

Evolution and Population Size

- Consequences of breaking assumption
- Bottlenecks
- Founder Effects
- Genetic Drift

Mimulus flower color example



Monkey Flowers of the Desert Southwest.

If genotype AA or Aa (homozygous dominant or heterozygous) flowers are pink-red.

If genotype is aa (homozygous recessive) flowers are yellow-white.

Mimulus flower color example

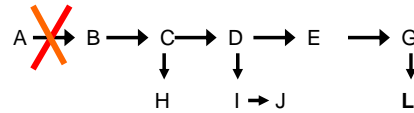
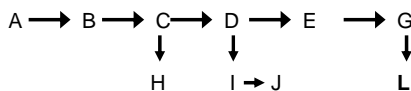
Why are the flowers red?

Ultimate Causes

Proximate Causes

Six different anthocyanin pigments. (purple)
One carotene pigment (yellow)

Many different genes are involved in controlling the synthesis of the anthocyanin pigments. In a multi-step process.



If a single enzyme is not present and early step in the synthetic pathway will not happen.

Genes are strands of DNA located at fixed locations on chromosomes.

Each strand of DNA consists of varying sequences of Base Pairs (A,T,C,G).

Every three base pairs (a codon) codes for a single amino acid.

A string of amino acids is a protein.

A single gene codes for a protein (an enzyme).

- If a mutation causes the sequences of base pairs to change a different amino acids to be coded for and a different protein to be produced.
- The “different” protein may not function as an enzyme as well.
- In this case a single mutation can prevent any anthocyanin from being produced.
- An individual homozygous recessive for this gene will not produce purple flowers.

Mimulus flower color example

Pollen contains the male gametes of flowers

Pollinators transfer the pollen (and gametes) to the stigma of another flower.

The pollen grows into the stigma and allows the male and female gametes to fuse.

A seed develops in the ovary of the flower

Mimulus flower color example

Red *Mimulus* flowers are visited by Hummingbirds.

Yellow *Mimulus* Flower are visted by bumblebees.

Each color flower thus tends to mate more frequently with its own type.

Selection

- Natural
- Artificial
- Sexual.

Sexual Selection

- Peacocks
- Mallards
- Baboons