THE BOTANICAL GARDEN ORGANIZATION
PRIME MINISTER'S OFFICE

NEWSLETTER

Number 05 June, 1997

Her Majesty Queen Sirikit paid a visit to see the living collections of the Garden on February 11, 1997. During Her Royal visit, Her Majesty was also interested in the progress of various research projects, including the *Diversity of Fireflies in Thailand*, a project under Her Royal initiatives (p. 22).

BOARD MEMBERS

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HRH PRINCESS MAHA CHAKRI SIRINDHORN'S VISIT

Her Royal Highness Princess Maha Chakri Sirindhorn presided over the opening ceremory of *the Symposium on Plant Resources of the Himalayan Foothills* on November 18, 1996, at Queen Sirikit Botanic Garden, Mae Rim, Chiang Mai.

HRH Princess Maha Chakri Sirindhorn visited the Information Center to see the poster presentations on various research projects (left) and also visited the living collections of the Garden (right).

FAREWELL AND WELCOME

FAREWELL

Professor Sanga Sabhasri served as Chairman of the Botanical Garden Executive Board from the establishment of the organization in 1992 to October, 1996. Through his vision and commitment, Professor Sabhasri was instrumental in the development of the Queen Sirikit Botanic Garden.

All BGO staff are grateful and pleased to know that Professor Sabhasri is presently involved as our Honorary & Advisory Board Member. We wish him good health and look forward to his continuing support.

We would like to bid farewell to the outgoing members of the BGO Executive Board, namely Dr. Chamlong Phengklai, M.L. Charuphant Thongtham, Professor Nakorn Nalampang, and Mr. Suwit Wangpushkane; whose contributions toward the development of the Garden are tremendous. We would like to express our gratitude for their commitment and wish them every happiness.

The BGO staff were sad to say farewell to Mr. Nattavood Prasertsuwan who resigned from the post as Deputy Director last October. During his three years of service, he performed his duty with dedication. Mr. Prasertsuwan was elected as a member of parliament in November, 1996. *Congratulations!* We wish him every success in his new career.

WELCOME

The BGO staff would like to welcome Mr. Likit Therdsteerasukdi who was appointed Chairman of the Executive Board, effective from October, 1996.

Mr. Therdsteerasukdi is the permanent secretary of the Prime Minister's Office. With his extensive experience in management and planning, we look forward to his support and many more productive years to come.

We also wish to welcome new board members:

1. Khunying Suchada Sripen, Deputy Rector, Kasetsart University; and Associate Professor, Department of Botany, Faculty of Science, Kasetsart University.

2. Mr. Wichai Suwanaratana, Deputy Secretary General (Administrative Affairs), Prime Minister's Office.

3. Police General Visut Kittivatana, Deputy Director-General (Administration), Royal Thai Police Force.

4. Dr. Pongsak Angasith, Associate Professor and Dean, Faculty of Agriculture, Chiang Mai University.

QBG ACTIVITIES

The QBG's Information Center has been in operation since November, 1996. The two-storey building, designed in a typical Lanna (northern Thai) architecture; is located near the Garden's entrance. Visitors and tourists will see botanical displays and receive useful pamphlets and publications free of charge. Future facilities will include multimedia displays and computerized information services, a souvenir shop and a restaurant.

Other major buildings of the QBG which have been in use since November 1996, are the Administration Building, and the Orchid Nursery. At the nursery, more than 300 species of native orchids have been collected and identified. The nursery will accommodate a larger collection of orchids in the future, and plans for it to become the center for orchid research for the Asia-Pacific region are being considered.

The construction of the QBG Herbarium has been completed. The building also houses a botanical library and a computer database center.

A temporary tissue culture laboratory has been set up for training staff and visiting students. At present, research projects are undertaken on a germplasm collection and the micropropagation of some rare and endangered Thai flora.

The Botanical Garden Executive Board Members and some QBG staff, led by Professor Sanga Sabhasri, former Chairman, visited Khunming and Xishuangbanna Provinces during October, 1996.

