XTBG

Annual Report 2014

Xishuangbanna Tropical Botanical Garden
Chinese Academy of Sciences

Cover photos, anti-clockwise:

1. The "Natural Orchid Show";
2. MYB82 regulates the growth of trichomes;
3. The 3rd Xishuangbanna International Symposium opening ceremony;
4. The new canopy tower crane;
5. Fieldwork in Myanmar led by Prof. QUAN Rui-Chang;
6. Miocene leaves of *Elaeagnus* (Elaeagnaceae) from the Qinghai-Tibet Plateau found by XTBG scientists;
7. "Nature Journal" note book designed by XTBG staff.

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March 29, 2015

Xishuangbanna Tropical Botanical Garden (XTBG), Chinese Academy of Sciences is a non-profit, comprehensive botanical garden involved in scientific research, plant diversity conservation and public science education, affiliated directly to the Chinese Academy of Sciences.

XTBG's vision:

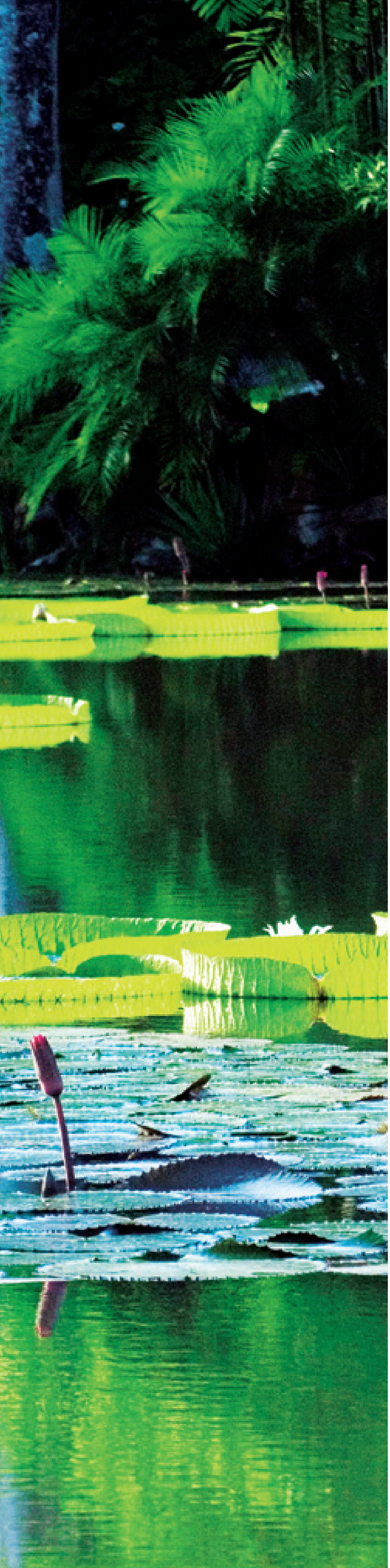
Desirable base for plant diversity conservation and ecological studies.

Noah's Ark for tropical plants.

XTBG's mission:

Promote science development and environmental conservation through implementing scientific research on ecology and plant diversity conservation, horticultural exhibition, and public education.

Photo by XU You-Kai



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Science

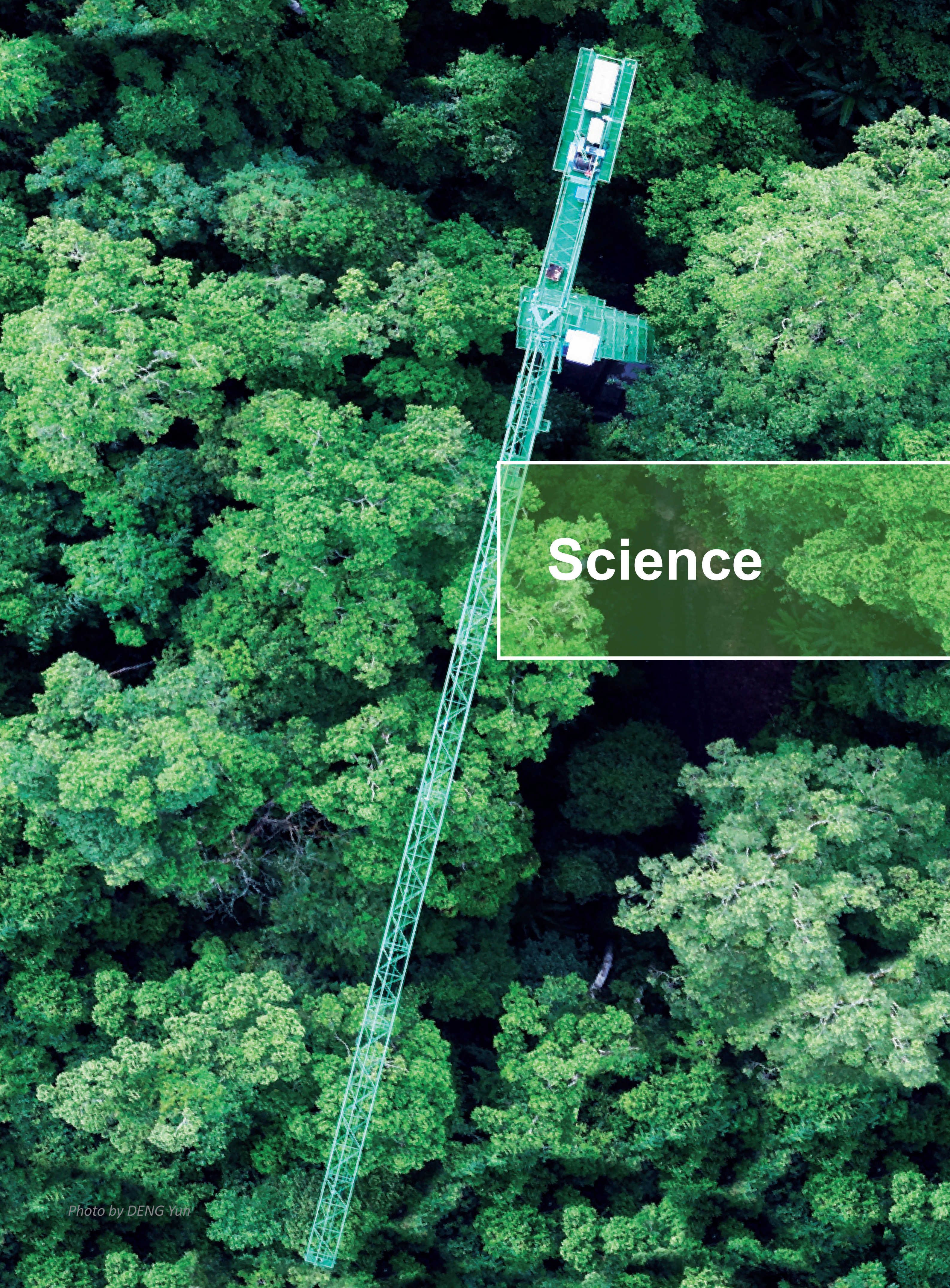


Photo by DENG Yun

In 2014, XTBG received 52.82 million Yuan in research funds from 75 new projects:

25 projects funded by the National Natural Science Foundation of China;

1 projects supported by the Ministy of Finance;

11 projects supported by other Ministries in China;

5 projects funded by Yunnan Provincial Fund for Natural Sciences;

6 projects supported by the Chinese Academy of Sciences;

9 projects funded by the CAS “Light in Western China” program;

18 projects funded by local government, enterprises and international agencies.

In 2014, XTBG researchers have achieved the following:

208 research articles published on internationally peer-reviewed scientific journals (Source Journals of ISI Web of Science);

57 research articles published on CSCD (Chinese Science Citation Database) refereed journals;

6 published monographs;

2 registered new plant varieties;

2 registration of computer softwares.

a) The "1-3-5" project progress review meeting
b) A series of P. volubilis oil products and the National Industrial Production License
c) Investigating the "Environmental friendly rubber plantation" demonstration

Project Development

"One Major Orientation, Three Significant Breakthroughs and Five Important Fostering Directions" project

"One Major Orientation, Three Significant Breakthroughs and Five Important Fostering Directions" project (shortened to "1-3-5" project) was launched in 2012 and has been carried out smoothly. In 2014, every team working on this strategy achieved good progress. The "1-3-5" project progress review meeting was held in XTBG in January. Innovation points, goals and supporting measures of each team were further and more clearly defined.

Eight "Zero Extinction" project bases

In 2014, XTBG successfully promoted the planting of *Plukenetia volubilis* more than 4,600 ha of land in Xishuangbanna, Laos, Myanmar and other areas. XTBG was certified with the National Industrial Production License in June to produce edible vegetable oil. A series of *P. volubilis* oil products have been put on the market. XTBG cloned and identified 6 functional genomics of the energy plant *Jatropha curcas*, and developed 3 pairs of hybridized combinations, with more than 100 regenerated plants.

The "Environmental friendly rubber plantation" program was continually drawing high attention from the Yunnan Government in 2014. An experimental demonstration site of more than 100 ha was established in cooperation with local enterprises.

The "Zero Extinction" plan initiated as part of the XTBG "1-3-5" project has aroused strong responses from society. In 2014, the Forestry Department of Yunnan Province declared that measures will be taken to achieve "Zero Extinction" for the entire province. The "Zero Extinction" project methods are now being applied in eight additional regions of China through the Chinese Union of Botanic Gardens (CUBG).

The success of the "1-3-5" project is also indicated by the many research findings published in top journals, such as *Ecology, Ecology Letters* and *Global Ecology & Biogeography*.

“Chinese Academy of Sciences—Southeast Asia Biodiversity Research Institute” project

“Chinese Academy of Sciences—Southeast Asia Biodiversity Research Institute” project (CAS-SEABRI) was launched in 2014, and good progress has been made.

In May, ZHANG Ya-Ping, vice president of CAS, listened to the start-up plan for CAS-SEABRI. The SEABRI working group was set up in July.

Prof. CHEN Jin, director of XTBG, headed up a delegation to visit the Ministry of Environmental Conservation and Forestry (MOECAF) in Nay Pyi Taw, Myanmar, during September 2-6, 2014. The XTBG delegation had meetings with University of Forestry, Forest Research Institute (FRI) and Forest Department (FD), and reached agreement with the Myanmar side on combined postgraduate training, field biodiversity investigations, ecology and biology training courses, and implementation of international scientific research.

On September 25, XTBG called a coordination meeting in Kunming in order to discuss the preparation progress and to actively promote the construction of SEABRI. This meeting aimed to strengthen the connection between XTBG, Kunming Institute of Botany (KIB) and Kunming Institute of Zoology (KIZ), and figure out the crucial preparation work for the establishment of CAS-SEABRI.

Mr. Zaw Win MYINT, director of FRI, Myanmar, headed a delegation to XTBG on November 23. During the visit, XTBG and FRI discussed the renovation plan of the office, laboratory, refectory and apartment building for SEABRI in FRI, Myanmar.

Following the MoU between XTBG and FD, Prof. QUAN Rui-Chang of XTBG led a fieldwork team, consisting of members from XTBG, KIZ, KIB and FRI, and conducted biodiversity explorations in Hkakaborazi National Park, Northern Myanmar, from November 16 to December 16. Through this fieldwork, the team collected some basic information about the plant, fish and animal diversity of Northern Myanmar.


a)


b)


c)

a) The meeting XTBG called to discuss the preparation progress and annual plan of SEABRI
b) CHEN Jin looking at the “Myanmar Center” site
c) XTBG fieldwork team in Northern Myanmar during November and December

“Full-Coverage Protection Plan of Native Plants (Pilot)” project

Based on the “Zero-Extinction Project” initiated by XTBG, the Chinese Union of Botanical Gardens (CUBG) launched this “Full-Coverage Protection Plan of Native Plants (Pilot)” project in 2014. The project aims to reduce the impact of agricultural expansion on many species, to help with the long-term survival of threatened species, and to increase botanical gardens’ capabilities to preserve native plants. Eight botanical gardens distributed in different geographic areas were selected as the pilots. These eight, from Southwest China (Yunnan, Guizhou, Chongqing, Sichuan and Tibet), South

FROM LEFT: "Full-Coverage Protection Plan of Native Plants (Pilot)" project work plan seminar; Initiation meeting in Guilin Botanical Garden; Fieldwork

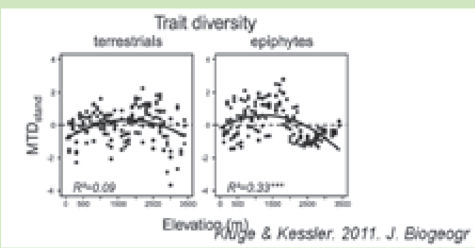
China, Central China, East China, North China, Northeast China, and Northwest China will chair the subprojects to carry out native plant species conservation in their corresponding regions, in collaboration with other member botanical gardens in their regions, and try to realize full coverage of native plant species conservation.

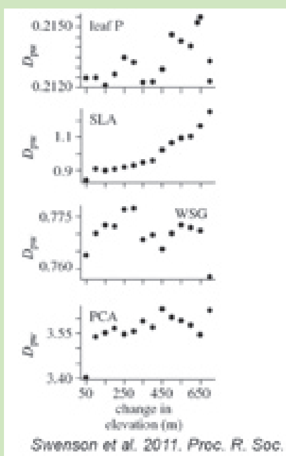
Up to the end of August, seven separate assessment meetings have been held. The first version of the rapid assessment report has been finished and it will be updated according the field inventory reports.

"The Evaluation of the Ecosystem Security Threshold Based on the Dynamics of Plant Functional Groups" project

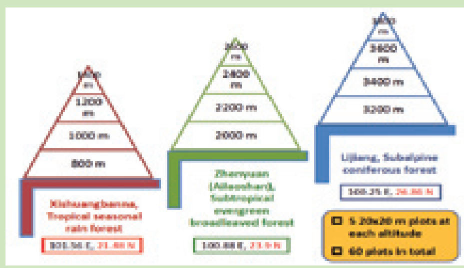
Lead by Prof. CAO Min, "The evaluation of the ecosystem security threshold based on the dynamics of plant functional groups" project went smoothly.

Tree seedlings, seed rain, litter fall, and DBH have been monitored regularly in the 20-ha plot. Functional traits, such as leaf area, leaf thickness, leaf dry mass, leaf mass per area, and petiole length, were calculated from field measurements of fully expanded fresh young and undamaged leaves of adult trees. Soil samples and seed germination were monitored in the rainy season and dry season, and the dynamics of seedling growth and survival was investigated on Nangong Mountain in Xishuangbanna. Research papers based on this project have been published in *Ecology* and other international journals.

