BGO NEWSLETTER

THE BOTANICAL GARDEN ORGANIZATION

PRIME MINISTER'S OFFICE

Number 10 ISSN 1513-1696 August 2002

THE ROYAL ANNUAL VISIT

On 30 January 2002, HM Queen Sirikit, accompanied by HRH Crown Prince Vajiralongkorn, paid the 7th royal visit to the Queen Sirikit Botanic Garden.

On this occasion, HM the Queen planted an *Arenga pinnata* Merr. (sugar palm) to add to the tropical species collection.

The waterfall in the Tropical Rainforest House

Feature Article:

THE FUTURE OF BOTANIC GARDENS

by Professor Peter R. Crane, FRS

Director of the Royal Botanic Gardens, Kew, U.K. page 15

Director's Message

The Botanical Garden Organization of Thailand has been established since 1992 and the progression of the development has been recorded in the newsletter from the first volume to this present issue. The prognosis is good and that the Garden is running in the right direction and is now well-known to scientists and visitors.

The whole region of Southeast Asia is one of the places that is still very rich in forested areas and diverse in ecological habitats. Therefore, QSBG can play an integral and active role in gathering further information through on-going research and collaborative efforts concerning native and endemic species of the region and their economical uses providing for the future benefit of the local and global community.

Biodiversity is another issue that QSBG is targeting to get more involved so that the Garden will be able to strengthen its conservation activities and better serve and educate the public and visitors to its commitment to environmental awareness and sustainability. Youth training program is now also becoming an essential part of the Garden's activity and will play a more important role in future especially that for school boys and girls.

In this issue, there are many interesting news and articles that able to reveal some QSBG present activities and show the role of the Garden in various ways indicating the readiness for the future cooperation with overseas botanical gardens. I would like to thank the editorial staff of the BGO Newsletter whom kindly worked on this newsletter No. 10, enabling the accomplishment of this Garden towards the public.

Weerachai Nanakorn

Weerachai Nanakorn, Ph. D.

The BGO Executive Board

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Editorial

Welcome to the 10th issue of the BGO Newsletter. Our feature article in this issue, "The Future of Botanic Gardens", is by Professor Peter Crane, Ph.D., Director of the Royal Botanic Gardens, Kew. The article was delivered as a speech by Prof. Crane to the QSBG staff during his visit to the Garden in November last year.

Included herein is the speech in its entirety, and we thank Prof. Crane for providing us with the transcript of the speech.

It is worth mentioning that collaboration between Kew Gardens and the QSBG goes back to its early days when the Garden was known as "Mae Sa Botanic Garden". It began when Prof. Sir Ghillean T. Prance, former Director of Kew, visited the Garden. In the following year, upon the request of the Thai Government, a "Kew Team" led by Dr. John Simmons came and worked on a master plan for the first botanical garden of the country to achieve high standards and international recognition.

Admittedly, the Garden has developed significantly and been a popular destination for thousands of people who enjoy the beautiful landscapes and plant collections, but this young organization can still gain a great deal from the advice and guidance offered by well-established institutions. It was most opportune to have the insightful views of Prof. Crane whose knowledge of botanical gardens and conservation is remarkable.

It is our earnest hope that you will find the topics covered in this newsletter enjoyable and useful.

S. Vessabutr

Suyanee Vessabutr, Ph.D.

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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:

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BGO News

New Executive Board Chairman

The BGO Executive Board changed in January this year. General Montri Supaporn became the fifth chairman. It is a great pleasure for us to welcome the new chairman and the board members, as well as all members of various BGO subcommittees. We look forward to the productive years and successes to come.

The QSBG staff would like to express sincere gratitude to Dr. Rongphol Charoenphandu and the out-going committee members for their commitment while sitting as the BGO Executive Board.

General Montri Supaporn
Chairman of the BGO Executive Board

About the New Chairman

General Montri Supaporn graduated with a B.Sc. in Engineering from the Chulachomklao Royal Military Academy and was commissioned a 2nd Lieutenant in the Royal Thai Army. During his military career, he attended a number of important courses, including the Army Command and General Staff College where he graduated first in a class of 200 students. As a result, he was selected to attend the U.S. Army Command and General Staff College at Fort Leavenworth, Kansas, where he graduated with honors. He also attended Class 399 of the National Defence College in Thailand. General Montri has always maintained a strong interest in military affairs, law, political science, and public administration. Consequently, he obtained a law degree from Thammasart University; and a Master's Degree and a Doctorate in Political Science from Case Western Reserve University, Ohio, U.S.A. As a military officer, he has held a number of important positions; and currently holds the position of Chairman of the Advisory Board, Supreme Command Headquarters. He is also a Special Officer attached to the King's Guards.

