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České Budějovice, 5th June 2021

Piotr Szefer:
Fungi, Herbivores and Predators as Determinants of Secondary Succession in Tropical Rainforest

The PhD thesis by Piotr Szefer focuses on a fundamental question of ecology, "Why are there so many tree species in tropical rainforests?" and tests experimentally the most promising explanation, so called Janzen-Connell Hypothesis (JCH). This hypothesis celebrated its 50th birthdays last year, and the two original papers where it was proposed were cited 4,500 times in the last decade. Despite this intense interest, the Szefer's research has found an original and important angle to explore, viz. the importance of JCH in the early secondary succession of tropical forests. The theoretical expectation was that the initial succession should be driven by competition among plants, rather than the top-down impact of natural enemies on plants as proposed by the JCH.

P. Szefer designed a large replicated experiment in lowland forests of Papua New Guinea that captured the effects of insect herbivores, their predators, and fungal pathogens on the trajectory of the first 12 months of succession. The study provided complex results, which could be summarized as a significant impact of herbivores but not predators on the vegetation diversity and composition. The most salient results were published in the *Journal of Ecology* and are in review in *Ecology*. They represent two chapters of the Thesis. The third chapter focuses on the species traits of pioneer plants, trying to explain the dynamics of the initial succession. P. Szefer also worked on the development of methods for interaction web analysis, contributing thus to the manuscript that constitutes the fourth chapter of the Thesis.

Interestingly, the JCH has been initially tested only indirectly, using the spatial patterns of vegetation. The experimental approach manipulating plant and/or herbivore and pathogen species is a relatively recent development, but the one proving essential to our understanding of the plant-herbivore/pathogen interactions. One reason for the late arrival of experiments is that they are very labor-intense, requiring long periods of observation and large-scale vegetation manipulations in replicated plots. The present study used numerous field assistants to create six blocks, each comprising six experimental gardens 5x5m in size, representing individual treatments. P. Szefer was able to organize this large undertaking in a remote part of Papua New Guinea and sustain the experiments for one year, followed by taxonomic analysis of a large number of plant and insect samples and an innovative data analysis.

Liza Comita and Simon Stump reviewed the state of the art for the JCH last year in *The Annals of the Missouri Botanical Gardens* and cited the Szefer's work as an impetus to focus more on ecological succession. Dan Janzen commented on the Comita & Stump paper in an email, saying "Now I really can retire. There is nothing left to discover." Although this conclusion is clearly an exaggeration, there is no doubt that we have progressed in the study of JCH and that the Szefer's work is a part of that progress.

In summary, it is my opinion that Piotr Szefer has clearly demonstrated the intellectual originality and independence, as well as practical and social skills necessary for an independent and promising research career, which is the main goal of a PhD study. I recommend his Thesis for defense.

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