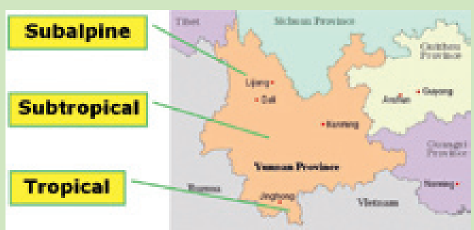




LEFT: Mean trait diversity (MTD stand) of 156 fern assemblages along an elevation gradient in Costa Rica
RIGHT: Pair-wise dissimilarity, Dpw, of each trait along the elevation gradient



Plots at different altitudes



Research sites

Yunnan Province "Agriculture-Science-Education Combination New Agricultural Social Service System Construction project-Fugong County Integrated Service Demonstration Site" project

The "Fugong County Integrated Service Demonstration Site" was launched in May, 2014. The project was supported by the Yunnan Provincial Department of Finance, CAS Kunming Branch and other collaborating institutes. The project successfully completed the goals set for 2014 and achieved economic and social benefits.

The project includes three parts. Firstly, to construct three-dimensional ecological and economic development demonstrations, as "medicinal plants-fruit trees-forest", "medicinal plants-fungus- forest" and "medicinal plants-forest". An area of 26 hectares of "3-D" demonstration site has been built. Secondly, to construct high-protein fodder introduction and "grass-forest" demonstration sites. 1,500 plants of Bulgarian rose have been planted under walnut forests. Thirdly, practical skills training and service system building. More than 30 training courses were held in Fugong villages, with 4,566 people joining the training courses.

a) Corn and Pinelliaternata interplanting
b) Gastrodiaelata planted under forest

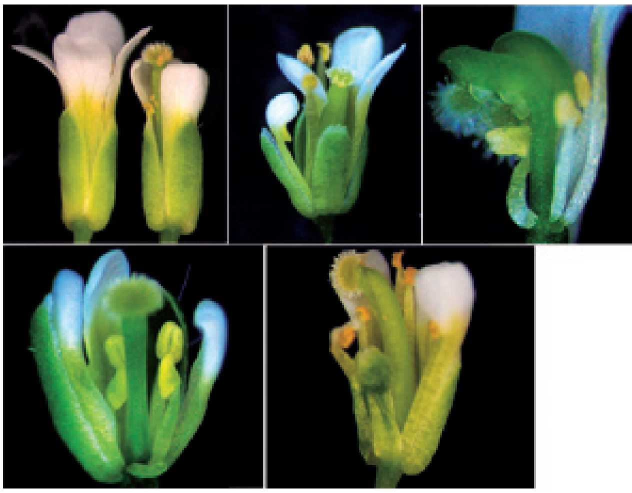
c) Walnut forests and Pinelliaternatea interplanting
d) Training course on planting Pinelliaternata
e) Training course

Research Progress and Outreach Highlights

New progress has been made in *Arabidopsis* studies

Prof. YU Di-Qiu and his team at XTBG have made new progress in *Arabidopsis* studies. They conducted a study to further characterize the regulatory role of BRASSINOSTEROID INSENSITIVE2 (BIN2), a critical repressor of brassinosteroid (BR) signaling, in mediating the ABA response during seed germination and subsequent postgerminative growth in *Arabidopsis*. Mechanistic investigation revealed that BIN2 physically interacts with ABSCISICACID INSENSITIVE5 (ABI5), a bZIP transcription factor. Further genetic analysis demonstrated that the ABA-hypersensitive phenotype of BIN2-overexpressing plants requires ABI5. BIN2 was found to phosphorylate and stabilize ABI5 in the presence of ABA, while application of epibrassinolide (the active form of BRs) inhibited the regulation of ABI5 by BIN2. Consistently, the ABA-induced accumulation of ABI5 was affected in BIN2-related mutants. These results provide evidence that BIN2 phosphorylates and stabilizes ABI5 to mediate the ABA response during seed germination, while BRs repress the BIN2-ABI5 cascade to antagonize ABA-mediated inhibition. The study entitled "BRASSINOSTEROID INSENSITIVE2 Interacts with ABSCISIC ACID INSENSITIVE5 to Mediate the Antagonism of Brassinosteroids to Abscisic Acid during Seed Germination in *Arabidopsis*" has been published in *The Plant Cell*.

Prof. YU Di-Qiu and his team found that WRKY57 functioned as a negative regulator in jasmonic acid (JA)-induced leaf senescence in *Arabidopsis*. Further investigation indicated that WRKY57 directly repressed the expression of SENESCENCE4 (SEN4) and SENESCENCEASSOCIATED GENE12 (SAG12). They revealed that auxin could antagonize JA-induced leaf senescence and that WRKY57 was a key modulator mediating the crosstalk between JA and auxin in JA-induced leaf senescence. They also revealed that a mechanistic understanding of how the crosstalk between the JA and auxin signaling pathways in JA-induced leaf senescence was fine-tuned by WRKY57. The study entitled "*Arabidopsis* WRKY57 functions as a node of convergence for jasmonic acid– and auxin-mediated signaling in jasmonic acid-induced leaf senescence" has been published in *The Plant Cell*.



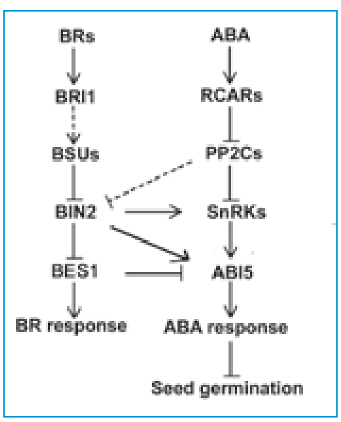
miR396 phenotype

Further, the function of miR396 in flower development has also been revealed by Prof. YU Di-Qiu and his team. Their study demonstrated that the products of all 7 GRF targets can interact with GRF-INTERACTING FACTORs (GIFs) that may function as co-transcription factors. Their results revealed the function of miR396 in reducing the formation of the GRF/GIF complex, which regulated pistil development. The study entitled "Molecular mechanism of miR396 mediating pistil development in *Arabidopsis thaliana*" has been published in *Plant Physiology*. miRNAs are a class of endogenous non-coding small RNAs that regulate gene expression

post-transcriptionally. Nitrogen (N) is a key component of many fundamental biological molecules. Prof. YU Di-Qiu and his team generated transgenic plants over-expressing miR826 or miR5090. The overproduction of miR826 or miR5090 correlated well with the decreased AOP2 mRNA level in transgenic plants, suggesting that miR826 and miR5090 suppressed AOP2mRNA abundance. Elevated miR826 or miR5090 expression suppressed the function of AOP2, resulting in the reduction of methionine-derived glucosinolates. Their study revealed that both miR826 and miR5090 regulated *A. thaliana*'s adaptation to low N conditions by affecting glucosinolate synthesis. The study entitled "Two young miRNAs originating from target duplication mediate nitrogen starvation adaptation via regulation of glucosinolate synthesis in *Arabidopsis thaliana*" has been published in *Plant Physiology*.

Prof. YU Di-Qiu and his team also conducted a study to examine the role of MYB82, an R2R3-MYB transcription factor, in *Arabidopsis* trichome development. The study focused on the function of MYB82 in trichome development and demonstrated that MYB82 functioned in the plant cell nucleus as a positive regulator. MYB82 over-expression led to abnormal trichome development. At the same time, over-expression of MYB82-SRDX (fused with a dominant repression domain) or an N-terminal R2R3-MYB domain caused glabrous leaves. MYB82 driven by the GL1 promoter was able to rescue the glabrous phenotypes of the GL1 mutant, suggesting that the MYB82 protein was functionally equivalent to the GL1 protein. Similar to GL1, MYB82 was able to interact with GL3, suggesting that MYB82 was incorporated into the WD40–bHLH–MYB complex to participate in the regulation of trichome development.

In addition, the study revealed that MYB82 proteins can form homodimers or heterodimers with GL1 proteins. The study entitled "MYB82 functions in regulation of trichome development in *Arabidopsis*" has been published in *Journal of Experimental Botany*.



FROM LEFT: A simplified model for the antagonistic effect of BRs on ABA during seed germination; MYB82 regulates the growth of trichome; miR396a over-expression results solitary carpel pods

Photoperiodic responses of *FLOWERING LOCUS T* to promoter variations

The *FLOWERING LOCUS T (FT)* gene is crucial for the accelerated flowering in response to long days. A study conducted by XTBG PhD candidate LIU Liang-Yu and his colleagues showed that the minimal photoperiod-responsive unit of *FT* promoter was composed of elements from two regulatory regions separated by a non-responsive intermittent region of variant length in *Arabidopsis* accessions (4.7−3.8 kb). Their results indicated that the distal regulatory region *Block C* and *Block A* (the two core regulatory regions) were necessary and sufficient to confer responsiveness to long days, while the intermittent sequences were required to suppress background expression in short days.

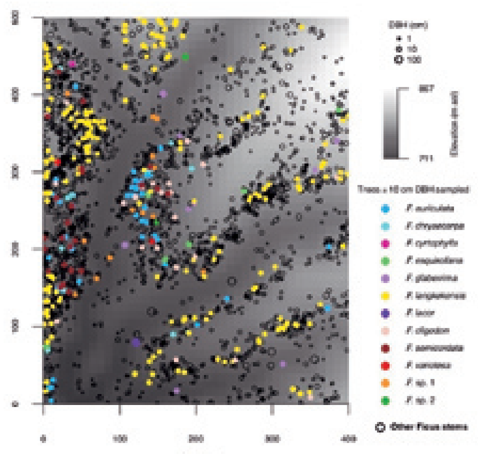
The study entitled "Induced and natural variation of promoter length modulates the photoperiodic response of *FLOWERING LOCUS T*" has been published in *Nature Communications*.

A deterministic model of community assembly in the 20-ha plot of Xishuangbanna

Prof. CAO Min and his team in XTBG analyzed the functional and phylogenetic structure of tree assemblages in the 20-ha Xishuangbanna forest dynamics plot (FDP). Their results demonstrated that functionally similar species co-occur across spatial and size scales and habitats in the Xishuangbanna FDP, indicating the importance of abiotic filtering governing the assembly process. The results also supported the hypothesis that abiotic determinism is more important at larger scales while biotic determinism is more important on smaller scales within habitats.

The study entitled "Functional and phylogenetic assembly in a Chinese tropical tree community across size classes, spatial scales and habitats" has been published in *Functional Ecology*.

Also in the 20-ha plot, another study led by Prof. CAO Min has been conducted. In cooperation with researchers from the University of Columbia, Prof. CAO and his team at XTBG studied the functional and phylogenetic diversity of co-occurring *Ficus* species in order to characterize mechanisms maintaining diversity across the plot. They studied six traits (leaf area, succulence, specific leaf area, maximum diameter at breast height (DBH), fruit size, and latex exudation) for 22 *Ficus* species and 335 individuals greater than or equal to 10 cm DBH on the 20-ha forest plot.Their analysis revealed three key properties of mechanisms that likely maintain diversity among closely related *Ficus* species in Xishuangbanna. Their findings suggested that niche partitioning along abiotic gradients and within sites promotes functional diversity of *Ficus* species, although high intraspecific variation may reduce the role of niche partitioning in species coexistence. The study entitled "The role of functional traits and individual variation in the co-occurrence of *Ficus* species" has been published in *Ecology*.



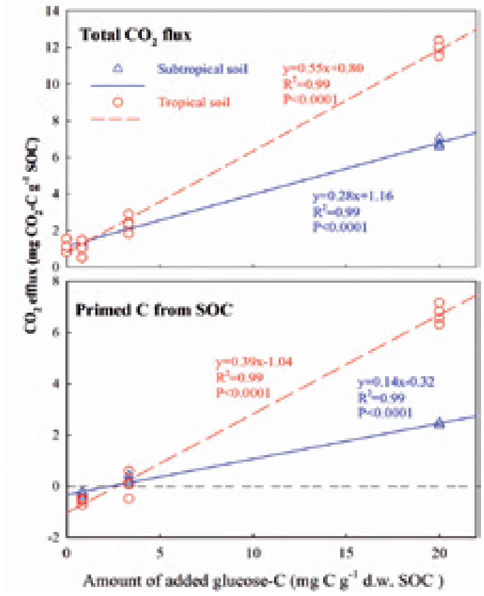
Map of the Xishuangbanna 20-ha plot showing Ficus individuals and those large trees (DBH ≥ 10 cm) whose leaf traits were sampled. DBH is indicated via circle size on a log scale

Soil carbon cycling in tropical and subtropical forests of Yunnan

XTBG PhD candidate QIAO Na and Dr. Douglas SCHAEFER in XTBG, in cooperation with colleagues from Institute of Geographic Sciences and Natural Resources Research and Göttingen University, conducted a "priming effect" study in a subtropical evergreen forest in the Ailao Mountains and a tropical rainforest in Xishuangbanna. The study was aimed to clarify whether single vs. more frequent glucose inputs produce different priming effects.

The researchers found that single additions of glucose overestimated priming effects in those subtropical and tropical soils and thus did not adequately reflect natural ecosystem C inputs. Continuous C inputs resulted in a greater C increase in the soil than single additions, further emphasizing the importance of labile organic carbon (LOC) addition patterns. Those patterns aside, responses of the very different soils to glucose additions were remarkably similar in terms of glucose release, priming, and net-C balance. They presented evidence that LOC additions might generally increase net C balances in soils.

The study entitled "Labile carbon retention compensates for CO_2 released by priming in forest soils" has been published in *Global Change Biology*. This paper resulted in QIAO Na being given one of the "Excellent Paper Awards for Young Scientists" by the Chinese Ecosystem Research Network (CERN).



Responses of total CO_2 flux (top) and primed C (bottom) to the amount of added glucose in tropical and subtropical soils. Red long dash lines and empty circles indicate the tropical soil while blue solid lines and triangles represent the subtropical soil

Flexibility of source-water uptake by non-native rubber trees

The seasonal water-use strategy of rubber trees over the course of a rainy/dry season cycle was assessed by Prof. LIU Wen-Jie and his research group at XTBG. Results showed that midday leaf water potential of rubber trees was relatively stable throughout the year and did not drop significantly during the late dry season, displaying isohydric behavior. Model calculations showed that the proportion of water uptake from the shallow soil layer (<30 cm) increased markedly after the most recent rainfall in the late dry season and the early rainy season (varying between 65% and 71%), indicating significant plasticity in sources of water uptake in this dimorphic-rooted species. Their results suggest that rubber trees are able to adjust the allocation of resources and thus acclimate to the spatiotemporal changes to water-conditions in the soil profile. The results entitled "Vertical patterns of soil water acquisition by non-native rubber trees (*Hevea brasiliensis*) in Xishuangbanna, SW China" have been published in *Ecohydrology*.

