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Replanting the World's Tropical Forests

All over the tropics, governments are worried about the continuing loss and deterioration of forests. In the past, the greatest concern was loss of economic forest resources such as timber and firewood, but these days, concern extends increasingly towards the role forests play in conserving soils and biodiversity. It was to focus on these conservation aspects of reforestation that a tropical forest symposium was held in Taipei, Taiwan from September 24th to 26th, 2001. Organized by the Taiwan Forestry Research Institute, the meeting was attended by 39 participants from Bangladesh, Burkina Faso, Canada, Cambodia, Ghana, India, Indonesia, Japan, Malawi, Malaysia, Nigeria, Philippines, Sri Lanka, Taiwan, Thailand, United States of America and Vietnam. The organizers assembled a distinguished array of speakers and provided generous support of participants from developing countries. Sub-titled "The Art and Practice of Conservation Planting," the symposium was divided into four main sections: tropical forest conservation; tropical tree seed research, propagation of tropical trees for conservation and physiological ecology of trees and conservation planting.

In a welcome address, Jenq-Chuan Yang, Director General of the Taiwan Forestry Research Institute, stated that sub-tropical Taiwan maintains 52 percent forest cover, including 14 percent man-made forests. As well as providing habitat for more than 4,100 vascular plant species, these forests play a vital role in protecting this mountainous nation from devastating landslides during tropical storms and earthquakes, which frequently ravage the island. To protect these vital forest resources, the government has established an impressive system of protected areas, covering 8.5% of the country's area.

Disappointingly, reforestation with exotic tree species was a recurring theme during the meeting. For example Ming-Jou Lai and Robin Rose described the "miraculous" transformation of Kinmen Island (178 km^2), 277 km west of Taiwan. Fifty years ago, the island was a desert, but from 1949 to 1971, thousands of soldiers planted 6.6 billion exotic trees: *Acacia confusa, Casuarina equisetifolia* and *Pinus elliotii*. Ming-Jou Lai defended the use of exotics for the reforestation of Kinmen: "it does not matter if you start natural succession with native or exotic species, it's the second generation of trees that matters". He pointed out that natural regeneration beneath *P. elliotii* is diverse and vigorous. *P. elliotii* seedlings do not establish beneath the pine canopy, so the species is gradually replaced by natural regeneration. Stands of *C. equisetifolia*, however, have not done so well and now need to be replaced. A study of remnant old trees revealed that deciduous forest was probably the island's former dominant vegetation type. Therefore, tree species selected to replace the degenerating *C. equisetifolia* plantations included *Litsea glutinosa, Melia azedarach, Ficus microphylla, Pistacia chinensis* and *Acacia confusa.*

Thai delegate, Bunvong Thaiutsa provided a presentation on the Highland Reforestation Project of the Royal Project Foundation, which has close technical and financial links with Taiwan. This project is introducing exotic tree and bamboo species from Taiwan and Japan and investigating the silviculture and environmental impact of man-made plantations. Agro-forestry systems, combining these exotic trees with coffee or cereals are being developed to improve the soil, ameliorate the microclimate and provide an eco-tourist attraction. In terms of yields, *Paulownia taiwaniana*, inter-cropped with wheat and barley, is the most promising agro-forestry system tested so far.

Although such exotic plantations can rapidly restore canopy cover, improve soil conditions and increase villagers' incomes, their contribution to the conservation of biodiversity is limited, until they are replaced with natural regeneration. Their continued promotion reflects a lack of research to survey the highly species-rich tree floras of most tropical countries to find fast-growing indigenous tree species that can maintain ecological relationships with the indigenous fauna, with which they co-evolved. As our understanding of the productivity and ecological suitability of many indigenous tree species improves, it is disappointing to see the continued promotion of exotic tree species at international meetings, with apparent disregard for the well-known inherent dangers associated with introducing exotics into fragile tropical ecosystems.

