BGO NEWSLETTER

THE BOTANICAL GARDEN ORGANIZATION
Ministry of Natural Resources and Environment

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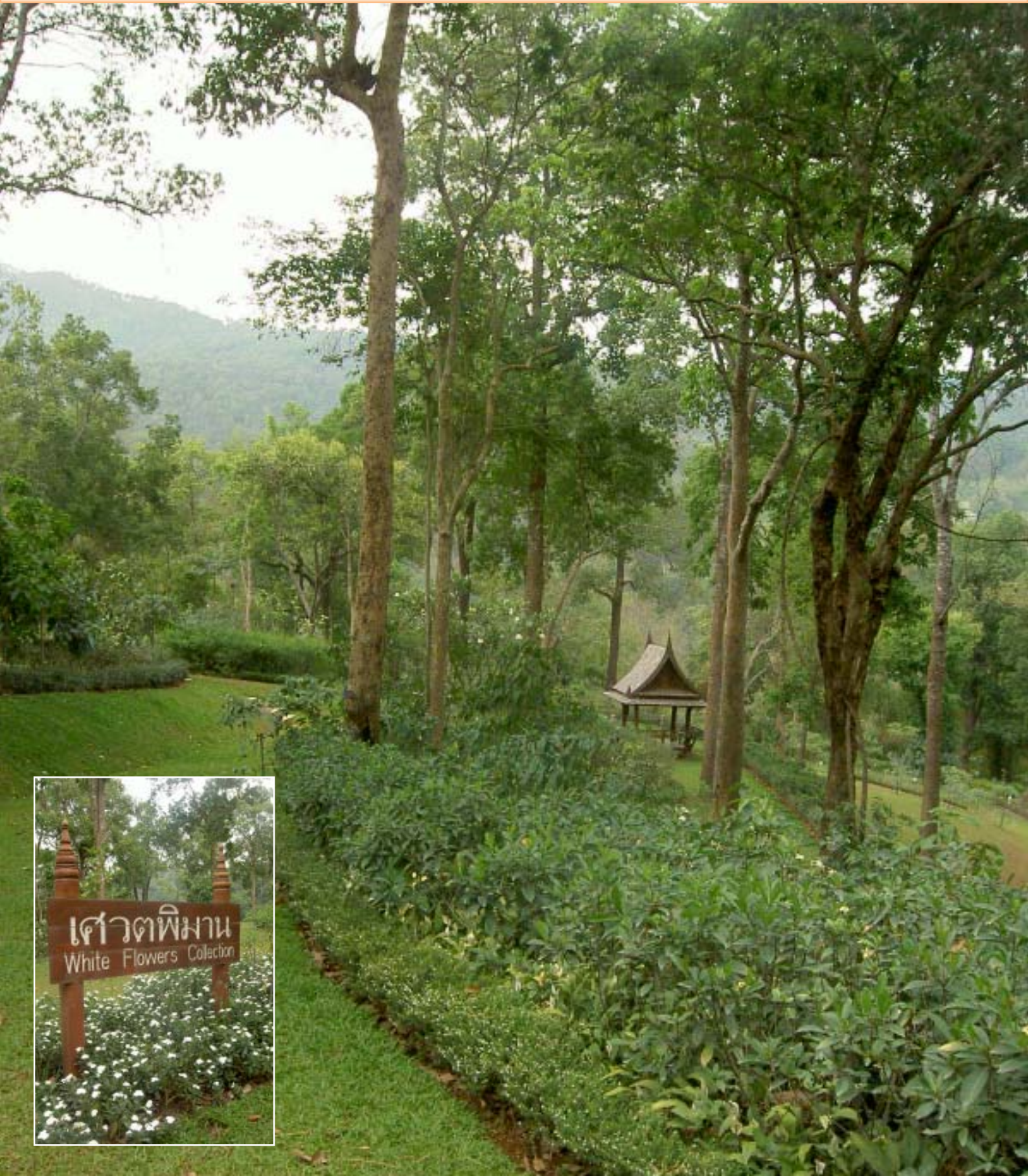

Director's Message

Since the establishment in 1993, Queen Sirikit Botanic Garden has grown up strongly to be a centre of excellence for tropical plants study and research. The garden is becoming a showcase for Thai plants, youth education, and in particular the field of public awareness and conservation.

The Thai plants exhibited within the garden were gathered from throughout the country and their number has increased rapidly, during the past decade we now have an amount up to almost 4,000 species. All collections are correctly identified with tagged, enumerated and database computerized.

One measure of success of the garden is the number of tourists who visited the garden. The number of visitors in 2004-2005 is approximately 250,000 individuals and proudly about 100,000 visitors are schoolboys and girls.

The reputation of the garden is becoming well-known to the public; therefore, the garden has developed into many varied events and many activities in various fields. The garden is still kept in mind as a place to support many botanical activities concerning the rapid changes of our forested areas as a global concern.

Weerachai Nanakorn

Weerachai Nanakorn, Ph. D.

The BGO Executive Board

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	Mrs. Ornanong Maneekarn

The Botanical Garden Organization

Headquarters: Queen Sirikit Botanic Garden
Mae Rim, Chiang Mai, THAILAND

Mailing Address: P.O. Box 7, Mae Rim
Chiang Mai 50180, THAILAND

Phone: (66 53) 299-753, 298-171/6

Fax: (66 53) 299-754, 298-177

Bangkok Office: The Botanical Garden Organization
Ministry of Natural Resources
and Environment
98 Phahon Yothin 7
Phahon Yothin Road, Bangkok 10400

Phone/Fax: (66 2) 298-2068

E-mail: qbg@chmai.loxinfo.co.th

Website: www.qsbg.org

Editorial

The year 2005 has been a fruitful year for the Garden judging by the various collaborative projects that have been developed with other institutions, nationally and internationally. Noteworthy among them are the projects with the Lamont-Doherty Earth Observatory, Columbia University, New York, USA; the Natural History Museum, London; and the University of Oxford, UK. We are also pleased to have been the organizer of a regional training workshop with the support of the Botanic Gardens Conservation International (BGCI), UK. Activities related to the above mentioned projects are presented in this issue. We hope that you will find the contents of the newsletter useful.

