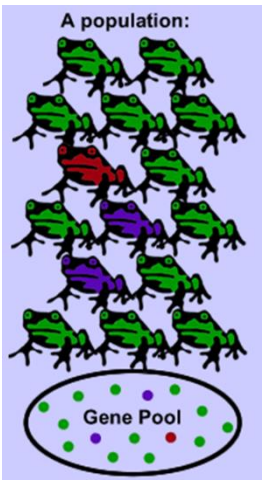
Name Hemingway

Selection

Genes and Variation



- Although variation in heritable traits was central to_____ theory, he did not know how heredity worked!
- During the 1930's biologists connected Gregor Mendel's (Punnet Squares) and Darwin's work
- Genes produce the heritable variation on which natural selection can operate
- Many genes have at least _____ of alleles

Sources of Variation

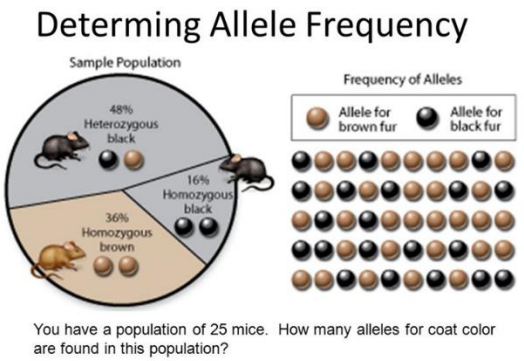
- Recombination of Chromosomes _____ _____
- Mutation
  - any _____ in a sequence of DNA
  - Mistakes in _____, _____ or_____

Sexual Reproduction

- _____ produces gametes with new combinations of genetic info
- You do not look exactly like your mother or father
- Genetic variation is_____ controlled or directed to any goal, it is _____
- Traits can be influenced by the _____
- "Nature vs Nurture" debate

Genetic Variation

- Studied in_____
- Population
  - Collection of individuals of the _____ in a given area whose members can _____with each other
    - Ex: Amount of coyotes in Burnaby



What makes something a species?

- A group of similar looking organisms that _____ with one another to produce _____ offspring in the natural environment
- They share a common _____
- Are donkeys and horses the same species?

Gene pool

- Since members of a population interbreed they share a common group of _____
- Gene Pool
  - The collection of _____ that are present in a population

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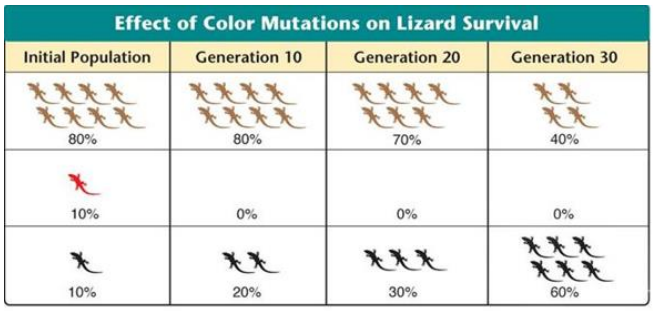
- _____
    - The relative frequency of an allele is the number of times that the allele occurs in a gene pool, compared with the number of times other alleles for the same gene occur
    - Has nothing to do with whether the allele is _____ or _____



Evolutionary Change

- Any change in the _____ of alleles in a population
- If the relative frequency of the B allele in the mouse population changed over time then the population is _____

Natural Selection

- Never acts directly on _____
- It is an _____, not a single gene, that survives/reproduces or dies without reproducing
- Evolution is any change over time in the _____ of alleles in a population
- Therefore it is _____ not individual organisms that can evolve over time

Phenotypic Variation

- Height
    - You can see a range of heights
    - Some people are taller, shorter etc.
    - _____: Caused by a combination of genes and environment (ex: nutrition and exercise)
    - If everyone had the same _____situation, variation would be due to genetic differences

