

CONCEPT: TRAITS AND VARIANCE

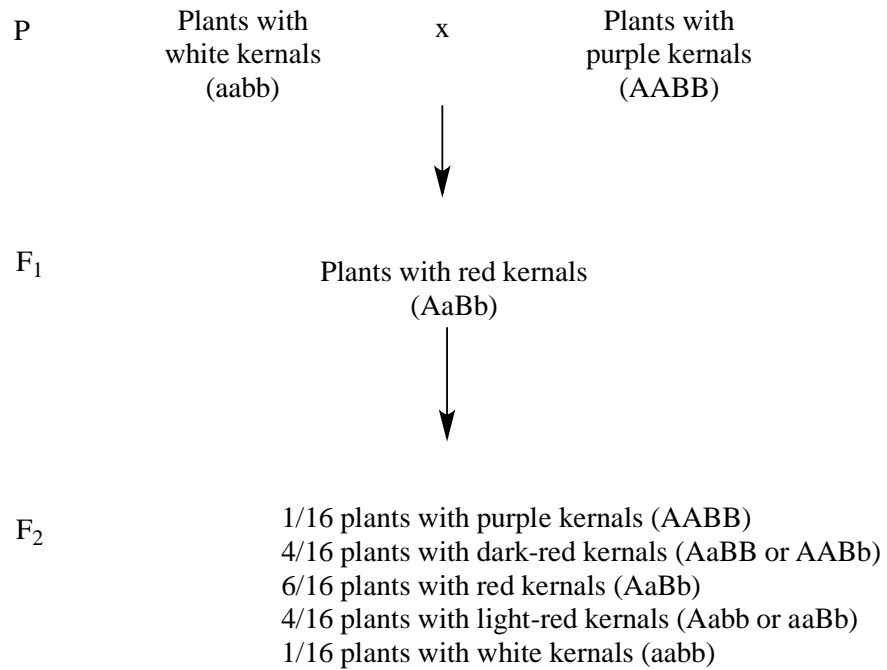
- There are many different types of inherited _____
 - **Continuous traits** can take a potentially infinite number of states within a range (Ex: height)
 - **Categorical traits** are traits that can be sorted into discrete categories (Ex: purple or white flowers)
 - **Threshold traits** are expressed when people reach a threshold of genetic and environmental factors
 - Ex: Type 2 diabetes
 - **Meristic traits (counting traits)** are traits that can be divided into a range of discrete values
 - Ex: Birds can lay 1, 2, 3, or 4 eggs, but cannot lay 2.58 eggs

EXAMPLE:

Example	Trait Type
Number of spots on a Dalmatian	
Human weight	
Foot size	
Cat Litter Sizes	

- Traits can be inherited in _____ ways
 - **Complex inheritance** is inheritance involving multiple genes and environmental factors
 - **Simple inheritance** is observed when progeny have standard Mendelian ratios (3:1, or 9:3:3:1)
- Most traits for complex organisms are controlled via polygenic inheritance (_____ inheritance)
 - Many genes are each behaving in a Mendelian fashion, and contribute to phenotype
 - Two types of alleles exist in polygenic inheritance
 - **Additive allele** is an allele that contributes and is added to the phenotype
 - **Non-additive allele** is an allele that does not contribute to the phenotype

EXAMPLE:



- There is a formula to predict how many genes _____ to a trait
 - The formula $(1/4)^n$ calculates the F₂ ratio of individuals expressing the parental phenotype (grandparents)
 - n = number of polygenes involved
 - The formula $2n+1$ calculates the number of phenotypic categories observed

PRACTICE:

1. A trait controlled through polygenic inheritance was observed in a series of experiments. A brown eyed rabbit was mated with a blue eyed rabbit. 130 F₂ offspring were produced. 2 offspring had brown eyes and 2 offspring had blue eyes. How many polygenes control eye color in rabbits?
 - a. 1
 - b. 2
 - c. 3
 - d. 4

2. If a trait is controlled by 5 polygenes, how many phenotypic categories will be observed in the F₂ generation?
 - a. 2
 - b. 5
 - c. 10
 - d. 11

3. Polygenic inheritance is what type of inheritance?
- a. Simple
 - b. Complex
 - c. Additive
 - d. Non-additive