Tree planting programs rely on an adequate supply of seed and several participants complained that difficulty in obtaining sufficient quantities of high quality seed is seriously limiting conservation plantings. Sometimes, seed supply is limited by lack of flowering. Richard Pharis gave an impressive presentation to overcome this problem by manipulating flowering with chemicals. Application of gibberellins, combined with artificially stressing plants, has successfully been used to induce early flowering in temperate conifers and probably has wide application for tropical gymnosperms. This technique dramatically increases the profitability of seed orchards. Ben Wang, one of the world's leading seed experts, reminded the audience of the proper precautions that must be taken when collecting and handling tropical tree seed. He identified the timing of seed collection and proper seed processing and storage as critical factors determining the success of reforestation programs. Seed technologists can establish the best scientific recommendations for efficient seed collection, but they are often unable to ensure that these recommendations are always carried out. Therefore, Ben Wang emphasized the need for scientists, policy makers and practitioners of seed collection to work in concert, to ensure the highest quality of future forests.

One way seed supply can be improved is through seed storage, but many tropical timber tree species have recalcitrant seeds, which cannot tolerate drying or storage at low temperatures. Aderonke Somade and J. O. Gbadebo showed that maximum germination of three Nigerian Mahogany species was obtained when seeds were stored at ambient temperatures for up to three months. Storage at 5°C and –17°C reduced viability. Boby Varghese and S. C. Naithani showed that both dried and non-dried *Madhuca indica* seeds could not tolerate cold temperatures, confirming the recalcitrant nature of this species. Tsan-Piao Lin suggested a possible biochemical mechanism to explain recalcitrance in tropical tree seeds. He found that differences in the phospholipid composition of the plasma membrane might determine desiccation tolerance. Compared with orthodox seeds, recalcitrant seeds have a higher PE (phophotidyl-ethanolamine) to PC (phosphotidycholine) ratio and higher saturated to unsaturated fatty acids.

Several papers dealt with propagation of tropical tree seedlings for reforestation programs. Vo Tri Chung, from Vietnam, emphasized the need to combine traditional indigenous knowledge with modern technology to devise the most effective methods of propagation. Suphawan Wongkamjan *et al.* outlined various innovative techniques to propagate framework tree species for forest restoration in the northern highlands of Thailand. Framework tree species are those which rapidly shade out herbaceous weeds, whilst attracting seed dispersing wildlife into planted areas, thus accelerating biodiversity recovery. Most treatments that increased permeability of the seed coat (such as scarification and soaking

in sulphuric acid) significantly increased germination rates. They also described a novel, simple technique to propagate framework tree species from cuttings in individual plastic bags

After seedlings have been successfully propagated, consideration of seedling physiology can increase planting success. Ochiai Yukihito looked at the habitat preferences of seedlings of various dipterocarp species. He emphasized that physiological site preference is different from ecological site preference. Species that may be physiologically capable of growing in a certain site may be absent due to ecological competition. Such considerations must be taken into account when planning enrichment planting in secondary forests. Yau-Lun Kuo and Chung-Teng Cheng found that a higher concentration of CO_2 in the forest understorey compensated for low light levels, thus enabling small seedlings (2–10 cm tall) to maintain high rates of photosynthesis, despite the shade. The response to elevated CO_2 levels was much greater for shade-tolerant tree species than for shade-intolerant ones. Sureeporn Kerdkankaew *et al.* also examined CO_2 uptake by trees from the aspect of carbon sequestration to address the issue of global warming. They found that CO_2 uptake was higher in *Azadirachta siamensis* than in *Pterocarpus macrocarpus* and the rate of CO_2 uptake was dependent upon irradiance and temperature.

