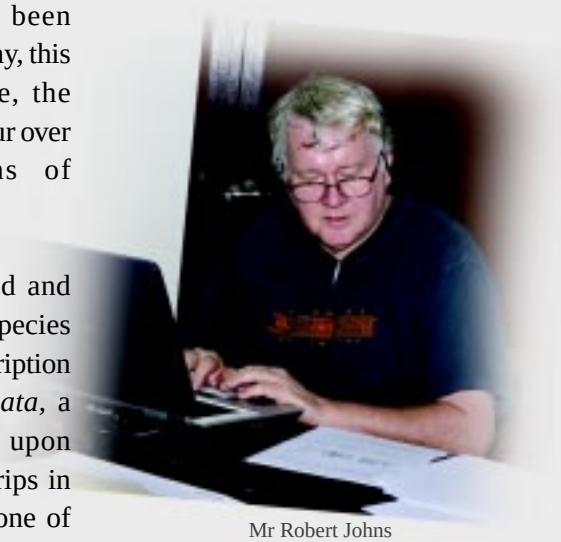
Through the Fellowship, Ms Jana Škorničková – another recipient– has published three scientific papers on *Curcuma*, one of the genera of the true gingers, Zingiberaceae. She clarified the obscure identities of some *Curcuma* species that have been described earlier. During her stay, this young botanist from Prague, the Czech Republic, also curated our over 400 herbarium specimens of *Curcuma*.

Prior to this, she has outlined and published a number of new species of *Curcuma*. Her very first description was of *Curcuma rubrobracteata*, a species which she stumbled upon during one of her collection trips in India. She said that this was one of her best moments as it has fulfilled her childhood dream of discovering new plants and becoming a botanist since the age of eight.

Ms Jana Škorničková

Curcuma rubrobracteata, as described by Jana. Photo was shot at Royal Botanic Gardens Edinburgh by Jana Škorničková

Robert Johns, or Bob as he would like to be called, worked on the New Guinean collections of C.E. Carr at the Singapore Herbarium. Carr died in 1936 from blackwater fever during his expedition to that unexplored land and subsequently a good part of his collections were deposited here. Bob, a native of New Zealand and recently retired from Kew Gardens in London, has been working intensively on the flora of New Guinea, a territory where he had lived and worked for more than two decades. He is preparing a complete listing of all of Carr's collections from New Guinea, which amount to over 7,000 specimens.



Mr Robert Johns

Conclusion

The SBG Botanical Fellowship helps raise the profile of the Singapore Herbarium and the Gardens in the international arena. It provides not only a learning platform for the visiting scientists and staff in the Gardens, but also cross-cultural exchanges at a social level. The Fellowship is not only an effective contribution by the Gardens to research and also builds closer relationships and collaboration between herbaria in the region and beyond.

Hassan Ibrahim
Herbarium

All photos by Hassan Ibrahim unless otherwise stated

The SBG Botanical Fellowship welcomes taxonomic researchers to apply for this programme. Up to five will be awarded annually with a grant of up to S$3,000 (for a stay of two to three weeks) or up to S$5,000 (for a four to five-week stay). Researchers from Southeast Asian countries are particularly encouraged to apply.

For further information on the Fellowship, please contact:

Director
Singapore Botanic Gardens
1 Cluny Road
Singapore 259569

chin_see_chung@nparks.gov.sg

A Gift of "Joy"


Chin See Chung

In July 2005, "Joy" arrived in the Gardens. It is a sculpture in bronze about 2.1 m tall. A stylized nude of a mother holding her child high in the air, "Joy" celebrates love, life and laughter.

The sculpture has been donated by a member of the public who wishes to remain anonymous. "Joy" is displayed on Lawn H, overlooking Swan Lake.

The donor has kindly written a few words about this gift.

Editors

When I was a child, my mother, who is an avid gardener and nature-lover, would take my siblings and I to the Botanic Gardens for a walk every Sunday. I remember ambling along the pavements and being completely enchanted by the colourful flowers, towering trees and a myriad of fluttering butterflies. Those visits were a real treat. The Gardens was, for me, a place of delightful mystery, where plants and insects lived in harmony, where there seemed to be at least 6 shades of the colour green, and life-in-progress was evident everywhere one cared to look.

My early memories of the Gardens did not fade over time. If anything, my appreciation of its constancy and accessibility grew as I did. I found myself strolling through it whenever I felt the need for solitude, serenity and tranquility amidst vibrant, lush and landscaped vegetation. It was a veritable sanctuary from the hustle and bustle of life beyond its gates. It is still that. And a great deal more.

Over the years, the Gardens has, through major and progressive re-development, transformed itself into a national park which has venues for orchestral concerts, fine dining and wedding receptions; without compromising its commitment to its goals of education, research and conservation of tropical botany and horticulture.