During 1-4 April 2002 the BGO Executive Board, led by General Montri Supaporn visited Kunming and Xishuangbanna Botanical Gardens, PRC.

In front of Xishuangbanna Botanical Gardens.

The BGO delegation with Deputy Director of Kunming Botanical Garden (center).

On 25 January 2002, HRH Princess Mahachakri Sirindhorn paid a private visit to the QSBG Herbarium, and the Database Center, Technical and Research Department.

HRH Princess Mahachakri Sirindhorn was greeted on arrival by Gen. Montri Supapom, Chairman of the BGO Executive Board.

Dr. Weerachai Nanakorn, QSBG Director (left) reporting on the database system of the Garden.

The Database Center has served as a reference resource for botanical information, especially about flora of northern and northeastern Thailand.

Her Royal Highness having a conversation with Mr. Sithar Dorji, a visiting scientist from the Royal Botanic Garden, Bhutan.

Her Royal Highness at the herbarium collection.

The QSBG Herbarium (est. 1997) is the third largest herbarium of the country with its collection of over 20,000 specimens at present. The collection has specimens from different parts of the world but with emphasis on plants of southeast Asia.

HRH Princess Galyani Vadhana, Princess of Narathiwat, paid a private visit to QSBG on 24 February 2002. Dr. Weerachai Nanakorn, QSBG Director, attends to HRH on a walk through the Begonia collection.

HRH Princess Soamsawali graced the opening ceremony of the Annual Flower Show held in August last year at the Hilton International Bangkok, at Nai Lert Park, where QSBG participated in flower arrangement exhibition.

Deputy Prime Minister Pitak Intaravitayanant visited QSBG on 28 October 2001. The picture shows Mr. Pitak having an interest in the herbarium work.

On 12 July 2002 Mr. Uthai Pimjaichon, (center) Chairman of the Parliament, visited the Garden. Mr. Vallobh Sukont, QSBG Deputy Director, led him around the plant collections.

Mr. Somsak Thepsuthin, Minister to the Prime Minister's Office responsible for the Tourism Authority of Thailand (TAT), visited the Garden on 27 July 2002.

To commemorate HM the Queen's 70th birthday anniversary, the BGO organized "The Second Symposium on HM Queen Sirikit and Biodiversity Conservation of Thailand" during 8-9 August 2002 at the Imperial Mae Ping Hotel which included a study tour at QSBG. Dr. Krasae Chanawongse, Minister to the Prime Minister's Office responsible for the Botanical Garden Organization presided over the opening ceremony. Like the previous year's successful event, the second symposium received much interest from the general public.

After attending the symposium, General Montri Supaporn (foreground), Chairman of the BGO Executive Board, along with the Subcommittee for Scientific Affairs, went to the Royal Agricultural Station at Doi Ang Khang, Amphur Fang, Chiang Mai Province. There, they observed ornamental plant collections and nursery management of the King's Royal Project.

M.L. Charuphant Thongtham (second from right), BGO Executive Board member, who has been working with the King's Royal Project for more than 20 years led the delegation to see the various plant collections.

QSBG Activities

The 6th Parataxonomist Training

The Parataxonomist Training Program organized annually by the Technical and Research Department has proved to be a popular one. More and more people have shown their interest in partcipating each year.

This year, the 6th Parataxonomist Training, with the theme of "Medicinal Plants and Local Wisdom", was organized during 13-16 May at the Queen Sirikit Botanic Garden and field studies were undertaken within the Garden's proximity. The number of participants increased from 50 to 70 people due to a large number of applicants. Persons interested in future Parataxonomist Training Programs please read the information in the box above.

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 effectivenesss of field studies, the workshop will normally accomodate not more than 50 participants. Those who are interested please contact the Education Section, Technical and Research Department.
Tel: (053) 298-171 ext. 1639 or 1208

National Agricultural Fair

Queen Sirikit Botanic Garden participated in the National Agricultural Fair hosted by Chiang Mai University at Mae Hiae Campus during 25-31 January 2002. The QSBG's exhibition on "Thailand Biodiversity Resources and Conservation" won second place.

Support for the Army

On 15 June 2002, QSBG staff donated food supplies to soldiers of the Thai Army who were on duty at the borders of Chiang Mai Province.

Plant Survey

Earlier this year, Mr. Santi Watthana, a QSBG Botanist, led a plant survey team to the south of Thailand. On 14 January, they visited Ban Tham Phung, Klong Phanom National Park, Surat Thani Province, where *Rafflesia kerrii* Meijer was found blooming (more about *Rafflesia kerrii* Meijer on page 13.)

