

Short INDELs and SNPs as markers of evolutionary processes in hybrid zones

Samuel Perini¹, Kerstin Johannesson², Roger Butlin³, and Anja Westram⁴

¹University of Gothenburg

²Department of Marine Sciences - Tjärnö, University of Gothenburg, 45296 Strömstad, Sweden

³Sheffield University

⁴IST Austria

February 25, 2022

Abstract

Polymorphic short insertions and deletions (INDELs [?] 50 bp) are abundant, although less common than single nucleotide polymorphisms (SNPs). Evidence from model organisms shows INDELs to be more strongly influenced by purifying selection than SNPs. Partly for this reason, INDELs are rarely used as markers for demographic processes or to detect balancing or divergent selection. Here, we compared INDELs and SNPs in the intertidal snail *Littorina saxatilis*, focusing on hybrid zones between ecotypes. Using capture sequencing data, we computed INDEL and SNP site frequency spectra (SFS) to compare the impact of purifying, positive and balancing selection on these variant types. Because signatures of selection may be confounded by GC-biased gene conversion and polarization errors, we also examined their influence. We assessed the impact of divergent selection by analysing allele frequency clines across habitat boundaries. We show evidence that short INDELs are affected more by purifying selection and less by positive selection than SNPs, but part of the observed SFS difference can be attributed to GC-biased gene conversion and polarization errors. We did not find a difference in the impact of balancing or divergent selection between short INDELs and SNPs. Short INDELs and SNPs were similarly distributed across the genome and so are likely to respond to indirect selection in the same way. A few regions likely affected by divergent selection were revealed by INDELs and not by SNPs. Short INDELs can be useful genetic markers helping to identify genomic regions under selective constraints or important for adaptation and population divergence.

Hosted file

Lsax_CZs_indels_ms.docx available at <https://authorea.com/users/462376/articles/557823-short-indels-and-snps-as-markers-of-evolutionary-processes-in-hybrid-zones>