In addition to the technology of reforestation, several papers addressed sociological and community aspects. Samuel Kainja described a successful project organized by the Wildlife Society of Malawi to develop alternative livelihoods for villagers living near forests in Mwanza District. After wide consultations with local village leaders, a fruit juice factory was constructed and bee keeping and the rearing of guinea fowl were promoted. Interest in these new economic activities has soared, reducing pressure on remaining areas of natural forest, while forest tree nurseries have been established to produce seedlings for forest restoration. J. B. Lal outlined the so-called "goal-dimension matrix" method for planning reforestation projects. This involves compiling a table with goals as column headings (stability of the physical environment, productivity and equity in the social environment) and "dimensions" as row headings (ecological, technical, socio-economic and institutional). This encourages stakeholders to consider all impacts of forest management on both the environment and the local human community. This approach was echoed in another paper from India. Uma Melkania stressed the need for forest managers in Aranchal Pradesh to consider all direct and inter-linked issues for better protection of the diverse forests of this eastern Himalayan region of India, including social, legal, economic and cultural considerations.

The meeting included several "country review" papers. Nguyen Hoang Nghia presented an overview of forest conservation in Vietnam. Despite the ravages of wars, Vietnam retains about one third of its area under some kind of forest. He called for a ban on both logging natural forest and the replacement of natural forest with exotic plantations and recommended that innovative silvicultural techniques, such as the framework species method, should be developed to encourage biodiversity conservation in reforestation programs.

Romulo Aggangan and R. Serrano stated that more than half of the Philippines' total land area is classified as forestland, but only about 5% is old growth forest. Upland poverty is the primary cause of forest loss, so the government is promoting community-based forest management to promote sustainable forestry. As of 1999, 4,659 various agreements to preserve community forests had been accepted. In order to revitalize the forest industry, the government has various schemes to encourage participation by the private sector,

whilst promoting responsible forest management. Aggangan and Serrano identified the need for a nationwide nursery system and longer periods of land tenure as top priorities for improved forest management in the Philippines.

Bambang Hero Saharjo discussed the hot issue of forest fires in Indonesia, responsible for elevating the country to one of the largest carbon polluters in the world. In 1997–98, 9.7 million ha were affected by fire. Fire is used, mostly illegally to clear land for crops or plantations, such as oil palms. Lack of law enforcement is the main problem. Many landowners evade detection by satellites by burning only when there is dense cloud cover.

Tuck Y. Chin concentrated on the technical standards of forest management that Malaysia is developing to meet its obligation to implement sustainable forest management as a member country of the International tropical Timber Organization. A few of these include a legal requirement for forest management plans, regulating logging by setting the allowable cut, retention of four seed trees per ha and the routine use of mycorrhiza innoculae. To minimize impact when logging, climbers are cut 1–2 years before tree felling.

Syphan Ouk surveyed the stand structure of logged-over forest in Cambodia, to determine the best methods to rehabilitate such areas. Cambodia currently retains 58% forest cover, but the forest is disappearing at a rate of 1.55% per annum; up from 0.56% 10–30 years ago. Ouk found that logging reduced merchantable species to 0.14–6.50% of the species component and removed mature seed trees, thus limiting future regeneration. He recommended enrichment planting with indigenous dipterocarps, in strips beneath the remaining forest canopy.

Several papers were of high quality and will be of general interest to foresters. A volume of proceedings is being produced and anyone interested in obtaining a copy should contact Robin Rose (robin.rose@orst.edu). Although most of the papers were interesting in their own right, the conference seemed to lack logical flow, with disconnected subjects following each other and little sense of continuity. Lack of round table discussions meant that there was little opportunity to critically analyze or synthesize the information presented into a coherent set of conclusions. There was no attempt to produce a plan of action or to determine priority areas for further research. In this age of instant publication on the Internet, I question the value of expensive and largely "passive" symposia with no interactive working groups to produce some kind of original output.

The main criticism of the meeting, however, must be that it did not live up to its title: "The Art and Practice of Conservation Planting". Conservation was hardly mentioned at all, whilst actual planting of trees was barely touched upon. As in so many international forestry meetings, when tree planting *was* brought up, commercial tree species and exotics were usually the only species mentioned. Biodiversity was largely ignored and I left the symposium wondering why the word "conservation" had been included in the title at all.