National Horticultural Fair

QSBG participated in the National Horticultural Fair During 28-30 May 2002 at Charoen Thani Princess Hotel, Khon Kaen Province. The event was hosted by Khon Kaen University.

Future Plant Collection Center for the Northeast

The Scientific Affairs Subcommittee had their third meeting on 27 May 2002 in Khon Kaen Province. Following their meeting, they went to visit the site of the future northeastern plant collection center at Amphur Muang Phon about 90 km south of Khon Kaen Province.

Staff Notes

Congratulations

To the following post-graduates:

* Mrs. Tharntip Thogsorn (Co-ordination Department) who received her M.Sc. in Political Science from the National Institute of Development Administration (NIDA).
* Mr. Chatthong Chuachan (Garden Department) who received his M.Sc. in Agricultural Extension from Mae Jo University.
* Mrs. Songsri Pipitkul (Technical and Research Department) who received her M.Sc. in Technology of Environmental Management from Mahidol University.
* Miss Prapawalai Kochsila (Public Relations) who received her M.A. in Tourism Industry Management from Chiang Mai University.

To the two botanists of the Technical and Research Department:

* Mr. Piyakaset Suksathan and Mr. Santi Watthana who both obtained scholarships granted by the Capacity Building in Biodiversity Project (CBBP) supported by DANIDA, to pursue their Ph.D. studies in plant systematics at Aarhus University and the University of Copenhagen, respectively. Mr. Suksathan's thesis research is entitled: "Systematic Studies in *Phrynium* group (MARANTACEAE) in southeast Asia", and Mr. Watthana's is: "Systematics and Ecology of the Genus *Pomatocalpa* (ORCHIDACEAE)".

Volunteers

We would like to express our sincere gratitude to the following volunteers for their contributions:

Sarah, Jeff and Fay

* Andrew Nottingham, a British native who volunteered through the arrangement of Involvement Volunteer - Thailand. Andrew spent two weeks during 12-25 December 2001 at the Technical and Research Department helping out in various things. His article about his experience at the Garden will appear on the Garden website before too long.

* Fiona Williams and Todd Smith who volunteered through the arrangement of the Endangered Flora & Fauna Conservation Association (EFFCA). Fiona contributed her extensive experience in journalism towards the content of the Garden website, while Todd helped out the Garden Department in landscaping design.

* Sarah and Fay Alikhani, and Jeff Johnson who were on their summer break from the University of British Columbia, Canada. They helped out on the layout and proof-reading of this Newsletter.

Mr. Chaichart Buraphacheep

Farewell

Mr. Chaichart Buraphacheep has resigned recently from his post as Deputy Director for Administration. He was with the Queen Sirikit Botanic Garden for almost two years. The QSBG staff would like to bid him farewell and wish him the best of luck.

Research Grant and Scholarship

On 27 January 2002, the Sanga Sabhasri Research Foundation (SSRF) granted a research fund of 210,000 Baht to a research team of King Monkut's University of Technology Ladkrabang, to conduct a study on "Development of Natural Product Herbicides from *Aglaia odorata* Leaf".

A scholarship of 17,000 Baht was also granted to a graduate student of the Department of Agricultural Economics, Chiang Mai University, to pursue a Master's degree on "The Evaluation of Indigenous Medicinal Plants Having Veterinary Potential Conserved at the Queen Sirikit Botanic Garden, Chiang Mai Province".

Associate Prof. Vachira Sabhasri, SSRF Vice President (right), presenting the awards to Dr. Patchanee Charoenying (above) and Miss Supakarn Hanbang (below).

Donation

A new gazebo in front of the Native Orchid Collection was donated by the Foundation last year.

Postcards and Calendar

A series of "Thai wild flowers" postcards and calendar are available. Proceeds from the sales will go towards promoting the goals of the Foundation. If you want to support the SSRF activities, please place your orders to:

The Sanga Sabhasri Foundation
c/o Miss Sineenat Honhuta
Box 7, Mae Rim
Chiang Mai 50180
Thailand

Botanical News

Everniastrum scabridrum Elix & Pooprang:
A new lichen species from Thailand.

Ecology: Found on *Pinus kesiya* in deciduous forest, ca. 1000 m; and on *Diospyros* sp. in plantation, ca. 1400 m, at Queen Sirikit Botanic Garden.

Distribution: Several localities in Chiang Mai Province, northern Thailand.

[Reference: Pooprang, T.; Boonprakob, K.; and Elix, J.A. 1999. New Species and New Records in the Lichen Family Parmeliaceae (Ascomycotina) from Thailand. Mycotaxon LXXI: pp. 111-127.]

