The seeds for a canopy training school: the canopy research field course of State University of Campinas, Brazil (March 16-April 3, 2002)

Sérvio Pontes Ribeiro (Lab. Evolutionary Ecology, Dept. Ciências Biológicas, ICEB, Univ. Federal de Ouro Preto, campus Morro do Cruzeiro, cep 35400-000, Ouro Preto, MG, Brazil; *spribeiro@iceb.ufop.br*)

Talita Fontoura (Univ. Estadual de Santa Cruz; Univ. Estadual de Campinas, IB - Depto. de Botânica/ PPGE, CP6109, CEP13083-970, SP Brasil; *talita_fontoura@uol.com.br*)

Flavio A.M. dos Santos (Univ. Estadual de Campinas, Univ. Estadual de Campinas, IB - Depto. de Botânica/ PPGE, CP6109, CEP13083-970, SP Brasil; *fsantos@unicamp.br*)

The first seeds for the Canopy Training School have been planted. The field course "Canopy Research", developed by the Universidade Estadual de Campinas, was attended by a diverse group of postgraduate students. As part of the course, students helped local researchers to carry out canopy research in different countries. This course is a joint effort among many institutions: Univ. Estadual de Santa Cruz and Univ. Federal de Ouro Preto (Brazil); The Marie Selby Botanical Gardens (USA); and Univ. of Oxford (UK). Financial support was provided by the Global Canopy Programme

Introduction

The Brazilian scientific community has historically been aware of the importance of forests. Because Brazil possesses the largest area of tropical rainforest in the world, the scientific community is naturally interested in studying the canopy. Many products, health problems, studies in climatic processes, and ecological projects focusing on forest structure and biodiversity take place there. Therefore, many students showed an immediate interest when Talita Fountoura organized the "First Workshop on Canopy Ecology" in the Santa Genebra research station, and when Sérvio P. Ribeiro and Yves Basset (from STRI, visiting Brazil) offered the course "Insect Biodiversity of Tropical Forests" in the Federal University of Ouro Preto, both in 2000. One year later, Talita Fontoura and Sérvio Ribeiro organized a seminar on canopy biology in the V Congress of Ecology of Brazil.

As Brazil has a network of post-graduate programs in ecology, botany and related areas, a demand for training in canopy research existed. Our course included practical aspects of canopy access, sampling methods and experimental designs for ecological studies, strongly supported by the ecological theory. This course met fertile ground when the GCP Steering Committee met at the Association for Tropical Biology meeting in Bangalore, India. The Brazilian initiative of implementing a canopy field course coordinated by Talita Fontoura (UESC-UNICAMP) and Flavio Santos (UNICAMP) was discussed as part of the "Building Capacity Core Project Area", in conjunction with The Marie Selby Gardens. A partnership with Oxford University generated the creation of the Canopy Training School.

Interest and support from foreign institutions aligned with local institutions and researcher experience. Prof. Flávio Santos is a plant ecologist, with experience in leading field courses; UNICAMP holds the oldest post-graduate program in ecology in Brazil. The field course on canopy research was inspired and developed by the young generation of tropical biologists from Brazil in conjunction with veteran Brazilian experimental ecologists.

This field course was a first attempt to create a program for training a new generation of leaders in canopy science. It was designed to explore the necessary links between theoretic and practical aspects of canopy research. Lecturers invited to contribute had experience either on field courses or canopy research. The climbing professionals had already participated on the "First Workshop on Canopy Ecology" in Brazil, and had experience on canopy research in the Amazonian region. The criteria for admitting students was based on their intrinsic interest in developing Masters or Ph.D. projects in the field of canopy ecology, and enrollment in a post-graduate program in ecology or biology. A group of undergraduate students from Santa Cruz State University were also admitted.

The field course activities

The course was held in an area of primary Atlantic rainforest in the "Reserva Natural da Serra do Teimoso (RNST)". The reserve has 200 ha, and is created and supported by the local NGO "Instituto de Estudos Sócio Ambientais do Sul da Bahia", and by "Fundação O Boticário de Proteção à Natureza". The RNST area is located in mid-elevations of the Atlantic Rainforest, in a transition zone between semi-deciduous forest at the base and rainforest higher up the slopes. The trees reach 20 to 30 m in a discontinuous canopy with a high number of vascular epiphytes. The area is a refuge for many endemic and threatened species of plants and primates, including Brazil wood (*Caesalpinia echinata*); guigó (*Callicebus*

personatus melanochir); Golden-headed lion tamarin (*Leonthopithecus chrysomelas*); and muriqui (*Brachythelles arachoides*).

Activities were divided into three parts: 1) vertical access techniques (single rope technique); 2) short ecology projects; and 3) week-long ecology projects. Complete information and results of projects can be found at: «*http://www.ib.unicamp.br/profs/fsantos/ne313/index.html*».

Short ecology projects

Students were organized into three groups. All of them experienced different projects with epiphytic communities, plant-animal interactions, plant communities, and plant ecophysiology. The lecturers advised students how to overcome difficulties of canopy research: using correct climbing techniques under the supervision of a trainer, using necessary climbing gear, and proper methodology for data survey. The results were presented during the evening, along with participation in conclusive roundtable discussions and formal seminars.

The first two days were spent in the field and the following five days were used to data survey and analysis of the following short projects:

Student on a tree branch of *Cariniana legalis* taking measurements of bromeliad leaves.

1. Micro climatic characterization in *Licania tomentosa*;
2. Reproductive allocation in *Tillandsia stricta*;
3. Patterns of spatial distribution of epiphytic species on *Cariniana legalis*;
4. Patterns of spatial distribution of lichens species on tree trunks;
5. Canopy openness in cocoa plantation and forest;
6. Epiphyll and gall species distribution on tree leaves in different strata of the canopy;
7. Hemiepiphytic distribution on humidity gradients;
8. Hemiepiphytic succulence on tree trunks;
9. Effects of morphology on diaspore dispersal;
10. Ant species: contrasting the canopy and the ground fauna;
11. Crown and root systems;
12. Correlation of *Hohenbergia disjuncta* volume and tree branch diameter

Long ecology projects

The first two days of the week-long projects in ecology were used to define hypotheses and adjust the methods to test their predictions, considering field conditions and climbing logistics. Constraints included limited amounts equipment and tree access routes. Projects included:

1. Epiphytes utilized by birds;
2. Epiphyte species distribution in four *Cariniana legalis* trees;
3. Plant architecture, herbivory and epiphylls along a vertical gradient;
4. Fly distribution in different strata;
5. Assessment of color preference by birds;
6. Gas exchange in Brazil wood (*Caesalpinia echinata*).

Conclusions

In contrast to many other sciences, canopy research is closely related to conservation of biodiversity, which is a strategic subject for developing countries. Hence, this new area of science needs strong skills from local people in order to succeed. As a consequence, the incentive for canopy research around the world is a doubly-hard, where solid ecological fundamentals need to be taught, and regional disparities must be taken in account.

Fifteen days in one of the most diverse hotspots in the world, developing personal abilities, experiencing new research perspectives from the forest, revealing patterns of organism distribution, and debating about ecology and conservation can change a student's mind. All organizers and participants expect that canopy research will become a mature science, able to reach different regions in the world and be developed equally among many different people. The development of canopy science can result in new perspectives in development and conservation.

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