Dr. Weerachai Nanakorn, visited the Australian National Botanical Garden (ANBG), Canberra, Australia, during 27 Mar-2 Apr, 1997. Possible collaborative work between the QBG and the ANBG is expected in the near future.

The Third Parataxonomist Workshop was organized during 12-16 May, 1997, by the Botanical Garden Organization, and co-sponsored by the National Center for Genetic Engineering and Biotechnology, Ministry of Science, Technology and Environment. The workshop was held at the Information Center, QBG. There were 54 participants from government offices, universities, primary and secondary schools, and the private sector.

Staff Training

Two QBG botanists attended overseas training programs as follows:

1. Ms. Surangraj Indhamusika attended a Botanical Internship Program, at the Australian National Botanical Garden; and Orchid Research Programme, at the Center for Plant Biodiversity, Canberra, Australia, during 4 Jan-1 Apr, 1997.
2. Mr. Charun Maknoi visited the Tsukuba Botanical Garden and the Kyoto Botanical Garden, Japan, to observe the management of the gardens and their herbaria during 1-28 Feb, 1997.

VISITORS

Mr. Chuan Leekpai, former Prime Minister and Leader of the Democrat Party, visited the QBG on Feb 22, 1997.

Mr. Rakkiat Suktana, Minister, Prime Minister's Office, visited the QBG on April 26, 1997, to observe the progress of the development of the Garden. On this occasion, Mr. Suktana met with new executive board members during the monthly meeting and expressed his wish to support the activities of the Garden.

H.E. Monsieur Gérard Coste, Ambassador of France to Thailand, visited the Queen Sirikit Botanic Garden on Jan 6, 1997. Accompanying him were executive members of the Attaché de Coopération Scientifique et Technique (ACST). The purpose of the visit was to initiate a collaboration between the ACST and the QBG.

During 11–27 May, 1997, the QBG had the opportunity to welcome a research group from the Department of Sciences, Ram Khumhaeng University, Bangkok, Thailand; and the Department of Biology, University of California at Los Angeles (UCLA), U.S.A. The group comprised professors, research assistants, and students, making a total of 34 participants who came to conduct several research projects on biodiversity at the Garden.

Professor Kai Larsen of Aarhus University, Denmark, visited the QBG during 13-16 May, 1997. A renowned plant taxonomist, Professor Larsen is a member of the BGO Honorary and Advisory Board. During his visit, Prof. Larsen gave presentations to QBG botanists and UCLA visitors on the early exploration of Thai flora, and Zingiberaceae in Thailand.

Over the past 6 months, the QBG has received more than 1,000 students from various schools, mostly in Chiang Mai Province. We are glad to see their enthusiasm and interest in botany. Their concerns on environment and conservation have been expressed which encourages us to be even more committed to preserve our precious resources for them and future generations.

An extract from a letter of appreciation sent to us is as follows, and many thanks to the students of Nakorn Payap International School, Chiang Mai, for their correspondence.

".....Thank you for showing us around the botanical garden. It was quite interesting, we learned a lot. The stroll through the garden was what we enjoyed most. The scenery was gorgeous, the parasite that grew on the tree were very fascinating, and the flowers and orchids were beautiful. We just want to say that we appreciate the effort you put in preserving the environment. What we saw that day revealed to us the dedication that was put into the construction of the botanical garden....."

Plant Resources of the Himalayan Foothills Symposium

The Botanical Garden Organization, Prime Minister's Office, organized a symposium on *Plant Resources of the Himalayan Foothills* during November 18–19, 1996, at the Queen Sirikit Botanic Garden and the Holiday Inn Hotel, Chiang Mai, Thailand. The purpose of the symposium was to bring together scientists and experts in botany and related fields to present their results and ideas on plant resources, conservation and utilization.