Thank you to members who notified the change in their address, and to those who have recently joined as new members. We also appreciate the feedback received from our readers. Please continue to send your comments and suggestions.

Suyanee Vessabutr, Ph.D.

Editorial Team

Editor:
Suyanee Vessabutr, Ph.D.

Technical Assistants:
Chaiyudth Glamwaewwong
Ratchuporn Sapanuchart
Porntipa Saguansak

Layout:
Soraya Klankoom

Photographers:
Pichsinee Tipmontar
Somkaul Suk-ieam

BGO Newsletter is published by the Botanical Garden Organization of Thailand. It is issued once a year and distributed without charge to members. Interested organizations, institutions, or individuals that would like to contribute articles for future issues, or receive the Newsletter please contact:

The BGO Newsletter Editor,
Technical and Research Department,
Queen Sirikit Botanic Garden,
P.O. Box 7 Mae Rim, Chiang Mai 50180,
THAILAND
Tel: 66 53 268-332
Fax: 66 53 268-331
Email: S.Vessabutr <Suyanee@qsbg.org>
or <vessabutr@yahoo.com>

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Welcome New Minister

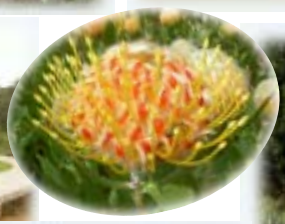
Mr. Yongyuth Tiyapairut
Natural Resources and Environment Minister

Mr. Yongyuth Tiyapairat, formerly PM's Secretary General was appointed Minister to the Ministry of Natural Resources and Environment (MoNRE) on 12 March 2005.

On 14 May 2005, Mr. Yongyuth visited the Queen Sirikit Botanic Garden and met with the BGO Executive Board and QSBG staff to observe the progress of the organization. He emphasized on Queen Sirikit Botanic Garden being 'Center of Excellence' in botanical research, and 'window opportunity' for the Ministry in relation to access to genetic resources concerning relevant international conventions.

BGO Executive Board in Australia

During 4-7 Septemeber 2005, a delegation of the BGO Executive Board led by Prof. Thira Sutabutra visited the Kings Park and Botanic Garden; and Caversham Wildlife Park, Perth, Australia.



A group photo showing the BGO delegation, from second left, Mrs. Ornanong Maneekarn, Prof.Thawatchai Santisuk, Dr.Weerachai Nanakorn (third right), Prof.Pongsak Angkasith, and Prof.Thira Sutrabutra; with Dr.Eric Bunn (center) from the Kings Park and Botanic Garden and Dr.Sureeya Tuntiwiwat (first left), Kasetsart University

H.M. the Queen's birthday celebration

To commemorate HM Queen Sirikit's 73 birthday anniversary, the BGO Executive Board organized the 5th Symposium on ***HM Queen Sirikit and Biodiversity Conservation in Thailand: Natural Fibers and Dyes*** on 29 August 2005. Over 200 participants attended the Symposium at the *Botanic Resort*, a conference center of the Queen Sirikit Botanic Garden.

The Symposium included oral presentations and a panel discussion by invited speakers.

Prof. Thira Sutrabutra, Chairman of the BGO Executive Board cutting ribbon at the opening ceremony

Exhibitions on products made out of various kinds of natural fibers and dyes were displayed at the *Natural Science Museum* at the Sanga Sabhasri Research and Development Center located inside QSBG.

Khunying Suchada Sripen (far right), Chairman of the Subcommittee for Scientific and International Affairs, key person in organizing the Symposium

QSBG Highlights

HRH Princess Mahachakri Sirindhorn and Royal Guests visited QSBG

On 21 November 2004, HRH Princess Maha Chakri Sirindhorn hosted the adjudicators of the Prince Mahidol Award Foundation at the Queen Sirikit Botanic Garden.

On this occasion, HRH the Crown Princess visited 'Golden Gardenia' a new souvenir shop of the Garden.

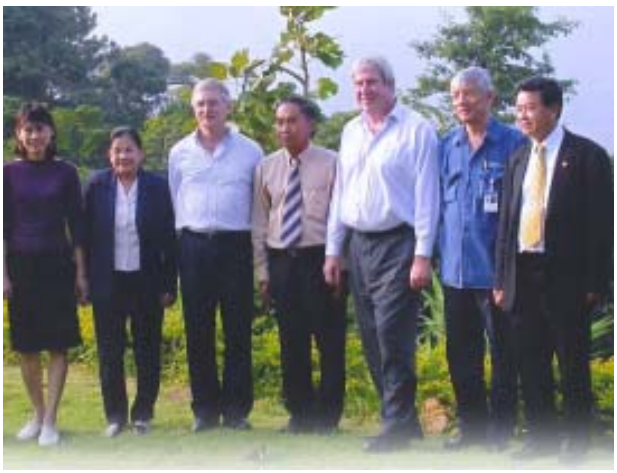
During 17-21 January 2005, Singapore's President SR Nathan and Mrs Nathan paid a state visit to Thailand as royal guests of HM King Bhumibol Adulyadej. The State Visit marked the first time that a Singapore President visit Thailand since the establishment of diplomatic relations between the two states in 1965.

The Singapore presidential couple travelled to Chiang Mai with HRH Princess Maha Chakri Sirindhorn to observe the activities of the Royal Project Foundation, as well as local handicraft and educational schemes, including the Queen Sirikit Botanic Garden on January 20.

H.E. Dato Paduka Abdul Kadir Sheikh Fadzir, former Minister of Culture, Arts and Tourism, and current Minister of Information, Malaysia; visited the Garden on 3 October 2004.

On 1 October 2004, a delegation of the Finance Committee of the Danish Parliament led by Mr. Svend Heiselberg, Vice Chairman; visited the Queen Sirikit Botanic Garden. Photo shows Dr. Weerachai Nanakorn, QSBG Director, gave the delegates a tour at the water lily collection.

On 14 October 2004, H.E. Elliot Morley, then Minister of State for Environment and Agri-Environment, DEFRA; visited the Garden to observe the progress of a collaborative project between the Natural History Museum, London, UK; and Queen Sirikit Botanic Garden. The project entitled **"Taxonomic Capacity Building in Support of Biodiversity Conservation in Thailand"** was launchecd at the Technical and Research Department in June 2004. The 3-year project is operated with the grant funded by the Darwin Initiative Project, UK, and with coordinating support from the MoNRE.



