

The Seedbank model

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Population genetics is the study of the distribution and variations of genotype frequencies within a population. Evolutionary forces, such as selection, mutation and random genetic drift, shape the genetic profile of a population. In this lecture we will provide an introduction to the stochastic models that play a central role in this field of studies. We will introduce the Wright-Fisher model, the Wright-Fisher diffusion, the Kingman coalescent, the Lambda coalescent, etc.

Later, we will focus in the effect of latency in population genetics. This is, how does the genetic profile of a population evolve, when this population reproduce using seeds or when it consist of individuals capable of becoming dormant (for example bacteria producing cysts). We will discuss the KKL model and the seedbank model.

1) Population genetics

- 1.1) The Wright-Fisher model
- 1.2) The Kingman coalescent and its universality class
- 1.3) The Lambda coalescent
- 1.4) Mutation and inference

2) The KKL model

- 2.1) Weak seedbank effect
- 2.2) Strong seed bank effect

3) The seedbank model

- 3.1) The seedbank diffusion
- 3.2) The seedbank coalescent
- 3.3) Probability of fixation
- 3.4) Time to the most recent common ancestor
- 3.5) Genetic variability

A) Mathematical tools

- A.1) Convergence of stochastic process
- A.2) The infinitesimal generator
- A.3) Duality