The Gardens is a source of pleasure to all its visitors; regardless of their age, race, or nationality. Everyone I have brought there remarks on how the Gardens is thoughtfully designed to display a wide array of multi-hued flora in an environment that is ordered, yet nonetheless evokes an authentic experience of a jaunt in the Tropics. They laud the positioning of steps, paths, water-features, gazebos and sculptures which are either functional or artistic; follow the contours of the land or add texture and dimension to the vista and landscape. And, of course, they never fail to mention how the Gardens is so well maintained and clean. They are also, invariably, astonished at the fact that a Botanic Gardens of this scale and standard does not charge an entrance fee.

I decided last year to gift the Gardens with a sculpture in honour of my beloved god-mother; as a gesture of our love for the Gardens and all its inhabitants, and an expression of gratitude to all who have fashioned and contributed to its splendour. It took me a while to find a suitable sculpture as I believe that it is important that any gift to the Gardens should be consistent with its vision and aesthetic. And, I wanted the Gardens to be happy with my choice.

The sculpture "Joy" is presented to the Gardens in celebration of love, life and laughter. Joy is what my god-mother and I feel whenever we are in the Gardens, and it is our hope that "Joy" will touch everyone who views it.

The Donor
6 August 2005

The Gardens' Calendars – A Partnership with ExxonMobil

The Gardens' 2006 calendar launched on 3 September 2005 marked the fourth year of our collaboration with ExxonMobil Asia Pacific Pte Ltd. The project affirms the strong and close partnership between two like-minded organizations that believe a difference can be made by reaching out and connecting with the community. Proceeds from the sale of the calendars goes towards supporting the Gardens' public exhibition programme, an important outreach vehicle helping us to connect people with plants and nature.

Deviating from the norm of featuring plants or garden scenes, the 2006 calendar pays tribute to some of the animal inhabitants in the Gardens. As the plant diversity of the Gardens and new habitats continue to increase, so does the diversity of animal. The calendar presents selected photos submitted for a photographic competition on 'Nature in the Gardens' organized in collaboration with the Nature Photographic Society of Singapore (see *Gardenwise* **24**(2005):14-15).

All calendars from our partnership with ExxonMobil are featured here as beautiful illustrations of a successful collaboration benefiting both the partners and the public.

Camelia Mahendran
Marketing and Commercial Activities

Photos from NParks & SBG Archives

The launch by Guest-of Honour, Mr Lim Swee Say, former Second Minister for National Development, now Deputy Secretary-General, NTUC.
(From left) Mr Kwa Chong Seng (Chairman & MD, ExxonMobil), Mrs Kwa, Mr Lim Swee Say, Prof Leo Tan (Chairman, National Parks Board), Dr Chin See Chung (Director, Singapore Botanic Gardens)

The 2006 Calendar showcases the Gardens rich and diverse animal life; from the familiar white swans to the more elusive Olive-backed Sunbird

The 2005 Calendar focused not on orchid hybrids which the Gardens has a long tradition of breeding, but on the natural orchid species

The 2003 Calendar featured familiar and well-loved scenes from the Gardens. Each year a wall and a desk version would be produced

The 2004 Calendar featured botanical illustrations from the archives of the Gardens. These illustrations were painted between 1890 and 1908 by the brothers, James and Charles de Alwis who were botanical artists employed by the Gardens. These paintings were created as scientific documentation of the plants depicted

A Forest Trek Through Time

A trek through the Gardens Rain Forest has been given a fresh twist by way of a poster exhibition and a new brochure for a self-guided tour. Visitors to this 6.2 ha relic of Singapore's ancient vegetation will be able to appreciate the forest existence in a different light.

Posters about the Rain Forest were displayed for visitors to the Gardens in September 2005. The exhibition aimed at encouraging appreciation and awareness of the forest's rich biodiversity and understanding of the importance of its conservation for future generations.

The Gardens Rain Forest has stood the test of time. With more than 314 species representing 15% of the total flora in Singapore, it is by itself not only a treasure trove of botanical interests but a national heritage. To prevent deterioration, necessary restoration and conservation efforts are underway.

The exhibition highlighted not only the forest's flora but also its fauna. The new brochure of the Gardens Rain Forest allows for a self-guided tour. Besides giving brief information about the Forest, the brochure also showcases ten plants along the forest trail for visitors to ponder upon.

So, go on a tour of the Gardens Rain Forest. Take a brochure along and observe the tallest trees (*Shorea gratissima*, *Ficus kerkhovenii* – both at about 45 m tall). Hunt for the elusive White-Banded Flatworm of just about 5 cm long or spot the Greater Racket-Tailed Drongo flying in mid-air.

