Institut für Ökologie, Evolution & Diversität
Vertretungsprofessur für
Ökologie und Geobotanik

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Oliver Tackenberg, Ökologie & Geobotanik, Ökologie, Evolution & Diversität,
FB Biowissenschaften, Max-von-Laue-Str. 13, 60438 Frankfurt/M.

To
Prof. RNDr. Tomáš Herben
Faculty of Science
Department of Botany
Charles University in Prague

**Dr. Oliver Tackenberg**

**Hausanschrift:**
Max-von-Laue-Str. 13
(Hauspostfach 20)
60438 Frankfurt am Main

Telefon: 069/798-42136
Telefax: 069/798-42131
eMail:tackenberg@bio.uni-frankfurt.de

Datum: 13.09.2014

**Review of the Ph.D. thesis of Mgr. Kristýna Vazačová**on „The evolution of dispersal traits in plants“

The thesis of Kristýna Vazačová consists of four papers that deal with seed dispersal of plant species. The first paper introduces a new method to assess endozoochory by birds, the three subsequent papers have an evolutionary focus or represent comparative analyses, respectively. Three papers are already published (or accepted) in international journals. The thesis is framed by a short general introduction and a short section with general conclusions.

The thesis is generally well written and formulated and there are relatively few grammatical or typing errors in it. The thesis is clearly structured and easy to read, however, it attracted my attention, that only few graphical representation of the results are presented, especially in paper 1 and 4.

In Paper 1 **(Vazačová & Münzbergová: Simulation of seed digestion by birds: How does it reflect the real passage through a pigeon´s gut? - Folia Geobotanica (2013) 48: 257-269)** seed digestion by birds was simulated with a set of similar experimental approaches and compared with *in-vivo* digestion. The most severe experimental treatments were the best predictors for *in-vivo* digestion, but all experimental treatments explained only a relatively small part of the variance observed *in-vivo*. In each single experimental treatment, the differences between the survival rates could be attributed to species specific traits like seed mass, water permeability or thickness of the seed coat, which have also been found important in other studies. However, the effect of seeds traits differed somewhat between the treatments and a substantial part of the variance remained unexplained.

In summary, this paper adds interesting details to our understanding of endozoochorous seed dispersal and clearly shows that the important task of finding an easy applicable standardized method to assess endozoochory is still challenging.

It has been frequently claimed (and scarcely found) that island species loose dispersal ability after colonization of the island, as the best dispersers may end up in the ocean. Paper 2 **(Vazačová & Münzbergová: Dispersal abilities of island endemic plants: What can we learn using multiple dispersal traits? - Accepted in Flora)** deals with this fascinating theory and compares dispersal abilities between species pairs that are endemic or non-endemic from the Canary Islands. Interestingly, the above cited hypothesis was supported only for endozoochory, while the other dispersal

modes often showed higher abilities in the non-endemic congeners. Higher dispersal abilities of the Canarian endemics were also related to the number of colonized islands.

Overall, this study significantly increases our understanding of evolutionary changes in dispersal after the colonisation of islands and critically scrutinises common theory.

In Paper 3 **(Vazačová & Münzbergová: The importance of species traits for species distribution on oceanic islands. - PLoS One. 2014 Jul 8;9(7):e101046. doi: 10.1371/journal.pone.0101046. eCollection 2014.)** the relationship between the distribution of plant species on the Canarian islands and species traits was analysed. Both, dispersal and persistence related traits were found to have an effect on species distribution, but the results differed when the analysis was made with and without phylogenetic correction.

Although the study shows interesting and reasonable patterns, important factors like ecological niche or population size were not addressed, although they might also be related to the observed patterns. Additionally, it remains unclear, in how far the results can be generalized, as the study only address few pairs of species that do not cover all dispersal modes.

The focus of Paper 4 **(Vazačová, Šurinová & Münzbergová: The evolutionary potential of different traits in subtribe Sonchiae. - not published yet)** is on the evolution and phylogenetic conservatism of dispersal and persistence/distribution traits. The most interesting result of this innovative study is that dispersal traits were much less conserved than persistence traits.

All in all, I found the thesis very stimulating and like it very much. With this thesis Kristýna Vazačová clearly shows her ability to work scientifically and I have no doubt, that it fully qualifies her for obtaining the Ph.D. degree. Therefore, I look forward an interesting discussion and yet have five questions to stimulate it:

1. What are plausible reasons for the relatively low explained variance of the single type simulations shown in Paper 1?
2. Do you assume that the species colonized the Canarian Island with the ‘most likely dispersal mode’ introduced in paper 2 or may ‘non-standard (and maybe unpredictable) means of dispersal’ be more relevant for the colonization of the islands?
3. How important are differences in the environment for the observed trait differences between the species occurring on El’Hierro and the other islands?
4. Are the differences between dispersal vs. persistence/distribution traits effected by the different data-types, i.e. that all physical persistence/distribution are binary an mist dispersal traits are continuous?
5. In how far are the results of the three evolutionary orientated papers (Papers 2-4) limited by methodological constraints in the assessment of long distance seed dispersal? Or more strongly worded: Are we at all able to assess dispersal abilities of large species sets and how can uncertainties be addressed in such comparative analyses?

Oliver Tackenberg