Title:	Reconstructing Demographic History of the Plant Arabis Alpina across Europe
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Abstract:	Arabis alpina is an herbaceous plant of Arctic-alpine Europe and North Africa. It is an emerging model organism to study the evolution of perenniality as a life history trait in extreme environments. In this project, I aimed to infer the demographic history of Arabis alpina across Europe. Studying demographic history is important because it helps us disentangle the selective effects from the demographic ones on the genetic diversity. Since the genomes contain a record of the past evolutionary events, I analysed whole genome sequencing data using a site frequency spectrum-based coalescent simulator, fastsimcoal2 to infer the demography. We unravel the most likely topology and order of splits in the three major groups in the European lineage. The Split between Scandinavian and Alps is more recent (around 47481 generation) compared to the split with Spain (around 93496 generations). A possible reason is that Scandinavia was previously glaciated, causing the plant to move towards the warmer Iberian region. As temperatures increased over time, the species then colonized Scandinavia. A stepwise approach was taken to incorporate various demographic events into the inferred topology, progressively increasing the complexity of the model. This approach enabled us to identify the demographic processes that are most likely to have occurred in the evolutionary history of the species and best explain the observed data. A more extensive six-population model was also built by using the data from two populations from each major region. Since this project involved extensive use of the method fastsimcoal2 in many different ways, it led to a better understanding of the method. It can be concluded that having different levels of variance within the samples used leads to a better inference. Differences in the SNP numbers in the populations can lead to a skewed inference and complex parameter space and weighting of variants need to be understood to draw and conclude realistic scenarios.
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