TOPIC 10.3: GENE POOLS

Gene Pools

Evolution is the change in the *allele frequency* within a *gene pool* over several successive generations

A **gene pool** is the sum total of all the genes (and the alleles) that are present within an interbreeding population

The **allele frequency** refers to the relative proportion of a particular allele within a population

Allele Frequencies

Genetic drift changes the composition of a gene pool due to random / chance events within the population

- There is higher drift in smaller populations *(faster change)*
- There is lower drift in larger populations *(greater stability)*

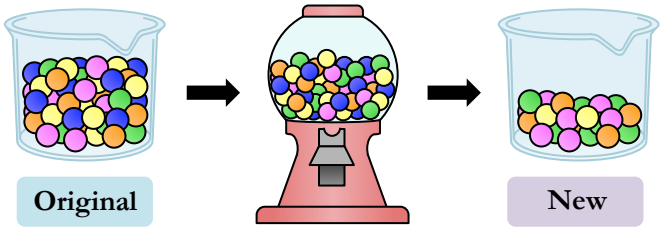
Natural selection changes the composition of a gene pool due to environmental selection pressures

- Selection may be stabilising, directional or disruptive

Genetic Drift

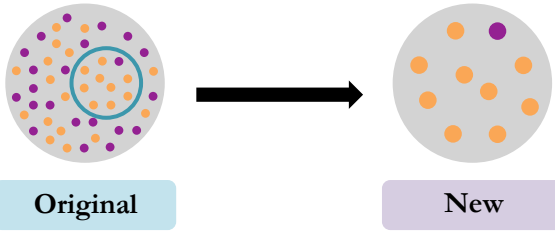
Population Bottlenecks

- Population bottlenecks occur when an event reduces the population size by an order of magnitude
- Surviving population has less genetic variability (⬆ drift)



Founder Effect

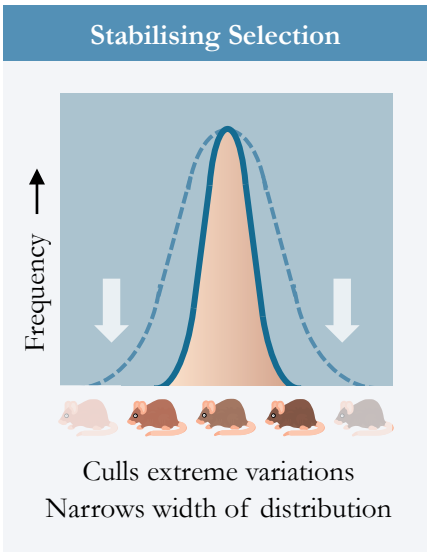
- The founder effect describes the establishment of a new population by a fraction of a larger existing population
- The new population has less genetic variability (⬆ drift)



Types of Selection

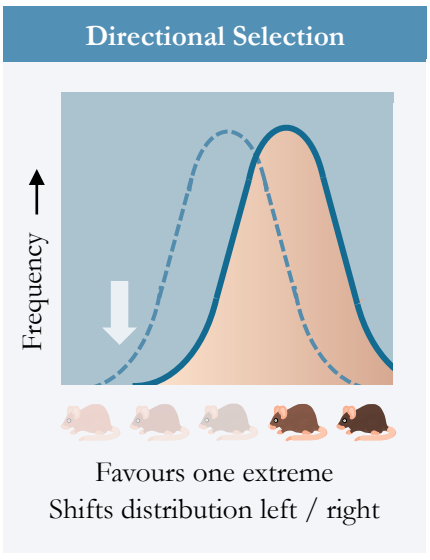
Stabilising Selection

- When an intermediate phenotype is favored at the expense of extremes
- Operates when conditions are stable
- **Example:** Human birth weights
  - ⇨ Too large = birth complications
  - ⇨ Too small = high infant mortality



Directional Selection

- When one phenotypic extreme is selected at the cost of the other
- Operates when conditions change
- **Example:** Antibiotic resistance
  - ⇨ Antibiotic = ⬆ resistance
  - ⇨ No antibiotic = ⬆ susceptibility



Disruptive Selection

- When both extremes are favored at the expense of the intermediate
- Operates when conditions fluctuate
- **Example:** Moth pigmentation
  - ⇨ Pigmentation = camouflage
  - ⇨ Benefit depends of conditions