About Lichens

A lichen is composed of a fungus living symbiotically with an algae. They are not parasitic to the plants they grow on. The algae part can produce its food by photosynthesis, while the fungus makes up the mass of the lichen's body.

Lichens are distributed from arid lands to the tundra regions.

Identification of lichens can be done by observation of the spore structures and testing the chemical products contained in the thalli.

New Record for Thailand found at QSBG

Family PARMELIACEAE:

1. *Bulbothrix hypochaea*
2. *B. meizospora*
3. *B. queenlandica*
4. *Hypotrachyna physcoides*
5. *Parmotrema abessinicum*
6. *P. incrassatum*
7. *P. overeemii*
8. *P. pseudonigherrense*

Family TRYPETHELIACEAE

9. *Pyrenula anomala*

[Boonpragob K. 2002. Personal Communication.]

Wrightia sirikitiae D. J. Middleton & Santisuk (APOCYNACEAE)

A species of *Wrightia* was collected by Profs. Tem Smitinand and Thawatchai Santisuk of the Royal Forest Department, in April 1972. It was not formally described and referred to simply as *Wrightia* sp. After several visits to the original collection site, it was eventually refound in February 2001 and confirmed as a new species in August of the same year. This plant is endemic to Saraburi Province, and considered as a rare and endangered species. The specific epithet is given in honour of HM Queen Sirikit of Thailand.

Reference:
Middleton, D.J., and Santisuk, T. 2001. A New Species of *Wrightia* (Apocynaceae: Apocynoideae) from Thailand. *Thai For. Bull.* (Bot.) 29: 1-10.

Rafflesia kerrii Meijer (RAFFLESIACEAE)

A full bloom of Rafflesia kerrii *Meijer.*

Open flower dimension: 50-70 cm in diameter

Distribution: Thailand and Peninsular Malaysia

The first collection was made by A.F.G. Kerr in 1927 in southern Thailand.

Present status: Rare

Mature buds.

Reference:
Meijer, W., and Elliot, S. 1990. Taxonomy, Ecology, and Conservation of *Rafflesia kerrii* Meijer in southern Thailand. *Natural History Bulletin of the Siam Society* 38: 117-133.

KEW Director' s visit to QSBG

During 24 to 28 November 2001, Professor Peter R. Crane, Director of the Royal Botanic Gardens, Kew, U.K., was invited to visit Queen Sirikit Botanic Garden.

From left to right: Dr. Crane, Dr. Weerachai, and Mrs. Crane, at the QSBG Visitor Center.

Prof. Crane's schedule of activities at QSBG included a visit to the Technical and Research Department and a tour of the Garden Department's facilities. A trip to Doi Inthanon National Park was also arranged by the Garden while the Chiang Mai University organized a visit to the Mae Sa Mai Reforestation Project.

At the Database Center.

Prof. Crane was granted the opportunity to meet with HRH Princess Maha Chakri Sirindhorn on 27 November 2001 before proceeding to Bangkok to visit King Rama IX Garden and the Royal Forest Department Herbarium. Prof. Crane left for Singapore on 28 November for an official visit to the National University of Singapore and the Singapore Botanic Gardens.

The nature trail at Gew Mae Pan, Doi Inthanon National Park.

The nature trail at Doi Ang-ga, Doi Inthanon National Park.

On 26 November 2002, Professor Peter Crane, Director of the Royal Botanic Gardens, Kew, was invited to give a speech to the staff of Queen Sirikit Botanic Garden. Prof. Crane's contribution was an educated and constructive perspective worthy of our feature article.

The Future of Botanic Gardens

Professor Peter R. Crane, Ph. D.
Director, The Royal Botanic Gardens, Kew, U.K.

Thank you for the opportunity to visit the Queen Sirikit Botanical Garden and to speak with you today. You had asked me to give a perspective on the future of botanic gardens, which I am very pleased to do. However, because we are all victims of our own experience much of what I will say will draw on my thinking about Kew, and the conclusions that we have come to about the future direction of our work. Unfortunately this introduces some limitations. It would be wrong to assume that all botanic gardens should seek to emulate Kew. Nevertheless, I hope that some of our experiences in the UK may have applicability to your situation in Chiang Mai. Similarly, I would hope that some of what we do at Kew would be modified in the light of what I learn from my visit to Thailand.