Selection on single gene traits

- Can lead to changes in the _____ frequencies
- If a colour change has no effect on fitness , the allele that produces it _____ be under pressure from natural selection

Selection on multi gene traits (Polygenic)

- Effects of Natural Selection are more complex
- Multiple alleles (from multiple genes) provides a range of _____
- Natural Selection affects the _____ of phenotypes in three ways
    - Directional Selection
    - Stabilizing Selection
    - Disruptive Selection

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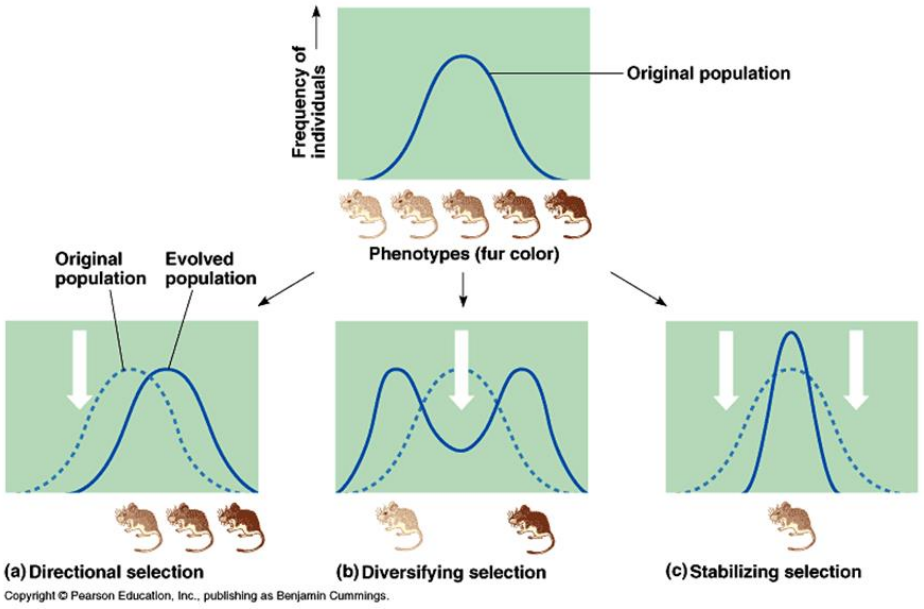

Original Population

- Normal population distribution based on _____ and has few individuals at the extremes with many average individuals

Directional Selection

- Individuals at _____ have a higher fitness than individuals in the middle or other side
- The range of phenotypes _____ as some individuals fail to survive and reproduce and others succeed.
- Can occur due environmental constraints
    - _____

Stabilizing Selection

- Occurs when individuals near the center of the curve have _____ than the individuals at either end
- _____ overall graph
- Selection acts upon the _____
- _____ the population

Disruptive Selection

- When individuals at the upper and lower ends of the curve have _____
- Selection acts against the _____
- If it acts long enough it can cause the curve to split in _____
    - I.e. creating two distinct _____
        - _____ can occur
            - New species arise from old ones

Sexual Selection

- Some mates are more _____ than others
    - More alluring song
    - Nicer feathers
    - Good dancer
- Disturbs _____ breeding
- Results in _____Selection
- May result in _____characteristics

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Peppered Moths: Natural Selection in Action!

- During the day moths stay on the bark of oak tress
- Earth _____century bark was light brown speckled with green
- Most of the moths were light brown
- There were a few dark coloured moths but the light brown moths were most common

Industrial Revolution

- Pollution from burning coal stained England's tree trunks _____
- Biologists started to notice dark coloured moths were more _____
- Predators were birds
    - What was happening?

Predation

- Harder for birds to spot the dark coloured moths on the newly coal covered tree trunks
- _____ works to the advantage of the moth

The Moth Population Was Changing

- As the tree trunks darkened, the rarer, darker moths were better able to_____
- The _____ moths had greater fitness
- During the Industrial revolution more of the darker moths survived and reproduced, passing on genes for dark colour to their _____
- The moth population_____ darker colouration