Review of the Ph.D. thesis
Tomáš Fér: Study of plant dispersal in river corridors using molecular markers

The thesis deals with plant dispersal in river systems. It consists of an introductory chapter, one published paper and three manuscripts. The introduction does a reasonable job providing a brief outline of the presented papers and a rationale for why such study is of great importance for better understanding of the given topic. It outlines several general aspects of plant dispersal, methodical approaches and ways how to analyse and interpret the data. It is followed by copies of the particular papers, published (or awaiting publication) in renowned journals and finally by a brief Concluding remarks.

I am sure that the topic of the present study as well as the model species representing different dispersal strategies were well choosen. Understanding the role of river corridors for plant dispersal is of key importance, mainly in times when spatio-temporal changes of the landscape are a common phenomenon. Objectives of the study are well defined; experimental design, data collection, molecular methods (AFLP´s and microsatellites) and statistical analysis are adequate (however, to answer some questions, more comprehensive sampling would be better). The gathered data provide us with quite substantial body of information.

Most important (from my point of view) results can be summarized as follows: (i) rivers are of crucial importance for long-distance dispersal, and (ii) the intensity of long-distance vegetative dispersal and wind- and animal-mediated seed dispersal among streams or river catchments were quantified. All the conclusions are sound and well supported by the data. The quality of English is good, references cited well and in abundance.

Several comments, minor reservations and questions follow:

1) To solve the question about gene flow (both pollen dispersal and propagule transport) two main frameworks, i.e. direct and indirect, have been developed. Indirect methods are effective as an estimate of the historical genetic connectivity between populations or for assessing the lifetime contribution of gene flow to the genetic structure across a range of populations (but they cannot be used to assess contemporary gene flow dynamics). What does reflect the recent geographical pattern of genetic variation in the studied species? Can we say with sure that the spread along a river only? It can be supposed that the landscape was much more rich in natural wetlands and (starting in the medieval period) ponds which might serve as „stepping stones“ for dispersal among rivers and thus the frequency of distribution and connectivity of populations of many water plants was higher in the past. Could it be that we only see a fragmented populations with rather low gene exchange along rivers/streams?
2) It is widely supposed that the majority of genotypes should be dispersed to lower reaches of the river if steady downstream represents the only dispersal mode of water plants. However, this is not always the case (so called ´drift paradox´). This is usually explained as a result of upstream animal-mediated transport of diaspores. However, I can argue that this pattern can be result of a lack of empty niches (I am aware that this term is not recommended in plant ecology…) in the lower reaches, founder effects, stronger competition or selection (besides others, water quality can act as a selection factor). Of course, this holds mostly for littoral species, not e.g. for *Nuphar lutea*.
3) Besides of diaspore transport, pollen-mediated gene flow is an important component of gene exchange. Unfortunately, in the majority of plant species no reliable information is available and this topic remains thus a moot point. Do you think that it can play a (more or less important) role and can influence the pattern of genetic variation in species examined in the present study? My personal feeling is that it

should be taken into consideration at least in anemogamous species, where long-distance pollen dispersal might be expected. And can you propose a methodical approach how to distinguish between pollen gene flow and seed genotype dispersal?

4) Are there any papers aimed at relationships between species composition of the hydrochoric seed pool (in the water) and local standing riparian vegetation?
5) Some clusters of *Phragmites australis* comprised only one genotype or several genotypes at only one sampling site. How can you explain this fact?
6) In my opinion it cannot be reliably concluded from the gathered data that the vegetative long-distance dispersal is of minor importance. More comprehensive sampling would be necessary, and it can also be underestimated due to somatic mutations in some microsatellite loci.

The study of Tomáš Fér is highly appreciated as it will help to solve the existing questions concerning the role of river corridors in a heterogeneous landscape. It fulfills the criteria necessary for obtaining the Ph.D. degree at the Charles University. I consider it suitable for defense.

Praha, 7 June 2008 Jindřich Chrtek