Changing Perceptions: Changing Missions

One interesting place to start in thinking about the future of botanic gardens is to examine the transition that has occurred in the world's zoos over the last two decades. I think in many countries around the world, for example in America and in Europe, the concept of the zoo has evolved very rapidly from a simple collection of curious and exotic animals, to an organisation that is actively involved in conservation. I believe that there are the beginnings of a similar process of evolution in botanical gardens, but we have perhaps not embraced this process as vigorously as we should. Zoos had to embrace the conservation agenda with a sense of urgency because they had become something of an anachronism. It had become difficult to justify keeping many animals in zoo conditions unless there was a broader goal than simple curiosity. That broader goal, it quickly was realized, must be the conservation of biodiversity, and education about the importance of diversity in the animal kingdom. Botanical gardens do not stir up the same emotions as zoos. Captive mammals evoke stronger passions than "captive" plants, but nevertheless we in botanical gardens also need to think hard about our relevance. Furthermore, asking "How are we relevant?" is not just an academic question. It is

a very pragmatic question because it comes immediately back to, "Why should we be supported by the public, by Government, by corporations, or by foundations?" We need to be able to articulate the importance of our work, and convince people that they should care about us and should support the work we do. For these reasons, over the last two years at Kew we have focused on the question of our relevance. Perhaps unsurprisingly we have come to the conclusion that botanical gardens have great relevance in contemporary debates about the future of biological diversity and specifically the sphere of plant diversity. At Kew, we now think of ourselves as a plant diversity institution. The question now, is "How should this be manifested in practical terms?"

The Royal Botanic Gardens, Kew, U.K.

The Botanic Garden as a Plant Diversity Institution

It's easy to say we are a plant diversity institution, but what does that mean? In what ways should the institution be different from what it was in, say the 1950s? What does being a modern biodiversity institution really entail? Along what trajectory should institutions, like Kew, continue to evolve?

Since I came to Kew, we have been thinking a lot about how we move forward and what we should be doing to enhance our relevance. One thing that we have done, very deliberately, has been to de-emphasize two words, which have sometimes been used too freely in the past in connection with museums and botanical gardens. In the 1980s and the 1990s many scientists working in institutions like museums and botanical gardens quite rightly emphasized the resurgence of systematics – the science of biodiversity. However, as part of our new vision at Kew we don't very often use the word **systematics** or the word **taxonomy**. This is not to say that we believe systematics and taxonomy are not important scientific disciplines – but these two words are too narrow as a description of the totality of a modern botanical garden. Instead, at Kew, we see ourselves as being concerned with plant diversity. To me, this is rather broader, less specific and more descriptive than saying that we are devoted solely to the systematics or taxonomy of plants.

At Kew our mission statement speaks of increasing knowledge and increasing understanding. Increasing knowledge we understand as research: how we generate new knowledge. By increasing understanding we mean education: how we enhance public understanding through interpretation and education.

The Herbarium at Kew.

The link between research and education is built in to many museums and botanical gardens around the world. For example, if you go back to the Charter of the Smithsonian Institution in the United States, which was founded in the nineteenth century, you will see that it speaks of the "increase and diffusion of knowledge". These same elements – research and education – are also inherent in modern research universities. The fundamental purpose of universities is teaching: there is no real reason why they should also undertake research. But they have the same notion that we share at Kew: there are benefits to having research and education done in the same organisation. The concept of the research in large modern universities is that you not only teach people what we know, but also how we come to know it. I believe that this is also what we should be trying to do in a modern research botanic garden. This then is the way that we are starting to think about Kew, as having two main strands to its mission which are intimately interconnected: a research mission – which is about building knowledge of plant diversity, and an education mission – which is about building understanding of plant diversity.

Finally, Kew's Mission Statement also speaks about "enabling better management of the earth's environment". This introduces a further key element – the importance of plant conservation and the sustainable use of plant resources.

Science Programmes in a Plant Diversity Institution

As a result of our recent strategic planning within Kew's science programmes we recognize five main groups of activities.

The first of these focuses on **Collections**. As you do here at the Queen Sirikit Botanical Garden, at Kew we have many collections, of which the herbarium collections, and the living collections are the most obvious. In fact there are about 19 different collections at Kew: the library collections, the archive collections, the histology collections, the DNA collections, the seed collections and so on. These collections are in essence the samples and raw materials that we use for studying plant diversity.

The second of Kew's science programmes we refer to as **Baseline Plant Diversity Research**. This is the kind of essential alpha taxonomy that stands at the core of many of the programmes of large and historically important herbaria such as Kew. The products of this work include checklists, basic Floras and basic kinds of monographs that seek to answer the following key questions: "What are the elements of plant diversity?" "Where do they grow?" "How are they distributed?". These questions are traditional for herbarium taxonomy – but they still

have great contemporary relevance, especially with respect to the overall goal of plant conservation.

