ENCONTROS SCIENTIA

How much difference makes a difference during adaptation? A real-time evolution study in *Drosophila subobscura*

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Understanding the mechanisms and processes that underlie adaptation and which factors affect the evolutionary potential of populations are central themes in Evolutionary Biology. Here we address the issue of how history, chance and selection can affect the adaptation to new environments, integrating several biological levels. For that we characterized the initial differentiation and subsequent evolutionary dynamics in a new common environment of three *Drosophila subobscura* populations, derived from different locations along the European cline for several phenotypic traits, thermal plasticity and chromosomal inversion frequencies. We found that quick convergence occurred at the phenotypic level, but populations remained differentiated for chromosomal polymorphism even after forty generations of evolution in the common environment. Nevertheless, some inversions presented similar selective patterns between foundations indicating that selection acted within the boundaries created by history. Summing up, we found that history does not constrain phenotypic adaptive evolution, nor plastic thermal response. We show that adaptation to a new environment can be attained through different genetic mechanisms. Finally, adaptation to a stable environment does not hamper later response to novel environmental challenges.

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