

Seminario Aleatorio

Sesión 368

Haldane's formula in Cannings models with moderate selection

Cornelia Pokalyuk

<https://www.math.uni-frankfurt.de/~pokalyuk/>

Abstract

A rule of thumb known as Haldane's formula states that the probability of fixation for a single beneficial individual with small selective advantage $s > 0$ and offspring variance v in a large population of N individuals is approximately equal to $2s/v$. In my presentation I will report on a proof of this asymptotics in the regime of moderate selection, i.e. $s_N \sim N^{-b}$ and $b \in (0,1)$, for a class of Cannings models which allow for a paintbox construction. A forwards as well as a backwards point of view of the paintbox construction turns out to be suitable for the analysis. Via the backwards view we arrive at a time-discrete analogue of the ancestral selection process which is in sampling duality to the wildtype frequency process. In the regime of moderately weak selection (i.e. $1/2 < b < 1$) and under conditions on the paintbox which ensure convergence of the neutral genealogy to Kingman's coalescent, this sampling duality leads to a proof of Haldane's formula (EJP 26(4), 2021). In the case of moderately strong selection ($0 < b < 1/2$) we make use of the forward construction and approximate the frequency process by Galton-Watson processes (arxiv:2008.02225).

The results are joint work with Florin Boenkost, Adrian Gonzalez Casanova and Anton Wakolbinger.

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<https://itam.zoom.us/j/91995584209?pwd=cDJYMGhJYVY1TjQ1WiszeDhET1N3QT09>

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