Elevational migration to be key in conserving woody plant species in Yunnan

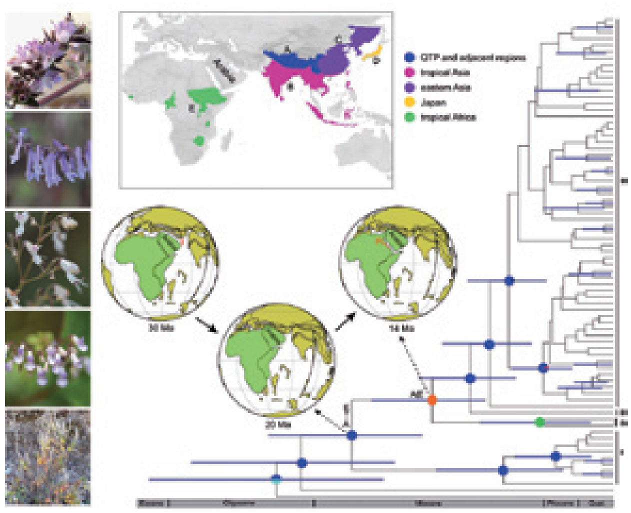
With the guidance of Prof. J. W. Ferry SLIK and Prof. ZHOU Zhe-Kun, Dr. ZHANG Ming-Gang of XTBG conducted a study to focus on how climate change will affect the woody plant species distribution patterns of Yunnan in the context of developing conservation strategies.

Their results implied that establishment of latitudinal migration corridors would not make a large contribution to woody plant species conservation under future changing climate. Their results also showed that most woody plant species in Yunnan would lose considerable amounts of their range due to the difficulty of moving northwards to track climate change, which might lead to considerable genetic erosion of those plant populations over time. Strategic reforestation in areas predicted to suffer most from increasing climate instability should therefore be considered to prevent a negative feedback between climate change and habitat degradation.

The study entitled "Major declines of woody plant species ranges under climate change in Yunnan, China" has been published in *Diversity and Distributions*.

Research advances in plant phylogenetics and biogeography

Rapid organismal radiations occurring on the Qinghai–Tibetan Plateau (QTP) and the mechanisms underlying Asia–Africa intercontinental disjunctions have both attracted much attention from evolutionary biologists. Dr. YU Xiang-Qin and Prof. LI Jie studied the genus *Isodon* (Lamiaceae), a primarily East Asian lineage with disjunct species in central and southern Africa, as a case to shed light upon these processes. Their results support a monophyletic *Isodon* that includes the two disjunct African species, both of which likely formed through allopolyploidy. A rapid radiation of *Isodon* was suggested to occur in the late Miocene, and it corresponds with one of the major uplifts of the QTP and subsequent aridification events. Their study supports the hypothesis that geological and climatic events play important roles in driving biological diversification of organisms distributed in the QTP area. Entitled "Phylogeny and historical biogeography of *Isodon* (Lamiaceae): Rapid radiation in south-west China and Miocene overland dispersal into Africa", the results have been published in *Molecular Phylogenetics and Evolution*.



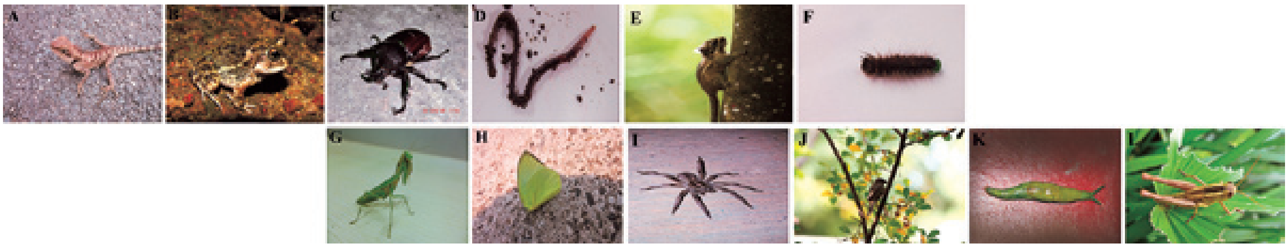
Chronogram of Isodon derived from BEAST analysis of combined cpDNA data set

Frugivorous birds prefer black and red over other colours in Xishuangbanna

Prof. QUAN Rui-Chang and his team experimentally addressed several questions concerning the preferences of frugivorous birds in Xishuangbanna. The results show that all experimental birds had a strong preference for the most common fruit colours, black and red. Relative to adult wild-caught birds, the innate colour preference of hand-raised birds, with a strong preference for black natural fruit, better reflected the frequency of natural fruit colour in Xishuangbanna. The preferences for common-coloured fruit and avoidance of ripe fruit of an uncommon colour were relatively invariant at inter- and intra-specific levels, and were also stable over time. The study entitled "Bird fruit preferences match the frequency of fruit colours in tropical Asia" has been published in *Scientific Reports*.

Varied seed traits affect seed re-caching process of scatter-hoarding rodents

Scatter-hoarding rodents are effective dispersal agents for many plant species. Few studies have directly examined how varied seed traits affect this important process. Dr. WANG Bo and his colleagues at XTBG conducted a study in a natural forest at the Shangri-La Alpine Botanical Garden. Their study found that the likelihood of seeds being re-cached increased with seed size, but not with nutrient content or tannin content. Furthermore, seed size also demonstrated a much more consistent and overwhelming effect than nutrient and tannin content on the primary foraging decision at the rodents' initial encounter with a seed. Most plant species that depended on scatter-hoarding rodents for seed dispersal bore relatively large seeds. Larger seeds usually had a much greater chance of being scatter-cached while small ones had a greater chance of being eaten. Meanwhile, large seeds were often more likely to produce seedlings. The researchers therefore concluded that the foraging preference for large seeds by scatter-hoarding rodents may have played an important role in the evolution of large seeds. The study entitled "Factors influencing repeated seed movements by scatter-hoarding rodents in an Alpine forest" has been published in *Scientific Reports*.



12 kinds of animals were used in the experiments

Children's contact with nature possibly enhances willingness to conserve wildlife

Prof. CHEN Jin and his students at XTBG have explored whether children's affective attitudes-biophilia and biophobia-towards mounted displays of common but ecologically significant animals could influence their conservation attitudes.

They conducted an intensive survey of 1,119 children aged 9-10, from schools spread geographically across China and along the urbanization gradient.

Their study found that the children's contact with nature was significantly positively related to their biophilia and negatively related to their biophobia. Children's biophilia, in turn, significantly affected their willingness to conserve animals, and, to a lesser extent, their general attitudes about conservation.

The study suggested that contact with nature may enhance children's willingness to support animal conservation indirectly by nurturing biophilic attitudes to wildlife. Their findings affirmed the idea that a decline in human interactions with the natural world, known as the "extinction of experience", is a threat to the conservation of biodiversity.

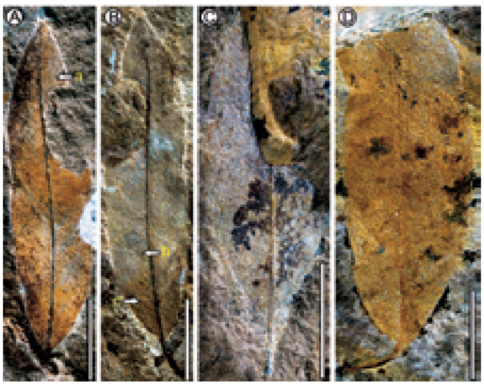
The study entitled "How contact with nature affects children's biophilia, biophobia and conservation attitude in China" has been published in *Biological Conservation*.

Studies on co-evolution of figs and fig wasps

Prof. YANG Da-Rong, Prof. PENG Yan-Qiong and their team have studied figs and fig wasps for a long time. In 2014, they compared components of fitness of female fig wasps developing in central and peripheral flowers. They found most females mated once, but some had the opportunity to mate up to four times and multiple mating opportunities were more frequent among centrally located galls. Females that had multiple mating opportunities produced more daughters but similar numbers of sons, resulting in more female-biased broods. These females are likely to have produced more offspring because of their larger size but may have also benefited from mating with more males. The results demonstrate that differences in the natal locations of foundresses can modify offspring sex ratios and obscure sex ratio adjustment in response to the number of foundresses sharing a fig. The results entitled "Fig wasps from the centre of figs have more chances to mate, more offspring and more female-biased offspring sex ratios" have been published in *Animal Behaviour*.

Ficus hispida fig showing the mating holes made by male Ceratosolen solmsi marchali in galled ovules that contain conspecific females

Miocene leaves of *Elaeagnus* (Elaeagnaceae) were found in the Qinghai-Tibet Plateau



E. tibetensis T. Su et Z. K. Zhou

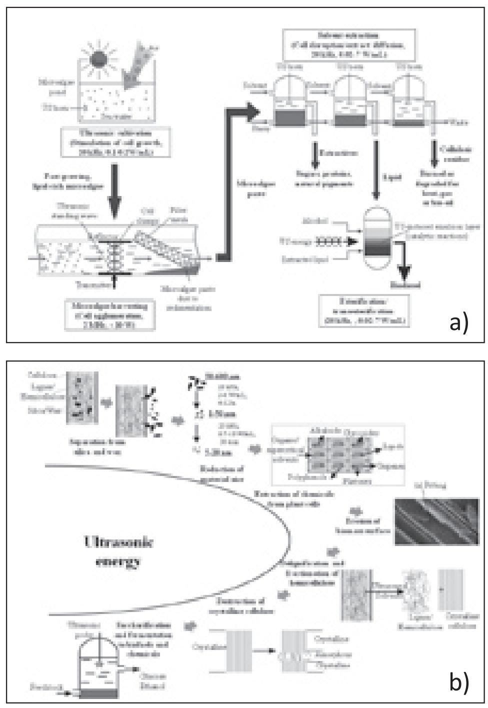
Dr. SU Tao, associate professor in XTBG, along with Prof. ZHOU Zhe-Kun and his team found fossil leaves of *Elaeagnus* (Elaeagnaceae) were present in eastern Tibet by the late Miocene. Together with previous fossil records, the new species supports a Holarctic history of the family. The diversification of *Elaeagnus* in the Qinghai-Tibet Plateau and adjacent areas might have been driven by continuous uplift at least since the late Miocene, causing formation of complex topography and climate with high rainfall seasonality. The characteristic scales on the leaf surfaces are likely to be an important functional adaptation to seasonal droughts during early spring. The results entitled "Miocene leaves of *Elaeagnus* (Elaeagnaceae) from the Qinghai-Tibet Plateau, its modern center of diversity and endemism" have been published in *American Journal of Botany*.

Application of ultrasound energy in conversion of biomass to biofuels

Critical assessment of ultrasound-assisted pretreatments and reactions of biomass for producing biofuels is needed to consider the role and mechanism of ultrasonic intensification and how it can be used advantageously in future biorefineries.

Dr. LUO Jia and Prof. FANG Zhen of XTBG reviewed progress in ultrasound-assisted pretreatments and reactions of biomass materials. They described and critically evaluated recent applications of ultrasonic energy in the pretreatment and conversion of lignocelluloses, biodiesel and microalgae. They also introduced the potential of ultrasound for other related biomass processing (emulsification, demulsification and aggregation) and *in-situ* process monitoring. They concluded that the introduction of ultrasonic energy played a positive influence on the pretreatment and thermochemical/ biochemical conversion of biomass. Ultrasound-assisted processes need to be further studied both at the fundamental level and at the applicable level to realize practical ultrasonic systems.

The study entitled "Ultrasound-enhanced conversion of biomass to biofuels" has been published in *Progress in Energy and Combustion Science*.



a) Ultrasound assists microalgae producing biofuels
b) Ultrasonic energy promotes lignocelluloses to preprocess and the conversion reaction

XTBG scientists won Yunnan Provincial Natural Science Award 2013

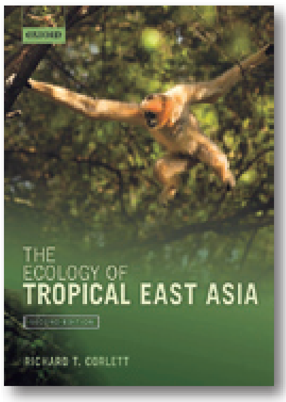
The awards ceremony for the "Yunnan Science & Technology Prize 2013" was held on August 26 in Kunming. Among the prize winners, Prof. YU Di-Qiu and Prof. YANG Da-Rong and their teams at XTBG were honored with the second prize of Yunnan Provincial Natural Science Awards respectively.

Prof. YU Di-Qiu and his team were honored for accomplishing "Studies on molecular mechanisms underlying plant stress resistance by the WRKY gene family". Prof. YANG Da-Rong and his team were honored for accomplishing "Studies on co-evolution of figs and fig wasps in Southwest China". Both teams made breakthroughs and got more than 20 research papers published in peer-reviewed journals.

Certificates

New books

A second edition of *The Ecology of Tropical East Asia* by XTBG Prof. Richard CORLETT was published by Oxford University Press in 2014. This book is a thorough update of the first textbook dedicated to the terrestrial ecology of the East Asian tropics and subtropics, from southern China to western Indonesia, originally published in 2009. The geographical coverage of the new edition has been enlarged to include the very similar ecosystems of northeast India and Bhutan.



The Ecology of Tropical East Asia by XTBG Professor Richard CORLETT

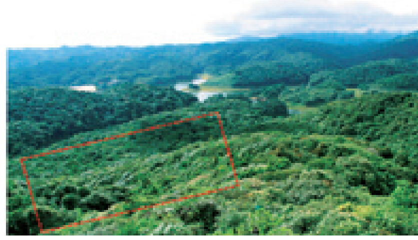
The book deals with plants, animals, and the ecosystems they inhabit, as well as the diverse threats to their survival and the options for conservation. It provides the background knowledge of the region's ecology needed by both specialists and non-specialists to put their own work into a broader context. The accessible style, comprehensive coverage, and engaging illustrations make this advanced textbook an essential read for senior undergraduate and graduate level students studying the terrestrial ecology of the East Asian tropics, as well as an authoritative reference for professional ecologists, conservationists, and interested amateurs worldwide.

A book named "*Orchids of Xishuangbanna: Diversity and Conservation*" has been published by the China Forestry Publishing House. The book was jointly completed by scientists from XTBG and the Management Bureau of Xishuangbanna National Nature Reserve.

In this book, 363 orchid species of 108 genera are introduced. The endangerment status was assessed as Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, and Least Concern. The book provides readers with fundamental information for further integrative conservation on local orchid plants, and a useful case study on assessing species endangerment status and determining protection priorities of a special taxonomic plant group at the regional level.

Orchids of Xishuangbanna: Diversity and Conservation

Improvement of Research Facility



Location and external view of the 20-ha permanent monitoring plot

A 20-ha subtropical forest dynamics plot established in Ailao Mountains

A 20-ha permanent monitoring plot for subtropical forest dynamics in Ailao Mountains has been established in 2014. The 20-ha plot is an expansion of the former 6-ha plot in Ailao Mountains. The survey and tree census methods employed on the plot have followed the protocols of the Center for Tropical Forest Science, Smithsonian Tropical Research Institute. Site selection, mapping, and positioning have been completed in March. Every woody stem≥1cm in diameter at 1.3m height was tagged with aluminum, mapped, and measured for its diameter at breast height (DBH).

