Periodic Report – Grant: 302504 ARCHIGENE - Fabrice Eroukhmanoff, University of Oslo, Norway.

THE GENETIC ARCHITECTURE OF SECONDARY SEXUAL TRAITS DURING HYBRID SPECIATION

This project was designed to investigate the genetic architecture of phenotypic traits in the homoploid hybrid species *P. italiae* and how the genomic background affects phenotypes. It was divided into the three objectives described below.

**PUBLISHABLE SUMMARY:**

During this period, patterns of variation both at the molecular and phenotypic level were investigated in the Italian sparrow (*Passer italiae*), one of few avian hybrid species, and compared it to its parent species, the house (*P. domesticus*) and Spanish (*P. hispaniolensis*) sparrow. This resulted in two publications where, by focusing on a full range of phenotypic characters, the ability of this hybrid species to locally adapt to environmental conditions or to the presence of one of its parent species was clearly demonstrated (Objective 1). Conserved patterns of covariance between beak dimensions or between a sexually secondary plumage trait and a morphological trait were also reported between the hybrid species and one of its parent species (Objective 1). Interestingly, there was no marked effect of genetic admixture on phenotypic variation (Objective 1).Two other manuscripts have been recently submitted, one on the genomic signature of character displacement in this hybrid species, and another one on the impact of hybridization on sexual organs (Objective 2). In addition, sperm morphology was shown to be similar in both parent species and play little role in reproductive isolation. Beak morphology could both have an impact at the ecological and reproductive level in this hybrid species, as gene flow is reduced between populations which differ strongly in beak height (Objective 1). Hence, another manuscript has been submitted, which focuses on beak morphology and its role in character displacement between the hybrid and one of the parent species, both at the phenotypic and genomic level. Full genome and RAD-sequencing of the three focal species has been conducted, attempting to map relevant traits to specific genomic regions to assess evolutionary changes in genetic architecture (Objective 3).

The host and the researcher also formulated a framework to study the question of genome evolution in hybrids, and published it in two paired papers. During this project, some of this work has contributed to establish the Italian sparrow as a model species for the study of hybrid speciation. In the future, this will likely stimulate further research in this area of evolutionary biology, and contribute to changing the view on the role of hybridization in evolution, including for the general public.

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