H.E. Minister Elliot Morley (third right), Mr. David Fall, British Ambassador (third left) with BGO Executive Chairman (far right), and QSBG staff

Staff of Melbourn Botanical Gardens, Australia visited QSBG on 20 October 2004.

The Armenian Prime Minister, H.E. Andranik Markaryan visited the Garden on 11 June 2005.

QSBG Activities

Training Courses and Workshops

The 10th Parataxonomist Training

The training workshop was organized during 18 to 21 January 2005 with the theme of "Ethnobotany". Field studies were conducted at Doi Inthanon, a Karen Tribe village (Ang Gha Noi), and within QSBG proximity.

Observing the Karen technique to preserve vegetables at Ang Gha Noi village, Doi Inthanon

At the Medicinal Plants Collection, QSBG

Participants at the highest summit of Doi Inthanon

The Parataxonomist Training Workshop is organized annually with the aim to support plant conservation by raising awareness in various aspects of the relevant issues. For the effectiveness of field studies, the workshop normally accommodates not more than 50 participants. If you are interested to attend the course, please contact the Education Section, Technical and Research Department.

Tel: (053) 84-1233 (Ms. Kanokwan Calhoun)

Practical Training Courses in Scientific Illustration and Fine Art

Nature Photography Training was offered to the general public during 24-26 June 2005 to promote the art and science of nature photography.

Mr. Surajit Jamornman, Mr. Waranun Chutchawantipakorn, and Mr. Wisan Numkarng, professional photographers were among invited instructors.

Scientific Illustration Training was conducted during 9-11 September 2005 by Mr.Vichai Malikul, a renowned Scientific Illustrator from the Entomology Division of the Smithsonian Institution, Washington DC., USA.

Mr. Vichai Malikul instructing a student

Participants received certificates

Botanical Art Training is part of the **Youth Environmental Education Program** organized by the Education Section, Technical and Research Department. The 1st Botanical Art Training was conducted during 16-18 September 2005 by Ms. Poonsup Jateleela and team.

The course is offered for grades 6- 9 students. For more information please contact Ms. Ratchuporn Sapanuchart, the Natural Science Museum, Technical and Research Department at (053) 84-1219

Students at practical session

Ms. Poonsup, a Landscape Architect by profession has developed keen interest in botanical art paintings. She has been conducting courses in the subject of watercolors, and acrelic painting of plants portraits.

Horticulture Workshop for Southeast Asian Botanic Gardens

Dr.Weerachai Nanakorn welcoming the participants

Ms. Sarah Oldfield, BGCI Secretary General giving opening remarks

Ms. Oldfiled presenting BGCI publications to QSBG Director

During 22-25 August, 2005 Queen Sirikit Botanic Garden in collaboration with the Botanical Gardens Conservation International (BGCI), U.K., hosted the 2nd Southeast Asian Botanic Gardens (SEABG) Workshop, at the Botanic Resort, QSBG, Chiang Mai, Thailand.

This horticulture workshop was part of BGCI's Investing in Nature (Southeast Asia) programme, and was aimed to assist staff of botanic gardens in the region improve their horticultural skills in maintaining their respective plant collections. Approximately 40 participants from China, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Thailand, and Vietnam attended the workshop. Lectures and practical sessions were given by experts from Australia, Japan, the Philippines, Singapore, South Africa, Thailand, and the USA. .

The Investing in Nature Programme is the largest corporate donation ever made for environmental conservation and education. Funded by HSBC bank in 2002, the donation totaled USD 50 million, and was awarded to Botanic Gardens Conservation International (BGCI), World Wildlife Fund, and Earthwatch. BGCI's activities under Investing in Nature include assisting botanic gardens worldwide with plant conservation, staff capacity building, and environmental education programmes.

Congratulations!

To the following staff of the Technical and Research Department who have recently received their doctoral degrees.

Ms. Ratchada Pongsattayapipat
Ph.D. (Systematic Botany),
The University of Aarhus, Denmark

Dissertation: Management of Palm Resources in Thailand

Mr. Piyakaset Suksathan
Ph.D. (Systematic Botany)
The University of Aarhus, Denmark

Dissertation: Systematic Studies in Asian Marantaceae

Mr. Prachaya Srisanga
Ph.D. (Biology)
Chiang Mai University, Thailand

Dissertation: Biodiversity of Vascular Plants on Doi Phu Kha National Park, Thailand

Mr. Santi Wattana
Ph.D. (Biology)
The University of Copenhagen, Denmark

Dissertation: Systematics and Ecology of the Genus *Pomatocalpa* (Orchidaceae)

Overseas Visits

June 1-18 2005

Dr. Suyanee Vessabutr, Head, Technical and Research Department was invited by Dr. Brendan Buckley, Director, Laboratory of Tropical Dendrochronology to visit the Lamont-Doherty Earth Observatory (LDEO), Columbia University, Palisades, New York. LDEO is a renowned institute in the international scientific community for its unique geological and climatological archives and state-of-the-art laboratory facilities and cutting edge research (see www.ldeo.columbia.edu).

During the visit Dr. Suyanee had the opportunity to meet with several Senior Scientists and observe activities of their laboratories, e.g., the Tree Ring Laboratory; the Biology and Paleo Environment Division, the New Core Lab, and archives of the world's largest collection of deep sea sediment cores.

She also met with Dr. Michael Purdy, LDEO Director to discuss possibility of having future research collaboration.

From left to right: Dr. E.R. Cook, Director of Tree Ring Laboratory; Dr.B. Buckley, Director of Laboratory of Tropical Dendrochronology; Dr. Sourioudong Sundara, Director General of the Research Institute of Science, Lao PDR; Dr. G.M. Purdy, Director of Lamont-Doherty Earth Observatory; and Dr. Suyanee

22-25 August 2005

Ms.Songsri Pipitkul, Ethnobotany Section, TRD attended **The 1st International Conference of Women's Health and Asian Traditional Medicine** at Kuala Lumpur Convention Center, Kuala Lumpur, Malaysia. Sponsorship for travelling expences and accommodation was provided by the Global Initiative For Traditional Systems (GIFTS) of Health project. Many thanks to Prof. Gerard Bodeker, University of Oxford Medical School, UK; Chairman of the Project for his kind support.