The third of Kew's science programmes we call **Comparative Plant Biology**. In some ways this kind of research is more synthetic than the baseline work. It includes for example major synthetic monographs and comparative studies of all kinds. In part it is also quite fundamental research, answering questions about how different aspects of plant biology differ across the broad sweep of plant diversity. For example, a little over a year ago we had the first complete genome of a plant published – for the small crucifer *Arabidopsis*. From the standpoint of comparative biology an important question is, "How do the insights that we have gained from studying *Arabidopsis* apply to the hundreds and thousands of other species of flowering plants?" Similarly "How can inferences on pollination biology or development or structure, derived from the study of an individual taxon, be extrapolated more broadly across plant diversity?".

The fourth of Kew's science programmes focuses on the **Sustainable Utilization of Plant Resources**. This includes work in economic botany, describing the basic uses of plants from around the world. Looking to the future, it also includes discovering new uses for plants, ranging from low tech ways of using species for famine food to searching for active chemical compounds in plants that are useful as drugs or insecticides.

The fifth and final science program focuses on the **Conservation of Plant Diversity**. Through the CBD of course, we recognize that these last two areas: sustainable utilization and conservation are intimately interconnected. Nevertheless we feel very strongly that in the context of Kew it is vital to give the conservation of plant diversity much greater prominence than it has had in the past.

Summarising these five programmes we describe ourselves as fundamentally a science-based institution devoted to plant diversity – how it came to be, in an evolutionary sense, what its current status is, and how it can be conserved and used for human benefit in the future. In turn, this view of Kew is leading us to make some specific changes in the way that we do things and the ways that we think about our mission.

Activating a New Approach: Education

If the modern botanic garden is a plant diversity institution, and if it has plant diversity and its conservation and use at its core, then these areas need to be a key focus of the messages that must be communicated to visitors. But this is not as straightforward as it looks. If we embarked on a publicity and marketing campaign that simply invited people to come to Kew to be educated or to learn, it would probably be singularly unsuccessful. For many people this just sounds too earnest – or even boring. We must recognise that people have many other things that they can do – other than visit the

botanic garden. They can go shopping, they can watch the football on the television, they can do a variety of other things and we would be foolish not to recognise that we are in a competitive situation with respect to the public's leisure time. Quite simply the public have many options – so the garden must be an attractive place that they want to come to. However, when they come, then there is an opportunity to get across key messages in a subtle, almost subliminal in a way. To do that we need to think very carefully about what those messages are.

Museums have known for a very long time, that if they want to get across a particular message they first have to clearly define in their own mind what that message is. As they design the exhibit they then need to make sure that every label and every piece of the exhibit supports the overall message. Very few botanical gardens, including Kew, have such a sophisticated view of their educational strategy. There is no overall interpretation plan for Kew. There is no overall interpretation plan for the Palm House. There is no overall interpretation plan for the conservation area. There is no overall interpretation plan for the order beds or the grass garden or the rock garden. All we have – like most botanic gardens – are scattered labels. Some labels just give you the name of the plant while others may give you two or three paragraphs. Cumulatively, however, they don't add up to a proper educational programme.

Against this background we are starting now to think much more carefully about what the educational curriculum should be for Kew as a whole, and what the interpretation plans should be in different parts of the garden. We need to start to think: "O.k. we've got the Palm House, what is the message that we are trying to get across?" We can then set up the individual labeling in the Palm House to make sure that that message is delivered clearly and efficiently. This is a different way of thinking, it's not good enough to just put a label up with a name on it, or to put up some interesting facts about the double coconut. We need something a little bit more holistic and strategic than that.

Activating a New Approach: Conservation Begins at Home

A further realisation that we've come to at Kew is that if one of our primary goals is conservation, then conservation action should begin at home – on the botanical garden site. At the southern end of Kew, we have a very nice conservation area. We now realise that we should use that to get across messages about the conservation of UK biodiversity. At Kew the busiest weekend of the year is for our annual bluebell festival. The bluebells are native British plants, they're not exotic. They are not the Titan Arum and, they are not the Giant Amazonian Waterlily. When we have 25,000 people come to the bluebell weekend, we should make sure they go away with positive messages about what they can do for UK biodiversity. So, to translate that to the Queen Sirikit Botanical Garden, I think you have a wonderful opportunity to communicate to the public (both locals and

tourists) what is wonderful about native plants. Through the forest that comprise part of your garden you can show how valuable and important the biodiversity of northern Thailand is for the future. At Kew we also use the word biodiversity – not just plant diversity – because we think that the animals are very important too. For example, we have badgers on the site, and we will be doing more interpretation of badgers, bats, birds, butterflies, insects, and newts in the coming years. All of these organisms are parts of the same system as the plants. What we need to be teaching children is that all of these things are interconnected and function together as a whole. We shouldn't be reinforcing the notion that you go to the zoo to see the animals, and you go to the botanical garden to see the plants: that the animals and plants can somehow exist independently of each other.