The BGO received the honor from Her Royal Highness Princess Maha Chakri Sirindhorn to preside over the opening ceremony at the Information Center, Queen Sirikit Botanic Garden, on November 18. Scientific programmes included poster presentations, displays of wild Thai orchids, and scientific lectures. Abstracts of the lectures are presented in this newsletter (pp. 11 to 16). There were 183 participants from government institutes, universities and the private sector from all over the country. The event proved to be a great success.

Abstracts of the papers presented at the *Plant Resources of the Himalayan Foothills Symposium*

Bioresources in Thailand

Professor V. Baimai, Department of Biology, Faculty of Science,
Mahidol University, Bangkok

Biodiversity is rather a new term for Thai people and an addition to the vocabulary in recent years. It refers to every level of variability among living organisms, from genetic diversity within a species to species diversity and ecosystem diversity, of microorganisms, plants, animals, and humans.

Tropical forests are rich in biodiversity which provides bioresources for the four necessities in human's life: food, clothing, shelter, and medicine. They are the source of genetic variation awaiting to be explored and sustainably utilized. During the past three decades, Thailand has lost much of its bioresources due to deforestation, destruction of their habitats and overharvesting. There is an urgent need to conserve bioresources in the country for the benefits of future generations.

Appropriate sustainable management of bioresources is very important and requires basic knowledge of tropical biology. The Thailand Research Fund (TRF) together with the National Center for Genetic Engineering and Biotechnology (BIOTEC) have established a special programme on the *Development of Knowledge and Policy for Bioresources Management in Thailand* emphasizing the biodiversity research and training (BRT). Thus, the programme has made available funding to support fundamental research projects, trainings in tropical biology, as well as studies on policy making and management of bioresources in Thailand.

A Preliminary Survey of Plant Diversity at Doi Inthanon

Dr. Chamlong Phengklai, Director, King Rama IX Garden, Bangkok

An intensive study on plant diversity at Doi Inthanon National Park was conducted in 1988 by extensive literature reviews and field surveys. The surveys were done by making 20 sampling plots of 10x40 meters, along both sides of the road at different altitudes. In each sampling site, height and canopy of trees with circumference more than 10 cm were determined; and their pictures were drawn horizontally and vertically. Investigation of smaller plants was conducted in a subplot of 1x1 meter within each sampling plot. All herbaceous species found in the subplot and within 50 meters radius from the borders of sampling plot were collected for further identification. Population density was recorded and compared with available references. Results of the studies have revealed that Doi Inthanon

(area 301,500 rai or 482.4 sq.km), with the highest peak of 2,565 meter above sea level, consists of a vast plant diversity. It comprises three types of forest: dry dipterocarp forest, moist upper mixed deciduous forest, and hill evergreen forest. There are about 1,274 plant species from 589 genera and 161 families. Among these, 37 species are considered new species, 31 species are new records and endemic to Doi Inthanon. Some species have potential as economic crops and can be divided into 23 groups (besides timber use). Moreover, the studies also found that 8 species were endangered species.

Plant Diversity of Doi Chiangdao

Professor T. Santisuk, Director, Botanical Division,
Royal Forest Department, Bangkok

Doi Chiangdao, the Permian limestone massif (c.400–2,190 m.a.s.l.) located at 19° 24' N latitude and 98° 54 E longitude, Chiangdao District of Chiang Mai Province, harbours a distinct flora and represents an astonishing reservoir of life forms not found elsewhere in Thailand. The tropical, subtropial, and temperate species are encountered in varying altitudinal zones of Doi Chiangdao. The botanical and ecological observations made were concentrated on the exposed rocky peaks and ridges, which teem with temperate species of the Holarctic elements (e.g. *Campanula, Cotoneaster, Delphinium, Thalictrum, Saxifraga, Scabiosa,* and *Silene*). Some mark their southernmost distributions in Doi Chiangdao (e.g. *Clarkella nana, Cotoneaster franchetii, Inula rubicaulis, Leucosceptrum canum,* and *Luculia gratissima*). Some are endemic taxa to this mountain and are typical alpine plants (e.g. *Geranium lamberti* ssp. *siamensis, Pedicularis siamensis, Primula siamensis, Rhododendron ludwigianum, Saxifraga gemmipara* var. *siamensis,* and *Veratrum chiengdaoense*). The tall palm, *Trachycarpus* sp., showing affinities with the Himalayan *T. martianus,* is apparently a new species.