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Environmental Forum for Sustainable Development

During 22–23 November, The Greater Mekong Subregion (GMS) Environmental Forum for Sustainable Development held a meeting at the Asian Institute of Technology to discuss four important issues facing the region. This Forum is sponsored by the Asian Development Bank, the GMS Business Forum, United Nations ESCAP, UNESCO, UNEP, and the Department of Environmental Quality Promotion of the Ministry of Science, Technology and Energy. The four issues discussed were:

1. Exploitation of national resources and development of infrastructure results in undesirable impact on the environment including the loss of diversity;
2. Urbanization and transboundary trade have impact on the environment and society;
3. Market-based resource used to promote industrial growth and environmental management is impeded by the lack of trained personnel, adequate technology transfer and insufficient investment;
4. Development and marketing of tourism can yield potentially damaging impact on the environment.

The meeting broke up into four subgroups to discuss each of these issues in detail and to recommend projects to deal with them. The projects were briefly outlined and for most, potential implementers and donors were identified. Many of these projects deal directly with ecology and the environment. For example, under Issue 1, the proposed projects included: Conflict aversion through environmental education, conservation and protection of aquatic biodiversity in the GMS through *ex situ* preservation of genetic resources, and collection of information on pollution and control of chemicals from agricultural activities.

Under Issue 4, dealing with tourism, the following projects were proposed: Defining sustainable tourism—definitions and techniques; and basic data collection and analysis of natural and cultural phenomena. This last project would involve analysis of the tourism potential and carrying capacity of national parks and other important sites in the subregion, and would be implemented by the Tourism Authority of Thailand with help from the Department of Mineral Resources and other agencies.

It is hoped that these projects will be submitted for funding and initiated next year.

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Biodiversity Research and Training Program Takes Stock of First Five Years

The Biodiversity Research and Training Program finished its first 5-year phase in 2000 and has begun its second phase this year. The program has been supported rather generously by The Thailand Research Fund and the National Center for Genetic Engineering and Biotechnology (BIOTEC) of the National Science and Technology Development Agency (NSTDA). We here summarize and evaluate information presented in its Annual Report for 2001, which was released at its annual meeting held in Udon Thani during 8–11 October, and comment on its future direction.

As has been reported previously in the *NHB*, the BRT Program funds research projects in seven different program areas, which are listed in Table 1. A total budget of 280.3 million baht (now equivalent to about US$ 6.37 million) was committed during the first phase on a total of 502 projects. Most of the projects (66 percent) consisted of student thesis research and training projects, whereas the most heavily funded area was systematics, with 43 percent of the budget for 87 projects. It was not by design that systematics received so much attention; there is much interest in this area due to the relatively large amount of work that remains to be done in describing the animal, plant, and fungal species of Thailand. The allotted budget for 2001, the first year of the Second Phase, seems quite small in comparison with the first phase. This is a result of the economic crisis that hit Thailand in 1997, from which the country, and the BRT budget, have not yet recovered. It is hoped that the budget will gradually grow, and that a more stable funding mechanism for the program will be devised. This is likely to happen within the next year as environmental and biodiversity programs in the government are in the process of being reorganized.

The BRT Steering Committee tries to encourage more persons to submit projects in population and community ecology, ecological monitoring, and also socio-economic projects involving local communities. That relatively few projects have been submitted in these areas is partly a reflection of a general shortage of expertise in basic ecology, and a lack of avenues for becoming involved with local people.

Table 1. Number of projects supported by the BRT Program in the First Phase and in the first year of the Second Phase, with budgets (millions of baht).