A poster presentation on "**Traditional Medicine and Refugee Women's Health in the Thai-Myanmar Border Region"** was presented by Miss Songsri (see p. 15)

27 June - 16 September 2005

Mr. Worawit Chanapirin, the Garden Development Department, attended a training programme on **Soil Conservation and Soil Fertility Management** at Slagelse, Denmark. Sponsorship was through the DANIDA Fellowship Programme under the auspieces of the Royal Danish Ministry of Foreign Affairs.

Mr. Worawit (third left) among other participants from Bangladesh, Bhutan, Kenya, Uganda, and Vietnam

Retirement

QSBG staff would like to bid farewell to Mr. Vallobh Sukont, Deputy Director; and Ms. Boonyanij Jantimangool, Head, Business Development Department, who will retire by the end of this month (September 2005).

Mr. Vallobh and Ms. Boonyanij have served the Garden since 1996, and 1993, respectively. We wish both retirees happy and restful days ahead!!

Mr. Vallobh Sukont

Ms. Boonyanij Jantimangool

New Deputy Director

Dr.Pornchai Preechapanya

Dr. Pornchai Preechapanya from the Department of National Parks, Wildlife and Plant Conservation, MoNRE will take up the position as Deputy Director commencing 4 October 2005.
Dr. Pornchai received his Ph.D. in Agroforestry from the University of Wales, Bangor, UK. Prior to joining the Garden, he served as Head of Watershed Research Center for Northern Thailand; and Country Representative for the International Center for Research in Agro-Forestry (ICRAF).

QSBG staff wouldlike to welcome him aboard.

Volunteers

Julie DeGuire and Josee Desrosiers, volunteers from Canada; spent their winter time learning about Thai orchids at QSBG. Julie is a horticulturist from Jardin Botanique De Montreal; while Josee, former Horticulturist of Hollandia Floral Center, is from St-Lazare, Quebec.

Julie DeGuire

During the preparation of this issue of the BGO Newsletter, Julie sent the editor her article which appeared on <www.bgci.org.uk/canada/newsletter.sept05.html>. Please read it in the quotations.

Josee Desrosiers

Julie working with Thitima, a TRD staff.

"After five seasons working as a gardener at Montreal Botanical Gardens, I was keen to take advantage of my time off last winter to go travelling in Asia. I thought that finding a horticultural internship or volunteer position would be a great way to meet people and learn more about the local culture. An internet search revealed several interesting organisations; there is a multitude of possibilities for organising this type of experience. In my case, I was able to contact several gardens in Asia through liasing with BGCI (Botanic Gardens Conservation International) and their "Partnership for Plants in Canada" project based at Montreal Botanical Garden.

One thing led to another and I received an invitation from Queen Sirikit Botanic Garden in Northern Thailand. They were exceptional hosts and I spend a month working on a native orchid conservation project in this magnificent garden near Doi Sutep-Pui National Park. I learned a lot from this experience, both professionally and culturally.

I would recommend this type of exchange to anyone who is open and interested in learning from cultural differences. I would like to thank Laurel McIvor, Suyanee Vessabutr and the extraordinary team at Queen Sirikit Botanic Garden."

Lourdes Niehaus or Lula, Arborist from Kelowna, British Columbia was with the Orchid Conservation Program, Technical and Research Department during April and May 2005. Lula is back in Kelowna and busy with her schooling. She has recently sent us pictures of her beautiful city.

orchards by the lake

Lourdes Niehaus

SSRF News

SSRF donation to the tsunami victims

On Sunday 26 December 2004, the most powerful earthquake in at least 40 years struck in the Indian Ocean, triggering massive tidal waves that slammed into coastlines across southern Asia, including southern Thailand. This Sumatra-Andaman earthquake tragically claimed thousands of lives in Thailand. The Sanga Sabhasri Research Foundation made a donation of some urgently needed items such as food, medical supplies, and coffins via the local tsunami relief effort.

Ms.Sininat Honhuta (second right) representing the SSRF to donate supplies at the Wing 41 Air Force

Research Support

SSRF granted a research bursary of 25,000 baht to Ms Phattaraporn Sonboon, MSc.student from Department of Natural Resources and Environment, Faculty of Agriculture, Naresuan University to conduct her thesis reseacrh on "*Application of Geo-Informatics for Plant Community and Land Use Management at Ban Rom Klaw, Pittsanulok Province*".

SSRF Office at Queen Sirikit Botanic Garden

SSRF now has its office located at the Herbarium Building, the Sanga Sabhasri Research and Development Center. The Foundation headquaters comprises a spacious office and a large meeting room.

SSRF offers the facility to visiting scientist/specialist while working at QSBG.

Traditional Medicine and Refugee Women's Health in the Thai-Myanmar Border Region

Songsri Pipitkul[1], Zaw Min Oo[2], Gerard Bodeker[3], Cora Neumann[4]

More than 1 million Burmese refugees and forced migrants live in Thailand. This study is a research partnership between the Global Initiative for Traditional Systems (GIFTS) of Health, Oxford, UK and the Queen Sirikit Botanic Garden (QSBG), Thailand, on refugee health in the Thai-Burma border region. Findings indicate that traditional medicine continues to be preferred for many common health conditions - including women's reproductive and sexual health issues - and that valuable ethnomedicinal resources exist for women's health in this area.

Our programme includes research on knowledge and use of traditional medicine among female outpatients at Mae Tao Refugee Clinic; interviews with female traditional health practitioners; development of a network of herbalists, providing coordinated traditional healthcare services to rural refugee villages and communities; and development of a medicinal plants database for community and healthworker use.

Survey findings on refugee clinic outpatients revealed that 42 female respondents listed nearly 191 traditional remedies used for common health conditions, and 13 of these respondents reported learning this knowledge from mothers or grandmothers. The female traditional practitioners interviewed specialized in women's health and were actively treating refugee women in the Mae Sot region.

