Abstract:
Abstract: We have developed a model for evolution from standing genetic variation using the nematode C. elegans, whereby the mating system is changed from a wild-type condition of partial selfing to complete outcrossing. By genotyping SNP-markers along 1/3 of the genome, we study how diverse forms of natural selection occur during 100 generations of adaptation to a novel laboratory environment. We find that populations with low outcrossing rates maintain higher heterozygosity and lower linkage disequilibrium than expected with genetic drift dynamics only. These patterns are not explained by purifying selection either. Modeling balancing selection on heterozygote advantage accounts for the observed SNP trajectories and further confirms that higher outcrossing rates, by increasing effective recombination, lead to more opportunity for balancing selection at multiple loci. At least during initial adaptation, increased recombination rates also results in increased disruption of gene complexes present in wild isolates. Overall, outcrossing versus selfing, or more generally sexual reproduction over asexuality, facilitates adaptation.