Program area	First Phase (1996–2000)		Second Phase (2001)	
	No. of projects	Budget	No. of projects	Budget
1. Systematcs	87	120.8	21	14.6
2. Population biology	6	32.8	8	11.2
3. Ecology, monitoring	22	27.9	1	0.5
4. Socio-economics and indigenous knowledge	17	5.1	2	0.2
5. Student support and training workshops	332	38.1	51	4.3
6. Utilization of bioresources	32	73.8	4	1.3
7. Policies for research	6	7.6	2	1.4
Total	502	280.3	89	33.5

The BRT Program has supported a significant proportion of the biodiversity research being carried out in the country, and has succeeded in stimulating it considerably. This has been reflected in the growing numbers of "biodiversity" papers being submitted to scientific journals (evaluated below). Five have been published in the *NHB* and several others are in press or in review. The great majority of papers fall into the "systematics" area and are published in relatively specialized taxonomic journals.

The list includes publications in books and journals, as well as papers proceedings of meetings that have been properly published. The list is not right up to date or comprehensive; many more publications are in various stages of preparation or review.

Of course, there is much biodiversity research that is not funded by the BRT Program, the quantity of which is not precisely known. There are many important projects that have not tapped into BRT funds because they have been able to obtain support from their local institutions or from foreign sources. The BRT Program also tries to give priority to young researchers and students. Much local research, however, is not published in English. The BRT Program requires that its grant recipients publish in internationally recognized journals or books in order to be considered for further funding.

It is still clear from the list of references that taxonomic expertise in Thailand is thin and very spotty, and is concentrated in relatively few prestigious universities or government agencies. There are very few qualified Thai systemic biologists. The most productive ones are collaborating with foreign colleagues (often former mentors) who contribute their greater experience and also foreign museum and library resources to the task of inventorying and describing local species. A young biologist cannot do taxonomy without first becoming familiar with all of the existing species that have been described in the taxon of interest in the region. Most experts on Thai flora and fauna are foreigners and most publications and museum specimens are not in Thailand, so that the science of taxonomy must truly be an international effort.

The BRT Program will continue to support research in all the existing program areas in the second phase. It is not easy to set funding 'priorities'; young researchers will be supported based on merit in whatever area they work in. The next phase, however, will initiate some new directions. It will support "area-based" studies in which a particular local habitat or region will receive coordinated project funding in several fields of study, including socioeconomics.

In order to facilitate coordination and help between researchers, the BRT has set up eight working groups in different research areas. These groups, and their coordinators, are as follows:

Invertebrate Group: Dr. Chaweewan Hutacharoen, Forest Department

Algae and Plankton Group: Dr. Sorawit Powtongsook, BIOTEC

Microorganism Group: Ms. Wanchern Potacharoen, BIOTEC

Plant Group: Asso. Prof. Thaweesakdee Boonkerd, Chulalongkorn University

Vertebrate Group: Asso. Prof. Somsak Panha, Chulalongkorn University

Ecology and Indiginous Knowledge Group: Asso. Prof. Sompoad Srikosamatara, Mahidol University

Genetics Group: Asso. Prof. Warawut Chulalaksananukul University

Utilisation of Bioresources Group: Asso. Prof. Wanchai De-Eknamkul, Chulalongkorn University

The BRT Program also intends to expand its activities in order to increase undergraduate

student interest in biodiversity, by holding biological science camps during semester recess, and offering short research apprenticeships to students. It also intends to sponsor full time postdoctoral research, to make it easier for young researchers to obtain needed advanced training and obtain jobs.

Visut Baimai
Warren Y. Brockelman

Appendix. Publications from Research Sponsored by the Biodiversity Research and Training (BRT) Program (1997–2001). Most papers cited "in press" have been included, but those presented at meetings for which no publisher is given have been excluded. Source: *BRT Annual Report 2001.*

Summary:	
Fungi	14
Lichens	2
Plankton and algae	20
Plants	29
Invertebrates: mollusks	20
Invertebrates: insects and acarines	39
Invertebrates: parasites and pathogens	15
Vertebrates	11
Ecology and environment	18
Genetics	17
Bioresources utilization	16
Total	201

Fungi

Bussaban, B., S. Lumyong, P. Lumyong, K.D. Hyde & E.H.C. McKenzie. (in press). Endophytic fungi from *Amomum siamense*. Cannadian Journal of Microbiology.