The 20-ha Ailao Mountains forest plot is a research project affiliated with XTBG. The functions of the plot are to monitor tree species diversity and abundance, as well as tree growth and survival, on a long term basis to enable the study of forest dynamics. It will be monitored for scientific research on forest sciences and climate change. It will also generate deeper understanding of the mechanisms behind changes in biomass and carbon storage in subtropical forests, and create extensive data sets on structural elements of the forest floor in addition to the live over story.

a) Positioning with total station device
b) Measuring plant DBH

A canopy tower crane was built and passed the acceptance check

Supported by the "Central science institution repair purchase special funds" project of the Ministry of Finance, a canopy tower crane with a height of 81 meters, arms of 60 meters and rotary angle of 540 degrees was completed at December. This is the tallest crane in China for now and can cover every spot of the forest canopy over a hectare of tropical rainforest. Plant-animal interactions, the mutual influence between the forest canopy and the atmosphere, and the impacts of global change can benefit from the three-dimensional access provided by the canopy tower crane.

The canopy tower crane is an important program of the project of "China forest biodiversity monitoring network platform". The project will be important support to the research and monitoring forest biodiversity network. Six such platforms are in China's 12th five-year-plan and for CAS to implement, two of which are for XTBG.

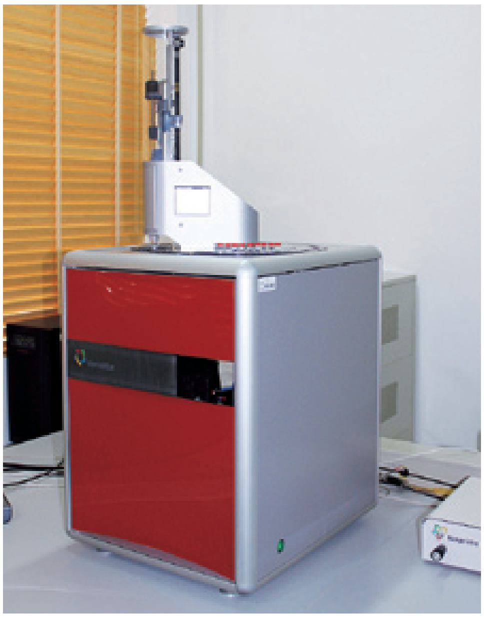
Biological information data analysis workstation

To improve the second-generation high-throughput sequencing platform of XTBG, and to meet the processing of large amounts of sequencing data analysis, XTBG installed a bioinformatics data analysis workstation in 2014, supported by "Central science institution repair purchase special funds". The workstation is an HP Proliant series of high-performance computer cluster system, with 5.4T flops peak performance. It consists of 8 HP BL460C blade servers (20-core) and 2 HP DL580 servers with 4-way Intel Xeon E7 4870V2.0 processors and 1.5TB RAM. The workstation will not only provide for the establishment of a mathematical model for an ecology-related operating platform, but will also provide hardware support for bioinformatics data comparisons, stitch and analysis, and help gain experience for building the data services.

In addition to the workstation installation, XTBG also installed other equipments, including: a high-speed refrigerated centrifuge, light incubator, flow cytometry instrument, high performance liquid chromatograph, and a 3D digital microscope with super depth of field.

Biological information data analysis workstation

Isotope mass spectrometer successfully test the hydrogen and oxygen isotope



The injector of the isotope mass spectrometer

In April, XTBG central laboratory staff successfully converted the solid mode of isotope mass spectrometer sampler peripheral device into a liquid mode, and mastered the complex interchange method of circuit and gas path between the two modes, with the guidance of an Elementar company engineer. The accuracy and precision of test results, which were determined by the international general hydrogen and oxygen isotope work standard, were confirmed to meet requirements. The determination of isotope ratios of carbon, nitrogen, hydrogen, and oxygen was implemented in the central laboratory. The analysis of isotope ratios of carbon and nitrogen in solid samples was not only achieved, but also the isotope ratios of hydrogen and oxygen of water or bound water in plants and soil. All of these efforts broaden the analysis scope of the isotope mass spectrometer and provide a better service for related research work.

Project of "Functional improvement and determining method research of fiber analyzer" successfully passed the acceptance by CAS

The improved fiber analyzer

The project of "Functional improvement and determining method research of fiber analyzer" was successfully accepted and supported by the Chinese Academy of Sciences in 2014 with a total of 190,000 Yuan. The fiber analyzer (SoxCap2047TM cup) can be used to determine the content of crude fiber, neutral detergent fiber, acid detergent fiber and acid detergent lignin in plants and foods. It has an important use in food engineering and in the research on the carbon cycle in ecosystems. The improved fiber analyzer will assume increasingly onerous analysis and detection tasks in the future. The main features of the improved analyzer include: compact, suitable for the determination of large numbers of samples, saving time, easy to clean and maintain, with high accuracy results, and having acid processing functions in fatty measurement.

Further improvement of the molecular biology research experimental platform

Molecular biology research experimental platform

The molecular biology experimental platform mainly centers around gene sequencing. After three years of construction and development, the platform has 19 conventional and 11 advanced large instruments and equipment at present, and it functions in material culture, storage of solution and reagent, substance extraction and determination, sterile operation and culture, imaging of DNA, RNA, protein and living plants, gene operation and cell analysis. The establishment and perfection of the platform contributes to improving the scientific research conditions at XTBG and to conduct basic and applied research in molecular and cell biology.

Experiment on ground validation of satellite data of CO_2 to be conducted in XTBG

The monitoring system

A monitoring system for direct solar radiation, scattering solar radiation, and spatial and temporal variation in CO_2 was set up in XTBG in early April. The monitoring system is a product of cooperation between the CAS Institute of Atmospheric Physics and XTBG. Through three-months continuous monitoring of direct solar radiation, scattering solar radiation, and spatial and temporal variation in CO_2, the researchers will compare data derived from satellites and ground surface observations, so as to correct observational errors.

Conferences and Symposia

The 3rd Xishuangbanna International Symposium

The 3rd Xishuangbanna International Symposium themed as "Botanical Gardens and Climate Change" was held in XTBG during January 13-16. Over 90 scientists from 20 countries gathered together at XTBG to develop a roadmap for scientific research and education in climate change biology at botanical gardens in China and worldwide. The symposium covered the following topics: 1) Climate change in China: past, present and future, 2) Monitoring the biological impacts of climate change, 3) Climate change and conservation,4) Mitigating climate change, 5) Climate change education, 6) Botanical gardens and climate change: priorities for the future.

THE XISHUANGBANNA DECLARATION ON BOTANICAL GARDENS AND CLIMATE CHANGE (16TH JAN)
THE PARTICIPANTS in the
Third Xishuangbanna International Symposium, Botanical Gardens and Climate Change, held at the Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, Yunnan, China,
on January 13-16th, 2014

1. Recognize both the growing threat from climate change to global plant biodiversity and the unique position of the world's Botanical Gardens at the interface between scientific research, conservation and public education.
2. Recognize also the responsibility of Botanical Gardens for delivering the targets of the CBD's Global Strategy for Plant Conservation (GSPC).
3. UrgeBotanical Gardensto use their individual and collective capabilities to:
   a. facilitate long-term, multi-disciplinary research into the impacts of climate change on plant populations and ecological communities, as well as the reciprocal influence of these communities on climate change;
   b. secure the survival of climate-sensitive species in situ in protected natural habitats and ex situ in germplasm banks and living collections, ensuring that the full range of genetic diversity is represented,while exploring the rolefor assisted migration in climate change adaptation;
   c. reconsider existing collection policies in the light of climate change projections and the need for an enhanced role in conservation;
   d. educate and involvevisitors in reducing the human contribution to climate change through carbon emissions, and adapting to the changes that are now inevitable, and demonstratethe multiple benefits of plant conservation in a changing world;build theirown capacity for climate change education andshare educational experiences with other Gardens;
   e. engage political, social, religious, and economic leaders in the development of policies and practices that address the impacts of climate change on plants and society.
4. Identifyresearch areas to which all Gardens cancontribute including:collecting comprehensive and consistent weather data,monitoring phenological and other responses to climate change, and assessing the vulnerability of local species and communities;encourage public involvement in data collection through citizen science projects.
5. Call for Botanical Gardensto develop detailed plans for their response to climate change and to engage with their management authorities, funding agencies, sponsors, visitors, local communities, and other stakeholders to ensure that these plans are carried out.
6. Recommend the further development of mechanisms for sharing data among Botanical Gardens, and with other potential users, with clear criteria and standards to ensure quality, reliability, and transparency.
7. Acknowledge that many Botanical Gardens are already making significant contributions in all these areas, but identify the urgent need to scale up existing activities and make more use of the opportunities presented by national, regional, and global networks of Gardens.
8. Support the establishment of new Botanical Gardens, or extensions of existing ones, in areas with climatic and biogeographical characteristics that are under-represented in the existing network.
9. Ask also that Botanical Gardens'live the message'and convey it to others by training their own staff and implementing appropriate sustainability policies in areas under their control.

The Xishuangbanna Declaration on Botanical Gardens and Climate Change

Some renowned botanists, such as Prof. Stephen BLACKMORE of the Royal Botanical Garden Edinburgh and Dr. Sara OLDFIELD of Botanical Gardens Conservation International, were invited as keynote speakers. Mr. LI Guo-Zheng, Deputy Governor of Xishuangbanna Prefecture, attended the opening ceremony. This symposium was reported by CCTV and other media.

7 keynote speeches, 33 oral presentations, 15 posters, and some oral sessions provided a platform for scientists to develop a blueprint for studies on botanical gardens and climate change. The symposium reached a common understanding of nine aspects, and asked botanical gardens to undertake the responsibility of addressing global climate change. "The Xishuangbanna Declaration on Botanical Gardens and Climate Change" was issued on the last day of the symposium.

“Research Priorities in Climate Change Biology in the Tropics and Subtropics” Workshop

A workshop entitled “Research Priorities in Climate Change Biology in the Tropics and Subtropics” was held in XTBG during June 11-12, and was attended by 26 researchers and educators from XTBG, the Organization for Tropical Studies, Kunming Institute of Botany, and several universities. The workshop was the second of the two planning meetings to establish collaborative research, education and training priorities, which was supported by the NSF Office of International Science and Engineering and the Division of Environmental Biology – Dimensions of Biodiversity program. Eighteen presentations were made at the workshop, which covered such topics as: causes of climate change, geographic framework of paleo-climate and paleo-vegetation, contemporary climate and spatial patterns of biodiversity, monitoring of responses of species distributions and biodiversity to climate change, public education and outreach on climate change, *etc*. Participants put forward their opinions on research priorities in climate change biology in the tropics and subtropics. A comprehensive report was completed by Prof. Richard CORLETT who chaired the workshop.

Scientific Seminar for the 50th Anniversary of the Sino-French Diplomatic Relationships

A scientific seminar for the 50th anniversary of the Sino-French diplomatic relationships was held in XTBG during July 24-25. The seminar was supported by the Scientific Department of the French Embassy in China. Prof. CHEN Jin of XTBG was the chair of the seminar.

The theme of the seminar was “Impact of climatic change on biodiversity: Yunnan biodiversity hotspot”. The program included 8 presentations by French scientists and around 10 presentations by Chinese scientists. Such renowned scientists as Prof. Finn KJELLBERG and Prof. Sovanmoly HUL made presentations at the seminar.

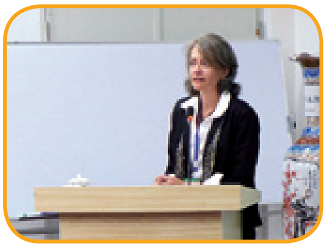
XTBG director CHEN Jin and Mr. Norbert PALUCH, science and technology counselor of the French Embassy to China, delivered opening speeches.

Participants of the seminar

Workshop on Biodiversity and Tropical Ecology

Prof. CHEN Jin delivers welcome speech

On September 17-19, the National Science Foundation (NSF) of the USA and XTBG jointly held a workshop on biodiversity and tropical ecology in XTBG. Twenty-six representatives from NSF, NSFC, XTBG and several universities of the USA, Thailand, and Laos attended the workshop. Prof. CAO Min, deputy director of XTBG, chaired the workshop. Sixteen presentations were made at the workshop. Representatives of NSF introduced the funding opportunities and research output of the NSF. Scientists from USA universities discussed cooperation potential with XTBG and Southeast Asian countries. Supaporn RODPRADIT introduced restoration of lower montane evergreen forest in Queen Sirikit Botanic Garden, Thailand. Somsanith BOUAMANIVONG presented on the biodiversity and forest ecosystems in Laos.



Dr. Nancy SUNG introduces NSF

The participants also discussed challenges and opportunities faced with current cooperation and training. The scale of funding programs is expected to be expanded via government to government meetings. The attending scientists were willing to promote the development of tropical biodiversity and ecology.

"Six-Academic Societies" New Year Sodality and Symposium

During January 17-19, "Six-Academic Societies" New Year Sodality and Symposium was held in XTBG. More than 120 members from the Yunnan Society for Cell Biology, Yunnan Society of Immunology, Yunnan Society of Biochemistry and Molecular Biology, Yunnan Society of Microbiology, Genetics Society of Yunnan and the Entomological Society of Yunnan participated in the event. XTBG Prof. YANG Da-Rong, the president of the Entomological Society of Yunnan(ESY), chaired the opening ceremony; ESY Secretary-General Prof. PENG Yan-Qiong chaired the symposium.

Prof. CHEN Jin, the president of the Ecological Society of Yunnan, made the welcome remarks, wishing everybody a happy new year. Seven presentations were made at the symposium, including new progress and important findings made in aspects of ecology, microbiology, cell biology, biochemistry and so on.

The "Six-Academic Societies" New Year Sodality and Symposium is held once a year, with the six societies taking turns to hold the symposium.

Participants in the symposium

CTFS-CForBio Workshop IV

Between July 28 and August 8, the Diversity and Forest Change Workshop IV, co-sponsored by the Center for Tropical Forest Science (CTFS), Smithsonian Tropical Research Institute (STRI) and Chinese Forest Biodiversity Monitoring Network (CForBio), was held in XTBG. The workshop was undertaken by XTBG and brought together 48 field biologists from 16 countries or regions. The workshop covered different aspects of the global forest biodiversity monitoring network. Nineteen presentations were made during the workshop.

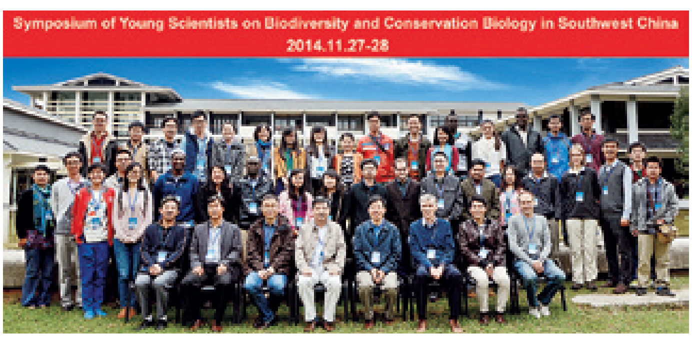
The workshop was divided into 4 groups: spatial distribution patterns of populations; communities and population dynamics; community functions and phylogenies; relationships between biodiversity and ecosystem functions. The attendees discussed the hot points in current ecological research based on the data obtained from large long-term plots all over the world and wrote and revised papers.

