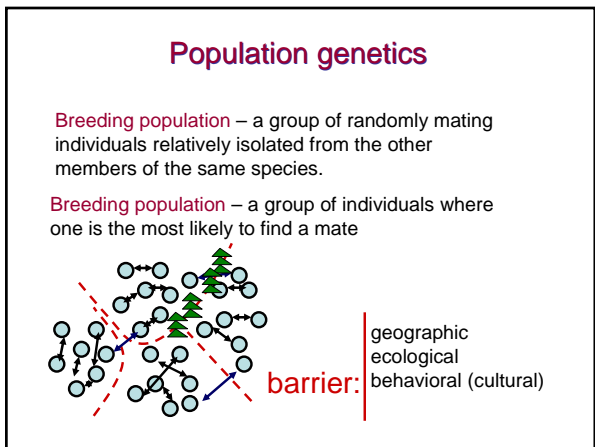
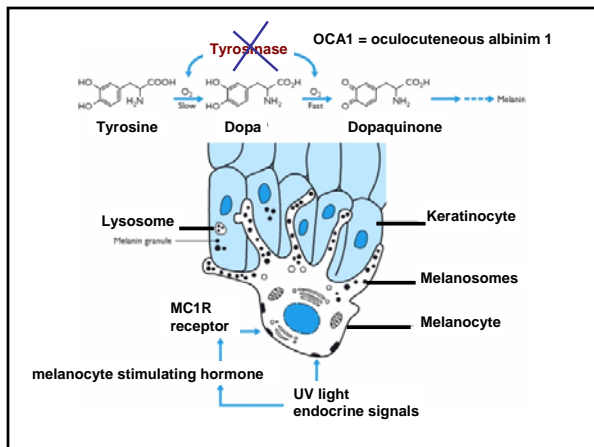
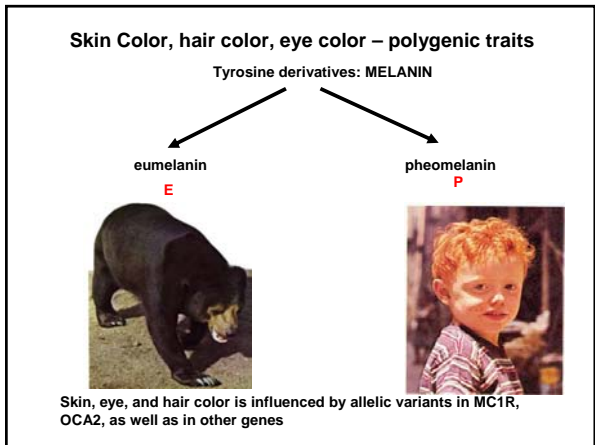
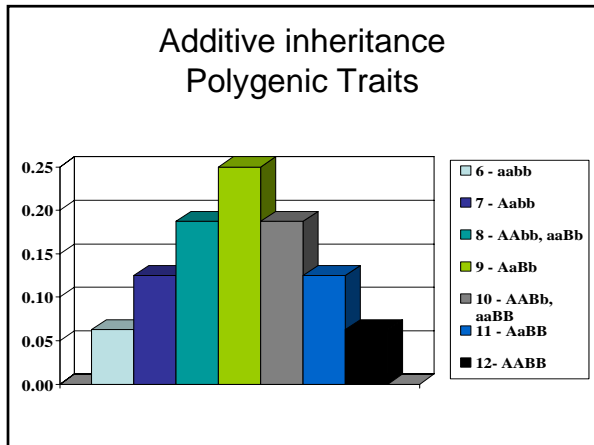
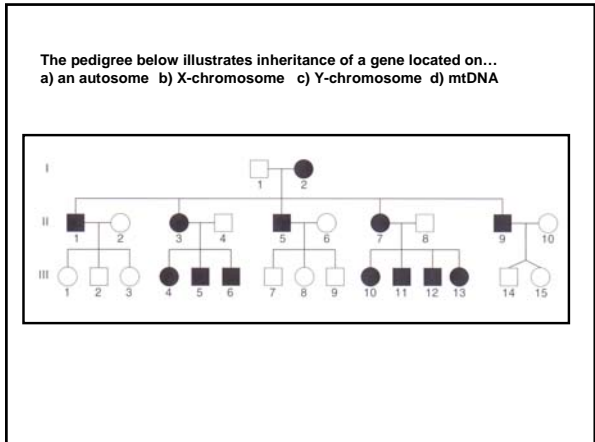
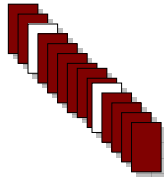