Bussaban, B., S. Lumyong, P. Lumyong, K.D. Hyde & E.H.C. McKenzie. (in press). Two new species of endophytes (Ascomycetes) from Zingiberaceae. Nova Hedwigia.

Desjardin, D.E., T. Boontratuang, P. Ruksawong, P. & N.L. Hywel-Jones. 2000. A new species of *Incrustocalyptella* from Thailand. Fungal Diversity 4: 75–79.

Hywel-Jones, N.L., &, G.J. Samuels. 1998. Three large species of *Hypocrella* pathogenic on scale-insects. Mycologia 90(1): 36.

Hywel-Jones, N.L., R.D. Goos & E.G.B. Jones. 1998. *Hirsutella petchabunensis* sp. nov. from Thailand, with a *Helicoma* anamorph. Mycological Research 102(5): 577–581.

Jones, E.B.G., S.W. Wong, S. Sivichai, D. Au & N.L. Hywel-Jones. 1999. Lignicolous freshwater Ascomycota from Thailand: *Micropeltopsis quinquecladiopsis* sp. nov. Mycological Research 103(6): 729–735.

Marvanova, L & N.L. Hywel-Jones. 2000. *Sigmoidea contorta* sp. nov. and two rare species from waters in Thailand. Cryptogamie Mykologie 21(1): 13–26.

Sivichai, S. & N.L. Hywel-Jones. 1999. *Biflagellospora* (aero-aquatic hyphomycetes) from submerged wood in Thailand. Mycological Research 103(7): 908–914.

Sivichai, S., E.B.G. Jones, & N.L. Hywel-Jones. 2000. Fungal colonisation of wood in a freshwater stream at Khao Yai Natioanl Park, Thailand. Fungal Diversity 5: 71–88.

Sivichai, S., N.L. Hywel-Jones, E.B.G. Jones. 1998. Lignicolous freshwater Ascomycota from Thailand: 1. *Ascotaiwania sawada* and its anamorph state *Monotosporella*. Mycoscience 39:307–311.

Sivichai, S., N.L. Hywel-Jones. & S. Somrithipol. 2000. Lignicolous freshwater Ascomycota from Thailand: *Melanochaeta* and *Sporoschisma* anamorphs. Mycological Research 104(4): 478–485.

Sivichai, S., T.K. Goh, K.D. Hyde. & N.L. Hywel-Jones. 1998. The genus *Brachydesmiella* from submerged wood in the tropics, including a new species and a new combination. Mycoscience 39: 239–247.

Sullivan, R.F., G.F. Bills, N.L. Hywel-Jones, J.F. White. 2000. *Hyperdermium*: a new clavicipitalean genus for some tropical epibionts of dicotyledonous plants. Mycologia 92(5): 908–918.

Wipornpun, P., S. Lumyong, P. Lumyong & K.D. Hyde. (in press). Endophytic fungi from wild banana (*Musa acuminata*) at Doi Suthep-Pui National park, Thailand. Mycological Research.

Lichens

Pooprang, T., K. Boonpragob & J.A. Elix. 1999. New species and new records in the lichen family Parmeliaceae (Ascomycotina) from Thailand. Mycotaxon 71: 111–127.

Vongshewarat, K., P.M. McCarthy, P. Mongkolsuk & K. Boonpragob. 1999. Additions to the lichen flora of Thailand. Mycotaxon 70: 227–236.

Plankton and algae

Angsupanich, S. (in press) A new species of *Pagurapseudopsis* (Tanaidacea) from Songkhla Lake, Thailand. Crustaceana.

Chittapun, S., P. Pholpunthin & H. Segers. 1999. Rotifera from peat-swamps in Phuket province, Thailand, with the description of a new *Colurella* Bory de St. Vincent. International Review of Hydrobiologia 84(6): 587–593.