Illegal conversion of the fragile habitat of the montane forests and scrubs at elevations of about 1,200–1,900 m.a.s.l. into agricultural fields by hill people in recent decades has resulted in severe gully erosion exacerbated by the mountain's steepness. The annual burning in the cool, dry season is disastrous to the existence and development of these montane and temperate species. As a consequence, certain species have not been re-collected or met with on the exposed rocky ridges and peaks by recent excursions. Changes in plant formation and floristic composition on the summits and ridges of Doi Chiangdao could soon be inevitable due to an increasing number of undisciplined trekkers.

Graminae (Poaceae) in Thailand

Dr. W. Nanakorn, Director,
The Botanical Garden Organization, Box 7, Mae Rim, Chiang Mai

This attempt is to enumerate the Thai Graminae since the treatment of Craib in 1931. The main objective of this work is to make an updated preliminary list of all the grasses distributed in Thailand and provide a fundamental data for future monographic and revisional studies. The taxa have been arranged according to genera after the classification system of Clayton & Renvoize (1986), with alphabetical modifications and species information provided by the author. Species names are obtained from all major regional and international references available at the libraries of the New York Botanical Garden and the Department of Botany, Smithsonian Institution. The specimens of the Thai Graminae deposited at the Forest Herbarium, Royal Forest Department (BFK), and the Herbarium, Botanical Section, Departmentof Agriculture:Bangkok (BK), Herbarium, the New York Botanical Garden (NY), and the United States National Herbarium (US), Herbarium, the Royal Botanical Gardens, Kew (K), and the Botanical Institute Herbarium Aarhus University, Denmark (AAU); have been investigated and all names are listed here. The introduced and cultivated species recorded in Thailand are also included.

At this point, no attempt is made to correct misidentifications or superflous synonyms. The list has been made as concise as possible, therefore, only selected literature and relevant basionyms and synonyms are cited. In conclusion, a total of 133 genera and 501 species of Graminae are recorded for Thailand.

Species Diversity of the Wild Thai Orchids

Dr. M. Kaewkumnerd, Chairman, Advisory Board, "Return Orchids to Their Natural Habitat" Royal Initiative Project, Mae Jo University, Chiang Mai

Orchids are monocotyledonous plants and belong to the family Orchidaceae. It is a family of beautiful, unusual flowers, which floral parts are highly modified from the basic monocot pattern. An orchid flower consists of 3 outer sepals and 3 inner petals, the lowest of which, known as the lip or labellum, is usually enlarged and different from the others in shape, markings and color. Style and filaments of an orchid flower are fused and called column.

There are more than 17,000 species from about 650 genera of epiphytic and terrestrial orchids found all over the world except where the climate is too extreme such as in deserts or the tundra. Orchids are mostly found in the tropical areas, especially near the equator.

An intensive study of wild orchids of Thailand was conducted by Dr. Gunnar Seidenfaden and the late Professor Tem Smittinund. They reported more than 1,000 species from approximately 150 genera of wild orchids found in the country. Many of them have potential as economic ornamentals or genetic resources for crop improvement in orchid production industry.

Zingiberaceae in Thailand

Professor P. Sirisuk, Dean, Faculty of Science,
Prince of Songkla University, Had Yai

Zingiberaceae are perennial rhizomatous herbs. The family have their highest diversity in Southeast Asia. The whole world has about 1,500 species. Thailand alone has approximately 20 genera and 200 species.