- Which sex chromosome (s) do boys get from their mothers?
 - X
 - Y
 - both X and Y
 - none
- Which sex chromosome (s) do girls get from their fathers?
 - X
 - Y
 - both X and Y
 - none
- Genes for sex influenced traits are located on...
 - X-chromosome
 - Y-chromosome
 - mtDNA
 - an autosome
- People with B blood type can donate their blood to people with
 - B blood type only
 - both B and AB
 - both B and O
 - B, O and AB
- People with AB blood type can receive blood from people with
 - AB only
 - AB and O only
 - AB, A, and B only
 - any blood type
- Pleiotropy refers to
 - several genes controlling one trait
 - one gene controlling several traits
 - two different alleles being expressed in heterozygotes



Population genetics is the study of the allele and genotype frequency distribution and change in a population

frequency - how often something occurs



I have 80 cards,
8 white,
72 red

What is the frequency of white cards?

$$\text{fr}(w) = \frac{8}{80} = 0.1$$

$$\text{fr}(R) = \frac{72}{80} = 0.9$$

$$\text{fr}(R) + \text{fr}(w) = 1 \quad \text{fr}(R) = 1 - \text{fr}(w)$$

Genotype frequencies

In a population of 75 individuals: Find genotype frequencies:

$$\#RR = 20$$



$$\text{fr}(RR) = \frac{\#RR/\text{total} = 20/75 = 0.27$$

$$\#RW = 10$$



$$\text{fr}(RW) = \frac{\#RW/\text{total} = 10/75 = 0.13$$

$$\#WW = 45$$



$$\text{fr}(WW) = \frac{\#WW/\text{total} = 45/75 = 0.6$$

$$\text{fr}(RR) + \text{fr}(RW) + \text{fr}(WW) = 1$$

Allele frequencies

In a population of 75 individuals:

Find allele frequencies:

$$\#RR = 20$$



$$\#RW = 10$$



$$\#WW = 45$$



$$\text{fr}(R) = \frac{2 \times \#RR + \#RW}{2 \times (\text{total number of people})}$$

$$= \frac{2 \times 20 + 10}{2 \times 75} = \frac{50}{150} = 0.33$$

$$\text{fr}(W) = 1 - 0.33 = 0.67$$

Finding Allele frequencies from the genotype frequencies

$$\begin{aligned} \text{fr}(A) &= \frac{2 \times \#AA + \#Aa}{2 \times N} = \\ &= \frac{\cancel{2} \#AA}{\cancel{2} N} + \frac{\#Aa}{2 N} = \text{fr}(AA) + 0.5\text{fr}(Aa) \end{aligned}$$

$$\begin{aligned} \text{fr}(a) &= \frac{2 \times \#aa + \#Aa}{2 \times N} = \\ &= \text{fr}(aa) + 0.5\text{fr}(Aa) \end{aligned}$$

True or False about a randomly mating population?

- ~~1. In a randomly mating population everyone is heterozygous~~
- ~~2. Dominant alleles are more common than recessive alleles in a randomly mating population~~
- ~~3. Frequency of heterozygotes tends to increase over time in a randomly mating population~~
- ~~4. Dominant phenotypes are more common than recessive phenotypes~~
5. Allele frequencies do not change
6. Genotype frequencies can be found from allele frequencies



Godfrey Hardy
and
Wilhelm Weinberg