Titan arum (Amorphophallus titanum)

Bluebell (Hyacinth non-scripta)

Particularly, when we talk about native biodiversity I think we have a real opportunity to talk about plants and how they interact with animals. There is also the opportunity to talk about invasive species. For example, among our bluebells, we have an invading species of Umbelliferae. We haven't yet sent those 25,000 people who come to see the bluebells away with the clear message about how important invasive species are, and how damaging they are to the environment - not just in the UK, but all over the world. This is a missed opportunity. We have a real living example in front of the eyes of our visitors, which links British biodiversity and the importance of alien plants. This will have much more impact than telling an abstract story about invasive species or using an example from Hawaii or some other exotic location.

The point that I am trying to make is that if we think that plant diversity and its conservation is important for modern botanic gardens then that message should start at home.

At Kew we are now doing more on UK biodiversity because we think that's one of best ways that we can communicate with our local audience. From an educational point of view, it also provides the opportunity to deliver a more ecological message. It allows us to link our traditional interest in plant diversity with an improved understanding of how ecological systems can be conserved, restored and managed in a sustainable way for the future.

Activating a New Approach: Science for Conservation

In terms of the science needed for conservation, botanical gardens are well known for their role in *ex situ* conservation: both through the *ex situ* conservation of plants in the living collections and also through initiatives such as Kew's Millenium Seed Bank. Such a Noah's Ark approach, which simply ensures survival, is fine as far as it goes. But if botanic gardens stop there then I believe that they are not really fulfilling their potential. Keeping living plants in the garden for purposes of conservation is important, but it is very limited in comparison to utilising them more broadly not only for exhibits and interpretation, but also for reintroduction and restoration programmes.

In the case of individual living plants growing in the safe-haven of the garden, it's probably only possible to attempt small-scale reintroduction programmes. Nevertheless these can be very important. For example, we are involved in reintroducing the native British lady slipper orchid *Cypripedium* back into its few native localities in Yorkshire. We grow the plants up in the micropropagation unit, get them established, and then plant them out in the wild using genotypes that are as close as possible to those which exist in the wild. We are also working on similar reintroduction projects in other parts of the world.

At broader scale ecological restoration too I think is important, such as the example that I saw at the Forest Restoration Research Unit (FORRU) near the Queen Sirikit Garden this morning. The seed bank that we are developing at Kew needs to connect with these kind of initiatives. To be useful as a bank you not only need the capacity to make deposits, but you also have to make withdrawals. It is important for the Millennium Seed Bank project that we are able to make withdrawals that are able to support restoration and reintroduction programmes. I am very interested in how *ex situ* conservation, which is one of the real strengths of botanical gardens, can be used in a practical sense to become still more relevant through increased reintroduction and restoration efforts.

British lady slipper orchid (Cypripedium calceolus)

In terms of other science programmes. We have a strong programme in cytology and genetics at Kew and this is also useful for conservation. Gradually these initially rather academic programmes evolved into quite a strong conservation genetics capability. This simply would not have been possible without basic knowledge and capacity in molecular genetics. We can now look, for example, at the stocks of a particular rare species of snowdrop in European gardens and ask: are they all genetically the same or are they genetically divergent? We can also determine which are the most important ones to conserve in gardens and which are the most important ones for reintroduction.

We also need to start to think about the future role of the herbarium taxonomists, and what they can do in terms of facilitating the evolution of the botanical garden toward a 'broader plant diversity enterprise'. One of the things that we're asking our herbarium taxonomists to do now is whenever they write a species account to at least attempt to comment on the likely conservation status of that plant in the wild. It is simply not efficient to write species accounts and then 10 years later to seek to respond to a question about the conservation status of that species. It is much easier to just put that in the flora or in the monograph as it is being written. The flora-writer or monographer, in most cases, will be the person who knows more about that species than anyone else in the world. So they must, even if with caveats, say what they feel about the status of that species, how many times that it has been collected, when it was last collected and what is known about its ecological status in the wild. All we are asking is for a very simple modification to a current work practice.

Developing new tools for conservation is also terribly important. When I was in Chicago we had a very strong ornithology group. Birds are very useful for monitoring the status of forests and forest fragments in the wild. But it turned out to be much more productive to make a CD of all the bird songs, and then to train people in the field to identify the birds by their songs – rather than to show them the dead specimens in the museum. Similarly for plants we need more creative approaches to providing tools to enable conservation action to take place. For example, Robin Foster, one of my former colleagues whom some of you might know, is an outstanding field botanist and ecologist. He has developed the concept of the Rapid Reference Herbarium, designed not for systematists, but for ecologists. So, instead of having a hundred specimens of a particular species, you have one good specimen of every species in a separate collection. In this way a specialist who is working on an ecological issue, for example, feeding in some kind of monkey, can come in with a plant fragment, quickly go through the reference collection and at least have a chance of making a determination. Similarly, an ecologist doing basic ecological work can use the Rapid Reference Herbarium to identify his or her plant specimens in the wild.