Our medicinal plants database includes ethnobotanical and medicinal information on plants commonly available throughout northwest Thailand and the Thai-Myanmar border region, including information on safe and effective use of traditional medicines. Of the 400 plants currently listed in the database, 52 are used for treatment of women's health conditions including pre- and antenatal care, menstrual disorders, sexually transmitted diseases and breast cancer. This information will be included in field manuals for use by traditional practitioners, community health workers and refugee families throughout the region.

Our research and programme findings indicate that women play an integral role in the practice and passing on of traditional health knowledge, and that valuable medicinal plant resources exist for treating a range of women's health conditions.

Recognizing and harnessing the potential of safe, affordable and culturally acceptable traditional medicines can contribute to improving health services and the health status of women who have become refugees.

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[1] Queen Sirikit Botanic Garden (QSBG), Mae Rim, Chiang Mai, Thailand.

[2] Global Initiative For Traditional Systems (GIFTS) of Health, Oxford, UK; & Guest researcher, QSBG, Thailand.

[3] Chair, Global Initiative For Traditional Systems (GIFTS) of Health, Oxford, UK; University of Oxford Medical School, UK; Mailman School of Public Health, Columbia University, USA.

[4] Oxford Institute for International Development, University of Oxford, UK.

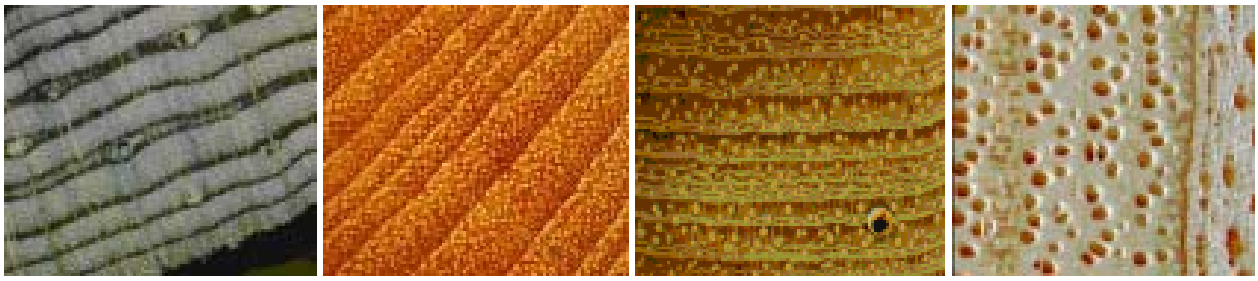
How Trees Tell Their Story

By: Orawan Buckley

Dendrochronology is the science that deals with the absolute dating and study of annual growth layers in woody plants (*Greek, dendron* = tree, *chronos* = time). The notion that variability in tree ring widths relates to variability in climate dates back, at least, to the time of Leonardo da Vinci, whose writing translate thusly: *The rings from cut stems or branches of trees show their number of years, as well as those years that were moist or dry, according to the size of their rings".*

The development of dendrochronology as a scientific field came in the early 20th Century, under the guidance of Andrew Ellicott Douglass. Douglass recognized that in the arid American Southwest, precipitation was the factor most limiting to tree growth. Therefore, before the time of the instrumental record tree growth could in turn be used as a proxy for rainfall.

The annual growth layer or "tree ring" is central to the science of dendrochronology. It can be described as a growth band in the xylem of a tree or shrub, with anatomically definable boundaries, and is formed during a single annual period of cambial activity. Growth rings are actually sheaths of cells generated in the vascular cambium, between the prior year's growth and the bark, and they appear as concentric rings in a cross section of the stem. In effect, each ring is an entirely new tree, as the cells from the previous year's ring cease to function as living tissue. Instead they are incorporated into the tree's transport system for moving water and nutrients from roots to foliage and vice versa as *sapwood*, ultimately serving only as structural support after becoming the chemically altered *heartwood*.



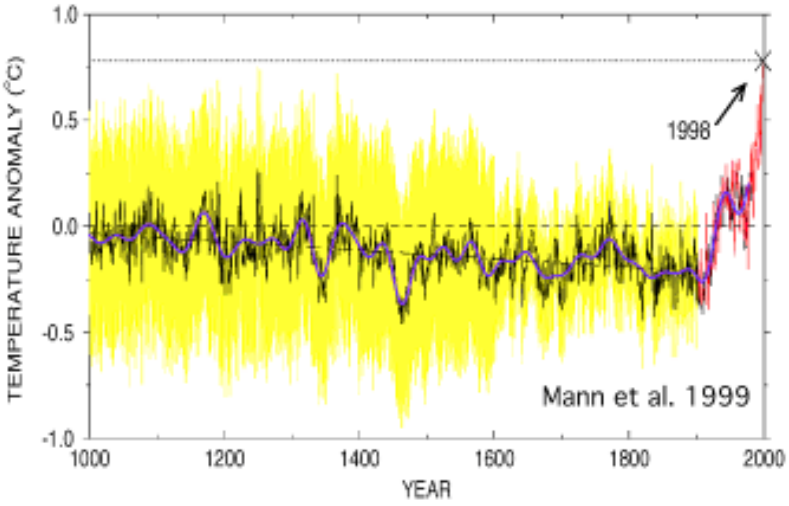
A B C D

Different types of growth rings. A = Pinus merkusii, a conifer from Thailand showing non-porous wood, B = Tectona grandis (teak) from Thailand showing semi-ring porous wood, C = the semi-porous rings of Gluta usitata of the family Anacardiaceae from Thailand. D = the ring porous wood of Fraxinus americanus (white ash) from New Hampshire.

"Cross-dating" or pattern matching was developed and used by Douglass as the basis for the science of dendrochronology. The simple counting of growth rings, in some instances, could result in errors of years or even decades over a span of hundreds of years of record. Douglass' procedure involved the rigorous detection of "locally absent" and "false" rings through sample replication and reproducibility of specific patterns. It was not long before this process led to the dating of aboriginal ruins from across the desert Southwest making dendrochronology one of the most significant tools in the field of archaeology.