There have been taxonomic revisions to several genera including *Boesenbergia* (14 species), *Hedychium* (20 species), *Kaempferia* (15 species), and *Scaphochlamys* (2 species). Some genera are also currently under revision including *Curcuma, Etlingera* and *Zingiber*. Information about taxonomy, ecology and distribution of the Zingiberaceae family are included in this presentation, and the illustrations of some species are also presented.

An Ethnobotanical Study of the Hill Tribes in Northern Thailand

Dr. C. Trisonthi, Biology Department, Faculty of Science,
Chiang Mai University, Chiang Mai

Northern part of Thailand is home for many highland indigenous people or hilltribes. There are six distinguished groups, namely, Karen, Hmong, Lahu, Akha, Mien and Lisu. Other minority groups are Lawa, Thin, and Mlabri. These hilltribe people live simply with their lifestyle well-blended with nature using their local knowledge and skills passed to them from many generations.

The objective of this ethnobotanical research was to study the local wisdom of various groups of hilltribes in the northern part of Thailand. The information obtained included the uses of plants as food, herb, dye, clothing, and for ceremonial functions. These data will be useful criteria for future social development of these rural areas.

Palms (Arecaceae) Diversity in Thailand

K. Tunsajaa, Nongnuj Village Co., Pattaya, Chonburi

Palms are one of the most important economic crops. In the ornamental plant industry, palms are considered as the king of ornamental plants. They are found in every continent with their main distribution in the tropics including Thailand. Many species of palms are edible such as coconut palm (*Cocos nucifera*), palmyra palm (*Borassus flabellifer*), and sago palm (*Metroxylon sagus*). Oil palm (*Elaeis guineensis)* and coconut palm are highly valuable for oil and wax. Some species such as rattan palm (*Calamus* spp.), *Oncosperma horrida, Nypa fruticans,* and *Johanesteijismannia altifrons* provide fiber and wood which are useful in making furniture and handicrafts. Leaves of talipot palm (*Corypha umbraculifera*) was used in Thailand as paper in the old days. Some plams have medicinal properties such as betelnut palm (*Areca catechu*) which is believed to be good for teeth. Due to personal interest and the intension to preserve valuable species of palms, the Nongnuj Village Co., has started its own collection and, presently considered as the largest palms collection in Thailand.

Aquatic Plants Diversity in Thailand

Assoc. Prof. S. Sripen, Department of Botany, Faculty of Science,
Kasetsart University, Bangkok

Aquatic plants are plants which grow in water, usually fresh water, including plants that grow in marshes, swamps, bogs, or at the edges of ponds and lakes. They may grow completely submerged in the water, or floating on the surface. Aquatic plants are useful as they help increasing oxygen level in the water. Some have the ability to fix Nitrogen. Their compost is a good source of organic matters for soil improvement. Many aquatic plants are useful as economic crops such as rice (*Oryza sativa*) and lotus (*Nelumbo nucifera*). Some species are serious weeds in waterway causing problem in irrigation and transportation. In this paper, the diversity of aquatic plants in Thailand is presented.

Bamboo (Bambusaceae) Diversity in Thailand

S. Rumyarangsri, Technical Division, Royal Forest Department, Bangkok

Bamboos are monocotyledonous plants which belong to the Graminae family. There are about 1,250 species from 75 genera of bamboos distributed throughout the world. In Asia, there are about 45 genera and 750 species; while 13 genera and about 60 species are found in Thailand.

Progression of the Flora of Thailand Project

Dr. K. Chayamarit, Herbarium Center, Royal Forest Department, Bangkok

The Flora of Thailand Project was initiated in 1954 as a national research project on plant taxonomy under the responsibility of the Royal Forest Department. The Headquarters of the project is located at the Herbarium Center, Royal Forest Department, Bangkok. The objective of the project is to study the diversity of Thai flora in order to understand the status of plant resources of the country, the number of species, their ecology, distribution, and uses. The results of this research will be useful for conservation planning and sustainable utilization.

