

Historical isolation facilitates species radiation by sexual selection: insights from Chorthippus grasshoppers

Zachary Nolen¹, Burcin Yildirim¹, Iker Irisarri², Shanlin Liu³, Clara Groot Crego¹, Daniel Amby³, Frieder Mayer⁴, M. Gilbert³, and Ricardo Pereira¹

¹Ludwig Maximilians University Munich

²Uppsala University

³University of Copenhagen

⁴Leibniz Institut für Evolutions und Biodiversitätsforschung an der Humboldt Universität zu Berlin

May 21, 2020

Abstract

Theoretical and empirical studies have shown that species radiations are facilitated when a trait under divergent natural selection is also involved in sexual selection. It is yet unclear how quick and effective radiations are where sexual selection is unrelated to the ecological environment. We address this question using grasshopper species of the genus *Chorthippus*, which have evolved strong assortative mating while lacking noticeable eco-morphological divergence. Mitochondrial genomes suggest that the radiation is relatively recent, dating to the mid-Pleistocene, which leads to extensive incomplete lineage sorting throughout the mitochondrial and the nuclear genomes. Nuclear data show extremely low genomic differentiation among species, yet hybrids are absent in sympatric localities. Demographic analyses shed some light into these seemingly contradictory patterns. The estimated demographic model shows a long period of geographic isolation, followed by secondary contact and extensive introgression. This suggests that an initial period of geographic isolation might favor the coupling of male signaling and female preference, which currently maintains species boundaries in the face of long-term gene flow. More generally, these results suggest that sexual selection can lead to radiations without a primary role of divergent natural selection, resulting in cryptic species that are genetically, morphologically and ecologically similar, but otherwise behave mostly as good biological species.

Hosted file

Chorthippus_diversification.pdf available at <https://authorea.com/users/324724/articles/452859-historical-isolation-facilitates-species-radiation-by-sexual-selection-insights-from-chorthippus-grasshoppers>







