Report on two internships

A first step into Plant Research

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As part of my bachelor degree program in Biology and Applied Mathematics in France, I had to study abroad for one year. I wanted to be able to follow my courses in English but also to learn a new language. I wanted to discover life in another European country and I was fascinated by the light, weather and the level of education of the Nordic countries…I landed in Helsinki in late August, one year ago.

What I really valued in Finland was the opportunity for the students to fully create their program by choosing their courses. My two first years of a B.Sc. in France, where we follow compulsory courses, gave me a broad view of the different areas in Biology. In Helsinki, I had the new and vertiginous liberty to create my own education. This was interesting and formative, as it forced me to decide what I wanted to do. I chose to study mostly Plant Biology and Mathematical Modeling.

I had the chance to attend a lab course in Molecular Plant Biology. This course consisted in different experiments supervised by researchers from several teams. This kind of lab course where you work directly in the university labs with the researchers who are not necessarily teachers is not common in France. It is however a great chance for the students, as it provides the opportunity to meet the researchers working at the university and to discover their areas of expertise. I learned to apply useful tools in plant molecular biology research, and to present the results in the usual ways for scientific research, by writing a report or doing oral presentations.

Another interesting and sometimes arduous point of this year abroad was the work in pairs or in teams. The English language sometimes seemed to be different between countries. So speaking of details of an experiment, or discussing results often turned out to be a complex exercise. We had to overcome our differences in culture and background, to fully understand and agree with each other.

At the end of the first semester, I contacted Pedro J. Aphalo and T. Matthew Robson to ask them for an internship opportunity, and happily obtained two positive answers. I definitely appreciated the fact that the labs were open to the students interested in their work and in gaining research experience.

Supervised by Luis O. Morales in the SenPEP (Sensory and Physiological Ecology of Plants) research group, I modestly contributed to a bigger project studying the impacts of UV and blue light on *Arabidopsis thaliana* gene expression and its dependence on different photoreceptors. I did all the stages of the experimental research from the sowing of seeds and application of light treatments, to the harvest and lab work. Being able to do the experiment from the very start, the seed, right through to the qPCR on the leaf samples of the treated plants was very exciting and gratifying. However, I had to leave before I could analyze the data, and missed one of the most important steps in the research.

I spent my last month in Finland at Lammi Biological Station, helping PhD students from

Figure 9.1: The author and Craig Brelsford in a forest near Lammi, Finland.

CanSEE (Canopy Spectral Ecology and Ecophysiology) research group, and running my own small experiment. I lived with the other students and researchers, trapped in the heart of Finland, a lake and a forest as my playing field (Fig. 9.1). I experienced spring's everyday changes by helping the PhD students Craig Brelsford and Marta Pieristè doing their measurements in the forest, which was rapidly waking up after the cold and snowy months. In parallel, I also set up a small field experiment. I chose to work on the effect of sunlight and shade on leaf defense response to herbivores. I sampled *Sorbus aucuparia* trees, common in Finland and attractive to herbivores, growing in either North- or South-exposed forest stands and hedgerows. I could discuss the different questions that were raised as I set up the experiment with Craig, who provided valuable help. Back in France, I had the chance to write an article about my results. It was the first time I did this kind scientific writing, and it turned out to be a truly intriguing but complex exercise to complete at a distance.

I realized how hard it is to obtain the best conditions for an experiment when you work out in the field. I realized how many factors you have to take into account, from the time of the day and sun exposure, to the soil quality…I realized how important it is to have a strong scientific background in your research domain when you do an experiment, and how crucial it is to be able to think about the results obtained by presenting the data in different ways to identify any mistake or interesting behaviour. I also realized the importance of communication in science, the interest to share and discuss your results with the others, and to keep up with the results of your peers.

Living in a research station was a great experience. It enables you to be directly in touch with the different work going on there and to discover other research areas, by attending conferences, or asking questions to the scientists working at the station. I also really appreciated that in both of my internships, my supervisors were available if I had any questions, but let me work independ-

ently. It was not easy, but really formative and it helps in getting to know oneself better and in gaining self-confidence.

Amongst my courses, I also followed Mathematical Modeling classes, given by Eva Kisdi and Stefan Geritz, which I really enjoyed. Mathematics and Biology are two domains that we usually separate from each other, but I am truly convinced that mathematical tools are powerful for biological research, and will be of a great help as we try to understand and grasp complex systems. As part of one course, I carried out a small project on the evolution of seed dormancy in a fluctuating (stochastic) environment. I studied the probability that a seed germinates, according to the local environmental conditions over several years. Modeling biological processes such as plant colonization, development, or nutrient fluxes within the plant gives another and more mechanistic understanding of plant functioning. Simulations test many hypotheses without practically doing the experiment, something that would cost both time and money. Simulations also raise new questions and new ideas, and allow not only a better comprehension of the system but also a prediction of the outcome.

In Finland, I gained research experience. Most bachelor programs are largely theoretical in France, and practical experience was not something I was expecting from this year of study, but I am truly happy to have been able to spend time in the lab and in the field doing research. Overall, my stay in Finland really helped me to find myself in science and confirmed my desire to continue into plant research. I had the chance to make a first step into plant science research, and I am willing to carry on along this path.

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Rozenn Pineau. I obtained my Bachelor degree in Biology and Applied Mathematics in June, 2016 from the University of Pierre et Marie Curie, Paris. I started a Master in Plant Biology at the University of Montpellier in September, 2016. The first year of the program is composed of courses during the first semester, and of a research internship for the second semester. I completed this internship in Yuelin Zhang lab, working on actors of the plant immunity activated downstream pathogen perception, in Vancouver, at the University of British Columbia. This novel experience was challenging, but I still would like to pursue a carrier as a Plant Biology researcher. I am planning to take a gap year to gain more research experience from September, 2017. I will be working in Plant Conservation, Ethnobotany and Phytochemistry with Cassandra Quave, at the University of Emory, in Atlanta.