Two of twelve posters of the Gardens Rain Forest *(Photos from Education Outreach)*

Hassan Ibrahim
Herbarium

(The exhibition was supported through Investing in Nature, a partnership between BGCI, Earthwatch, HSBC and WMF. Our deepest appreciation goes to the organizations for their support.)

Janice Yau

A visitor viewing the posters during the exhibition

Seri Hayuni Hadi

A guided tour of the Rain Forest

Shutterbugs at Play

A good picture has depth and gives insight. An excellent picture will draw the viewer into it….so says Mr Yap Kok Sun, a professional photographer from Peninsular Malaysia. A few tips: Take the picture from a different perspective, make use of diagonal elements to connote a feeling of movement. Avoid random composition, which lacks order and has no specific focal point.

Fong Wei Kark

More ideas were given during a 3-day photographic workshop opened to NParks staff from 25-27 October 2005. An overwhelming response meant that only 30 participants were allowed to play shutterbugs. The workshop - organized by the Singapore Herbarium and Education Outreach – was kindly sponsored by BGCI (Botanic Gardens Conservation International).

Mr Yap conducted the workshop with much charm and patience. The course started off with him providing tips and rules for basic outdoor photography. He recommended suitable cameras and the accessories to use. He also suggested ideas as to what constitute a good photo-composition using visual elements like lines, colours, scale, shapes or direction. These visual elements, according to him, are some of the building blocks of a picture.

Practical sessions ensued. Participants enthusiastically clicked their cameras away at scenes around the Gardens. Then it's judgment time where the professional and us amateur photographers gave critical comments on the photos back in class. The aim was to share knowledge and experience so that participants can better shoot photos for say a pocket guidebook or other publications of NParks.

Hassan Ibrahim

Hassan Ibrahim
Herbarium

(The workshop was also supported through Investing in Nature, a partnership between BGCI, Earthwatch, HSBC and WWF. We gratefully acknowledge their invaluable support.)

Tay Soon Lian

Jeremy Ang

Group Photo with the pro (standing in green polo t-shirt) and the amateurs

Voon Tin Keat

Sweet and Sour, the Lovely *Gelugor*

Three young trees (one hidden) at the Economic Garden showing their characteristic form

Gelugor or *Asam Gelugor* (*Garcinia atroviridis*), is a distinctive conical to columnar tree with a characteristic architecture. Many closely-spaced branches, drooping at their ends, emerge almost horizontally from the main trunk. Old trees have a more rounded crown. The fleshy and shiny green leaves are fairly large, from 13 to 30 cm long. Periodically, flushes of red young leaves are produced making this tree rather attractive. These gradually fade becoming pale and then dark green. This medium-sized tree can reach 25 m tall.

The male flowers - borne in terminal clusters - are small and nondescript. However, these are uncommon as most trees are female. If found, they are borne on the same tree with the female flowers which are larger, 3 to 4 cm across, with four small greenish sepals and four larger bright red petals. The sepals and petals are persistent and found on young fruits, the latter turning green as the fruit develops. When the fruits mature, the petals are shed. The large and prominent disc-like stigma is 1 to 1.5 cm across.

Fruits dangle from the end of small branches and are strongly fluted with 10 to 15 rounded segments. They are a rich, shiny green when young but ripen to a distinctive and attractive bright yellow. They reach 10 to 12 cm across. The bulk of the fruit is made up of a very thick rind that is yellow throughout when ripe. Inside, the core is orange with each segment represented by a seed cavity and surrounded by a tangy, sweet-sour pulp.

Asam Gelugor (*asam* meaning sour or a sour relish and *gelugor*, the

Immature fruits dangle from the end of small branches

Fruits shown in section, the larger one is not fully ripe. Segmentation is obvious, seeds are absent. *(Note: The ruler is 20 cm long)*

Dried fruit slices, a commercial product locally found in virtually all grocery stores. Seeds are evident. *(Note: The ruler is 20 cm long)*

name of the tree) is found wild from the Malay Peninsula to Thailand and Myanmar. Matured fruits are harvested before they are fully ripe and sliced longitudinally. If sliced transversely, the pieces tend to break up along the lines of the segments. The slices when are widely used as a souring agent in spicy dishes. It is an important village tree providing a small industry based on its culinary use. Another souring agent in food is the tamarind or *Asam Jawa* (*Tamarindus indica*), whose fruit pulp is widely used to flavour many Asian dishes. *Gelugor* slices have a sharper flavour than tamarind and are often slightly resinous, although if ripe fruits are used, the product has a softer and smoother flavour. Besides the fruits, the delicate young leaves – though sour and slightly resinous - may also be used in food.

