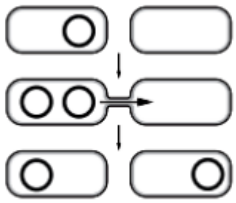
4. Types of Gene transfer

Types of Gene Transfer

Horizontal gene transfer

Genes are transferred in **same** generation



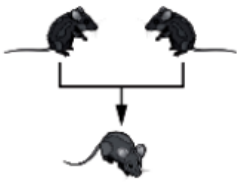
Vertical gene transfer

Genes are transferred from **parent** to **offspring**

Sexual reproduction

Fertilisation of gametes by 2 parents

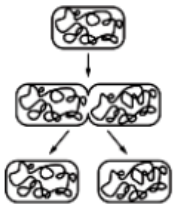
Variation



Asexual reproduction

Mitosis producing a clone.

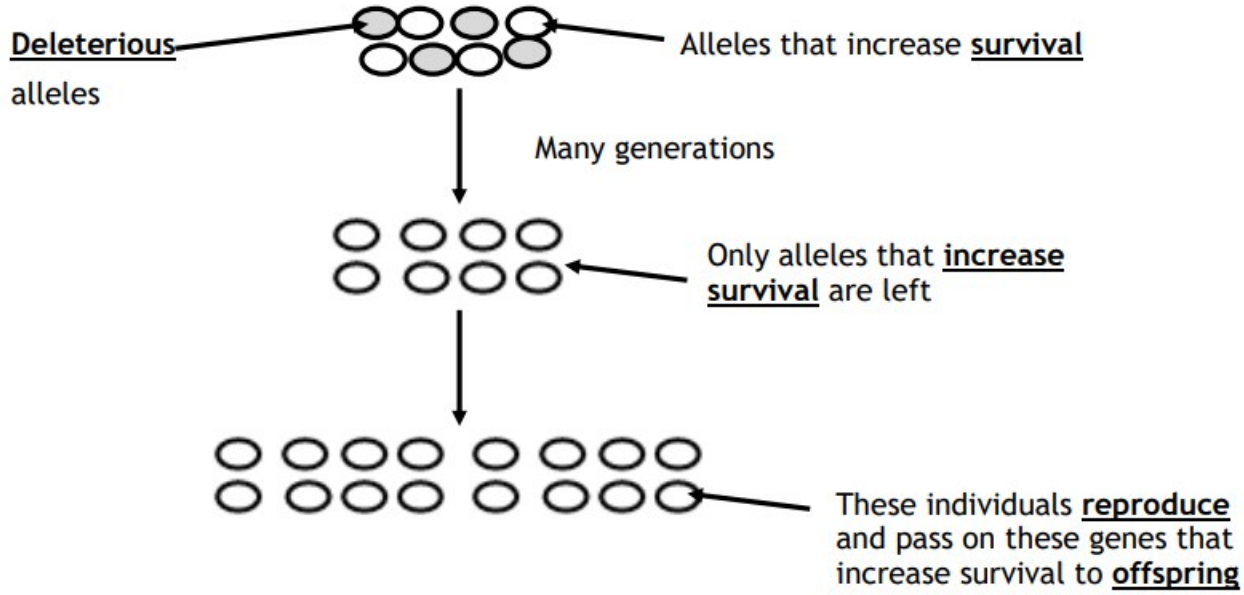
No variation



4. Evolution

Evolution

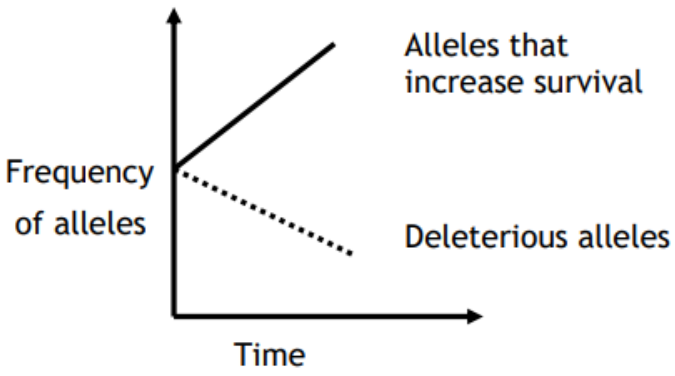
Changes in organisms over **generations** as a result of genomic variations.



