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Genome evolution in wild house mice

The frequency of positive selection events in natural populations is one of the most important, yet least known variables in evolutionary biology. By definition, it can only be determined in natural populations. The key to get a reliable measure of positive selection lies in the choice of populations, for which historical information needs to be available. We have used a comparison of two populations of the house mouse (*Mus musculus domesticus*) which have split upon arrival in Central Europe about 3,000 years ago and for which subsequent major bottlenecks can be excluded. 915 microsatellite loci were assessed for signatures of selective sweeps and candidate regions were further characterized. We find at least one positive selection event occurred per 30-45 generations in each lineage and these selective sweeps were exclusively driven by low selection coefficients. Thus, positive selection events seem to be common in natural populations and generally induced by weak beneficial mutations.

Selection may work on the basis of gene expression, which is believed to play a major role in the evolutionary divergence of organisms. Changes in expression can be driven by various mechanisms, some of which act extremely fast, potentially leading to different phenotypes within a short time frame. We investigated differences in expression between the two Western European house mouse populations. Affymetrix gene chips enabled us to quantify genome wide expression patterns in different organs. For all tested organs, we observed that evolutionary changes in expression tend to occur in a tissue specific manner, independent of the expression specificity of the respective genes. We found a number of significantly differentially expressed genes, some of which appear to be associated with a selective sweep.

CV

Since January 2007

Independent Group Leader, Section of Evolutionary Genetics, Max-Planck-Institute for Evolutionary Biology, Plön, Germany

July 2006 - Dec 2006
2006

Postdoc, University of Zuerich, Switzerland
PhD in Genetics, Institute for Genetics, University of Cologne, Germany

2002

Diploma degree in Biology (M.Sc. equivalent),
University of Bonn, Germany