Universität Basel

Research Project

Dissecting the molecular footprints of natural selection in threespine stickleback fish

Third-party funded project

Project title Dissecting the molecular footprints of natural selection in threespine stickleback fish
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Project start 01.04.2016
Probable end 31.03.2019
Status Completed

Investigations of the molecular basis of adaptive diversification among populations from ecologically distinct habitats have started to provide a fresh perspective on evolutionary mechanisms and to inform long-standing theoretical questions in genetics. Nevertheless, research combining ecologically interesting organismal systems, strong experimental designs, and powerful genomic resources are still scarce. In this proposal, I describe two such studies using threespine stickleback fish, each representing a separate PhD. The first subproject will involve the release of genetically heterogeneous stickleback obtained by crossing lake and stream populations from Switzerland into replicate natural stream habitats, followed by genome-wide marker-based tracking of allele frequency shifts driven by natural selection over multiple generations. This innovative study design will thus characterize evolution in action at the genomic level. The second project will focus on stickleback populations that have recently adapted to multiple basic and acidic lakes on the island of North Uist, Scotland. Combining genome-wide marker data and targeted sequencing in ten total populations, the study will scan for genes important to evolution driven by different water chemistries. These projects will address major unresolved issues in current adaptation genetics and will pave the way for functional investigations using evo-devo approaches.

Keywords Adaptation, Evolutionary genomics, Gasterosteus aculeatus, Natural selection
Financed by
Swiss National Science Foundation (SNSF)

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