Natural selection

1. **Non random** increase in frequency of alleles that promote **survival.**
2. **Non random** decrease in frequency of **deleterious** alleles.
3. Only successful individuals left to **reproduce** and pass on successful survival alleles to **offspring.**

Evolution (natural selection) graph

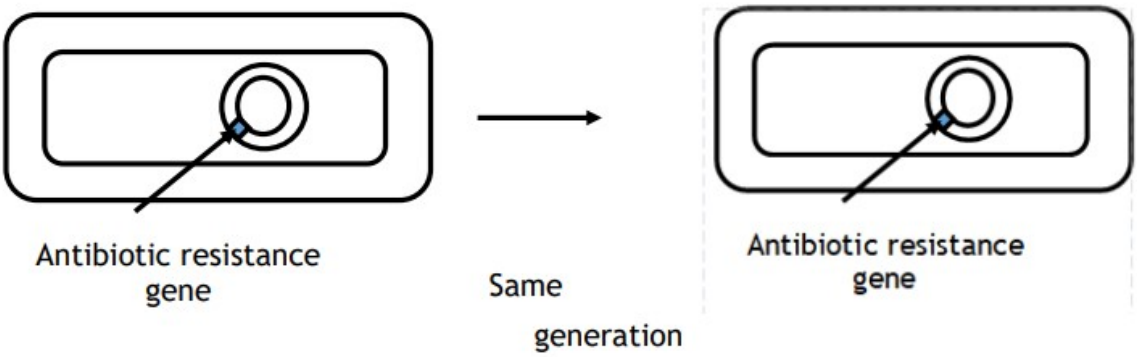


4. Speed of Evolution

1. Prokaryotic Evolution

Natural selection **more rapid** in prokaryotes due to **horizontal gene transfer**.

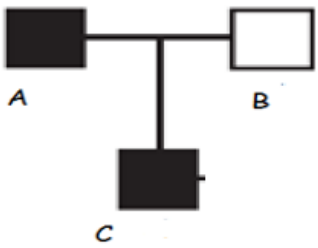
E.g. **antibiotic resistance** in bacteria



2. Eukaryotic Evolution

Natural selection **slower** in eukaryotes as they can only undertake **vertical gene transfer**.

E.g. myxoma virus in rabbits



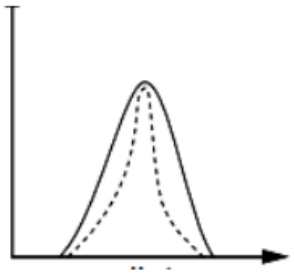
Next generation
(parent to offspring)

Types of Selection

Three types of **selection pressure** can occur during **natural selection** resulting in changes in **phenotype frequency**.

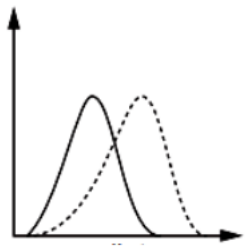
1. Stabilising Selection

   An **average phenotype** is selected for and extremes of the phenotype range are selected against.



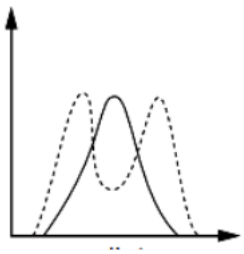
2. Directional Selection

   One extreme of the **phenotype** range is selected for.



3. Disruptive Selection

   Two or more phenotypes are selected for.



4. Speciation

Species

A group of organisms that are capable of **interbreeding** and producing **fertile** offspring &

do not normally breed with other groups.

Speciation

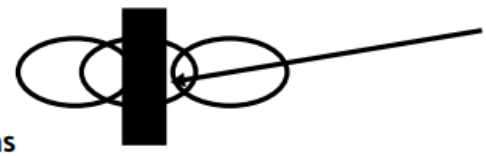
Generation of a **new** biological species by evolution.

Type of Speciation	Type of Isolation Barrier
Allopatric (different place)	Geographical (river/mountain)
Sympatric (same place)	Ecological (light intensity, pH, temperature) Behavioural (nocturnal/dirurnal, feeding patterns)

Stages of Speciation (I'M a New Species)

1. **Isolation**

   Prevents **gene flow/interbreeding** between two sub-populations.



Isolating barrier

- Geographical
- Ecological
- Behavioural

2. **Mutations**

   Different mutations occur either side of isolating mechanisms

   Some mutations are **advantageous** conferring a selective advantage for **survival.**

3. **Natural selection**

   Non random increase in alleles that promote **survival.**

   These individuals **reproduce** and pass on successful genes to **offspring**

   Non random decrease in **deleterious** alleles.

4. Evidence of New Species

   The two species cannot **interbreed** to produce **fertile** offspring.