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META-ANALYSIS OF WITHIN-POPULATION GENETIC DIVERSITY ACROSS THE MEDITERRANEAN BASIN

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Understanding which ecological processes shape biodiversity is vital to the sustainable management of our global environment. Most biodiversity investigations are done at species level. However, analysing population genetic data in a biogeographic framework can uncover past ecological events that have left a significant imprint on population structure. Seminal studies on Mediterranean forest tree species showed a spatially-structured within-population genetic diversity (GD) in conifers and some angiosperms, with greater diversity in the eastern Mediterranean than in the western Mediterranean. This spatial structure is not congruent with that of species diversity, organized in regional hotspots of endemism and richness. A possible cause for this GD pattern is the climate of the Last Glacial Maximum 21 000 years ago, which was drastically harsher in the western Mediterranean than in the Eastern Mediterranean. Such conditions are likely to have modified available ecological niches, with the advent of small refugia in the west and demographic bottlenecks leading to genetic drift and loss of GD. As trees are key organisms driving the patterns biodiversity of terrestrial organisms we set out to decipher the ecological drivers of microevolution in woody plants and their associated organisms. We report a multispecies and biome-wide survey of the GD based on scientific literature. We gathered data from ca. 200 publications into a database holding around 9000 geolocalized references on ca. 220 plant and animal species. GD was regressed to longitudinal coordinates of sampled populations and globally analysed by meta-analysis procedures. The influence of covariables such as genetic methods used in primary studies as well as several species life-history traits was also investigated. A global positive effect size was found, corresponding to higher GD in the east than in the west, which remained positive and significant after controlling for latitudinal position of the populations (i.e. the effect of migration from refugia towards higher latitudes at the onset of the Holocene). A refined analysis of this pattern on precise taxonomic groups is also presented. Our findings are discussed relative to the hot-spot structure of plant species diversity and in terms of conservation strategies from genes to species in the Mediterranean Basin.

Keywords: genetic diversity, Mediterranean Basin, meta-analysis