Wood volume (ring width) and density are the two most common features used for the cross-dating procedure. Scarring, frost-damaged cells, resin ducts and other features (when common to trees at a site) can all be used to corroborate cross-dating. By matching the patterns of growth from living trees of known

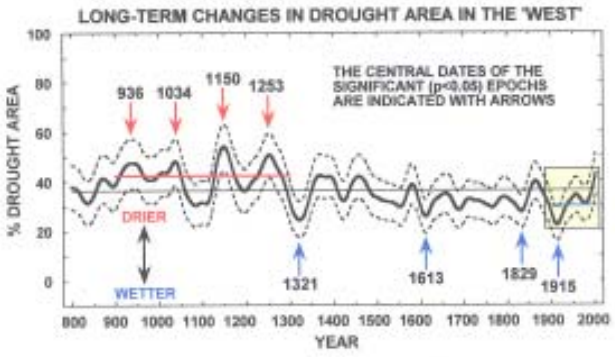
age with similar patterns in the wood from progressively older trees, one can extend the time scale backward into the distant past. These distinct patterns can then be used for the accurate dating of events that somehow affected the growth or life of individual trees. Any event that kills one or more trees or otherwise leaves an impact at a particular year can be fixed accurately in time through dendrochronology and cross-dating. Examples can be seen throughout the literature, from the dating of buildings and other wooden artifacts, to the determination of precise years of earthquakes, to the detection of epic droughts that caused mass mortality in the early North American settlements. Dendrochronology can be used as an important tool in many different fields, perhaps none more centrally than the field of climatology. At the center of the global warming debate, for example, trees from the world's boreal forests comprise a large percentage of the evidence for recent changes in climate. Located near the very margins of their temperature tolerance, and dependent upon growing season warmth, these long-lived conifers vary their ring widths and density with the rhythm of summer climate. Against this backdrop of natural variability in climate, the current changes detected from the period of instrumentation can be compared.



The well-known "Hockey Stick" plot of Northern Hemisphere temperature over the past 1000 years, reconstructed from multiple proxy records, including tree rings. This plot, published by Dr. Michael Mann et al. In the journal Geophysical Research Letters in 1999, has been at the center of the controversy surrounding the global warming debate, and was featured prominently in the IPCC document on climate change.

Similarly, networks of arid-site conifers from the American Southwest have been used to reconstruct the severity and spatial extent of drought over the past two millennia. These conifers are completely dependent upon precipitation for their moisture, mostly in the form of winter snowfall. In times when winter precipitation fails, trees suffer moisture stress in the heat of summer and this is reflected in greatly reduced ring growth. Often rings are absent from many of the trees in a given stand, and this can only be resolved through rigorous cross-dating. A Drought Area Index (DAI) for the western US, as shown in the figure below, was calculated from dozens of tree ring chronologies and indicates periods in the past where multi-decadal droughts were common. This work, published by Dr. Ed Cook from the LDEO Tree Ring Lab as the North American Drought Atlas (see www.ldeo.columbia.edu/res/fsc/trl/), has great significance because it shows that current drought in the region pales in comparison to the Medieval Warm Period "mega-drought". A reversion to this type of climate pattern would have catastrophic results.

Tree ring based reconstruction of drought indices for the western USA depicted as Drought Area Indices (DAI), expressed as percentage of area in drought with a PDSI of <-2 (adapted from Cook et al., 2005). This is a smoothed plot that accentuates decadal scale variability. Of particular interest is a "Medieval Dry Period" of extended drought from the mid 10th – late 13th centuries that is unmatched in intensity for the past 1200 years. The current drought pales in comparison to the protracted aridity of the Medieval drought.



Dendroclimatology

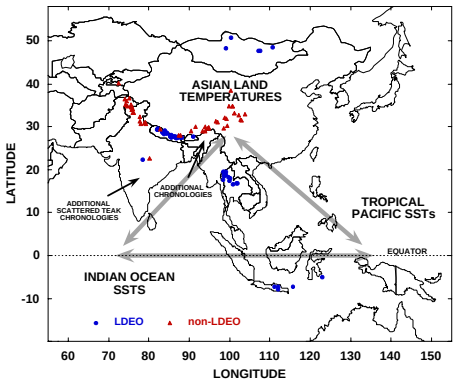
Dendroclimatology is the branch of dendrochronology that utilizes absolutely dated and annually resolved growth layers in woody plants such as trees, for the reconstruction and analysis of past climate variability. The same underlying principles of dendrochronology still apply. At the core of dendroclimatology lies the central tenet of all dendrochronological applications; the accurate *cross-dating* of multiple tree ring samples that are all uniformly controlled by climate, such that the same signature of narrow and wide (or dense and

less dense) rings can be identified in all of the sampled trees across time and space. The stronger the common "signal" between trees (i.e., the greater the degree to which narrow or wide rings are consistently narrow or wide), the stronger will be any reconstruction of climate that is derived from them. Methodologies have been developed for testing *signal strength* in chronology indices, and for *calibration* and *verification* of climate/tree-growth models.

As suggested above, climate may influence tree growth across space and time and can result in a high degree of common variability expressed in the pattern of annual growth rings in trees across broad regions. The tree ring chronologies with the highest degree of strength in their common signal tend to be from regions where climate is at its most limiting to growth, and is most regionally coherent, and where other non-climatic factors such as competition and disturbance are at a minimum. Trees growing in regions with little climate variability and optimum conditions for growth are less likely to produce the high variability in annual growth necessary for robust reconstructions of climate. It is for this reason that *dendroclimatologists* seek trees from those areas where trees are most likely to be limited by climatic factors such as temperature or drought, normally at the limits of their ecological range. However, recent interest in augmenting the limited instrumental records of climate from the world's tropical regions has resulted in an intensified interest in tropical tree ring studies. It has long been thought that tropical trees do not form annual rings, or that climate seasonality is not defined enough for trees to enter periods of dormancy. It is now being shown that this is not the case, and tree ring chronologies and reconstructions of climate are being developed from tropical regions of the world. With recent interest in accurately determining the past variability of climate on planet Earth, this work is at the cutting edge of paleoclimate research.

Laboratory of Tropical Dendrochronology (LTD) at QSBG

The Asian monsoon climate system plays a significant role in large-scale climate variability over much of the globe. Due to its considerable importance to global climate and implications for more than half of the world's human population, there is an urgent need for greater understanding of this system, with one goal being improved prediction on annual to decadal and longer time scales. A subsequent goal is to improve preparedness for dealing with projected changes in the climate regime, and possible solutions for addressing ways to negate some of the more deleterious effects. With that background, the Asian Monsoon project is an attempt to gain an insight into the nature of the long-term natural climate variability within Monsoon Asia, and in particular what role the tropical regions play in driving that variability.



