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Populations genetics of the X-chromosome and the autosomes in *Drosophila melanogaster*: Comparing patterns of SNP diversity and gene expression variation

Comparing levels of DNA polymorphism between the X-chromosome and the autosomes in *Drosophila melanogaster* leads to surprising observations. Under the standard neutral model the ratio of X-linked to autosomal diversity should be approximately 0.75. Yet, we find that in ancestral African populations this ratio is significantly higher, while in derived non-African populations it is significantly lower. Multiple hypotheses have been proposed to explain this pattern, including demographic history, unequal sex-ratios, levels of recombination and natural selection. We made use of large scale genome scan data to model demographic history and unequal sex ratios in two *Drosophila melanogaster* populations. While polymorphism patterns in African flies are well explained by our model, non-African flies show unusually low levels of nucleotide polymorphism on the X-chromosome. This suggests the additional action of natural selection in this population. Polymorphism on the gene expression level also shows interesting features. Overall levels of expression diversity are similar between populations, despite the African population having a significantly larger effective population size. This independence of population size can be explained by stabilizing selection governing levels of gene expression. However, expression diversity is consistently lower for X-chromosomes than for autosomes in both ancestral and derived populations. This pattern seems to arise due to the paucity of highly variable male-specific genes on the X-chromosome.

Short CV

Since 2008: *Wissenschaftlicher Assistent* (assistant professor) at the University of Munich
2007: PhD in biology, University of Munich
2004: Marie Curie Fellow at the University of Barcelona
2003: Diploma in biology, University of Munich