Mendelian Genetics II – Dihybrid Crosses

Environmental Impact on Phenotype



* pH: of the soil will change the color of hydrangea flowers from blue to pink
* Temperature:

Generation “Gap”

* Parental P1 Generation = the parental generation in a breeding experiment.
* F1 generation = the first-generation offspring in a breeding experiment. (1st filial generation)
	+ From breeding individuals from the P1 generation
* F2 generation = the second-generation offspring in a breeding experiment.
(2nd filial generation)
	+ From breeding individuals from the F1 generation

Mendel’s Laws - Laws of Inheretance

* **Law of Segregation**: When gametes (sperm egg etc…) are formed each gamete will receive one allele or the other.
* **Law of independent assortment**: Two or more alleles will separate independently of each other when gametes are formed

Results of Monohybrid Crosses

* Inheritable factors or genes are responsible for all heritable characteristics
* Phenotype is based on Genotype
	+ Which of these does natural selection act on?
	+ Each trait is based on two genes, one from the mother and the other from the father
	+ True-breeding individuals are homozygous ( both alleles) are the same

Law of Dominance

* In a cross of parents that are pure for contrasting traits, only one form of the trait will appear in the next generation.
* All the offspring will be heterozygous and express only the dominant trait.
* RR x rr yields all Rr (round seeds)

Law of Segregation

* During the formation of gametes (eggs or sperm), the two alleles responsible for a trait separate from each other.
* Alleles for a trait are then "recombined" at fertilization, producing the genotype for the traits of the offspring.

**Applying the Law of Segregation**



Use the Foil Method:

First

Outside

Inside

Last

Law of Independent Assortment

* Alleles for *different* traits are distributed to sex cells (& offspring) independently of one another.
* This law can be illustrated using *dihybrid crosses*.

Dihybrid Cross

* A breeding experiment that tracks the inheritance of two traits.
* Mendel’s “Law of Independent Assortment”
* Each pair of alleles segregates independently during gamete formation
* Formula: 2n (n = # of heterozygotes)
* Question:
How many gametes will be produced for the following allele arrangements?

**Remember: 2n (n = # of heterozygotes)**

 **1. RrYy =**

 **2. AaBbCCDd =**

 **3. MmNnOoPPQQRrssTtQq =**

**Dihybrid Cross**

**Traits: Seed shape & Seed color**

**Alleles:**

 **R round
 r wrinkled
 Y yellow
 y green**

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| --- | --- |
| **Dihybrid Cross** | **Summary of Mendel’s laws** |