Such an approach has very useful practical consequences for ecological work, because to do any kind of *in situ* conservation you must be able to identify the plants that occur in a specific area.

We often use the need for identification as the justification for herbarium taxonomy, but we rarely do a lot about it. Constructing a complex key is very valuable discipline, but the result is often exceedingly difficult to use in the field, especially when fruiting or flowering material may not be available. Keys are also completely inpenetrable for non-specialists. With the Rapid Reference Herbarium you can quickly xerox the sheets from a particular area to produce a cheap rapid field guide. Using simple picture matching you can then make a start on identifying unknown plants based on their leaves. Also, of course, once you have a synoptic collection constructed, you can digitize it and make it available in electronic form. So new plant diversity tools for ecologists, and the development of closer working relationships between systematists and ecologists, are both things that I think are very important.

Conclusions

I hope that this short talk has given you a sense of some of the things that we're trying to do at Kew and the new approaches that we are trying to take. We have not solved all the problems. We're still thinking them through, and still have a great deal of work to do. But these are some of the directions in which we are heading. I firmly believe that botanical gardens are very very important for the future, but to realise their full potential will require flexibility of thought and a willingness to continuously modify and update the models that we have inherited from the past. Our ideas of what constitutes a botanic garden must continue to evolve.

I think the facilities that you have at the Queen Sirikit Botanical Garden, and the opportunities that you have here, are truly remarkable. You have better facilities and greater potential than I've seen at almost any botanical garden in the world, including Kew. Also, because you are just getting started, you have a wonderful opportunity to do things differently and invent new ways of defining and approaching your mission that will enhance your relevance. In particular you are very well positioned to have a major impact on plant conservation, not only here in Thailand but also more generally in south eastern Asia and also in the World.

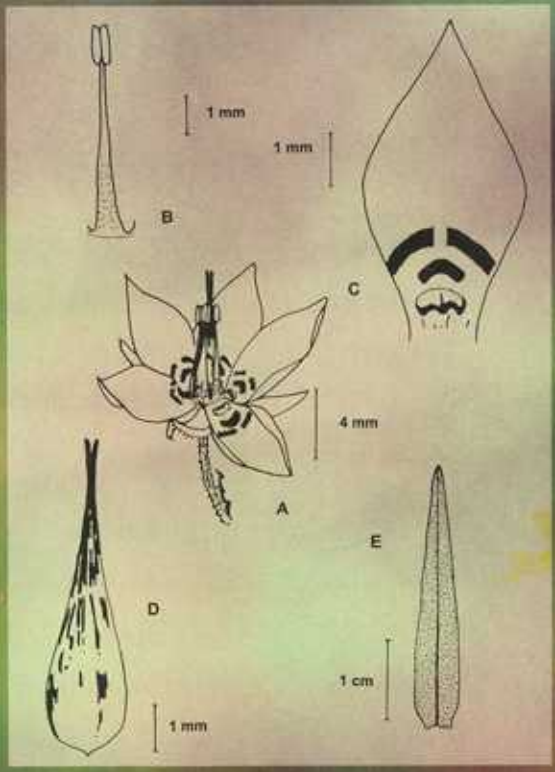
I wish you all the very very best of luck with your endeavors, and to the extent that I or Kew can be helpful, we hope that we can be. Thank you so much for having me here.

About Professor Peter Crane, FRS

Professor Peter Crane became the Kew Director in August 1999. Before joining Kew Gardens, he was Director and Vice President of Academic Affairs at the Field Museum of Chicago. He was also a professor in the Department of Geophysical Sciences at the University of Chicago.

Swertia chiangdaoensis P. Suksathan
GENTIANACEAE

There have been only three species of *Swertia* ever found in Thailand. This new discovery is clearly distinct from the rest. It is an annual herb found on exposed summit grassland at an altitude of 2,225 m on Doi Chiang Dao, Chiang Mai Province. Although presently known only from the type locality, it is unlikely to be endemic to Doi Chiang Dao or even to Thailand.



Swertia chiangdaoensis P. Suksathan: A. flower; B. stamen; C. corolla lobe; D. pistil; E. leaf.

[Reference: Suksathan P. 2001. A New Species of *Swertia* (GENTIANACEAE) from Thailand. Edinb. J. Bot. 58(3):429-434].