The past three workshops were held in Changbai Mountain Research Station of Forest Ecosystems in 2011, University of Washington in 2012, and Smithsonian Conservation Biology Institute in 2013.

Listening to lecture

Symposium of Young Scientists on Biodiversity and Conservation Biology in Southwest China

Sixty young scientists and graduate students gathered together in XTBG during November 27-28 for the "Symposium of Young Scientists on Biodiversity and Conservation Biology in Southwest China". The theme of the symposium was "Applications of Molecular Techniques ", which provided a platform to discuss the formation, evolutionary pattern and evolutionary history of biodiversity in southwest China. It covered such topics as phylogenetics and evolutionary analysis, biogeography and phylogeography, population and conservation genetics, community phylogenetics, DNA barcoding and metabarcoding, high-throughput sequencing and phylogenomics. Five keynote speeches and twelve presentations were given at the symposium.



The 2nd International Forum on Biodiversity and BioEconomy

The Second International Forum on Biodiversity and BioEconomy was held during May 21-23 in Bangkok, Thailand. Prof. CHEN Jin, director of XTBG, was invited to give a plenary speech entitled “Development of environmental friendly bio-industry in tropical Asia: with rubber as an instance”.

The international forum was hosted by the Biodiversity-Based Economy Development Office (BEDO). The theme of the forum was “Biodiversity and BioEconomy Development: Global Opportunities and Challenges”, the forum featured a panel of well-known international speakers giving more than 20 presentations. Over 500 participants from over 10 countries joined the forum. Participants in the forum also visited Nong Nooch Tropical Garden.

Mr. Petipong Pungbun Na AYUDHYA, President of BEDO, Thailand, headed a 9-person delegation which visited XTBG on July 26, 2012.

ATBC 2014

The 51st annual meeting of the Association for Tropical Biology and Conservation (ATBC), the largest organization in the world for the study and conservation of tropical systems, was convened in Cairns, Australia during July 20-24. The meeting brought together 589 scientists and conservationists from 55 countries. XTBG scientists including Richard CORLETT, Alice HUGHES, Akihiro NAKAMURA and some others attended the conference.

Prof. Richard CORLETT made a presentation entitled “Targeting plant zero extinctions in Xishuangbanna, China”. He introduced the target set by XTBG to reduce plant extinctions in Xishuangbanna to zero, by first identifying species in need of conservation action and then using a combination of *in* and *ex situ* conservation to ensure their long-term survival. Six other presentations were made by XTBG scientists at ATBC 2014.

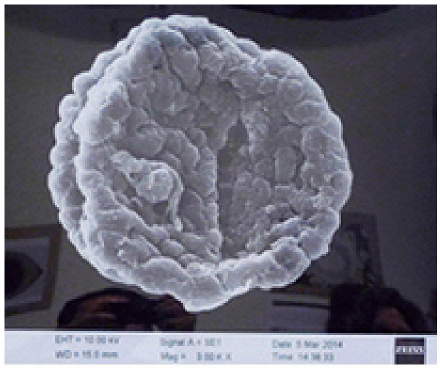
A festschrift was held in July for Prof. Roger KITCHING, an adjunct professor at XTBG. The symposium was named “Insect ecology and diversity”. Dr. Akihiro NAKAMURA of XTBG made a presentation, then sent a gift to Prof. Roger KITCHING on behalf of Prof. CAO Min, deputy director of XTBG, in recognition of his contribution to scientific research and talent training for XTBG.

The gift to Prof. Roger KITCHING

The 9th European Palaeobotany and Palynology Conference

The 9th European Palaeobotany and Palynology Conference was held on August 26-31 in Padova, Italy, and brought together more than 500 participants from Italy, UK, Germany, France, USA, China, Japan, and other countries. Prof. ZHOU Zhe-Kun and four young scientists from XTBG were present at the conference. Each of them made oral presentations.

Thirty-six symposia were organized for the conference, ranging from general topics to Palaeozoic, Mesozoic and Cenozoic palaeobotany and palynology. Many symposia were related to the Quaternary and Achaeobotany.



Images of plant fossils by XTBG displayed at the conference

The 4th International Palaeontological Congress

Dr. SU Tao

The 4th International Palaeontological Congress (IPC) was held in Mendoza, Argentina, from September 28 to October 3, 2014. The conference was hosted by the Centro Científico Tecnológico CONICET Mendoza and partner organizations. It brought together more than 1,000 participants from around the world. Dr. SU Tao of XTBG participated in the meeting and made an oral presentation entitled “Resilience of plant-insect interactions in an oak lineage through Quaternary climate change”.

The International Palaeontological Congress is a global meeting devoted to Palaeontology throughout the world. It convenes every four years under the aegis of the International Palaeontological Association. A variety of meeting styles including a combination of plenary lectures, symposia on leading issues, interactive workshops, technical sessions and short courses, were available at the 4th IPC.

The 5th Conference of IABG Asian Division

The Joint 5th Conference of the International Association of Botanical Gardens (IABG) Asian Division and East Asia Botanical Garden Network Meeting was held in Nanjing during October 18-22. More than 150 botanists and officials from Asia, Britain, Canada, and Russia attended the conference.

The 5th Conference of IABG Asian Division held in Nanjing

Under the theme “Building Capacity for Biological Resources Service- The Role of Botanical Gardens”, the conference addressed a wide spectrum of concern, including plant conservation, plant germplasm resources, plant introduction and domestication, botanical research, botanical garden management and conduct of garden practices.

Prof. CHEN Jin, director of XTBG and chairman of the Chinese Union of Botanical Gardens, was a member of the organizing committee and made a keynote speech entitled “From 'zero extinction' to 'complete coverage': a collective effort from the botanical garden community for an effective conservation of China's flora” at the conference.

The conference was composed of the following symposia: Conservation Biology of Rare and Endangered Plants; Plant Acclimatization and Diversity; Exploitation and Utilization of Plants; Management and Construction of Botanical Gardens; and Public Education.

The 3rd SCB Conference Asian Chapter

August 19-22, the 3rd Society for Conservation Biology (SCB) Asian Chapter Conference was hold in Malacca, Malaysia. Prof. Richard COLETT led an XTBG group which participated in the conference and made presentations. The SCB conference is an important international conference in conservation studies.

Dr. Alice HUGHES organized a pre-conference training course themed as “Fundamentals of GIS for ecology, and species distribution modeling”.

SCB Conference XTBG attendees

Photo by WAN Jin-Peng

2014 Annual Conference for Chinese Botanic Gardens

2014 Annual Conference for Chinese Botanic Gardens was held in Shanghai Chenshan Botanical Garden on October 22-26, with 350 representatives from over 120 botanical gardens or arboreta and international organizations around the world. The theme was "Social Responsibilities of Botanical Gardens".

A training course named "Chinese biodiversity conservation and green development fund" was held during the sessions of the conference. Prof. CHEN Jin, director of XTBG and chairman of CUBG, delivered an opening speech and made a plenary presentation. XTBG Prof. XU Zai-Fu and some other young researchers were also present at the conference.

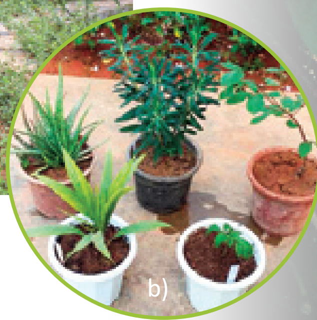
Annual Conference 2015 of Chinese Botanic Gardens is to be held in XTBG.

Prof. CHEN Jin giving a presentation

Prof. XU Zai-Fu giving a presentation

Horticulture

Photo by HUANG Tian-Ping



New progress achieved in plant introduction and production

A total of 1,539 species were successfully introduced in 2014, an increase of 40% over the previous year. Among these were 1,055 native species, mainly from southern Yunnan, and 484 species from abroad, mainly from America, Thailand and Myanmar. Among them 392 species were first introductions to XTBG.

In 2014, XTBG put more effort into plant production and 1,363 plants of 308 species were transplanted from the nursery to the living collections, while 32,000 pots of flower seedlings were produced, respectively 1.25, 1.26 and 2.76 times last year.

a) XTBG staff introducing species from Guizhou Province
b) New introduced plants

New progress achieved in the work of insect pest prevention

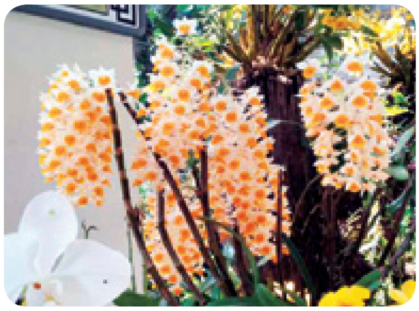
A member of staff monitoring insect pests

XTBG not only carried out the normal plant protection work, such as termite control, dodder weed removal, and *Catopsilia pomona* prevention, but also successfully found the physical adsorption ways to control viviparids, sprayed soap powder to prevent mealybugs, and used physical and biological methods to control insect pests comprehensively, such as moth killing boards, light traps, pheromones and other types of traps.

XTBG started monitoring plant diseases and insect pests in September, observing 38 kinds of plants once a week, in order to explain the occurrence regulation of plant diseases and insect pests, and establish the early warning mechanism.

Three flower shows

A "Natural Orchid Show" was held in the middle of April. The theme was to demonstrate the relationship between orchids and humans, present the current situation of conservation and progress in scientific research. Three main display areas were designed: epiphytic orchid area, terrestrial orchid and *Phalaenopsis* area, and boutique leisure area. Each area had its strong characteristic. A total of 138 species of orchids were put on display during this show, and most of them were wild species. Blooming flowers attracted a lot of visitors and impressed them very much.



The Victoria, Lotus and Water Lily show continued from July through September. More than 200 cultivated varieties of lotus and water lilies were displayed in this aquatic plant exhibition. While enjoying the beauty of the nature, introductions, poems and pictures about the exhibited plants were shown to the visitors.

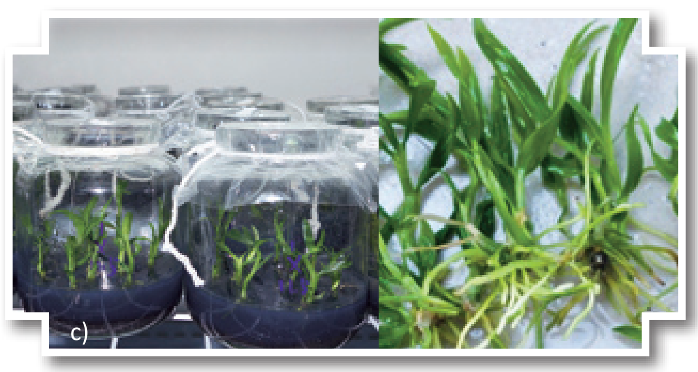
To welcome the spring festival, 20,000 pots of flowers were arranged as the numbers of "2015"and the Chinese character for Flower Garden on the big lawn in the Flower Garden. These flowers were produced by the XTBG nursery.

Enhancing the plant conservation capacity

In order to enhance the plant conservation capacity, XTBG has been applying for funds for support from the treasury department. The repair projects were funded after 3 years effort. An isolation greenhouse (460 m^2) and a greenhouse for species conservation (2,400 m^2) were repaired, and equipment inside the greenhouses was also replaced. The completion of the cultivation conservatory created various cultivation conditions, greatly improving the cultivation conditions of the nursery. The tissue culture room was put into use in July. Sixteen orchid species were established by the aseptic system and tissue culture seedlings of staghorn fern were transplanted from tube to pot.

Newly repaired isolation greenhouse

In the year 2014, a new brush chipper was introduced into XTBG. It gives a new engine both for accelerating the pace of landscape upgrading and for enhancing the plant conservation capacity. Some other new equipments, such as an autoclave and a clean bench, were purchased, which make horticultural work more effective.



a) Newly equipped brush chipper
b) New autoclave and clean bench
c) Orchid plants in tissue culture

Public Education

Photo by DUAN Qi-Wu

Facts:

Total annual visitors to the Garden: 524,451

Total annual visitors to the museum: 245,224

Special educational programs: 67

Total annual hits to the Garden website: 3,206,272

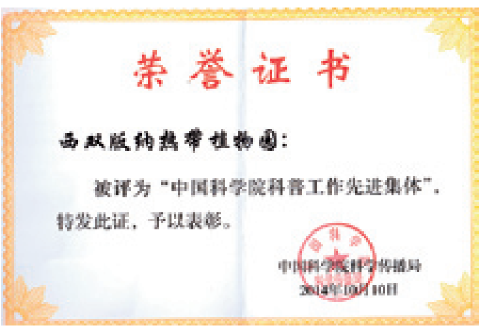
Inquiry learning camps

The number of students involved in winter and summer camps created a new record

About 2,500 students from all over China participated in winter and summer camps in XTBG in 2014, including 22 inquiry learning camps and 16 nature experience camps. The total number created a new record. As usual, the rainforest trek, lectures focusing on scientists' lives, hand in hand with scientists, night hike, and other activities have inspired participants to explore and enjoy the amazing rainforest. This year, the students were asked to prepare a poster to describe their research topic and explain it to their peers. In this way, the students were encouraged to think about how to communicate science to the public. The number of partners was increasing as well.

a) Taking a "Nature Journal"
b) Kindergarten Education Project
c) Poster made by winter camp students

XTBG received several rewards for its environmental education efforts



荣誉证书

西双版纳热带植物园：

被评为"中国科学院科普工作先进集体"，特发此证，予以表彰。

中国科学院科学传播局
2014年10月10日

Advanced Collective in Science Education Certification

In 2014, XTBG received several national and international rewards for its excellent environmental education efforts. In March, XTBG was named as one of the Best Popular Science Education Bases by the China Association of Science and Technology in 2013. In September, XTBG received Advanced Collective in Science Education as the only botanical garden in the Chinese Academy of Sciences. In October, XTBG was awarded as one of the Top Ten Favorite Science Education Bases in Yunnan Province. In December, XTBG biodiversity conservation program based on communities was rewarded as one of the Excellent Programs during National Science Day by the China Association of Science and Technology. Meanwhile, Mr. WANG Xi-Min, the head of the environmental education team, received the Marsh Award for Education in 2014, which is supported by the Marsh Christian Trust and BGCI.

BGCI highlighted the "Holy Hill" Restoration Project

BGCI China has been collaborating with XTBG to restore the "Holy Hill" near Mangyangguang village, Xishuangbanna. Good progress has been made and the project is receiving enthusiasm and support from local communities, schools and the government. The BGCI website highlighted the project in August. Led by XTBG, this "Holy Hill" Restoration Project builds on more than 50 years' research and will make use of XTBG's extensive botanical knowledge and collections, historical records, experience in environmental education, and nursery expertise, as well as its local prestige and excellent community relationships. Survey results and earlier species lists were used to develop a list of 67 tall tree species that will be the focus of propagation and restoration efforts. Working with local participants, a native tree nursery has been established supported by XTBG staff. A number of schools are in the process of setting up native tree nurseries. Designed by teachers and pupils, to support the project aims, a Nature Observation Club was established at a local school and has helped with clearance of invasive plants and tree planting.