Jumnongthai. J. & N. Chotikavanitch. (in press). Recent brackish foraminifera from Southern Peninsular Thailand. Journal of the Geological Society of Thailand.

Peerapornpisal, Y., T. Pekthong, P. Waiyaka & S. Promkutkaew. 2000. Diversity of phytoplankton and benthic algae in Mae Sa Stream, Doi Suthep-Pui National Park, Chiang Mai. Natural History Bulletin of the Siam Society 48(2): 193–211.

Pekthong, T. & Y. Prerapornpisal. (in press). Fifty one new record species of freshwater diatom in Thailand. Journal of the Faculty of Science, Chiang Mai University.

Sanoamuang, L. 1998. Rotifera of some freshwater habitats in the floodplain of the River Nan, Northern Thailand. Hydrobiologia 387/388: 27–33.

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Sanoamuang, L. 2001. *Mongolodiaptomus dumonti* n. sp., a new freshwater Copepod (Calanoida, Diaptomidae) from Thailand. Hydrobiologia 448: 41–52.

Sanoamuang, L. 2001. *Eodiaptomus phuphanensis* n. sp. a new fresh water Copepod (Calanoida: Diaptomidae) from the Phu Phan National Park, Thailand. International Review of Hydrobiologia 86(2): 219–228.

Sanoamuang, L. (in press). Distributions of three *Eodiaptomus* species (Copepoda: Calanoida) in Thailand, with a redescription of E. *draconisignivomi* Brehm, 1952. Hydrobiologia.

Sanoamuang, L. & S. Athibai. (in press). A new species of *Heliodiaptomus* (Copepoda, Diaptomidae) from Northeast Thailand. Crustaceana.

Sanoamuang, L. & W. Kotethip. (in press). A new species of *Brachionus* (Rotifera, Monogononta, Brachionidae) from riverine swamps of Northeast Thailand. Hydrobiologia.

Sanoamuang, L., G. Murugan, P.H.H. Weekers & H. Dumont. 2000. *Streptocephalus sirindhornae*, new species of freshwater fairy shrimp (Anostraca) from Thailand. Journal of Crustacean Biology 20: 559–565.

Sanoamuang, L., C. Saengaroon & W. Kotethip. (in press). The Cladocera of Lake Kud-Thing, a shallow lake in Nong Khai province, Northeast Thailand. Journal of Crustacean Biology.

Sanoamuang, L., N. Saengphan & G. Murugan. (in press). A new species of *Branchinella* Sayce, 1902 (Crustacea, Anostraca, Thamnocephalidae) from Thailand, the first record of this genus in Southeast Asia. Hydrobiologia.

Sanoamuang, L. & S. Savatenalinton. 1999. New records of rotifers from Nakhon Ratchasima province, northeast Thailand, with a description of *Lecane baimaii* n. sp. Hydrobiologia 412: 95–101.

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Sanoamuang, L., & H. Segers. (in press). Additional records of rotifers from Thailand, with descriptions of two new species. Journal of Limnology.

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Wongrat, L. (in press). Freshwater phytoplankon tn the central part of Thailand: Class Euglenophyceae. Kasetsart University Museum of Fisheries, Note.

Plants

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Chantaranothai, P. & S. Koomgratok. (in press). Taxonomic notes on some Southeast Asian species of *Vitex* L. (Labiatae). Kew Bulletin.

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Esser, H-J. & S. Cafferty. (in press). The proposal to reject the name *Euphorbia pilulifera* L. (Euphorbiaceae). Taxon.

Esser, H-J & K. Chayamarit. (in press). Two new species and a new name of Thai *Croton* (Euphorbiaceae). Thai forest Bulletin (Botany) 29.

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Esser. H-J. & P.C. Van Welzen. (in press). *Colobocarpos*, a new genus of Southeast Asian Euphorbiaceae. Kew Bulletin.

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