Positive diversifying selection is a pervasive adaptive force throughout the Drosophila radiation - DTU Orbit (30/08/2017)

Positive diversifying selection is a pervasive adaptive force throughout the Drosophila radiation

The growing genomic information on non-model organisms eases exploring the evolutionary history of biodiversity. This is particularly true for Drosophila flies, in which the number of sequenced species doubled recently. Because of its outstanding diversity of species, Drosophila has become one of the most important systems to study adaptive radiation. In this study, we performed a genome-wide analysis of positive diversifying selection on more than 2000 single-copy orthologous groups in 25 species using a recent method of increased accuracy for detecting positive diversifying selection. Adopting this novel approach enabled us to find a consistent selection signal throughout the genus Drosophila, and a total of 1342 single-copy orthologous groups were identified with a putative signal of positive diversifying selection, corresponding to 1.9% of all loci. Specifically, in lineages leading to D. grimshawi, a strong putative signal of positive diversifying selection was found related to cell, morphological, neuronal, and sensorial development and function. A recurrent signal of positive diversifying selection was found on genes related to aging and lifespan, suggesting that selection had shaped lifespan diversity in Drosophila, including extreme longevity. Our study, one of the largest and most comprehensive ones on genome-wide positive diversifying selection to date, shows that positive diversifying selection has promoted species-specific differentiation among evolutionary lineages throughout the Drosophila radiation. Acting on the same biological processes via different routes, positive diversifying selection has promoted diversity of functions and adaptive divergence.

General information
State: Accepted/In press
Organisations: Center for Biological Sequence Analysis, Department of Bio and Health Informatics, Immunoinformatics and Machine Learning, University of Innsbruck
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Number of pages: 53
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Molecular Phylogenetics and Evolution
ISSN (Print): 1055-7903
Ratings:
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 2.194 SNIP 2.12 CiteScore 4.34
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.267 SNIP 1.759 CiteScore 3.85
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.331 SNIP 1.929 CiteScore 3.99
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.96 SNIP 1.858 CiteScore 4.05
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.161 SNIP 2.071 CiteScore 4.04
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.006 SNIP 1.758 CiteScore 3.62
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.982 SNIP 1.926
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.276 SNIP 1.942
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.102 SNIP 2.092
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.129 SNIP 2.018