Map showing the Asian monsoon region that is the focus of the research project (thick gray arrows) The three main areas of interest are Asian Land Temperature, Indian Ocean Sea Surface Temperature and Tropical Pacific Sea Surface Temperature. All three are regions with known influence on the Asian Monsoon.

The Laboratory of Tropical Dendrochronology (LTD), based at the QSBG, is a satellite laboratory of the Tree-Ring Lab (TRL) at the Lamont-Doherty Earth Observatory of Columbia University in New York. The LTD spearheads the tropical portion of a 5-year project entitled *Tree Ring Reconstructions of Asian Monsoon Climate Dynamics*, a project funded by the U.S. National Science Foundation (see www.ldeo.columbia.edu/res/fsc/trl/ for more details). The LTD collaborates with the Faculty of Forestry at Kasetsart University in Bangkok, where academic and research activities of the Asian Monsoon project and a new dendrochronology program have been well received. The National University School of Forestry of Lao PDR, the Indian Institute of Tropical Meteorology in Pune India and the University of Paradeniya in Sri Lanka are among the growing network of regional collaborators that are contributing to the success of this project. The LTD is directed by Dr. Brendan Buckley of the LDEO Tree Ring Lab, and has already been host to visitors from the USA, Australia and Laos. This upcoming year should see far greater activity and exciting new developments in tropical dendrochronology in Southeast Asia.

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A Blooming Day at The New York Botanical Garden

Story: Suyanee Vessabutr
Photos: Kritsadapan Palakit

It was a pleasant cool sunny day in June when we left the Palisades Campus of Columbia University for the New York Botanical Garden (NYBG) located in the Bronx. Dr. Brendan Buckley, from the Tree Ring Laboratory of Lamont–Doherty Earth Observatory was the driver. We arrived at the destination by 10 a.m., just on time as we had arranged with Darrin Duling, NYBG Glasshouse Curator.

He was waiting to receive us near the gate with an 8-seater cart. Darrin and I were overjoyed to meet each other after 8 years since he left Thailand. Darrin worked at Queen Sirikit Botanic Garden during 1996-1997 as Foreign Advisor, then moved on to work at the Preservation Foundation of Palm Beach, Florida, and the American Orchid Society, before taking the position as Curator of Glasshouse Collections at the New York Botanical Garden.

Darrin told us that this was the day before last for him at the NYBG. He was leaving his post to start his own landscaping business with a friend in Greenwich, Connecticut. We wished him all the best in his new endeavor and thanked him for sparing his time with us despite his tight schedule.

Darrin drove us to the **LuEsther T. Mertz Building**, where the administration, herbarium, library and gallery are housed. Before entering the building he gave us a brief background of the NYBG. The garden is operated as a private corporation, with some support from the City of New York and the State of New York. The 250-acre garden (est. 1891) is situated in the heart of the city along the Bronx River. Our group happened to visit NYBG during the events of Spring Flower Show and Glasshouses Exhibition. For all of us, this was our first visit, there was so much to see but so little time, we had to be quick.

Darrin Duling with our group in front of the LuEsther T. Mertz Building

Our first stop was at the gallery where there was an exhibition on *Glasshouses: The Architecture of Light and Air*. The exhibition displayed books, drawings, paintings and photograph of glasshouses dated back to the past three centuries; revealing the evolution of glasshouse architecture. Darrin told us that the gallery organized 2 exhibitions a year and usually connected with the outdoor event. For example, the ongoing exhibition has been organized to coincide with the celebration of the new Nolen Greenhouses from May 14 to August 14, 2005. He planned to take us there later on.

We then went across the hall to the **Mertz Library**. It's the most impressive library I have ever seen. The collections cover diverse subject areas in botanical and horticultural fields. The Mertz Library has a 'Rare Book Room' where over 600,000 volumes of old books and folios published before 1753 (pre-Linnean publication) are collected. We didn't spend much time there since the library was closed on that particular day. Thanks to the kind staff who let us in.

Inside the Mertz Library

Flower arrangement in a glass box designed by Darrin Duling

We took the elevator to the ground floor. The next move was to see the plant collections and displays. Every one was eager and got the camera ready! Darrin drove the cart along the Garden trail passing the Conifer Collection and stopped in front of the **Enid A. Haupt Conservatory**. At the entrance there were a few staff working on flower arrangement and decoration for the fund raising cocktail party that evening. Apparently, many "rich and famous people" in town were coming. I noticed a concerned look on Darrin's face. As I know him, he always takes his commitment seriously. Maybe he was thinking "I wonder should I go (with my visitors) or should I stay (to help my colleagues)".

The Haupt Conservatory

Conifer Collection

Well, he chose to be a good host and continued guiding us around (for which we are really grateful, Darrin!).

Inside the Haupt Conservatory was the exhibition of the *Spring Flower Show*. A serene woodland garden was created. The colorful flowers were spectacular. My most favorite were the reflecting pools with tea-colored water but decent clarity of reflection. Darrin explained that most of the pools used in the exhibition were temporarily installed using a pre-formed pond and plastic liner. The pool is actually shallow but looks deep because of the black dye applied to the water. This non-toxic dye (vegetable based) hides under-water algae growth and enhances the reflection.

Various designs of reflecting pools

The Conservatory covers almost an acre. The collections include tropical plants, palms, a collection of cacti from the Americas and succulent from Southern Africa. In terms of pest management, they use an 'Integrated Pest Control' system.

Our group members seemed to disperse in different directions due to individual interest. We gathered again in front of the Conservatory entrance.

While waiting for everyone to get ready, our photographer kept busy taking photos of the beautiful peonies along the roadside. Darrin told us that it was a collection of prize winning varieties.

Various varieties of peonies: the lovely blooms of spring

"Our next stop will be the Nolen Greenhouses", announced our guide. He drove us past the new Visitor Center, the Children Gardens, and the arboretum. The arboretum, with exposed rock scattered around, features Conifer Collection and the original forest. The towering pines, elegant spruces, and mountain firs were among the first planted at the Garden, back in the early 1900s. "Are there any wild animals?" someone asked. "Yes. There are wild turkeys and pheasants" answered Darrin.