"Holy Hill" Restoration Project

Inspiring local communities for conservation

a) Drawing forest
b) Art education

XTBG carried out a series of activities for local students to improve their awareness, knowledge, and intention behaviors on biodiversity conservation about tropical rain forest. Collaborating with Xishuangbanna National Nature Reserve, five primary schools and middle schools were visited by XTBG staff to do educational programs in 2014. More than 1,000 students were involved in lectures, nature experiment activities, art education, *etc*. Fifty high school students were invited to attend a science education summer camp for a week in XTBG. Meanwhile, with the support of the Xishuangbanna Education Department, 10 nature clubs were established in the whole of Xishuangbanna and more activities are going on.

Partnership

Photo by DUAN Qi-Wu

Domestic

The Chinese Union of Botanical Gardens

The Chinese Union of Botanical Gardens (CUGB) was officially launched in June, 2013. The secretariat of CUBG is based in XTBG and is responsible for the specific programs set out by the council. Over the year of 2014, CUBG took an active and positive role in promoting cooperation among Chinese botanical gardens.

Several programs have been launched by CUBG. Among them, the "National Standard System on Evaluation and Accreditation" project was initiated by the South China Botanical Garden; the "Full-Coverage Protection Plan of Native Plants (Pilot)" project was initiated by XTBG. These projects ensure that CUBG carries out its mission and promote the cooperation among botanical gardens.

On March 12, the Chinese Academy of Science (CAS) organized a meeting in Beijing to discuss the best way to construct CUBG. Prof. CHEN Jin, director of XTBG and chairman of CUBG, introduced the program assignments. Implementation plan, task partitioning, time nodes, budgets, and other issues were discussed and justification forms were filled by experts.

During September 15-16, the Annual Work Conference 2014 of the botanical gardens work committee of CAS was held in Shenyang. An academic forum was concurrently held. Prof. CHEN Jin, together with directors or vice directors of the other 12 CAS botanical gardens, attended the meeting. The attendees discussed the work plan for 2015. The second Board of Directors Meeting of the CUBG was held in Shanghai on October 22. After the meeting, 37 botanical gardens were approved to join CUBG. Up to now, CUBG has 88 members all over the country.

Training courses including "Identification and Classification Training Course" (May 22-June 5 in Shanghai) and "CUBG Environmental Education Training Course 2014"(August 5-18 in Xishuangbanna), were initiated by CUBG. These training courses enhanced botanical gardens' staff knowledge of conservation and other technical skills.

CAS vice president SHI Er-Wei encouraged all member gardens to make a joint effort and give a play to each advantage, so as to solidly promote the construction and development of CUBG.


a)


b)


c)


d)

a) Experts meet to discuss construction of CUBG
b) The second Board of Directors Meeting of the CUBG was held in Shanghai
c) Identification and Classification Training Course
d) CUBG Horticulture Training Course

Hefei, Anhui

During December 26-28, Prof. TENG Mai-Kun, vice president of the School of Life Sciences, University of Science & Technology of China (USTC), headed up a 6-person delegation to XTBG. During their stay, a discussion about co-establishing a “Research Center for Botany and Ecology” was held. Mr. LI Hong-Wei, secretary of XTBG CPC, chaired the discussion. XTBG director Prof. CHEN Jin, deputy director Prof. CAO Min, deputy director Prof. ZHOU Zhe-Kun and director assistant FAN Ze-Xin attended the meeting. A decision was made on a cooperation agreement between the two sides. As the representatives of the two sides, CHEN Jin and TENG Mai-Kun signed an MoU. The two sides agreed to enhance cooperation in studies of plant sciences and ecology. They will carry out joint studies based on the principle of “resource sharing, complementary advantages, common development, and mutual benefits”. A work team will be assigned; some students will be under joint supervision of teachers from both XTBG and USTC; some researchers will become adjunct professors of the School of Life Sciences, USTC; correspondingly, some USTC teachers are to serve as adjunct professors of XTBG; laboratories will be set up on both sides; annual meetings will be held.

The two sides pose for a group photo

Photo by XU You-Kai

Jinghong, Yunnan

XTBG cooperated with the Bureau of Sciences of Xishuangbanna and Yunnan Environmental Protection Department to solve the crucial problems of the *Dendrobium* industry. In 2014, XTBG established the first resource base of orchid mycorrhizal fungi planting. The base achieved the successful of imitating wild cultivation of two kinds of medical *Dendrobium*: *Dendrobium aphyllum* and *Dendrobium devonianum*, which indicates a massive application in 2015. In 2014, XTBG was endowed with a patent on orchid production, which set up the foundation of the development of the *Dendrobium* industry in Xishuangbanna.

XTBG cooperates with the Xishuangbanna government to promote the industrialization of *P. volubilis*. XTBG was certified with the National Industrial Production License in June to produce edible vegetable oil and directed Yinqi Botanical Resources Development Co. Ltd. to establish the production line that is able to produce one thousand tons of seed oil per year and develop a series of over 30 products which have been successfully launched.

Mengla, Yunnan

On March 25, Mr. YAN La, head of Mengla County, headed up a delegation to XTBG. Prof. CHEN Jin, director of XTBG and Mr. YAN La signed "The agreement on strategic cooperation frame of XTBG and Mengla". The agreement states the cooperation content and system of helping and supporting the poor, cadre exchanges, science and technology education, the establishment of bases of rare forests and bioindustry development of both parties. One excellent scientist of XTBG, Dr. CHEN Hui, has been chosen to serve as a temporary deputy head of Mengla County. XTBG held summer training for children from kindergarten to middle school students, and a series of lectures of "The Growing *Parashorea*" program has benefited 1,264 children. Both parties anticipated that with the cooperation on the projects such as the industrialization of *P. volubilis* and "Environmental-friendly rubber plantation", bioindustry in Mengla will be rapidly developed.

Abroad

The UK

On May 8, Prof. CHEN Jin visited Bangor University. Prof. John HUGHES, vice chancellor of Bangor University, and Prof. Stephen BLACKMORE, former Regius Keeper of the Royal Botanic Garden Edinburgh, met CHEN Jin. As representatives of the two sides, CHEN Jin and John HUGHES signed an MoU at Treborth Botanic Garden between XTBG and Bangor University. According to the MoU, the two parties are to cooperate in exchange of faculty and students, research on environmental education, study of horticulture and botanical garden management.

CHEN Jin (L) and John HUGHES (R) shake hands after signing the MoU

At the signing ceremony, Dr. Sophie WILLIAM of Bangor University, who is also a post-doc at XTBG, outlined the progress in cooperation. Dr. CHEN Jin made a short speech, focusing on the significance of collaboration and the complementary advantages of the two sides. Prof. Stephen BLACKMORE wished a complete success of the partnership.

During his visit in Bangor University, Dr. CHEN Jin delivered a lecture entitled “Contributions to regional biodiversity conservation: a case study of a conservation botanical garden” at the College of Natural Sciences.

During May 10-11, Prof. CHEN Jin went to the UK to participate in the annual meeting of the Editorial Board of the Proceedings of Royal Society B: Biological Sciences. CHEN Jin is an associate editor of the journal. During his stay in the UK, CHEN Jin paid a visit to the Royal Botanic Garden Edinburgh (RBGE). He was given a warm reception by Prof. Pete HOLLINGSWORTH, director of Science at RBGE.

Prof. CHEN Jin made field trips to the living collections of RBGE. He talked with Leigh MORRIS and Martyn DICKSON from the Department of Horticulture of RBGE on jointly holding CUBG horticulture training course in China.

Mr. Simon MILNE, the Regius Keeper of the RBGE, warmly received Prof. CHEN Jin. Prof. CHEN Jin expressed his gratitude to Mr. Simon MILNE for the substantial support from RBGE to the horticulture training course of the CUBG.

CHEN Jin (L) and Simon MILNE (R)

Australia

Prof. CHEN Jin awards CAS Visiting Professorship for Senior International Scientists to Prof. Roger KITCHING

On April 30, Prof. Roger KITCHING, Chair of Ecology, Griffith School of Environment, Griffith University, headed a delegation to XTBG and a meeting was held in XTBG. Prof. CHEN Jin, director of XTBG, and Prof. CAO Min, deputy director of XTBG, attended the meeting. CAO Min chaired the meeting. CHEN Jin spoke highly of the cooperation between XTBG and Griffith University, based on the support by the Queensland-Chinese Academy of Sciences. He anticipated more cooperation made between XTBG and Griffith University. CAO Min introduced the canopy crane system of XTBG. An MoU was signed between XTBG and Griffith University.

According to the MoU, the two parties are to promote exchange activities based on their respective academic and educational needs: exchange of faculty, education of graduate students, exchange of academic information and materials, organization of joint research programs, organization of joint conferences and workshops, *etc*.

After signing the MoU, entrusted by CAS President BAI Chun-Li, Prof. CHEN Jin conferred a certificate of CAS Visiting Professorship for Senior International Scientists to Prof. Roger KITCHING.

Vietnam

During February 15-21, Prof. CHEN Jin headed a delegation (including Prof. Richard CORLETT and Dr. Eben GOODALE) from XTBG to the Cat Tien National Park and Biosphere Reserve in Vietnam. The Director of Cat Tien, Mr. DIEN Nguyen, warmly welcomed the XTBG delegation.

CHEN Jin (R) and DIEN Nguyen (L) pose for a photo after signing a new MoU

Then he explained to the delegation his vision to improve the conservation of plants in the park and also its tourist and educational capacity, and requested the delegation to inspect several potential areas for establishing a botanical garden.

An earlier MoU between XTBG and Cat Tien was discussed, and a new MoU, with more specific directions for cooperation, written and signed. The new MoU pledges for continued cooperation between the two institutions on the botanical garden and other projects, including the potential for forest dynamic plots and training of staff and students. The relationship between XTBG and Cat Tien promises to bring more opportunities to both institutions to fully explore how conservation efforts can protect both plants and animals in this region for future generations.

Cat Tien is one of the largest (more than 70,000 ha) remaining reserves in southern Vietnam and has had a longstanding relationship with XTBG to promote the conservation of both plants and animals. The cooperative relationship was initiated 3 years ago after the visit of CAS Vice President Prof. DING Zhong-Li and the delegation from CAS headquarters to Cat Tien National Park.

Talent Training and Team Building

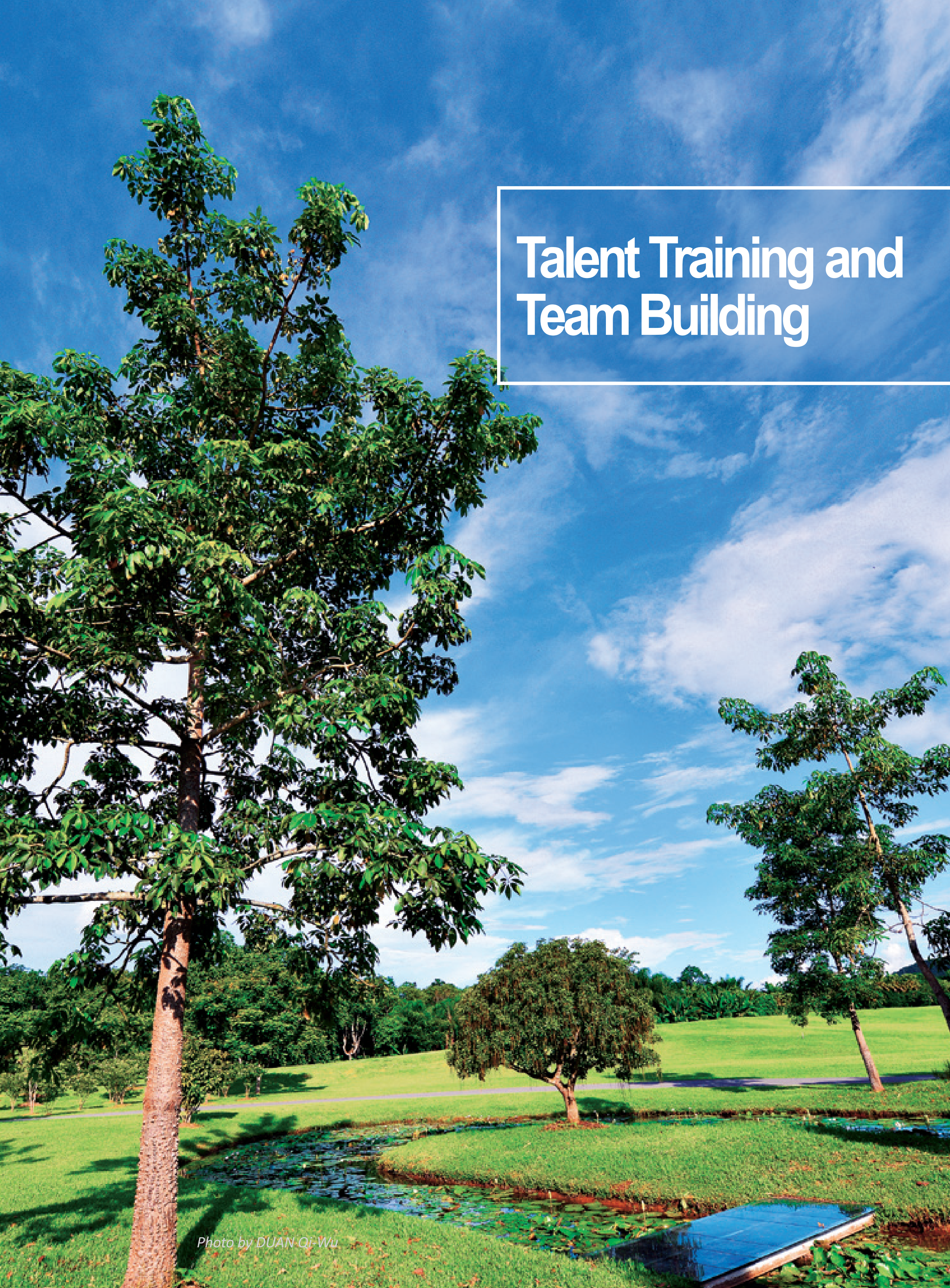


Photo by DUAN Qi-Wu

Postgraduate Education

Five XTBG students received national scholarships and five students received scholarships from CAS

Congratulations to five XTBG graduate students who were granted national scholarships in 2014. The two award-winning doctoral students (JI Kai-Long, QIAO Na) each received 30,000 Yuan per year, while three outstanding postgraduates (AO Tao, WANG Hou-Ping and WU Jun-En) each received 20,000 Yuan per year, in recognition of their outstanding performance.
LIU Jia-Jia, HE Hua, and QIAO Na had the honor of 2014 Zhuliyuehua Scholarships for Excellent Doctoral Students, CAS. LI Dan-Qing was awarded the second prize of Di Ao Scholarship, CAS. ZI Xiao-Meng won the Paul Biotechnology Scholarship for Outstanding Students, CAS.

