

Assignment 3: Genetic Drift

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1 Introduction

Genetic drift is a mechanism of evolution that influences allele frequencies in populations. It occurs due to random sampling of alleles during the formation of gametes, leading to changes in allele frequencies in the subsequent generation. Here we explore the effects of genetic drift on allele frequencies using a simulation of random mating in a population. We observe that fixation and loss of alleles occurs quickly even in the absence of selection.

2 Results

In a random mating simulation (Figure reffig:drift with no selection, five samples, five loci where, and the number of offspring was center on two with a standard deviation of one, two alleles were lost, and three reached fixation.

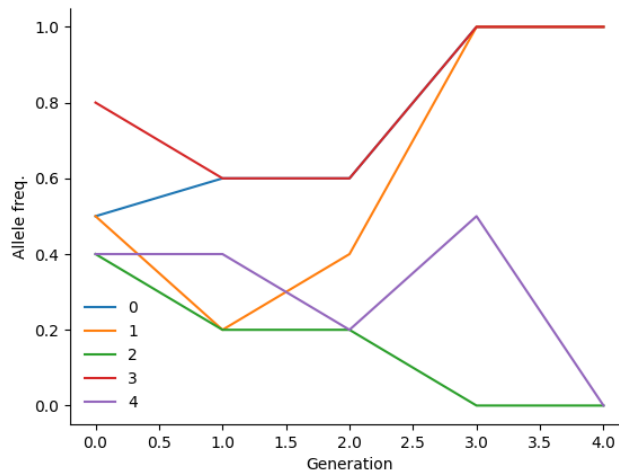


Figure 1: The allele frequency of each generation of A random mating simulation with five samples, five loci, mean number of offspring of two, and standard deviation of one.

3 Methods

Samples were represented by lists of alleles, where each was either a one or zero, corresponding to the sample having or not having that allele. At each generation, samples were randomly paired and the number of their offspring was randomly selected from a normal distribution centered on mean number of offspring with is specified by the user. For each offspring, alleles were determined by randomly selecting a parental value. Once all offspring alleles were set, the parents were removed from the simulation. At each round, the allele frequency of each allele was determined by inspecting all of the offspring.

Figure 1 visualizes the allele frequency at each generation for one simulation with five samples, ten loci, mean number of offspring of two, and standard deviation of one

To run the software, first clone the repository, then run the allele frequency simulation as follows:

```
$ clone https://github.com/ryanlayerlab/drift.git
$ cd drift/src
$ python af.py \
  --num_samples 10 \
  --num_sites 5 \
  --mean_offspring 2 \
  --stdev_offspring 1 \
  --out_file af.png
```