We came to a stop at the entrance of the **Nolen Greenhouses**. There, stand a striking bronze sculpture of the titan arum-*Amorphophallus titanium*, showing its various stages of reproductive cycle. "Look here" Darrin pointed at the dung beetles – *Amorohophallus* pollinators. "The artist, Tom Otterness is wellknown for his typical sense of humor. He likes to add small cartoonish characters in his works. You can see many of them at the subway stations in New York City" explained Darrin.

The Titan Arum Sculpture

He then guided us into the Greenhouse Complex. "We had the grand opening on May 14 this year". Darrin showed us around the modern facility with a working space of about an acre under glass and controlled conditions. The facility comprises 8 different zones with state-of-the art operating systems and a central computer. Apparently, the Nolen Greenhouses are for living plants propagation and maintenance; as well as for research collections. Scientists can study the complete life cycles of plants throughout the year.

The Nolen Greenhouses for Living Collections

The time was close to 12 o'clock. "My plan is to take you guys for a sightseeing in the morning, then to visit the Herbarium and Laboratory after lunch. Are you hungry yet?" Darrin asked us. "Hmm, not really", was my answer. "Let's continue with the tour".

We stopped at the **Peggy Rockefeller Rose Garden**. Here, Darrin explained that there are thousands of rose varieties, from exquisite antique roses to modern hybrid teas, floribunda, and shrub roses. This year the Rose Exhibition is scheduled to be from 4 to 26 June, where visitors can view the latest All-American Rose Selection Winners!

It seemed that we were too early for the roses. Most of them were still in small buds. We were disappointed not seeing this stunning garden in full bloom.

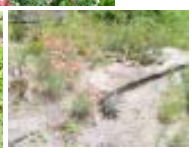
"Let's go to the Rock Garden", Darrin said. "Sure!" everyone agreed. The **T.H. Everett Rock Garden** is open only in spring and summer. There is an additional entrance fee to visit the Rock Garden. The fee is quite minimal, i.e., Adults $1.00, Seniors and children $0.50; and Under 2 free!!

I was not surprised to see why the place is considered as one of the most beautiful rock gardens in the world. This 2.5 acre rock garden features a sparkling waterfall and flowing stream, an alpine meadow, graceful woodland plants, and flowers from mountainous regions of every continent. "There are even plants from Antarctica", Darrin told us.

An eldery man, sitting on the bench seemed to be a regular visitor. He wore a broad-brimmed hat and put on his sun-glasses, well-prepared for a long relax in the sun. He nodded his head to acknowledge our presence. We tried not to disturb his peaceful moments.

Sharing solitude!

A blooming day in the Rock Garden



It was almost 1 p.m., and with the combined effect of walking in the garden and seeing the beautiful surroundings, everybody had good appetite. We all enjoyed the lunch at the cafeteria.

2 p.m., we headed to the **International Plant Science Center** where Darrin had arranged for us to meet with Dr. Kenneth M. Cameron, Assistant Curator of the Lewis B. and Dorothy Cullman Program for Molecular Systematic Studies.

Dr. Kenneth Cameron

Kenneth is a young energetic scientist. His research interests are in orchid conservation, and carnivorous plants.

Kenneth explained the scope of work at the Molecular Genetics Laboratory of which he is in charge. He told us about an interesting ongoing project called the 'Plant Genomics Consortium' which is a collaboration between the NYBG, the New York University, the American Museum of Natural History, and the Cold Spring Harbor Laboratory (CSHL). The consortium is unique not only for its structure but also for its scientific approach. They are using comparative genomics to understand the molecular basis of evolution and development in plants. The consortium is a pool of research expertise in plant systematics and economic botany with cutting-edge genomic techniques.

Kenneth also told us about some research on looking into the genes that control medicinal properties of plants, such as the 'Black Cohosh', a perennial plant in the buttercup family, native to North America. The native people used the roots and rhizomes to treat various illness and disorders, including the conditions that affected female's reproductive organs, especially the menstrual problems.

I found visiting Dr. Kenneth Cameron's laboratory most valuable. We could have talked a lot more in details of our work since we share the same interest; but we didn't have the time.

We exchanged our business cards and I invited him to come to the QSBG if he was in the region.

After saying thank you and good bye to Kenneth, we left the molecular genetic lab for the Herbarium.

The William and Lynda Steere Herbarium holds more than seven million preserved specimens of plants, lichens, and fungi; with emphasis on the flora of the New World. It is the fourth largest herbarium in the world, and the largest in the Western Hemisphere.

Here, we met Dr. Jacquelyn Kallunki (or 'Jacki' as Darrin called her), Associate Director and Curator of the Herbarium. She oversees the daily operation of the Phanerogamic section of the Herbarium and coordinates the work of its staff.

Dr. Jacquelyn Kallunki
Herbarium Curator

Jacki enthusiastically showed us around the modern impressive facility. She explained how the herbarium specimens were processed, catalogued, and also lent to others.

Apparently, the Steere Herbarium is one of the most frequently used collections in the world, not just by the Garden's staff, but also by visitors, and by researchers at other institutions via loans.

Spacious interior of the Steere Herbarium

Preserved specimens in cabinets

Our last stop for the visit was at the Children's Garden. Unfortunately, I don't have pictures to show the readers because the camera battery ran out of charge!

The Everett Children's Adventure Garden is a fantastic place for kids to learn about the wonderful world of plants and nature through hands-on indoor and outdoor activities that are fun and educational. Colorful topiaries, mazes, and interactive exhibits are combined to provide the best 'edutainment' environment ever. "Another excellent project to be considered for the QSBG educational program'', I thought.

Time to say goodbye

I remembered the Chinese proverb that says "Every party must have an end". We said goodbye to Darrin. He was such a great friend and a wonderful host. Everyone gave him a big hug. I watched him driving the cart away.

Leaving the NYBG

"So long my dear friend. 'Til we meet again". Who knows when, but when there is a will, there is a way!


Bauhinia variegata Linn.
CAESALPINIACEAE