Graduation Ceremony 2014

The 2014 graduation ceremony and degree awarding was held on June 19. 35 students were conferred with master degrees and 15 students were granted with doctoral degrees. The ceremony was to celebrate their academic achievement, to honor their hard work and dedication. Prof. ZHOU Zhe-Kun presided over the ceremony.
Prof. CHEN Jin expressed his feeling of being a graduate supervisor and the way of XTBG cultivating graduate students. He encouraged the graduates to stay positive in a changing, challenging and sometimes negative world, to concentrate and keep thinking, and to bear social responsibility.
ZI Xiao-Meng, a graduate representative, spoke of her feeling of pride of her growing in XTBG and expressed the heartfelt gratitude to the advisors.
Prof. CHEN Jin moved the tassel of the caps of every graduate to the right place. The audience expressed congratulations to all graduates of doctoral or master's degrees.
A tree of *Chieniodendron hainanense* was planted for memory in front of the students' apartment.

Talent Training

Advanced Field Course in Ecology and Conservation - XTBG 2014

Between October 12 and November 23, 2014, the Program for Field Studies in Tropical Asia implemented the Advanced Field Course in Ecology and Conservation- XTBG 2014 (AFEC-X 2014). 46 from 30 institutions in 8 countries were selected to attend the workshop (26 participants) and field course (20 participants). Fifteen researchers from XTBG, KIB and Guangxi University were involved in teaching and another twenty students and young staffs from XTBG were working as course assistants.

The topics included tropical environments, molecular ecology, plant-animal interactions, biodiversity, conservation biology, invasive species, climate change and experiment design & statistics. In addition the students had a one-day trip to Mengla and a 5-day trip to Yuanjiang Savanna Ecological Station and Ailao Mountains to carry out instructor pre-defined short projects.

Six projects were carried out: 1) Response of ants to resource provisioning in different habitats, 2) Is there competition among frugivorous birds at figs? A pilot study in Southwest China, 3) Biodiversity of butterflies in rainforest and rubber plantation of Southwest China, 4) Predicting the flower preference of genus *Eurema* butterflies in XTBG using floral traits, 5) Functional role of buttresses in two different tropical forests of Xishuangbanna, 6) A comparative study on bat and small non-volant mammal species between two habitats in XTBG.

A symposium was held to present the findings from the independent research projects.

AFEC-X 2014 was sponsored by XTBG, CAS Graduate Education Foundation, International Center for Research in Agro Forestry Beijing Office, Ministry of Human Resources and Social Security of the People's Republic of China (MHRSS). AFEC-X 2014 was awarded as "2014 Advanced Training Program, Professional and Technical Personnel Knowledge Updating Project of MHRSS" and "Excellent Training Program of Chinese Academy of Sciences".

AFEC-X 2014

Field Course on the Ecology of Climate Change in the Tropics and Subtropics

From June 16 through July 16, 2014, XTBG and the Organization for Tropical Studies (OTS) held a joint training program "Field Course on the Ecology of Climate Change in the Tropics and Subtropics" at XTBG. XTBG received 138 applications from Asian and American countries, from which 26 from 24 institutions in 16 countries were selected to attend the course.

Eleven researchers from XTBG and six experts from other institutes taught different aspects of climate change ecology, from practical, theoretical and social perspectives.

The course encompassed cutting-edge techniques and research technologies, and multiple perspectives on the interaction between climate change, biodiversity and ecosystem function. Topics ranged from prediction to empirical research on species physiologies and a timeframe from the Eocene to the future.

In addition the students paid a one-day trip to Mengla to visit the *Dipterocarpaceae* forest, a 5-day trip to Yuanjiang Savanna Ecological Station and Ailao Mountains to carry out instructor-guided short independent projects and experience the altitudinal vegetation and agricultural changes.

Four groups, formed according to the students' interests, carried out four instructor-guided independent projects during the field trip to Yuanjiang: 1) Invasive flora along an elevation gradient and implications of climate change: A case study from Ailao Mountains range, Yunnan, China; 2) Potential influence of climate change on plant-pollinator interactions- Preliminary study from Yuanjiang subtropical forest; 3) Woody plant diversity and leaf morphology along an altitudinal gradient in the Savanna Ecological Station; 4) Coloration of butterflies along an elevation gradient.

XTBG-OTS Field Course

In the end, a symposium was held to present the findings from the independent research projects.

This field course was funded by the National Science Foundation, USA and Bureau of International Cooperation of CAS.

XTBG Summer Camp 2014 for Outstanding College Students

The XTBG Summer Camp 2014 for Outstanding College Students was held from August 1 to 5. The Summer Camp brought together 32 outstanding students from 20 universities nationwide. At the opening ceremony of the summer camp on August 1, XTBG deputy director Prof. ZHOU Zhe-Kun expressed a warm welcome to all campers and gave a brief introduction to XTBG.

Summer Camp 2014

A series of activities were carried out in the camp. 16 special themed lectures aroused research interests among the students. The topics included wisdom of bees, pollination biology, co-evolution, molecular mechanism of leaf movement, plant physiological ecology, gene function and genetic improvement of woody oil plants, green transformation of energy plants, plant fossils, forest ecology, and global change. Academic salon, laboratory tours, field trip to 20-ha tropical forest dynamics plot, and volleyball contest all provided the campers pleasant, practical, and meaningful experiences.

CUBG Horticulture Training Course

Twenty-five staff from 18 botanical gardens of China gathered together in Kunming and Xishuangbanna from November 21 to December 3 to attend a horticulture training course at Kunming Botanical Garden (KBG) and XTBG. The course had been arranged by CUBG, with the aim of raising horticulture capacity throughout botanical gardens nationwide. The trainers included Mr. Duncan COOMNS and Adrian H. NIGEL from University of Worcester, the UK, Prof. CHEN Xiu-Hong from Southwest University of Forestry, Prof. SUN Wei-Bang from KBG, and Prof. CHEN Jin, Ms. HU Jian-Xiang and Mr. LI You-Yun from XTBG.

The training course was composed of seven parts: propagation technology – seed propagation and cutting propagation of plants; common diseases and pest insects in plants in botanical gardens and biological controls; brush cutting and care of woody plants; technique of plant transplantation; effective *ex situ* conservation of important plant groups; ornamental plant configuration and display aimed at knowledge dissemination; use, maintenance and management of gardening machines.

Prof. CHEN Jin, chairman of CUBG and director of XTBG, spoke at the opening and closing ceremonies. He encouraged the participants to change vocational interests into personal interests, to extend communication and share information and experience. Horticulture capacity of participants was expected to be better and better. The gap in garden construction and management between advanced nations and China is expected to be reduced.

a) Students visiting a living collection in XTBG
b) Listening to the instructor

CUBG Environmental Education Training Course

During August 5-18, the CUBG Environmental Education Training Course 2014 was held at XTBG. With 20 trainees from 14 botanical gardens around China participating in the training. The two-week training course provided the participants with new insights into carrying out public education in botanical gardens.

The course focused on techniques for delivering innovative environmental education and also how to evaluate the success of environmental education programmes. It also dealt with case studies of environmental education, climate change and environmental education in botanical gardens, citizen science, *etc*. Prof. CHEN Jin, Dr. Shaun RUSSELL, Dr. Sophie WILLIAMS, and Mr. WANG Xi-Min were invited as training specialists. The course was composed of lectures and practicals. The training specialists delivered a series of lectures concerning environmental education research and evaluation. The trainees were divided into 6 small groups to raise scientific questions, design experiments, collect data, and analyze data. On August 17, trainees presented their results to an expert panel.

a) Group photo
b) Discussion session
c) Sophie WILLIAMS and trainees

Team Building

LI Qing-Jun was honored as one of the "Yunling Scholars"

The Organization Department of Yunnan Province announced that 30 scholars from universities and institutes of Yunnan are supported by "The Distinguished Scholars in Yunnan" Program. Prof. LI Qing-Jun of XTBG is one of them, 2 million Yuan was funded.

"The Distinguished Scholars in Yunnan" is a program launched by Yunnan Province, which aims at implementing the medium- and long-term program for talent development of Yunnan, training and bringing up science and technology talents. The selected distinguished scholars will be given the title as "Yunling Scholars".

XTBG scientists were approved by "100 Foreign High-Level Talents" Project of Yunnan Province

Richard CORLETT and Eben GOODALE of XTBG were funded by the"100 Foreign High-Level Talents" Project of Yunnan Province, totaling 1.5 million Yuan. Since 2009, Yunnan province aimed to bring 100 foreign high level talents to Yunnan in 5-10 years to promote key-tech, develop high-tech industry and drive new projects.

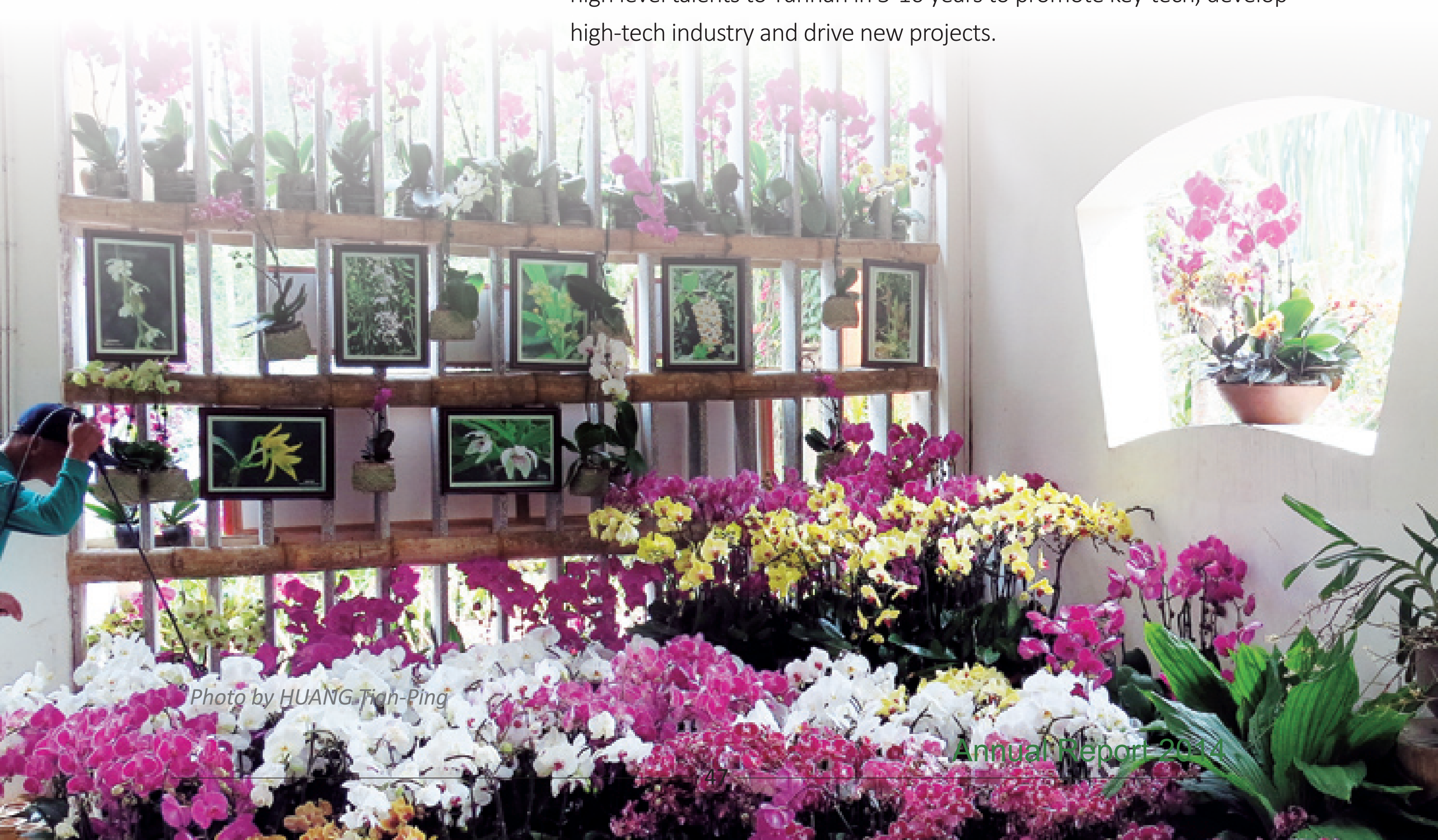


Photo by HUANG Tian-Ping

XTBG staff awarded by CAS

Dr. CHEN Jiang-Hua of XTBG was approved by the “100 Talents Project” of CAS in 2014 and 2.6 million Yuan was funded. CHEN Jiang-Hua focuses on gene functional study of the legume plants. Several key genes have been isolated and studied in the model legume *Medicago truncatula*. He has published more than ten research papers in the peer-reviewed journals, including *PNAS, Plant Cell, Cell Research* and *Plant Physiology*.

Fifty young scientists of CAS have been funded by the CAS Excellent Young Scientist Program. Dr. FAN Ze-Xin of XTBG is included in the list. FAN Ze-Xin’s research interests include dendroclimatology, forest dynamics, wood anatomy, and tree physiology. Over the past few years, he has had his research results published in such academic journals as *Journal of Ecology, Climatic Change* and *Global and Planetary Change*, and *Palaeogeography*.

Dr. HU Yan-Ru was supervised by Prof. YU Di-Qiu in XTBG. He was awarded his doctorate in 2013 with a dissertation entitled “The regulatory mechanisms of *Arabidopsis* WRKY8 transcription factor in modulating salinity stress responses and jasmonate in regulating plant freezing stress responses”. He published 3 high qualified papers in leading journals during his period of study, such as *Plant Cell* and *Plant Journal*. With his outstanding performance, he was awarded “Outstanding Doctoral Dissertation Award of CAS” in 2014. At the same time, Prof. YU Di-Qiu received the “Outstanding Graduate Tutor Award, CAS”.

Dr. LI Chao-Qiong was supervised by Prof. XU Zeng-Fu in XTBG. She was awarded her doctorate in 2014 with a dissertation entitled“Cloning and functional analysis of the FT/TFL1gene family in *Jatropha curcas*”. With her outstanding performance, she was awarded “Excellent Student Prize of President Fellowships, CAS” in 2014.

Nine scientists of XTBG were approved by CAS “Light in Western China” Project

After the approval of CAS Personnel Bureau, 9 scientists in XTBG (ZHENG Yu-Long, JIANG Yan-Juan, WANG Xi-Min, MA Xiao-Nan, HE Hua, SHEN Xin-Jie, YANG Jie, WANG Gang and CHEN Jun-Qiu) got funded by the “Light in Western China” Project, in total 1.42 million Yuan.

By the end of 2014, 71 scientists in XTBG had received funding from the “Light in Western China” Project, totaling 10.29 million Yuan.

