Title:	Evolution of dispersal syndrome and its corresponding metabolomic changes
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Abstract:	Dispersal is one of the strategies for organisms to deal with climate change and habitat degradation. Therefore, investigating the effects of dispersal evolution on natural populations is of considerable interest to ecologists and conservation biologists. Although it is known that dispersal itself can evolve due to selection, the behavioral, life-history and metabolic consequences of dispersal evolution are not well understood. Here, we explore these issues by subjecting four outbred laboratory populations of Drosophila melanogaster to selection for increased dispersal. The dispersal-selected populations had similar values of body size, fecundity, and longevity as the nonselected lines (controls), but evolved significantly greater locomotor activity, exploratory tendency, and aggression. Untargeted metabolomic fingerprinting through NMR spectroscopy suggested that the selected flies evolved elevated cellular respiration characterized by greater amounts of glucose, AMP, and NAD. Concurrent evolution of higher level of Octopamine and other neurotransmitters indicate a possible mechanism for the behavioral changes in the selected lines. We discuss the generalizability of our findings in the context of observations from natural populations. To the best of our knowledge, this is the first report of the evolution of metabolome due to selection for dispersal and its connection to dispersal syndrome evolution.
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