Extracts from fruits of *Gelugor* as well as from *Garcinia gummi-gutta* (see *Gardenwise* **24**(2005):24) and *Garcinia indica*, contain antioxidants as well as hydroxycitric acid. The latter is an ingredient in health products reputed to assist in weight loss and possibly lowering cholesterol.

This lovely tree, with its well-behaved columnar form and attractive flushes of red young leaves, makes it a good candidate for parks and large gardens. However, one will have to bear with fallen fruits. In Singapore's rather uniform climate, it is unlikely that fruiting would be profuse. The growth rate is moderate. The three young trees at the Economic Garden (in Bukit Timah Core) featured here were planted eight years ago from small saplings. They are now nearing six metres tall and fruited - though seedless - for the first time this year.

Chin See Chung
Director

Photos by Chin See Chung

Fruit slices dried in the sun in a village in Perak, Malaysia

Hosea lobbii Moon Ladder

Very often, some plants burst with great aplomb into the gardening scene only to fade away into oblivion thereafter. In this issue, I would like to highlight a plant with an intriguing story behind it but does not share the same fate. According to our records, *Hosea lobbii* appeared time and again over the last 100 years in different parts of the Gardens.

This is a monotypic climber, found in the swampy areas and is endemic to Sarawak and Brunei. This attractive climber has bright orangey-red bracts and salmon-orange flowers. It has an interesting vernacular name, *Tangga Bulan*, meaning Moon Ladder in Malay.

Thomas Lobb, a plant collector, employed by Veitch & Sons (an English horticultural firm) stumbled across this beautiful climber. He mislabeled the locality as a collection from Penang when it actually came from Kuching, Sarawak. C. B. Clarke, a botanist described this plant as *Clerodendron lobbiana* in 1855 from the specimen Lobb collected. However, it did not belong to that genus. H. N. Ridley revised it to *Hosea* in 1908.

In the early 1900s, Bishop Hose donated a plant to Singapore Botanic Gardens. He had it in cultivation for many years in his garden in Kuching, Sarawak. This genus, *Hosea*, was in fact, named in his honour by Ridley. A century later, this climber re-emerged into the horticultural circle as a rare and a plant collector's prized item.

Hosea lobbii can be viewed alongside other climbers on the fence near the entrance of the Evolution Garden.

Andrea Kee
Plant Resource Centre

Photos by Andrea Kee

Footnote:

- Thomas Lobb was an English plant collector employed by Veitch & Sons from 1843 to 1860 to collect plants of horticultural value in this region. He was commemorated in the genus Lobbia and a few Malaysian plant species of which Hosea lobbii is one of them.

- Bishop George Frederick Hose was one of the founders and the first President of the Straits Branch of the Royal Asiatic Society in 1877. He was a priest based in Malacca, Singapore and Sarawak from 1868 to 1908.

Hosea lobbii

Close up of the flower

EDUCATION OUTREACH

Art in Evolution

In February 2005, the Gardens embarked on a collaborative project, "Art in Evolution" with Siglap Secondary School, which is also the Centre of Excellence (Art) in the East Zone of Singapore. This project made use of the Evolution Garden to demonstrate how art and botany can come together to inform, entertain and inspire.

Students of Siglap Secondary School visited the Gardens in early February to learn about the Evolution Garden. Back at school, they produced art pieces based on their individual unique perspective of the Evolution Garden. The result was a collection of artwork that ranged from detailed depictions of the plants to very abstract pieces.

As part of this project, we gave a total of 11 assembly talks on the Evolution Garden, reaching out to eight schools in the East Zone of Singapore - five primary and three secondary schools. These assembly talks, held between May to September 2005, were each complemented by an exhibition of the collection of paintings on the Evolution Garden. This "travelling" art exhibition was displayed at the schools for a week each time. The assembly talks on the Evolution Garden were a huge success and saw a participation of more than 10,500 students.

Through this project, we got the opportunity to interact with students at their schools and share the Evolution Garden with both students and teachers. We discussed the various sights, features and educational lessons that can be found there. It is hoped that with this exposure to the Evolution Garden, teachers and students will plan to visit and explore the very unique Evolution Garden.

This is the first time the Education Outreach team has worked on a dual-disciplinary project with a school. The students' boldly coloured art pieces gave a unique twist to the Evolution Garden.

The art pieces have since been returned to Siglap Secondary School to be displayed at their premises. A big thank you goes to the school. Their crucial support and enthusiasm make this collaboration a success.

Janice Yau
Education Outreach

Photos from Education Outreach

The traveling art exhibition with expressive art works put together by students of Siglap Secondary School

Education Manager, Winnie Wong, addressing pupils during an assembly talk at Damai Primary School