Four postdoctoral fellows’ projects were funded by China Postdoctoral Science Foundation

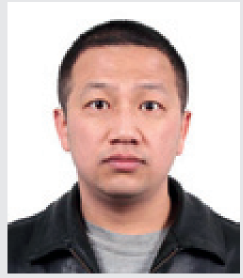
Four postdoctoral fellows, Mika YASUDA, Sophie WILLIAMS, Daniele CICUZZA and Uromi GOODALE, were supported by National Postdoctoral Foundation of China Postdoctoral Science Foundation, totaling 330,000 Yuan.

New PIs and visiting scholarship

Prof. PENG Yan-Qiong

Associate Prof. Kyle TOMLINSON

Prof. LIU Wen-Jie



Prof. LIU Chang-Ning

Three XTBG professors were promoted as Principle Investigators in 2014. They are: Prof. PENG Yan-Qiong, new promoted PI of the Coevolution Research Group, Prof. LIU Wen-Jie, new PI of the Ecohydrology Research Group, and associate Prof. Kyle TOMLINSON, new PI of the Community Ecology and Conservation Group.
While Prof. LIU Chang-Ning, a new recruited PI for the Bioinformatics Group, joined XTBG in 2014. LIU received doctorate degree in bioinformatics from Institute of Computing Technology, CAS in 2007. Before joining XTBG, he was an associate professor in Institute of Computing Technology, CAS. He is a member of the Youth Innovation Promotion Association, CAS, a member of the Best Research Laboratory of ICT, CAS. LIU was awarded Lu Jiaxi Young Scientist Award of CAS. His research work focuses on bioinformatics of non-coding RNAs. He has published more than 25 papers in the peer- review journals, including *Nucleic Acids Research* and *Int J Mol Sci. BMC Genomics*.
Prof. Roger KITCHING from Griffith University, Australia, has been granted the CAS Visiting Professorship for Senior International Scientists (visiting scholarship) for participating research work at XTBG.

New Young Scientists Groups

In 2014, two Young Scientist Groups were set up in XTBG. The Community Assembly and Species Coexistence Group (CASC) with associate Prof. LIN Lu-Xiang as the PI, and the Terrestrial Ecosystem Processes and Simulations Group (TEPS) with associate Prof. TAN Zheng-Hong as the PI.
The research work of CASC focuses on bio-community assembly, includes tree species community, soil microbial community, and birds community, while to discover the mechanism of community assembly and species coexistence. Four research staff and four master students are involved in this research group.
The major research object of TEPS is terrestrial ecosystems, includes natural forests, plantations, wetland, and urban ecosystem. Specifically, TEPS cares ecosystem processes, such as radiation balance, energy balance, photosynthesis, and transpiration.
Since 2012, XTBG set up a project to support outstanding young outstanding scientists who under age of 40 to pursue their research goals by leading young scientists groups.

New postdoctoral fellows recruitment

Three postdoctoral fellows, Dr. Sophie WILLIAMS, Dr. Daniele CICUZZA, and Dr. WEE Kim Shan, joined XTBG in 2014.
Dr. Sophie WILLIAMS, from the UK, received doctorate degree in Bangor University, the UK, has joined XTBG since January. She focuses her research on environmental educational and biodiversity conservation. Dr. Daniele CICUZZA, from Italy, earned his PhD from Institute of Systematic Botany, University of Zürich, Switzerland, has joined XTBG since January. His work focuses on forest fragments, specifically on the impacts on the fern diversity. While Dr. WEE Kim Shan, from Malaysia, received doctorate degree from Singapore State University, her research work focuses on developing the genotyping protocol that utilizes next generation sequencing to genetically optimize the living collection, especially for threatened plant species.

Visits

Photo by DUAN Qi-Wu

JIA Qing-Lin

Mr. JIA Qing-Lin, a former member of Politburo Standing Committee, former chairman of the Chinese People's Political Consultative Conference (CPPCC), paid an inspection tour to XTBG on January 16. After listening to report on XTBG's development by Prof. CHEN Jin, Mr. JIA Qing-Lin visited the living collections accompanied with XTBG director CHEN Jin and XTBG CPC secretary LI Hong-Wei. Mr. JIA Qing-Lin remarked that XTBG played a model role for the construction of ecological civilization in Yunnan Province. He expected a better development prospect for XTBG. He planted a tree of *Hopeaodorata* Roxb. in the Commemorative Plant Garden. Mr. JIA Qing-Lin also urged the local government of Yunnan province and Xishuangbanna prefecture to support the development of XTBG.

XU Jia-Lu

Mr. XU Jia-Lu, former vice-chairman of the National People's Congress (NPC) Standing Committee paid an inspection tour to XTBG on February 18. His tour was accompanied by Mr. YANG Bao-Jian, vice director of Yunnan NPC and Mr. SHAO Ya-Ping, vice director of Xishuangbanna NPC.

Prof. LI Qing-Jun, deputy director of XTBG briefed the delegation on the mission, the research plan and the development and showed them around the living collections and the central laboratory of XTBG.

After knowing XTBG "1-3-5" project, Mr. XU Jia-Lu highly appreciated the achievement on scientific research and public education. He spoke highly of the contribution XTBG has made to regional biodiversity conversation and local economy development. He encouraged XTBG promoting local ecological restoration and protecting traditional culture.

WANG Qin-Min

On April 26, Mr. WANG Qin-Min, vice chairman of the Chinese People's Political Consultative Conference (CPPCC) and president of the All-China Federation of Industry and Commerce, paid a visit to XTBG for an inspection of public education and tourism. Mr. SHAO Qi-Wei, director of the National Tourism Administration of China, accompanied the tour. Prof. LI Qing-Jun, deputy director of XTBG, showed the guests around the living collections and the Tropical Rainforest Ethnic Culture Museum. LI Qing-Jun briefed XTBG's achievements in scientific research, species conservation, tourism and public education. WANG Qin-Min spoke highly of the rich biodiversity and beautiful landscape of XTBG. He also gave recognition for the mode of promoting tourism and popular science, and achievements in scientific research and campus construction.

ZHANG Ya-Ping

CAS vice president Academician ZHNAG Ya-Ping and 40 other experts from CAS institutes gathered together in XTBG during March 6-7. The meeting was aimed at discussing the management work of 14 Regional Centers of large apparatus and equipment of CAS.

The Regional Centers establish public platforms to incorporate all major equipment from different institutes, fostering the sharing of research equipment in CAS. Besides, the centers also provide funding for technical innovation and offer technical training to students and researchers.

During his stay in XTBG, ZHANG Ya-Ping listened to a work report by Prof. CHEN Jin. He is concerned with the progress in “1-3-5” plans, breakthrough in oil plants studies, talent introduction, team building, and campus construction. He also had an on-site inspection on the“3H (Housing, Home, Health) Project” of XTBG.

DING Zhong-Li

On August 7, Prof. DING Zhong-Li, CAS vice president paid a visit to XTBG Kunming Division to conduct a survey on the problems and difficulties in practical work.

CHEN Jin, director of XTBG, delivered a report focused on problems and difficulties of the development of XTBG. Prof. DING Zhong-Li listened to opinions and suggestions to CAS “Pioneer Initiative” project, CAS party office and the relevant CAS departments from XTBG leadership team, research and management backbone, the retired and postgraduate representative.

DING Zhong-Li fully recognized XTBG’s efforts and development of internationalization in recent years. He also conducted in-depth conversations with the participates of the meeting about the orientations of XTBG, the evaluation system of the profession training of the postgraduates, the education of postgraduates and schooling issues of the children of the investigators.

Other Visitors

January

12 Dr. Stephen BLACKMORE, former director of Royal Botanic Garden Edinburgh, UK, visited XTBG.

12 Dr. Sara OLDFIELD, Secretary General of Botanic Gardens Conservation International (BGCI), visited XTBG.

13 90 scientists from 20 countries participated the 3rd Xishuangbanna International Symposium in XTBG.

17 120 members from Yunnan Society for Cell Biology and other 5 Societies participated in “Six-Academic Societies” New Year Sodality and Symposium in XTBG.

February

25 Dr. Folkard ASCH, from University of Hohenheim, Germany, visited XTBG and gave a talk at the XTBG Seminar.

March

3 Prof. Dr. Stuart PIMM, a world leader in the study of present day extinctions from Duke University, USA, visited XTBG and gave a talk at the XTBG Seminar.

April

1 Dr. Antony LYNAM, Regional Advisor of Asia Programs, Wildlife Conservation Society (WCS), visited XTBG and gave a talk at the XTBG Seminar.

12 Mr. Peter HAYMOND, Consul-General of the U.S. Consulate General in Chengdu, visited XTBG and looked up US staff and students in XTBG.

22 Prof. Vojtech NOVOTNY, Head of the Department of Ecology and Conservation Biology in the Czech Academy of Science, Czech Republic visited XTBG and gave a talk at the XTBG Seminar.

26 Mr. Barnaby Michael WILCZAK, an ecological photographer from the UK visited XTBG.

30 Prof. Dr. Roger KITCHING, Chair of Ecology of Griffith University visited XTBG and discussed further cooperation between XTBG and Griffith University.

May

7 Dr. LIU Jian, Mr. Youssef NASSEF, Ms. Ermira FIDA, Mr. Arthur HANSON and other 18 experts from the project “Enhancing Capacity, Knowledge and Technology Support to Build Climate Resilience of Vulnerable Developing Countries” visited XTBG.

11 Dr. Fernando TOMBOLATO from Instituto Agronômico (IAC), Brazil, visited XTBG .

15 Prof. Dr. Nate SWENSON from the Michigan State University, USA, visited XTBG and gave a talk at the XTBG Seminar.

June

2 Prof. Dr. Alpert PETER from the University of Massachusetts Amhers, USA, and Prof. Dr. YU Fei-Hai from Beijing Forestry University visited XTBG and gave a talk at the XTBG Seminar.

11 26 researchers and educators participated in the workshop entitled “Research Priorities in Climate Change Biology in the Tropics and Subtropics” in XTBG.

17 Dr. Jennifer POWERS from University of Minnesota, USA, paid a visit to XTBG and gave a talk at the XTBG Seminar.

26 Dr. Frank STERCK from Wageningen University, the Netherlands, visited XTBG and gave a talk at the XTBG Seminar.

July

1 Dr. Scott K. ROBINSON from University of Florida, USA, paid a visit to XTBG and gave a talk at the XTBG Seminar.

7 Dr. John C. WINGFIELD, director assistant of Department of Biological Sciences, National Science Foundation, USA, headed up a delegation which visited XTBG.

8 Dr. GU Hong-Ya from Peking University visited XTBG and gave a talk at the XTBG Seminar.

15 Dr. Yoon Soo KIM from Chonnam National University, South Korea, visited XTBG and gave a talk at the XTBG Seminar.

22 Dr. Jason DOWNING from Florida International University, USA, visited XTBG and gave a talk at the XTBG Seminar.

24 10 scientists from French institutes participated in the scientific seminar for the 50th anniversary of the Sino-French Diplomatic Relationships in XTBG.

28 48 field biologists from 16 countries or regions participated in the fourth CTFS-CForBio Workshop in XTBG.

August

12 Dr. Zhongbo Bob SU from University of Twente, the Netherlands, visited XTBG and gave a talk at the XTBG Seminar.

12 Dr. Shaun Russell WALES from the Research Hub and Darwin Initiative Committee, UK , visited XTBG.

September

2 Dr. Sang-Hun OH, former president of Daejeon University, South Korea, visited XTBG and gave a talk at the XTBG Seminar.

9 Dr. Burak K. PEKIN from San Diego Zoo Global, Escondido, USA, visited XTBG and gave a talk at the XTBG Seminar.

10 Dr. Pramook BENYASUT, deputy director of Queen Sirikit Botanical Garden, Thailand, headed a 16–person delegation which visited XTBG.

16 Prof. Hans LAMBERS from University of Western Australia visited XTBG and gave a talk at the XTBG Seminar.

17 26 representatives from NSF, NSFC, some universities of the USA, Thailand, and Laos attended the Workshop on Biodiversity and Tropical Ecology in XTBG.

23 Prof. James NIEH from University of California, San Diego, USA, visited XTBG and gave a talk at the XTBG Seminar.

24 Dr. WU Xin-Yu, director of International Development of Bangor University, UK, visited XTBG and had a discussion about future cooperation.

30 Prof. Timothy BONBRAKE from Hong Kong University visited XTBG and gave a talk at the XTBG Seminar.

October

24 Prof. Mitsuyasu HASEBE of the National Institute for Basic Biology paid a visit to XTBG.

28 Prof. BAI Shu-Nong from Peking University visited XTBG and gave a talk at the XTBG Seminar.

November

4 Randall WESELAKE from University of Alberta, Canada, visited XTBG and gave a talk at the XTBG Seminar.

5 Dr. NING Jue, from University of Texas, USA, visited XTBG and gave a talk at XTBG.

11 Prof. Stephen COMPTON from University of Leeds, UK, visited XTBG and gave a talk at the XTBG Seminar.

12 36 experts from Global Tropical Sustainable Rural Development Projects visited XTBG.

16 Dr. Patrick JANSEN from the Smithsonian Tropical Research Institute, Panama, visited XTBG and gave a talk at XTBG.

17 Prof. Sergei VIKULIN from the Russian Academy of Sciences invited by Prof. ZHOU Zhe-Kun visited XTBG.

22 Mr. Zaw Win MYINT, director of Forest Research Institute of Myanmar, headed up a 4-person delegation to XTBG.

27 60 young scientists and graduate students gathered together in XTBG to participate in the "Symposium of Young Scientists on Biodiversity and Conservation Biology in Southwest China".

December

2 Prof. LIU Man-Qiang from Nanjing Agricultural University visited XTBG and gave a talk at the XTBG Seminar.

11 A 90-person delegation from Yunnan Precious Timber Advanced Meeting visited XTBG.

16 Prof. Farshid AHRESTANI from the Pennsylvania State University, USA, visited XTBG and gave a talk at the XTBG Seminar.

19 Prof. Laurent GENTZBITTEL, from Institute National Polytechnique de Toulouse, France, and Prof. Cecile BEN, from University of Toulouse, France, visited XTBG.

23 Mr. Jim HARRIS and Dr. SU Li-Ying from the International Crane Foundation visited XTBG and gave a talk at the XTBG Seminar.

Financial Review

Photo by LIU Guang-Yu

Income and Expenditure (Million Yuan)

	Categories	FY 2012	FY 2013	FY 2014
INCOME				
	Government Grants	84.235	47.716	46.593
	Infrastructure	0	0	0
	Admissions and Services	46.688	56.197	55.635
	Grants for Research	70.841	109.232	94.619
	Miscellaneous	0.247	0.747	1.047
	Sum	202.056	213.892	197.894
EXPENDITURE				
	Staff Costs	74.629	89.739	91.370
	Maintenance	2.352	5.669	3.277
	General and Admin. Expense	16.835	7.088	5.059
	Infrastructure	0	0	0
	Equipment	60.384	65.920	48.998
	Research and Horticulture	35.552	34.768	47.797
	Miscellaneous	0	0	0
	Sum	189.77	203.184	196.501


Photo by DUAN Qi-Wu
Publications

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