COMPUTATIONAL BIOLOGY WEBINAR @ IMSc

DISPERSAL EVOLUTION:
THE DROSOPHILA STORY

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Given global climate change and large-scale degradation of ecosystems due to human activities, the continued survival of many species might depend on their ability to evolve to become better dispersers. Therefore, investigating the effects of dispersal evolution on natural populations is of considerable interest to ecologists and conservation biologists. Although dispersal is a complex multi-stage process, studies on dispersal evolution often investigate isolated components of dispersal like propensity (i.e. fraction of dispersers in the population) or ability (i.e. distance covered during dispersal). Thus, there is little understanding of how these components and their related costs interact during dispersal evolution and ultimately affect the dispersal kernel. To investigate these issues we subjected four replicate populations of *Drosophila melanogaster* to directional selection for increased dispersal, and compared them with matched controls. We found that the dispersal propensity and ability of the selected populations had increased simultaneously. Moreover, the selected populations had a greater frequency of long-distance dispersers (LDDs) and their dispersal kernels had evolved significantly greater standard deviation and reduced values of skew and kurtosis. In terms of life history, the dispersal selected populations had similar values of body size, fecundity and longevity as the controls. However, in terms of behavior, the selected populations evolved significantly greater locomotor activity, exploratory tendency, and aggression. These observations led to predictions about putative mechanisms that were confirmed through untargeted metabolomic fingerprinting using NMR spectroscopy. The selected flies had evolved greater amounts of glucose, AMP and NAD, suggesting elevated cellular respiration. At the same time, levels of neuropeptides related to aggression and exploration had increased.

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