The Role of Queen Sirikit Botanic Garden in Conservation of Plant Genetic Resources

Dr. S. Vessabutr, Head, Research Division,
The Botanical Garden Organization, Box 7 Mae Rim, Chiang Mai.

Queen Sirikit Botanic garden (QBG), Mae Rim, Chiang Mai province, was established in 1992 with the goal to be a center of botanical information and plant genetic resources. To achieve this goal, *in situ*, *ex situ*, and *in vitro* conservation approaches will be utilized. The germplasm conservation will cover a wide range of wild relatives of some economic plants, and indigenous species; especially rare, threatened, and endangered species. The Garden has played an important role in habitat evaluation and rare species monitoring. The activity on *in situ* conservation is in the form of 'habitat gardening' in which the native species are identified and other species in the same family are introduced to be grown in the same area.

The Technical and Research Division of the QBG has been given the responsibility for the plant genetic resources conservation program. Construction of the building where the Research Division and Laboratories will be located is underway. The Division will support the conservation activities by establishing a seed bank, a germplasm collection facility, and a computer data bank.

The importance of collaboration in scientific research, training programs, and exchange of information is well recognized at the QBG. Cooperation with national and international institutions in conservation of plant genetic resources will be actively promoted.

Feature Article

Biological Control of Giant Sensitive Plant

Dr. Banpot Napompeth*

Giant sensitive plant

The giant sensitive plant, *Mimosa pigra*, is one of the most noxious weeds in Thailand. *M. pigra* and other *Mimosa* spp., are native to Central and South America. Their presence in Thailand is due to both intentional and unintentional introductions. *M. pigra* was introduced into the country in 1947 by tobacco growers in Mae Taeng District, Chiang Mai, for trial as green manure crop. Once found useless, it was abandoned, which eventually dispersed by seeds to other parts of the country. The giant sensitive plants are found growing abundantly along the water edges of ponds and lakes, as well as canal banks and irrigation ditches. They are also invading open lands in forest reserves and national parks.

*Director, National Biological Control Research Center, Bangkhen, Bangkok.

Biological control of M. pigra

Several management strategies to control *M. pigra* are available. These include mechanical, chemical and biological controls, which could be employed in an integrated management manner. Effective biological control by employing natural enemies is considered the most suitable and environmentally friendly method. In 1983, a collaborative research project on the management of *M. pigra* was initiated between the National Biological Control Research Center (NBCRC), Thailand; and CSIRO Brisbane, Department of Primary Industry, Northern Territory, Australia.

The project was supported by the Australian Center for International Agricultural Research (ACIAR). An extensive survey and evaluation of the natural enemies of *M. pigra* in its native range, from the Mexico through Venezuela and Brazil, were carried out. A number of insects and pathogens, having potential as biological control agents were screened and tested for host specificity under quarantine in Brisbane before any of them could be approved for deliberate field releases.

A total of six species of insect natural enemies of *M. pigra* was introduced from its native through Australia to Thailand during 1983-1991. All of these insects have been tested for safety and approved for releases in Australia. They are:

1. Two species of seed bruchids, *Acanthoscelides puniceus* and A. *quadridentatus* (Coleoptera:Bruchidae), native to Mexico, introduced in 1983.

2. Chrysomelid, *Chlamisus mimosae* (Coleoptera:Chrysomelidae), native to Brazil, introduced in 1985.

3. Shoot borer, *Neurostrota gunniella* (Lepidoptera:Gracillariidae), native to Mexico, introduced in 1988.

4. Stem borer, *Carmenta mimosa* (Lepidoptera:Sessiidae), native to Mexico, introduced in 1989.

5. Flower apion, *Coeloephalapion aculeum* (Coleoptera:Apionidae), native to Mexico, introduced in 1991.

These insects were safety-tested and approved for field releases in Australia. However, prior to field releases in Thailand, they were further subjected to quarantine and safty-tests. In such screening and testing carried out at NBCRC quarantine in Bangkok, all introduced insects except the shoot borer, *N. gunniella*, were found safe and subjected to mass rearing and eventually field releases. The shoot borer was rejected and its culture destroyed since it could complete its life cycle on Phak Kra Ched, *Neptunia reptans*, which has become a plant of economic importance in Thailand; but is considered as weed in Australia. This is often the case of the conflict of interest characteristic commonly encountered in the implementation of biological control of weed project throughout the world.

