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"Drosophila Mojavensis is a Cactophilic Fly composed of Four Geographically and Ecologically Distinct Host Populations

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Project Summary:

Drosophila mojavensis is a cactophilic fly composed of four geographically and ecologically distinct host populations. These flies oviposit, develop and feed as adults in the necrotic tissues of cacti, organpipe (*Stenocereus thurberi* in Sonora Desert), agria (*S. gummosus* in Baja California), red barrel (*Ferocactus cylindraceus* in Mojave Desert) and prickly pear (*Opuntia littoralis* in Santa Catalina Island). Each cactus host species offers the resident *D. mojavensis* population a distinct chemical and nutritional environment. These environmental differences have contributed to the differential patterns of local ecological adaptation. Among some of the significant differences across the populations is the behavior of larva. Larva from the prickly pear population (Catalina Island) tend to be less active and forage less than the organpipe population (Sonora). Correlated with this behavioral difference is the fact that the two cactus host species are structurally distinct, prickly pear has flat cladodes (pads) and organpipe have tall columnar arms. This study will focus on the variation of larval activity of the cactophilic *Drosophila mojavensis*. By crossing representative inbred line from Catalina and Sonora we will perform a quantitative trait loci (QTL) mapping experiment. The purpose of this experiment is to identify the loci that are responsible for the behavioral difference across the populations.

Student Prerequisites

The most appropriate student for this project would be a Biology Major with laboratory experience. The lab experience could be either from advance biology laboratory courses or from actively participating in a research. *Drosophila* husbandry experience is a plus, but it is not necessary. Participant must be interested in utilizing computational and statistical tools to answer important biological questions.

Student Duties:

Student will be instructed on the rationale and steps behind a QTL mapping study. I will provide the student with the necessary background reading and information regarding this widely using quantitative genetics tool. The student will be an active participant in maintaining the *Drosophila* crosses, prepping the crosses and measuring larval activity. Larval activity is measured using a digital video capture system which tracks the motion of moving larva. Once the video is recorded, it will be the responsibility of the student to digitized larval motion and extract data parameters used for the statistical analysis. Furthermore, following analysis of behavior, each individual larva will need to be cataloged, stored and its DNA extracted for genotyping. The student will be an active participant in the statistical analysis.

Mentor Supervision and Interaction:

I will personally discuss and train the student on the specifics of the project. Background reading material will be supplied to the student to better place the project in the large context of the lab's research program. I will meet with the student on a weekly basis, and more frequently if necessary, to get updates and to troubleshoot any potential difficulties. The ultimate goal will be to eventually produce a peer-reviewed publication in which the student would be an author. Lastly, the student will give a presentation to the entire research group on the results of her/his summer work during one of the first weekly lab meetings of the Fall semester.