The introduced insects for biological control of the giant sensitive plant released in Thailand are:

1. Seed bruchids, *A. puniceus* and *A. quadridentatus*, released in 1984.
2. Chrysomelid, *C. mimisae*, released in 1986.
3. Flower apion, *C. aculeatum*, released in 1991.
4. Stem borer, *C. momosa*, released in 1993.

Of all the insects released, the seed bruchids are found permanently established and spreading to give a satisfactory degree of seed damage resulting in reduced seed bank and relatively slower rate of weed dispersal. The seed bruchids have spread naturally into Myanmar, Laos, Malaysia, Singapore; and recently detected in Bogor, Indonesia; where the insects have not been known to be released. The chrysomelid and the stem borer became established at the release sites but their natural spreading is rather slow, thus found not effective as biological control agents. As for the flower apion, the insects could not be recovered at all after repeating field releases at various locations. Focus on biological control of *M. pigra* is now on mass rearing and field releases of the seed bruchids. They have been reintroduced to Australia to help boost the efficiency of the bruchids earlier released but not performing well. As far as the control efficiency of the seed bruchids is concerned, seed damage in most infestation areas, although relatively low, is increasing all over the country. At certain infestation areas percent seed damage is about 80% or higher. At the regular experimental sites in the northern highlands, the average of seed damage is from 10 to 15%. In terms of plant infestation in most areas, it is 100% with varying degrees of seed damage.

The original consignment of the seed bruchids introduced in 1983 to Thailand was only 500 adults. With the first field releases made in Chiang Mai and Chiang Rai in August 1984. It is difficult to estimate the population number of the insects arise from subsequent field releases in the country. From a highly conservative estimation of the number of *M. pigra* seeds produced, the figure is some 40,000 seeds per plant per year. If left uncontrolled, it is difficult to project how fast and how widespread the seed dispersal would be in a few year time. A mere 10–15% seed destruction by the insects, one could imagine how many billion seeds of the plant could be destroyed by these insects per year resulting in reduced rate of dispersal and reduced *M. pigra* seed population. This is biological control in action, it takes time to see the result, but once achieved the effect is permanent and environmentally sound.

Unfortunately, the beneficial action of the seed bruchids on the control of the giant sensitive plant has gone unobserved and not obviously visible by most people. Their achievement and derived benefit are not merely unknown but are overlooked and unappreciated.

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Figure 1 At Queen Sirikit Botanic Garden, Mae Rim, Chiang Mai; the infestation of *M. pigra* has been observed along the road sides and in the ground areas.

Figure 2 Seed bruchids obtained from NBRC

Figure 3 In March 1997, the insects were released in the infested areas of the Garden to control the spread of the giant sensitive plants.

Research Notes

Insects at QBG

During 4–6 November, 1996, Dr. Angoon Lewvanich of the Entomology and Zoology Division, Ministry of Agriculture and Cooperatives, Bangkok, conducted a preliminary survey on insects at QBG. Here is the list of insects at the Garden found during the brief survey.

ORDER LEPIDOPTERA

Family Lymantridae
Dasychira horsfieldii Saund

Butterfly

Family Danaidae
Euploea mulciber mulciber Cramer
(Host: *Ficus benjamina* L.)

Family Papillionidae
Graphium agamemnon L
(Host: *Michelia alba* DC.)

Family Pieridae
Catopsilia florella Fabricius

Moths

Family Arctiidae
Asura intersepta Moore
Chionaema coccinea Moore
Creatonotus transiens Walker
Maenas sp.

Family Bombycidae
Gunda ochracea Walker

Family Epiplemidae
Epiplema quadricaudata Walker
(Host: *Anthocephalus chinensis* Rich. ex Walp.)

Family Geometridae
Thalassodes sp.

Family Limacodidae
Parasa repanda Walker
(Host: *Duabanga grandiflora* Walp.)
Euproctis sp.
(Host: *Michelia champaca* L.)

Family Noctuidae
Episparis costistriga Walker
Oxyodes scrobiculata Fabricius

Family Notodontidae
Spatalia jezoensis Wileman&South

Family Pyralidae
Brihaspa atrostigmella Moore
Dichocrocis sp.
(Host: *Dipterocarpus* sp.)
Glyphodes bivitralis Guenee
(Host: *Ficus benjamina* L.)
Pionea sp.

ORDER COLEOPTERA

Family Elateridae
Alaus sp.

Family Scutelleridae
Chrysocoris grandis Thunburg
Poccilocoris latus Dall

ORDER HEMIPTERA

Family Pyrrhocoridae
Iphita sp.

ORDER HOMOPTERA

Family Flatidae
Thromnia sp.

ORDER HYMENOPTERA

Family Vespidae
Vespa binghami Buysson

Diversity of Fireflies in Thailand

S. Govittavavong*

Her Majesty Queen Sirikit has long been committed to the conservation of biological diversity. Many projects related to nature and wildlife conservation in Thailand have been initiated by Her Majesty.

On her first Royal visit to Queen Sirikit Botanic Garden, Mae Rim, Chiang Mai, on April 8, 1996; Her Majesty the Queen expressed her concern about the disappearing of fireflies due to the loss of their natural habitats. She indicated to Professor Sanga Sabhasri, then Chairman of the BGO Executive Board, that a research on fireflies in relations to ecosystems should be conducted. From her Royal initiative, a study of biodiversity and ecology of fireflies in Thailand has begun. The objectives of the project are:

1.To study the diversity of fireflies in Thailand and their natural habitats.

2.To study the population of fireflies in each season.

3.To study the relations between fireflies and ecosystems including factors affecting their reproduction, growth and development

4.To study life cycle of fireflies

5.To study fireflies rearing techniques to increase the population for conservation purposes.

The project is coordinated by the Queen Sirikit Botanic Garden with specialists from well-known institutes such as Chiang Mai University; Khon Kaen University; Department of Agriculture, Ministry of Agriculture and Cooperatives; National Biological Control Research Center; and the Smithsonian Institution. Surveys of fireflies in every part of Thailand, their ecosystems, as well as their cultivation are underway.

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EDITOR'S NOTE

Dear Readers,

In this issue, you will find abstracts of presentations from the *Symposium on Plant Resources of the Himalayan Foothills*, organized by the Botanical Garden Organization last November. The presentations included a wide range of topics, from aquatic plants to orchids. We hope that the newsletter provides a good forum for the dissemination of information.

We have a feature article on *Biological Control of the Giant Sensitive Plant* by Dr. Banpot Napompeth, a renowned entomologist of Thailand and a leader in the biological control of plant pests and diseases. This issue also contains research notes on *A Study of Diversity of Fireflies in Thailand,* and *Insects at QBG.*

I wish to thank the authors whose contributions appear in this issue, and urge our readers to consider sending research notes or articles of relevance to us.

We would like to prepare a mailing list of those who are interested in receiving the BGO Newsletter. Please take the time to fill in the enclosed application form and mail to us.

Thank you for your kind cooperation.

Sincerely yours,

Suyanee Vessabutr, Ph.D.

Dendrobium cruentum Rchb.f.

Local name"Ueong Pak Nok Kaew" (literally means parrot's beak orchid) is an endemic orchid of southern Thailand. Due to the threat of becoming extinct from the loss of their natural habitat, *D. cruentum* is now listed on Appendix I, CITES, i.e., trade in specimens of the species must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances.

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